months old they are called "boilers", so are old hens culled from your laying flock. An old hen can make good eating.

Hens in lay if good layers, will have these characteristics: bright eyes, large red healthy-looking combs and wattles, wide apart pelvic bones (fairly loose so eggs can get out) and a white, large, moist, vent. If they have the opposite, wring their necks. They won't lay you many eggs and you should certainly not breed from them. Don't stop hens from going broody.

Eggs

Eggs are much better eaten fresh, and it is quite possible to have new-laid eggs throughout the year. If you want to store eggs, clean them first and drop them into water-glass, which you can buy from the chemist.

TURKEYS

These are very delicate birds compared to other poultry. If they associate in any way with chickens, they will get a fatal disease called blackhead unless you medicate their water or their food. If you want to keep them without medicating them, you must keep them well away from all chicken-kind, and even be careful about walking from the hen run to the turkey run without changing your boots and disinfecting yourself. It's hardly worth it. Turkeys do not seem to me to be a very suitable bird for the self-supporter, unless he wants to trade them. In this case he can rear them intensively in incubators and brooders, or buy them reared from another breeder.

GEESE

These are the most excellent birds for the self-supporter. They are hardy, tough, self-reliant grazing birds and they make good mothers. The best way to start breeding geese is to buy eggs from somebody and put them under a broody hen. A hen will sit on five or six goose eggs and bring them off, but you want to make sure that she hasn't been sitting too long when you put the goose eggs under her, for goose eggs take longer to hatch than hens' do (up to thirty days or even more). During the last week of the sitting take the eggs out from under the hen every day and wet them with lukewarm water (goose-mothers get wet but hen foster mothers don't). On the day when the eggs start to pip, wet them well. Some people remove the first goslings that hatch so that the foster mother doesn't think she's done her job, and then they replace them when the last egg has hatched. I have never bothered and have always had good results.

Feed the goslings well for the first two or three weeks on bread soaked in milk (or skimmed milk). If they are fairly safe where they are, let the hen run around with them. If you fear they will get lost, confine the hen in a broody coop. I prefer the hen to run loose. When the young birds no longer need the foster mother she will leave them and start laying again.

. But geese, although such fierce and strong birds, are vulnerable to two enemies: rats and foxes. Rats will pull goose eggs out from under a sitting hen or goose, and they will kill baby geese whenever they get a chance. So poison them, deny them cover, gas their holes: do anything to get rid of them. They are the enemy of everything wholesome on your farm.

Foxes just love geese. They will snatch a sitting goose off her eggs whenever they can. So they cannot really co-exist with the self-sufficient husbandman. Shoot them with a shotgun or a .22 at night. Use one of those powerful electric torches which illuminates the sights of the gun as well as the fox. If there are foxes in the area you must confine sitting geese in a fox-proofplace. Adult geese, running out loose, can often protect themselves from foxes, but even so you will always lose a few.

If you start reducing the goslings' food after three weeks, they will live on grass. As adults, they don't need any food except grass, but it is a good idea to chuck them some corn in January andFebruary when you want to feed thegooseupabit to get her to lay well. Three weeks before you intend to kill them (generally Christmas), you should confine them, and feed them liberally with barley meal, maize meal and milk if you have it to spare. They will fatten on this, and one of them will provide the best Christmas dinner in the world.

Geese pair for life, so I prefer to keep one goose and one gander together as a breeding pair, although many people keep a gander to two or threegeese. They lay early: inFebruary or March. If you leave them alone they will sit on a dozen or more of their own eggs and bring them off with no trouble at all, but if you are greedy you can keep stealing their eggs and putting them under broody hens. But hens aren't always broody as early in the year as that.

Killing a goose or turkey

Grab the bird by its legs with both hands. Keep the back of the bird away from you. Lower the head to the floor, and get someone else to lay a broomstick across the neck, just behind the head. Tread on both ends of the broomstick, and pull the legs upwards until you feel the neck break. If you hold the tips of the wings as well as the two legs the bird will not flap after it is dead. Then treat like a chicken.

DUCKS

To say that ducks don't need water is nonsense. Ducks do need water and cannot possibly be happy without it. It is inhumane to keep animals in conditions grossly different from the ones their species has been evolved to livein. So give them access to water, but keep your ducklings away from it>for their first week or two until they have the natural protection of oil on their feathers. "You must give them drinking water, however.

Swimming water for ducks is better if it is flowing, and renews itself. A stagnant pond is less healthy. Many eggs get laid in the water, or on the edge, and if the water is dirty the eggs, which have porous shells, can be dangerous to eat. So don't eat eggs that have been lying in filthy water, no matter how much you superficially clean them. If there is no natural water on your holding, my advice is not to keep ducks. You

can, of course, create an artificial pond, either out of concrete, puddled clay, or plastic sheeting buried in earth, but if you do, make sure the water is renewable and does not become stale and stagnant.

One drake will look after half a dozen ducks and enjoy it, but ducks make rotten mothers. If you let them bring off their own eggs you must confine them in a broody coop, or they will kill the little ducklings by dragging them all over the place. Hens are much better duck-mothers than ducks are. Duck eggs hatch in 28 days.

Baby ducks need careful feeding. From hatching to ten weeks feed them as much barley or other meal as they will eat, and add milk if you have it. Feed ducks about the same as you would hens when you are not fattening them. The duckis not a grazing bird to the extent that the goose is, but ducks will get quite a lot of food if they have access to water, or mud, or are allowed to roam around. They are partly carnivorous, and eat slugs, snails, frogs, worms and insects. Don't let breeding ducks get too fat, or they will produce infertile eggs. They like a mash in the morning of such things as boiled vegetables, flaked maize, pea or bean meal, wheat meal and a little barley meal. Give them about half a handful each for breakfast, and half a handful of grain in the evening. If you find they get fat, give them less. If you find they get thin, give them more.

There are ducks (such as the Indian Runner) with very little meat on them that lay plenty of eggs, and table ducks (such as the Aylesbury) with plenty of meat but not many eggs. Then there's the Muscovy, a heavy, far too intelligent, very hardy bird, that's good to eat but has dark flesh.

You should kill your young ducks at exactly ten weeks. They are full of bristles before and after that time. They won't put on weight afterwards anyway. At ten weeks they are easy to pluck and are at their prime. You can of course eat old ducks if you want to, but they are tougher and much fattier.

Housing for ducks can be extremely simple, but this does not mean that it should be reach-me-down. Ducks like a dry, draught-free but well-ventilated house. If it's mobile, so much the better, because otherwise the immediate surroundings get in a mess. It must also be fox and rat proof.

PIGEONS

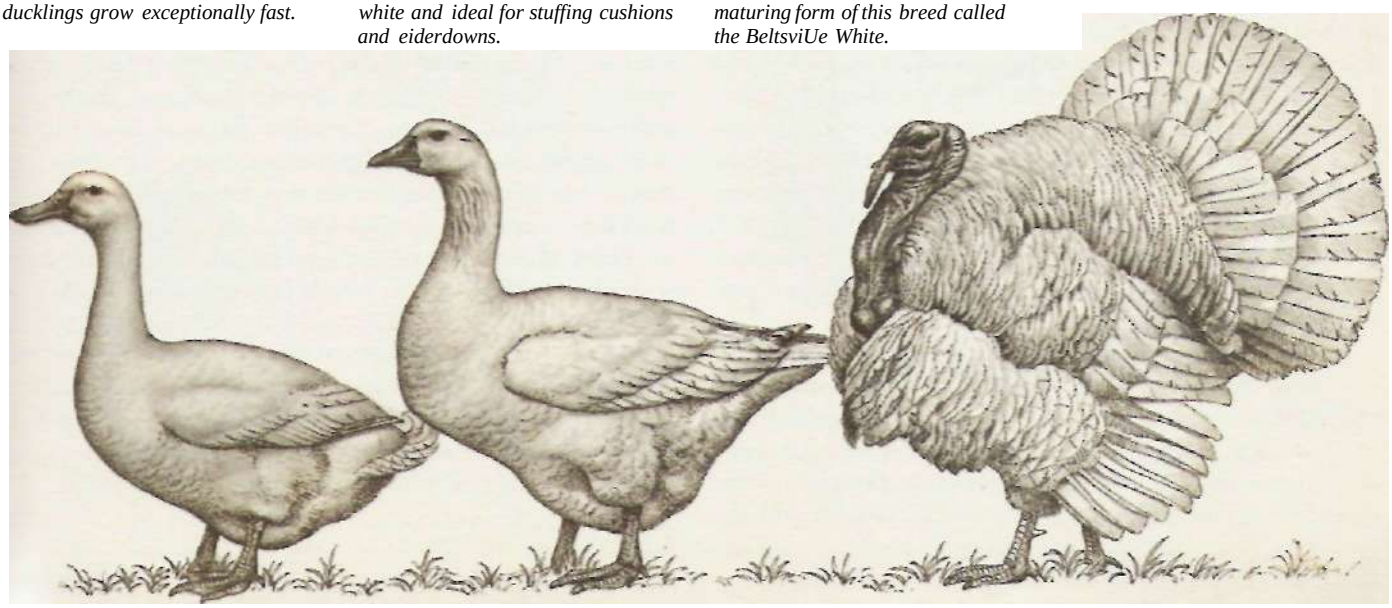
In America squabs are a great dish. They are young pigeons killed at about four and a half weeks. The parent birds are sometimes reared intensively, in a special house with a wire run or "fly" for the birds to flap about in. Kept like this the birds should be fed on grain, with some peas included as they must have some protein. A pair of pigeons might eat up to a hundredweight of grain a year and raise up to fourteen squabs a year, so if you had a dozen pairs you would be eating squabs until you were sick of them. If they are confined in this manner you must give them grit, as well as water for drinking and bathing in, and you must attend to hygiene by having some sort of litter on the floor which you can change.

Personally I would object strongly to keeping pigeons like that and would always let them fly free. Have a pigeon loft, get a few pairs of adult pigeons (already mated) from somebody else, and before letting them loose keep them for three weeks in some sort of cage in the loft, where they can see out (this is important). Then let them out, chuck them a little grain every day, and let them get on with it. Kept like this they are no work and little expense, and in fact do very little damage to crops, although you hope they eat your neighbour's and not yours. If he shoots a few, well, that won't break you. Harvest the squabs when the underside of the wing is fully feathered. Kill, pluck, draw, and truss, as if they were chickens (see p. 127).

Aylesbury* drake
The best British table breed. It is large, heavy and very hardy, and its ducklings grow exceptionally fast.

Embden gander
The Embden is a good table breed. Its feathers and down are pure white and ideal for stuffing cushions and eiderdowns.

White turkey
These can grow up to 38 lbs (17.2 kg). There is a small quick-maturing form of this breed called the BeltsviUe White.



Bees & Honey

Bees will provide you with all the sugar you need and as a self-supporter you shouldn't need much. A little sugar (or, preferably, honey) improves beer,.and sugar is necessary if you want to make "country wines" (which I shall discuss on pp. 193-194), but otherwise the part that sugarplays in the diet is wholly deleterious. It is such an accessible source of energy that we satisfy our energy requirements too easily, and are not induced to turn to coarser foods, whose valuable constituents are less concentrated and less refined. The ideal quantity of refined sugar in the diet is: nil.

Now honey will do anything that sugar can do and do it much better. Not only is it a healthier food, for beekeepers it is also free. It is sweeter than sugar, so if you use it for cooking or wine-making purposes use about two thirds as much as you would sugar. Before the sugar-cane countries were opened up to the western world honey was the only source of sugar, and for years I lived in central Africa consuming no sugar excepting that produced by bees. These bees were wild ones of course; all Africans know how to chop open a hollow tree with bees inside it and get out the honey. Many also hang hollowed-out logs in trees in the hope-generally realized - that bees will hive in them.

Beekeeping is really a way of getting something for nothing. It is a way of farming with no land, or at least with other people's land. You can keep bees in the suburbs of the city, even in the centre of the city, and they will make plenty of excellent honey

The medieval skep

The medieval method of keeping bees was in the straw skep. You plaited straw or other fibres into ropes, twisted the ropes into a spiral, lashing each turn to the next, until you formed a conical skep. You placed this in a cavity left in a wall, so as to protect it from being blown over or soaked from above by rain. In the autumn, if you wanted the honey, you either destroyed the bees you had in the skep by burning a piece of sulphur under them, or you could save the bees by turning their skep upside down and standing another empty skep on top of it. The bees in the inverted skep could crawl up into the upper skep. More sensibly, you could stand an empty skep on top of a full one, with a hole connecting them, and the bees would climb up. When they had done so you removed the old skep which was full of honey and comb. If you dug this comb out you could wring the honey out of it by putting it in some sort of strainer (muslin would do), squeezing it, and letting it drip.

If the skep-inversion method worked without killing the bees, then this would be quite a good way of keeping them. You need no equipment save some straw, a bee-veil, gloves, and a smoker. You get nothing like so much honey out of a skep as you do out of a modern hive, but then you could keep a dozen skeps with practically no expenditure, whereas a modern hive, at its most basic, is a fairly costly item. When hundreds of people kept bees in skeps, and probably every farm had half a dozen or more, there were a great many more bees about the countryside, and swarms were much more common than they are now. It was easy.to find them and not so necessary to conserve the bees that one had.

Langstroth's method

In 1851, a Philadelphian named Langstroth discovered the key secret about bees, which was what he called the "bee space." This is the exact space between two vertical planes on which bees build their honey-comb without filling the space in between, yet still remaining able to creep through. This discovery made possible an entirely different method of keeping bees, and turned beekeeping from a hunting activity into a farming one.

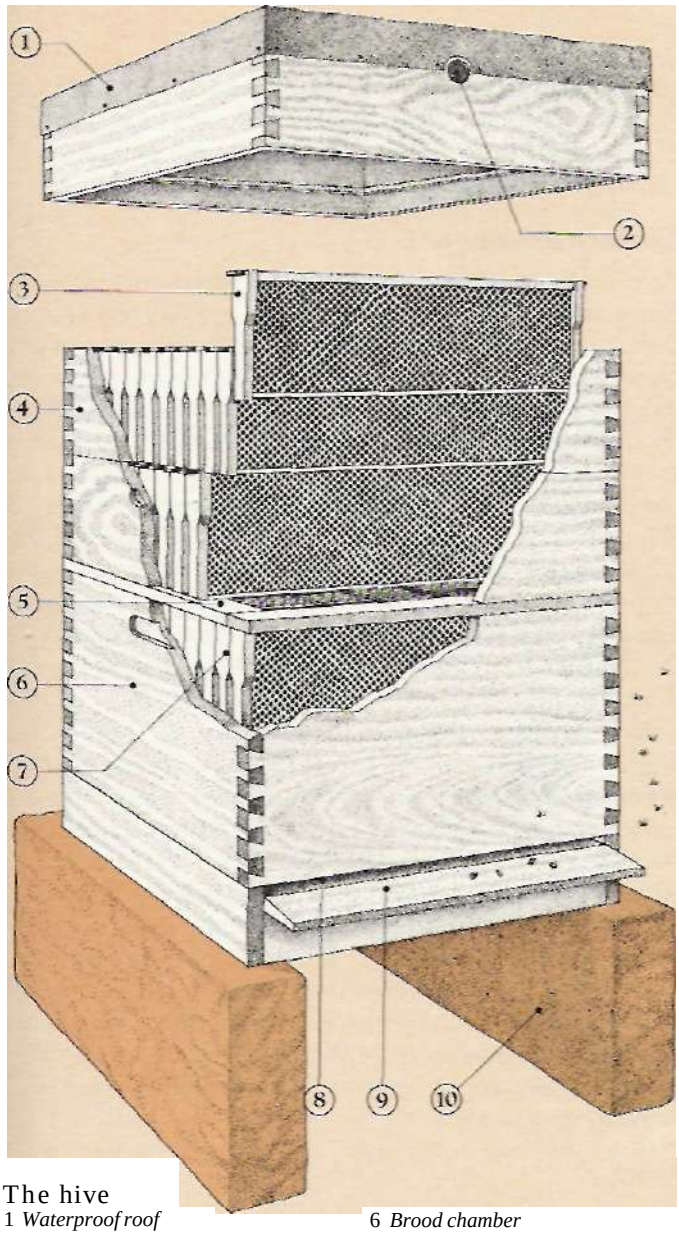
The method Langstroth developed was to hang vertical sheets of wax down at the correct space apart. The bees, instead of building their comb in a random fashion, would build it on these sheets of wax. Then, with the invention of the queen excluder, which is a metal sheet with holes just big enough for the workers but not the queen to get through, the queen was kept down below in a special chamber (the brood chamber) so that she could not lay eggs in the cells above, which as a result were full of clean honey with no grubs in them. You could then remove the frames, as the vertical sheets of wax were called, with their honey, extract the honey without killing any bees or bee larvae, afterwards replacing the emptied frames for the bees to build up and fill once more.

The modern hive

Langstroth's discovery has affected the construction of the modem hive. This has a base to raise it, and an alighting board, with a narrow slit for the bees to enter. On top of the base is the brood chamber, with its vertically slung "deep" or "brood" frames. These wooden frames have foundation inside them, like canvas inside a picture frame. The foundation is sheets of wax that have been embossed by a machine with exactly the pattern made by comb-making bees. Above the brood chamber is a super, which is shallower. The queen excluder divides the two chambers. You may have two or three supers, all complete with frames fitted with foundation, one on top of the other. On the very top is a roof. The roof has a bee-escape in it, through which bees can get out but not in. There should also be a clearer-board, which is a board with a bee-valve in it. This will let bees through one way but not the other. Then you should have a bee-veil, gloves, a smoker, and an extractor, which you may be able to borrow. The extractor is a centrifuge. You put your sections full of honey into it and spin them round at great speed, which flings the honey out of the comb on the the sides of the extractor. It then dribbles down and can be drawn off.

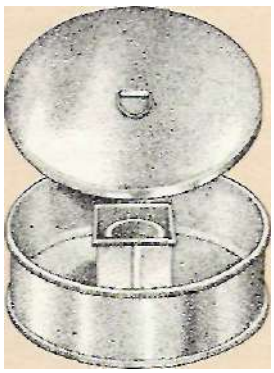
Capturing a swarm

If you are lucky enough to come across a swarm, what you will

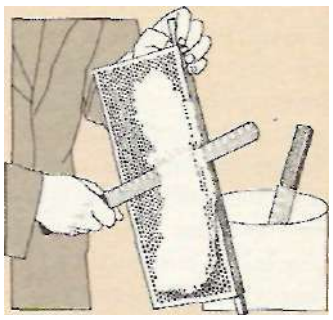


The hive
1 *Waterproof roof*
2 Ventilator *and bee-esc*
3 *Shallow honey frame*
4 *Super*
5 *Queen excluder*
6 *Brood chamber*
7 *Deep brood frame*
8 *Entrance*
9 *Alighting board*
10 Base *blocks*

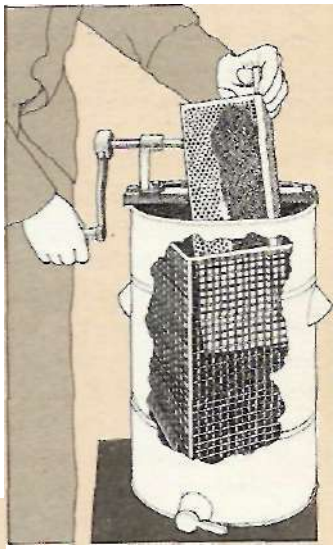
Collecting honey
Take the honey-loaded super out and bang, shake and brush the bees out of it. Or else insert a clearing board the day before under the super, or supers, from which you wish to extract honey The supers will then be free of bees when you want to take them out.



Feeding
If you take all the honey from a bee-hive in the late autumn you will have to feed the bees sugar or syrup. The feeder allows the bees to lick the syrup without getting drowned.

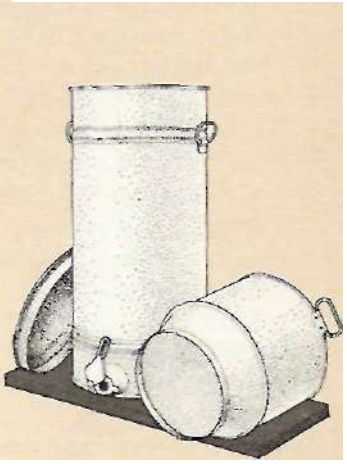


Decapping
To remove the honey cut the wax capping from the comb with a hot knife. Use two knives - heat one while you use the other.

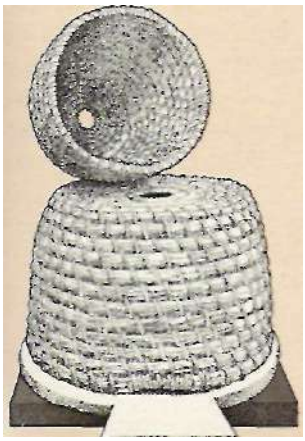


Extracting
Put the decapped frames in the extractor. Spin very fast until the honey is all out of one side, turn the frames round and spin again.

Robbing
Smoke, which is best applied with a special "smoker", quietens bees, makes them fill with honey and sting less readily. Use a screwdriver to break the top super off.



The honey tank
This is useful if you have a large number of bees. Pour the extracted honey carefully through the strainer and let it settle before drawing it off into jars or containers.



The skep
The original beehive, or skep, is made of twisted straw or rope sewn together into a conical shape with straw. If you use a skep your honey will be full of brood, or immature bees, because the queen can lay eggs in every cell. There is no queen excluder as there is in a modern hive. You can strain the brood out, but you kill a lot of bees. It is also impossible for the bee inspector *to* check a skep to see whether your bees have any diseases.

find will be a cluster of bees about the size of a football hanging on to a tree, or something similar. If it is a tree you just hold a big, empty, cardboard box under the swarm, give the branch a sharp jerk, and the swarm will fall kerplomp into the box. When this happens, turn the box upside down, put a stick under one side to keep it just off the ground, and leave them until evening. This is to let the scouts, out searching for a new home, come back to the swarm. Some ruthless people simply take the swarm away immediately. Swarming bees are unlikely to sting you, as they are loaded with honey and don't like stinging in this condition, but I'm not going to say they will never sting you.

To get a swarm into your hive, lay a white sheet in front of the hive sloping up to the entrance, and dump the swarm out on to the sheet. They should all crawl up into the hive. Make sure the queen, who is bigger and longer than the others, crawls into the hive too: without her you won't have any bees.

Bees in a colony

The fine South African scientist Marais proved conclusively that a colony of bees, for all practical purposes, is one individual. Apart from the queen, the separate bees are more like cells of an organism than like individuals. One colony mates with another and produces a swarm, the bee-equivalent of a child. The queen lays the eggs, and exerts a strong hold over the rest of the colony; kill her and if the workers can't rear another queen quickly enough from an existing grub, the colony will just die. The drones are as expendable as spermatozoa. Each one tries to mate with a young queen of another colony; whether mating is successful or not, either " way the drone is killed by the workers as he is of no further use. There are about 20,000 workers in a mature colony, and they spend their lives working: gathering nectar, building cells for storing the honey, feeding the queen, nursing the young bees, ventilating and cleaning the nest, guarding it, and generally doing everything to be done. If a worker stings you she dies. Her death is unimportant, for she is not an individual, but merely a cell. Her sacrifice means nothing.

The organism survives at the expense of the individual, so if you capture a swarm you can just leave the bees to get on with it, and they will establish themselves.

A swarm of bees in May is worth a load of hay,
A swarm of bees in June is worth a silver spoon,
A swarm of bees in July is not worth a fly.

Which means that you won't reap much honey from a swarm of bees in July, but all the same do not despise one: hive it and it will establish itself and give you honey the next year.

Buying and feeding a nucleus

If you can't find swarms you can buy nuclei of bees from other beekeepers or dealers, who are fairly common in most countries; then just follow the instructions on the box. If you do this you should feed the nucleus for a while. You can do this by giving them two parts sugar to one part water in a feeder, which you can buy and put in your hive on top of the brood chamber. In the case of a nucleus don't have a super: confine them in one brood chamber until that is full of honey and grubs before adding any supers on top.

Gathering the honey

As the frames get built up and filled with honey, and the brood chambers below with bee grubs, you may add a super, then a second super, and you may decide to take some honey. To do this take out one super, insert the clearer-board under it, and replace it. Next day go and remove the super which should be full of honey but empty of bees. Put the frames in the extractor and spin the honey out of them. You must first cut the capping off the combs with a hot knife. Each frame should be turned once to extract both sides. Then put the empty frames back in the super and return it to the bees so that they can start building on it again. Always work quietly and calmly when you work with bees. There is no substitute for joining a local beekeepers' group, or for making friends with a knowledgeable beekeeper and learning from him.

You should leave at least 35 lbs (15.8kg) of honey in the hive for the winter. I rob my bees only once: in early August. After that I leave them alone, with one empty super, and they make enough honey to last themselves the winter. My one hive gives me from 20 to 40 lbs (9.0T8.1kg). This late honey in our case is heather honey which I could not extract anyway, because it will not come out in the extractor: it has to be pressed out. People who rob all the honey from their bees have to feed them heavily all winter on syrup or candy. In fact, some commercial honey nowadays is little more than sugar turned into honey by the bees. The honey you buy from small beekeepers is generally flower honey though, and is much nicer as a result.

Wax

The cappings which you cut off the combs are beeswax, which is a very valuable substance: it makes polish, candles (the best in the world), and is good for waxing leatherwork and other purposes. Gentle heat melts the wax and it will run dow'n a slope for you to collect, minus most of its impurities, in a container. The heat can be supplied by the sun, shining through a glass pane into an inclined box. It has been said that the reason why the monks of the Middle Ages were such a jolly drunken lot was that they had to keep lots of bees to provide the wax for their ecclesiastical candles; what could they do with the honey except-make mead of it?

Addresses

In Britain, bees can be obtained from:

BIBBA	or	The Brother Apiarist
B. A. Cooper		Buckfast Abbey
Whitegates		Devon
Thulston		
Derby		

Food from the Garden

"I have often thought that if heaven had given me choice
of my position and calling, it should have been on a rich spot of earth,
well watered, and near a good market for the productions of
the garden. No occupation is so delightful to me
as the culture of the earth."
JEFFERSON

The Food-Producing Garden

The countryman's garden of my childhood was a mixture of vegetables, flowers, soft fruit, top fruit (oh those greengages!) and very often tame rabbits, almost certainly a hen run, often pigeons and often ferrets. It was a very beautiful place indeed. Now alas it has disappeared under a useless velvety lawn and a lot of silly bedding plants and hardy perennials, but *ot* course the owner is constrained to keep up with the people next door.

But how can we best reproduce the old cottage garden, which was one *ot* the most productive places on Earth?

We are best to divide our garden area into six parts: seven if we insist on having a small lawn-and-flower area in which to sit among the fragrance of flowers.

One of the areas we will set aside for perennial food plants: that is plants that go on growing for year after year such as asparagus, globe artichokes, horse radish, hops perhaps (but they are very hungry and shading), comfrey, and herbs of many kinds. Another will be used for fruit canes, soft-fruit bushes, and a few top fruit trees (but remember a fruit tree really does shade and sterilize a large area of soil).

We should then divide the rest of the garden up into four parts, which can be cropped on a four year rotation.

Each yearly crop on each plot is called a "break'.' The four breaks are essentially: pea and bean family; cabbage family (brassica) but including swedes and turnips; roots meaning carrots, parsnips, onions, beet, celery and so on; and spuds, which means potatoes and is a very good word. More about rotation and the four plot garden will be found on p. 160.

Liming

If your land is acid it will need lime. You can test for this with a very simple device bought from any garden shop - or by asking a neighbour. You should lime before the pea and bean break. The peas and beans like the lime and the cabbage tribe that follow them like what is left of it. Lime has more time to combat the dreaded club-root disease, which is carried by brassica, if it is in the soil for a few months before the brassica are planted.

Mucking

If you have muck - farmyard manure - and I hope you have, or if you have compost, concentrate this on your potato break. The potatoes benefit enormously by it. In fact you won't grow very many without it. It is better not to put it on the root break because some roots, carrots and turnips in particular, are apt to "fork" if they have too much fresh muck. It is better not to put muck on the pea and bean break, because you lime that and lime and muck don't go very well together in the same year.

Mulching

It is quite advantageous to put a mulch, a covering of some dead greenstuff, on the surface of the soil between the cabbage-tribe plants, but only *after* you have hoed them two or three times to suppress the weeds. If you mulch on top of weeds the weeds will simply grow through the mulch and the mulch will then impede the hoe.

Organic gardening

The aim of the organic gardener should be to get as much *humus* into his land as possible. Muck, compost, seaweed, leaf-mould, human excrement, spoiled hay, nettles, roadside cuttings, anything *or* vegetable or animal origin: compost it (see p. 136) and put it on the land, or just put it on the land. If you dig it in well, you dig it in. If you just leave it on top, the worms will dig it in for you.

Unless you keep animals on your garden, you will have to bring organic matter, or inorganic matter if you are not "organically minded}' in from outside if you want a really productive garden. I subsidise my garden with manure made by animals that eat grass, hay and crops grown on the rest of the farm. There is much wild talk by would-be organic gardeners who think a garden will produce enough compost material to provide for itself. Well, let them try it. Let them take a rood of land, grow the bulkiest compost-making crop they can on it, compost it, and then see how far the compost it has made goes. It will not go very far.

Percentage values of organic fertilizers

	Nitrogen	Phosphorus	Potash	Calcium
Average farm yard manure	**0.64**	**0.23**	**0.32**	nil
Pure pig dung	**0.48**	**0.58**	**0.36**	nil
Pure cow dung	0.44	0.12	0.04	nil
Compost	**0.50**	**0.27**	**0.81**	nil*
Deep litter on peat	**4.40**	**1.90**	**1.90**	2.20
Deep litter on straw	**0.80**	**0.55**	**0.48**	nil
Fresh poultry dung	**1.66**	**0.91**	**0.48**	nil
Pigeon dung	**5.84**	2.10	**1.77**	nil

*Unless lime has been added

True, deep-rooting plants, such as comfrey and lucerne (alfalfa), can do great work in bringing up minerals, and phosphates and potash as well, from the subsoil to add to your soil. Trees do an even better job. But the land that is devoted to growing the comfrey or the trees is out of use for growing food crops.

Of course if your own sewage goes back, in one form or another, into the soil of your garden, one big leakage of

Organizing the self-supporting garden
However limited the space available, you only need the determination to abandon your space-wasting lawn and flowerbeds in exchange for a scheme oj planned crop rotation for everv *inch of your garden to become a pwductive unit. You will save money, your end products will be fresh, and your garden will be a fine example of a dying breed: the cottage garden of yesteryear.*

plant nutriments is stemmed. The old cottage gardens of the past had all their sewage returned, because the sewage system was a bucket and the contents of that were buried in the garden. Provided the ground in which they were buried was left undisturbed for a time any pathogens in the sewage would die a natural death. These country gardens owed **their** phenomenal fertility to the fact that the inhabitants were importing food from outside all the time, as well as eating their garden's own produce, and both lots of matter ended up in the soil.

But if you annually extract large amounts of produce from a piece of soil, and either export it or eat it and export the resulting sewage, and don't import any manure or fertilizer, the laws of nature are such that you will ultimately exhaust that soil.

It is vital that your garden be well drained, and it is an advantage if the land beneath it is not too heavy. A well drained medium loam is most desirable, but sandy soil, provided you muck it well, is very good too. Heavy clay is difficult to manage, but will grow good brassica crops. Whatever your soil is, you can scarcely give it too much muck, or other humus or humus-forming material.

Making compost

If you pile vegetable matter up in a heap it will rot and turn into compost. But to make good compost, and to make it quickly, you have to do more than this.

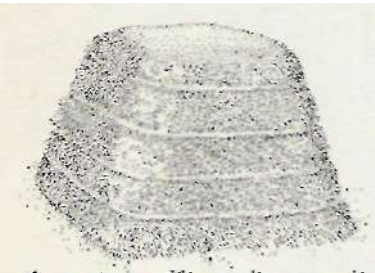
You can make the best compost in the world in twelve hours by putting vegetable matter through the guts of an animal. To make it any other way will take you months, whatever you do. But the principle of compost-making is this. The vegetation should be broken down by aerobic organisms. These are bacteria and fungi, which require oxygen to live. The bacteria which break down cellulose in plant matter need available nitrogen to do it. If they get plenty of available nitrogen they break down the vegetable matter very quickly, and in doing so they generate a lot of heat. The heat kills the weed seeds and disease organisms in the compost. If there is a shortage of available nitrogen it takes the organisms a very long time to break the vegetable matter down. So in order to speed the process up as much as you can, you try to provide the things that the compost-making organisms need: air, moisture, and nitrogen.

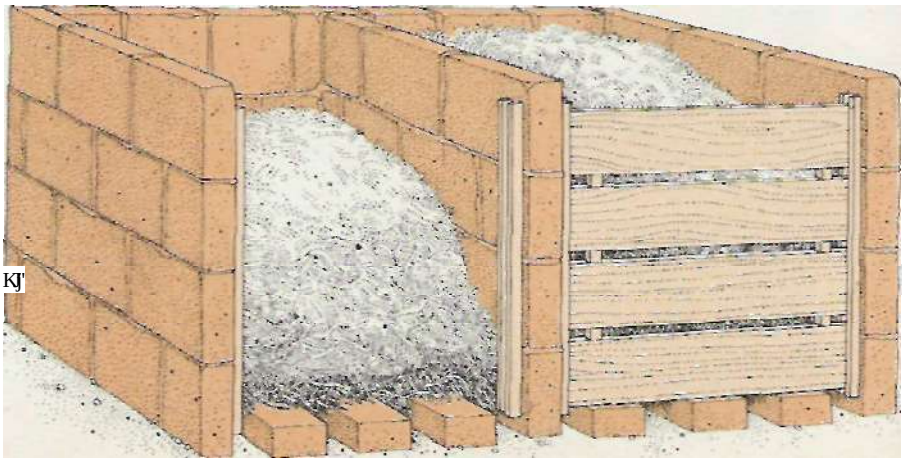
You can provide the air by having rows of bricks with gaps between them underneath the compost and, if you like, by leaving a few posts in the heap as you build it, so you can pull them out to leave "chimneys!' You can provide the moisture either by letting rain fall on the heap, or by throwing enough water on it to moisten it well. And you can provide the nitrogen by adding animal manure, urine, fish meal, inorganic nitrogen, blood, blood meal, or anything you can get that has a fairly high nitrogen content.

The natural, and traditional, way to make compost is to throw your vegetable matter (generally straw) at the feet of yarded cattle, pigs, or other animals. The available nitrogen in the form of the animal's dung and urine "activates" the compost. The urine also provides moisture and enough air gets between the straw. After a month or two, you dig the heap out and stack it carefully out of doors. More air gets into it and makes it rot down further. Then, after a few months, you cart it out and spread it on the land as fertilizer.

But if you don't have any animals your best bet is to build compost heaps by putting down a layer of bricks or concrete blocks with gaps in them, and laying coarse woody material on these to let the air through. Then put down several layers of vegetable matter, sprinkling a dusting of some substance with a high nitrogen content between them. Ten inches of vegetable matter and a couple of inches of chicken dung, or a thick sprinkling of a high-nitrogen inorganic fertilizer, would be ideal. Some people alternate lime with the nitrogen. Keep the sides vertical using walls of either wood, brick or concrete, and keep it decently moist but not sopping. When it begins to heat, keep most of the rain off it, either by shaping the top, by building a roof, or by covering it with old carpets. After a month or two, turn it, putting what was the top and the sides into the middle.

Making a compost heap





If space is no problem, make an open-layered compost heap - the larger the better, so that heat can build up inside without too much escaping. But an enclosed heap is probably more practical: you build up layers of animal and vegetable matter in a confined space, on bricks covered with twigs and small branches, and between walls. Keep the compost damp and leave gaps between the bricks for air to get through.

After another month or two, it will be fit to put on the garden. Every possible object of vegetable or animal origin should go in the compost heap.

Green manuring

Green manuring is the process of growing a crop and then digging or ploughing it in to the soil, or else just cutting or pulling the crop, and throwing it down on top of the soil. This latter form of green manuring is "mulching." Ultimately, the green matter will rot and the earthworms will drag it down into the soil in their indefatigable manner. If you dig in green manure crops you should do it at least three weeks before you sow the next crop on top of them. The only way round this is to add plenty of available nitrogen to help to rot down the green manure without it robbing the soil.

Green manuring improves the quality of the soil because the vegetable matter rots down into humus. The amount of humus added by an apparently heavy crop of green manure is smaller than you might think, but the great value of such crops is that they take up the free nitrogen in the soil. Bare soil would lose this nitrogen to the air, whereas the green crop retains nitrogen and only releases it when it has rotted, by which time the subsequent crop should be ready to use it.

It should be the aim of the organic gardener to keep as much of his land as possible covered with plants. Bare soil should be anathema unless for a very good reason it has to be bare temporarily. The old gardener's idea of "turning up land rough in the autumn to let the frosts get in it in the winter" has not proved a very good one.

Using weeds

Even weeds can be a green manure crop. If weeds grow, pull them out and let them rot, either on the surface or dug in. But don't let them seed. For one thing, "one year's seeding is seven years weeding," and for another, all green manure crops should be cut or pulled at the flowering stage, or earlier, when their growth is young, succulent, and high in protein. They then have enough nitrogen in them to provide for their own rotting down.

So look upon annual weeds as friends provided you can keep them under control. Perennial weeds (weeds that go on from year to year) should not be tolerated at any cost. They will do you nothing but harm, and will ultimately beat you if you don't beat them. I would make an exception with nettles, and also bracken. If you grow these two crops on otherwise waste land you can cut them and add them to the compost heap. They will do great good, as they are both deep rooting and thus full of material they have brought up from below.

Planting green manure

Green manure crops can be divided into winter and summer crops, and legumes and non-legumes. People with small gardens will find winter crops more useful than summer ones, for the simple reason that they will need every inch of space in summer for growing food crops. Legumes make better green manure than non-legumes, because they have bacteria at their roots which take nitrogen from the air, and this is added to the soil when they rot.

Grazing rye

Of winter green manuring crops grazing rye is probably the best. It can be broadcast at a rate of 2 oz (56g) of seed per square yard (0.8 square metre) after early potatoes have been lifted. Rake the seed in, leave it to grow all winter and then dig it in during spring. You can plant grazing rye as late as October, although you won't get such a heavy crop.

Comfrey

Comfrey is a fine perennial to grow for either green manuring or compost. Plant root cuttings from existing plants two feet (0.6m) apart in really weed-clear land in spring and just let it grow. The roots will go down into the soil as far as there is soil for them to penetrate and they will exist for a decade giving heavy yields of highly nitrogenous material, rich in potash, phosphate, and other minerals too. Over sixty tons an acre of greenstuff has been achieved, although this was probably in response to heavy manuring. Still, you might well get forty tons, and forty tons of comfrey yields about four tons of good compost, and when dug in, it makes magnificent green manure.

Other green manure and compost crops

Tares are legumes and winter crops and are therefore doubly valuable. They can be sown from August to October, and dug in next spring. As a summer crop, they can be sown any time in the spring and dug in when in flower. Mustard is a much-used green manure crop, which is sown after early potatoes are lifted. Give the dug-over ground a good raking, broadcast the seed lightly and rake it in. Dig the crop into the ground as soon as the first flowers appear. Red clover seeds are expensive but it is a fine bulky nitrogen-rich legume, which can be sown after early potatoes and dug in in the autumn. If you plant some in the spring for the purpose of keeping seed you will save having to buy any. Lupins are a large legume. Put the seeds in at six inch (15cm) intervals both ways in the spring or early summer. Here again you can save your own seed. *Tagetes minuta* is a kind of giant marigold, and is an interesting crop to plant for compost material. It grows ten feet (3m) high and has two marvellous effects. It kills eel-worm, and it wipes out ground elder and bindweed. It even suppresses to some extent the hideous couch grass or spear grass, which is the scourge of many gardens. It is too tough to be dug in as green manure and should be composted. Sunflowers make bulky compost material. The seed is planted half an inch (1cm) deep and one foot (30cm) apart both ways in the spring, and cut when it is in flower.

The Gardener's Tools

Spade A good spade, kept clean and put away after use, is essential for inverting the soil and digging in manure.

Fork The garden fork is a marvellous instrument, and many experienced gardeners use it more often than the spade. With it you can loosen up the soil, very quickly, without inverting it, incorporate compost or manure with the first few inches and fork out roots of creeping weeds like couch grass. It is also essential for digging up spuds.

Hoe There are two main types of hoe. There is the ordinary hoe, and what the English call the Dutch hoe. The former is for pulling through the soil and the latter is for pushing. The ordinary hoe is much faster, goes deeper and can tackle tougher weeds. The Dutch hoe has the advantage that you walk backwards when you use it, and so leave the ground free of footprints. For people who really have some hoeing to do, and must get on with it, I would always recommend the ordinary hoe.

Rake A rake, preferably a large steel one, is essential for raking down fine seed beds and for covering seed.

Wheelbarrow A wheelbarrow is necessary in anything bigger than a very small town garden. The old-fashioned wooden wheelbarrow, with a wooden wheel and a removable top on which light bulky loads could be carried, was a splendid and beautiful vehicle, and much better than the low steel builder's wheelbarrow sold everywhere nowadays.

Watering can Get a big galvanized iron watering can and not a streamlined plastic one that wont last five minutes.

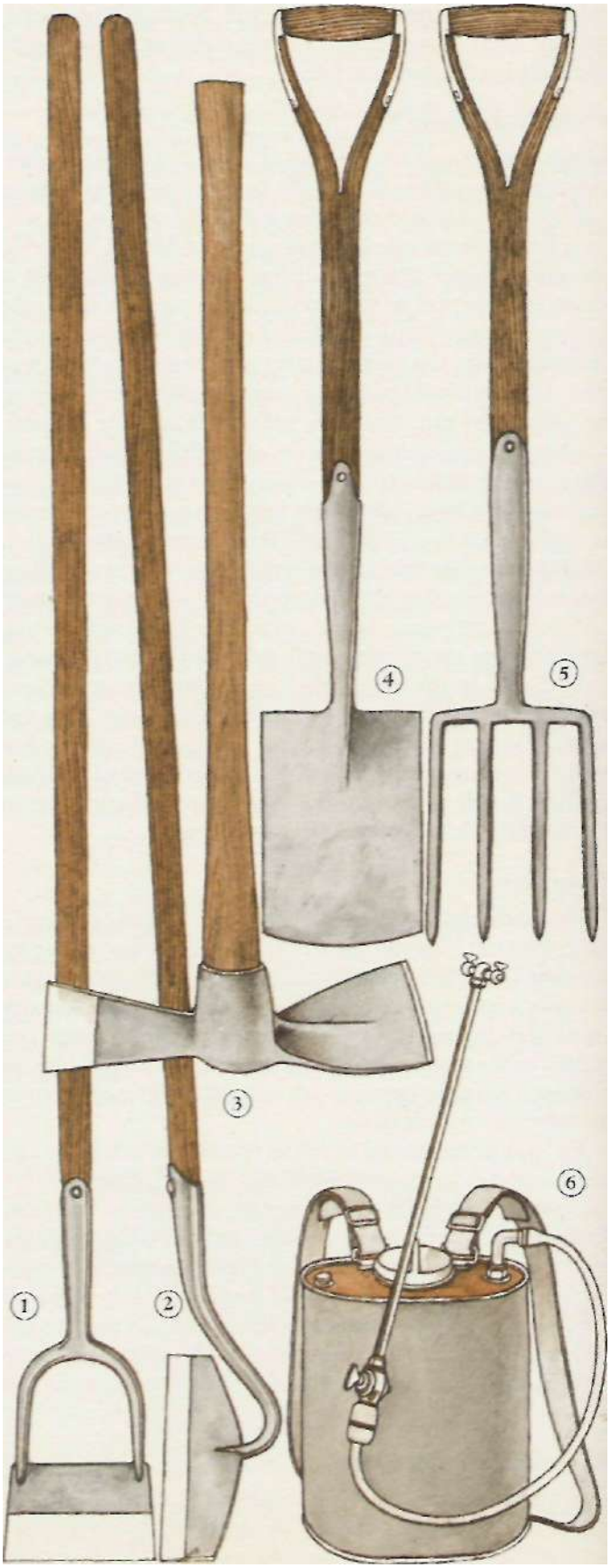
Trowel You will need a trowel for setting out plants.

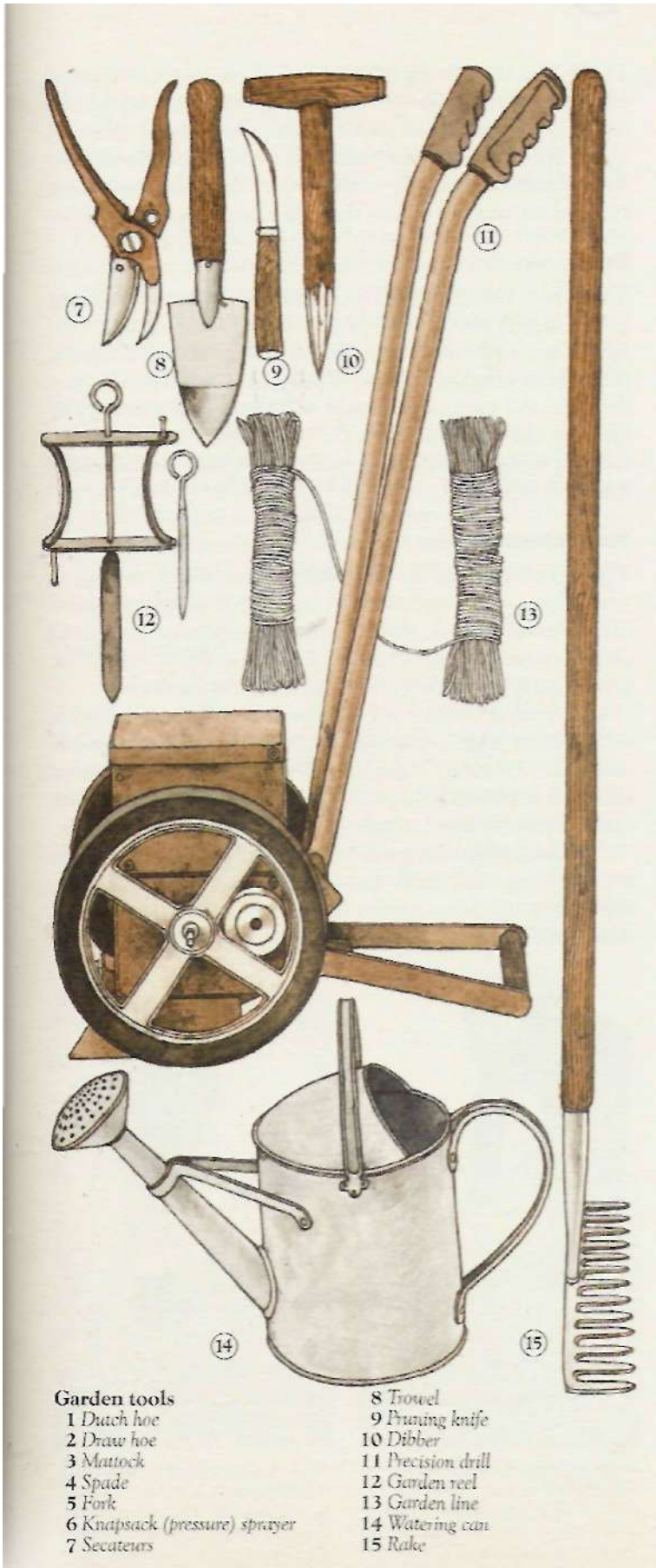
Dibber A dibber can be made by cutting down a broken spade or fork handle. You will need it for setting out smaller plants and seedlings.

Secateurs Secateurs are very useful for pruning. They are much quicker and also kinder to the plants than a knife, and they are also useful for severing chickens' neckbones when you are gutting them.

Garden line A garden line which is a light cord, rather than a string which gets tangled up, should be kept on an iron or wooden reel on which it can be wound up. This may seem a luxury, but it is very useful for getting your rows of vegetables straight.

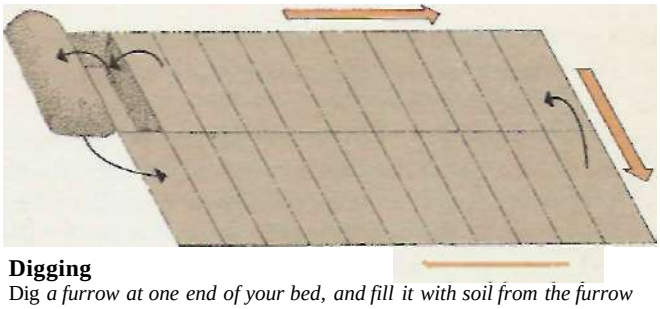
Wheel-hoe Small wheeled tools can be a real help. A wheel-hoe is most useful; it is the equivalent of the horse-hoe in the fields. You push it up and down between the rows. This means, of course, that you still have to hand-hoe in



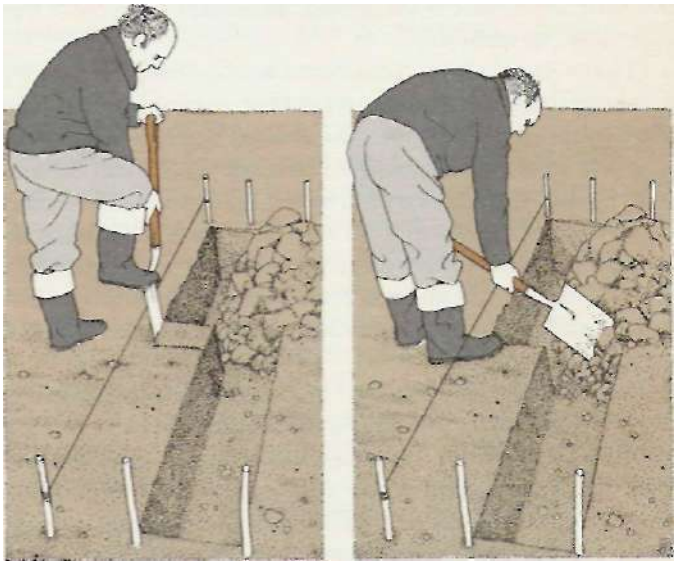


Garden tools

1 *Dutch hoe*
2 *Draw hoe*
3 *Mattock*
4 *Spade*
5 *Fork*
6 *Knapsack (pressure) sprayer*
7 *Secateurs*
8 *Trowel*
9 *Pruning knife*
10 *Dibber*
11 *Precision drill*
12 *Garden reel*
13 *Garden line*
14 *Watering can*
15 *Rake*



Digging
Dig *a furrow at one end of your bed, and fill it with soil from the furrow you dig next. Proceed in this way to the end; then fill the last furrow with the spare soil from the first. Or* split *your bed and dig down one side and back the other. You then have spare soil near the empty furrow.*



Before you start digging, mark off the plot to be dug with a garden line. Score a light furrow along the line and then dig your trench a foot (30 cm) wide and a spade's depth (or spit) deep.

When digging break up the earth properly, don't just turn it over on itself. Thrust your spade vertically into the ground, and with a neat twist flick the soil over into the next trench.

the rows, between the plants. There is a technique of planting such things as the larger brassica (Brussels sprouts etc), maize, and potatoes in squares, so that you can wheel-hoe both ways, at right angles. Don't be misled into thinking that you can really plough with the "plough" attachment of these instruments. It is just for scoring a small furrow to drop seeds in and it is very useful.

Drills There is a great variety of small wheeled drills on the market. Most of them just agitate the seed until it falls down through a spout which drops it below the surface of the ground. There are precision drills, however, which pick seeds up one at a time and drop them at exactly the right intervals. These are expensive, and not justified in a small garden, but on a market garden scale are well worthwhile. They save seed, and also save work thinning later. However, they won't handle all seed, -and some kinds have to be "pelleted". You can buy seed already pelleted so it can be picked out by the selector mechanism of a precision drill. This seed is expensive, but you save if you use a lot.

Sowing & Planting

Some people are said to have "green fingers" meaning that when they plant a seed or a plant or a tree, it grows. I suspect that this mysterious power is merely common sense and sympathy. Sympathy for the new life that you are helping to nurture. After all what does a seed want? Moisture, warmth and soil friable enough for its shoot to grow upwards and its roots downwards. This soil should be in close contact with the seed, and there shouldn't be too much soil between the seed and the light, as the plants growth depends on the energy collected from the sun by photo-synthesis in its green leaves. This energy takes over from the energy stored in the seed when that is exhausted, and helps to protect the plant from its enemies.

Plants vary in their requirements, of course, but broadly speaking, there are two ways to establish vegetables. One is by sowing the seed direct into the ground where it is going to stay. The other is by sowing it somewhere else, and then in due course transplanting. And there are even occasions when we transplant the plants from where we sowed the seed into another bed, leave them there to grow for a while, and then transplant them again into their final bed. There are two quite sensible reasons for this seemingly laborious and time-consuming procedure.

First, by crowding the seed in a seed bed, we release the land that the plants will ultimately take up, and can use it for another, earlier crop. So nearly all our brassica (cabbage-tribe), our leeks, and those other plants that will grow through the autumn and possibly part of the winter, occupy very little ground for the first half of the summer. Then we put them in ground vacated by earlier crops, such as early spuds or peas, and so we get two crops off the land in one year. The second reason for transplanting is to give seeds a good start. This is done by sowing seeds in a seed bed, but under glass, plastic or some other covering. This way we who live in temperate climates can start them earlier and give them an initial boost, so that thev will come to harvest during our short summer. After all, manv of our vegetable crops were evolved for warmer climes than the ones we grow them in.

Peat pots

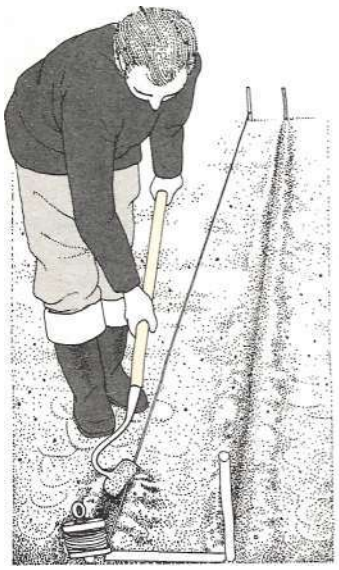
There are certain crops which respond far better to being grown in peat pots before they are transplanted, rather than in flats or seed boxes. These are crops which don't like having their roots interfered with. When you plant the peat pot direct in the ground the roots will simply drive their way through the wet peat and the plant won't suffer. Maize, melons, squashes, and manv other semi-hardy plants benefit from this treatment.

Soil for seed boxes

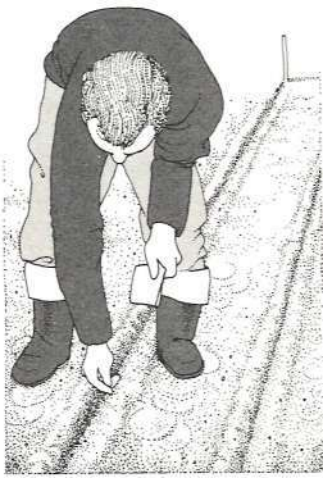
The sort of soil you put in your flats, or seed boxes, or pots, or whatever, is very important. If you just put ordinary topsoil in it will tend to crack, and dry out, and it will have insects and disease organisms in it that may flourish in the hot air of the greenhouse. This won't give you very good results.

If you can get, and afford, prepared potting composts such as the John Innes range, then get them. The expense is justified by results. These composts are carefully blended and well sterilized. If vou can't, or don't want to buy them, you will have to manufacture potting composts of your own.

The fundamental ingredients of the John Innes composts are loam, peat and sand. You can make the loam by digging top quality meadow turves and stacking them, grass-side down, with a sprinkling of good compost or farmyard manure



Sowing
Fork over the ground. Mark out the rows, and stretch a garden line along each one. Drive a drill with a draw hoe at a suitable depth.



Sprinkle tiny seeds thinly. Large seeds like peas and beans should he planted at regular intervals, usually recommended by the seedsman, Water them gently.

When you have finished sowing, rake the bed all over, so that the entire'surface becomes a fine tilth. This top layer of crumbly soil is the most important feature.

After you have raked the soil, tread it firmly with your feet or with the base of the rake. This ensures that the seeds are in close contact with the earth.

in between each layer of turves. Stack them in six foot layers, and leave them for from six months to a year. The loam should be sterilized. This is best done by passing steam through it. Put the loam in any container with holes in the bottom and place it over a vessel of boiling water. This will sterilize it.

Peat can be bought in bales, or it can be dug from a peat bog, and then sterilized by simply boiling it in water.

John Innes seed compost, for putting in flats or seed boxes, is, by volume: 2 parts sterilized loam; 1 part sterilized peat; 1 part coarse sand. To each bushel (25.4 kg) of the above add l 1/2 oz (42 g) superphosphate of lime and 3/4 oz (21 g) of ground chalk or ground limestone.

John Innes potting compost is by volume: 7 parts sterilized loam; 3 parts sterilized peat; 2 parts coarse sand. To each bushel (25.4 kg) add 1/4 lb (114 g) of John Innes base fertilizer and 4 oz (21 g) ground chalk or limestone.

And John Innes base fertilizer is by weight: 2 parts hoof and horn meal; 2 parts superphosphate of lime; 1 part sulphate of potash.

Transplanting

The same qualities are needed for transplanting a growing plant successfully as are needed for sowing seed: sympathy and common sense. Consider what a trauma transplantation must be for a plant, which is a life form evolved for growing all its life in one place. It is wrenched out of the ground, and most of the friendly earth is shaken from its tender roots which themselves are probably severely damaged. Then it is shoved roughly into some alien soil, possibly with much of its root system not in contact with the soil at all and the rest jammed together into a matted ball. It is quite amazing that transplanted seedlings ever survive, let alone grow into mature plants.

So dig plants out gently and be sure that as much soil adheres to their roots as possible. Transplant them as gently as possible into friable soil with their roots spread naturally as they were before. Make sure the soil is well firmed, but not roughly trampled so as to break off tender roots. Then water them well. "Puddling" transplants, which means completely saturating them, is nearly always a good idea. It is drying out that kills most transplants. Of course, if we have hundreds or thousands of brassica to plant, *we* can't be too particular. We are forced by sheer pressure to bang them in pretty quickly, but even then it is surprising how one person will have a hundred percent success with his plantings, while another has many failures.

Putting the plant in

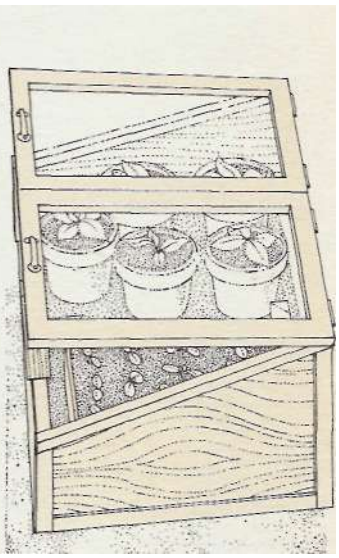
Plant when it is raining if you can, or when rain is promised. Put large plants in with a trowel and smaller ones with a dibber, which is basically a pointed stick. Farm labourers transplanting thousands of brassica plants go along at a slow walking pace, jabbing the dibber in beside the plant and then moving the dibber over towards it to jam the earth tight around its roots. Ifa moderate tug on the plant doesn't pull it out, it will be all right.

With larger or more delicate plants, such as tomatoes, broad beans (if you really have to transplant them) or sweet corn, keep a ball of soil on the roots and very carefully place them in a hole dug with a trowel. Then firm the soil around them. If you have grown them in pots, carry them in the pots to their planting station. Water them well, then take them gently out of the pots immediately before you place them in the ground.

Planting
Crowd seeds into a seed box, so that the land where they will eventually grow can bear another early crop in the meantime.

Alternatively *you can plant your seeds in pots. As the seedlings grow thin* them out to *allow the* strongest *seedlings more room for their roots to develop.*

When *the seedlings of your first seed box look overcrowded, it is time to prick them out. This means thinning and removing to a box or bed where they have room to grow.*



Give your seeds a good start by putting them, in pots or seed boxes, under glass. They will grow and thrive earlier than they would if left in the open air.

Growing under Cover

You can get a greenhouse which has an interior like a space module about to make a landing on the moon, with thermostats, propagators, electric fumigators and hell knows what. But if you buy this sort of equipment you are spending the money that would buy you out-of-season vegetables at the nearest greengrocers for many decades. Consider: is it really worthwhile going to great trouble and expense in order to have some vegetable or fruit ready a fortnight earlier than you would otherwise? If you are growing for market, the answer is yes.

Greenhouse production-or intensive cloche production -for sale is a very sensible and valid way of making the small amount of money that every self-supporter must have to conduct his limited trade with the rest of the world. I write books, my neighbour gives piano lessons, another makes wooden articles. If anyone wants to make under-glass cultivation his money-spinning enterprise he must get some good specialist books on the subject, which is a very complex one, and requires a great deal of knowledge to make the difference between success and complete, expensive failure.

But unless the self-supporter intends to make greenhouse production a main item of foreign exchange or money-earning, only the simplest of greenhouses is justified, with maybe some cold frames, "hot frames," or a variety of cloches. You can buy your greenhouse ready-made or build it yourself. Buying the frames with glass in them is often the best thing, for you can then build your own lean-to greenhouse. See pp. 172-173 for more details.

Cold frames

If you make four low walls and put a pane of glass on them, sloping to face the sun, you have a frame. The walls can be made of wood, bricks, concrete blocks, rammed earth, what you will. The glass must be set in wooden frames so that it can be raised or lowered. Frames are fine for forcing on early lettuces and cabbages, for growing cucumbers later in the summer, or for melons and all sorts of other things. Most of them are too low for tomatoes.

Hot frames

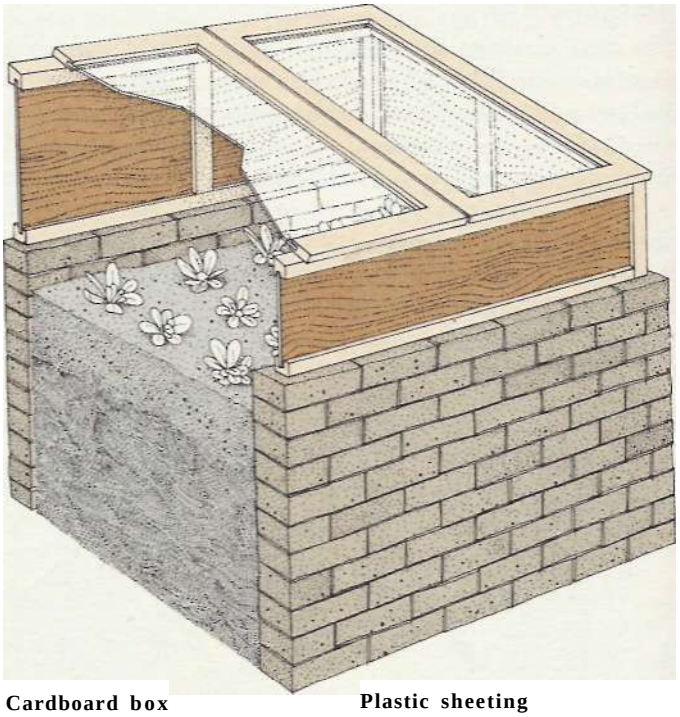
These are much used by the skilful French market gardeners, and are a fine and economical way to force on early plants, but they do need skill. You make a "hot bed." This is a pile of partly-rotted farmyard manure or compost. The best is stable manure: horse shit mixed with straw, mixed with an equal part of leaves or other composting material so it won't be too hot. Turn this a couple of times until the first intense heat of fermenting has gone off along with the strong smell of ammonia, then lay it down in your frame with a shallower layer of earth on top. Manure two and a half feet (76cm) deep with a foot (30cm) of soil over it is appropriate. The seed should be put in when the temperature falls to about 80°F (27°C). You can transplant plants into the bed. You would of course be doing this in the late winter or early spring, and so as the hot bed cools the spring advances, and the heat of the sun replaces the heat of the manure, which will have gone by the time you no longer need it. You will then have lovely well-rotted horse manure.

Growing in a hot frame is not as easy as it sounds, but if you get the procedure right it is highly effective. It is sad that it is not used more often. Maybe as heating greenhouses with oil and electricity becomes more expensive it will be. Of course - you must first find your horse. A well-made compost heap with some activator will work too.

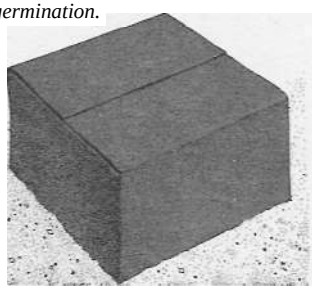
Cloches

The first cloches were bell-shaped glass bowls, and were much used in France. They were simply inverted over the plants to be forced. These were replaced by continuous cloches, which are tent or barn-shaped glass sheds placed end to end to form long tunnels. These are much cheaper, which is a good thing, because if you are half as clumsy as

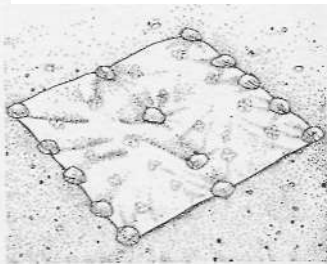
Hot frame
Enough heat to last from late winter right through spring comes from a thick layer of decomposing manure or compost. Cover with a layer of soil.



Cardboard box
A cardboard box painted black absorbs the sun's heat and aids germination.



Plastic sheeting
A transparent plastic sheet will help germination and force on early vegetables.



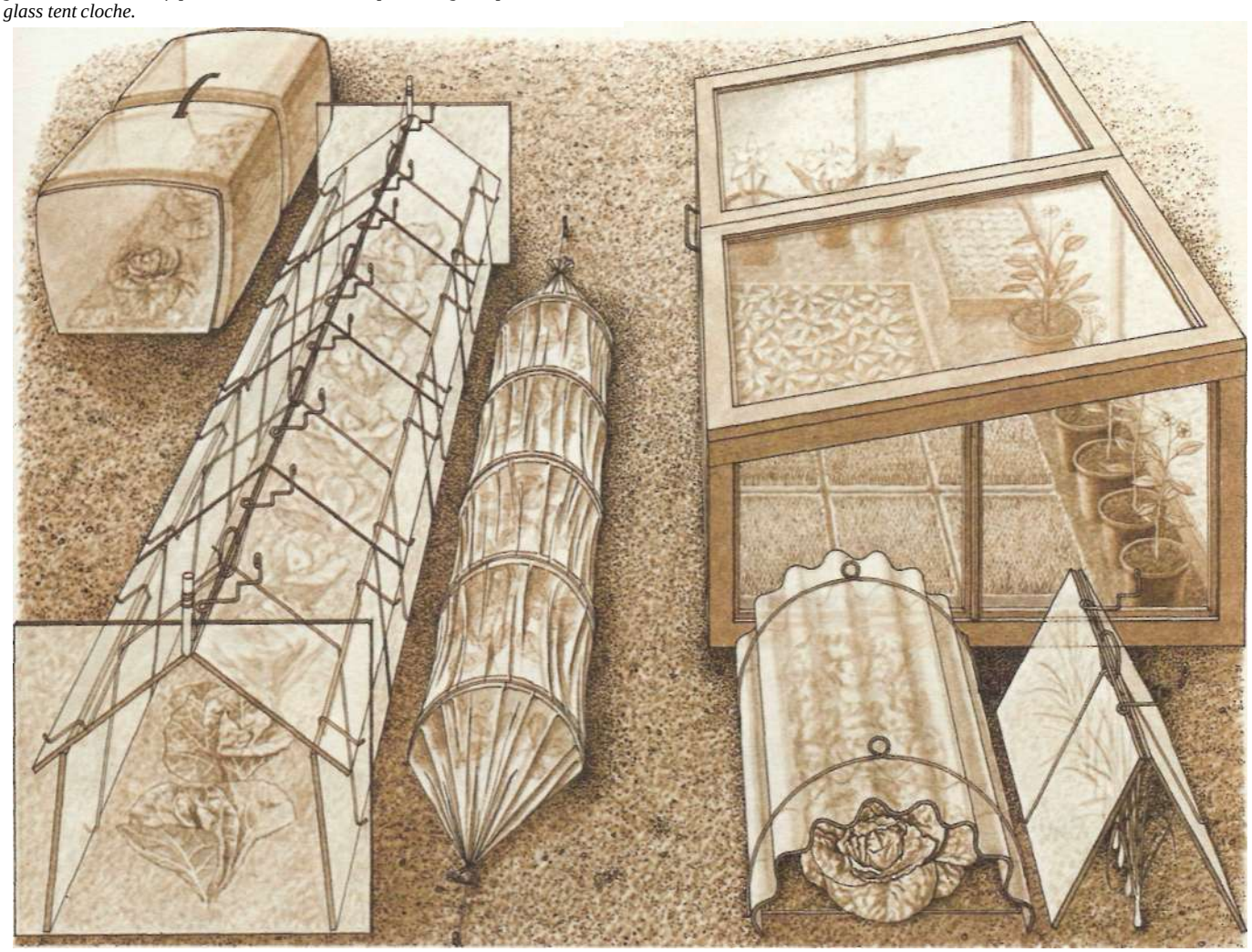
I am your cloche-managing career will be incessantly punctuated by the mem" tinkling sound of breaking glass. If I just look at a glass cloche it falls to pieces, so when you reflect that you have got to hoe round crops, hand-weed, water (very necessary for crops under cloches as they do not get the rain), thin, inspect and harvest, and that the cloches have to keep coming off and going back on every time you do one of these operations, you will realize that cloche-mortality can be very high.

Polythene tunnels supported by inverted U-shaped wires were the next development. They don't shatter, but can very easily be blown away in a gale, and blown to pieces. However, they do work, and many people use them now; many market gardeners have them on a large scale. Getting them on and off enormously increases the labour involved in growing a crop, but harvesting a fortnight early may well make the difference between profit and loss. PVC by the way retains the heat more efficiently than polythene, but is more expensive. And don't neglect the humble jam-jar! One of these inverted over an early-sown seed or plant of some tender species will protect it as well as any cloche. A sheet of any transparent plastic spread on the ground and weighted down on the edges with earth is fine for forcing on early potatoes and so on. When you do this sort of thing you must be careful to "harden off" the plants sensibly and gradually.

Propagators

You can use a propagator to get very early seeds going. This is an enclosed glass box with soil in it and under-soil electric heating. It produces the condition known as "warm feet but cold head" which many plants like. Tomato seed can be germinated in one of these in January in a temperate climate, but the air above it must be kept at 45°F (7°C) at least, as well as the soil being warm. A propagator is probably a worthwhile investment if you have electricity, and the time and skill to grow your OWTI tomato plants from seed.

Cloches and a cold frame
Four walls *with glass across them make a cold frame (top right). Cloches are portable and there are innumerable types: (left to right) hard plastic cloche; glass bam cloche; soft plastic tunnel cloche; simple corrugated plastic cloche; glass tent cloche.*



Protecting from Pests

The weeds that grow so merrily in our gardens, in defiance of all our efforts to wipe them out, are tough organisms, and well adapted to protect themselves from most enemies and diseases. They wouldn't be there otherwise. But our crops have evolved gradually through artificial selection so as to be succulent, good to eat, and productive of high yields. As a result, their natural toughness and immunity against pests and diseases have often been sacrificed to other qualities. We must therefore protect them instead. However, avoiding attack by pests and diseases is not so easy. In fact it presents a great problem.

If you observe the principles of good husbandry, by putting plenty of animal manure or compost on the land, and by keeping to strict crop rotations (never grow the same annual crop on a piece of land two years running, and always leave the longest possible gap between two crops of the same plant), you will avoid many troubles. You will always get pests and diseases but they will not reach serious proportions. An organic farmer I know who farms a thousand acres with never an ounce of chemicals, and whose yields for every crop he grows are well above the national average, says that in his wheat he can show you examples of even- wheat disease there is, but never enough of any one for it to make the slightest difference to his yield.

A highly diversified floral and faunal environment makes for balance between species: plenty of predators of various sorts kill the pests before they get out of hand. Destroy all forms of life with poisonous chemicals and you will destroy all the predators too, so that when you do get a plague of some pest there will be no natural control, and you will be forced to use chemicals again. All the same, no matter how organically you farm, there are times when some pest or disease gets the upper hand, and when something must be done if you are not to lose the crop.

Work with nature, not against it.

Nasturtiums *repel cucumber beetle and Mexican bean beetle.*

Toads *will eat nasties such as slugs, aphids and mosquitoes.*

Thrushes *eat snails which would otherwise damage your plants.*

Hedgehogs *eat pests including millipedes that like potatoes.*

Mint *with its smell keeps white fly from beans.*

Lacewings *and their larvae destroy aphids.*

Centipedes *eat slugs' eggs and are the gardener's friend.*

Ladybirds *aren't just pretty. They consume aphids by the thousand.*

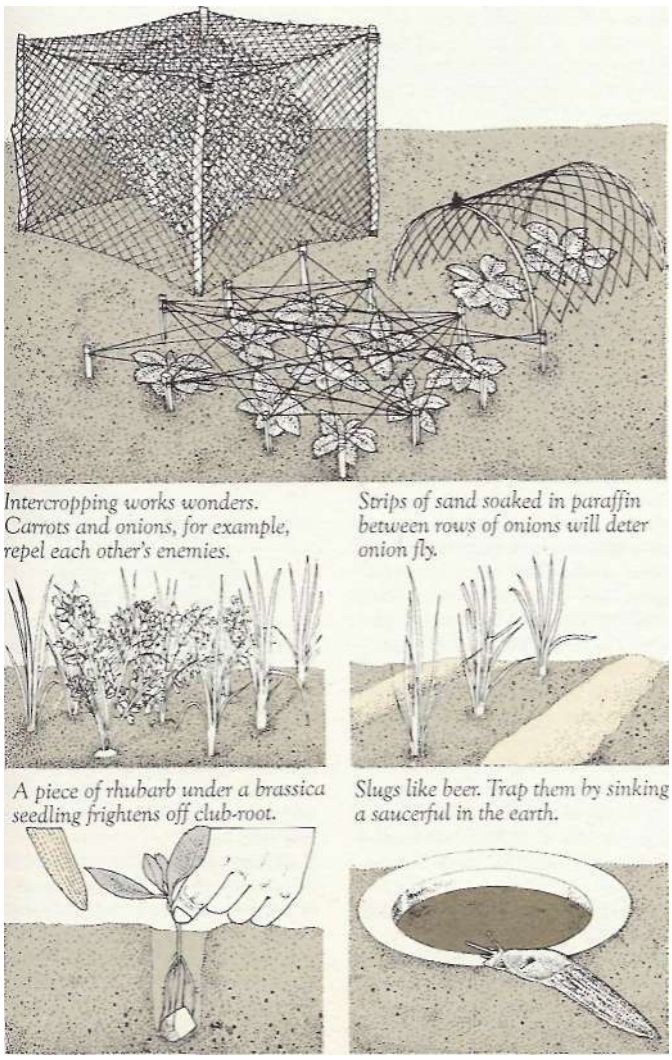
Chemical pest control

Orthodox gardeners will say use poison. You can indeed use some poison, and maybe sometimes you will have to; but surely it is far better and more skilful gardening practice to save your crops without using poison? Any fool can keep disease at bay simply by dousing his crop with chemicals, but what of the effect on other, benign, forms of life? If a chemical is poisonous to one thing you can be certain it will be poisonous to other forms of life too, and that includes human life: it will do damage even if it doesn't kill.

The only chemicals I use are Bordeaux Mixture (see p. 87) against blight in potatoes, various poisoned baits against slugs, and derris or pyrethrum or a mixture of both against caterpillars and green or black fly. Derris and pyrethrum are both derived from plants, are non-persistent, and harmless to any non-insect. I have tried calamine (mercuric chloride) against club-root but it was ineffective.

Simple methods of protection

Young plants and bushes need protection from birds. Four sticks and some soft netting can cage in a growing bush. Cover seedlings with wire netting stretched across hoops, or with a mesh of string wound on wooden pegs.



Biological pest control

Very little research has so far been done into natural, or biological, means of defence, simply because there is no money to be made out of doing such research. No big company will look into ways of controlling pests and diseases which aren't going to make it any profit, and which will even operate against the profits it already makes by selling poisonous chemicals.

Lawrence D. Hills of the Henry Doubleday Association in Bocking, Braintree, Essex, England, with voluntary assistants all over the world, has in fact done some research into biological methods of pest and disease control. Many of these are merely confirmations of old and tried methods that have been used by countrymen for centuries, but some are quite new. The Association sells a little book called *Pest Control without Poisons* which is very useful. Here are some tips from it (and from other sources):

Tie sacking strips or corrugated cardboard round fruit trees in late summer and then burn complete with weevils, codling moth grubs and other nasties.

Put a very good old-fashioned grease-band around tree boles to catch nasties coming up. Most predators fly.

Cut off all dead wood from stone fruits in early summer and burn as a guard against silverleaf and die-back.

Spray winter wash on fruit trees in winter. This should only be done if needed, for it kills useful predators as well as nasties. There are many proprietary brands of winter or "tar" wash.

Use plenty of potash to prevent chocolate-spot in beans. Grow winter-sown broad beans instead of spring-sown to avoid blackfly. Pick out (and cook and eat!) the tips of broad-bean plants at the first sign of aphis attack.

Avoid carrot fly by interplanting with onions. The smell of the one is said to "jam" the smell of the other; thus you avoid both carrot and onion fly. Putting sand soaked with paraffin around carrot or onion rows is probably a better preventative. Onions from "sets" are less likely to get fly than onions from seed.

Rigorously get rid of every brassica weed such as charlock and shepherd's purse so as not to harbour club-root.

Drop bits of rhubarb down each hole before you plant out brassica seedlings, or better still, water seed beds and seedlings with rhubarb-water. The smell of the rhubarb is said to deter the club-root organism. This is an old remedy but I have never tried it.

Sink basins full of beer into the ground to trap slugs. Or save the beer and use milk and water instead.

My own experience with pests and diseases is that, except for potato blight if you don't spray occasional plagues of caterpillars on brassicas, and occasional aphis or greenfly and blackfly attacks, there is no need to worry as long as you obey the laws of good organic husbandry which are nature's laws. A few pests on healthy crops do very little harm - certainly not enough to worry about.

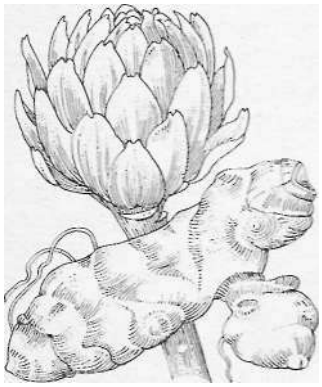
Vegetables

If you grow just a few of the vegetables listed below you can eat your own fresh vegetables from early spring to late autumn. And if you grow the right things and store them (see p. 182), or if you set yourself up with a greenhouse (seep. 172) you can have your own vegetables the year round, and need never again suffer a flabby bought lettuce or a tasteless tomato in your own home.

ARTICHOKES

Globe artichokes

Use Globe artichokes are perennials and therefore a long-term proposition. I would not recommend them as the crop to feed a hungry world, but the object of the self-supporter should be to live a rich and varied life and part of this must be a rich and varied diet. Basically globe artichokes are huge thistles, and what we eat are the flower heads, and not even all of these, but just the little bit at the base of each prickly petal, and the *heart*, which lies under the tuft of prickles that are immature petals, and is delicious beyond description. Boil the whole flowers and eat with butter or oil and vinegar.



Sowing In spring plant suckers from an existing plant, each with a piece of heel of the old plant attached. Plant them four inches (10 cm) deep in good well-manured well-drained soil at three foot (91 cm) intervals.

After care Keep them well hoed.

Harvesting Spare the first year, pluck the heads the second and each ensuing year. After five or six years dig out and plant a new row somewhere else. If you plant a new row every year and scrap an old one you will never have a gap with no artichokes. Muck well every year and cover in the winter with a thick mulch of straw.

Cardoons

Use Cardoons are exactly like globe artichokes, except that they are annuals and they have slightly smaller flowers. The flowers can be eaten like globe artichoke flowers but cardoons are really grown for earthing up in the spring so thatyou can eat the stems like celery.

Planting Plant from seed, which is generally sown in a greenhouse in spring and then pricked out a fortnight after the last frost.

Jerusalem artichokes

Use A useful standby in winter time as a substitute for potato. They can be lightly boiled or fried in slices. They have absolutely nothing to do with globe artichokes or Jerusalem.

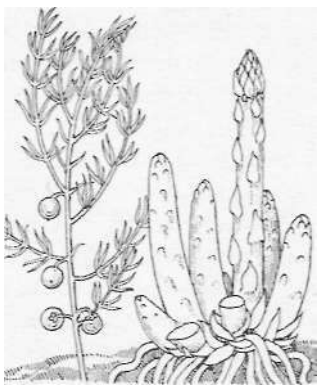
Planting Like potatoes, the Jerusalem artichoke grows from tubers planted in early spring. They are very easy to grow, and need only a little extra lime if your soil requires it. They are rarely attacked by pests.

After care Hoe until the foliage is dense enough to suppress weeds.

Harvesting Dig them up as you need them. They can be left in the ground throughout the winter. Save a few mature tubers to plant next year.

ASPARAGUS

Use Asparagus are perennial vegetables, so once they are planted they can't be moved each year. They take three years to get established, but it is well worth waiting. They come very early - just when you need them - and are delicious and nutritious, perhaps one of the most valuable crops you can grow. Do not be put off by any stupid puritanical ideas that this is a luxury crop and therefore somehow sinful. It is nourishing, delicious, and comes just when you don't have anything else.



Soil They like a deep light loamy fertile soil but above all it must be well drained. They will grow on sand as long as it has plenty of muck. Make absolutely sure thete are no perennial weeds in your future asparagus bed: couch grass or ground-elder can ruin a bed, because they cannot be eliminated once the asparagus begins to grow. The roots get inextricably intertwined. People always used to have raised beds for asparagus, but nowadays some people plant in single or double rows. It doesn't really matter. I like a raised bed with three rows of plants, and as the years go on the bed tends to get higher because I put so much stuff on it. It is a good plan to cover it thickly with seaweed in the autumn. If it hasn't rotted down by spring take it off and compost it.

Sowing K luck really heavily in the autumn, buy or beg three-year old plants in spring and plant them eighteen inches (46 cm) apart measuring from their middles. The plants look like large spiders. Don't let them dry out before you plant them, and most important, pile a few inches of soil on top of them. Make sure the soil does not dry out, and keep weeding the bed. Don't let any weed live.

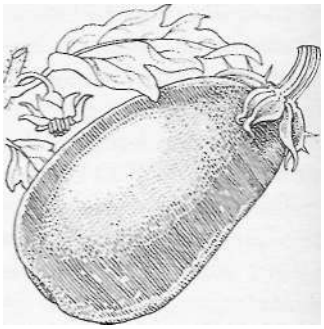
Treatment Don't cut any aspatagus the first year: not a single stick. In late autumn cut the ferns down to the ground, and muck well again. The following spring you can feed well with fish meal, mature chicken dung, seaweed, or salt (yes salt — asparagus is a sea-plant), and weed again. That second year you may just have a feed or two but delay cutting until June. Muck again in the late autumn, and feed again in the spring.

Harvesting The third year when the shoots look like asparagus shoots, cut them just below the ground. You can cut away fresh asparagus ready to eat every two or three days. They soon shoot up again, and you can go on cutting until the third week in June and then stop. No more cutting, and by then you will have plenty of other green things to eat anyway. Let the tall ferns come up again, cut them down in the late autumn to confound the asparagus beetle by destroying their eggs. Then, muck them, or feed them, or both, for these are lime and phosphate-hungry plants and like plenty of humus.

AUBERGINE OR EGG PLANT

Use Aubergines have, in recent years, become more popular in Britain. They can be used for exotic dishes like moussaka and ratatouille.

Sowing Sow aubergine seeds indoors in early spring. Sow them in compost and try to keep the temperature close to 60°F (16°C). Pot out into peat pots or soil blocks about a month later.

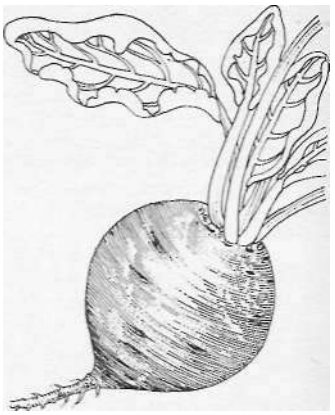


Planting Plant them out in the open in early summer. Protect them with cloches if you live in a cool climate. When you plant them pinch out the growing points to make them branch. Or you *can* sow seeds out in your garden under cloches in late spring and still get a late crop.

Harvesting Pick them when they are a deep purple and glossy. Pick before frost sets in.

BEETROOT

Use Beetroot is a very rich source of betain, which is one of the B vitamins. Beetroot therefore keeps you healthy, particularly if you grate it and eat it raw, but it tastes a hell of a lot better cooked, although tiny immature beet are good raw.



Soil Beetroot likes light deep loam, but most soil will do.

Treatment It doesn't like freshly manured land, and wants a good fine seed bed.

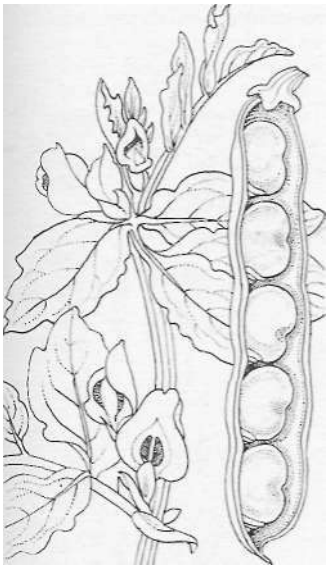
Sowing Sow the main-crop in early summer, very thinly, a couple of seeds every six inches (15 cm)! The seeds are multiple ones and you will have to thin anyway. Sow an inch deep (2.5 cm) in rows a foot (30 cm) apart.

Aftercare Thin andhoe. You can eat the thinnings raw in salads.

Harvesting You can leave them in the ground until they are needed, or else until the heavy frosts set in. Or you can lift them in autumn. Twist (don't cut) the tops off, and not too near the roots, or they will bleed. Clamp, or store in sand in a cool cellar.

BROAD BEANS

Use You can pick off the tops of autumn-sown broad beans and cook them. You can eat the seeds when they are green, which is their main use. Or you can dry them for winter. It is best to rub the skins off winter-dried beans to make them more tender.



Soil They will grow in most soil.
Treatment Treat the same as you would peas (see below). Lime well and use plenty of mulch.
Sowing 1 like to sow broad beans in late autumn, but then the climate here is fairly moderate. If the weather got intensely cold it might nip them off but it never has yet, although once or twice in severe frost they have looked pretty[7] sick. They perk up again though. If winter is too severe, or if you haven't been able to get seed in in the autumn, you can plant in early spring on light well-drained soil. The later you sow the more trouble you are likely to have from black-fly. Sow three inches (8 cm) deep, each seed eight inches (20 cm) from the next, in two rows eight inches (20 cm) apart. Common sense will tell you to stagger the seed in the rows. Each pair of rows should be at least two foot six (76 cm) away from the next pair.

After care In the spring, just as soon as the black-fly attack, as they inevitably will, pick the tender tops off and eat them. Hoe of course.

Harvesting Pick them as they are ready. Go on picking as hard as you can, and dry any that are left after the summer.

BROCCOLI

Hearting broccoli or winter cauliflower

Use Hearting broccoli are like cauliflower. They are a damned good winter and early spring stand-by, and you can have heads from late summer one year until early summer the next if you plant successionally and use a number of different varieties.

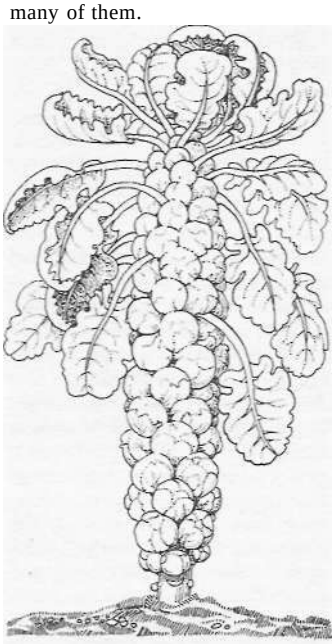
Soil They like good, heavy, firm soil, but will grow in most soil as long as it is well manured.
Treatment Like all brassica, broccoli needs lime and doesn't like acid soil. It likes deeply cultivated, but very firm soil.
Sowing Start sowing in seed beds in late spring and go on for four or five weeks.
Planting Plant out as soon as the plants are ready and you have the ground. Seedlings are ready when they are a few inches high and have made *at least* four leaves. Plant two feet (61 cm) apart in rows two feet six inches (76 cm) apart.
Aftercare Hoe regularly until the weeds stop growing in the autumn.
Harvesting Autumn varieties can be cut in September and October; winter varieties from January[7] to March; spring varieties up to April. To get late heads protect the curds (the white cauliflower heads) by bending leaves over them. Always cut when ripe, and don't boil, just steam lightly. (Don't "steam launder" any brassica as hospital kitchens and private schools do. This boils the life out of them.) Steam lightly until soft but still firm.

Sprouting broccoli, purple or green.

Use These are quite different from hearting broccoli. Purple sprouting broccoli is very hardy and therefore the great standby in late winter and early spring when there is not much else about. Green broccoli or calabrese is a delicious vegetable for autumn use.
Treatment This is the same as for hearting broccoli (see above), except that green broccoli is planted in midsummer. You pick and eat the purple or green shoots when they appear. Leave the leaves until the very last and then eat them too.

BRUSSELS SPROUTS

Use Sprouts are the most useful and delicious winter green vegetable. You simply cannot have too many of them.

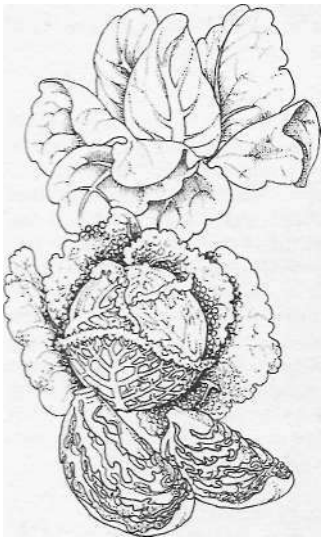


Soil They like deeply worked rich loam, but they will give a crop in most soils as long as it is deeply worked and made very firm.

Treatment Put on compost or muck the previous autumn, or plant after a well-mucked crop. If your soil is lime deficient, plant after a limed crop.
Sowing Sow in the open in seed beds during early spring, if you want late sprouts sow again in a few weeks time.
Planting Plant out in early summer three feet (91 cm) apart in rows three feet apart (91 cm). It is useful, especially in windy places, to give each plant a stake so that it can be supported and kept straight when it grows taller.
After care Hoe when required. "Intercrop" (plant in alternate rows) if you like with lettuce or another quick-growing catch-crop, because the spaces are wide. Keep free of slugs and caterpillars. If you didn't stake the plants in spring, in autumn earth up the stems to give support and to encourage the growth of new roots.
Harvesting Early sprouts are ready in late summer.but look on them, if you live in a reasonably temperate climate, as a winter standby. Christmas dinner without sprouts is a travesty, and they should keep you going until spring. Pick off the leaves only after they have gone yellow. Use the tops of the plants after you have picked the sprouts.

CABBAGE

Use Cabbage is the most reliable of all the brassica. It is not fussy about soil and treatment, yields a heavy crop per acre and some varieties can be stored in clamp, cellar, or sauerkraut vat. What we should do without cabbages I cannot think. There are three sorts: spring, summer and autumn, and winter.



Spring cabbage

Soil Light soil is ideal.
Treatment They like fertile soil which is not acid, and it needn't be particularly firm.
Sowing Sow during the summer in a seed bed.
Planting Plant in autumn, a foot (30 cm) apart in rows 18 inches (46 cm) apart.
Aftercare Hoe regularly, and you can top-dress with nitrogen if you want to.
Harvesting Use as spring greens

in the hungry gap - early spring - or leave a few to heart for eating in late spring and early summer.

Summer and autumn cabbage

Soil They are not very fussy.
Treatment See Spring cabbage.
Sowing Sow in late winter in a cold frame or in spring outdoors.
Planting Plant a few where there is room in early summer.
After care See Spring cabbage.
Harvesting You don't need many cabbages in summer anyway, but pick when you feel like a change.

Winter cabbage

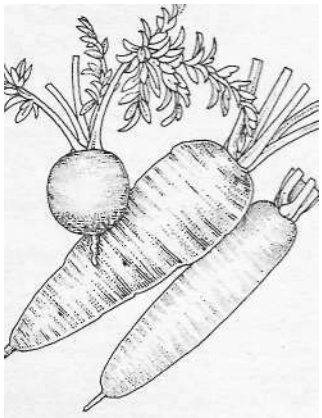
Soil They like a heavy loam.
Treatment See Spring cabbage.
Sowing Sow in seed beds in April and May.
Planting Plant two feet (61 cm) apart in rows two feet (61 cm) apart in midsummer.
After care Hoe regularly. Don't bother to top-dress.
Harvesting Where winters are not too severe leave them in the ground until you want them. Where there's lots of snow and ice, cut in autumn and clamp or make sauerkraut.

Red cabbage

Treat the same as Winter cabbage. Pickle or cook in oil and vinegar with spices. Cook it for some time because it is tough stuff.

CARROTS

Use Carrots have more vitamin A than anything else we are likely to grow, and in World War II it was put about that the uncanny success of British night fighter pilots was due to their huge consumption of carrots which helped them see in the dark. In fact, it was. all due to radar, which the Germans knew nothing about. Carrots store well through the winter and are a most useful source of good food for the self-supporter. They can be eaten raw in salads or cooked with absolutely anything. .«



Soil Carrots like a deep, well-cultivated sandy loam. They grow well in very light soil, almost sand in fact.
Treatment Like most roots they fork if planted in soil which has recently been heavily manured with muck or compost, although in fact well-matured compost doesn't seem to affect them so much. Shakespeare compared Man to a forked carrot. So don't plant them after fresh muck.They don't like sour ground (a pH of about 6 is fine). The land must have been deeply dug and then worked down into a fine tilth.
Sowing There is no point in sowing carrots until the ground is dry and warm, say in the late spring. Sow very shallowly, as thinly as you can, and tamp down rows with the back of the rake afterwards. Some people sow a few radishes in with them to show where the rows are before the slower carrots emerge. Then they pull the radishes for eating when they are ready. Some people intercrop with onions, in the belief that the carrot fly are put off by the onions, and the onion fly-are put off by the carrots.
After care If you sow in dry-weather, it is good to water the rows to start germination. Hoe frequently and carefully so as not to damage the carrors, and hand-weed as well. Suffer not weeds to exist in your carrot rows. To get a heavy crop thin to about three inches (8 cm) apart, then harvest every other carrot so as to leave them six inches (15 cm) apart. This is best for big tough 'carrots for winter storing, but for summer and autumn use don't bother to thin at all. When you do thin try to do it when it is raining (to thwart the carrot fly), or if it's not raining sprinkle derris dust around the plants. After thinning draw the soil around the plants and then tamp down so the scent of bruised carrots will not attract the beastly carrot fly.
Harvesting Pull them young and tender whenever you feel like it. Lift the main crop with a fork before the first severe frost of winter, and store in sand in a cool place such as a root cellar. You can clamp (see p. 183) them but they sometimes go rorten in the clamp. Washed carrots won't keep at all whatever you do. They rot almost immediately.

CAULIFLOWER

Use Eat them in summer and autumn. Hearting broccoli are apt to take over in winter. Cauliflowers yield well, but you need skill and good land to grow rhem successfully. They are not a beginner's crop.

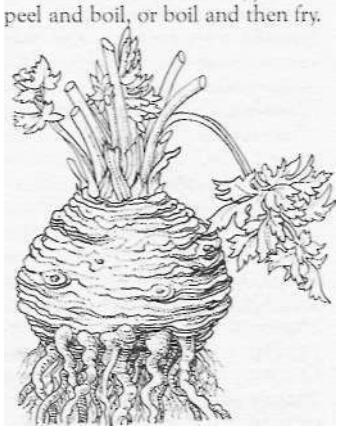
Soil They want deep, well-drained, well-cultivated soil, well manured, and with ample water. They won't grow on bad land or under bad conditions.

Treatment They must have non-acid conditions, like all brassica which means you must lime if necessary. A fortnight before planting fork on or harrow in a good dressing of fish manure or the like. They also need some potash.
Sowing They can be sown under cold glass in September or in a warm greenhouse in January or February. Sow outdoors in late spring. Plant two feet (61 cm) apart in rows two feet six (76 cm) apart.
Planting Autumn and winter sown plants go out in spring. Spring sown ones in summer.
After care Hoe of course. Make sure there is always plenty of moisture for they can't stand droughr. Top-dress with nitrogen if you have any. Keep them moving, in other w-ords, don't let them stop growing.

Harvesting Cut them when they are ready, early in the morning if possible. Don'r boil them to death. They are nice boiled, then dipped in batter, fried and eaten cold.

CELERIAC

Use You can grate the big swollen roots and eat them raw. Or, you can peel and boil, or boil and then fry.

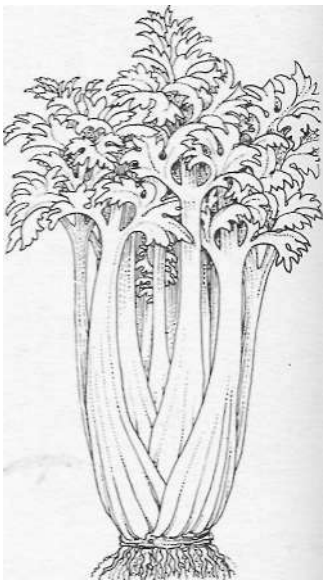


Sowing Sow, prick out and plant out just like white celery.
After care When you hoe draw the soil away from the plants instead of earthing them up as you would for celery.
Harvesting Begin harvesting in autumn. Earth them up in the middle of November for protection against winter frost.

CELERY

White celery

Use It is said that celery is best after the first frost has been on it. If you are lucky it will keep going until a few weeks after Christmas as long as you ridge it well. It is a most delicious and useful winter vegetable whether eaten raw, as the blanched stems should be, or cooked in stews as the tops should be.



Soil It loves deep fertile soil, very moist but not sw-ampy. The very best celery is grown in soil which is high in organic matter and retains moisture. Don't ler the soil dry out.
Treatment Celery- prefers acid to alkaline conditions, so never give it lime. It needs plenty of humus so dig in muck orw'ell-rotted compost where ir is going to grow.
Sowing Sow under glass at a temperature of between 60°F and 65°F (16°C and 19°C) in spring, or buy plants from a nursery. The seedlings must be kept moist. Sprav them with water at least twice a day.
Planting Early summer is the usual time to plant. Plant very carefully a foot (30 cm) apart in trenches with muck underneath. Soak well with water.
After care You can grow catch-crops such as lettuce or radish on ridges between the furrows. Wher. these catch-crops have beer. harvested, earth up the celery. Cut off the side shoots. Then hold the plants in a tight bunch and earth

up so only the tops of the leaves are above the new ridges. Always keep ground moist. Never let it dry-out. To prevent leaf blight spray with Bordeaux Mixture (see p. 87) once or twice as you would spuds. If you want to extend the eating season in the winter protect the plants with straw, bracken, cloches, or what you will. Or you can heel them into dry ground in a protected position if you fear very hard frost. It makes harvesting difficult.

Harvesting Dig them out whenever you want them and eat them fresh.

Self blanching celery

You can grow this on the flat, in the same conditions as ordinary or white celery (see above). But you don't need to earth it up. It gets used before the white celery and must be finished before hard frosts begin as it is not frost-hardy. It is not as good to eat as white celery, but is a good standby in the autumn before white celery is readv.

CHICORY

Use Chicory makes good winter salading.

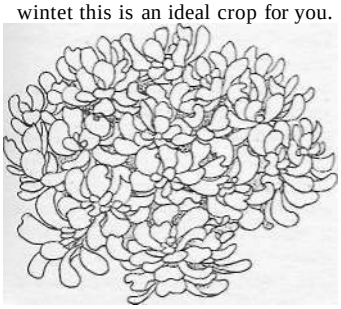
Sowing Sow the Witloof type in early summer in a fine tilth, and thin to a foot (30 cm) apart in rows 18 inches (46 cm) apart.

After care Cut down to just above the crown in November. Lift and plant in pots and keep in the dark at 50°F (10°C) or thereabouts. They will then shoot.

Harvesting Break the shoots off just before you need them. They should grow again every four weeks or so. Keep picking.

CORN SALAD

Use If you like eating salad in the wintet this is an ideal crop for you.



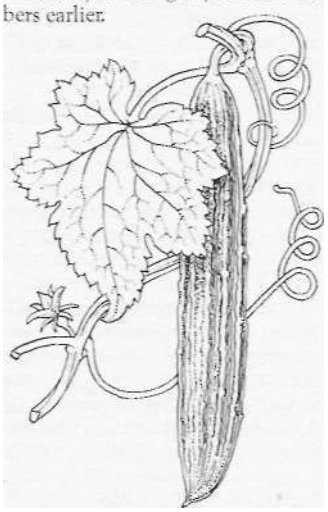
It produces leaves like tender young lettuce leaves.

Sowing Sow in drills one foot (30 cm) apart in late summer.

Harvesting Cut it when the plant is short with just three or four leaves. Don't let it get too lanky.

CUCUMBERS AND GHERKINS

Use Ridge cucumbers and gherkins, both of which are fine pickled, can be grown out of doors. Frame cucumbers, which are better looking and better tasting when fresh, are grown in frames or under cloches. A heated greenhouse is even better because you will get your cucumbers earlier.



Soil Cucumbers will grow on light soil if it has plenty of manure in it. They must have plenty of moisture, and they don't like acid soil.

Treatment Dig plenty of mulch in during the previous autumn.

Sowing Frame cucumbers can be sown, under cover, in early spring. It is ideal if you can start them off in a heated greenhouse, keeping the temperature at about 60°F (16°C). Outdoor types can't be sown until early summer unless they are protected for the first month. In wet climates plant six seeds of an outdoor variety- on a small hill, four inches (10 cm) high and later thin out to the three best plants on each hill. In dry climates use the same technique, but plant in a small depression that has had plenty" of muck or compost dug below it the previous autumn.

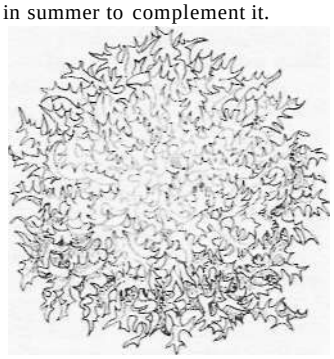
Planting Outdoor cucumbers just continue to grow where you plant them. Frame cucumbers can be hardened off in early summer. If you grow cucumbers in a greenhouse, pot them in peat pots as they grow big enough to handle, then plant them, pot and all, in the greenhouse soil when they are about to outgrow the pot. Always water them with warm water, keep the greenhouse humid and well ventilated.

After care They must have plenty of water and never be allowed to get dry It helps to soak muck in the water. Ridge cucumbers should have all the male flowers pinched off them, so that the female flowers which produce the cucumbers don't get fertilized. If they do the fruit will be bitter. And ridge cucumbers should also have the growing points nipped out when the plant has seven true leaves.

Harvesting Pick them regularly while they ate young and they will go on cropping. Pickle the last lot before the first frosts.

ENDP7ES

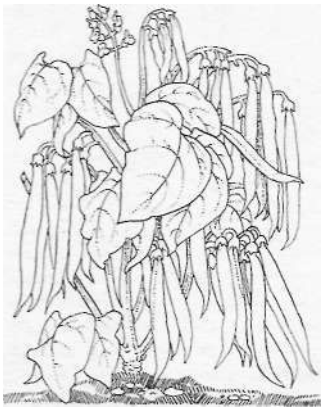
Use A vegetable which can be eaten in winter instead of lettuce, in summer to complement it.



Sowing Sow in mid summer and put cloches over in late summer. Whitewash the cloches so as to keep out the light and the endives will blanch and make good winter salading. Blanching also helps to reduce the bitter flavour. For summer endives sow in the open from spring onwards and eat, green, in salads.

FRENCH BEANS AND DRIED BEANS

Use Haricots are ripe French beans that have been dried for winter use. Butter beans and Lima



beans are specifically for drying and using in the winter. For vegetarians such dried beans are really necessary, because they are about the only source of protein readily available to them in winter time. French beans can be eaten green, pods and all, just like runner beans.

Soil They all like lightish well-drained, warm soil. It's no good trying to grow them in heavy clay or on sour land.

Treatment Like all the legumes, thev grow best after a heavily mucked crop. Lime well if necessary.

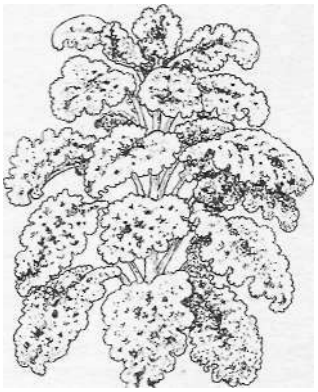
Sowing Sow in early summer in a temperate climate. They are all very frost-tender, and will not thrive if sown in cold damp ground. Sow in a wide drill, about two inches (5 cm) deep, in two staggered row"S, so the beans are about six inches (15 -cm) apart.

After care Hoe well, and draw the soil around the plants. Dwarf varieties don't need sticking but high varieties do. Any arrangement of sticks, or wire and string supported on poles, will do.

Harvesting If the beans are for drying for the winter let them get quite ripe, then pull the plants intact and hang them upside down from the roof of an airy shed. Thresh them as required. If you are eating them green pull them and pull again. The secret of having plenty of them, young and fresh, is to keep on picking.

KALE

Use Kale is very hardy and therefore an excellent winter green standby. It will grow in cold and wet climates where there is little other greenstuff in wintet and early spring. In the highlands of Scotland the "kale-yard" has often been the only source of greenstuff in winter.



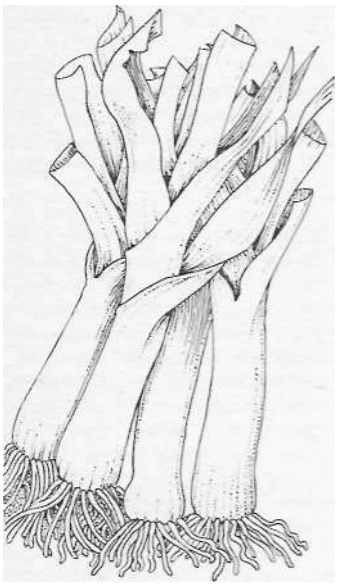
Soil Kale is not at all fussy, but the richer the soil the better the crop.

Treatment See Spring cabbage.

Sowing Sow during late April and

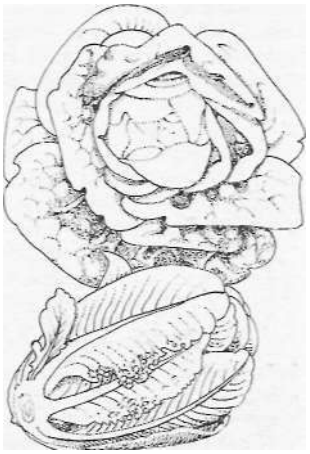
early May in colder climes and in early April in warmer ones.
Planting It is a good idea to sow the seed *in situ* and not transplant it, but thin it instead. But you can transplant it if you need the land.
After care See Spring Cabbage.
Harvesting Leave kale until you really need it, that is after the Brussels sprouts have rotted, the cabbages are finished, the slugs have had the rest of the celery, and the ground is two-feet deep in snow and only your kale plants stand above it like ship-wrecked schooners.

LEEK
Use In cold wet areas this is one of the most useful plants, for it stands the winter and provides good food and vitamins in the months when perhaps little elsehas survived except kale. Onions are hard to grow and to keep, but leeks are an easy substitute. The Welsh are very sensible to have this excellent plant as an emblem and not some silly inedible flower or a damned thistle.



Soil Leeks grow on pretty well any soil as long as it is not watetlogged.
Treatment Heavy manuring is advantageous. Most people plant leeks out on land from which early potatoes have been harvested and which has been heavily mucked for that purpose. If you can't lift your earlies before mid summer however, this is too late. You must plant on other ground, which should be well dug and manured.
Sowing Sow the seed in the general seed bed, an inch (2 cm) deep in rows a foot (30 cm) apart, in spring.
Planting The traditional way to plant leeks is to chop the bottoms off the roots and the tops off the leaves of the little plants, and just drop the plants in small holes and leave them. If you do this they grow and make leeks, but I have come to believe that this is a silly idea, and it is better not to mutilate the plants and also better to plant them properly. Why not try both methods and compare them? Draw drills three inches (8 cm) deep with a hand-hoe or a wheel-hoe and plant the leeks five inches (13 cm) apart in the furrows. Make a biggish hole for each leek and plant carefully making sure'that the little roots are not doubled up. Don't press down as you would onions. Just water them in and this will wash a little loose earth into the hole round the roots.
After care Hoe them of course and ridge them, raising the ridges from time to time so as to blanch the lower parts of the stems.
Harvesting Leave them until you really need them and then, towards the end of the winter, dig them out and "heel them in" on another small piece of ground. Heeling in means opening a slot in the ground with a spade, putting the leeks in quite thickly, and heeling the earth back on their roots. They won't grow any more like this, but they will keep alive and fresh until you need them. They are very hardy and don't mind frost.

LETTUCE
Use Lettuce is the firm base of salads throughout all the fair months of the year, and with a little glass protection we can even have them through the winter if we feel we must. They are not a brassica so we needn't worn" about club-root. Try growing different types of lettuce - some are much crisper than others.

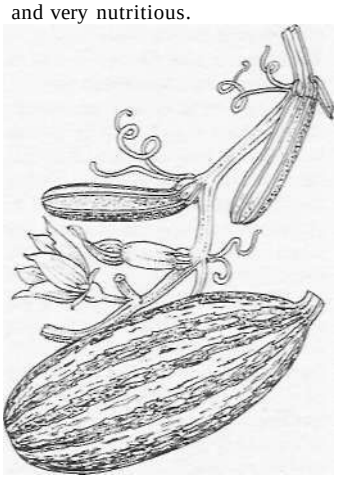


Soil They like good soil, but will grow on most soil, especially if it is richly manured. Lettuce likes it cool and will stand shade but will not grow well near trees. They like a moist climate.
Treatment Dig in well rotted muck or compost tor summer lettuce, but not for winter, as winter lettuce doesn't like too much fresh manure: it gets botrytis. Work down to a fine seed bed.

Winter lettuce
Sowing and planting Sow about an inch (2 cm) deep in late summer and then expect to protect them with cloches or something over the winter. Of course in very cold climates winter lettuce is out. You can sow wintet lettuce in seed beds with the intention of planting them out in early spring to get an early crop. And of course, you can get lettuces all winter in a heated greenhouse.

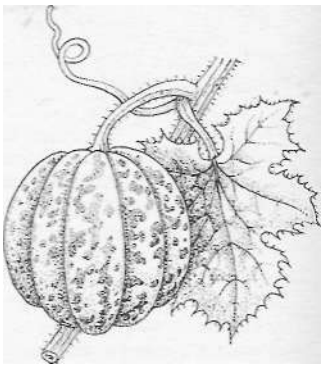
Summer lettuce
Sowing and planting Sow-thinly starting in the spring with a foot and half (46 cm) between rows. Thin the plants out to over a foot apart, and transplant the thinnings elsewhere because they transplant easily. Don't sow too much at one time, but keep on sowing throughout the summer.
After care Hoe and hoe and water whenevet necessary. Keep eating.

MARROWS, SQUASHES AND PUMPKINS
Use They can be kept for the wintet, and are rich in vitamins and very nutritious.



Soil Nothing is better for these than to grow[7] them on an old muck-heap, and that is what we often do. They love a heavy soil.
Treatment If you don't plant on a muck heap dig in plenty of muck or compost in the autumn.
Sowing Sow seeds in situ in late spring under cloches or, better still, under upturned jam jars. Otherwise sow in soil blocks or peat pots under glass. Harden plants off gradually in early summer, by propping the jam jars up in the day, for example, and putting them down again at night. Remove the glass, or plant the potted plants out in the open, a few weeks later Plant three seeds to a station and have the stations six feet (1.8 m) apart because these things like to straggle.
After care Hoe of course, water when necessary, mulch if vou can and beware of slugs.
Harvesting Keep cutting them when they are young and tender and you will get more. Young marrows, or courgettes, are particularly good. In late summer leave some to ripen, and store them out of the frost in a cool place, preferably hung up in a net. In southern Africa, where you don't get too much frost, pumpkins are thrown up on corrugated iron roofs and left there all winter. They dry out in the winter sun, become delicious and form the chief wintet vegetable of that part of the world.

MELONS
Use Melons grow outdoors in warm climates, and can be grown outdoors in cool climates as long as you start them off under cloches after the last frost. But they are best grown under protective frames in cooler climates.



Treatment Treat them exactly like cucumbers, but don't remove the male flowers. Plant them on small hills six feet (1.8 m) apart.

ONIONS
Use Good food is inconceivable without onions.
Soil They like medium loam well drained, deeply dug and richly composted. Onions are a demanding plant.
Treatment The soil must not be acid, so if necessary lime it in the autumn. Dig deeply in the autumn and incorporate manure or compost. Get it down to a fine tilth in the spring and then get it teally firm,

because firm soil is a necessity for onions to grow well.

Sowing You can sow in mid-summer, and leave in the seed bed until spring. Or you can sow in early spring, or as early as the ground is dry enough to walk on without it caking. Sow very shallowly, very thinly in rows ten inches (25 cm) apart, if you intend to thin the onions and grow them *in situ.* But you can have the rows much closer together if you intend to plant them all out. Rake the seed in very lightly and firm the soil with the head of the rake.

Planting Plant very firmly in firm soil, but don't plant too deeply. Plant summer sown seedlings in early spring - whenever the soil is dry enough. Inter-rowing with carrots is said to help against onion fly, and I believe inter-rowing with parsley is even better.

After care Growing onions means a fight against weeds which seem to love onions, and the onions have no defence against them from broad shading leaves as many crops have. Now I know that some people say onions will grow well in a mass of weeds, but my experience is that you must keep them free of weeds in the early months of their growth. It is true that if large annual weeds grow among them for, say, the last month they may still grow into good onions. I like to keep them weed-free and mulch them well with pulled-out weeds in their later stages. If you are growing onions *in situ* in the seed-bed, single them to about four inches (10 cm) apart. If you have sown very thinly you might like to try not thinning at all. You will get smaller onions but they will keep better.

Harvesting When the tops begin to droop bend them all over to the ground. This is said to start the onions ripening, and possibly it also stops them growing up and going to seed. After a few days pull the onions and lay them down on bare soil or, better still, on a wire netting frame to keep them clear of the ground. Turn them occasionally. The more hot sun that falls on them the better. Before the autumn string them and hang them up, or hang them in net bags, or lay them on wire netting in a cool and draughty place. The air must be able to get between them. They don't mind some frost, but can't stand lack of ventilation.

Shallots

Sow the bulbs in late winter and you get lots of litde onions that grow around the first bulb next summer. You can then go on picking until autumn. Keep some of the best bulbs to plant next year.

Tree onions

These onions are perennial so once you have planted them they will grow year after year. Each year, when the plant grows, little onions will form at the tips of the stems. When this happens you must support the weight of the plant on sticks. Plant six inches (15 cm) apart in rows 18 inches (46 cm) apart. You can use the onions that form underground as well as those on the leaf tips.

Pickling onions

These like poor soil. Broadcast the seed in spring and lightly rake it in. Hand weed but don't thin. Pull and pickle when ready.

Salad onions

Sow these like ordinary onions in late summer and again if you like in early spring. Don't thin, and pick to eat as required.

Onion sets

These are the lazy man's way of planting onions. Sets are immature bulbs, with their growth arrested by heat treatment. Plant them early in the spring very firmly, and re-plant any the birds pull out. Then treat them like ordinary onions. They are much easier to grow.

PARSNIPS

Use Parsnips make the best of the root wines, and, properly cooked and not just boiled to death, are a magnificent vegetable, very rich in vitamins A, B and C.

Soil They grow on any soil provided it is deep and not too stony. As with all root vegetables, don't use fresh manure.

Treatment They like potash, and the ground must be deeply dug. If you want to grow really big ones make a hole with a fold pritch, or steel bar, and fill the hole with peat and compost, or a potting compost, and sow on this.

Sowing Drill anincfr(2.5 cm) deep and fourteen inches (36cm) apart, in early spring, or as soon as the land is open and dry enough. They take a long time to grow so sow-some radish .with them, as these declare themselves first and enable you to side-hoe.

After care You can intercrop with lettuces for one lettuce crop. Then hoe and keep clean.

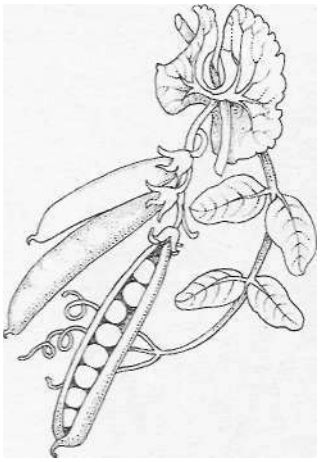
Harvesting Leave them in the gtound as long as you like. They are far better after they have been frosted. If you want them during hard frost, when it would be difficult to dig them out, pull them before the frost and leave them in a heap outside or in a shed. You can boil them in stews, but they are far better baked around a joint in fat, or partly boiled and then fried in slices. There are old boys in Worcestershire who devote half their gardens to rhubarb and half to parsnips. And the whole lot of both crops go to make wine!

PEAS

Use Eaten green, peas are delicious and extremely nutritious. Allowed to dry they can be kept through the winter and cooked like lentils. It is better to have fresh green peas in their season, and only then, so that you come to them every year with a fresh and unjaded palate. Freezing them is a bore.

Soil They like a medium loam but will grow on most soils. Like all legumes (and brassica) they don't like acid ground. They like to be kept moist.

Treatment If you want a bumper crop dig a trench in the autumn, fill it with muck, compost, or any old thing so long as it's organic, and bun- it. Lime the soil well. Plant in what is left of the trench in the spring. But this is very laborious. Put your peas in after your spuds and your land should be well mucked already.



Sowing I personally sow peas thick in a little trench dug about three inches (8cm) deep with a hoe. And I eat a hell of a lot of peas. Plant each pea two or three inches (5-8cm) from its neighbour. Cover and firm the soil over the peas. It helps a lot to have soaked the peas for two or three days first to get them germinating so they sprout early. Also swill your seed in paraffin to deter mice. Birds too are a menace; wire pea-guards are an answer, and so is a good cat.

You can sow some round-seeded peas in November in mild climates, and some more in February. For this the land must be light and dry. Of course if you cloche them it helps. You will thus get very early pickings, but for most of your crop sow from mid-March onwards in successional sowings right into July. For your last sowings use, paradoxically, "early" varieties. They will ripen quickly before the frosts cut them down.

After care Hoe until the pea vines themselves smother the weeds. And mulch does wonders with peas for it keeps the ground cool and moist, which is just what peas like.

Harvesting Pick them young to eat raw in salads, and then when the pods are tighter packed, pick for cooking. Keep picking as hard as you like, and if you have more than you can eat green, let them ripen on the vines and harvest properly. In other words, pull the vines when they are dead ripe (but

before the autumn) and hang them up in the breeze but out of the rain. Thresh them in due course, stow them in jars, and eat them in soup.

PEPPERS

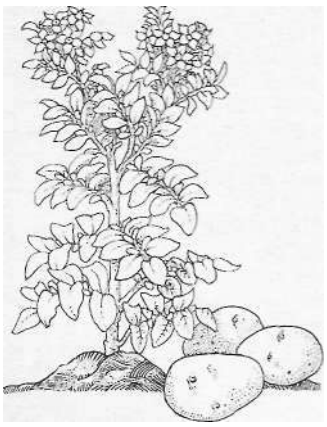
Use The peppers we can grow have nothing to do with real pepper, which is grown on vines in Malabar and marketed entirely by a strange lost race called the White Jews who have a monopoly of the trade.

Sowing and planting Sow seed indoors in early spring, and plant out in the garden on well-mucked ground at least a fortnight after the last possible frost, under cloches if you have them in cold climates. Plant two feet (60cm) apart in rows three feet (91cm) apart. After the ground has really warmed up, mulch. Peppers need moisture but not too much or they will die off. So in a wet climate plant them on the tops of ridges.

Harvesting Harvest them when they are green or leave them to turn red.

POTATOES

Use Quite simply one can live on them. They are one of the best storable sources of energy we can grow, and are our chief source of vitamin C during the winter.



Soil Potatoes like good strong soil. They will grow in clayey loam, love peat and are one of the few crops that not only tolerate but like acid soil. If you lime before planting they will get scabby. They want plenty of muck.

Treatment Better to dig deeply in the autumn and dig again in the spring, this time making ridges and furrows. They don't want a fine tilth but they want a deep one. Throw as much muck or compost as you can spate into the furrows before planting. Plant the spuds straight on top of it.

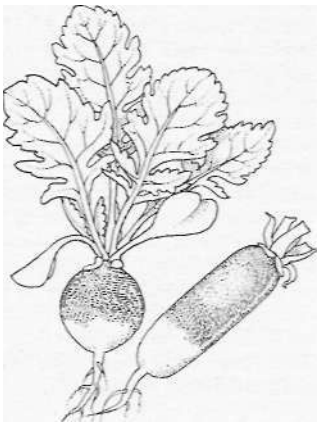
Planting Put your first earlies in when other people in your locality do, or a fortnight earlier under cloches or transparent plastic. The slightest touch of frost on the leaves blasts them and they have to start growing all over again. If you want early potatoes chit your seed potatoes, that is lay your early seed in trays, on shelves, or on old egg trays, in the light and not in the frost. 40°F to 50°F (5°C to 10°C) is right. When you plant them be careful not to knock off all the shoots. Leave two on each tuber. Don't chit the main crop. Bung them straight in in the late spring, but not before. Plant earlies only about three inches (8cm) deep, a foot (30cm) apart in rows eighteen inches apart. Plant main crop eighteen inches (46cm) apart in rows eighteen inches apart, but plant them about five inches (13cm) deep.

After care As soon as leaves show, earth up. In other words bank earth lightly over the potatoes. Three weeks later earth up some more, and with main crop earth up again in another couple of weeks. Hoe between the rows. Spray with Bordeaux Mixture (see p. 87) when the weather gets warm and muggy to prevent blight.

Harvesting If you have plenty of early potatoes in, don't deny yourself a feed or two when they are quite tiny: why should you? Then go on digging earlies until they are finished. If you have second earlies go on to them. Your main crop will then take over for immediate eating, but don't lift the bulk of the main crop until the haulms (tops) have completely withered away. Then fork them out carefully and let them lie on the ground for a day and a half to set their skins (more than two days might start them going green in which case thev become poisonous). Then clamp them, or put them in a root store in the dark. They must never be allowed to be affected by frost or thev will go bad.

RADISHES

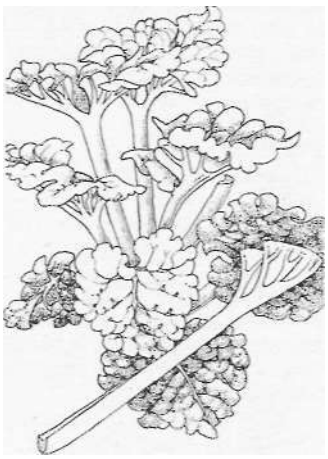
Use Radishes grow just anywhere. Add them to salads for extra flavour, crunchiness and colour.



Sowing Sow the large seeds in drills and pick them when they are ripe after about six weeks. They are brassicas, but grow so quickly that they don't get, or perpetuate, club-root. Put in successional sowings all through the spring and summer so as to have a constant supply of tender young ones. Don't let them get old and go to seed.

RHUBARB

Use Rhubarb is a perennial, and once you have planted it, or inherited it, you have got it for good.



Soil Pretty well any soil is fine.

Treatment Put on plenty of muck.

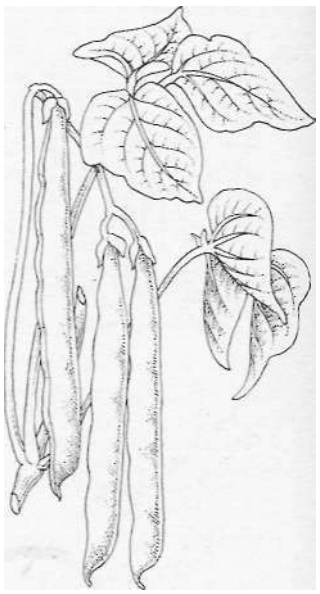
Planting Buy or cadge crowns and plant them in late autumn. Leave three feet (91cm) between plants and four feet (1.2m) between rows and put some nitrogenous fertilizer on top to turn it into a self-activating compost heap. Put upturned pots or buckets over some of the plants in spring to force them on early.

After care Cover the beds with deep straw in autumn.

Harvesting Pull what you want when the stems are thick and tall. Leave what common sense will suggest, so as not to rob the plants too much.

RUNNER BEANS

Use These come later than the drying beans described earlier. They yield very heavily, are tougher and have a coarser, and I think better, flavour. They need more care in planting and must have tall sticks. Salted they are a great standby for the winter.



Soil They like good rich deep soil.

Treatment Double dig a deep ditch in early spring and incorporate plenty of compost or muck in the bottom of it. If you have comfrey leaves dig them in, because they are rich in potash which all beans like. As they come in your bean break you will already have limed the ground, if you had to, the previous autumn.

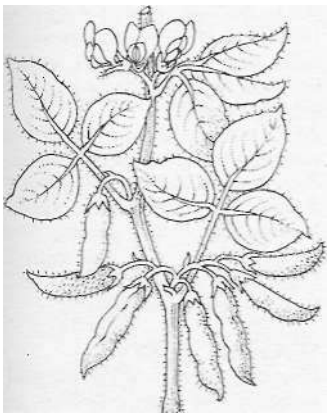
Sowing Sow them in the early summer in a wide but shallow trench two inches (5cm) deep in two staggered rows with the seeds nine inches (23cm) apart. Leave at least five feet (1.5m) between stands of beans. Put in tall sticks early enough for the beans to get a good start. Otherwise you can pinch the growing tops out and let the vines straggle on the ground, but you won't get much of a crop and in my opinion it's a poor way of growing these magnificent climbing plants which can be about the most beautiful and productive things in your garden.

After care Hoe of course and keep well watered in dry seasons. When they start to flower make sure they have plenty of water.

Mulch with compost if you can, and spray the flowers with water occasionally because this "sets" the flowers in the absence of rain.
Harvesting Just keep on picking. If you can't cope with the supply, and you probably can't because they crop like hell, just pick anyway. String the beans, slice them (you can buy a small gadget for this), and store them in salt (see p. 182). Pick them and give them to the pigs rather than let them get old and tough. Keep some though to get ripe for seed for next year.

SOYABEANS

Use Soya beans have been grown in Asia for centuries. They came to the West less than 200 years ago - and are now proving to be a very worthwhile crop to grow in warm areas because of their high protein value. They do need a long, warm growing season though - at least 100 days. They can be eaten green like peas or the beans can be left to ripen and then dried for use all through the winter. The beans can be ground into flour.



Preparation Dig the ground in autumn and add plenty of lime.
Sowing Sow in the late spring about an inch (2.5cm) deep, three inches (8cm) apart in rows two feet (61cm) away from each other.
Harvesting Pick the beans for eating green when they are young, certainly before they turn yellow. It is easier to remove the beans from the pods if they are boiled for a few minutes first. If the beans are for drying or for flour, leave them on the plants to ripen but they must be picked before the pods burst and release the beans. Judge this carefully but be guided by the colour of the stems on the plant - they should still be green.

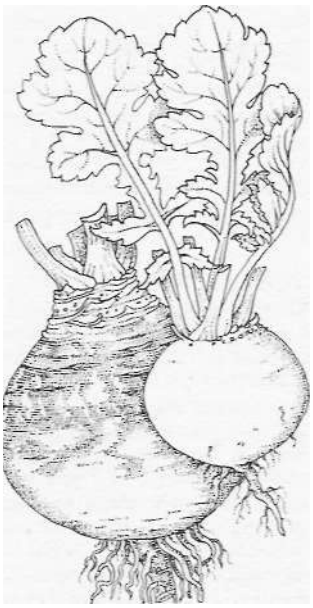
SPINACH

Use There are several kinds of spinach, but treat them all as just spinach. There is New Zealand spinach, spinach beet, perpetual spinach, seakale beet.
Soil Like nearly even-thing else spinach likes a good rich loam, so give it as much muck as you can. It will do well on clay but is apt to run to seed on sandy land unless you give it plenty of muck.

Sowing Sow an inch (2.5 cm) deep in drills a foot (30cm) apart. Later thin the plants in their rows to six inches (15 cm) apart.
After care Hoe, mulch and water during the summer.
Harvesting Pick the leaves when they are young and green, taking only a few from each plant leaving the smaller ones ro grow bigger. Don't boil spinach. Wash it in water and put the wet leaves in a saucepan and heat over a fire. When you harvest seakale beet pull off the stems as well as the leaves. Eat the stems like asparagus.

SWEDES AND TURNIPS

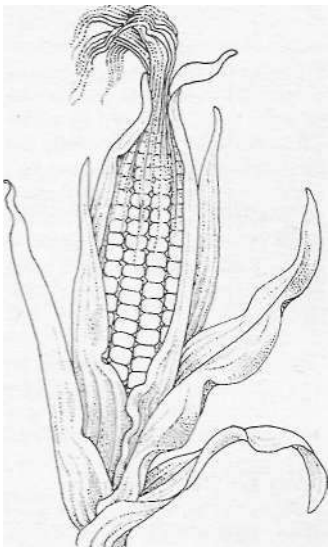
Use Swedes and turnips can be eaten young and tender in the summer and autumn and clamped for winter use. Turnips will survive in the ground until severe frosts begin, maybe till Christmas in temperate climates. Swedes are much hardier and will live in the ground all winter. All the same it is handiet to pull them and clamp them so you have them where you need them. They are cruciferous, which means they are subject to club-root, and should therefore be part of the brassica break so that this disease is not perpetuated. You want to leave the longest possible gap between crops that are prone to club-root. Kohl-rabi is much like turnip and is grown in the same way.
Soil Light fertile loam is best. Keep it well-drained, but not too dry. But turnips, particularly your main crop for storing, will grow on most soils.



Treatment In heaw rainfall areas, say over 35 inches (89cm) a year, it is a good thing to grow turnips and swedes on the tops of ridges to aid drainage. So ridge up your land with a ridging plough, or on a small scale with a spade, and drill on the ridges. If you want to grow on the flat just treat the land as you would for spring cabbages (see p. 147).
Sowing Very early sowing can be done in the early spring or a week or two before the last probable frosts, but you can sow turnips and swedes right up until August. Sow the seed shallowly in drills about nine inches (23cm) apart. Cover and press down.
After care Beware the flea-beetle. These are little jumpers that nibble tiny holes in the leaves. You can kill them by dusting with an insecticide, or you can trap them with a special little two-wheeled arrangement. The sticky underside of a board goes along just over the plants and a wire brushes the plants. The beetles jump and get stuck to the board. It sounds silly but it works. Thin to fout inches (10cm) apart in the rows while they are still quite small. Hoe at least twice again afterwards.
Harvesting Eat them when they are ready (after about two months), or leave until early winter and pull, top, and clamp them.

SWEET CORN

Use Sweet corn is maize that has not been allowed to get ripe. The seeds are still fairly soft and slightly milky, and the carbohydrate is mostly in the form of sugar, which is soluble and can therefore move about the growing plant. As the cobs mature or when they are picked, the sugar changes to starch. It will grow in the hottest climates, and in temperate climates if you grow hardy varieties.



Soil Sweet corn will grow in most good well-drained soils, but it is a greedy feeder, likes plenty of muck, and a pH of about 6.5.
Sowing A long growing season is essential but sweet corn can't stand frost, so if we plant it a week or two befote the last likely frost under upturned jam jars, or little tents of plastic, or cloches, so much the better. In warm climates you can sow it straight out in the open in early summer, but if your summers are a long time coming you would do bettet to sow it in peat pots indoots in late spring and then plant it out. Sow the seed an inch (2.5 cm) deep, fifteen inches (28 cm) apart in rows two and a half feet (76cm) apart. And try to sow in blocks, nothing narrower than four rows for example, because make is wind-pollinated, and if it is sown in long thin lines many plants will not get pollinated.
Planting If you have grown it in pots plant it out very carefully, because it doesn't like being disturbed anyway. Plant out when it is about five inches- (13 cm) high and preferably plant peat pot and all. Water well after planting, but it is a lot better if you can sow them in theit final position.
After care Hoe and top dress with nitrogen about a month after planting if your soil is not as rich as it should be, to keep the plants growing. Apparently the

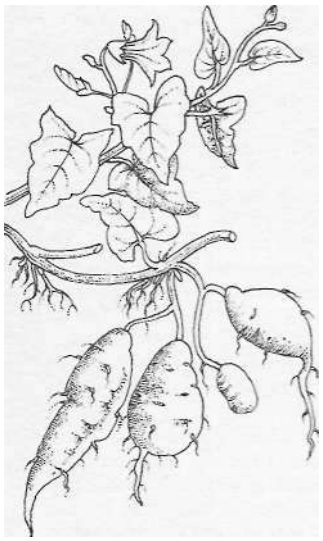
Amerindians used to bun' a dead fish under each plant. This is a very good idea, for the nitrogen would become available just when it was needed. I know a vet who gave all the dogs he "put down" to a fruit farmer who buried them under his newly planted apple trees for the same reason.

Harvesting Break the cobs off in the milky stage after the tassel has begun to wither and turn brown. To test, pull the leaves off part of a cob and press your thumb nail into the gtain. It should be milky. They say you can walk down the garden to pick your corn, but you must run back to cook it; it must be dead fresh. This is because the sugar starts turning into starch as soon as you pick it and it loses flavour. If you have too many cobs, you can dry them in the way described on p. 182.

The straw makes good feed for cows, litter for pigs, or material for the compost heap, and it is a valuable crop for this teason alone.

SWEET POTATOES

Use Sweet potatoes can be your staple food in a dry warm climate, but you won't get much of a crop in a damp cool environment. They are very frost-tender.



Soil They grow in sand, or sandy loam, and they don't like rich soil.

Treatment Just dig deeply. You needn't add anything.

Planting Plant tubers just like potatoes (if you are sure they haven't been sprayed with a growth-inhibitor). Plant them 16 inches (41cm) apart in rows 2 feet .6 inches (76cm) apart. Don't plant them anywhere in the world until two weeks after the last frost.

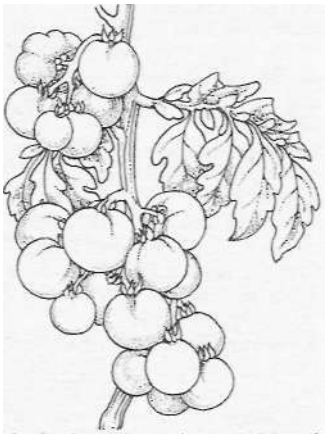
After care Just hoe.

Harvesting Dig them up very carefully at least a fortnight before the first frost. Cute them by laying them carefully on hay and leaving them out in the sun for about ten days. They don't go green because they are no relation of real potatoes. Turn them from time to time. If there isn't enough sun keep them somewhere with 90 percent humidity between 80°F (27°C) and 90°F (32°C) for ten days. Store them packed lightly in straw in an airy place at not less than 50°F (10°C).

TOMATOES

Outdoor tomatoes

Use Outdoor tomatoes are a dicey business in any cold wet climate. What they need is a warm dry ripening season in late summer, and that is what, where I live, they don't get. But green tomatoes make famous chutney and if you store them well they sometimes get ripe in store, although they never taste like sun-warmed fruit picked off the vine and eaten straightaway. But if you can grow them they are an enormously valuable crop for bottling to keep your family healthy during the dark days of winter. They really are bottled sunshine.



Soil The soil must be well-drained, and in a sunny but sheltered position in cold climates.

Treatment I ridge the land in the autumn, put well-rotted compost or muck in the trenches in early spring; split the ridges over it and then plant the tomatoes on the new ridges.

Sowing The most luxurious tomatoes I ever saw" growing were on the overspill of a sewage works, which leads one to think that it would be better to eat the seed before we plant it. But failing such extreme measures sow thinly under glass in John Innes seed compost, or in any equivalent seed compost, including the kind you make yourself. If you sow in the late spring in a temperate climate the plants will grow even if you have no heat in your greenhouse, but if you do have a little heat so much the better. It you have no heat put thick newspapets over the seedlings at night to keep them warm. 55°F (12°C) is right. Water diligently with luke-warm water but not too much. Don't drown them. Or you . can sow direct, in situ, a week or two later, under cloches in warmer climates, or just out of doors in hot climates.

Planting Most people plant twice. First, when they have thtee to four true tomato-type leaves they plant in either soil blocks, or peat pots, or in compost in small flowerpots. These pots can be put into cold frames and the plants gradually hardened off. Then plant out in the first fine warm weather in early summer. Plant very carefully, retaining as much of the compost on the roots as you can, and plant a little deepet than they were before. Plant on the mucked ridges described above. Give each plant a tall stake for support as it grows bigger and heavier.

After care Hoeing and mulching, within reason, help, and with low-fruiting varieties it is common sense to put clean straw on the gtouhd to protect the fruit. Pick out all side-shoots. These are little shoots that grow between the fruiting blanches and the main stem, rather as if you had another little arm growing out of your arm-pit.

You cannot pamper tomatoes too much. Water them whenever they need it. Many gardeners soak muck in the water so that they feed the plants as they watet them. As they grow taller tie them carefully to the stakes with raffia or string." Spray them with Bordeaux Mixture to protect them from potato blight. (The tomato is so closely related to the potato that it is almost the same plant.) Don't touch them with • tobacco-stained hands, because you can convey tobacco virus disease to them. (The poisonous tobacco plant is also closely related to the tomato.) Allow the plants to set about four trusses. To.ripen tomatoes in dull climates it is often advantageous to lay them down flat on clean straw and place cloches over them. Some people pull leaves off-"to let the sun get to the fruit". I don't think this" is worth it.

Harvesting Homegrown torn atoes are so good to eat (immeasurably better than bought tomatoes that are bred for "a long shelf life" and not fot flavour) that you will not be able to stop eating them as they ripen. But try to bottle as many as you can. We wallow in vitamins in the summer: it is for the winter and the hungry gap that we need them.

Indoor tomatoes

Use If your greenhouse is heated you can sow seed in early winter and get ripe tomatoes in spring. If you don't want to eat them all you can sell them at a good price.

Sowing If you have an adequately heated greenhouse, sow seed in November at a temperature of 70°F (21°C). Never let it fall below 6C°F (16°C) during the winter. If you can't raise a temperature of 70°F (21°C), sow seed in February and keep' the tempetatute at 60°F (16°C). Sow in compost made of two parts sifted loam, one part leaf-mould and a little sand. Cover with glass to prevent evaporation. Keep them moist.

Planting When the plants have formed two rough leaves pot the plants singly in 5 inch (13cm) pots. Use the same compost as before but add some well rotted muck. When the first truss of flowers is formed, move the plants into much larger pots (about twelve inches or 30cm in diameter) or into the gteenhouse soil.

After care Treat greenhouse tomatoes in the same way as out-door tomatoes, but you can let them set up to ten trusses.

Harvesting Begin picking the tomatoes as soon as they are red. This will be much earlier in the year than outdoor tomatoes.

WATERCRESS

Use Watercress is one of the rich-est sources of vitamin C likely to come your way. It makes a superb salad, or it can be cooked.

Sowing Sow seed *or* tooted cut-tings in a damp shady spot in late. spring or midsummer. Dig the soil deeply and work in some peat if you can get it. Rake the bed, flood it and sow thickly when the water has drained away. You can grow it in an unpolluted stream.

JL JLS^JL fLFS

Herbs are a very cheap and easy way of improving the flavour of food; they also make it more digestible and do you good at the same time. In ancient times they were valued as much for their healing properties as for their culinary ones. The coming of the Industrial society saw a decline in the use of herbs, and until recently only parsley, mint and - in enlightened circles - horseradish were being much used in the North American and British kitchen. Now, the revival of a flourishing international cuisine has once more made people eager to experiment with a variety of new tastes. Consequently, growing fresh herbs to add natural enhancement to food is becoming an increasingly attractive proposition for everyone. Even people without gardens can grow them in pots.

A drift of borage or a sea of thyme look splendid from the kitchen window. There is really no reason why herbs should not take the place of inedible flowers in beds near the house instead of being relegated to an inaccessible patch at the back of the garden. But unless you are planning to become a herbalist it is better to concentrate on a few herbs that will be useful to you rather than cultivate scores of varieties, most of which you will neglect.

Herbs divide fairly straightforwardly into two groups: perennial and annual, with just the odd biennial to complicate matters. Most herbs prefer a light, well-drained soil and plenty of sun, although a few prefer the shade. All respond to constant picking.

Drying herbs

You dry herbs in order to keep the colour and aroma of a fresh herb in a dried one. It is a delicate operation as it requires both speed and care, but most herbs can be dried and stored.

As a general rule harvest the leaves and stems just before the plant flowers, on the morning of a fine hot day after the dew has gone. If you are going to preserve the herbs take them to a drying rack immediately. Do not over-handle them. They bruise easily, and every minute you waste means the loss of more volatile oils. These are what give herbs their flavour and quality.

Tie the herbs in small bunches and hang them in an airy place. Ideally you dry them at a temperature between 70°F and 80° F (21° C and 27° C), in the strongest possible draught of air. You can leave them hanging up indefinitely, but they will collect the dust. A better' thing to do is to rub leaves off the stem when they are quite dry and brittle (butyouhope still green), crumble them up and store in sealed glass or pottery jars in the dark. If the air is too damp to get them dry, lay them in a cool oven at 110°F (44°C) on sheets of paper overnight. Or you can hang them in a solar drier (see p. 214) which is ideal for drying herbs, but in that case watch the temperature by using a thermometer.

Below I describe some of the herbs that the self-supporter might find most useful for flavouring his food or fortifying his spirit or, even, banishing his ailments.

ANGELICA

Angelica archangelica
Biennial

Uses Angelica was once thought to cure the plague. The scented leaves make a fine tisane. The roots and stems can be candied or they can be crystallized.

Soil Angelica needs a rich, moist soil and a shady position.

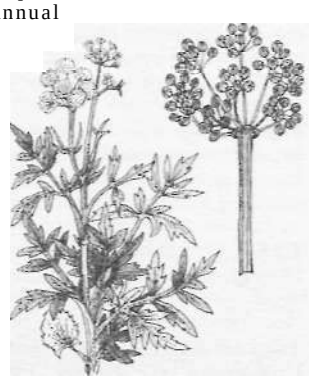
Sowing Seeds should be absolutely fresh or they won't germinate. Plant in midsummer immediately they are ripe, in drills one inch (2.5 cm) deep.

Planting Transplant seedlings or young plants in the autumn and thin to 6 inches (15 cm) the first year, 2 feet (61 cm) the following year. In the third year distance them 5 feet (1.5 m) apart. They grow very tall and their leaves are spreading.

Harvesting Leaves should be cut in early summer while they are still a good colour. Stalks and leaves are best picked in late spring or they become too hard for candying. Roots should be dug up in the first year in the autumn before they get too woody. Wash thoroughly, then plait and dry as quickly as possible.

ANISE

Pimpinella anisum
Annual



Uses Anise has valuable digestive properties. The fragrant seeds can be used to impart a slight licorice flavour to breads, cheeses and puddings.

Soil A moderately rich and fairly dry soil is best.

Sowing Sow in situ in late spring, and thin later on to 8 inches (20 cm) apart. Take care when thinning, as the herb is fragile and easily upset.

Harvesting The seeds will mature the first year after 120 days, as long as they are exposed to full sun. Harvest when the seedheads turn grey-brown, and thresh them when they have dried out thoroughly.

BALM

Melissa *officinalis*
Perennial

Uses The leaves impart a fresh lemony flavour to soups and summer drinks.

Soil Balm likes a fairly rich, moist soil in a sunny, sheltered spot. If it is too shady, the aroma will be stifled; if too dry, the leaves will turn yellow.

Sowing Grows easily from seed which it self-sows profusely. Sow in spring or early summer in a cold frame. It should germinate in 3-4 weeks. Prick out and plant in the garden when 4 inches (10cm) high. Or sow the seed in your garden in midsummer and plant seedlings out in the early summer of the following year.

Planting Keep 10 inches (25cm) between the rows and 12 inches (30cm) between the plants. Balm is susceptible to frost, so protect your plants by earthing them up or giving them a light cover of manure, peat or leafmould.

Harvesting Don't expect too much the first yean Harvest just before the buds flower, and then again in the autumn. Balm bruises easily, so keep your hands off it as much as possible. Dry in the dark with plenty of ventilation, then store in stoppered jars in the dark. The temperature should never go beyond 100°F (38°C) or it will lose its flavour.

Herbs

BASIL
Ocimum basilicum
Annual

Uses A fine pungent herb, basil is'superb in sausages, spaghetti, and stuffed tomatoes.
Soil Basil needs dry; light, well-drained soil and a sunny, sheltered position.
Sowing A hardy perennial in hot countries, basil is a delicate plant in colder climes where it has to be grown annually from seed. Sow indoors in early summer.
Planting Seedlings should not be planted until the soil is warm. Plant 8 inches (20 cm) apart in rows a foot (30 cm) apart.
Harvesting Basil needs plenty of water to keep the leaves succulent. The leaves can be picked off as soon as they unfurl. Cut down for drying in late summer or early autumn. Basil needs a longer drying time than most herbs; it is also very sensitive to light and heat, and it bruises easily - so handle as little as possible.

BAY
Laurus nobilis
Evergreen

Uses Once used to crown poets in ancient Greece, bay leaves are now more often used in casseroles.
Soil Bay is amenable to anv reasonable soil. Give it shelter from harsh winds; it will grow in the shade, though it likes the sun. Intense frost will kill it; in colder climates bay is almost always grown in tubs so that it can be moved indoors in winter.
Planting It propagates rapidly from hardwood cuttings of half-ripened shoots. Don't let it dry out; feed manure occasionally.
Harvesting The leaves can either be dried (at a low temperature, which helps retain their natural colour) or picked all year fresh.

BORAGE
Borago officinalis
Annual

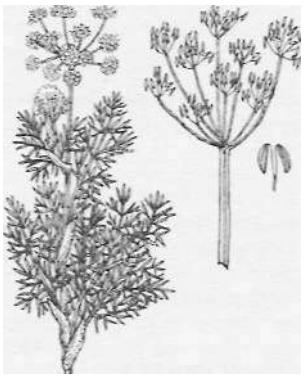
Uses Tradition has it that borage will stimulate the mind and fortify the spirit. Add a sprig or two to your wine and you will certainly notice a difference. The blue flowers can be used raw to garnish salads, and the leaves can be chopped into soups and stews.
Soil Borage needs sun and a well-drained loamy or sandy soil.
Sowing Seed is best sown in spring in drills 1 inch (2.5 cm) deep, 3 feet (91 cm) apart, 3 seeds to a station. Later, thin to 1 plant per station. Seeds will germinate early and thereafter sow themselves and need only to be kept weeded.
Harvesting Leaves are ready for use in approximately 8 weeks and only the young leaves should be picked. The herb is ready for harvesting as soon as it flowets, but it needs quick-drying at a low temperature.

BURNET
Poterium sanguisorba
Perennial

Uses Young tender burnet leaves lend a cucumber flavour to iced drinks or salads. They provide the perfect accompaniment to cream or cottage cheese. The dried leaves make a good burnet vinegar.
Soil It grows well in dry, light, well-limed soil.
Sowing Sow trom seed in early spring and thin to 12 inches (30 cm) apart. You can also grow burnet from cuttings. Full sun is essential; seed should be sown annually if a constant supply of fresh leaves is required.

Harvesting The plant is hardy in most climates. Pick young leaves frequently for salads, or for drying.

CARAWAY
Carum carvi
Biennial



Uses As well as using caraway seed for cakes and breads, sprinkle the ground seeds on liver or roast pork, or cook them with goulash and sauerkraut. Leaves can go into salads, and the roots make a good vegetable if you boil them and serve them like parsnips.
Soil Caraway likes a fertile clay loam and a sheltered position. It is winter-hardy, and thrives in cool temperate climates.
Sowing Sow from seed in mid-summer, and it will flower and seed the following year. Protect flower stalks from the wind, to prevent the seedheads shattering before the seed is ripe.
Harvesting Cut off the flower heads as the seed turns brown, and dry the seed in an airy place before threshing.

CELAVIOMILE
Matricaria *charnomilla*
Annual

Uses Sometimes used in flower borders, this herb is grown chiefly for medicinal purposes. Chamomile tea is a cleansing aid to digestion, and an infusion of two teaspoons of flowers to a cup of boiling water makes a splendid gargle, or a soothing cute for toothache.

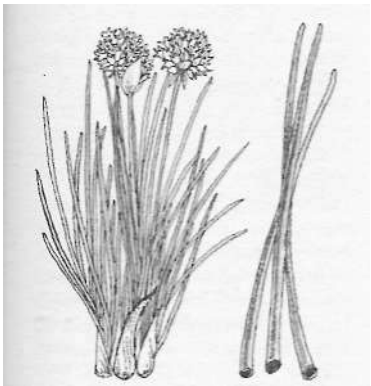
Soil Any goodgarden soil with full sun suits chamomile admirably.
Sowing Sow the very fine seeds mixed with sand or wood-ash, on a humid day in early spring. Thin later to 9 inches (22 cm) apart. The seeds self-sow easily. Watering is advisable during germination.
Harvesting Flowers appear and are ready for picking eight weeks after sowing. Pick often but only on sunny days when the oil content of the flowers is highest. Try not to touch the flowers too much.

CHERVIL
Anthriscus cerefolium
Biennial

Uses Chervil is famed for the flavouring it imparts to soups and sauces. It is well worth growing. Use it as a garnish, or make that classic dish - chervil soup.
Soil Chervil will grow in most soils but it will not thrive in a heavy, badly-drained soil.
Sowing Sow from seed in early spring out of doors and in the greenhouse at over 45°F (7°C) all winter. Sow in drills 1 foot (30 cm) apart. After that it will self-sow easily. Chervil does not transplant well so sow where you want it to grow. Seedlings should be thinned out when 2-3 inches (5-8 cm) high. Keep beds weeded and moist.
Harvesting You can eat chervil 6-8 weeks after sowing. Always pick leaves from the outside to enable it to go on growing from the centre.

Don't allow it to flower - it takes away the flavour. Chervil is a difficult herb to dry, needing a constant low temperature but as it is available fresh all year this should be no problem.

CHIVES
Allium schoenoprasum
Perennial

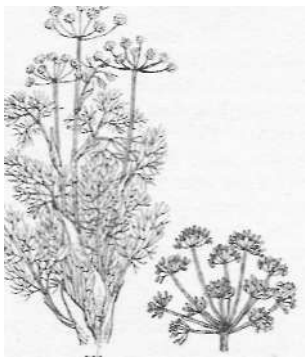


Uses Chives add an onion flavour with a green fresh difference to salads, soups or any savoury dish. Snip into scrambled eggs and cream cheese. The bulbs can be picked like small onions.
Soil Chives like a warm, shady position, and will grow in almost any soil, but they must have humidity. So plant them near a pond or water tank if you can.
Sowing Sow from seed in spring in drills 1 foot (30 cm) apart. Chives will thrive on doses of strong humus, and then need careful, frequent watering.
Harvesting Chives are ready for cutting about 5 weeks after spring planting. Plants sown in a greenhouse in winter at 80°F (27°C) will be ready in 2 weeks. Cut close to the ground.

CORIANDER
Coriandum sativum
Annual

Uses An important ingredient in Indian cooking, coriander can be grown successfully in cold countries. Use the seeds crushed or whole in curried meats or stuffed vegetables; add some to marmalade to make an exotic change. Seeds are sometimes sugar-coated and eaten as sweets.
Soil Coriander needs a sunny, well drained site in fairly rich soil.
Sowing Sow in late spring in drills a foot (30 cm) apart, and thin seedlings to 6 inches (15 cm). They will grow rapidly to about 2 feet (61 cm).
Harvesting Cut the seedheads when the pods are ripe, and allow the seeds *to* dry thoroughly before using, as they will taste bitter if they are still green. Thresh and store in the usual way.

DILL
Anethum graveolens
Annual



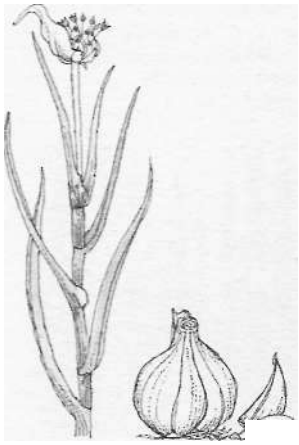
Uses The name comes from the Norse "dilla" meaning to lull to sleep, and the seeds were once called "meeting house" seeds for they were taken to church to be nibbled during endless sermons. While dill seed is the soporific ingredient in gripe-water, the herb can enliven your cooking. It is good with fish, roast chicken, vegetables and chopped up raw into salads and sauces.
Soil Dill needs a well-drained medium soil in a sunny spot.
Sowing Sow consecutively through late spring and early summer in rows 1 foot (30 cm) apart and later thin to 9 inches (23 cm). Keep plants well watered.
Harvesting Leaves can be used from 6 weeks to 2 months after planting. Cut dill for drying when 1 foot (30 cm) high, before the plant flowers. For pickling seed, cut when flower and seed are on the head at the same time. If seeds are wanted for sowing or flavouring leave longer until they turn brown. Seedheads should be dried and then shaken or threshed. Never dry the leaves in a temperature higher than blood heat or you will cook them and they will lose their strong flavour.

FENNEL
Foeniculum vulgare
Perennial

Uses Fennel's sharp-sweet flavour is specially suited to the oilier sea fish. Chop the leaves in sauces, salad dressings and marinades. The broad base can be sliced into salads or cooked whole wirh a cheese sauce. The seeds can be put into sausages, btead or apple pie.
Soil Fennel needs sun, a rich, chalky soil, and plenty of moisture.
Sowing Seeds should be sown in spring in stations of 3-4 seeds 18 inches (46 cm) apart. If you want to get seed you will have to sow earlier under glass and in heat. If propagated by division, lift the toots in spring, divide and replant 1 foot (30 cm) apart in rows 15 inches (38 cm) apart.
Harvesting Leaves can be used through the summer months and seedheads are ready for drying in the autumn. Harvest the seeds when they are still light green and dry in a very low temperature, never in direct sunlight. Lay in thin layers and move often as they sweat. Harvest the whole fennel when it takes on a grey-brown hue.

GARLIC
Allium sativum
Perennial

Uses Garlic is the basis of good health and good cookery. Unhappy are the nations who have to do without it. Use it liberally and use it often. Take no notice of foolish injunctions to "rub a suspicion" round the salad bowl. Chop a clove or two and put it in the salad.
Soil Garlic needs a rich soil, plenty ofsun, and a certain amount of moisture. If your soil is light, enrich it with manure.
Planting Plant individual cloves in spring just like onion sets to a depth of 2 inches (5 cm), 6 inches (15 cm) apart. They will be ready for eating in the autumn. Plant again then and you will have garlic all year round.



Harvesting When the leaves have died down, lift the crop. Allow to dry in the sun a few days, then plait and hang in bunches under cover in a dry airy room.

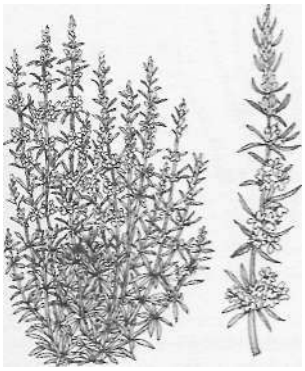
HORSERADISH
Cochlearia armoracia
Perennial

Uses Shred finely and use as it is or mix into a paste either with oil and a little vinegar, or grated apples and cream. Horseradish sauce is traditional with roast beef; it is also good with smoked trout and ham.
Soil It needs a rich, moist soil and a fairly shady position.
Sowing Horseradish grows furiously and spreads large tap roots with equal abandon. So give it maximum space. Plant the roots in early spring. Dig trenches 2-3 feet (61-91 cm) deep, throw about 15 inches (38 cm) of topsoil in the bottom, dig in a layer of good compost on top of this and fill with the rest of the soil. Take 3-inch (8 cm) pieces of root, plant

Herbs

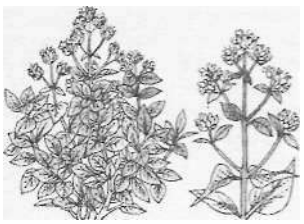
roughly 1 foot (30 cm) apart. And keep it weeded. Seed can also be sown in early spring and plants thinned to 1 foot (30 cm) apart. Harvesting Roots are ready for eating 9 months after planting. Use the larger ones in your kitchen and the smaller roots for replanting.

HYSSOP
Hyssopus officinalis
Perennial



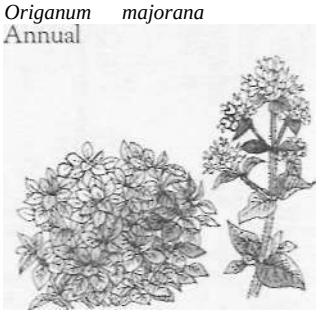
Uses Mentioned in the Bible fot its purgative properties, monks now use hyssop to make green Chartreuse. You can use sprigs of it in salads, or chop it into soups and stews. Its slightly minty flavour is pleasant in fruit pies. I like it with fat mackerel. But use it sparingly.
Soil Hyssop prefers light, well-limed soil and a sunny plot.
Sowing Hyssop grows easily from seed and often self-sows. It can also be propagated by division, from cuttings taken either in the spring before flowering or in the autumn after it. Sow from seed in drills 4 inch (0.5 cm) deep, and plant out seedlings 2 feet (61 cm) apart when 6 inches (15 cm) high.
Harvesting Cut back the tops of the plants often to keep leaves young and tender. Cut for drying just before flowering.

MARJORAM (POT)
Origanum onites
Perennial



Uses Pot marjoram has less flavour than sweet marjoram; use it in sausages and stuffings.
Soil It prefers a dry, light soil, and it needs sun.
Sowing. Grow it from seed in spring in shallow* inch (1 cm) drills 8 inches (20 cm) apart. When the seedlings are big enough to handle transplant to 1 foot (30 cm) apart. Alternatively grow it under glass from cuttings taken in the early summer, and plant out later, allowing 2 feet (61 cm) between plants and between rows.
Harvesting Harvest as for sweet marjoram. Pot marjoram seeds ripen' in late summer or early autumn. Cultivated pot marjoram can last for years.

MARJORAM (SWEET)
Origanum majorana



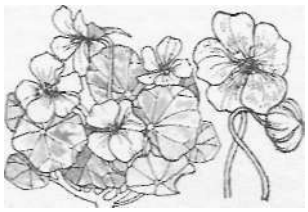
Uses Sweet marjoram lends a spicy flavour to sausages, and to game and poultry stuffings.
Soil It needs a medium rich soil, plenty of compost and a' warm, sheltered spot.
Sowing Sow sweet marjoram in pots under glass in early spring and plant out in early summer 1 foot (30 cm) apart.
Harvesting Leaves and flowers are best collected just before the bud opens towards the end of summer. Dry in thin layers, at temperatures not over 100°F (38°C).

MARJORAM (WILD)
Origanum vulgare
Perennial

Uses Wild marjoram (oregano) turns up in many spicy dishes, which incorporate its overpowering flavour With ease. In delicate dishes use it in moderation.
Soil It needs a warm dry place to grow, and prefers a chalky or gravelly soil.
Sowing Sow from seed in early spring. The distance between plants should be as much as 20 inches (51 cm); if you sow in drills you should thin to 8-12 inches (20-30 cm). Like pot marjoram, it can be grown from cuttings.
Harvesting Harvest as for sweet marjoram. Seeds ripen in early autumn.

Uses There are several kinds of mint, with different properties and flavours, but they can be treated together. For mint sauce use Bowles mint rather than garden mint if you want a stronger flavour.
A few sprigs of peppermint make a fine tisane. Mint added to any fruit dish or drink peps it up.
Soil Mint has a rampant root system and is best planted away from all other hetbs. Grow mint in the sun and it will have a fuller flavour, but it needs a moist, rich soil and plenty of water.
Sowing Plant in autumn or spring from roots or runners. Lav horizontally in drills 2 inches (5 cm) deep, 1 foot (30 cm) apart. Hoe frequently during the first weeks and compost liberally.
Harvesting Mint for drying should be harvested at the beginning of the flowering season (midsummer), but fresh leaves can be cut any time. Ftequent cutting helps the plant to grow. Don't cut for drying in damp, rainy weather, for the leaves will only blacken and go mouldy. Keep peppermint leaves *whole* when drying for tea. Rub them and they will have a totally different taste.

NASTURTIUM
Tropaeolum major or *minus*
Annual



Uses The round, hot-flavoured leaves are delicious tossed in rice salads. They are a healthy alternative to pepper for people who like spicy food. The flowers are good with cream cheese. The young green seeds can be pickled and used like capers. They are excellent with roast mutton.
Soil Given a light, sandy soil and plenty of sun, nasturtiums will grow almost anywhere. Plants grown for leaves need a ground rich in compost.
Sowing Sow the seeds *in situ* in late spring. If they are planted near other plants, they are said to protect them from pests.
Harvesting The highest vitamin content is found in the leaves before they flower in midsummer, so harvest then. Chop or dry, then rub or shred. The leaves dry well, but the flowers should always be eaten fresh.

PARSLEY
Carum petroselinum
Biennial

Uses There are several varieties of parsley, but all are rich in vitamin C, iron and organic salts. Chop it up into tiny pieces and use lavishly as a garnish.
Soil Parsley needs rich soil with a fine tilth.
Sowing Sow parsley fresh every year as it runs to seed. Sow in early spring and later in midsummer at a distance of 8-12 inches (20-30 cm) in drills *i* inch (1 cm) deep. Cover thinly and water well, especially during the 5-8 week germination period. When seedlings are 1 inch (2.5 cm) high, thin to 3 inches (8 cm) and finally to 8 inches (20 cm) when mature. Keep it well watered. Curly" parsley can often be sown three times a year: in early spring sow in a border, on open ground in early summer, and in a shelteted spot in midsummer.
Harvesting Pick a few leaves at a time. Bunches should not be picked until the stem is 8 inches (20 cm) high. Pick for drying during the summer and dry quicHy. Plain parsley is the only herb requiring a high drying temperature; it must be crisp and brittle before you start rubbing it.

ROSEMARY
Rosmarinus officinalis
Perennial

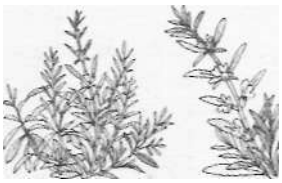
Uses This evergreen shrub was thought by the Greeks to stimulate the mind. We use it to stimulate meat, fish and game dishes.
Soil Rosemary can grow to well over 5 feet (1.5 m). It likes a light, dry soil in a sheltered position, and it needs plenty of lime.
Sowing Sow seeds in early spring in shallow drills 6 inches (15 cm) apart. Transplant seedlings to a nursery bed when they are a few inches high, keeping 6 inches (15 cm) distance between plants, and finally plant out 3 feet (91 cm) apart. Cut in midsummer so shoots have a chance to harden off before winter sers in. Then cover the soil over rhe roots with leafmould and sacking for the winter.
Harvesting Leaves can be picked from the second year on, at any time of the year, although late summer is the best time for drying purposes. Rosemary flowers should bepicked just before they are in full bloom.

SAGE
Salvia officinalis
Perennial

Uses Although now better known for its presence in stuffings, sage . was for centuries regarded as one of the most universal healing remedies. Narrow-leaved sage is better for cooking, while broad-leaved sage is much more suitable for drying.

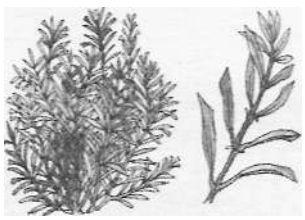
Soil Sage grows to around 2 feet (61 cm) and needs a light, dry chalky" soil. It makes a good border plant and loves the sun.
Sowing
Narrow-leaved sage Sow seed in late spring, in humid soil and cover lightly. Germination takes 10-14 days. Transplant seedlings 15-20 inches (38-50 cm) apart in the early summer.
Broad-leaved sage is always propagated from cuttings taken in very late spring. When rooted, plant out 15-20 inches (38-50 cm) apart in rows 2 feet (61 cm) apart.
Harvesting Second year.plants are richer in oils and give a better harvest. Broad-leaved sage is best cut in midsummer and again a monrh later to prevent it becoming too woody. Don't expect it ever to flower in a temperare climate. Cut narrow-leaved sage in early autumn. Sage leaves are tough and need a longer drying time than most herbs.

SAVORY (SUMMER)
Satureja hortensia
Annual



Uses Summer savory is known as the "bean-herb" and brings out the innate taste of all beans.
Soil A bushy plant growing about 12 inches (30 cm) high, it flourishes best in a fairly rich, humid soil, wirhout compost.
Sowing Sow in late spring or early summer, in rows 1 foot (30 cm) apart. Thin seedlings to 6 inches (15 cm). You will get two cuts from this sowing, one in midsummer and anorher, smaller one in autumn.
Harvesting Cut shoots for drying shortly before flowering occurs (from midsummer through to autumn). Harvest seeds as soon as they are brown.

SAVORY (WINTER)
Satureja montana
Perennial



Uses Winter savory- has a strong flavour and goes well with sausages, baked fish or lamb.
Soil Winter savory makes an ideal herb garden hedge, prefers a chalky, well-drained soil and plenty of sun.
Sowing Winter savory is germinated by light, so don't cover the seed. Sow in late summer in drills 12-15 inches (30-38 cm) apart, or propagate by cuttings in spring, planted out 2 feet (61 cm) apart. Plants will continue to grow healthily year after year- in the same place.
Harvesting Cut shoots and tips from early summer of the second year onwards. Cut befote flowering to get oils at their peak.

SORREL
Rumex acetosa
Perennial

Uses Pick young leaves and eat them raw or cook like spinach. Sorrel's acid taste combines well with rich stews and fish. Sorrel soup is a speciality of France.
Soil Sorrel needs a light, rich soil in a sheltered, sunny spot.
Planting The herb is best propagated by division of roots in spring or autumn. Plant out 15 inches (38 cm) apart. When the plant flowers in early summer, cut it back to prevent it from going to seed.
Harvesting Pick 3-4 months aftet planting when it has 4 ot 5 leaves. Harvest shoots and tips for drying in the early[7] summer before flowering Starrs.

TARRAGON
Artemisia dracunculus
Perennial

Uses An important cooking herb, tarragon is a classic for shellfish, and is also delicious with chicken and buttered vegetables (especially courgettes). The young leaves are fine in salads.
Soil Drainage is important if you are ro grow tarragon well. Slightly sloping stony ground is ideal.
Planting Tarragon is another sun-loving herb and the roots
• will spread out about 4 feet (1.2 cm) so give it growing room. The best way to establish is to buy plants from a nursery and plant out 2 feet (61 cm) apart after the last frost of winter. Pull underground runners away from the main plant fot propagation in late spring. Transplant cuttings either in spring or autumn.

Harvesting Fresh leaves can be picked continually all summer long and rhis will encourage new ones to grow. Harvest the leaves for drying at the beginning of the flowering period.

THYME
Thymus vulgaris
Perennial

Uses Garden thyme is a good herb to put in the pan with any roast meat, or to use in stews and' stuffings. It should not be used too freely as it can drown other tastes.
Soil Thyme thrives in a dry, well-drained position, with light soil.
Planting Seeds can be sown in late spring i inch (0.5 cm) drills 2 feet (61 cm) apart, but the herb is generally grown from cuttings taken in early summer. Side shoots can be layered in spring. Transplant the rooted cuttings or layers 12 inches (30 cm) apart in rows 2 feet (61 cm) apart. Keep beds well watered and free from weeds.
Harvesting In the first year only one cutting should be made. Two cuttings can be taken from the second yeat on, the first in early summer, just before flowering, the second in midsummer. Don't cut stems from the base of the plant, cut shoots about 6 inches (15 cm) long. Trim the plant after flowering to prevent it growing leggy.

Food from the Garden

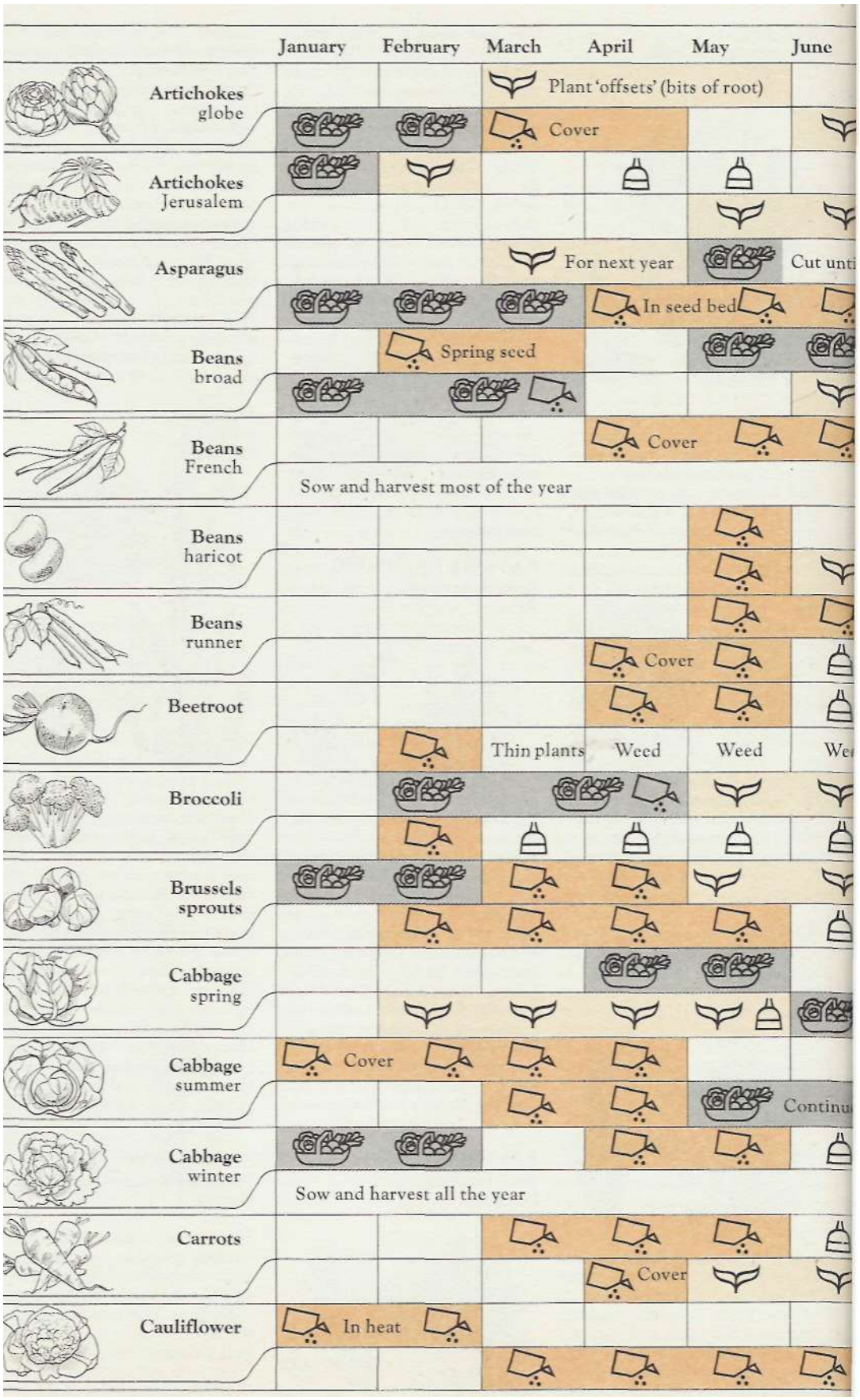
Vegetables through the \ear

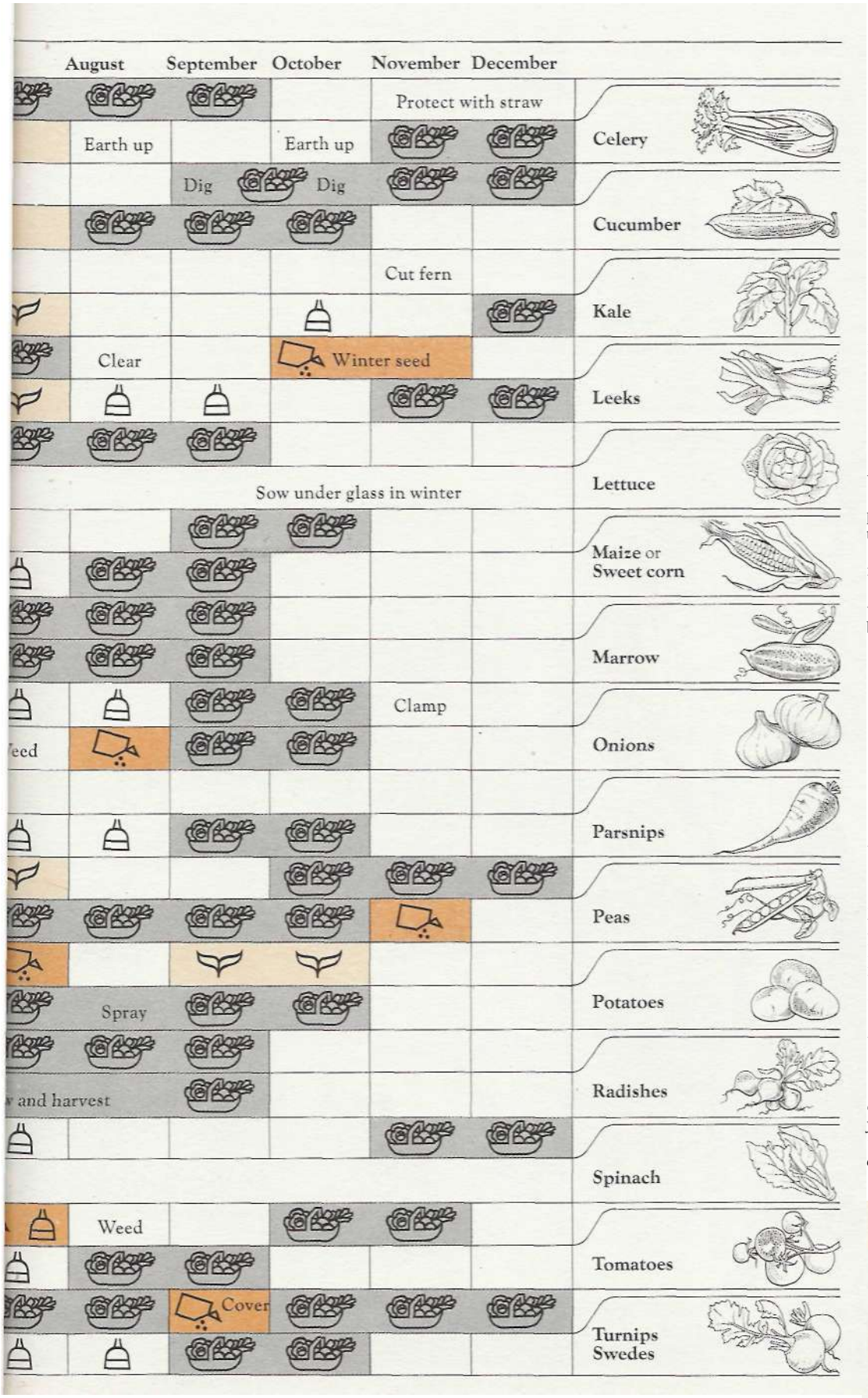
Exactly the same principle of crop rotation applies to the garden as to field crops, but in the garden there are two main considerations to take into account: you want the biggest possible gap (at least three years) between brassica crops to prevent club-root disease building up, and the biggest possible gap between potato crops to guard against eel-worm. You should also take into account that potatoes don't like freshly limed ground, which makes them scabby, whereas beans and peas do. Brassica prefer limed ground, but after the lime has been in it a few months. The root crops don't like land too freshly mucked or dunged.

You can pander to the needs of all these plants if you adopt a four year rotation something like this:

Manure the land heavily and sow potatoes. After the potatoes are lifted, lime the land heavily and the next year sow peas and beans. Once the peas and beans are lifted, set out brassica immediately from their seed bed or their "holding-bed" (see below). The brassica will all have been eaten by the next spring and it will be time to put in what I call mixed crops. These will be onions, tomatoes, lettuce, radishes, sweet corn, and all the gourd tribe (marrows, squash, courgettes, pumpkins, cucumbers). Follow these with root crops such as carrots, parsnips, beet and celery. (Mixed crops and root crops can be very interchangeable.) Don't include turnips or swedes which suffer from club-root and therefore must go in the brassica rotation, if you aren't already growing them on a field scale which suits them better. Then back to spuds again, which is where we started.

This suggested rotation will suit you if you garden in a temperate climate with a fairly open winter. (Snow doesn't hurt unless it is extremely deep, but intense frost stops you having anything growing outside in the winter at all.) Probably no-one would stick to this rotation, or any other, slavishly. I know that there are idiosyncrasies in it, but I also know that it works. For example, I cram the brassica break in after the peas and beans, and clear the land of brassica the subsequent spring: this may be crowding things a bit, but two main crops are being produced in one year. Now to do this (and personally I find it a very good thing to do) you must sow your brassica seed in a seed bed, preferably not on any of your four main growing plots at all but in a fifth plot which is for other things such as perennials. Then you





must plant out the little plants from your crowded seed bed to a "holding bed'.' This is a piece of clean, good land, in which these small brassica plants can find room to grow and develop, for it will be late in the summer before many of them can go in after the just-harvested peas and beans, and it would be fatal to leave them crammed in their original seed bed until that late. So cramming five main crops into four years requires a holding-bed as well as a seed bed.

We can then look upon such quick-growing things as lettuces, radishes, and early peas (which are actually best sown late) as catch-crops, ready to be dropped in wherever there is a spare bit of ground.

Perhaps you think that radishes are brassica and therefore should only go in the brassica break? Well, we pull and eat ours so young that they don't have time to get and perpetuate club-root. But don't leave them in to get too old and go to seed, or they will spread this rather nasty disease.

There are plenty of othet rotations, one of which might suit you best, but provided you keep brassica crops three years away from each other, you won't go far wrong.

Climate of course is all-important, and for the seasonal plans on the following pages I have taken as the norm a temperate climate, which will support brassica out of doors all winter but which will not allow us to grow sub-tropical, or even Mediterranean plants out of doors at all. In a climate with no winter frosts we could get three or four crops a year, provided we had enough rain, or enough water fot irrigation. In climates too cold for winter greens outside we would have to devote the summer to one plot of brassica for storage during the winter. But it goes without saying that the reader must make allowances for climatic differences.

A vegetable calendar

The chart shows the sowing, planting out, hoeing and harvesting times for vegetables that you might grow in a temperate climate. But check with your neighbours first; the climate where you live could make as much as a month's difference.

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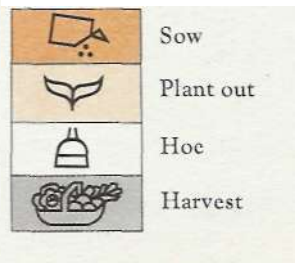


Food from the Garden

Winter

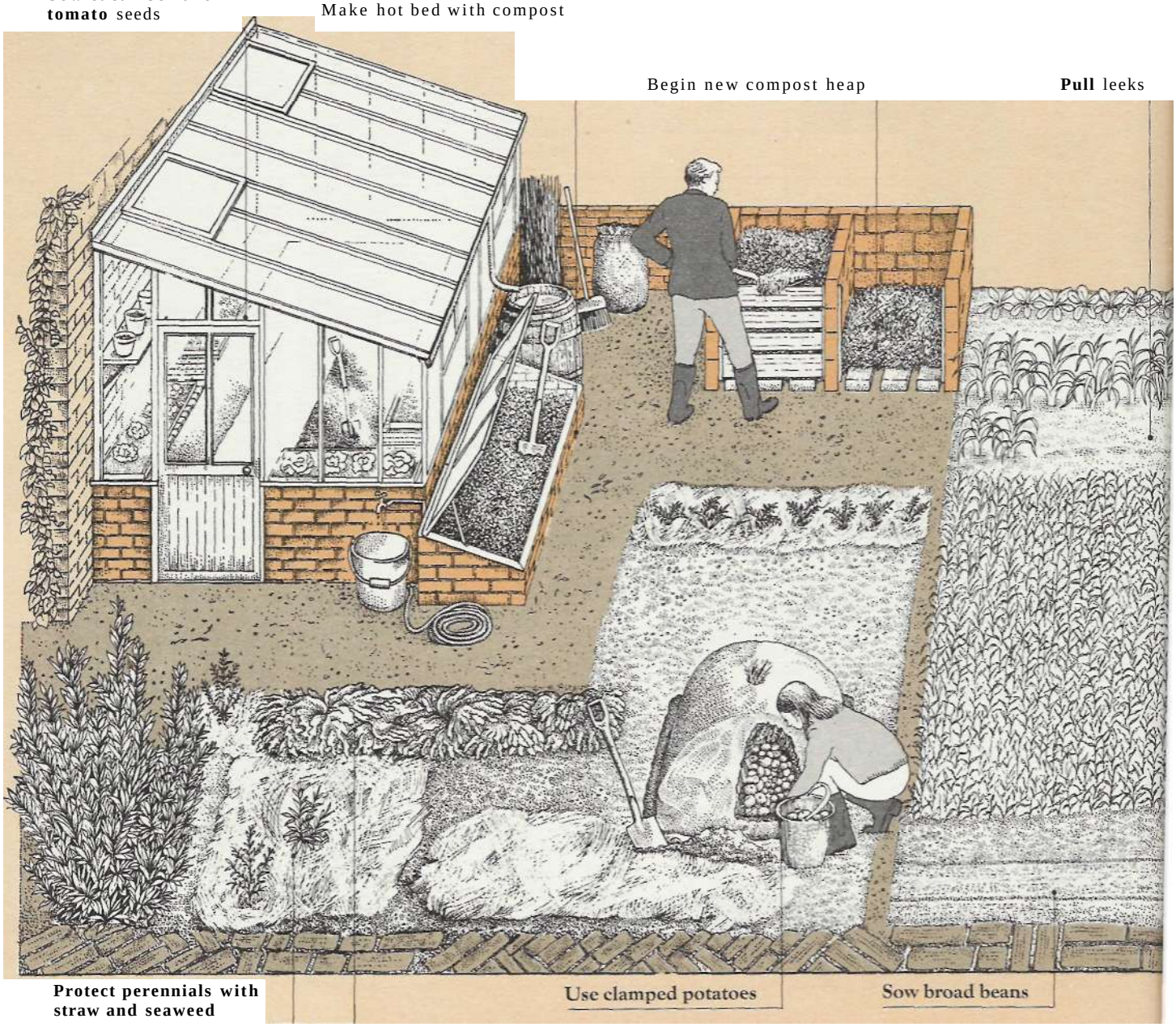
Winter is a time for building and repairing, for felling timber and converting it, for laying hedges, digging drains and ditches, building fences and stone walls. If the soil in the garden is heavy clay, it is best to keep off it as much as possible, because digging or working such soil in winter only does harm to it. On lighter land the same inhibition does not apply In cold climates the land may be deep under snow anyway, and all the crops that have been harvested will be safe in clamp or root cellar, or stored away in jars or bottles, crocks and barrels. The good husbandman should start the winter feeling that his labours have secured him a store of good and varied food, to keep him and his family through the dark months, and provide hospitality for his friends too. So for the self-supporter winter is also a time for feasting.

Greenhouse and perennials

In the greenhouse, it is time to clear winter lettuce, and the enriched soil that grew tomatoes last year goes out to the garden, with fresh soil harrowed in and mixed with compost Tomato and cucumber seed are sown in the heat of the greenhouse. "Hot beds" can be built up in the cold frames. Mature compost is emptied on to the land intended for potatoes. Any remaining compost then goes into an empty bin to aerate it, and a new compost heap is begun. Perennial plants protected from the winter cold by straw and seaweed, are resting, preparing for their spurt of growth in the spring.

Plot A

This plot will have been very heavily mucked after the potatoes were lifted last autumn. A small proportion of it may well be winter-sown broad beans this year, if the winter is mild. The rest will go under winter rye or another winter green crop, which will stop the loss of nitrogen, and keep it ready to dig in as early as the land is dry enough to work in the spring. The plot was limed last autumn, after the spuds had been lifted, and this will benefit the peas and beans that are to follow and also the brassica crop which will come after them. A small part of this bed will have been planted with spring cabbage plants last autumn, and there will be a bed of leeks, which will be ready to pull.

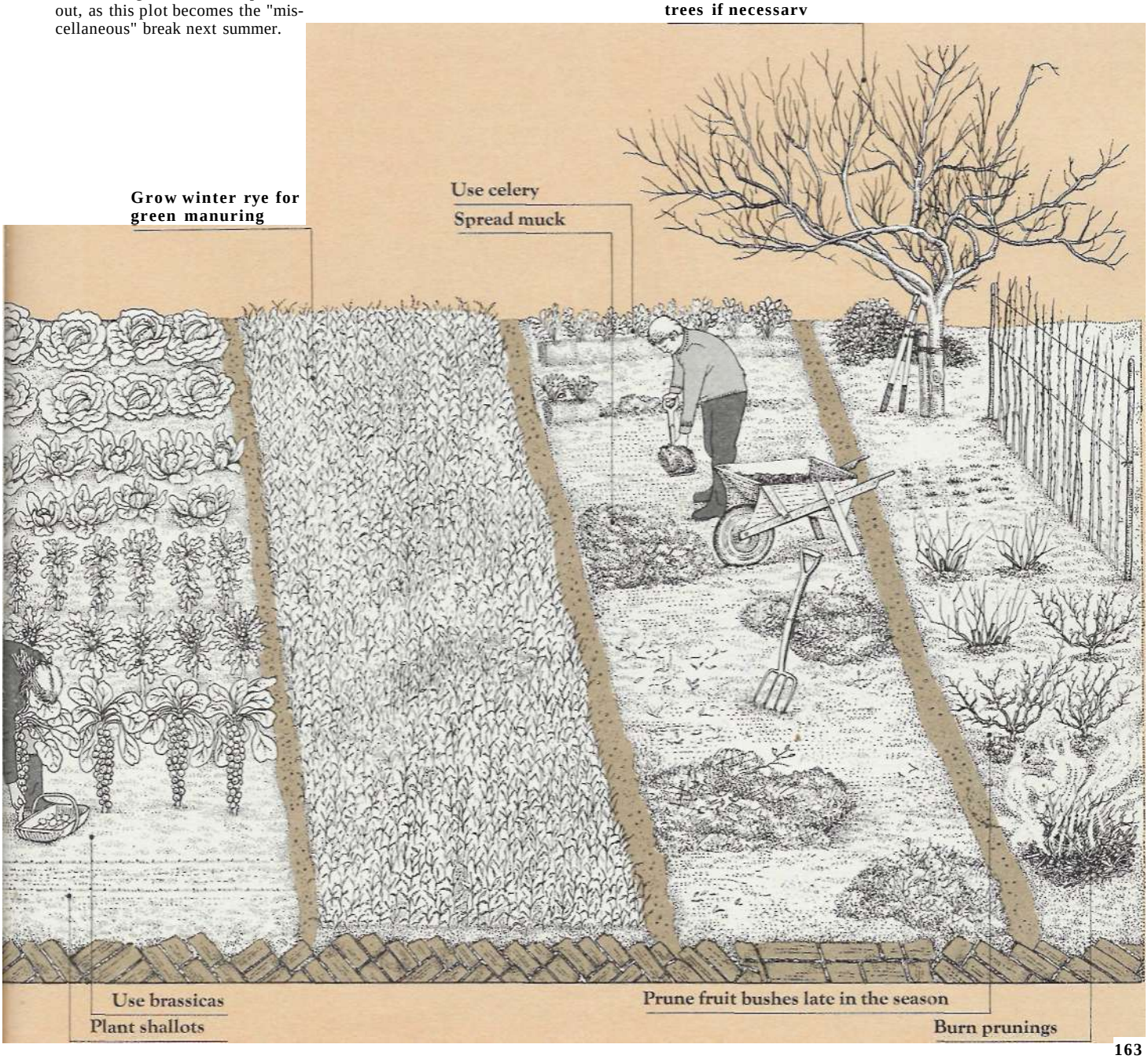


PlotB
This plot should be full of big brassica plants: Brussels sprouts, hearting broccoli ("winter cauliflower"), big hard-hearted winter cabbage, kale, red cabbage, and any-other brassica plant that can weather the winter. There may well be a few rows of swedes if these haven't already been harvested and clamped. Turnips must be in the clamp orroot cellar by now, forthey can't stand the winter as swedes can. This plot will provide most of the greenstuff during the winter, helped by the leeks in plot A. In temperate climates, this helps to avoid much complicated canning and bottling. Shallots are planted out, as this plot becomes the "miscellaneous" break next summer.

PlotC
This plot is under green manure such as rye or some other winter crop. Last year it bore the miscellaneous, short-lived crops. As soon as the land is dry enough to work, the green manure can be forked into the ground, so that it can begin to rot down. There is no hum', because this plot is going to be "roots" this year, and most of these will not have to be planted out very early.

PlotD
This plot is fallow, or else under green manure, although if the roots were harvested late last year, there may not have been time to sow any green manure. It is time to barrow-out compost or muck for the future crop of spuds. If harrowing is done in heavy frost, it is easier to push the barrow. It also does the ground less damage. There may be a row of celery left undug, and this can be remedied as the winter progresses.

Fruit plot
The fruit trees only need spraying with a winter wash if pests have afflicted them badly. Two-and-a-half pounds (1.1 kg) of caustic soda dissolved in ten gallons (45.5 litres) of water was the old-fashioned remedy, but these days most people buy proprietary winter washes. After the middle of February fruit trees, gooseberries, and other bushes are pruned. The black-currants may well have been pruned in the autumn. Muck or compost is barrowed and dumped around trees and bushes, and the ground between soft fruit bushes is forked lightly. All prunings should be burned.



Food from the Garden

Spring

There is so much to do in spring that it is difficult to get going fast enough. For a start, the green manure crops are turned in (a rotovator is quite good for this), the seed beds prepared and seed sown. But it is no good being in too much of a hurry to sow seeds, because they can't grow in half-frozen ground, and wet ground is cold ground. It is better to sow a week or two later, in dry warm soil, than earlier, in wet cold soil. Some things, like parsnips, need a very long growing season, and can be put in early. Some others are best started off early, but under glass. Cloches are a great help at this time of year, to warm the soil for early sowing. In March I have a big sheet of transparent plastic over February-planted early potatoes. The soil under it feels warm to the touch, while the soil outside is freezing.

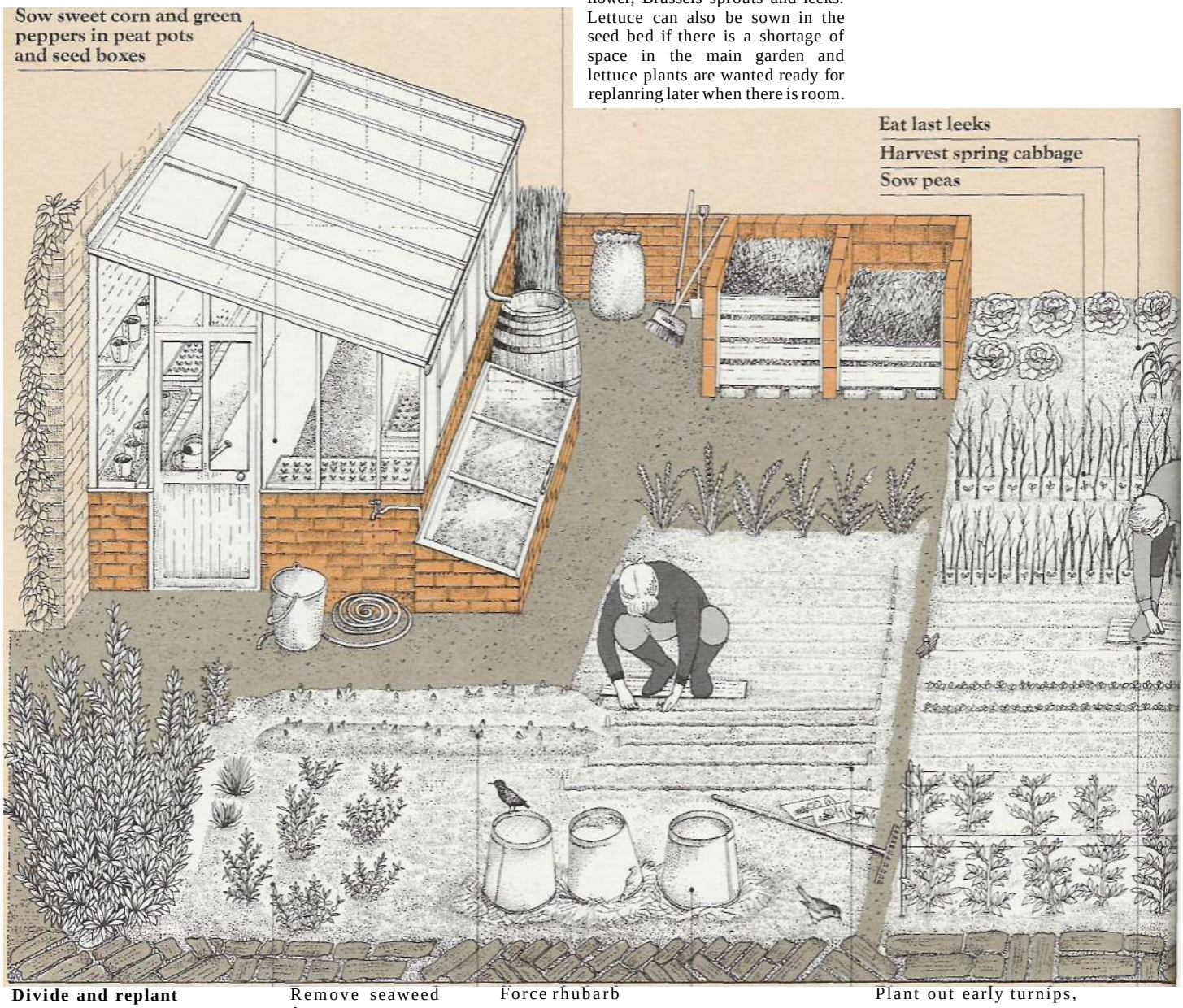
Greenhouse and perennials

In a heated greenhouse, sweet corn is sown in peat pots and green peppers in seed boxes. As the tomato and cucumber plants become big enough they can be planted out in pots or greenhouse soil. Cucumbers can be sown in the hot bed. In the herb garden it is time to lift, divide, and replant perennial herbs such as mint, sage and thyme, if they need it. The seaweed covering should be removed from the asparagus bed, and the seaweed put in the compost heap. Rhubarb is forced under dark cover. Globe artichokes should be progressing well. Seeds are sown in the seed bed ready for planting out later: onion, all broccoli, cabbage, kale, cauliflower, Brussels sprouts and leeks. Lettuce can also be sown in the seed bed if there is a shortage of space in the main garden and lettuce plants are wanted ready for replanring later when there is room.

Plot A

The leeks are cleared and eaten as the spring advances. The winter-sown broad beans will be growing well, but if there aren't enough of them spring-sown varieties may be planted early in the season, when early peas will also go in. After this, peas will be sown in succession as the year advances. However many are grown, there will never be enough! Early turnips, soya beans and swedes should go in this plot, which will be brassica next winter. The row of spring cabbage will do for fresh greens, and will get eaten as spring advances.

Sow cucumbers in hot bed



Divide and replant perennial herbs

Remove seaweed from asparagus

Force rhubarb

Sow brassicas and onions in seed bed

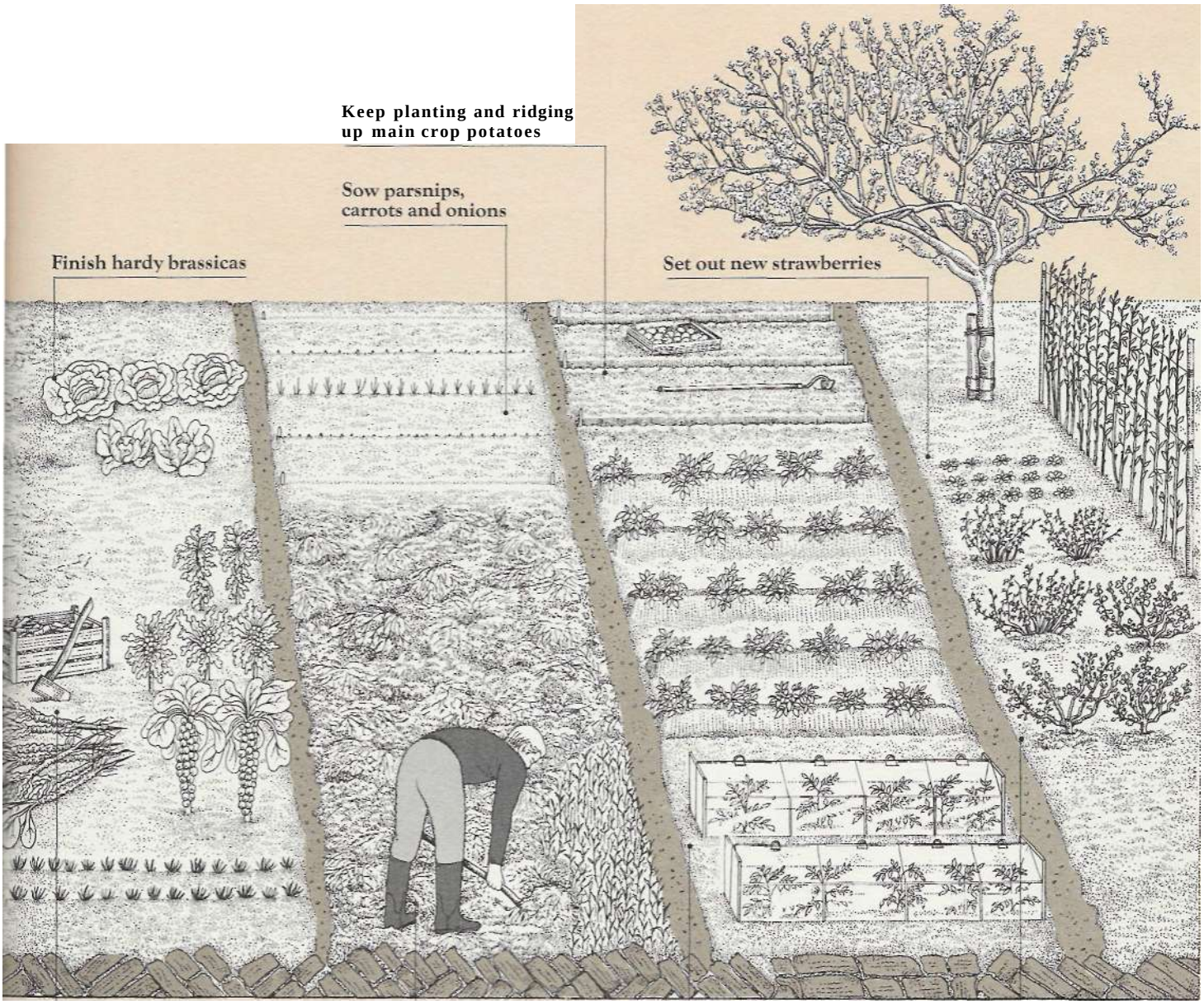
Plant out early turnips, swedes and soya beans

PlotB
Spring is more of a hungry-gap than winter, but the late hardy brassica, together with the leeks, tide things over. The brassica are nearly finished, but maybe a few Brussels sprouts are still standing, with some kale, some sprouting broccoli, and perhaps a few hearting broccoli. As the plants are finished, they must be pulled out, the stems smashed with an axe and then put on the compost heap. The shallots should be growing well.

PlotC
By now the winter rye sown last year as a green manure crop should be dug in, to make way for the roots to be sown later in the year. The only root crop sown early on is parsnip, but as spring progresses onion seed and carrots are sown in the bed. It is time to plant out onion sets and autumn-sown onions. If there is no garlic in the herb garden, it must be put out here early in spring. As spring turns into early summer more and more crops go into this root break bed.

PlotD
A row of early potatoes could be growing under cloches or transparent plastic. These will have been planted towards the end of February in mild climates, or late March in severer ones. The main crop won't go in until mid-April. The earlies get planted shallowly but the main crop go in deep furrows, both with ample muck or compost. They are ridged up as they grow.

Fruit plot
Prune gooseberries early in the season. Some people set out strawberry plants in March or April. The ground around soft fruit such as blackcurrants, gooseberries and raspberries should be kept hoed and cultivated to prevent grass from growing. Insect pests are to be avoided and something must be done about them if they attack. Grease-bands put around fruit trees will catch crawlies climbing up. It is important not to spray insecticides on flowering trees, as they kill the beneficent bee.



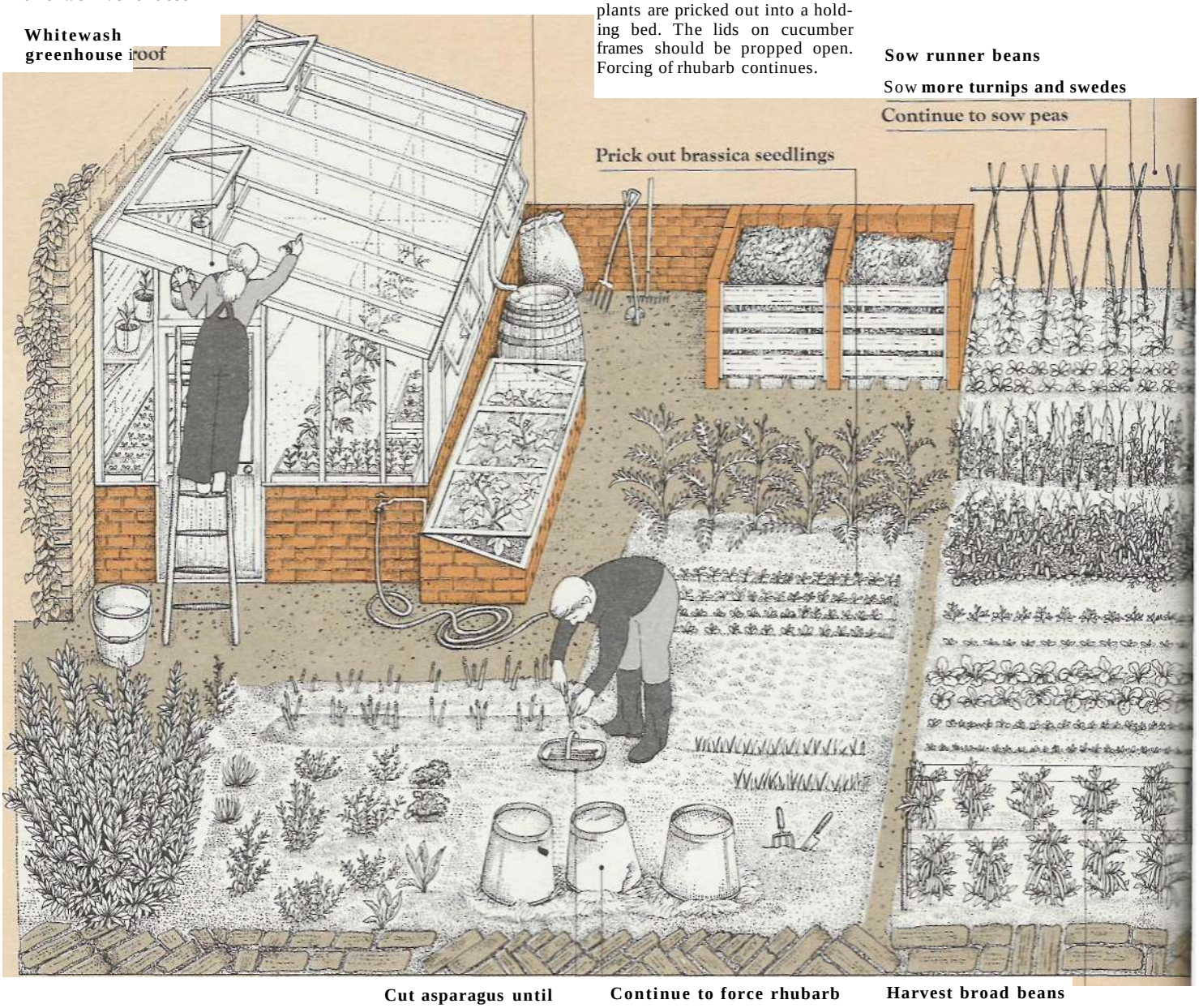
Pull up brassicas and smash ready for composting **Dig in winter** rye **Grow early potatoes under cloches** j **Prune gooseberries**

Early Summer

Successional planting must go on unabated with many crops during April, May and June. A constant supply of fresh peas, lettuces, radishes and French beans can be maintained by planting these short-lived plants little and often. Fresh young turnips should be available all summer too. Hoeing should never be neglected during the early summer, as this is the time when the weeds are raring to get a foothold along with everything else. If they are allowed to get away with it, the crops will be miserable or non-existent. Onions and carrots must be meticulously hand-weeded. If some radish seed is sown along with the parsnips, radishes will be clearly visible before the slow-growing parsnips have declared themselves, and can be side-hoed with safety.

Greenhouse and perennials
Asparagus can be cut and eaten until the end of June, when it must be abandoned and allowed to grow. Herbs will thrive on frequent pickings. Artichokes are growing fast. The seed bed is kept weeded and if flea-beetle appear on brassica seedlings, they can be dusted with derris or pyrethrum dust. The ventilation in the greenhouse must be carefully adjusted. The top glass should be lightly shaded with whitewash. A good airing is vital during the day, but cold air must be kept out at night. The air is kept humid by spraying the floor and plants. Tomato plants are fed with water in which muck has been soaked, and as small cucumbers begin to develop they too are fed. Brassica plants are pricked out into a holding bed. The lids on cucumber frames should be propped open. Forcing of rhubarb continues.

Plot A
Peas are sown in succession and given sticks to twine around as they need it. More turnips and swedes can be sown. May, or June in later districts, is the time to sow out French and runner beans on previously prepared, well-composted beds. These need regular weeding and watering; all these legumes want frequent watering in a dry season. It is time to harvest broad beans, and if there had been any signs of black-fly earlier the tops of the broad beans should have been snapped off immediately and cooked. As soon as they are finished cut them down and sow French beans in their place.

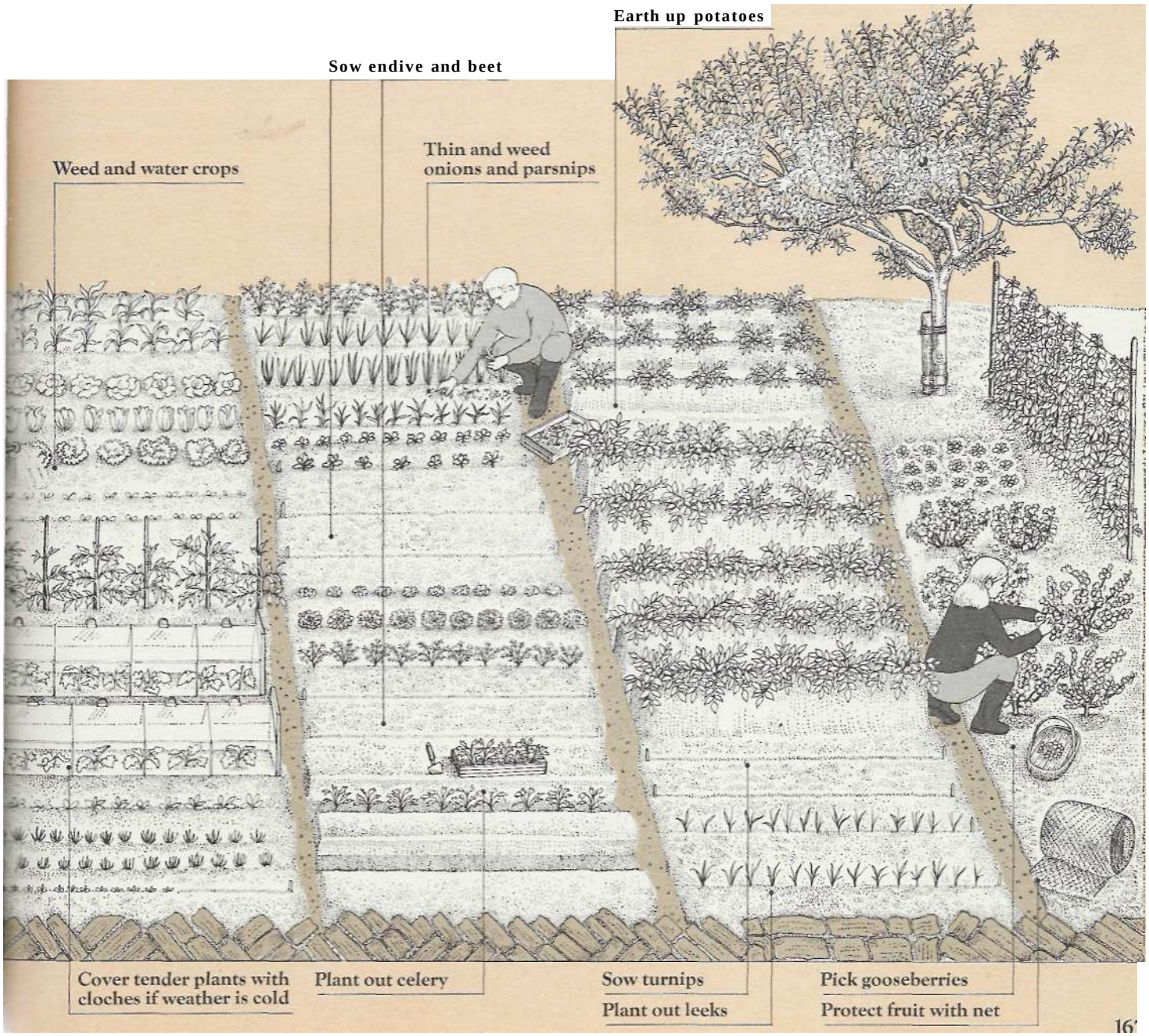


PlotB
Now cleared of last winters brassica, this plot becomes the new miscellaneous bed, for outdoor tomatoes, courgettes, melons, marrows, pumpkins, squashes, radishes, lettuce, ridge cucumbers, spinach and sweet corn. As all these things - some of them reared in greenhouse or cold frame - become ready, and the weather is warm enough, they are planted out, and should be watered and tended. A good mulch of well-rotted muck or compost, if it can be spared, will do them all good. It revives the soil, and shouldn't make next year's roots "fork" too much, if put on well in advance.

PlotC
Onions in the root break plot should be growing well and will need weeding and thinning. The carr.ots should be thinned if they are wanted for winter storing but not if intended for summer eating. The wily carrot fly must be avoided. Carrots should only be thinned when it is raining, otherwise paraffin, or some other strong-smelling stuff, must be sprinkled on the row after thinning. Parsnips are thinned and weeded. Endive and beet are sown. Celery should be planted out before the end of May in a previously prepared celery trench, and never allowed to dry out at all.

PlotD
The potatoes already planted should be earthed up as they grow. Very early morning, or late evening, is the best time to do this, because the leaves lie down and sprawl during the day and make earthing up difficult. Turnips can be sown to come up in the brassica break when the early potatoes are out. The trick of planting leeks after spuds have been lifted can only be done if the spuds are early ones. Earlies are being eaten by June, so leeks canbe transplanted into the ground when it is clear.

Fruit plot
Nets go over strawberries and straw underneath them, and birds must be kept off other soft fruit too. Soft fruit such as gooseberries can now be picked, starting with the hard ones for cooking, so as to give the younger ones a chance. Insects and various blights must be kept at bay. The ground between soft fruit bushes is hoed, and a mulch of compost or anything else put on. It is vital on light land.

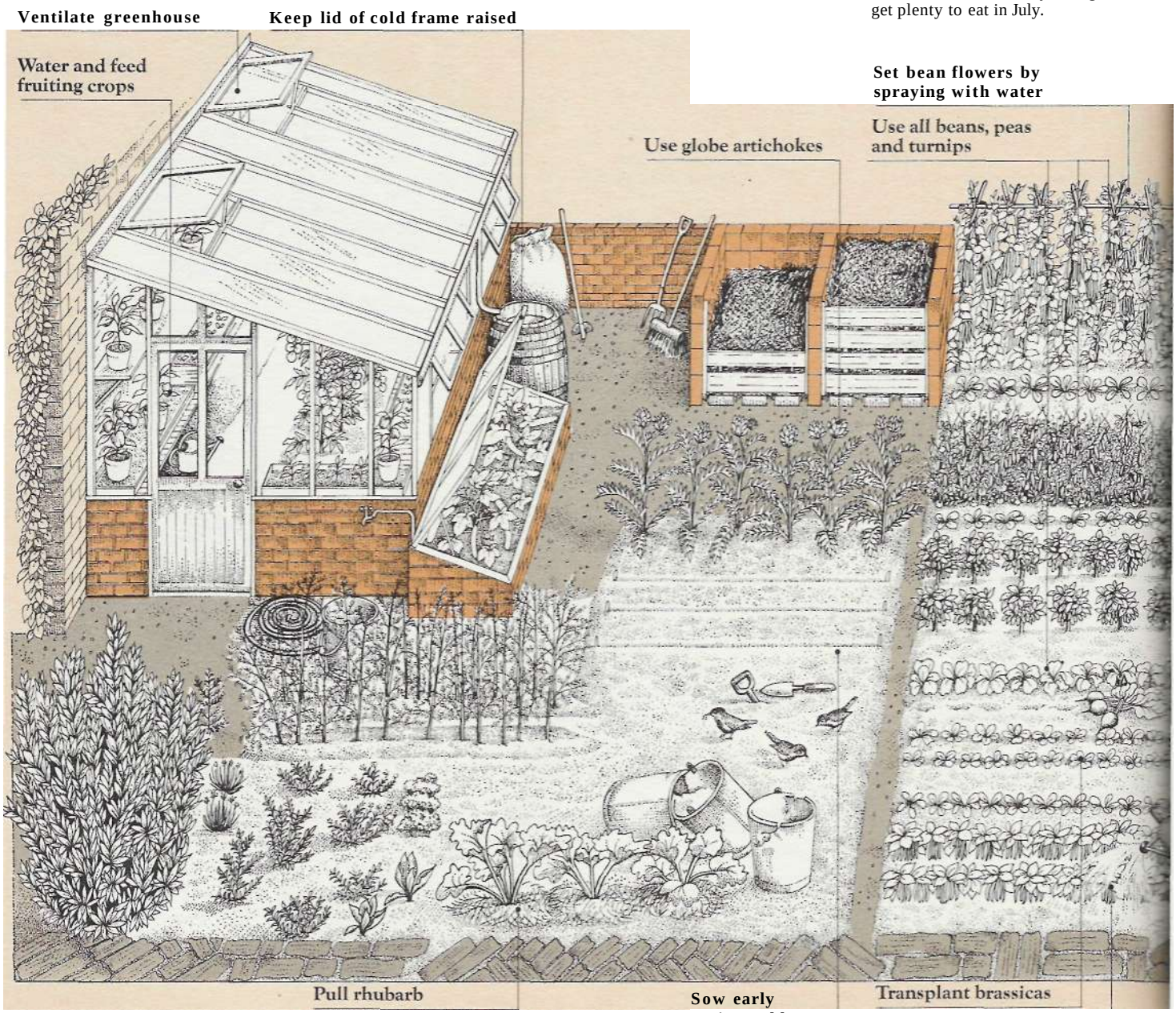


Late Summer

Earlier labour will now start bearing fruit in earnest. There is almost an *embarras de richesse* of harvest, and it is time to think of giving away, or trading, the surplus of many crops. The surplus of French or runner beans can be stored in salt, and the haricot beans and peas prepared for dry storage. As fast as peas and beans are harvested and cleared the space is filled with well-grown brassica plants. Fitting the main brassica crop in as a catch-crop after the peas and beans have been cleared is made possible by the use of the "holding-bed", which comes into its own this season. Brassica seems to benefit by the twice planting-out. Hand-weeding must go on incessantly, for weeds that are too big to hoe must be pulled out before they have time to seed: one year's seeding is seven years weeding.

Greenhouse and perennials
With the lid now taken off the cold frames, the cucumbers will run riot. Tomatoes, cucumbers and peppers in the greenhouse will be bearing, and will want watering and feeding. They now need plenty of ventilation. In the seed bed early spring cabbage seed can be sown. The herb and asparagus beds are kept weeded and the rhubarb needs to be regularly pulled. Soon the flowers of globe artichokes will be eaten; they should not be neglected, because uncut plants will not produce any more. But it is fun to leave a few to burst out in brilliant blue flowers and add to the scenery.

Plot A
The peas and beans are watered if they need it, and the flowers of runner beans sprayed with water even' evening, to help the flowers set. Peas, French beans, and runner beans galore are now ready to be picked. So are the turnips. As each row passes its best, it must be ruthlessly cleared out of the way, and the space planted up with well-grown brassica plants from the holding bed. When the tunner beans begin to yield, they must be picked and picked again and never allowed to get old and tough. A great many are salted for the dark days of the winter. The true countryman always bears the winter in mind; it is easy enough to get plenty to eat in July.

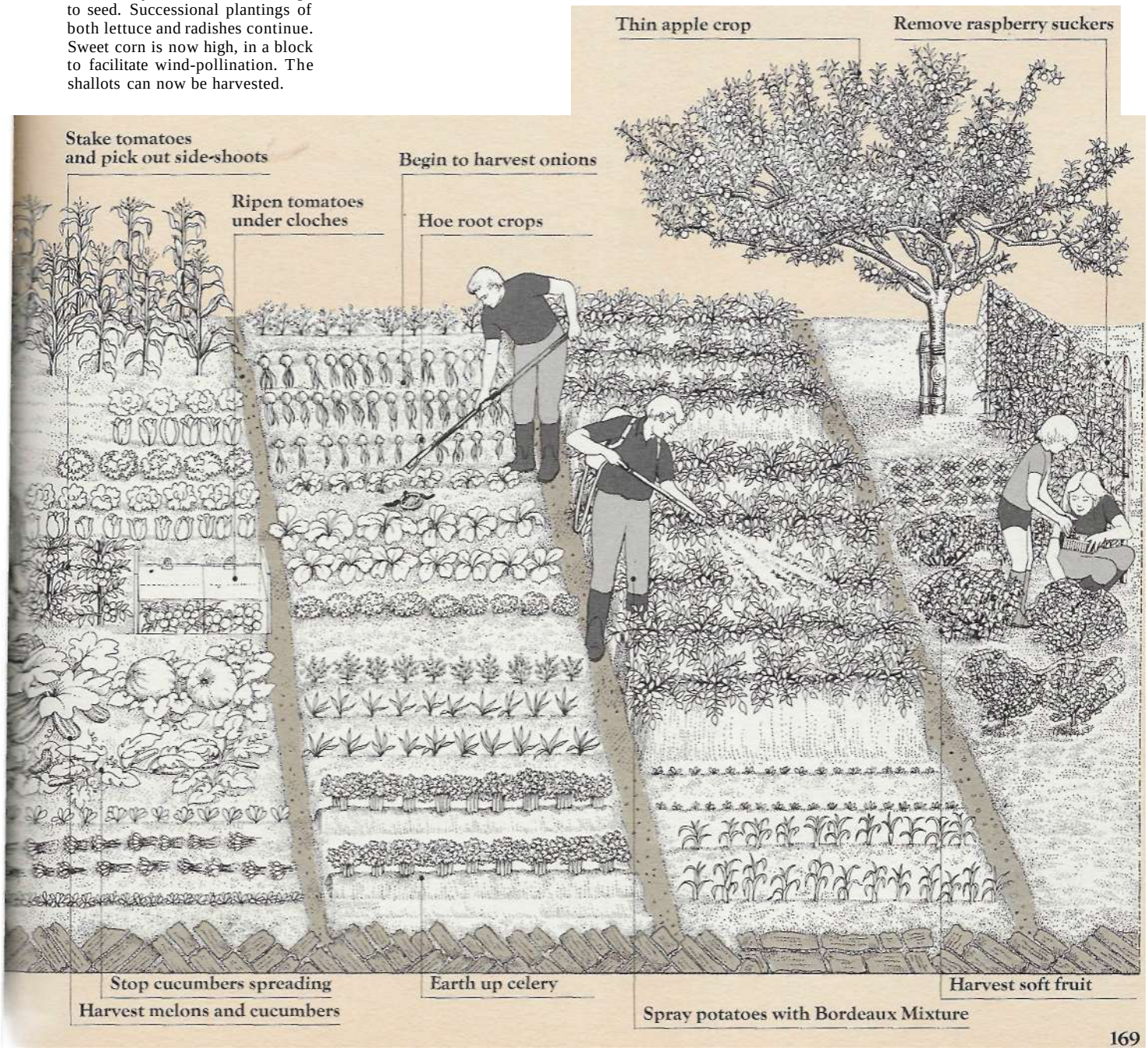


Plot B
Any straggling vines of melons, pumpkins and squashes must be cropped. The tomatoes must be staked, side-shoots picked out, and the plants stopped when they have four trusses. They must be well watered if it is dry. In damp climates, it is a good idea to lay the tomatoes down at the end of August and put cloches over them so that more of them may ripen. Outdoor cucumbers are stopped before they get out of hand, and they must be picked hard and continuously so as not to get too big and bitter. All male flowers must be picked off. Lettuce should be eaten when ready and not allowed to go to seed. Successional plantings of both lettuce and radishes continue. Sweet corn is now high, in a block to facilitate wind-pollination. The shallots can now be harvested.

Plot C
There is little to do now but hoe all root crops, keep weeds down and kill slugs. In fact, this is by far the best rime of the year to clear all the weeds in the garden. Celery can be earthed up and sprayed with a Bordeaux Mixture in preference to leaf-spot. Start harvesting the onion tribe.

Plot D
By now the early potatoes are gradually being eaten, and the second lot started on if there are any. The main crop must not be lifted yet, but can be sprayed twice with Bordeaux Mixture, if blight is feared. Warm muggy weather is the enemy. The main crop must be well earthed up, but when the tops meet across the furrows it won't be possible or necessary to hoe any more, though the big annual weeds should still be hauled out. Turnips and leeks should be establishing themselves.

Fruit plot
Any superfluous suckers are cut out from the base of the raspberry plants. Immature apples are thinned where they are too thick on the tree (although the "June drop" may do this naturally) and fruit trees, particularly cordons and trained trees, are summer-pruned. Plums and soft fruit should be eaten now, while birds are eating the cherries. I think August is the time to plant a new strawberry bed, so root the strawberry runners in small sunken pots. Hoeing between soft fruits continues, it keeps the grass down and also gives the birds a chance to eat creepies.



Autumn

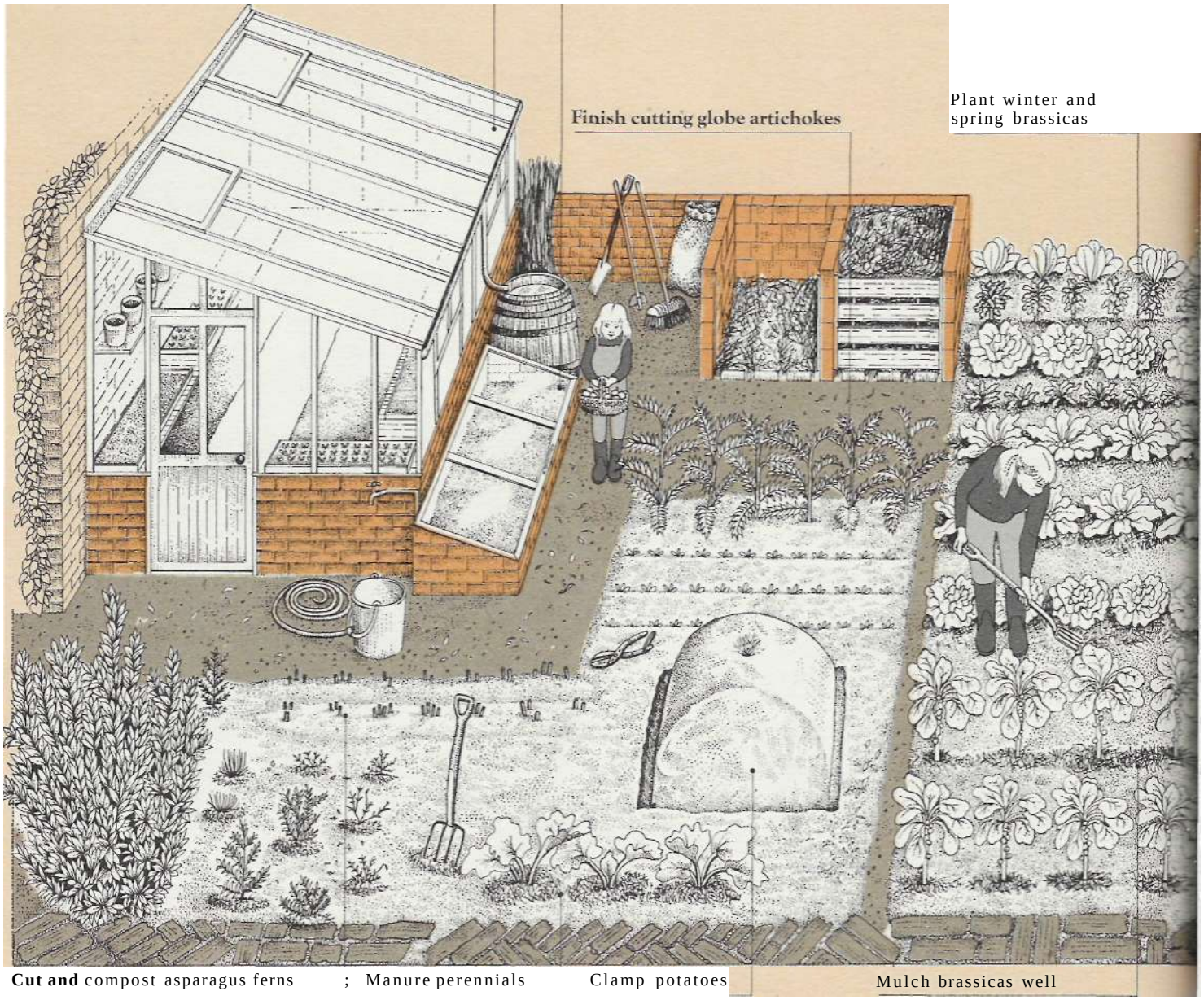
Autumn is the season of mists and mellow truitfulness according to Keats. It is also the real harvest time, when all the main crops have to be gathered in and stored for the winter. The good gardener will try to broadcast green manure seed whereverbeds are left empty, although on very heavy soil old-fashioned gardeners are fond of leaving it "turned up rough" after digging so that frost can get at it. I prefer the green manure approach. After the first frost has touched celery and parsnips it is time to start eating them, and time to think of parsnip wine for Christmas (or the Christmas after next, as purists would have it).

Greenhouse and perennials

Frames and greenhouse can be sown with winter lettuce, spring cabbage and summer cauliflower. The last two will be planted out next spring. Asparagus ferns are cut down and composted, thus defying the asparagus beetle. Potatoes may well be clamped near the house, or put in the root cellar (or anywhere cold, dark and frost-proof). Globe artichokes are cut as long as there are any left. Then they are abandoned, except for a covering of straw, as they die down, to protect them against frost. It is a good idea now to cover the asparagus bed with seaweed, or manure, or both. All perennial crops want lavish manuring.

Plot A

Now it is time to clear away all the peas and beans, even the haricot beans, soya beans and any others intended for harvesting and drying for the winter. This bed will hold winter and spring brassica, planted late perhaps, but none the worse for that, as they have been growing away happily in their holding bed. The cabbages will benefit from the residual lime left by the peas and beans and the residue of the heavy manuring given to the previous spuds. When all weeds are suppressed it is a good idea to mulch the brassica with compost, but slugs must be kept down.

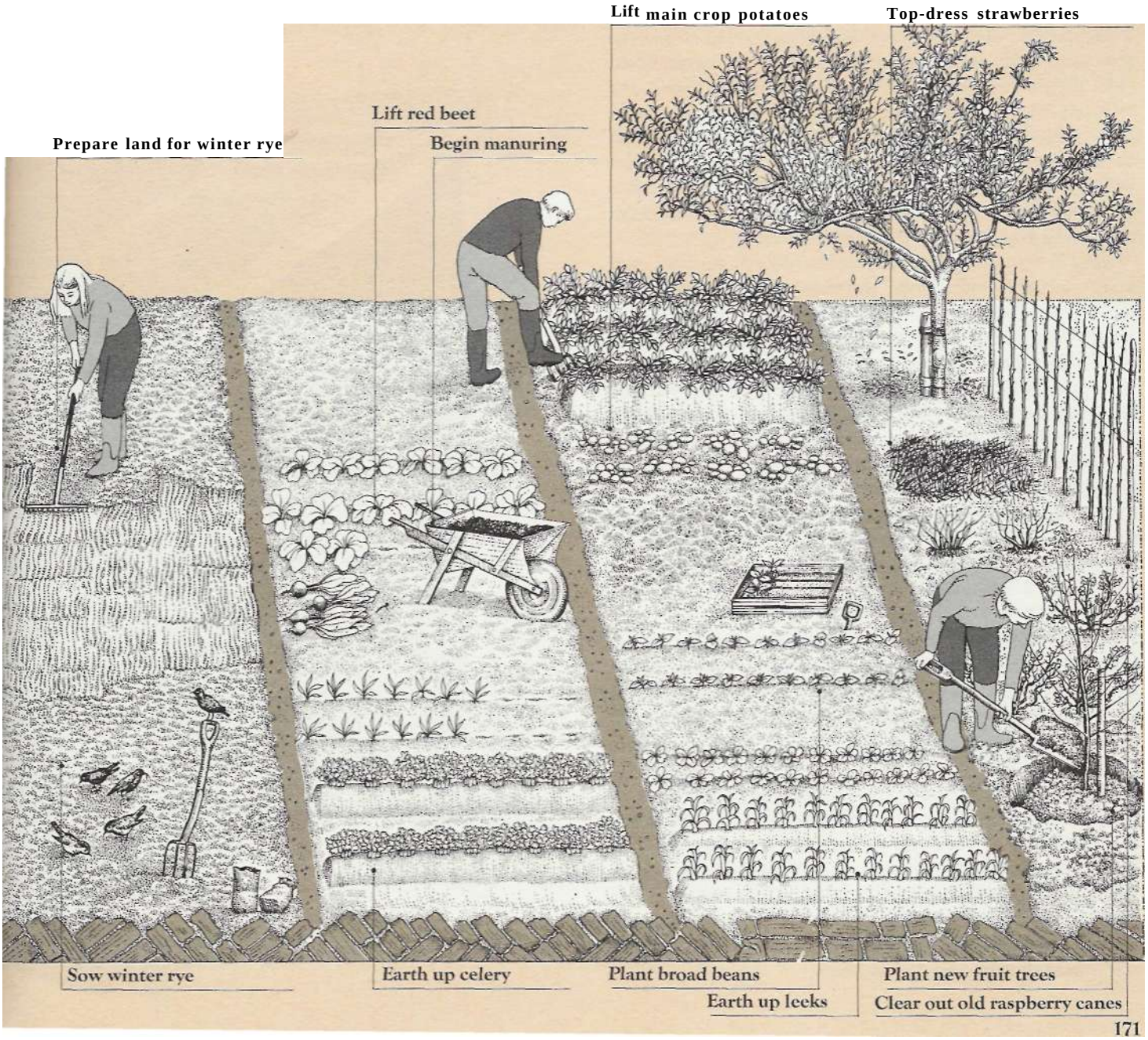


PlotB
All the plants in this bed (which are plants with a short growing season) will have been harvested. After the bed has been cleared, it should be lightly forked over, and winter rye planted for green manure. Unfortunately, it is not much good trying a clover for this as it is too late in the year; only a winter-growing crop like rye will work.

PlotC
Parsnips can stay in the ground indefinitely. Once earthed up, celery will also survive much of the winter. The rest of the roots are lifted in September and put safely in store.' Red beet needs lifting carefully, as its roots bleed when damaged. As the land is cleared rye can be sown in it at least up until the end of September. This bed will be spuds next year, and manuring can now begin.

PlotD
The main crop of potatoes is lifted quite late, just before the first frosts are expected. This way, the tubers will harden in the ground and keep better, and if blight is present there is less chance of the spores being on the surface of the ground to infect the tubers when they are lifted. The spuds should lie drying out on the surface for a day or two, while their skins set. Then they are clamped or stored away. The leeks are earthed up and will be a great winter standby. As this plot will be the pea and bean break next year, broad beans are planted in October or September if you have hard winters.

Fruit plot
Runners are cut away from the strawberries, the ground cleared and given a good top-dressing of muck or compost. All fruit is harvested as it becomes ripe, then apples and pears are stored in a cool but not a frosty place, so that they don't touch each other. The old fruiting canes of raspberries are cut out, leaving the young wood, and blackcurrants are pruned in November or December. New fruit trees can be planted in November if the ground is not too wet. As tree leaves fall, rake them up and compost them, because they harbour troublesome pests.



The Greenhouse

A greenhouse can be a very basic thing; it can consist of a three foot (91 cm) high foundation of brick, concrete or stone, a wooden framework containing the glass (heavy glass is best), a door, and four ventilators (two at each end of the building, one high up and another low down). Inside you need staging for standing seed boxes on, and you should be able to remove this so that in the summer you can plant tomatoes in its place.

Unheated greenhouses

In countries where grapes and tomatoes will grow reliably out of doors I personally would not bother to have a greenhouse, but would spend the money on other things. But in cooler climates even an unheated greenhouse is enormously useful for starting off things like celery seed, sweet corn, early summer cabbage, and anything else you wish to get off to a flying start out of doors as soon as the frosts are over. You can also use it during the summer for growing that magnificent plant the tomato. Tomatoes are a most desirable crop for the self-supporter. They are expensive to buy, but easy to grow; they bottle well, and having a store of them makes all the difference between some possibly pretty dull food in the winter and *"la dolce vita". A* couple of dozen large kilner jars filled with fine red tomatoes on the shelves come autumn are a fine sight and give us hope for the future.

And in summer your cold greenhouse may nurture such luxury crops as aubergines, melons, green peppers which turn into red ones if you leave them long enough, and of course cucumbers. The cucumbers you grow inside a greenhouse taste much better than frame or ridge cucumbers grown out of doors. And you can have lettuce nearly all the year round if you grow it in a greenhouse. In spite of this, a cold greenhouse will not help you much in the winter time, except by bringing along some early cabbage or some winter lettuce, or something that is pretty hardy anyway, because the temperature inside the greenhouse, when there is no winter sun, may go well below freezing point. So do not expect marvels. Remember the limitations.

Heated greenhouses

If you can just manage - by hook or by crook, by oil or electricity, or wood burning or coal - to keep the temperature of the air in your greenhouse above freezing all winter, and your greenhouse is big enough, you can have peaches, pears, nectarines, grapes, and most Mediterranean climate fruits every year in any climate.

If you want to heat your greenhouse, you can have water pipes running through it. The pipes should slope gently up from the boiler as far as they go, since the hot water will tend to rise and the cold to sink back to the boiler. At the highest point of the pipes there must be a bleeder-valve to let out air or steam that may collect. If the masonry inside the greenhouse is painted black, heat is absorbed during the day and let out during the night to allay the frost.

The self-supporter will like the idea of heating his greenhouse without buying fuel. This canbe done with a Fachongle Furnace (see pp. 248-249), or possibly by water or wind-generated electricity. The former is likely to prove more reliable. Solar heating, properly used, has always been adequate to heat greenhouses in the warmer months of the year.

Greenhouse temperatures

In the winter the temperature should be about 40°F (4°C) at night. The sun should bring this to about 50°F (10°C) on bright days. The day temperature should not be allowed to get too high, but it must not be kept down by admitting freezing air into the place, as this will inevitably kill tender plants. S o cool the air by letting the boiler fire go out, but get it going

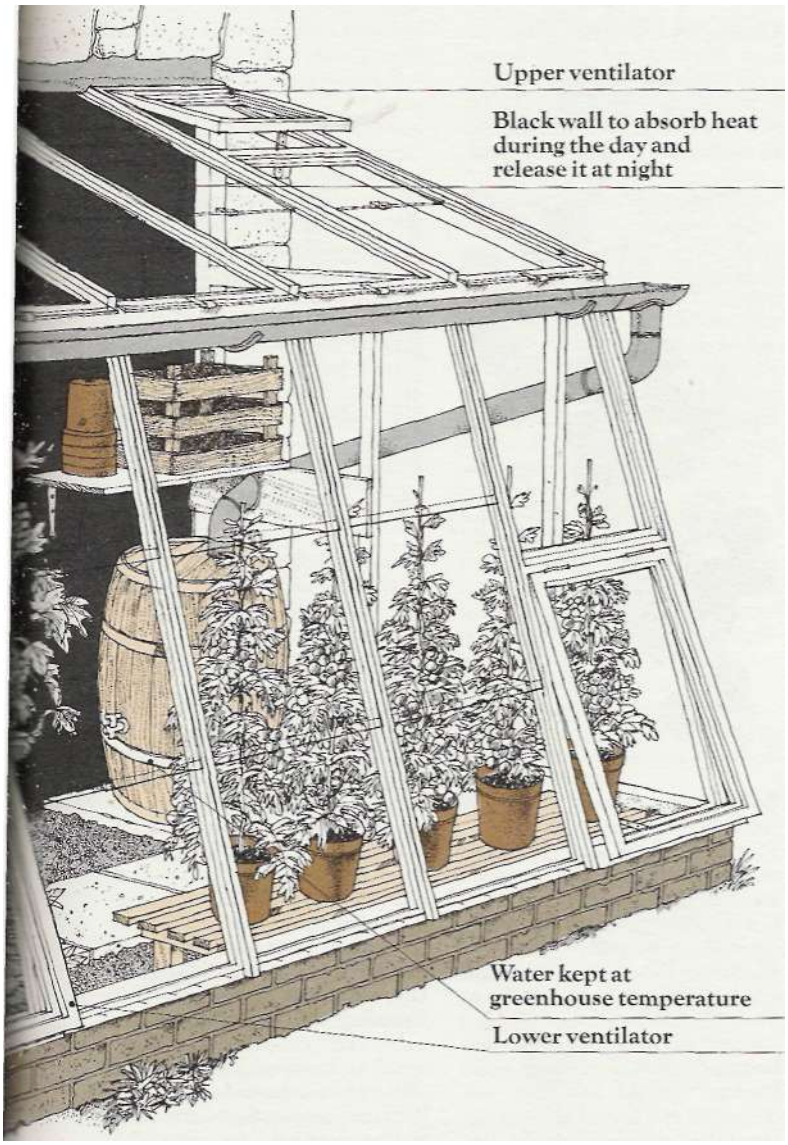
A lean-to greenhouse

This greenhouse is a practical way of getting such things as lemons, peppers, grapes and tomatoes off to a flying start in a temperate climate.

again in the afternoon so that the temperature can be kept up at night. During the daytime in winter have the leeward top ventilator open. Then, as spring gets into its stride, openboth top ventilators a little more. Eventually, open one of the bottom ones as well, but arrange for the cold air coming in through this to go over the hot pipes. In spring and summer sprinkle water on the floor occasionally to keep the air humid. It helps if you can arrange for the water from the roof of your house to go into a butt kept inside the greenhouse. This will be easier if you have a lean-to greenhouse.

Greenhouse soil

Greenhouse space, whether heated ornot, is expensive, and it is therefore not practical to fill your greenhouse with any old soil. The better the soil in the greenhouse the better use you will be making of this expensive space. If you mix very good compost, good topsoil and sharp sand in equal parts, and add a scattering of ground rock phosphate and a little lime, you will have a very good soil for your greenhouse. You can put this soil in raised beds, or straight on to the existing soil of the greenhouse. The more you rotate crops inside the greenhouse the better, but if you are driven to growing the same crop year after year then you may have to remove the old, or spent, soil bodily and replace it with new. Tomatoes particularly can suffer from disease if grown too many years on the same soil.



Greenhouse crops

As to what to grow in the greenhouse, we are all guided in this by what we can grow and what we want. A cold greenhouse enables you to grow a slightly greater range, more reliably than you could outdoors. A hothouse enables you to grow practically anything that can be grown on earth. For my part the main uses of the greenhouse are: winter lettuce and other saladings; seed sowing in flats or seed boxes in the early spring of celery, tomatoes, peppers, melons, aubergines, sweet corn, cucumbers; and my greenhouse crop is tomatoes which go on all through the summer. I know you are supposed to be able to grow tomatoes outdoors in a temperate climate but you can't really, whereas a tiny greenhouse will produce a really impressive tonnage of ripe red tomatoes that can be eaten fresh until you are fed up with tomatoes. Then they can be bottled to provide marvellous food and flavouring right through the year. You simply cannot have too many tomatoes.

As for cucumbers, they can be grown out of doors (the ridge and frame varieties), but there is no reason why you should not grow a few in the tomato greenhouse too. The conditions are not ideal for them though: the true cucumber house is much hotter and more humid than the good tomato house. My advice is to keep your house to suit tomatoes and let the cucumbers take pot luck and do the best they can.

And then there is no harm, when you live too far north to grow grapes reliably out of doors, in having a big old vine growing up the back (north) wall of the greenhouse, trained under the roof so as to get the benefit of the sun without shading the precious tomato plants. A fan-trained peach tree, too, is a pleasing luxury in a fairly large greenhouse. And in countries with very cold winters it is quite useful to sow the seeds of temperate things like brassica in the greenhouse in the very early spring.

Whatever you do don't overcrowd your greenhouse. It is far better to grow plenty of one really useful crop, like tomatoes, in the summer, and another really useful crop, like lettuces, in the winter than to fill your greenhouse with innumerable exotic fruits and vegetables. Make all the use you can of hot beds under cold frames, cloches, jam jars and sheets of transparent plastic and the like, out of doors (see pp. 142-143).

Soft Fruit

It takes courage to plant top fruit trees knowing that you have many years to wait before you harvest any fruit, but unless you have one foot actually in the grave there is no excuse for not planting soft fruit. Soft fruit comes into bearing quickly enough: strawberries planted one summer will give you a big yield the next, and bush fruit does not take much longer. And soft fruit will give you, besides a lot of pleasure, a source of vitamins, easily storable, which will ensure the good health of you and your family.

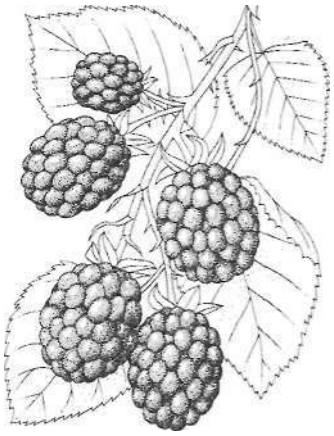
By far the best soft fruit to plant, for my money, is blackcurrants. They are hardy, prolific, extremely nourishing - about the richest source of vitamin C and other vitamins you can grow - and easily preserved. With blackcurrants you can be sure of an ample source of delicious fruit right through the winter and hungry-gap. Bottled they taste nearly as good as fresh, and they very seldom seem to have a crop failure: in fact, in twenty years of growing them I have never known one. -

White currants and redcurrants are not nearly as heavy yielding as blackcurrants. One might grow a few for the novelty, and for variety, but they won't really make much difference to whether you starve to death or not during the winter months. Raspberries are a good grow - they can be very prolific, and are fine for jam. They are also hardy and will thrive in wet and cold latitudes. Raspberries are far easier to grow than strawberries and really just as good to eat. They have a long picking season and children can be turned out to graze on them.

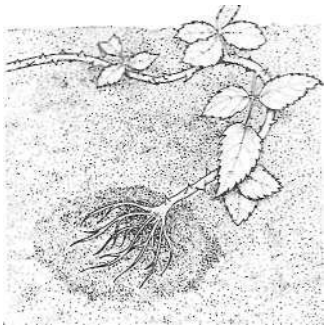
Blueberries and the many small berries of that ilk are grown by people who are hooked on their flavour. They are so laborious to pick in any quantity that they must be looked upon as a luxury. They are useful, though, in cold climates where lusher fruit will not grow.

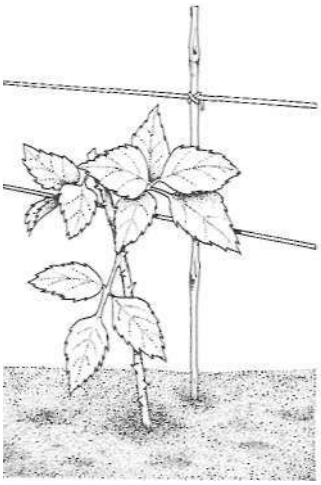
BLACKBERRIES OR BRAMBLE FRUIT

Use I live in countryside where brambles are a blasted nuisance, and as we pick bushels of wild fruit from them, I wouldn't dream of planting blackberries. But cultivated brambles provide a heavier crop of bigger, sweeter fruit, and are very hardy. They also make good prickly hedges, although you may prefer a thornless variety.



Planting If you want a hedge of tame blackberries make sure the ground is completely clear of perennial weeds such as couch grass. Dig in muck or some phosphatic manure, or both, then plant small plants every six feet (1.8 m). Each plant must have a bit of stem and a bit of root and each stem and root should have been shortened





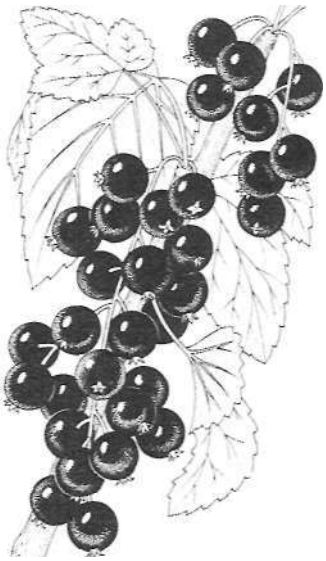
to about half its length. Provide them with a wire fence and they will climb along it. In fact they will spread at an amazing rate, so keep a close eye on where they are growing.

Pruning If you inherit wild brambles, and want to improve them for fruiting, cut the big patches into blocks by clearing rides, or paths, through them. Cut a lot of the dead wood from the bushes, clip the long straggling runners and fling in some phosphatic manure if you really want to make a meal of it.

After care Keep the rides clear, and you will greatly improve both the yield of that bramble patch and the ease of picking the fruit. Do not forget to watch for stray shoots growing up nearby.

BLACKCURRANTS

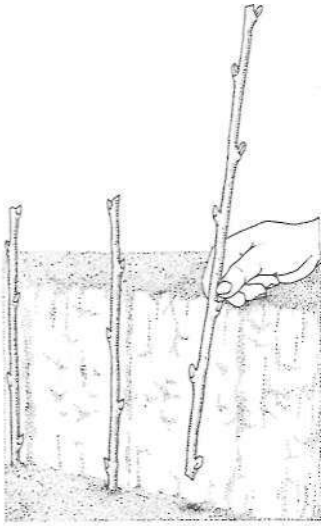
Use Blackcurrants are by far the most important soft fruit you can grow. They are the richest in vitamin C, and make the best wine of all the fruits.



Soil They thrive on a cool and rather heavy soil, even on clay.

Preparation of soil The land should be limed the previous autumn if it is under about pH6. Get rid of any perennial weeds and dig in plenty of muck.

Planting Take your cuttings from existing bushes in late autumn. Do this in the ordinary course of pruning and remove the tops and bottoms with a very sharp knife. Cuttings should be about ten inches (25 cm) long. The lower cut should be just below a joint. Make a slot in the soil with a spade, put a little sand in the bottom and if you



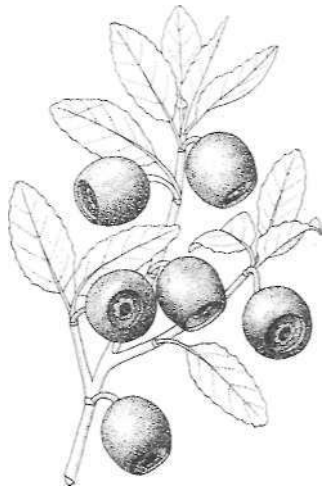
are a perfectionist, stick the cuttings into it with about a foot (30 cm) between each. Cover them with leaves or compost as protection against the frost heaving the soil up during the first winter. Nurserymen in cold climates make the cuttings from prunings in November, tie them in bundles and heel them in until March. Then they plant them as described above. Next November lift the young rooted plants carefully and plant them one foot (30 cm) apart in rows 18 inches (46 cm) apart. At the end of the second year, lift them and transfer them to their permanent quarters, six feet (1.8 m) apart. Don't plant them too deeply.

Pruning Blackcurrants, unlike red or white currants, fruit on new wood, so, if you can, cut out all the wood that was fruited on last year. But you will often find that you are faced with a long old branch with a new branch' growing on the end of it, so you will end up retaining

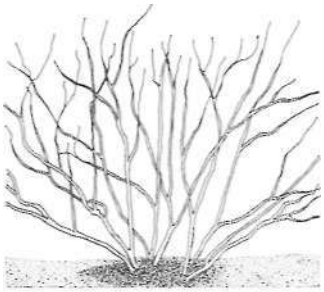
some of the old wood. Do not worry;
After care Give them plenty of muck every winter and keep the ground clear of grass and weeds.
Pests "Big-bud" is the worst pest. This is caused by a mite, and causes swollen buds. Pick off all such buds and burn them. Another disease they can get is "reversion" when the leaves go a weird shape like nettle leaves. Pull these bushes right out and bum them, so the disease doesn't spread to other plants.
Harvesting Some very lazy people commit the awful atrocity of cutting the fruiting branches off, taking them indoors, and stripping the berries off there! Well of course, it is easier to sit at the kitchen table and pick berries off a branch than to stoop or kneel out in the garden, and you kill two birds with one stone because you should prune out those already-fruited branches that winter anyway. I know people who do it, and it seems to work. But 1 have never been able to bring myself to do it, because I know that there is still a lot of "nourishment" in that green branch, which will go down to the roots as winter comes on, and I feel it is a crime to cut it off before this happens.

BLUEBERRIES

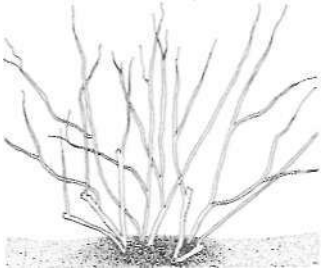
Use Blueberries aren't much good in warm climates, but people living in cold northern regions should consider them vers' seriously, for they are basically mountain fruit.



Planting Blueberries prefer acid soil to alkaline, so don't put lime on them. They stand up to intense cold and like a rather shallow water table so their roots are near the water. They can't grow in a swamp unless on a hummock. They will grow well on mountain peatland and prefer a pH value of about 4.5, which is very acid. Propagate from cuttings, or buy three-year-old plants, and plant them six feet (1.8 m) away from one another.



Before pruning



After pruning

Pruning When the plant is four years old (the first year after planting three-year-olds), cut out most of the flower clusters and cut away the suckers, the shoots that come up from the roots. Do this for two years. Then limit the suckers to two or three for each bush. From then on cut away old wood from time to time. Don't pick the berries until they come off very easily, or they will have little taste.

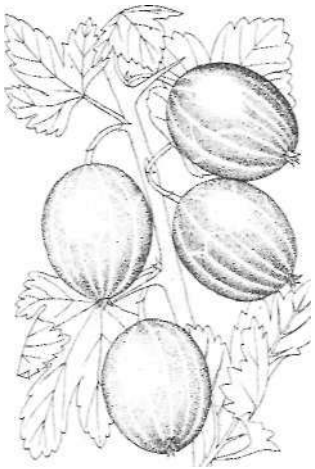
CRANBERRIES

Use These fruits are most commonly used to make cranberry sauce which is traditionally eaten with turkey. They will only grow under carefully controlled conditions and for this reason they are rarely grown in gardens.
Soil Cranberries grow in very acid soil. They must be well drained yet well watered in summer, and then flooded in winter.
Planting Cuttings can be planted in spring in a three inch (8 cm) layer of sand on top of peat.

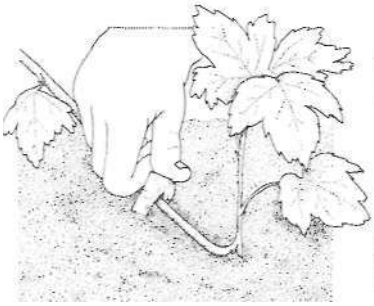
Harvesting After three years of weeding, watering, and protecting, the plants may begin to fruit. The fruits are hand-picked.

GOOSEBERRIES

Use Gooseberries are a very useful source of winter vitamins, and they bottle and cook well. You can't have too many of them, and for my part these and blackcurrants and raspberries are the only bush fruit really worth bothering about.



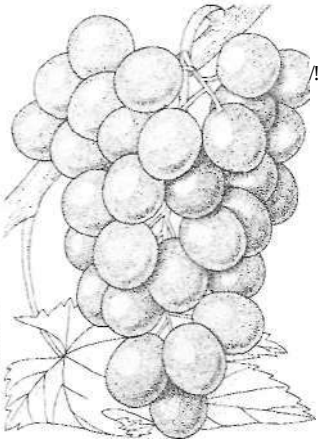
Soil They like a good deep loam, but you can improve clay for them by digging sand in, and you can improve sand by digging clay in, and you can improve all soils by heavy mucking.
Propagation Just like blackcurrants (see above), except that you rub out, with your fingers, all the lower buds on the cutting leaving only four at the top. They also layer well - peg a low branch to the ground and it will root. Cut it off and plant it.



Pruning Prune hard the first year or two to achieve a cup-shaped bush (open in the middle, but with no branches straggling down). Then shorten the stems to three or four inches every winter, cutting out all old branches that don't fruit any more. Always keep the middle open so you can get your hand in to pick the fruit. But never prune gooseberries in frosty weather.
After care Muck or compost mulch every year. Bullfinches will destroy every bud during the winter if they can, so build a fruit cage if you have to. Leave the cage open in the summer until the fruit can form in order to let goody birds in to eat the pests, but close it in the winter to keep baddy birds from eating the buds. The bullfinch plague in England and other places is due to game-keepers. They have destroyed all the predators, like owls and hawks, and small birds have now become a pest.
Diseases A horrible aphis sometimes lives inside gooseberry leaves and makes them curl up. Pick the curled leaves off and burn them. American gooseberry mildew can be sprayed with two ounces (56 g) of potassium sulphide dissolved in five gallons (23 litres) of water. You can recognize it by a white felt-like growth over leaves and fruit.
Harvesting Just pick them when they are ready. You will find them good for bottling or for wine.

GRAPES

Use Grapes don't mind how cold the winter is, provided the summer is warm enough and there is enough sunshine. They will grow as far north as Suffolk, England. I grew ninety outdoor vines there and got plenty[7] of grapes. The pheasants ate all the grapes, but I ate all the pheasants, so that was all right.

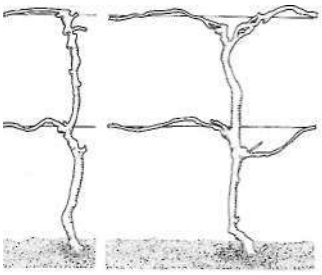


Soil Grapes need a very well-drained, warm soil, rich in humus, and they want plenty of sun and air. A south-facing hillside is fine. A pH of 6 is good, so you may have to lime. They can also be grown in a greenhouse and left to climb all over the place.
Propagation They grow well from

Soft Fruit

cuttings. Plant rooted cuttings out in lines six feet (1.8 m) apart in cold climates, and maybe more in warm. Grapes will fruit better in cold climates if you keep the vines small, and near the ground.

Pruning Have two horizontal wires, one a foot (30 cm) from the ground and the other two-foot six (76 cm). Vines fruit on this year's wood, so you can always prune last year's off provided you leave two or three buds which will produce this year's shoots. In cold damp climates, don't be too ambitious, leave three shoots to grow. One is a spare in case something happens to one of the others, and you cut it off when the other two are established.



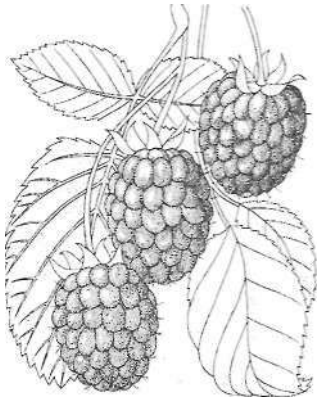
Train the two you leave in the same direction along the two wires by tying them. In warmer climes, leave five shoots. Train four along the wires, two each way, and keep one spare. Prune in late winter. Cut the shoots off after they have made about six buds.

After care Mulch heavily every year with compost. Keep down weeds, and spray with Bordeaux Mixture (see p. 87) in June.

Harvesting Cut the bunches off with secateurs. Never tear them off roughly.

RASPBERRIES AND LOGANBERRIES

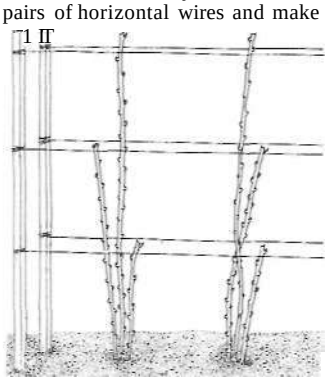
Use Both taste excellent with fresh cream, and store well as jam.



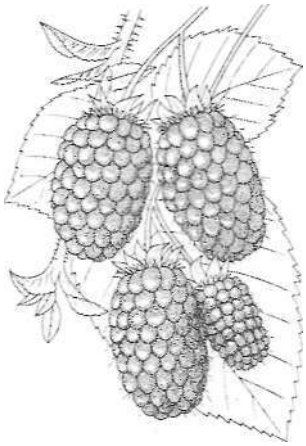
Soil They like a heavy, moist soil and will thrive in cold northern regions better than most soft fruit. They tolerate shade and a northern aspect. Get rid of all perennial weeds and muck very heavily. They are greedy feeders of muck and will thrive if you give them plenty.

Propagation Either buy young plants from a nursery, raise them from layers, or just dig them out from the ground near existing raspberries.

Planting Plant them quite shallow, two feet (61 cm) apart, in rows five feet (1.5 m) apart. Establish a fence for them to climb up, or to contain them. 1 just have three pairs of horizontal wires and make



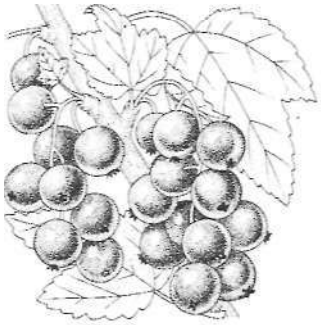
sure the canes grow between these, but some people tie them to the wires to give the canes extra support and to keep them neater.



Pruning Let them grow, but don't let the first shoots flower - cut them down before they do that. The second generation of canes will fruit. Cut the canes out after they have fruited, and just keep three new canes to fruit next year. Cut out all the weak canes. As the years go on leave more canes to grow, up to about a dozen. Suppress suckers, or dig them up to plant elsewhere. Cut the tips at different levels because they fruit at the tips and you want fruit at all levels on the plant.

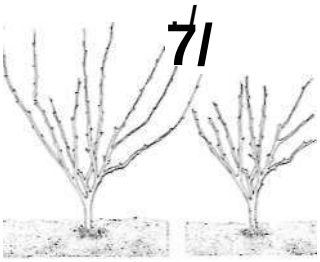
RED AND WHITE CURRANTS

Use These are nothing like as useful as blackcurrants, but I grow them for fun. They are good for making jelly.

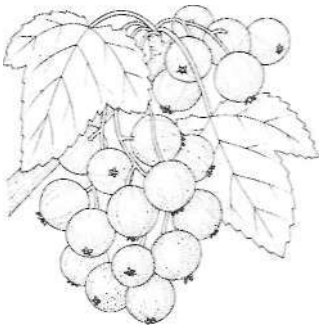


Planting Propagate from cuttings just the same as you would with blackcurrants (seep. 174)-

Pruning They fruit, not on the leaders, like blackcurrants, but on spurs like apples. So cut back the



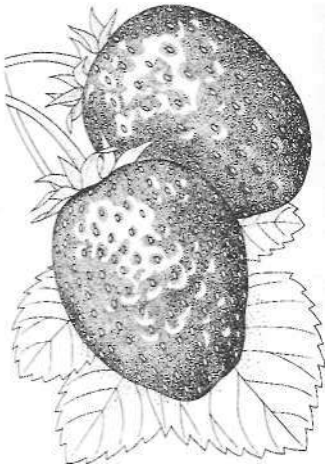
first leaders, or new shoots, to half their length the first winter. Then cut all the main leaders back to half their length, and cut out all subsidiary leaders to within half an inch (1 cm) of where they spring. Fruiting spurs will form at these points. In fact, keep as much older fruiting wood as possible, while cutting out much of the new wood.



After care Otherwise treat them just the same as blackcurrants. They don't get "big-bud" or "reversion".

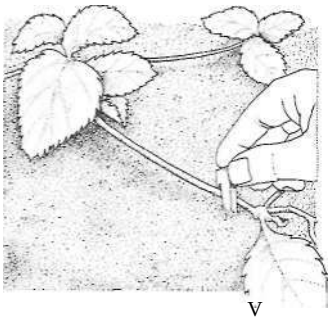
STRAWBERRIES

Use Thisfruitisaverygoodsource of vitamin C, rashes in some small children, and income for homesteaders. Strawberries are very labour-intensive, but they yield about the highest income per acre of anything you can grow. If you grow different strains you can have strawberries all summer.



Soil They are a woodland plant so they need tons of muck and slightly acid soil: no lime.

Propagation Strawberries make runners which root, and you can dig these out of the ground. Or you



can make the runners root in little buried flower-pots with compost in them. Then when they are rooted you can cut the runners, remove the pots, and plant them out.

Planting Put little plants in during August and then transplant them a foot (30 cm) apart in rows eighteen inches (46 cm) apart. Don't plant them deep and spread the roots out shallow.

After care Hoe and weed constantly or your bed will become a mess, and mulch heavily with peat, if you have it, or compost. Beware of slugs. If you haven't any peat, put straw below the plants to keep the berries clean. If you get botrytis (grey mould), dust with flowers of sulphur.

Harvesting It is best to let them fruit for three years, then scrap them. Establish a new bed every year for a constant supply.

Tree Fruit

Happy is the homesteader who inherits a holding which has plenty of established fruit trees. Unfortunately farms that have previously been tenanted almost never have any. Why should a tenant plant trees on another man's land? So it often happens that the newcomer finds no fruit at all, and has to wait several years before he picks even a solitary apple. The only thing you can do is plant fruit as soon as possible.

Plant: some standard or half-standard hard fruit trees; some espalier or cordon hard fruit trees (especially if your space is limited), or else dwarfed trees which generally yield a much heavier crop much more quickly than full-size trees; and some soft fruit. Thelatterwillgiveyoufruitinthreeyears, or less if you plant two-year old bushes. The big standards, or half-standards, will eventually give you a great bulk of fruit, possibly for the rest of your life, and pro vide you with enough apples for cidermaking. So, to reap your reward quickly, put them in as soon as you possibly can.

However, if you have a very small garden you had better not grow too much top fruit (that is fruit grown on large trees) because trees take up a lot of space and sterilize the ground underneath them for some distance by drying out the soil, extracting nutriments from it, and shading it from the sun.

When you site your orchard you must consider drainage. This is very important because no fruit trees will thrive with their feet in water. Air drainage is vital too. Frost runs downhill and therefore a basin is a "frost pocket". Thus you don't want a hedge below a sloping orchard because this will impede the flow of cold air downhill, creating frost which will impair the quality of your soil. Apples, pears, plums and the rest need good soil.

APPLES

Use Apples are quite simply the most useful fruit of all for cool and temperate climates. By having both early and late varieties, and long-keeping varieties, you can have prime apples *nearly* all the year, with maybe a little gap in summer when you have plenty of soft fruit anyway. A raw apple a day can be one of the most valuable items of your diet.

Soil They like good deep loam but will grow in most soils with plenty of muck. They don't do well on acid soil so you might have to lime. Land must be well drained and not in a frost pocket.

Preparation Cultivate well and get rid of all perennial weeds. Dig holes bigger than the tree-roots are likely to be, and if you can get it, throw some lime builder's rubble in the bottom of the hole (and plant a dead dog down there too if you have one).

Planting If you buy trees from a nursery get them to prune them before they send them. Three year-old trees are usual, but if you take immense care with the planting you can have an almost ready-made orchard by planting even seven-year-old trees. Planting trees is covered in detail on p. 180.

Varieties There are at least a thousand varieties in Europe alone so I cannot begin to deal with them here. Get local advice on the best varieties to grow in your area, and make absolutely sure that varieties that need other varieties to pollinate them have their mates nearby. Otherwise they will remain fruitless old maids.

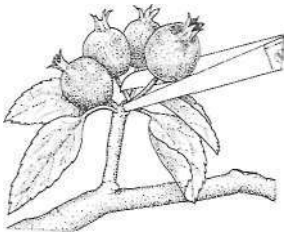
Pruning Pruning is of vital importance if you want large fruit, but don't prune until the middle of February (to guard against rot spores). If your apples are "tip-bearers", and you must find this out from the nursery, the only pruning you should do is cut out some main branches, and in fact cut out the odd complete branch to keep the tree open and not too densely crowded.

But most other apples you will have to prune more scientifically. Cut all "leaders" (leaders are the long shoots which you want to leave to form new branches) to a third of their length, and cut to about half an inch beyond an outward-facing bud. This is because the last bud you leave will turn into a branch next year and you want the branches to grow outwards, away from the centre of the tree. Try to aim for a cup-shaped tree, open in the middle with four or five nicely-shaped main branches growing out from the trunk at about 45°. Don't let it get too crowded with minor branches. So for the first year or two remove all young shoots that are not required for leaders to create the final shape of the tree. Cut them off half an inch (1 cm) from where they join the trunk.

Then the aim should be to encourage fruiting spurs and discourage too much non-fruiting wood. If you cut off young shoots within half an inch (1 cm) of their base a fruiting spur will probably grow in their place. So, on each small branch, cut the middle, or main, leadet back to half its length but cut all the subsidiaries back to within half an inch (1 cm) of theit bases so that they will form additional fruiting spurs.

Prune lightly in mid summer too. Don't prune leaders, but cut all subsidiary shoots that have grown that year down to within about four inches (10 cm) of theit base.

In later years you may have too many fruiting spurs. In this case you must cut some out. And if a tree bears a lot of small fruit one year and none the next thin the flowers out. If, during a good year, your tree appears to be supporting an excessive amount of fruit, thin out some of the tiny apples to make sure that the fruit left grows to a good size.

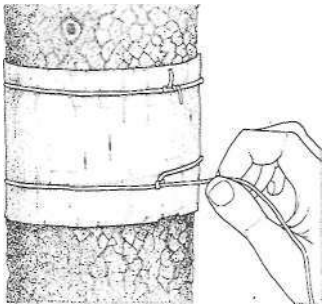


Ptuning is very complicated and I would recommend that you find yourself an experienced adviser.

After care Try to keep the ground directly around your trees free of weeds and grass; annual heavy mulching with whatever waste vegetable matter you have, plus muck or compost, helps this. However, don't put too much highly nitrogenous compost on. Pigeon and chicken dung are out for apples. They cause too much rank growth and not enough apples. Grass the space in between the trees if you don't want to intercrop with something else, but above all keep the grass close-mown all summer and don't remove the cut grass. Leave it there to rot and for the worms to pull down.

Don't start spraying until you are hurt. If you obey all the books you read you will swamp your trees with deadly poisons (some growers spray a dozen times a year, drenching trees, fruit, and soil with persistent toxins) and you will kill all the predators, the insects and arachnids that feed on your insect-enemies, as well as your enemies themselves. If you don't spray at all you will probably be all right.

If you get "canker" (rotting patches on the branches) cut out all dead wood and paint the affected areas with white lead paint. If you get "scab" (brownish scabs on the apples) carefully collect all fallen leaves, pruned branches and so on and burn them every year. Spray with Bordeaux Mixture (see p. 87), but add half as much again of water as you would for potatoes. Spray just before the flower petals look as if they're going to open and again just after the flower petals drop. If you get "apple sawfly" (maggots that bore into the apples) sptay with quassia, which kills the maggots but not the predators.

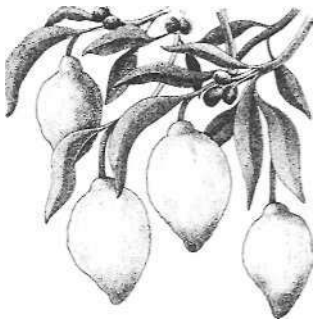


Grease-banding really is a good old safeguard against many horrid

things. Just stick bands of greasy material around the tree above the ground. Many nasty things try to climb up the trunk and get stuck in the grease. I believe keeping a few-hens under fruit trees is good, because the birds scrap out a lot of wicked insects. Planting buckwheat near fruit trees is said to be good, for it attracts beneficial hover-flies. But you may well find you need do nothing to protect your trees, and you still get good apples.

CITRUS FRUIT

Use Ifl could only grow one citrus fruit tree - in other words if I only-had room for one tree in a greenhouse - I would grow a lemon, because you could not hope to produce a significant amount of oranges off one tree whereas one lemon tree would keep a family in lemons, and without lemons a good cook is lost. You can, of course, grow oranges or lemons in tubs, kept indoors in the winter and put outside in the sunshine in summer, but you will get very little fruit like this.



Soil and climate Citrus fruit will grow well outdoors in subtropical climates. Lemons are slightly more frost tender than oranges: 30°F (—1°C) will kill the young fruit and 26°F (-3°C) may kill the tree. Oranges will put up with a degree or two colder. The best soil is sandy loam, pH between 5.5 and 6.2, and good drainage is essential.

Planting Plant like any other top fruit trees (see p. 180).

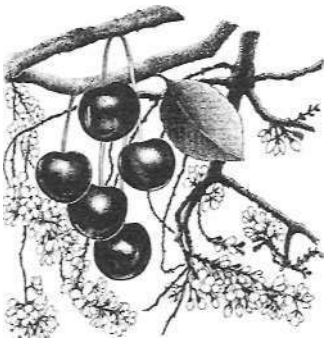
After care Keep the ground constantly moist for several weeks after planting. Aftet the second year, if you are using irrigation, they should have at least 20 gallons (90 litres) of water a month. They don't need much pruning except for root-stock suckers and diseased or injured wood. They like plenty of compost mulch, but keep it from touching the trunk's foot - if you do not, foot-rot may result.

Harvesting Citrus fruits are harvested during the winter and can be left on the trees quite safely for

many months. So obviously it is best to leave them on the tree until you want them and then pick them while fresh.

CHERRIES

Use Two distinct species of cherry *(Prunus avium* and *Primus cerasus)* have given rise to the many varieties now cultivated. The former are sweet, the latter sour, but hybrid breeds are common. The vitamin content of the fruit is high, and cherry juice has been used to help relieve sufferers from acute arthritis.



5oil and climate Successful cultivation of cherries depends more on a favourable climate than on any other single factor. An unexpected late frost will kill the crop without fail. Good water and air drainage is crucial. On well-drained soil trees can send their roots down as far as 6 feet (1.8m), at which depth they are not in danger of suddenly drying out. Sweet cherries like a deniable loam; sour cherries prefer a clay soil which is more retentive of moisture.

Planting Cherries arebestplanted in autumn, and the first buds will appear early in spring. A thick mulch applied soon after planting protects the tree.

Aftercare Cherry trees bear their crop early in the season, so if agood mulch is maintained, moisture other than natural spring and winter rain will not be necessary. A young cherry tree should be trained in a way that creates a central trunk with branches coming from it all the way up, not an open cup-shaped tree, which will bear less fruit. The birds will get all your cherries if you just grow them in the open so the answer is to grow them up a wall where they can be protected by a hanging net. Or else don't have so many birds.

If they get "die-back" (branches that are dying from the tips') prune the dead wood away and bum it. If they get "leaf-curl" spray with Burgundy Mixture (see p. 87) before the leaves open in spring.

Harvesting Picking cherries with their stems is not simple, for it is easy to damage the fruiting twigs. The smallholder with the single tree may find it easier to pick his cherries without stems, although the fruit must then be used at once before any bacteria have time to enter through the break in the skin. The longer the fruit is allowed to hang when ripe the sweeter the juice will become.

FIGS

Use The ancient Greeks called figs the Fruit of the Philosophers and all one can add to this is that the philosophers must have had very-good taste, for fresh figs, sun-warmed, are a unique experience.

Soil and climate They are truly a Mediterranean fruit but will bear fruit out of doors in cooler climates, including England and many parts of the northern USA. In such climates the Brown Turkey fig is the only one to grow. They are best grown against a south facing wall, and in rainy and fertile land their roots should be confined in some way. A box a cubic yard in size is ideal. The walls should be concrete and the floor should be soil with broken stone on it. The reason for this is that figs grown unconfined in moist and fertile places put on too much leaf and branch growth and not enough fruit. An eccentric parson of my acquaintance confines the roots of his fig trees with tomb stones of the long deceased.

The fig will thrive in most soils, but a light or sandy loam is held to be best. In fact the fig is very much a fruit of poor soils.

Planting Figs grow well from cuttings. Take two to three year old wood of under an inch (2.5 cm) in diameter in winter, cut to ten inch (25 cm) lengths, plant almost completely buried in the soil and keep moist. In places where figs grow well a fig tree can do with about 20 feet (6 m) of space. In colder climates fan-train up against a wall.

Aftercare Figs need little pruning unless fan-trained. If their roots are not enclosed and they do not fruit, root-prune them severely. An interesting thing about some figs, particularly the Smyrna fig, is that they can only be fertilized by a certain very slim wasp *(Blastophaga psenes)* which can crawl into the fig's neck. The fig is not a fruit, but a piece of hollow stem which has both male and female fruits inside it. When the Smyrna fig was taken to America it w-as not understood why it would not fruit until it was discovered the fig wasp was needed, and these were imported in a certain wild fig called the Caprifig. The Brown Turkey fig which is the one to grow in northern climates does not need *Blastophaga* to fertilize it.

Figs can be dried, and make a very nutritious and easily stored food for the winter.

OLIVES

Use Where you can grow it the olive is the most valuable tree imaginable, for it produces quite simply the best edible oil in the world besides the most delicious and nutritious fruit. In fact one could live on good bread, olives, and wine, and many people have done so. Olives and the locust bean tree are among the most desirable trees you can grow, for they draw their sustenance from the deep subsoil, and allow inter-cropping with grass or other smaller herbage. This is true three-dimensional farming, which may well be the subsistence farming of the future.

Soil and climate Olives suffer damage at 18°F (—8°C) and very severe damage at 10°F (—12°C) so

they are not suitable for cold climates. But they don't worry about late frosts above these temperatures because their flowers don't come until late spring or early summer when such frosts will not occur. They will not grow at altitudes over 800 metres unless they are very near the sea, but near the sea they suffer from "fumagine" (a sooty mould disease). If you can match these conditions grow them on a slope if you can, because they cannot stand having their roots in stagnant water. On the credit side they will put up with practically any soil at all. If on sandy soil in a semi-desert climate they will survive with as little as 8 inches (20 cm) of rain annually In clay soils further north they will need 20 inches (50 cm) or over. The best soil of all for olives is sandy soil interspersed with clay layers. They need rain in the summer period, and if there is none you must irrigate profusely and regularly.

Propagation If you take cuttings in late summer and plant them in a mist propagator you can grow trees from these. There are three ways you can do it: you can plant small cuttings of 4 to IT inches (2 to 4 cm) diameter and 10 to 12 inches (25 to 30 cm) long vertically in the ground; you can plant larger cuttings li inches by 10 inches (4 cm by 25 cm) below the ground horizontally; or you can plant root cuttings (taken from a tree growing on its own roots ofcourse, not from one grafted on a wild olive root stock) either in a bed or in the position you want your new tree.

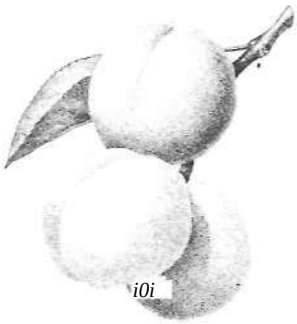
Professionals grow trees from seed, then graft them on wild olive stocks, but this is a very tricky business. If you are going to grow olives on any scale you should plant about 250 trees to the acre. Plant them any time between late autumn and early spring. Trees may-begin to produce at five or six years old, be producing heavily at ten to fifteen years and go on for a hundred. Mature trees will give from 90 to 150 lbs (40-70 kgs) of fruit and about 18 pints (10 litres) of olive oil.

After care Olives must be heavily pruned, but this is a complicated job which must be learnt from someone with experience. Alternatively, you can find a professional who will come and prune your trees.

Harvesting You can harvest from the end of November right on through the winter. If you are going to eat your olives you must carefully pick them by hand. If you want them for oil you should shake them down into a sheet.

PEACHES AND APRICOTS

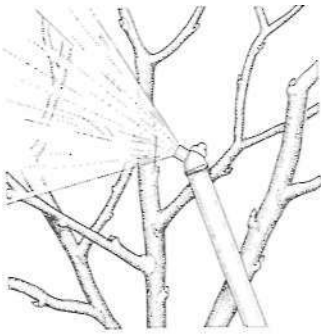
Use Peaches and apricots are perhaps most appreciated in temperate climates where they are not so easy to grow. Increasingly they are found frozen or tinned, so it is worth growing them fresh.



Soil and climate Paradoxically peaches and apricots need both heat and cold. If they don't get cold in winter, say 40°F (4°C) or below, they don't have their winter sleep and exhaust themselves. On the other hand one late frost after flowering will wipe the crop out and they need real heat and sunshine in summer. Most of the people who w-ere going to make a fortune growing outdoor peaches in England after the war have given it up. They like light soil, sandy or gravelly loam.

Planting The fruit is best planted in spring except in climates where the winters are exceptionally mild.

Aftercare Prune right back when you transplant the tree. Prune sensibly in the early stages to shape the tree, and nip out half the fruit if it is too crowded. If they get leaf-curl disease spray with Burgundy



Mixture (see p. 87) in early spring, just before the buds swell.

Harvesting Peaches and apricots are ripe when all green in the skin gives way to yellow. Be careful not to bruise the fruit when picking, as once bruised they degenerate very rapidly. You can store them for up to two weeks.

PEARS

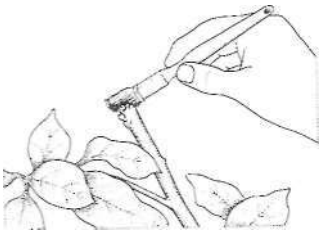
Treat almost exactly the same as apples. Pears like a more sheltered spot than apples and are not quite so hardy. Plant a succession of varieties. Give copious top dressings of manure, but see that it doesn't touch the stem, or roots will grow out from the scion instead of the stock. Incidentally - if you graft pear scions on wild hawthorn bushes they will grow and produce pears! And remember pears won't keep as well as apples do.

PLUMS

Use A number of very different species are all known as plums. They range from sweet dessert plums to tart damsons exclusively used for jam. Prunes are varieties of plum which have so much natural sugar that they do not ferment while drying out with the pit still inside the fruit.

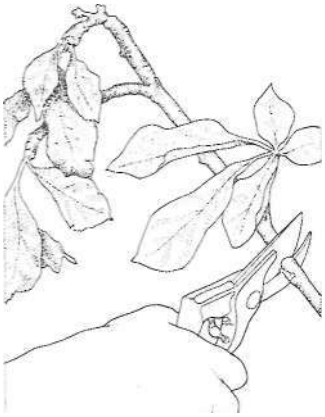
Varieties Plums are not always self-pollinating, so you must make sure that the varieties you plant are capable of pollinating each other or you won't get any fruit. If you only want to plant one tree, find out if any of your neighbours have plum trees and choose a variety which can be pollinated by any of them.

Pruning Don't prune plums for the first three years you have them and then don't prune them until early summer or disease might get into them. Then take out any over-crowded branches, and if the tree is too luxurious shorten leaders to a foot (30 cm) and side-shoots to six inches (15 cm). This will slow them down and make them fruit. Always in early summer cut out any "die-back" (branches that are dying from

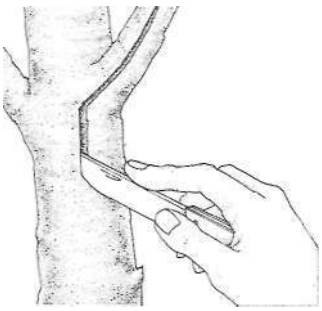


the tips) and paint the wound with paint. Never prune plums in winter.

After care "Silverleaf disease" is a bad disease of plums. If you get it the leaves will turn silver and the insides of the twigs brown. Cut off



the twigs and branches until you get into clean wood, and - an old



remedy - slit the bark with a knife right from the cut you have made down the trunk to the ground. Of course bum all affected parts to prevent the disease spreading.

Harvesting Plums for preserving can be picked as soon as a bloom appears on the skin, but if they are to be eaten fresh they should be left to hang for longer. Their flavour is best when they look and feel over-soft.

Caring for Fruit Trees

Planting

All fruit trees are planted in the same way It is best to plant during the winter months when the sap is not moving around the tree. Normally you would buy three-year-old trees to plant from a nursery, but get the nursery to prune them before they deliver them.

However, if you take enormous care with the planting, you can have almost an "instant orchard" by planting even seven-year-old trees. But these trees would be considerably more expensive, and you really need to know what you are doing when you plant them. You would have to put a bag around the root ball to keep the soil in, dig right below and all around the roots, plant with immense care, and keep watered for a month. But I would recommend anyone inexperienced in orchard growing to buy three-year-old trees. The techniques of planting are illustrated below.

Grafting

If you buy trees from a nursery they will already be grafted: cuttings from the fruit tree that you think you are buying will have been grafted on to another kind of tree. The latter will be some hardy, near-wild variety: for example it will be a crab if the fruit tree is an apple. Thus you have the advantage of a hardy variety for the all-important root and trunk, and a highly-bred, high-yielding variety for the fruit. Very few amateur gardeners do much grafting, but there is no reason why they shouldn't, as it is easy enough.

It is no good grafting on to an old diseased tree, or one that is prone to, or has had, canker (rot in the bark or wood). A very useful exercise is the top-grafting of old established fruit trees, which are of a poor variety, or are neglected, badly pruned, otherwise inefficient, and in need of reviving. The growing tree you graft on to is called the stock, and the tree you graft on top of it is called the scion. Scions can be made from winter cuttings. Heel in the cuttings (plant them in a cool place) after you have cut them off an existing healthy young tree of the type you fancy, just as if they were ordinary- cuttings. Then, in spring, cut all the branches of the old tree you wish to revive down to about a foot from their point of union with the trunk, for top-grafting. Trim the edges of the saw cut with a super-sharp knife, and go about grafting your scions on to each branch.

There are several methods of grafting, according to what sort of branch you are grafting on, but the principle is always the same, and involves bringing the cambium (under-bark) layers of stock and scion into close contact. It is in this layer just under the bark that growth and union of tissue start.

Apples and pears are easily grafted; grafting plums is much more difficult because grafting lets in silver-leaf disease. So don't graft plums unless you have to, and then only with great care. You can, by the way, graft pears on to white thorn or may trees, and get pears! If we had the time and energy we could do this all along our hedges.

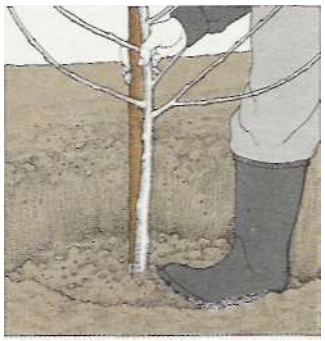
Planting a tree

When planting out a tree or a bush put yourself in its place. Consider the shock to the roots, accept that the tree is delicate and treat it accordingly. Start by digging a hole much bigger than the root ball of the tree.

Drive a stake into the bottom of the hole before you put the tree in. You train the tree up the stake. Thenput the tree in and prune off any broken roots or very long ones.

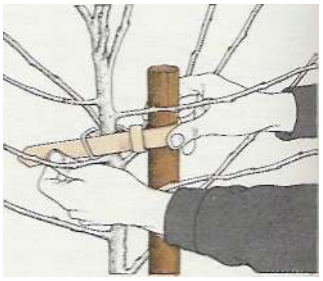
You will of course only be transplanting the tree in winter when it is dormant, but even so minimize the shock. Put a heap of rich loam in the middle of the hole and spread the roots round it. Make sure that you plant the tree at the same depth as it was before. Sift in more loam round the roots with your fingers, and rub the soil gently into them. Continue filling the hole until the roots are in close contact with the soil.

As the tree grows it will need a good supply of nutriments below it. So the soil under the tree and all round it must be firm; if the soil caves away under the roots and leaves a cavity, the tree will die. You should firm each layer of soil as you plant, making sure it is broken up finely. When you have installed the roots to your satisfaction (and the trees), throw more soil in on top and stamp gently but firmly.

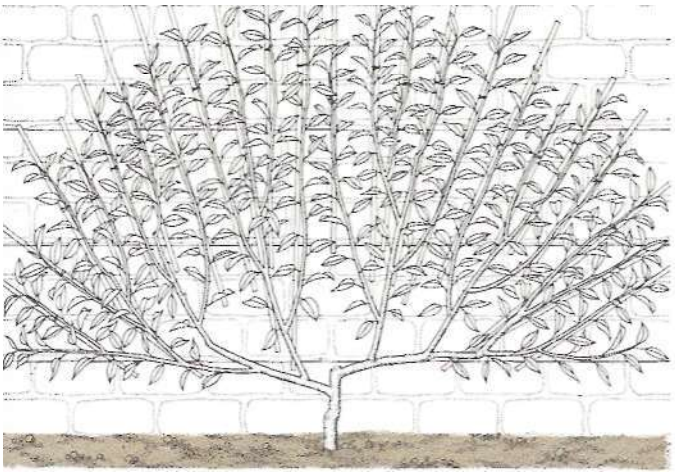


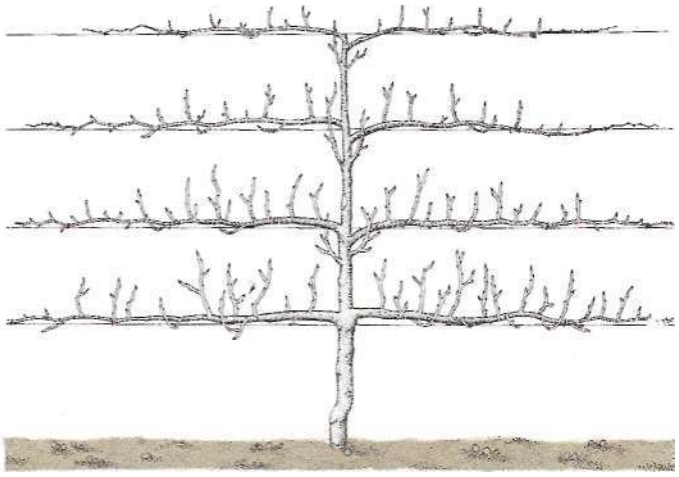
Do not stamp heavily as this will tear delicate roots. When the hole is completely filled in, and the soil heaped up a little, you can stamp harder.The stake ensures that no movement disturbs the roots of the tree once growth begins.

A tree must have moisture after it has been replanted. So water it well, and then put a good thick mulch of organic matter on the soil around the tree to conserve the moisture.



Tie the tree to the stake with a plastic strap and buckle. You can then adjust this when the trunk thickens.

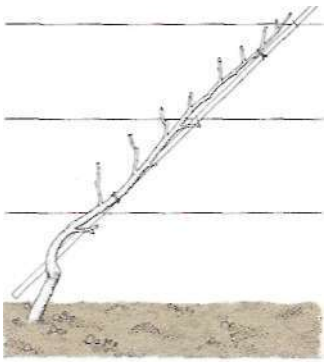




Tree shapes
Train your young fruit trees into a variety of decorative shapes. This can save space, and in some cases can considerably increase yields.

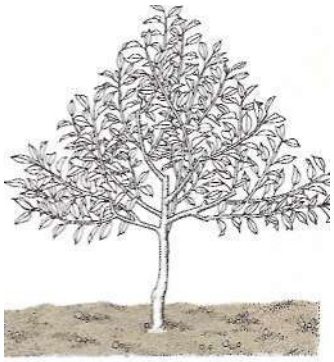
Fans
Train a "maiden" (a single-stemmed, one-year-old tree) along a wall or fence, with the help of canes tied to wires 6 in (15 cm) apart (above).

Cordons
Train a young fruit tree up a fence at an acute angle, and limit it to one stem and no long laterals (right).

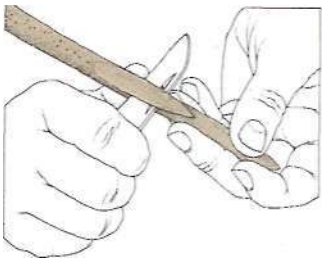


Espaliers
Stretch horizontal wires one foot (30 cm) apart between posts. Train the central stem vertically upwards, and the lateral shoots at 90°, tying them to canes fastened to the wires.

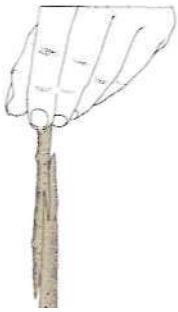
Dwarf pyramids
The advantages of dwarf trees are that they take up less space than full-size stock, but their fruit yields are as heavy. Restrict the growth of a young tree to 7 feet (2.1 m). Keep side shoots short. Dwarf trees fruit earlier, but do not live as long as full-size stock.



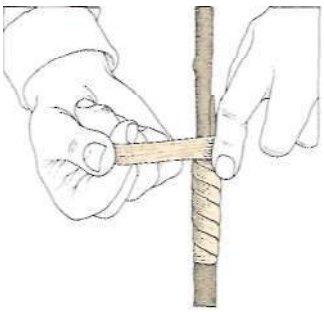
Whip grafting
This is a form of grafting which is used when the stock and the scion are approximately the same size. The stock is the branch on to which you graft the scion; the scion is a shoot that you have cut in winter, and then "heeled in" to a cool place until needed for grafting.



Prepare the scion by making a cut just behind a bud at the lower end of the scion so that it slopes away to nothing at the base. The cut might be two inches (5 cm) long. Near the top of this cut make another small one upwards, without removing any wood, so that a small tongue is formed. Cut the tip off the scion leaving from three to five buds. Now make cuts on top of the stock branch to correspond with those you have made in the scion.

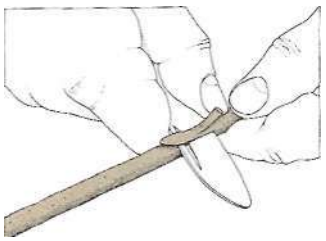


Fit scion to stock, slipping one tongue down behind the other. The two cambium layers must be in contact with each other.

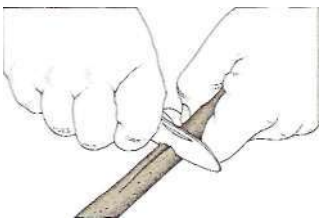


Tie the two parts together with raffia (cotton will do) and cover the whole joint with grafting wax.

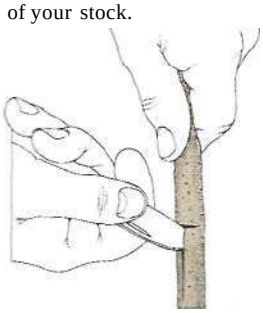
Budding
This method of grafting is much used by rose-growers, although it can also be done with fruit trees. In summer select a strong healthy scion about a foot long and put it in water.



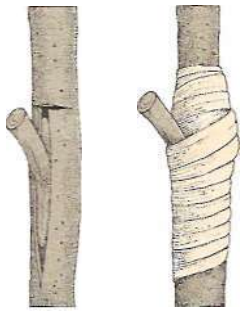
Take your scion out of water and slice out a shield-shaped piece of bark which contains a bud within a leaf axil.



Cut a T-shaped slit along the back of your stock.



Peel back the two flaps of bark formed by the cut.



Insert the shield into the T-shaped cut. Remove any of the shield sticking out above the T-shaped cut, and put back the flaps on each side. Bind with raffia or tape after insertion. As the bud grows you can cut off any stock above the bud-graft.

Storing Fruit & *Vegetables*

VEGETABLES

Clamping

Clamping is the process of making a pyramidical pile of potatoes or any other root, covering this with a good layer of straw or bracken or any dry litter, and then covering this with a layer of earth about six inches (15 cm) thick. The earth must be beaten flat with the back of a spade. In order to allow air circulation there should be small tunnels along the bottom of the clamp where the straw has been allowed to protrude through the earth, and small chimneys along the top. Water should be kept out by the trench you have dug to get the earth for the covering, but beware of thieving, destructive rats.

All potatoes and roots can be clamped. The advantage of this is that if there is blight in your spuds, or any other root disease, you don't get a build-up of the organisms as you would in a permanent building. In intensely cold winters and in severely cold climates clamping may not be possible - no clamp would stop the frost, and potatoes cannot stand much frost or they will rot. In these conditions they must be stored inside, ideally in a cellar although any frost-proof building will do.

Burying in sand

Carrots are traditionally laid down in dry sand, each root separate from the others, and stored in a frost-proof place. Lift them gently, trying not to damage them with the fork. If you wash them before storage they will just rot, and there's an end to it. They can be clamped in larger quantities, but don't expect them to last too long. There are few things more ugly than tons of slimy, putrescent, carrots. Beetroot and sweet potatoes can also be stored in this way.

Heeling in

Jerusalem artichokes, celery and leeks are generally best left in the ground until required, but if you fear hard frost, heel them into dry ground nearer the house where they will derive some protection from harsh weather.

Hanging in nets

All manifold squashes, such as marrows or pumpkins, should be stored away from frost. They will keep best if hung in nets, although they can be stored on shelves, if turned occasionally.

Stringing

It is a very good idea to string onions with baler or binder twine. Then hang them in a cool airy place. In many peasant communities the tradition is to hang them against the wall under the eaves of the house. Onions don't mind ordinary frost but must be dried thoroughly and not kept in a warm place. Warmth makes them sprout and go bad. Dry them in the sun on wire netting or on the ground. If it rains they should be in the wind, but under cover.

Drying

Beans and peas should be dried and stored away in great quantities every autumn. When they are thoroughly dried, threshed and winnowed, store them in crocks, barrels, bins or other mouse-proof places.

Mushrooms and most fungi can be treated in the same way as apples (see below), but they dry out at an ideal temperature of 120°F (50° C). Crumble them afterwards into a powder and store them in closed jars. The powder is marvellous for flavouring soups, stews, and so on.

Sweet corn is excellent dried: it really is a thing worth having. Boil it well on the cob, dry the cobs in a slow oven overnight, cut the kernels off the cobs and store them in closed jars. When you want to eat them just boil them.

FRUIT

Wrapping and shelving

As a rule the early-maturing varieties of apples and pears will not store well. So eat them as you pick them, and store only late-ripening varieties. Leave these on the trees as long as possible and only pick them when they are so ripe that they come off if vou lift them gently. Pick them and lay them carefully in a basket. Then spread them out gently in an airy place to let them dry overnight. Next day store them in a dark, well-ventilated place at a temperature of 35°-40°F (2°-4°C). Pears like it very slightly warmer.

Ideally each fruit should be wrapped individually in paper to isolate any moulds or bacteria. Only perfect fruit can qualify for storing. So disqualify any with bruises, cuts, or missing stalks. It is better if the floor of the store is earth, stone or concrete, so you can throw water on it occasionally to keep the air moist. Storing fruit in a hot dry attic is simply giving the pigs a treat.

Apples may well keep until spring. Pears have a critical moment when they reach utter perfection. This lasts a few-days. If they are not eaten then, they go sleepy and should be given to the pigs. So gourmets need to be very selective.

Drying

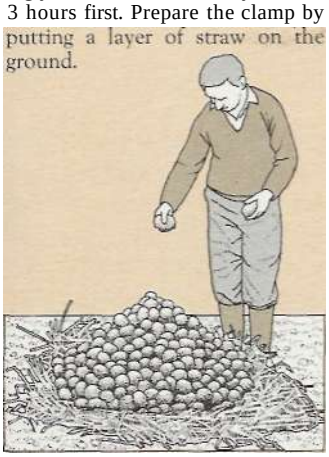
If you are afraid your stored apples won't keep long enough, vou can happily dry them. Core them, slice thinly, string up the slices, and hang over a stove, or in a solar-heated drier (see p. 214), at a temperature somewhere around 150°F (65°C) for five hours. When they are crisp and dry put them into an airtight container and store in a cool place.

Prunes can be made of plums or damsons, and are rich in vitamin A. Plunge your plums in a lye, made of 1 oz (28g> caustic soda dissolved in a gallon (4-5 litres) of water, for a few minutes. This softens the skins. Then wash them very thoroughly in cold water. Dry them on trays over a stove, or in a solar drier, at 120°F (50°C) at first, raising it gradually to 160°F (71°C); it must be raised gradually or the plums will burst. Keep them in this heat for two days. When you want to use them soak them first in water for twelve hours.

Clamping

Clamping is a method of protecting root crops in the open, where diseases do not build up as they can in a cellar. But no clamp keeps out hard frost, so in very cold winters you must store indoors.

When you pick potatoes for clamping you should let them dry' for 2 or 3 hours first. Prepare the clamp by putting a layer of straw on the ground.



Heap the potatoes (or other root crop) up on top of the straw in the shape of a pyramid so that when it is finished, rain will drain off.

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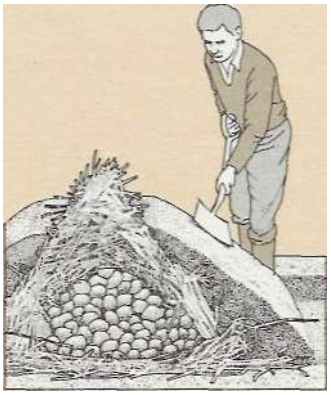
Cover with a layer of straw or bracken. Allow a period for sweating before covering with earth.

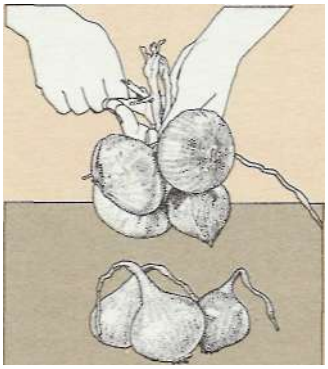


Cover with a layer of earth five or six inches (13-15 cm) thick. Beat the earth flat with the back of a spade.

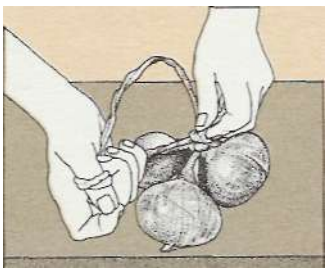
Make sure that bits of straw protrude from the clamp to admit some air to the crop inside.

Stringing onions

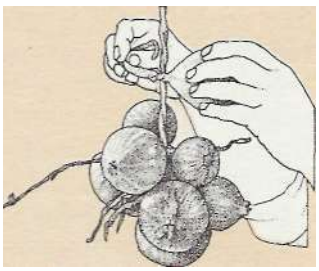
You can store onions on trays with slats, on polythene netting, or on a wooden stand. But the ideal way of keeping them is to string them up in a cool place with access to plenty of air. Before you store your onions, always remember to dry them thoroughly first, either by leaving them on the ground in the sun, or covered but in the wind if it is wet.



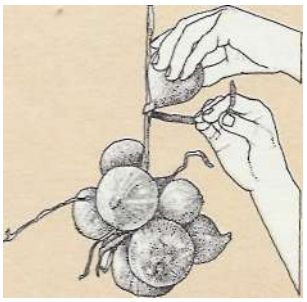
Make sure that all the onions you want to string have long stalks. Start by knotting four of them firmly together.



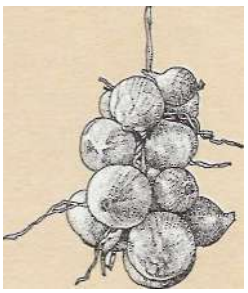
Plait the knotted stalks round the end of a long piece of string so that the onions hang evenly when you hold them up.



Add onions one by one to the original four. Twist their stalks and knot them tightly round the string.



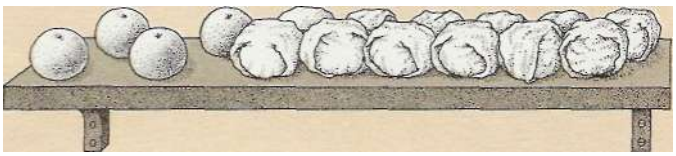
Continue adding individual onions to the growing bunch, ensuring that each one is securely tied on, and that the bunch does not become unbalanced.

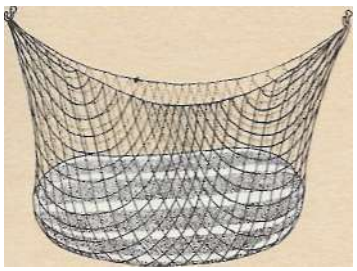


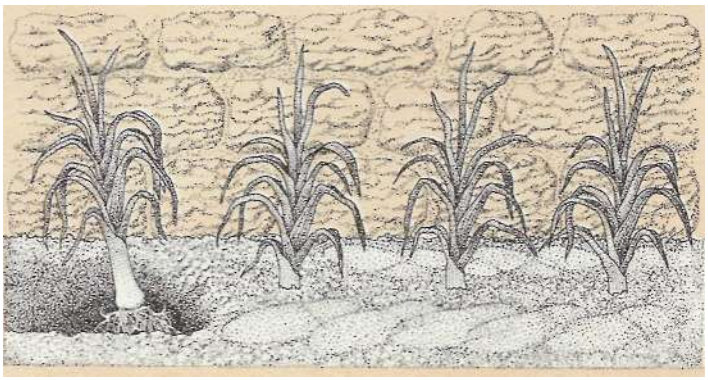
Hang the string up when you decide that your bunch is complete. The onions should keep indefinitely.

Other storing methods

Late-ripening apples last all winter if you keep them in a cool dark place, but be sure that they aren't touching each other. Preferably wTap each one in paper. Hang marrows and pumpkins in nets; store beetroot and carrots in dry sand so that the roots don't touch. Keep all these safe from frost. If leeks, celery and artichokes are exposed to frost in the open, "heel" them into dry, sheltered ground.







Preservin:

The harvest season is short for most things, although in a temperate climate it is possible to pick fresh green things every day of the year. The urge to prolong unnaturally the season of every mortal thing, by embalming them in deep-freezes and the like, should be resisted. Few things can equal the pleasure of coming fresh to new green peas at the beginning of their season after six months of pea-abstinence. The palate, jaded and corrupted by months of frozen peas, or quick-dried peas masquerading as fresh garden peas, does not find this fierce pleasure. True dried peas, cooked as pease pudding, or put in soups and stews, are quite another thing. They are a traditional time-honoured way of preserving plant protein for the winter months, and eating them all winter does not jade the palate for the fresh garden pea experience every June.

At the same time there is, potentially a vitamin shortage in the dark winters, and those dark cold days should be enlivened by nice tastes and odours besides that of salt bacon. So the self-supporter will wish to preserve certain things, preferably by a process which improves their natural flavour, such as bottling, pickling, chutneying or wine-making. There is nothing more encouraging in autumn than the sight of shelves heavily laden with full jars and crocks. More than anything they give you the feeling that you are likely to survive the winter. This may sound like a contradiction but it isn't. You cannot improve any food by deep-freezing, but you actually improve fruit and vegetables by making them into chutney, jam and the like. Freezing ' meat is another matter: unless you are very hungry you cannot eat a bullock before it goes bad. In more sensible times people killed meat and shared it. Now the whole principle of sharing with neighbours is forgotten and the cold of the deep-freeze has replaced the warmth of neighbourly relations.

Wine

Wine-making, like beer-making (see pp. 70-73), turns sugar into alcohol. Some fruits, such as grapes grown in a warm climate, have so much natural sugar in them that you don't have to add any. But many of the things you can make wine of are low on sugar. So you will have to add sugar if you want alcohol of a decent strength. And remember that weak wine won't keep: it just goes bad. Some "wine" described in books of wine recipes is simply sugar-water fermented and flavoured with some substance. Most flower wines (see p. 192) are made like this and people even make "wine" of tea-leaves - that sugarless substance!

Fruit wines have their own sugar, though generally not enough, so you must add some. The same goes for root wines. Parsnip, which is by far the best, has quite a lot of sugar. What country wines do is to preserve and even enhance the flavour and bouquet of the things they are made of. They cheer us up in the dark days of winter and are very good for us too.

Chutneys and pickles

You make both chutneys and pickles by flavouring fruit or vegetables, or a combination of both, with spices and preserving them in vinegar. The methods of preserving, however, do not resemble each other (see pp. 188-189).

Chutneys are fruits or vegetables which have been cooked in vinegar, often heavily spiced and sweetened. They are cooked until all excess liquid has evaporated, leaving a thick pulp, the consistency of jam. The flavour is mellow. Pickles are put down w-hole or in large chunks in vinegar, but not heated in it. Anything which is to be pickled must not have too much moisture in it. So sometimes moisture must be drawn out first with salt. The resulting flavour is full and sharp.

Both chutneys and pickles are an excellent way of preserving things for the winter and of enhancing their taste as well. They are delicious with cold meats and meat pies, and also offset the taste of curries or cheeses.

Ketchups and similar sauces are strained juices of fruits or vegetables spiced and cooked in vinegar. These too, if well made, can give a lift to plain food.

Bottling

The principle of bottling is very simple. Food is put in jars, the jars and their contents are heated to a temperature which is maintained long enough to ensure that all bacteria, moulds and viruses are destroyed; at this point the jars are completely sealed to prevent any further pathogens from getting in, and then allowed to cool. Thus the contents of the jars are sterilized by heat, and safe from attack by putrefactive organisms (see pp. 186-187).

The same principle applies to tinning, or canning, except that the product is preserved in an unattractive steel box. It is also a process that the self-supporter will find considerably less easy than bottling.

Fruit bottles very well. Vegetables are far more difficult, because they are low[r] on acid, and acid makes food preservation easier. My own feeling about the bottling of vegetables is - don't do it. What with salted runner beans, sauerkraut, clamped or cellared roots or cabbages, and, in all but arctic climates, quite a selection of the things that will grow and can be picked fresh out of doors all winter, there is no need for the rather tasteless, soggy matter that vegetables become when they have been bottled.

On the other hand tomatoes, which aren't strictly speaking a vegetable, are a very good thing to bottle indeed. They give a lift to otherwise dull winter dishes like nothing else can. They are easy to bottle, you can grow a big surplus during their short growing season, they are rich in vitamins and they taste delicious.

Fruits of the year
It *is autumn, and you have a surfeit of all the crops you have been gathering through the summer. What more fulfilling than to bottle, pickle and preserve in all possible ways for the dark days of winter ahead?*

Food from the Garden

Glass jars for bottling must have airtight tops, capable of supporting a vacuum, and arranged so that no metal comes into contact with the contents of the jar. If you examine the common "Kilner" jar, or any of its rivals, you will find quite a cunning arrangement ensuring that the above requirements are met. A rubber ring compressed by a metal screw-cap forms an airtight seal, and only the glass disc inside the screw-cap comes into contact with the jar's contents. Kilner and other proprietary jars need the metal parts smearing with vaseline to prevent them rusting, both when in use and when stored away. Keep the rubber rings in the dark, tor light perishes rubber.

To bottle you also need a container in which jars can be boiled. If you buy one it should have a false bottom, so that the jars are not too close to the source of heat. Alternatively, put a piece of board in the bottom, or else just a folded towel. When bottling fruit pack the jars as tightly as you can; tapping the base of the jar on the table helps to settle the fruit, and drives air bubbles out.

BOTTLING FRUIT

Cold water bath method

Put the fruit into jars of cold brine or syrup and put the jars in cold water. Take an hour to bring water to 130°F (54°C), then another half hour to raise it to the temperature given on the chart below.

Oven method

Fill the jars, not putting any syrup or brine in them yet, and covering them with loose saucers only Put them in a low oven at 250°F (121°C). Leave them for the time given in the chart, take out and top up with fruit from a spare jar that has undergone the same process, then fill up with boiling brine or syrup, screw on the tops, and leave to cool.

Hot water bath method

If you have no thermometer, and no oven, use the hot water method. Fill packed jars with hot syrup or brine, put the lids on loosely, lower into warm water, bring to the boil, then simmer for the length of time shown on the chart.

For fruit other than tomatoes, use a syrup of sugar and water if you wish. Water alone will do, and if you pack the fruit tightly you won't need much. But if the fruit is sour a weak syrup does help.

BOTTLING VEGETABLES

I strongly advise against the bottling of vegetables, but if you insist upon doing it you must heat in a pressure-cooker,, as boiling at atmospheric pressure is not enough to make it safe. Sweet corn can be bottled (although I prefer the oven drying method I described on p. 182): husk your corn, remove the silk, wash well, and cut the corn off the cob with a knife. If you force the cob on to a nail sticking up from a board at an angle you will have it steady for slicing. This will leave a little of each grain on the cob, but that's all the better for the pigs. Pack the corn in the jar to within an inch of the top, add half a teaspoonful of salt to each pint of corn, fill up to half an inch from the top with boiling water, put the lid on loosely and heat in a pressure-cooker at 240°F (115°C), at ten pounds pressure, for an hour. Remove the jars from the cooker and seal.

Salting runner beans

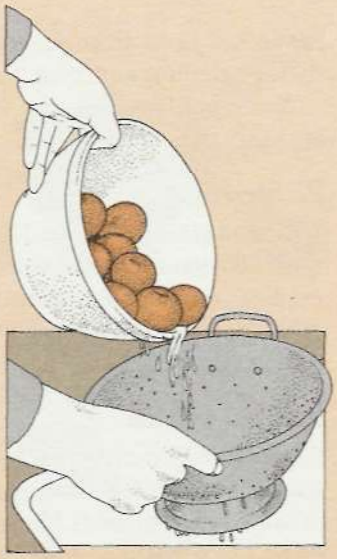
Use a pound (0.5kg) of salt to three pounds (1.4kg) of beans. Try to get "dairy" salt or block salt but vacuum salt will do. Put a layer of salt in the bottom of a crock, a layer of stringed and sliced beans (tender young French beans do not need much slicing, whereas runners always do) on top, another layer of salt, and so on. Press down tightly. Add more layers daily. When you have enough, or there are no more, cover the crock with an airtight cover and leave in a cool place. The beans will be drowmed in their own brine so do not remove it. To use, wash some beans in water and then soak them for no more than two hours.

	Cold water bath		Hot water bath		Slow oven	
Basic method	Take 90 minutes to bring water from cold to required temperature. Then follow instructions given below.		Start at 100°F (39°C) taking 25-30 minutes to reach required temperature of 190°F (88°C). Follow instructions.		Preheat to 250°F (121°C). Leave bottles according to times given below,	
Liquid in bottles	Put cold syrup or water in before processing.		Put hot liquid at 140°F (60°C) in before processing. For tomaroes, liquid is optional.		Add boiling liquid at end of processing,	
	Temperature	**Time**	Temperature	Time	Temperature	Time
Soft fruit Blackberries, raspberries, currants etc. and apple slices.	165°F (74°C)	10 mins	190°F(88°C)	2 mins	250°F (121°C)	45-55 mins
Stonelruit Cherries, plums etc.	180°F (83°C)	15 mins	190°F(88°C)	10 mins	Heat oven to 300°F (149°C) and put hot syrup in before processing them.	40-50 mins
Citrus fruit						
Tomatoes	I90°F (88°C)	30 mins	190°F(88°C)	40 mins	250°F (121°C)	80-100 mins
Purees and tight packs	Allow 5-10 mins longer than times showi above and raise temperature a little.					

Bottling tomatoes

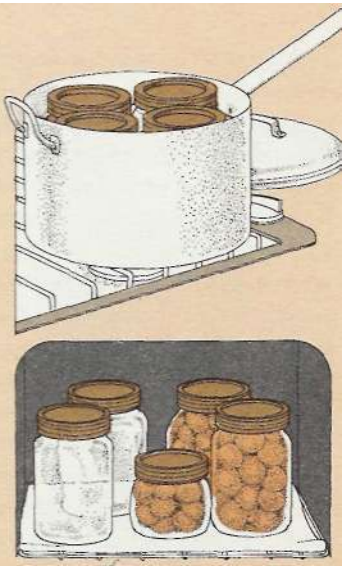
Jars of bottled tomatoes on your shelves in winter are a cheering sight. They are easy to bottle, and it even improves their flavour.

Remove the green tomato stalks, and nick the skins with a knife.

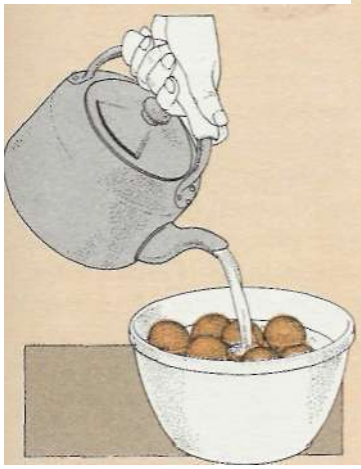


Drain and cover with cold water. Don't leave them very long as they soon go soggy.

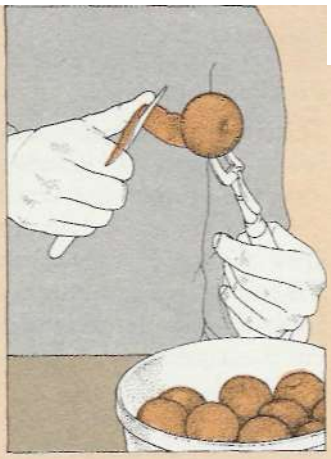
Pack tomatoes in jars very tightly. Push large fruit into place with the handle of a wooden spoon.



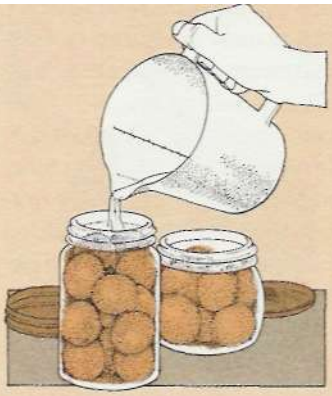
Put jars in a pan of water, or stand on newspaper in the oven. Cook.



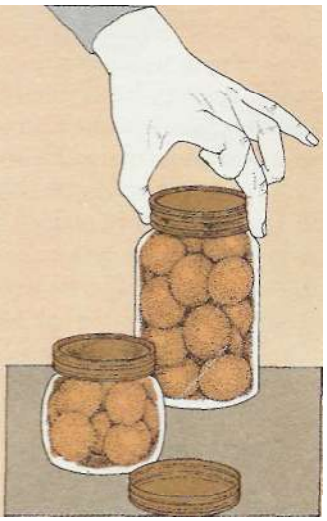
Put the tomatoes in a bowl and pour over boiling water. Leave until the skins have loosened.



With a sharp knife peel off the skins carefully so that the tomatoes retain their shape and do not loose any juice.



If sterilizing in water, fill the jars with brine, cover with sealing discs and screws lids on loosely; if in the oven, add brine after.



When cool, try lifting bottle by disc only. The vacuum should hold.

Making sauerkraut

You can clamp the, hearting cabbages you harvest in late autumn, but, if greens are scarce, sauerkraut is a noble winter standby.

Shred hard white cabbage hearts finely, and estimate *i* 01 (14 g) salt for each 1 lb (0.5 kg) of cabbage.

Pack layers of shredded cabbage into a stone crock or wooden tub; sprinkle salt between the layers.

Spread one big cabbage leaf across the top, put a cloth over it, and cover that with a plate.

Weight down and leave in the warm. In 3 weeks put it in jars and sterilize as described opposite.

Making Pickles & Chutneys

Pickles and chutney are another way of preserving produce. They add flavour to cold meats, meat pies, cheeses and curries. The principle of both involves flavouring fruit and vegetables with spices, and then storing them in vinegar.

Ideally you would make your own vinegar and I describe how to do this on p. 196. But if you cannot do this, and have to buy it, you should note that there are vinegars of different strength, cost and flavour. Distilled or fortified vinegar is much the strongest (it is also the most expensive). Wine vinegar is the strongest natural vinegar, and more expensive than cider or malt vinegar. Remember that vinegar leaves its flavour in chutney, and even more so in pickles, so if you want to have the best-tasting accompaniments to your cold pies, you may find yourself paying for your vinegar. And the best-flavoured vinegar is wine. However, when you make chutney much of the liquid is evaporated during the cooking, so a malt vinegar may prove to be a more economic proposition.

PICKLES

The vinegar is first steeped with spices and sometimes cooked with sugar, to improve and mellow its sharpness. To make a spiced vinegar suitable for a variety of pickles, you can add any spices you like. Ground spices make vinegar go cloudy, so if you want the pickle to be attractively presented, and clearly recognizable, you should use whole spices.

The ideal way of making spiced vinegar is to steep all the spices in cold vinegar for a couple of months, after which time the liquid is ready to be strained and used. Since this is not always practicable, what follows is a speeded-up version. For 2 pints of vinegar take 2-3 oz (56-84 g) of spices and tie them in a little muslin bag. Include:

a piece of cinnamon bark
slivers of mace
some allspice
6-7 cloves
6-7 peppercorns
2 teaspoon mustard seed

If you like the flavour of garlic, or of any particular herb, add it. If you like a hot taste add chilli, ginger or more mustard.

Now put the vinegar and spices into a jug or heatproof jar which can be covered with a lid or a plate. Stand it in a panful of water. Bring the water to the boil, then take it off the heat. Leave the whole thing to cool down for two hours, by which time the spices should have thoroughly flavoured the vinegar. Remove the little bag and the vinegar is ready to use.

You can pickle fish, eggs, fruit, and vegetables, and you can pickle them whole or in pieces. Moist vegetables and fish are usually salted first. This draws out some of their water. Crisp pickles like cucumbers, beetroot, cabbage and onion are put straight into cold vinegar. Others like plums, tomatoes and pears are cooked till soft in spiced vinegar, which is then reduced to a syrupy consistency before finishing. When adding sugar to sweet pickle, use white sugar - it keeps the pickle clear and light.

Pickle jars need close sealing to prevent evaporation, and the vinegar must not come into direct contact with metal lids.

You should eat all pickles within sixmonths; after this they are likely to soften.

Pickled eggs

Hard boil as many new-laid eggs as you like: you need about a quart (1.1 litres) of vinegar for even" dozen. Shell them. Pack them in jars and cover them with spiced vinegar. Add a few pieces of chilli if you like. Close tightly and begin to eat after one month.

Pickled onions

Choose small button onions. Don't skin them at once, but soak them in a brine of salt and water using four ounces (114 g) of salt to each quart (1.1 litres) of w7ater. After 12 hours skin them. Put them in a fresh brine for two to three days, with a plate on top so that they stay submerged. Then drain and pack in jars or bottles with spiced vinegar. A little sugar added to the vinegar helps the flavour. They are good to eat after two or three months.

Pickled apples

This is a sweet pickle. Use small apples (crab apples are good). For tw'o pounds (0.9 kg) of apples use two pounds (0.9 kg) of sugar and one pint (0.6 litres) of spiced vinegar.

Cook the sugar and vinegar until the sugar is just dissolved. Prick the apples all over, using the prongs of a caning fork. If they are too big for the jar cut them in half. Simmer in the vinegar/sugar mixture until they are soft but not falling apart. Put them gently in jars. Reduce the syrup to half a pint (0.3 litres) by boiling. Pour it hot over the apples, but not so hot that it cracks the glass.

CHUTNEYS

Chutney is a concoction of almost any fruit or vegetable you like, flavoured with spices and cooked with vinegar to a thick jam-like consistency. Soft, over-ripe fruit and vegetables are suitable, as they turn into pulp quickly.

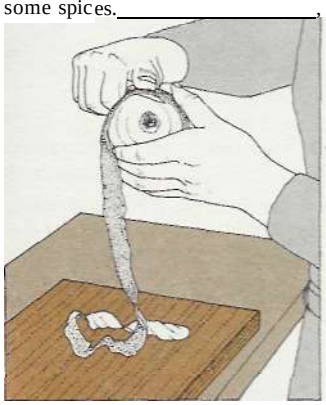
Possible ingredients for chutney are marrows, pumpkins, swedes, turnips, peppers, onions, beetroot, carrots, celery, aubergines, mangoes, tomatoes, apples, rhubarb, blackberries, pears, bananas, lemons, damsons, gooseberries, plums, dried fruit, peaches, elderberries, cranberries, oranges and grapefruit.

The herbs and spices can be any of these: bay leaves, chilli, cumin, coriander, cardamom, cinnamon, cloves, ginger, allspice, peppercorns, mustard seed, horseradish, paprika, cayenne, juniper and garlic.

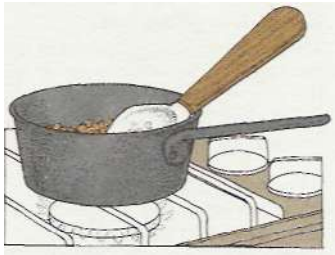
It is best to mince vegetables or fruit for chutney finely and then cook them slowly for a long time to evaporate the liquid. Sugar plays a large part in chutney. Most chutneys go dark as they are cooked, so if you want an even darker one use brown sugar. Black treacle is a possible alternative.

Making tomato chutney
The secret of good chutney is to use contrasting ingredients. In this particular case the spice and gatlic offset the tomatoes and apple.

You need: 2 lbs (0.9 kg) tomatoes, 2 onions, 1 cooking apple, raisins, 2 cloves garlic, 1/2 oz: (14 g) fresh ginger, 2 oz (56 g) brown sugar, 1/2 pt (0.3 litres) vinegar, salt and some spices.

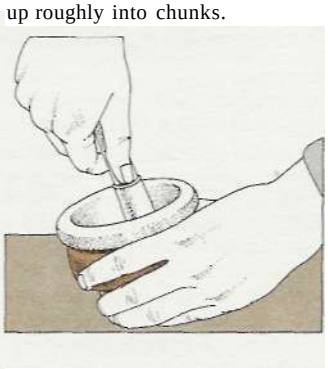


Skin the onions, peel and core the apple. Then chop them up finely.



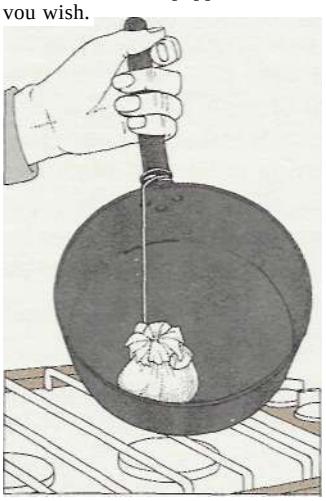
Simmer the onion in a small pan with a little water. Add the apple and the raisins, and cook gently until thev soften.

Skin the tomatoes, then chop them up roughly into chunks.

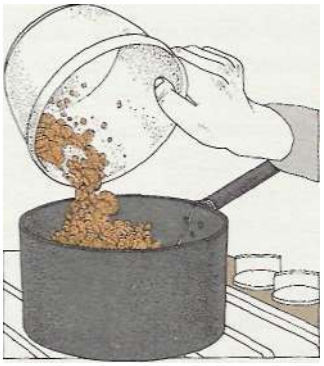


Crush the garlic and fresh ginger in a pestle and mortar with salt. If you are using dried ginger instead, add i oz (7 g) to the bag of spices.

Tie up in a little muslin bag: 1 crushed bay leaf, 2-3 crushed dried chillies, r teaspoon mustard seed, 4-5 cloves; add catdamoms, cinnamon, coriander, peppercorns as vou wish.

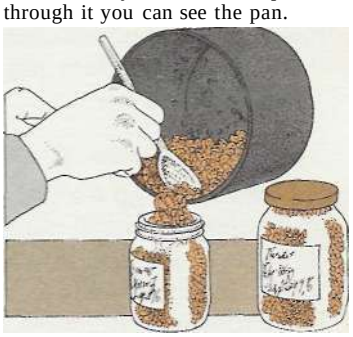


Tie the muslinbag to the handle of a large saucepan, so as not to lose it in the chutney.



Pour the softened ingredients into the pan, then everything else.

Cook on a low heat for an hour or so, until the mixture thickens so that when you draw a spoon through it you can see the pan.



Pot at once in hot clean jars. Seal and label.

Cooking chutney
Use aluminium, stainless steel or enamelled pans. Copper, brass or iron pans are not suitable as vinegar eats into them.

Simmer hard ingredients such as apple and onion in a little water before mixing with softer ingredients such as marrow or tomato, and before adding salt, sugar and vinegar, which tend to harden fruit or vegetables.

Put whole herbs and spices in a muslin bag, which you can tie to the handle of the pan so that you don't lose it in the chutney. If you prefer to use powdered spices they can be added loose to the other ingredients. Crush garlic and fresh ginger in a pestle and mortar before adding to chutney. Soak dried fruit in water before cooking it.

Use sufficient vinegar just to cover the ingredients. Cook until the consistency is of thick jam, and there is no free liquid. Be careful it doesn't burn towards the end. Stir well while it cooks. Pot while still hot, in clean hot jars, cover, label and store in a cool, dark place.

Storing chutney
Chutney improves with keeping, so store it in glass jars. Make sure they are tightly sealed or the vinegar will evaporate, leaving an unappetising dry shrunken mess. Cellophane papers such as are sold for jam covers are not suitable. I use twist-on metal caps from old jam or pickle jars. Check that the metal from the lid is well lacquered or protected with a waxed cardboard disc, otherwise the vinegar will corrode the metal. You can also use synthetic skins, or waxedpaper circles underneath a greaseproof paper tie-on cover. Cover the jars with a cloth that has been dipped in melted candle-wax.

Making Jams & Syrups

Jams and conserves of all kinds are a very useful way of preserving fruit. Usually the fruit is cooked first without any sugar, to soften it and to release the pectin, which is what makes it set. Sugar is added next, and the whole thing boiled rapidly until setting point is reached. As long as jams are properly made, well covered, and kept in a cool, dry place, they keep for ages.

Fruit should be under rather than over-ripe, and clean. Bruises on damaged fruit don't matter as long as they are cut out. It is important to weigh the fruit before you begin cooking, otherwise you don't know how much sugar to add. Don't add more water than necessary to cook the fruit. The sugar should be preserving sugar as this dissolves fastest. Brown sugars are OK but bear in mind that they add a flavour of their own and in some cases are damp, therefore adjust the weight.

Some fruit has more acid and pectin in it than others. Fruit which is low in acid or pectin usually needs extra acid or pectin added to it (see below).

In general, jam-making goes like this: clean, sort and prepare fruit. Weigh it. Cook it with sufficient water to make it tender. Put it in a large wide pan, and when it is boiling add the required amount of sugar. Stir until all the sugar is dissolved. Bring to a rapid boil. Don't stir. Test from time to time to see if setting point (see below) is reached. Stop cooking when it is, allow to cool a little so that pieces of fruit will not float to the top of the jam in the jars. Fill hot clean jars to the brim with jam: cover, seal, label.

Testing for pectin

Put into a little glass a teaspoonful of strained cooled fruit juice from the cooked fruit, before you add the sugar. Add three teaspoons methylated spirits, and shake together. Wait a minute. Pour the mixture out into another glass. If the fruit juice has formed one solid blob, the pectin is good. If it is several blobs, it is not so good, so add less sugar. If it is all fluid, it is useless, in which case boil fruit again. Even add commercial pectin at a pinch.

Testing for set

Put a little jam from the pan on a saucer to cool. If the surface wrinkles when you push it with your finger, it is done. Examine the drips from the spoon: if a constant stream flows, it is no good; if large thick blobs form, it is OK. The temperature of the boiling jam should reach 222°F. (105°C). It is best to use all or at least two of these methods to be absolutely sure your jam is ready.

Potted fruits or conserves do not keep as long as jam, but because they are only cooked briefly the flavours are very fresh. It is not so necessary to worry about pectin with conserves, so you can make them with low pectin fruit like raspberries, strawberries, blackberries and rhubarb. Note that there is more sugar per pound in conserves.

Damson or plum jam

Much of the pectin in plums is found in the stones, so if you can, extract the stones first, crack some of them and tie the kernels in a little bag. If this is difficult, never mind; they will float to the top when the jam cooks and you can skim them off with a slotted spoon at the end. You will need:

6 *lbs (2.7kg) damsons or plums*
6+ lbs (3.0kg) *sugar*
1/2 pint (0.3 litres) water

Wash the plums, cut them in half. Simmer with the water until tender. Add the sugar, stirring until dissolved, then boil hard until setting point. Remove floating stones, or if you put kernels in a bag, remove the bag. Leave the jam to cool a little before potting so that the fruit will not rise to the top of the jars. Pot, seal and label.

Raspberry- conserve

4 *lbs (1.8kg) raspberries*
5 lbs (2.3kg) sugar

You can use damaged but not mouldy fruit. Warm the sugar in a bowl in a low oven. Butter a large pan, put in the fruit and cook over a very low heat. As the fruit begins to give up its juice and bubble slowly add the warm sugar. Beat hard until the sugar is quite dissolved. It should remain a lovely bright colour and taste of fresh raspberries. It should be quite thick. Pot and cover in the usual way, but examine for mould after a few months.

Another way is to put sugar and raspberries in layers in a large bowl. Leave overnight, and bring just to the boil next day, before potting.

Lemon curd

This is not a jam.but a good way of using up eggs.

4 *oz (lHg) butter*
1 lb (0.9kg) sugar
4 eggs
3-4 lemons depending on size and juiciness

Grate the rind from the lemons, squeeze out their juice. Put rind, juice, butter and sugar into a small pan and heat until the butter melts and the sugar just dissolves. Let it cool. Beat up the eggs. Put them in a bowl which will just fit over a saucepan of simmering water, and stir in the juice. Beat over the saucepan of water, or use a double boiler, until the mixture thickens to curd consistency Pot and cover.

Lemon curd doesn't keep long, so use it up quickly. Don't make too much at a time.

Richer curds can be made using eight egg yolks instead of four eggs. Variations include using oranges or tangerines instead of lemons. Use less sugar for sweeter fruit.

Lemon and carrot marmalade

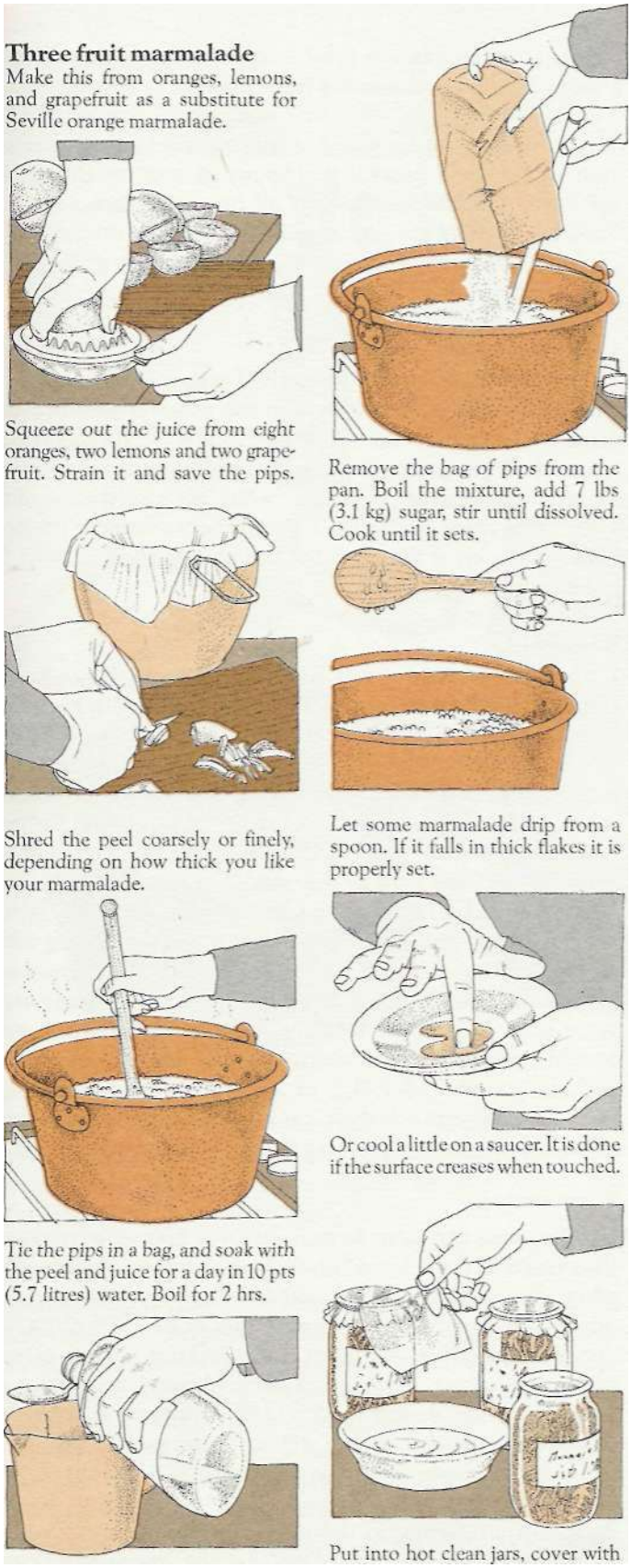
5 *oz (228g) thinly sliced lemon*
8 oz (22%) *shredded carrot*
2 pints (1.1 litres) water
1 lb (0.9kg) sugar

Mix the lemon, the carrot and the water. Cover and allow to stand overnight. Cook in a covered saucepan, bring to the boil, then simmer for about half an hour, or until tender. Then add sugar, and simmer until it completely dissolves; boil rapidly until setting point. Try a little on a cold plate to see if it jells; it may take 15-30 minutes. Pour into clean, warm jars, cover with waxed paper and seal.

The flavour of canot and lemon is very fresh and fairly sweet. Eat within three months.

Making fruit butters and cheeses

Fruit butters and cheeses are jams made from pureed or sieved fruit. Butters are softer than cheeses. Cheeses, if firm enough, can be turned out of their moulds as little "shapes".



Test for pectin by adding 3 teaspoons meths to 1 of juice. Shake. The juice should solidify.

They are delicious eaten as puddings with cream or even spread on bread.

Blackberry and apple cheese

You will need equal amounts of blackberries and apples. Wash the apples but don't bother to peel or core them. Cut them up roughly. Pick over the blackberries, wash them if they are dusty. Put both fruits into a pan, just cover with water and stew, stirring occasionally, until the apples have gone mushy. Sieve the cooked fruit. You should have a fairly thick pulp. Weigh it. Add one pound (0.9kg) sugar to each pound of pulp. Boil together. Stir all the time, as this burns easily. When it thickens enough for you to see the bottom of the pan as you draw the spoon across it, it is done. Pot and cover like jam. It sets quite firmly, like cheese, and will last for ages.

Making jellies

Jellies are simply jams which have had all the solids strained from the cooked fruit. When the juice is boiled up with sugar it forms jelly which can be used in the same way as jam.

Blackberry and apple jelly

This recipe will suit any high-pectin fruit, such as crab apples, redcurrants, citrus fruits, quinces, gooseberries, sloes, damsons, and rowanberries. You can also experiment with mixtures of fruits. Cook them separately if one needs more cooking than the other.

Proceed as for blackberry and apple cheese to the point where the fruit is cooked and soft. Then strain the juice through a cloth. Don't succumb to the temptation of squeezing it to speed it up or the finished jelly will be cloudy. Measure the juice and add one pound (0.9kg) sugar to each pint (0.6 litres) of juice. Cook until setting point is reached and pot and label in usual way.

If you are very economically minded you can stew up the residue of fruit in the jelly bag with more water, then either extract more juice or make a fruit cheese by sieving it. Follow the instructions given above if you want to do this.

Fruit syrups

Fruit syrups are made in the same way as fruit jellies, though you don't need to add so much sugar to syrups. To prevent spoiling by fermentation (when you would be on the way to making wine) you have to sterilize syrups and keep them well sealed. They make very refreshing drinks and milk shakes in summer, or you can use them as sauces for puddings and cereals.

Extract the juice from any unsweetened cooked fruit you fancy, as for jelly, or, if you wish, extract it by pressing then straining. Measure the amount and then add about one. pound (0.9kg) sugar per pint of juice. Heat it until the sugar is just dissolved - no more or it will start to set like jelly. Let it cool. Sterilize the bottles and their lids, preferably the screw-cap sort, by immersing in boiling water for 15 minutes. Drain, then fill with syrup. Screw up tightly then unscrew by half a turn, so that the heating syrup will be able to expand (leave a one inch or 2.5cm gap at the top of each bottle).

Stand the bottles in a pan deep enough for the water to come up to their tops. If possible use a pan like a pressure-cooker, that has a false bottom. Bring slowly to the boil and keep boiling for 20 to 30 minutes. Take out the bottles and screw the lids on tightly as soon as they are cool enough. If you are doubtful about the tightness of the seal, coat with melted candle wax.

Making Wine

Books about home-made wine-making have rolled off the presses in their regiments these last few years, each one blinding us with science more effectively than the last. You really only need to remember a few essentials:

You are unlikely to get more than three pounds (1.4 kg) of sugar to ferment in a gallon (4.5 litres) of water, so keep to approximately this ratio if you want strong wine.

You must keep all wine-making equipment scrupulously clean. Use boiling water whenever possible.

You must ferment at the temperature most favourable to vital yeasts.

You must give your special cultivated yeast every help and an unfair advantage over the wild yeasts and other organisms that might ruin your brew.

You must keep all contaminants out of your wine, especially vinegar flies, those little midges that hang round rotting fruit, carrying the bugs that turn wine to vinegar.

You must "rack", or pour off, the wine from the lees and sediments before the latter spoil its flavour.

You must allow the wine to settle and clear in the cool after the yeast has done its work.

Finally, having safely bottled your wine, you must try to keep your mitts off it for a year with red wine, if you can, and at least three months with white.

Strict cleanliness is essential in wine-making, for wine is made by a living organism (yeast) and if other living organisms (wild yeasts or other moulds or bacteria) get into the act either the tame yeasts that you want to use for your wine cannot do their job, or you get putrefaction, bad tastes and odours.

Equipment

You need jars, barrels, or bottles for fermentation. You need fermentation locks (if you can get them). The purpose of these is to allow the gases produced by fermentation to escape while keeping out air, which is always germ-laden, and vinegar flies. Many a gallon of fine wine has been made without a fermentation lock and with just a plug of cotton wool stuffed in the neck of the vessel. Many a gallon of wine has been ruined this way too. A fermentation lock is a very useful thing. A thermometer is not to be despised. You also need a flexible tube - rubber or plastic - for "racking" or syphoning, a funnel or two, and bottles or flagons for the final bottling of the wine. A corking gun is very good for driving in corks, which have to be driven in dead tight or air gets in and the wine goes bad. Polythene sealers are quite a good substitute for corks if you do not want to invest in a corking gun.

Materials

You will need yeast. Old fashioned country wine makers, including myself, have used all kinds of yeasts - bread yeasts and beer yeasts and so on - but undoubtedly it is best to buy wine yeasts from a shop. For very good and strong results some people use yeast nutrients, also bought from a shop. Acid is another thing you may have to add. Lemons will provide this, as will citric acid which you can buy. Tannin too can be bought, but tea or apples - particularly crab apples - will provide it. The reader may say that it is not being self-sufficient to buy all this stuff from a shop. True, but I would say that a trivial expenditure on this sort of thing is necessary if you are going to make a great deal of fine wine.

GRAPE WINE

There is no wine like grape wine. Red grape wine is made by fermenting the grapeskins in with the wine. White wine is made by taking the skins out. White wine is often made with red or black grapes, for all grapes are white inside. It is easier to make red or rose wine than white because the tannin in the skins helps the "must" (wine-to-be) to ferment better, and the quicker it ferments the less chance there is of bad organisms getting to work.

Crushing

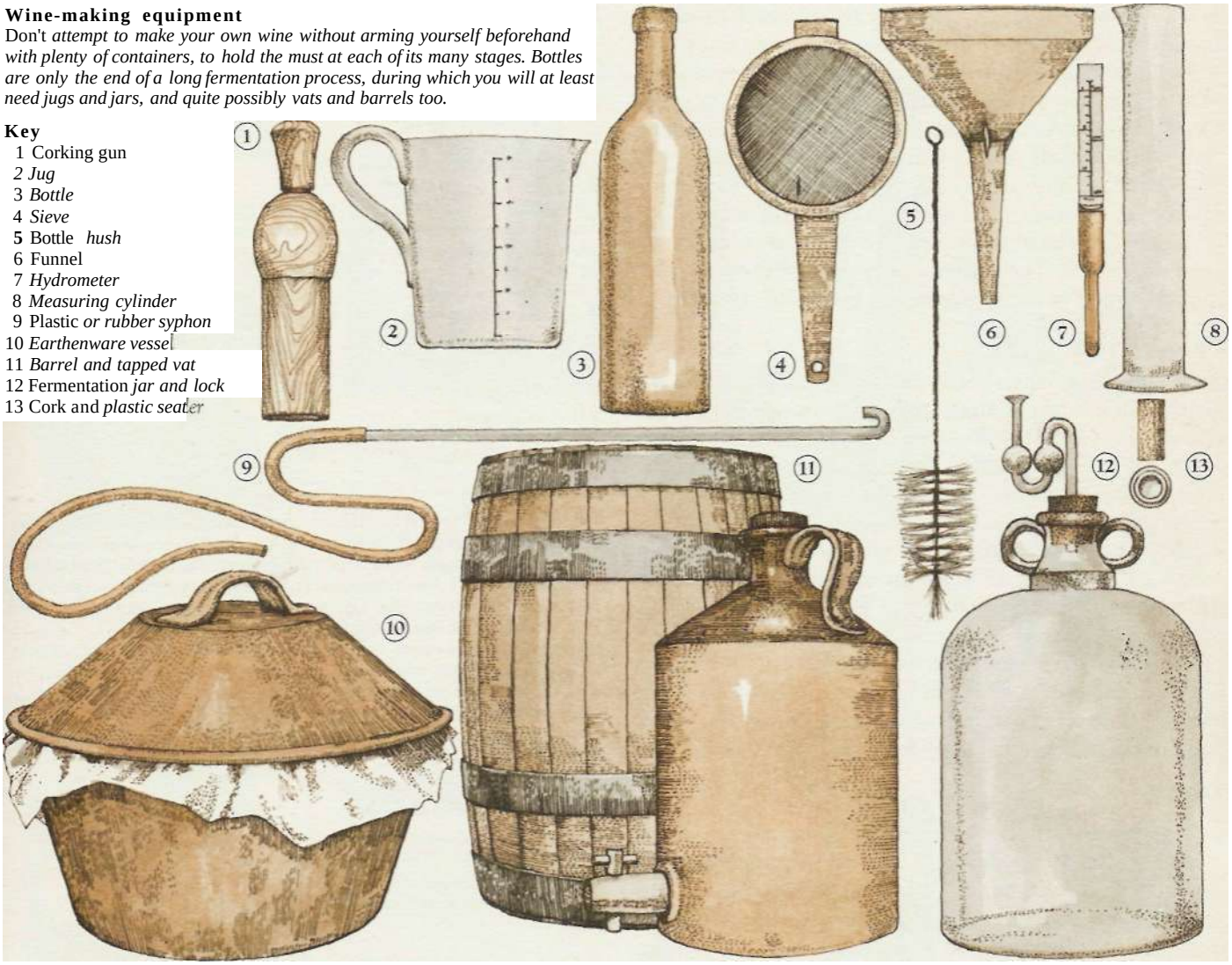
Crush your grapes any way you like. Personally I could not drink wine if I had seen somebody treading it with his bare feet, so I would use some sort of pestle and mortar for this job. If you want to make white wine, press the broken grapes in a press (a car jack will do), having first wrapped them in strong calico "cheeses", which I describe on p. 196. In the case of red or rose press in the same way, but then add a proportion of the skins to the wine. The more you add the deeper the red of the wine but, in cold climates at any rate, the deeper red ones may contain too much tannin and will be a little bitter as a result. Now^ in real wine-growing climates (w7here you will not be reading instructions like this anyway since your neighbours will initiate you), you don't need to add any sugar. In less sunny climates add between four and six pounds (1.8-2.7kg) of sugar to even- ten gallons (45.5 litres) of wine. If there has been a hot season and the grapes are sweet you need less, if a bad season, more.

Fermenting

Let the juices and skins ferment in a vat. Grapes have their own yeasts in the "bloom" on their skins but you had better add a wine yeast culture bought from a shop if you can get one. Warm a bottle of the must (juice) to 75°F (24°C), dump the yeast culture into it, and stand it in a warm place with some cotton wool in the neck. Meanwhile try to get your main body of must to 75°F (24°C). When the "starter" or culture in the bottle, has started to fizz pour it into the main body. If you keep the temperature at about 75°F (24°C) fermentation will be so active that there is no danger of air getting to the must, for the carbon dioxide given off will prevent this. Don't let the temperature rise above 80°F (27°C) or some of your good yeast will be killed. Don't let it fall below 70°F (21°C) if you can help

Wine-making equipment
Don't *attempt to make your own wine without arming yourself beforehand with plenty of containers, to hold the must at each of its many stages. Bottles are only the end of a long fermentation process, during which you will at least need jugs and jars, and quite possibly vats and barrels too.*

Key
1 Corking gun
2 *Jug*
3 *Bottle*
4 *Sieve*
5 Bottle *hush*
6 Funnel
7 *Hydrometer*
8 *Measuring cylinder*
9 Plastic *or rubber syphon*
10 *Earthenware vessel*
11 *Barrel and tapped vat*
12 Fermentation *jar and lock*
13 Cork and *plastic seal*



it, or your yeast will get sleepy and foreign yeasts will have the advantage. At all times keep the skins stirred into the must. They will float on top, so don't let them form a dry floating crust.

Racking

When the first violent fermentation has ceased, rack off the must, squeeze the juice out of the skins so as not to waste it, and pour the juice into a barrel or carboy, so that the must fills it completely. Do not leave an air space above it. Let the temperature fall now to ordinary room temperature of about 60°F (16°C). When you think most of the sediment has sunk to the bottom, rack the wine into another container. At this stage people in continental climates often put wine out of doors in winter so that it almost freezes, as this hastens the settling down of sediment. Rack it again. After another month or two bottle it in the way I will now describe.

Bottling

Bottles must be completely cleaned and then sterilized. It is no good "sterilizing" anything with dirt in it; the dirt must first be removed. Sterilize by heating slowly so as not to crack the bottles, in an oven if you like; then pour in boiling water, or put in cold water and slowly bring to the boil and boil for five minutes. Hang the bottles upside down immediately to let them drain and stop dust floating down into them. Either use as soon as they are cool or cork until you want them. Boil the corks before you use them and w7ang them in with a special corker. Store bottled wine on its side so as to keep the corks wet. If they dry out they will shrink, and air and vinegar-bacillus will get in. Store wine in the dark, at a cool even temperature. A cellar is ideal.

COUNTRY WINES

Overleaf are some recipes for "country wines" that work, as I know from long experience.! would not put anybody off

"scientific wine-making", which is reliable and produces good wines, but country people all over Europe and North America have used the sort of recipes I give for centuries, and very seldom have failures; indeed their wines are very good. One point worth noting is that the larger the bulk of wine you make, the less likely you are to have a failure. My old friends in a Worcestershire village who all brew rhubarb wine in the summer and parsnip in the winter, in batches of sixty gallons (273 litres) stored in huge cider barrels, have never known what a failure is. Their wives cry in vain for them to grow something else in their gardens, but their wine is superb.

Flower wines

Pour a gallon (4.5 litres) of boiling water over an equivalent quantity of whatever flowers you wish to use, cool, and press the water from the flowers. Add four pounds (1.8kg) of sugar, half a pound (228g) of raisins (optional), and the juice of three lemons. As the flowers don't give much nutriment for the yeast, and sugar alone is not enough for it, add some yeast nutriment if you have some. A table-spoon of nutriment to a gallon of wine is about right. Then, when the temperature has fallen to 75°F (24°C), add yeast. A bought wine yeast is best. Put the wine in a vessel with a fermentation lock, and leave it to ferment. Rack off and bottle when ready I have made wines from broom flowers, gorse flowers, elderflower (superb), cowslip, dandelion, and I have drunk good rose wine.

MEAD

To supply what in your estimation is about three pounds (1.4kg) of honey to a gallon (4.5 litres) of water you want comb cappings, odd bits of "wild comb" that you can't put through the extractor, and perhaps some pure honey stolen from the main storage pot when your wife isn't looking. Melt the honey in the water and ferment. Honey is deficient in acid, so put the juice of two or three lemons in a gallon, or some citric acid. Mead also likes some tannin to feed the yeast, so some crushed crab apples are a good idea. I have heard of people putting tea in mead. I once dumped some rose hip syrup that the children decided they didn't like into my mead, which wasn't fermenting very well, and it started to ferment like blazes. Mead goes on fermenting for a long time, so don't hurry it, and if you can leave it in a bottle for a few years so much the better. But can you? Here are some wine recipes to try for yourself:

Rhubarb wine

15 lbs (6.8kg) rhubarb
2 1/2 lbs (1.1kg) sugar
1 gallon (4.5 litres) water
yeast

Chop up the rhubarb, pour boiling water over it, and mash. Don't boil it any further. Leave it to soak until the next day, strain off your liquor and press the "fruit" to get as much out as you can. Stir in the sugar and bung in the yeast. Leave it to ferment, then rack it and bottle it.

Nettle wine

4 lbs (1.8kg) nettle tips
4 lemons
2 lbs (0.9kg) sugar (preferably brown)
1 oz (28g) cream of tartar
2 gallons (9.0 litres) water
1 tablespoon dried yeast or brewer's yeast

Put nettles and cut-up lemons in the water and boil for twenty minutes. Strain liquor out and add cream of tartar and sugar. When cool enough add yeast and ferment for three days in a warm place. Then let it settle for a couple of days in a cooler place before bottling in screw-top bottles. You can drink it in a week and it doesn't keep long. It is extremely pleasant and refreshing. If you add some ginger to it, it is even better.

Parsnip wine

4 lbs (1.8kg) parsnips
3 lbs (1.4kg) sugar
1 gallon (4.5 litres) water
some lemons or citric acid
yeast

Cut the parsnips up and boil them without letting them get too soft. They should just be easily prickable with a fork. Boil a couple of lemons up with them if you have them. Strain off the liquor, and while it is still hot, stir in the sugar, so that it dissolves. Put in some lemon juice or citric acid, and some raisins if you like. The purpose of the lemon juice or citric acid is to give the yeast enough acidity to feed on, as parsnips are low in acid. Put even-thing in a vessel, wait until the temperature drops to blood heat, then add your yeast and allow to ferment. Like all other wine, ferment under a fermentation lock, or-put a wodge of cotton wool in the neck of the vessel, to keep the vinegar flies out and let out the carbon dioxide. Rack it well a couple of times and then keep it as long as you can lay your hands off it.

Elderberry- wine

6 lbs (2.7kg) elderberries
3 lbs (1.4kg) sugar
1 gallon (4-5 litres) water
2 oz (56g) citric acid or lemon juice
yeast

You are supposed to get all the berries off the stalks, but I have shoved in stalks and all and it has made no difference. After all, if you can save a lot of work by departing from slavish convention why not do so? Pour the boiling water on, mash hard with a potato masher, cover and leave to soak for 24 hours. Put the sugar and yeast in and leave it alone. The longer you leave it the better. When it has finished fermenting rack it into bottles or other containers, so as to leave the sediment behind. You do this with all wines.

The above recipe can be applied to any wine that is made from berries or currants.

Elderflower "champagne"

This is nothing like champagne of course but it is a very refreshing summer drink and it does not have to be kept long before you can drink it.

12 heads of elderflowers (in full bloom and scent, picked on a hot day)
1 1/2 lbs (0.7kg) sugar (white sugar is less obtrusive than brown in such a delicate drink)
1 lemon
2 tablespoons wine vinegar

Put blooms in a bowl with the juice of the lemon. Cut up the rind of the lemon and put that in (minus the white pith). Add the sugar, vinegar, a gallon (4.5 litres) of water and leave for 24 hours. Strain liquor into screw-top bottles, cork up and leave for a fortnight. Don't add yeast - the weak yeasts on the flowers are enough. Drink before three weeks old.

Making rose hip wine

The principle of wine-making does not van- much according to the main ingredient. The addition of a wine yeast to your brew starts off the fermentation process which can take as long as three months.

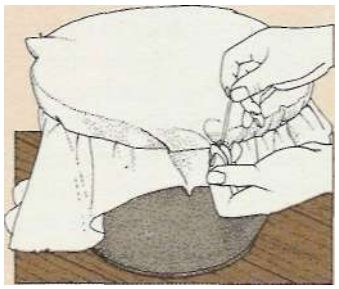
Take 3 quarts (3.4 litres) of rose hips, clean them and chop them up finely Crush with a wooden spoon or mallet.

Put the crushed nips into a deep bowl and pour *h* gallons (6.8 litres) of boiling water over them. If you like you can add the rind and juice of an orange.

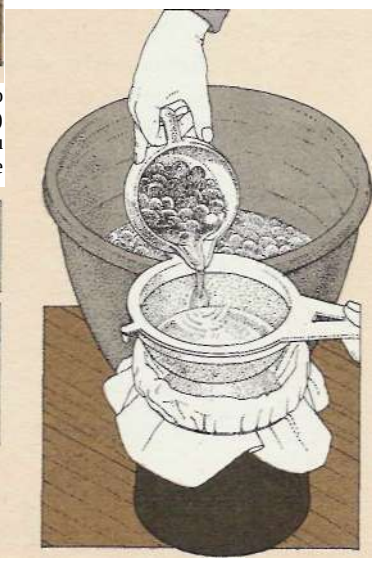
W

Add 2 lbs (0.9 kg) of sugar to the brew, and heat it to 75°F (24°C)-

Stir in a teaspoon of fresh yeast. You can put this first into a bottle of "starter", which you add to the brew when it starts fermenting. Add one teaspoon of citric acid and half a teaspoon of tannin.

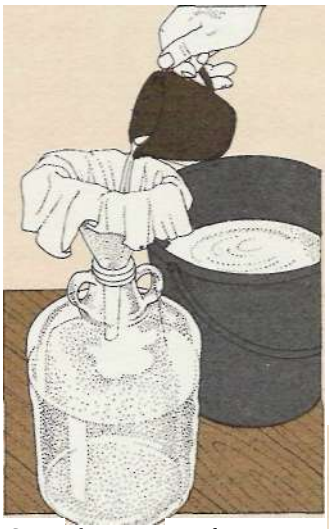


Cover the must to keep out vinegar flies and all other contaminants. Leave for 24 hours.

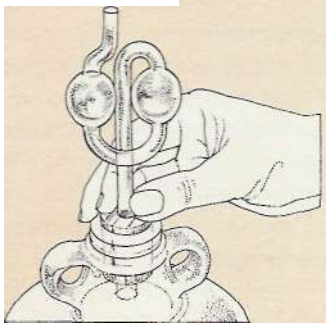


Strain the must from the hips through a sieve or muslin cloth. For even clearer must use both these methods.

Or you can strain through a jelly bag, suspended from two stools. Don't press it, or it will go cloudy.



Strain the must into fermentation jars. Use a funnel. Keep at a temperature of *75* F (24°C).



The fermentation lock keeps air out but allows gases to escape.

When fermentation stops rack the wine off the lees into bottles. Use a rubber or a plastic tube for this.

If you have no tube, use a hand jug and a funnel. Leave an inch (2.5 cm) at the top fot corks when filling the bottles.

A corking gun is excellent for driving corks in tight, but a wooden mallet will do. Date, label, and leave for a year.

Making Cider & Vinegar

CIDER

Cider should be made from a mixture of apples. The ideal mixture is rich in acid, tannin and sugar, so a good combination mixes very sweet apples with very sour ones, perhaps with some crab apples thrown in to provide the tannin. Cider can be made with unripe apples but it is never very successful. Ideally the apples should be picked ripe and then allowed to lie in heaps for two or three days until they begin to soften a little. A few bad or bruised apples in the press don't seem to affect the quality of the cider at all. Apples vary greatly in juice content, so it is not possible to tell exactly how much cider you will get from a given number of apples. As a rough estimate, 10-14 lbs of apples make one gallon (4.5 litres).

Crushing

You then crush the apples. Traditionally this was done by a horse or an ox pulling a huge round stone round a circular stone trough. You can crush apples in a cider mill, which is an expensive item to buy, or you can just use any hard object, such as a wooden mallet, as long as it is not metal. Crushing is an arduous task. I did have one friend who used to put his apples through a horizontal mangle, which reduced them to pulp very effectively. Put the juice in a fermenting vat and wrap the pulp in hessian or coarse cloth to form "cheeses". _ Pile the "cheeses" in a press one on top of the other and press to extract the juice. After one pressing rearrange the "cheeses" and press again. The pressed pulp can be fed, in strict moderation, to pigs or cattle.

Fermenting

Traditionally the juice is put in large vats, which are great hooped wooden structures. Commercial ones are enormous and hold thousands of gallons, but the self-supporter who might make ten gallons at a time will find an ordinary wooden barrel or an earthenware crock perfectly adequate. No yeast or other additive is put in: the stuff just ferments, and there are stories of farmers putting lumps of beef in to add strength, and having them simply eaten up by the potent cider. As all the sugar in the apples ferments out to alcohol the cider is terribly sharp, and is known as "rough" in cider circles. Only a hardened rough cider drinker can drink it without a shudder going down his spine.

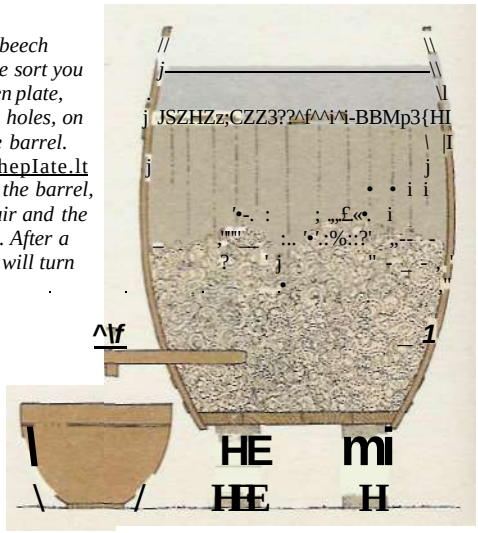
If you want to speed up the fermentation process, you can add a culture ofwine yeast when you have extracted the juice from the pulp. This should work faster than the wild yeasts, which may or may not be man enough for the j ob. If you want a sweet cider rack the fermenting cider off its lees (syphon it off without disturbing the sediment) and add roughly six pounds (2.7 kg) of sugar per ten gallons (45.5 litres); then, allow it to ferment once more and in about a week rack it again. If you want to bottle it and have sparkling cider, it is best to try bottling a small quantity first. Fill a screw-topped flagon half full, screw it up, and put it in a warm place. After six hours open it. If it is filled with gas, and has thrown a heavy deposit, the cider is not ready for bottling. It is only safe to bottle when you find just a little fizz of gas given off, and no heavy sediment thrown.

Cider improves with keeping, so you shouldn't drink this autumn's cider until next summer.

VINEGAR

Vinegar is wine, beer or cider, in which the alcohol has been turned into acetic acid by a species of bacteria. This bacillus can only operate in the presence of oxygen, so you can protect your wines, beers and ciders from turning to vinegar by keeping them from the air. Yeast produces carbon dioxide in large quantities, and this expels the air from the vessel that the beverage is stored in. But yeast cannot operate in more than a certain strength of alcohol, so fermentation ceases when so much sugar has been converted into alcohol that the yeast is killed or inhibited by its own action. This is the moment when the vinegar-forming bacillus, *Acetobacter,* gets active, and the moment when your beverages need protecting most rigorously from fresh air and bacterial infection.

But if you want to make vinegar, then you must take your wine, beer, or cider, and expose it to the air as much as possible. If you just leave it in an open barrel it will turn into vinegar in a few weeks. But it is better to speed up the process, as smells from the surrounding atmosphere might give the vinegar a taste, and hostile bacteria have time to attack. To hasten the process, take a barrelful of beech shavings. Beech is traditional but any shavings will do as long as they do not come from a very resinous tree. Soak them well in a good vinegar of the type you are trying to make. Then put a perforated wooden plate in the barrel over the shavings and pour your wine, beer or vinegar on to this plate. The liquid will then drip slowly through the holes, which must be very small, mere pin-holes. The liquid drips slowly through the shavings, thus being well exposed to both air and *Acetobacter,* and at the bottom it is drawn off through a cock. Leave it then in an open cask and it will turn into vinegar within a week.



Making vinegar
First soak a barrelful of beech shavings in vinegar of the sort you are making. Put *a wooden plate, perforated with pin-sized holes, on* top *of the shavings in the barrel.* PouryouraIcohoiontothepIate.lt *will drip slowly through the barrel, and be well exposed to air and the vinegar-forming bacillus. After a week in an open cask, it will turn into vinegar..*

Food from the Wild

"A man may fish with the worm that
hath eat of a king, and eat of the fish that
hath fed of that worm."
SHAKESPEARE

Game

Man should be a husbandman, not a bandit. We have no right to slaughter other animals just for fun or to assuage our blood-lust. Nor have we the right to deplete the stock of any species of animal so that it becomes scarce or extinct. Yet we have a part to play in maintaining the balance of nature and if we fail to play it nature will very rightly shrug her shoulders and shake us off.

If man plays his proper part in husbanding nature he not only helps to maintain a proper balance, he also supplements his diet with good food (wild meat is a far better source of protein than the meat of domesticated animals), and he protects his crops. The true husbandman will accept his responsibility in this matter. He will also accept responsibility[7] in the way he hunts his game. It is unforgivable to wound an animal instead of killing it outright, so don't go shooting until you are a good shot. And never take a shot unless you are absolutely certain of a kill.

Guns

A shotgun is a smoothbore tube which fires a charge of shot. Shot consists of lead pellets. These are traditionally made by pouring molten lead through a sieve at the top of a tall tower. The molten droplets fall, become quite spherical in their descent, solidify in the air, and land in water at the bottom so that they are not disfigured. They are then graded in screens for size. The sizes are numbered according to what number of shot make up an ounce (28 g): thus no. 1 shot is very big (it is used, wrongfully in my opinion, for roe deer), no. 3 is about right for wild geese, no. 5 for duck, no. 6 for pheasants, rabbits and small game, and nos. 8 or 9 for snipe or woodcock.

Shotguns are graded according to the size of their bore (size of their barrel). The bore depends on the number of lead balls in a pound (0.5 kg) that exactly fit a barrel. Thus the barrel of a twelve bore takes twelve balls to fit it, making up a pound. The twelve bore is by far the commonest size all over the world now and is a good all-purpose gun. Sixteen and twenty bores are sometimes found: they hit as hard as a twelve but have a smaller "pattern" (area covered by the shot at a given distance from the barrel). They are light and handy but to use one well you must be a good shot. The "four-ten" (.410 inch) is commonly used to start children off. Ten and eight bores are heavy guns used for wildfowling, particularly for geese and wild duck. The four bore, almost extinct now, is a very heavy gun indeed, used for firing at mobs of birds on estuaries; the giant "punt guns" of yore could be "half-crown" bore (the barrel the size of the old British half-crown) or even larger, and would fire up to two pounds (0.9 kg) of shot.

In Europe the double-barrelled shotgun is common; in America pump action semi-automatics are usual, or else fully self-loading automatics. It is all a matter of what people think is "sporting". Cartridges are loaded with nitro-powder, which is smokeless and reliable, but some people load their own brass-cased cartridges (with an apparatus bought from a gun shop) and thus save alot of money. Modern cartridges are fired by a percussion cap (small brass cap containing fulminite of mercury) pressed into the base of the cartridge.

The old muzzle loading guns, which are very good but need a longer time to load, used percussion caps put into a hole in the breach of the barrel and hit by the hammer. Before that invention they had flint locks: a hammer with a piece of flint in it came down and struck a steel pad, sending a spark down into some gunpowder in a pan which communicated with the charge inside the barrel. There was a slight delay when you fired one of these and some uncertainty as to whether it wouldgo offatall.Butmuzzleloaders couldbe very effective weapons and may very well come back one day. It is perfectly possible to fire a ball from a shotgun, but common sense will tell you that it must not be larger than the smallest part of the barrel, otherwise you will kill, not the quarry, but yourself. A ball, however, is not very accurate over more than a few score yards. To achieve great accuracy with firearms it was found necessary to make the projectile spin, so as to cancel any irregularities in it and give it a gyroscopic effect. Muzzle-loading rifles are possible, but slow to load.

A rifle has a series of spiral grooves cut down inside the barrel, and a single bullet of soft metal, or coated with soft metal. When the bullet is propelled out of the chamber of the gun into the barrel, the metal around it conforms to the shape of the spirals and this gives the bullet a spin. Without this spin the bullet will not travel accurately but will invariably veer off to one side or another. The "two-two" (.22 inch bore) is common all over the world and is perfect for small game such as rabbits, hares, small deer or buck, and birds, or vermin such as foxes, crows and other marauders. Its ammunition is cheap, light and small, and the rifle is very effective up to several hundred yards. I have shot kudu, reed-buck, and various other big game with a two-two, and have never once merely wounded one of them or failed to kill it; but then I would never use a two-two for such a purpose unless I was very close and quite sure of my target.

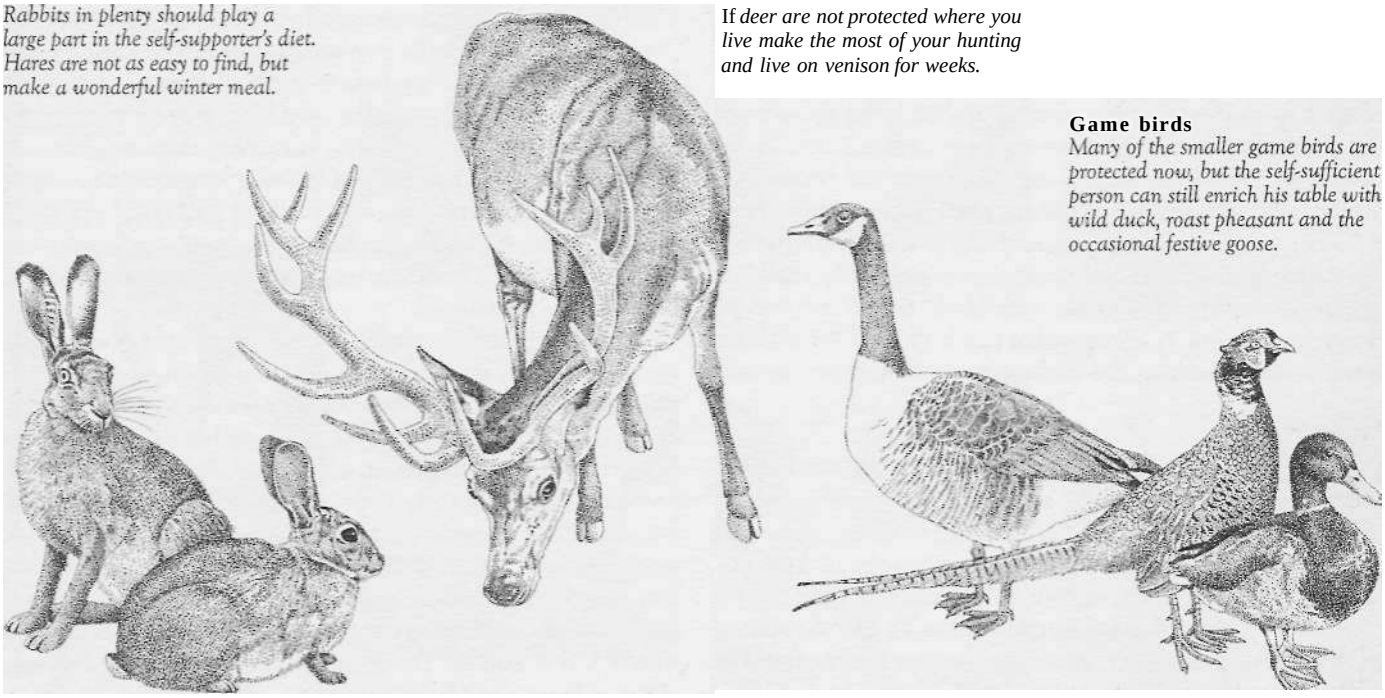
For larger game, however, larger rifles are really much better. Seven millimetre is a very common size (the 7 mm Mauser has always been, in my opinion, the best small sporting rifle in the world; the 6.5 mm Manlicher is as good ballistically but has an inferior magazine). The 9 mm is fine for thick-skinned game. I used a .404 inch bolt-action rifle in Africa; it gave me a certain sense of security when being charged by a buffalo but by God it kicked.

Rabbits

Rabbits are temporarily being controlled in Europe by myxomatosis, a disease that originally came from America, where it is epizootic among the cottontails and does them very little harm, whereas European rabbits had no resistance to it. So at the moment they should be "given law" (spared, in hunters' parlance). When they come back in strength they must be well controlled, or they will become the all-pervading menace they once were, when no forester could

Hares and rabbits
Rabbits in plenty should play a large part in the self-supporter's diet. Hares are not as easy to find, but make a wonderful winter meal.

Deer
If *deer are not protected where you live make the most of your hunting and live on venison for weeks.*



Game birds
Many of the smaller game birds are protected now, but the self-sufficient person can still enrich his table with wild duck, roast pheasant and the occasional festive goose.

plant a tree without enormous expense on extermination and rabbit-proof fencing, and when twenty-five percent of the crops in many areas went down the rabbits' throats. In any case they are also very good food.

The most humane way of taking rabbits (along with most other small animals and birds) is to shoot them either with a shotgun or a two-two rifle. Very early in the morning is the best time to "walk-up" rabbits with a shotgun, or to lie in wait for them with a two-two.

Long-netting is perhaps the second best way of killing rabbits. It is humane, quiet, cheap (no expenditure on cartridges) and properly done it can be very efficient. You set up the net between the rabbits' grazing ground and their burrows in the day time at your leisure. Keep it folded up out of the way where the rabbits can get underneath it, with a release string to let it drop when you pull it. You then go along at night, when the .rabbits are out in the field grazing, and the net is between the grazing ground and the rabbit warren. You pull the string, down comes the net, your accomplice gets behind the rabbits, makes a noise; they all run off into the net, get tangled, whereupon you kill them. If you are netting on land where it is better for you to remain inconspicuous, you creep out after dark, get between the grazing rabbits and their burrows in absolute silence, set up the net quickly (not folded up) and then get the rabbits chased into the net. I used to do this on heavily game-keepered land with an accomplice who was deaf. This made it very difficult to communicate without alarming the whole countryside. I have had a dozen rabbits with one setting of a long net.

Snaring is an effective way of getting a rabbit for the pot if you really need one and have no other way, but I don't like it for it is somewhat cruel, in spite of the fact that a rabbit generally strangles itself very quickly in a snare. Brass picture wire is good for rabbit snares: unravel it and use three strands or so. It is advisable to buy a snare first and copy it. The best places for snares are rabbit runs, entrances to burrows, or holes in fences..

Ferreting is a good way of controlling rabbits. Furthermore it is great fun. Keep ferrets in a hutch, keep them clean, feed them sparingly on fresh meat, and handle them often to keep them tame. Use deliberate steady movements when handling them, as they will sometimes bite your hand, thinking that you are giving them a piece of meat.

You can work ferrets loose, on a line, or with a bell. Only a reliable ferret can be worked loose; an unreliable one may kill a rabbit down the hole and "lay up" with it. A line ferret has a collar round her neck with a long line on it. The disadvantage of this is that the line may get snagged around a tree root far down a burrow, in which case you will have a lot of digging to do. *We* used to work them loose but keep one "liner" in reserve. If a ferret did lay up we would send the liner down and then dig along the line and thus find the errant ferret. The point of a bell is that the ferret wearing a bell scares the rabbits out without being able to kill them; also, if the ferret does lay up, you can hear the bell and dig him out. Probably the best thing is just to use loose ferrets and trust to luck.

There are ways and means of recapturing a ferret if he lays up. The best is probably a box trap, with a dead rabbit inside it, and a trap-door, so that when the ferret goes in the door shuts behind him. Anyone with some ingenuity can devise one of these.

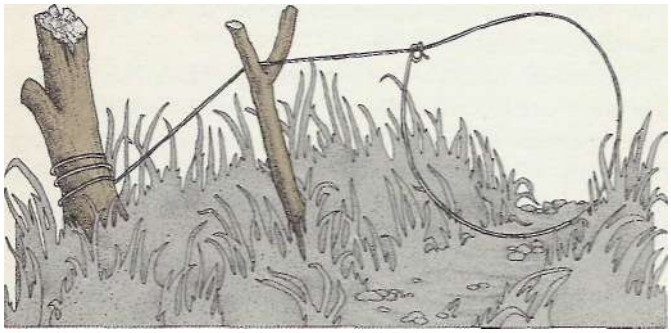
Rabbits "bolted" by the ferret are best caught in purse nets. These are simply small bags of nets staked around the entrances to the holes. You can shoot the rabbits with shotguns as they bolt, but this has the disadvantage that the noise of the guns makes the rabbits still down the holes shy of bolting. Purse nets are far and away the best method. On a larger scale a warren can be ringed with long nets and the rabbits driven out by the ferrets and chased into the long nets by dogs.

When you have caught your rabbits you must kill them. I have already described how to do this on page 123. "Hulk" or "paunch" rabbits as soon as you catch them: this means removing its guts. A countryman can hulk a rabbit without using a knife: he uses the rabbit's own sharp claw instead.

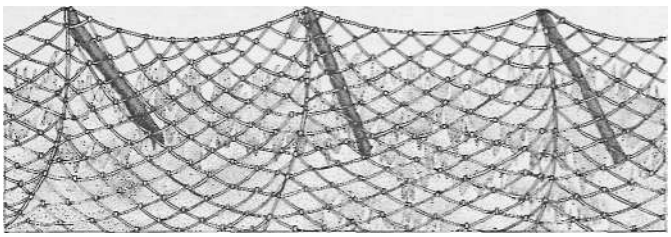
Hares

Hares can be snared, but it takes practice to know where to put the snare. If you examine a hare's run you will see where the hare commonly lands after each leap. Put the snare just before this spot. Purse nets can be set over gaps in fences or hedges where hares are known to go and the hare can be chased in by a dog. A good lurcher will run a hare down and kill it, but it has got to be a good lurcher, for the hare runs at enormous speed. You can train lurchers to keep out of sight, and never to come near you if a stranger is anywhere about.

When you have caught your hares, hang them for at least a week, because hares, unlike rabbits, are game. Only after hanging should you hulk and skin the hare. This is an evil-smelling job, but persevere. Hares make a wonderful meal.



Snaring
Place a wire snare in a rabbit or hare run; the animal is caught by getting his head stuck in the wire ring, which tightens and traps him. Snaring is an effective method, but a cruel one.



Long-netting
Position your net *between burrows and grazing grounds. Erect it folded up, and pull the release string while the rabbits are feeding. Startle them back towards the warren, and they will get caught in the net.*

Game birds

Pheasants and partridge can legally be shot on your own land, always assuming that the previous owner did not reserve the right to shoot them when he sold the land. If there seem to be no pheasants actually on your own land, there is nothing to stop you attracting them from your next door neighbour's land. Pheasants are incapable of resisting Jerusalem artichokes, and about a quarter of an acre of these will bring the birds flocking from far and wide. Buckwheat and sunflowers are also superb crops for attracting pheasants' attention. Maize and kale are also useful.

It is oi course unforgivable to take a hen bird from off the nest, and, if ever this should chance to happen, as an honourable poacher you would of course take the eggs and hatch them out under a chicken hen. Chicken hens never seem to mind whose eggs they sit on when they are broody

Pigeons are best shot over decoys, which are model pigeons. Place them on a pigeon feeding ground: under an oak with plenty of acorns dropping from it is ideal, but your cabbages will do. Conceal yourself well - pigeons have gimlet eyes - and shoot them as they swoop in. If you have no decoys shoot a few and set them up as decoys on forked twigs. Always face your decoys up-wind.

Wild ducks can be lured to decoys too.They are magnificent food, and, unlike the domestic duck, should be hung as game. I stopped shooting wild geese when I discovered that they mate for life. Most other game birds are fine delicacies, but they are now almost all protected; the rarer the delicacy the more unlikely you are to be eating them legally.

Big game

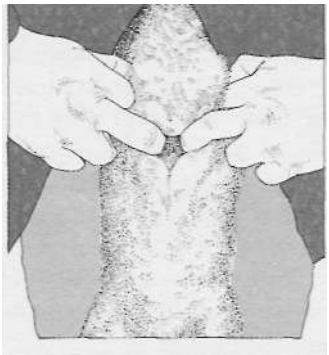
Deer, antelope and other big game are often shot in Europe with the shotgun. This, to my mind, is quite wrong, for deer undoubtedly get away with shotgun pellets inside them. The rifle is the only weapon for the humane killing of deer, unless you are really expert with the cross-bow or the bow and arrow. An effective way of shooting deer or antelope is at night with a "balala light". A balala light (the word is African) is a light with a powerful beam and you strap it to your forehead. The heavy battery is carried on your belt. The beam illuminates both the quarry and the sights of your rifle. The advantage of shooting at night is that the game are generally quietly grazing, not expecting danger, and you can often walk right up to them; somehow, shooting down the beam of a light, it seems impossible to miss. In any case you get nothing but very close shots. I have shot hundreds of buck in Africa in this manner (they were our only source of meat) and never missed, or only wounded, a single one. The method is against the law in many countries, and as long as shooting is looked upon as "sport" this will be so. When it is looked upon, as it should be looked upon, as "work" - a legitimate way of harvesting a crop of meat - then such silly laws will be changed.

Shooting in the daytime is a matter of walking very quietly up or across wind if possible, keeping calm and cool, not

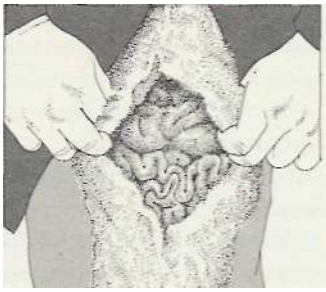
Skinning a rabbit

Once you have killed your rabbit, you will need to prepare him for the pot. Before you skin him you must "paunch" him: that is, remove the guts. Skinning is not difficult; you will find that the skin comes away from the flesh very easily. And if the thought of preparing the animal still appals you, just brace yourself • and think hard of rabbit pie.

Hold the rabbit between your knees by its head, so that its tail hangs free and its belly faces upwards. Cut a hole in its belly.



Pull the skin apart at the cut, and insert two fingers into the hole.



Prise open the belly to expose the guts and remove them. "Paunching" is now complete.

Cut off all four paws of the rabbit with a sharp knife.

Separate the skin and fur from the flesh of the rabbit, at the belly.

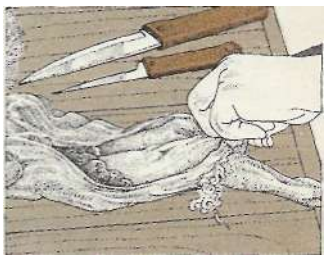
Invert the skin and fur, so that the flesh of first one hind leg, then the other, is exposed.

The hind quarters are now free from all skin and fur, and now is the moment to cut off the tail.

Hold the hind legs in one hand and pull the skin down to the front legs.

Expose the front legs and cut away the last tendon joined on to them.

Pull the skin over the rabbit's neck and cut off its head,



Split the hind legs from the belly and cut out the anal passage. Then place your knife in the rabbit's breast, and remove the "lights" and heart. You must also remove the gall from the liver.

getting puffed or out of breath, observing closely, and seeing the game before they see you. Shooting deer or wild pig in northern woods is best done by sitting in a hide up a tree near a pool or some likely grazing place.

If you do just wound a buck or a deer sit down and rest for at least half an hour. Don't follow the blood spore immediately. If you do, the animal, on the alert, will hear you before you see him and get up and run away. Leave him for half an hour and he will lie down, get stiff- he is losing blood all the time - and probably go to sleep. When you then walk quietly up you will see him before he sees you and get another shot in. You will almost never kill a wounded buck if you follow the blood spore immediately.

Hanging game

Most game should be "hung", that is hung up in a cool airy larder for some time before eating. Hang game birds up by the neck, not the feet as with tame birds. The reason for this is so the guts do not press against the meat of the breast. Do not gut the birds then. In the winter in a northern climate it is all right to hang a pheasant, or a wild duck for as much as ten days. At the end of this period pluck them and gut them. Game birds hung up with their feathers on look pretty, but, if you just want them to eat, it is quite a good plan to pluck them when you shoot them there and then (always assuming that you are not on somebody else's land), because the feathers come out easily when the birds are still warm.

Fish & Sea Foods

The self-supporter ought to make the most of any opportunity he gets, and fish should figure at the forefront of his healthy, varied, natural diet. The "sport" of angling, in my opinion, is a complete waste of time. Catching fish, weighing them and throwing them back does no one any good. Many anglers hold the misguided belief that freshwater fish are inedible or unpleasant, but this is quite untrue. Freshwater fish make wonderful food. People should be encouraged to take or farm freshwater fish for food. The methods I describe are not necessarily legal in every country, but all I can say is that they ought to be.

FRESHWATER FISH

Trout Plenty of people catch trout with their bare hands by "tickling". You lean over a bank and very gently introduce your hand into a cavity underneath it, waggling your fingers in a tickling movement as you do so. When you feel a fish with the tips of your fingers you just gently tickle its belly for a minute; then grab it and fling it on the bank. "Groping" is another method: wade along in a shallow stream, walking upstream, and grope with your hand under rocks, grabbing any fish you find there. You are quite liable to get bitten by an eel while you are doing it, though.

Pike "Snaring" was a method much used in East Anglia when I was a boy. You have a wire snare hanging from a stick, and when you see a large pike hanging in the water, as pike do, you very carefully insert the snare in front of him and let it work slowly back to his point of balance. When you think it is there you haul him out. If the wire does just touch him as you work it over him he thinks it is a stick because it is going downstream.

Salmon You can "gaff" salmon. To gaff a salmon first locate him; you will find him resting in a pool or under an overhanging tree. You then take the head of a gaff, which can be made from a big cod hook, out of your pocket, cut a light stick from a bush, and lash the gaff on to the stick. You have a lanyard (light cord) running from the eye of the gaff to your wrist where it is tied round. You drag the gaff'into the fish and then just let go of the stick. The line unwinds from the stick which falls away, and you haul the fish in with the line. If you try to haul him in with the stick he may well pull you in.

Eel Sensible people, among whom I include the Dutch and the Danes, account the eel the best fish there is, and indeed if you have ever eaten well-smoked *gerookte palling* in Holland you must agree. You can take eels in "grigs" or "eel-hives": these are conical or square baskets made of osiers, wire netting or small mesh fish netting on a frame, with an admission funnel like a very small lobster pot. Bait this with fresh fish or meat; whatever people say eels don't like bad fish. Fresh meat or fresh chicken guts in a gunny sack, with the neck of the sack tied tight, and some stones inside it to sink it, will catch eels.

"Babbing" for eels is a good way of catching them. Get a bunch of worms as big as your fist, thread wool yam through them, tie them in a bunch, and lower them into shallow water on the end of a string, which is tied to a stick. After a while haul the "bab" gently out and eels may be found hanging to it, their teeth entangled in the yarn. Pull the bunch over your boat, or over the bank, and give it a shake. I have caught a hundredweight of eels this way in an afternoon.

I have not discussed conventional angling with rod and line, for this is done more as a sport than for food production, although good anglers can sometimes get a lot of food this way too. But the fresh waters should be farmed for fish just as the land is farmed for crops and animals. To reserve fish solely for sport is an indulgence that a hungry world cannot afford: they should be cropped, harvested and conserved, and looked upon as a source of good food. If we have some fun catching them as well, then so much the better. I discuss the techniques offish farming on p. 246.

SEA FISH

Catching pelagic fish

From the point of view of the person who wishes to catch sea water fish, they fall into two groups: pelagic and demersal. The former swim freely about the seas, independent of the bottom. The latter are confined to the bottom. Obviously the means of taking them are quite different.

Hooks and feathers Sometimes you can catch hundredweights in a few hours when hooking for pelagic fish. Mackerel in particular canbe caught productively in this way, though traditionally they were caught by a last. This was a piece of skin, about two inches (5 cm) long, cut from near the tail of a mackerel you had already caught. The method was to move along at about two knots dragging the last on a hook astern. Then somebody discovered the "feathers". With this new invention you have perhaps a dozen hooks, on snoods (short branch lines), tied to a line with a weight on it. Each hook has a white or coloured feather whipped to the shank (though almost anything will do: bits of white plastic, or shiny tin). You lower the tackle from a stationary boat, find the depth at which the mackerel are biting, and plunge the feathers up and down with a motion of your arm.

Don't waste time trying to catch mackerel when there aren't any. Wait until other people report them in good quantities, and then go and hit them hard. Often one day's fishing, salted, will give you enough to last you a year. The rest of the time forget about it. Time is of great importance to the self-supporter, and he can't afford to waste it.

Drift net Herring cannot be caught on a hook. Unlike mackerel they don't hunt other fish, but live on small fauna in the plankton, so their mouths are too small for hooks. They are traditionally caught with a drift net. This fine net hangs down vertically in the water suspended from a float-line, which is a line with corks or plastic floats all along it. You can let it drop to any depth you like by hanging it on longer or shorter pendants. The whole net must have positive buoyancy. It will catch more at night, and a fine night is the best time for catching herring. "Shoot" (to shoot, in fishing terms,

means to put into the water) the net from a boat and hang on to one end of it for an hour or two, letting both boat and net drift with the tide. Cast off occasionally and row along the net, and just lift a few yards of it to see if there are any fish. If a shoal hits the net haul it in. Don't bother to try getting the fish out of the net into theboat, justpay thenet down into the stem of the boat and go back to port. Then unload the net and shake the fish out into a piece of canvas, laid on the beach. Drift nets will take any pelagic fish if the mesh is the right size: mackerel, sprats, pilchards, salmon, sea-trout and many other fish are all taken in drift nets.

Catching demersal fish

Trawl net B ottom fish can b e taken by a trawl net. There are basically two sorts: the beam trawl and the otter trawl. The beam trawl is a net bag with its mouth held open by a beam which is supported on two "heads" which are like the runners of a sled. The otter trawl has two "otter boards" holding its mouth open: they swim through the water like kites, holding the trawl mouth open as they do so. Probably for the self-supporter with a small boat the beam is best, although many would dispute this. You need considerable power to haul a trawl, particularly an otter trawl which takes a certain minimum speed to keep the otter boards working. A small beam trawl can be hauled by sail alone, especially if you work down-tide. Often the tide is enough to pull the net. Always trawl down-tide anyway, as the fish face up-tide. A small-meshed beam trawl also takes shrimps.

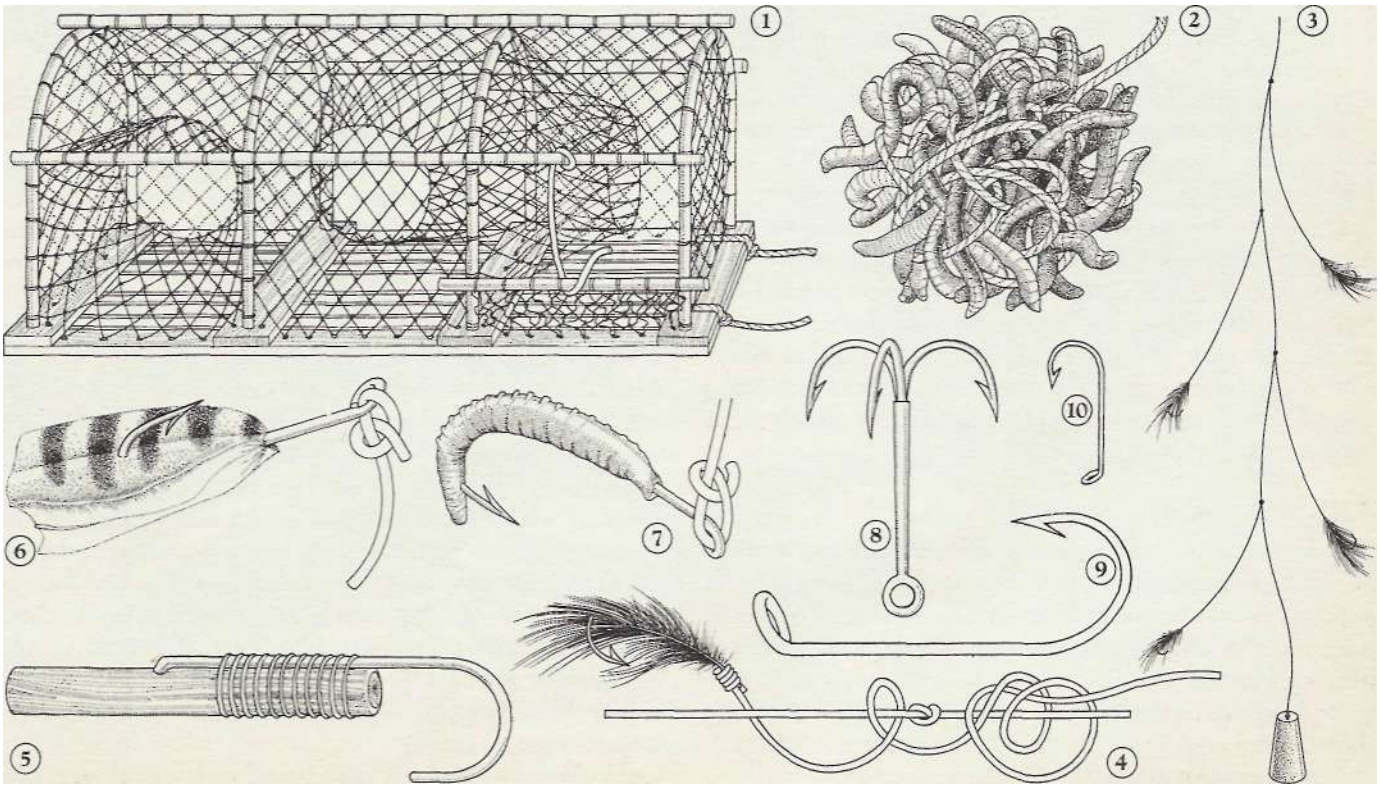
Tangle net This is a recent invention made possible by very strong, thin, man-made fibre. It is a very light, large-meshed net which sinks to the bottom of the sea, where some of its width is supported by a submerged cork line and the rest just lies in a heap on the bottom. Anything that walks or swims near the bottom is taken by it, getting inextricably tangled, and then you have the lovely job of clearing the net! That is the disadvantage, for the net is hell to clear and always gets badly torn, so that you have to repair it. But it catches a lot of fish and will take crabs and lobster along with everything else.

Shore seine net This is another of the long wall nets. You keep one end of it on the beach while the other end is taken out in a boat which goes round in a half circle, coming back to the beach again. Both ends of the net are then pulled in and any fish that were caught are dragged up on to the beach.

Nylon drift net You can also catch salmon with nylon drift nets as they run up river from the sea. These should be mist green monofilament, six meshes deep, with meshes 54 inches (13 cm) apart for medium fish and 5*i* inches (14 cm) for large. Four inches (10 cm) is fine for sea-trout. These monofilament nets are so invisible that you can fish for salmon by day with them as well as by night. Your only trouble (apart from any stray fishery-law enforcement officers!) may be seals, which pursue the fish into the nets and tear the latter to shreds.

Long-line You can shoot this from a boat. The line can have

Hooks, lines and sinkers
1 *Parlour pot, a type of lobster pot.* 2 *Bab, a tied bunch of worms for eels.* 3 *Feathers, weighted line with snoods.* 4 *Feather (detail).* 5 *Barbless hook, for removing hook from fish.* 6 *Last, apiece of shiny skin.* 7 *Lug-worm bait.* 8 *Treble hook for pike.* 9 *Hook for cod.* 10 *Hook for dabs.*



any number of hooks on it, each one in a snood, and each one baited. Coil the line down carefully in a basket, or tin bath, or plastic tub. As you coil the line down lay each hook in order over the side of the receptacle, next to the following hook in the line. The snoods are long enough to allow this. Bait each hook. Then go up-tide from where you wish to shoot the line, throw out one anchor, and let the line whip overboard as the tide drives it inexorably down-tide. The baited hooks should fly over in their turn. Have a short piece of stick in your hand to help them do this if they are reluctant. If you get in a "fangle" let the whole line go over; don't try to unfangle it or you get a hook in your hand as sure as fate. If you work carefully and keep cool it should go over clear. When you get to the other end throw over the other anchor and the buoy and that is that. Come backnext day and haul against the tide, using oars or engine or the wind to carry the boat along at the right speed.

The size of hooks will depend entirely on the kind offish you hope to catch. Size 6 or 8 hooks are fine for dabs, plaice and so on, while size 4/0 to 8/0 may be needed for conger-eel, or large cod. Conger are a fish very apt to be caught on long lines: I once helped catch half a ton in a night. Mind you, there were twelve hundred hooks. For such large fish, particularly conger, it is an advantage to have a swivel on each snood, so that the hook can turn as the conger turns.

Getting a hook out of the throat of a large fish is very easy when you know how to do it. You need a small barbless hook securely attached to a handle. Get the hand-hook, as I shall call it, in the bite of the fish-hook, and yank the fish-hook out with the hand-hook, holding the snood firmly with your other hand so as to keep the two hooks engaged. You should carry a "priest" (small wooden club, traditionally of box-wood). It is so called because it administers the last rites, and is more humane than letting fish drown to death in air which is what happens otherwise.

Hand-line Only in certain circumstances is hand-lining for bottom fish productive. Those lines of hopefuls who lean endlessly on the rails of piers spend far more on bait and tackle than they take home in fish. Only bother to hand-line on the bottom when you know there are fish there. At certain times of the year you can sometimes find a good mark for whiting, or codling, that makes hand-lining more than just a way of passing the time. Enquire and observe closely what locals do before wasting a lot of time.

THE SEASHORE

You do not need a boat to benefit from the riches of the sea. A visit to the seashore provides ample opportunity to accumulate edible sea creatures of various sorts. Obviously the man who takes some equipment with him will be better off than the one who takes a casual stroll, but a very little know-how means that anyone can return after a walk along the seashore with the makings of a snack if not a full meal.

A man without a boat may catch fish quite effectively with a beach long-line. Go down to the bottom of a beach at low tide and lay a long-line (as described earlier) along the sand near the sea. As the tide comes back demersal fish will follow the water, intent on helping themselves to such small beach animals as emerge from the sand to go about their business when it is covered. You will catch some fish, perhaps not many; you will be lucky to get a fish every twenty hooks, but after all one fish is a meal and better than no fish at all. If you really want to practise this fishery effectively put down a lot of hooks; a hundred is not too many

The long-line must be anchored by a heavy weight at each endandshouldhaveapennant (branchline) onitwithabuoy on top so as to make it easy to recover. Remember here that the tide is not the same every day. About the time of every full moon and about the time of even[7] new moon there is a spring tide, when the water goes both higher and lower than in neap tides, which occur at half-moon periods. Even these spring tides vary: some come up much higher and go down much lower than others. So you may lay your line out at the bottom of the beach on one tide only to find that the tide does not go out far enough to uncover it next day. If you have a buoy on a pennant you will be able to wade out and recover your line.

As for bait, nearly everywhere on sandy beaches you will find the reliable "lug-worm". This can be dug out at low water with a spade or fork. There is a trick to this, and if you do not know it you will not find many. The lug-worm throws up a worm-shaped cast of sand. Do not dig under this. Instead, look for a small hole which should be a foot away from the cast. This is the worm's blow-hole. Dig there, dig fast, throw the sand out quickly, and you will get your lug-worm.

Other forms of bait are limpets, mussels, slices of herring or mackerel, whelks and hermit crab tails. Limpets must be knocked off the rocks with a hammer by surprise; once you have warned them of your intentions they cling on - well - like limpets, and you can only get them off by smashing them to pieces. Mussels are somewhat soft and some people tie them on to the hook with a piece of cotton.

Shellfish

Mussels Pick these as low on the rocks as you can get at low tide, preferably below the lowest tide mark although this is not always possible. They must be alive: if they are firmly closed it is a sign that they are. They must not be taken from water in which there can possibly be any pollution from sewage as they are natural filters and will filter any bacteria out of the water and keep it in themselves. The advice commonly given to cook them only long enough to make them open their shells is extremely dangerous: all mussels should be boiled or steamed for at least twenty minutes otherwise food poisoning can take place. What you do with them after that does not matter.

Cockles Rake these out of the sand with a steel rake. You

soon get good at spotting where they are under the sand which has a different look somehow. It is often greyer than the surrounding area. Then rake them into small hand-nets and wash the sand out of them in shallow water. It is much easier to harvest cockles on the sand flats when shallow water still lingers over the sand. Boil or steam them for twenty minutes.

Razor fish These betray themselves by squirting water out of the holes in the sand in which they live. They do this when you tread on the sand nearby. They live very low down on the beach, right down where the sand is only uncovered at low spring tides. If you walk backwards over the sand you will see the spurts of water after you have passed. The best way to get them is with a razor spear. This is a pointed iron rod with small barbs near the point. You push it gently down the hole and the razor fish closes on it and is pulled out. Another method is to dump a handful of salt on the hole. This makes the razor fish stick out and you grab it.

Limpets Limpets are only just edible. If you are hungry enough you can eat them raw (provided you are sure they are unpolluted) but they are much better cooked and they make quite good soup.

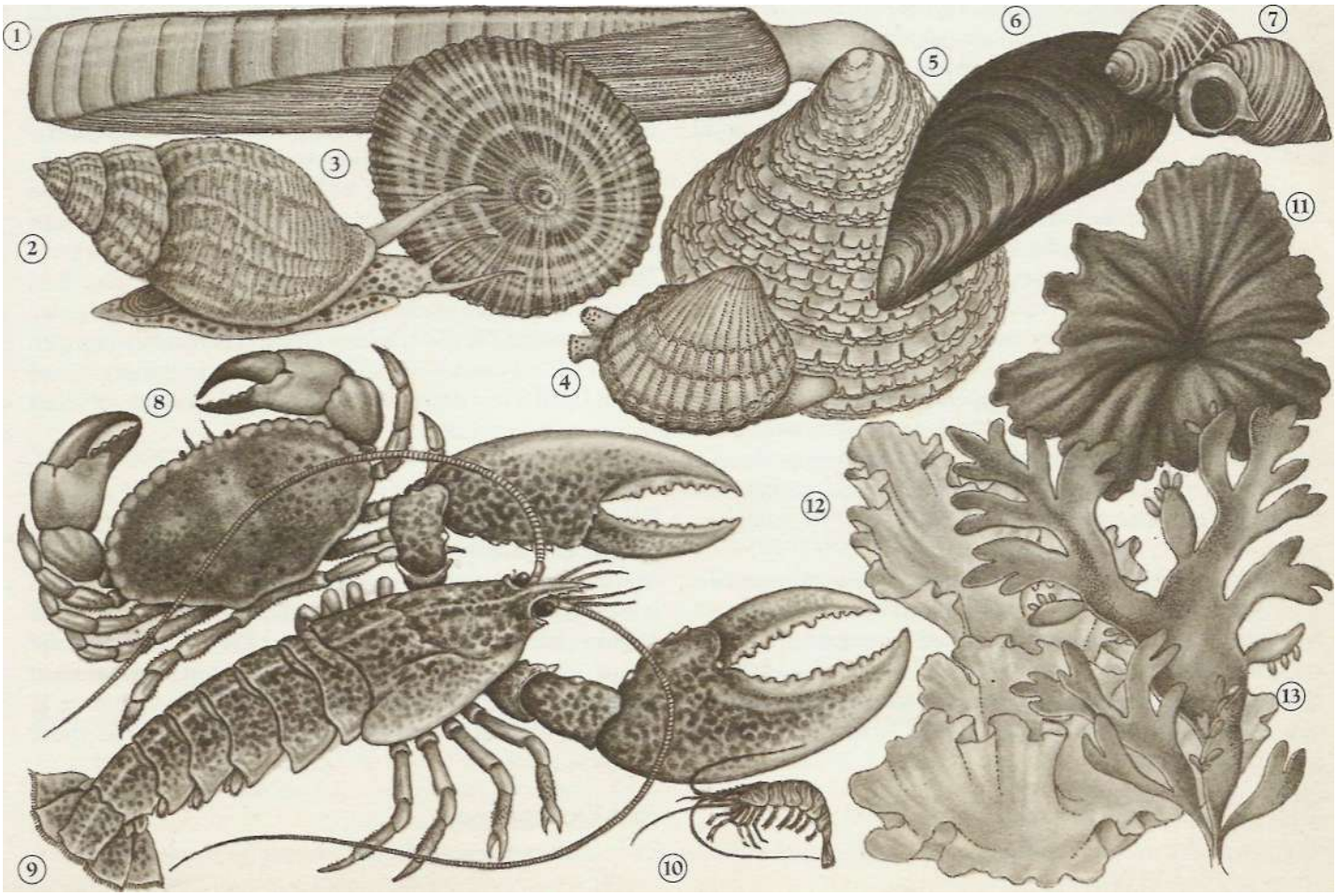
Oysters You should only eat oysters raw if you are sure they are unpolluted. But they are delicious cooked and much safer to eat then. To open an oyster hold it in a cloth in your left hand and plunge a short stiff blade into the hinged end. You can cheat by popping them in a hot oven (400°F or 204°C) for not more than four minutes, but if you intend to eat them raw this is desecration.

Clams Clams are dug out of sand and are traditionally baked in the United States on hot stones in a sand pit. Dig a pit, put large stones in the bottom, and keep a fire going on them for three or four hours. Put some seaweed over the stones, and clams on top of it along with sweet corn or anything else you fancy. Add more seaweed, chuck some seawater over all of it, cover with a tarpaulin, and let the lot steam until the clams begin to open.

Winkles These can be picked up in small rock pools at low tide. Boil them for a quarter of an hour in water. Pick them out with a pin, sprinkle them with vinegar and eat with bread and butter. They are pretty dull.

Whelks Whelks are a deep water shellfish and are caught in pots like lobster pots but smaller. Salt herring or mackerel make a good bait. Boil them for half an hour, or steam them. They taste rather like wet leather.

Plants and creatures of the seashore
1 *Razor* 2 Common *whelk* 3 Common *limpet 4 Edible cockle 5 Common oyster* 6 *Common mussel* 7 Common *winkle* 8 *Edible crab 9 Lobster* 10 *Brown shrimp* 11 *Purple laver* 12 *Sea lettuce* 13 *Dulse*



Fish & Sea Foods

Lobsters and crabs These are normally caught in pots, which are cages with funnels into them so that the shellfish can get in but not out. The pots can be made of willow, steel mesh or wire netting. A more sophisticated pot is the "parlour pot" which is longer than the usual pot with an entrance hall at each end and then net funnels into the "parlour" which is in the middle. If you have to leave pots out for long because of bad weather the parlour pot is good, because the lobsters, on finding themselves confined in the entrance halls, try to get out, get into the parlour, and wait there. Meanwhile the bait is not eaten and attracts more lobsters.

When trawling you may catch hermit crabs. If fishermen do not want the tails of these for bait they normally throw them overboard. This is nonsense as the tails, boiled, are delicious. Spider crabs, too, are delicious to eat.

Seaweeds

Many seaweeds are edible, but there are two plants that are excellent to eat: laver weed *(Porphyra umbilicalis)* and samphire *(Salicornia europaea).*

Laver weed has thin, translucent purple fronds and grows on rocks on the beach. To cookityou soakit for afewhours in fresh water, dry it in a slow oven and powder it in a mortar. Then boil it for four hours, changing the water. Drain it and dry it and you have made laver bread, the stuff that the South Wales coal miners used to think was good for their chests. Eat it with bacon for breakfast. You can just wash laver weed well and boil it for several hours in water in a double saucepan. Beat this up with lemon or orange, and a little butter or oil and it makes a good sauce for mutton.

The other really valuable seaweed, samphire, is not really a seaweed at all. It looks like a miniature cactus growing below high-tide mark, and can be eaten on the spot raw as it is (provided the estuary is not polluted). It can be boiled and served like asparagus with butter but if you eat it like this you must draw the flesh offbetween your teeth leaving the rough fibres behind. Samphire also makes a most magnificent pickle. To pickle, fill a jar with it, add peppercorns and a grated horse-radish, if you like, then pour into the jar a boiling mixture of dry cider and vinegar in equal quantities, or else just vinegar.

Some of the other more delicate seaweeds, such as sea lettuce *(Ulva lactuca)* and dulse *(Rhodymenia palmata)* can be treated in the same way as laver weed.

Sea-kale is also edible but it is really a perennial vegetable. It is native to the sandy shores of the North Sea, Atlantic and Mediterranean, but it can be cultivated in the garden where it should be treated like rhubarb. The leaf shoots of sea-kale are blanched and eaten like asparagus, and you can cultivate it in any cool or temperate climate which is similar, to some extent, to its seashore origin.

SMOKING AND PRESERVING FISH

Eel To smoke eel, gut the fish but do not skin them. Wash them and lay them in dry salt for twelve hours, then hang them on sticks and dip theminboiling water for afewseconds. This makes the fish open out. Smoke over an open fire at 140°F (60°C) for from two to four hours according to what size they are. Eat them like that, don't cook them. They are probably the most delicious food known to mankind.

Salmon To smoke salmon, fillet the fish and remove the ribs. This is difficult, but you can trim the flesh away a little so that you can see the ribs and pull them out with a pair of pincers. String through the shoulders and carefully score the thickest part of the head end of the fish so the salt can get in. Lie the fish on a layer of fine salt, put half an inch of salt on the thick end and taper the salt off to nothing at the tail end. Leave the fish in salt for 12 hours for a IT to 2 pound (0.7 - 0.9 kg) fillet, 18 hours for a 3 to 4 pound (1.4 -1.8 kg) fillet, and 24 hours for a fillet over 4 pounds (1.8 kg). If the underlying flesh still feels soft at the end of the given period leave the fish a little longer in the salt. Then wash the salt well out, and smoke the fish for 24 hours at 70°F (21°C) in heavy smoke, and for 12 hours at 80°F (27°C) in lighter smoke. Olive oil rubbed on the fish during the cooking is a good idea.

Neither smoked eel nor smoked salmon will keep indefinitely. To deep freeze them should be an indictable offence, although to deep freeze the fresh fish and then thaw and smoke them is pardonable. Plenty of other fish, both fresh water and salt, can be smoked to advantage. The above methods are known as "cook-smoking", as opposed to the "cold-smoking" that produces kippers (and bacon).

Kippers To make kippers, split your herrings, mackerel or pilchards down the back, running your knife alongside the backbone. Soak in 70 to 80 percent brine for an hour or two, then smoke for 6 hours at 85°F (30°C). The harder you smoke them the longer they will keep but even that is not very long.

Bloaters To make bloaters, do not head or gut your fish. Leave them buried in dry salt overnight, and smoke them for four hours at 80°F(27°C).Imerely leave them in the big open chimney over a wood fire. Then if I come in hungry late at night, I pull a few down, lay them on the hot ashes for a few minutes, and eat them.

Salting pelagic fish

To salt herrings, mackerel, pilchards and other pelagic fish, gut the fish and bury them, in barrels or crocks, in dry salt. You can soak the salt out when you want to eat them, and cook them with plenty of boiled potatoes as the West Highlanders do; but the longer they have been in salt the longer you have to soak them, and this often amounts to forty-eight hours. And then they are still not very nice, at least not for soft southerners. Pickled herring is far more pleasant to eat.

Pickling herring

To pickle herring soak the salt herring (or mackerel or whatever) for twenty-four hours, and lay it in vinegar for at least a

Making rollmops

Rollmop herrings prepared at home are both cheap and delicious.

Remove your salted herrings from their crock. Gut and decapitate them, and soak them in water for 24 hours to draw out the salt.

•Slit the fish very carefully down the belly.

Lay the fish on its opened belly. Press very hard and firmly along the backbone of the herring with yout knuckles or thumbs to ease the ribs away from the flesh. This process flattens the fish further.

Draw out the ribs and backbone of the fish. You will probably find that you have to cut the bone away from the tail with a knife.

Cut the fish in half lengthways down the middle.

Lay one or two pieces of peeled and chopped onion across the middle of the fish; then toll it up tightly, starting from the wide end. Tuck in peppercorns and a chilli as well if you like.

Take a sharpened matchstick or a skewer, and pierce the centre of each fish to hold the onion in place.

Pack the rollmops tightly into ajar, and fill the jar with spiced vinegar. Ease the fish from the sides of the jar with a wooden spoon to let out air bubbles.

week, with onions, peppercorns, a chilli or two and any other spice you fancy. It is best to split the fish first. To split it cut the head off, lay the fish on its opened belly and press very hard along the backbone with your knuckles. This draws the ribs out, and you can then pull most of them out along with the backbone. If you really want to go to town make "rollmops" (see illustration).

Salting demersal fish

You can also salt cod and other demersal thick white fish. Split the bigger fish down the belly and rip out all of the backbone except the tail, which you keep as a handle. Pile them up with dry salt between each layer. Leave them for fifteen days if the fish are large, a week if small, letting the brine drain away. Then expose them to dry on racks in the wind and sun, but not in rain.

Preserving small fish

To preserve sprats, anchovies and other small oily fish, first soak the fish in 80 percent brine for fifteen minutes. Stick a sharpened stick through their gills and hang them while still wet, in smoke at 90°F (32°C) for half an hour and then 180°F (83°C) for half an hour. You can eat them like this. Or you can put them in sterilized jars and cover them with olive oil or vegetable oil, sterilize them by heating them for half an hour, and seal. They then keep for a long time and taste absolutely delicious.

The Dutch way of eating salt herring or mackerel is to soak the fish in fresh water overnight, then slice them into very thin slices. Soak them in vinegar for an hour, smoke them in dense hot smoke for half an hour, and pack them in olive oil. They keep for a couple of months in cool weather and taste marvellous when you come to eat them.

Potting mackerel

During the annual mackerel campaign I generally pot mackerel, thus copying the fishermen of north Norfolk. Cut the fish up into sections about two inches (5 cm) long and drop them into vinegar with onions, spices and all the rest of it. A chilli or two always helps on these occasions, as do bay leaves which are traditional. Put the earthenware crock, with the fish and brine inside it, into a slow oven overnight. In the morning cover the pot with grease-proof paper or something similar and put it away in a cool cupboard. Potted fish are an excellent standby, to be eaten just as they are, cold, say late at night when you come home from the pub.

Food from the Wild

Plants, Nuts & Berries

There are innumerable wild foods that you can find growing in the woods and fields and hedgerows, but my advice would always be: find out what the local people consider good to eat in your locality and eat that. An enormous number of "weeds" can be eaten, so can all kinds of seeds, and of course a great many wild fruits, berries, nuts and fungi.

With fungi you really must know which ones are safe and for this you need either a knowledgeable friend or the advice of local people. Beside the common field mushroom a few fungi that are delicious to eat and easy to identify are: Shaggy ink cap (try it boiled lightly in milk), Giant puff ball, Parasol, Shaggy parasol, Horse mushroom, Cep, Boletus (several species),Morel and Chanterelle.

More "weeds" can be eaten than are a positive pleasure to eat, but a few that are excellent are: Nettles, Fat hen and Good king henry. Treat all three exactly as you would spinach: pick them in the spring when they are young and tender, cover with a lid and boil. Some other wild substitutes for green vegetables are: Shepherd's purse, Yarrow, Ground elder and Lungwort. Common mallow can be pureed and turned into a good soup; Chickweed can be cooked and eaten like spinach or used in salads; Jack-by-the-hedge is a mild substitute for garlic. You will find many other varieties in your locality, and don't forget the dandelion - delicious raw in a salad. But use it sparingly.

Of the edible nuts, walnut is the king in temperate climates. After picking, leave the nuts for some weeks until the husks come off easily, then dry them well. You can pick hazel nuts green when they are nice to eat but won't keep, or you can pick them ripe and bury them, shells and all, in dry salt. Sweet chestnuts are magnificent food. Pick them when they ripen in autumn. Shell the prickly covers off them, and store in a dry place. Of course the finest way to eat them is to roast them in the embers of a fire, but prick them first to stop them exploding. Raw they are bitter. Pureed they taste marvellous, and turkey is unthinkable without chestnut stuffing. Beech nuts are tasty but fiddly to eat; better to crush them in a mill, put the pulp in cloth bags and press it. It yields a fine oil. Ash keys make quite good pickle; boil them well and pickle in vinegar.

Among the wild fruits the elderberry is perhaps the most versatile. The berries can be used for cooking in a number of ways. Mixed with any other fruit they improve the flavour; boiled in spiced vinegar they make an excellent relish or sauce which will keep well, if properly bottled when hot. The berries also make an excellent wine as do the flowers (see pp. 192-195), and the flowers add flavour to cooked gooseberries and also gooseberry jam. If you find blueberries, or bilberries in the wild, do not ignore them: they make a wonderful pie. And if you find cranberries you can preserve . them but their flavour is nowhere better captured than in a fresh cranberry sauce. Mulberries and rowan berries make very good jam. And do not forget juniper berries, which can impart an agreeably tart flavour to all savoury dishes.

Sloes make marvellous fruit wine. Take half a pound (228g) of sloes, prick them all over with a fork, and half fill abottle with them. Add an equal quantity of sugar, fill the bottle with gin, and in a few months you will have a liqueur as fine as you can buy

Crab apples vie with sloes for the title of the sourest fruit. Some of their bitterness is caused by tannin, in which they are rich, and one of their good uses is as an additive to tannin-poor wine. Mead ferments better if you put crab apple juice in it, but the best use for crab apples is jelly.

Fruit
1 *Elderberries*
2 *Juniper berries*
3 *Sloe berries*
4 *Rowan berries*
5 Mulberries
6 *Crab apple*
7 *Bilberries*

Nuts
8 *Sweet chestnuts*
9 *Beech nuts*
10 *Ash keys*
11 *Walnuts*
12 *Hazelnuts*

Fungi
13 *Field mushrooms*
14 *Chanterelle*
15 *Shaggy ink cap*

Weeds
16 *Shepherd's purse*
17 Nettle
18 *Dandelion*

Natural Energy

"Take care, your worship, those things over
there are not giants but windmills."
CERVANTES

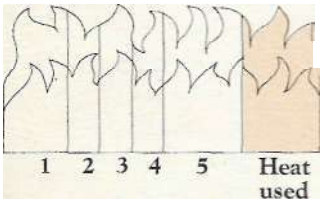
Saving Energy

THE ALTERNATIVES

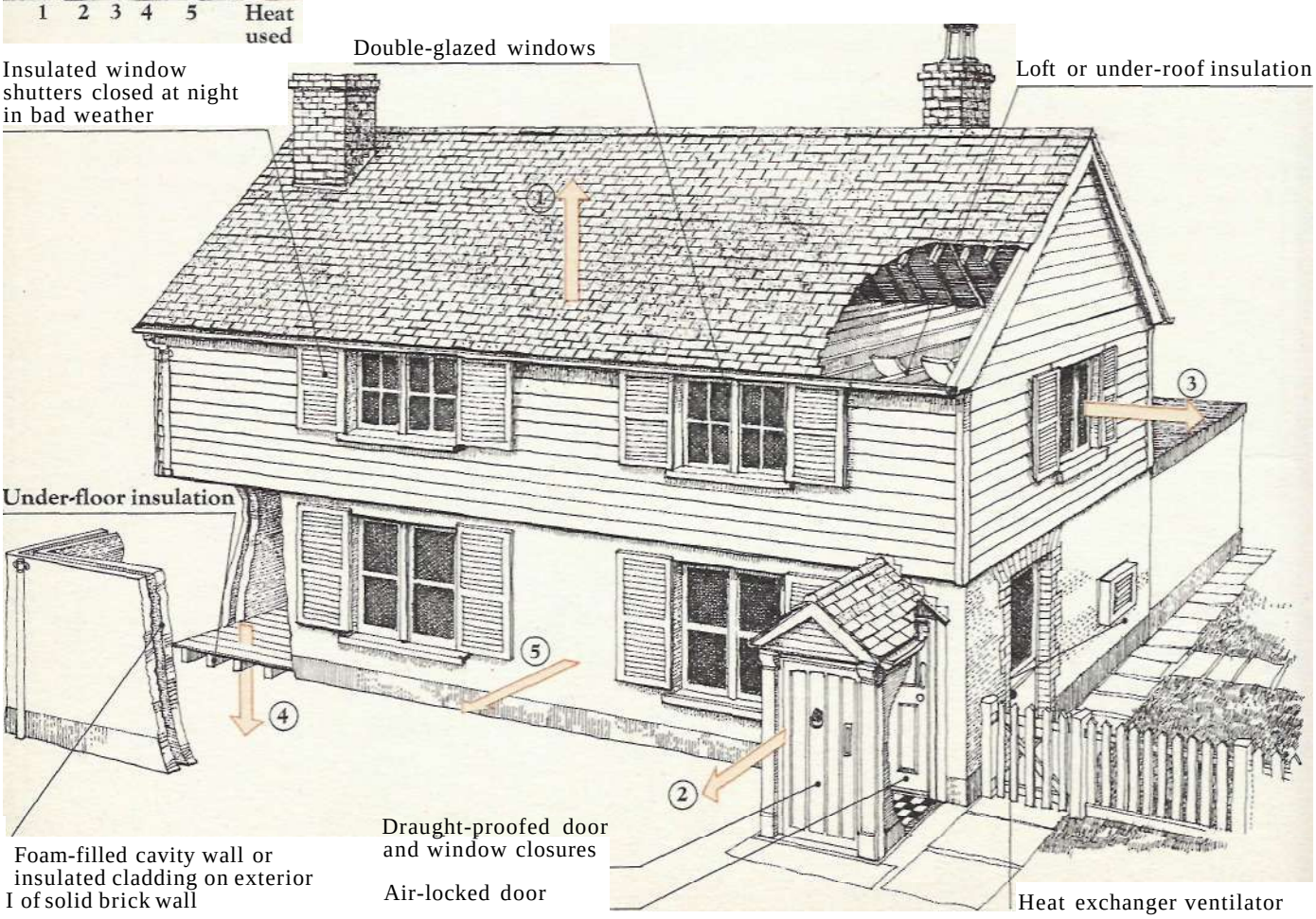
Throughout this book I have advocated an integrated approach to the land: the encouragement of organic beneficial interaction of soil, crops and animals. When considering energy we must adopt this same approach. We should look upon our holding of land as having a certain energy potential that we can use for our own good purposes, and we should aim to make our holding autonomous in this respect, as we have aimed to make it for food. There is something wrong about burning coal to heat water on a hot sunny day, or burning oil to warm a house when there is a fast, flowing stream next to it. Or, for that matter, using mains electricity to drive a mill or a power loom, when there is potential wind or water power nearby.

Water power is most available in hilly, rainy countries and wind power in flat lands, but wind power should never be used where water power is available. The simple reason for this is that the wind is fickle while water is relatively reliable and consistent. Where there is hot sun it is ridiculous not to use it. It is obviously unproductive to feed cold water into your water boiler when the corrugated iron roof over your shed is so hot you can't hold your hand on it.

A characteristic of natural sources of energy is that they lend themselves much more to small scale use than to large scale exploitation. For example more energy can be got out of a given river more cheaply by tapping it with a hundred small dams and waterwheels right down its length, than by building one enormous dam and driving one set of huge turbines. The wind's energy can be tapped, but only by a myriad of small windmills: not by some gigantic wind-equivalent of a power station. Every house in a city could have a solar roof, and derive a great part of its energy requirements from it, but a solar collector big enough to supply a city belongs to the realms of fantasy Scattered farmsteads can easily make their own methane gas, but to cart muck from a hundred farms to some central station,



Heat loss
A house built in the traditional way loses vast amounts of heat through 1 the roof, 2 doors, 3 windows, 4 the floor, 5 outside walls. Use a combination of the methods illustrated and, as shown in the diagram (left), you will find that you can save as much as two thirds of the annual domestic energy requirement. Fire is still the cheapest way of producing heat where and when you need it. But an open fire wastes as much as 90 percent of its energy, so controls are essential.



make gas from it and then redistribute it would be madly uneconomical. So these "alternative energy devices" commend themselves especially to the self supporter.

Now it may well be that it is better for the self-supporter to combine several sources of energy instead of concentrating on just one. For example, you could have a big wood-burning furnace (see p. 248) that does the cooking for a large number of people, and heats water for dairy, kitchen, butchery, bathroom and laundry. If you preheated the water that went into it with solar panels on the roof, you would need less wood to heat more water. Then if you had a methane plant to utilize animal and human waste and used the methane to bring the hot water from the furnace to steam-heat, for sterilizing dairy equipment, better still. Then you could use a pumping windmill to pump up water from the clear, pure well below your holding, instead of having to use the very slightly polluted water from the hill above. And what about lighting your buildings using the stream that runs nearby to drive a small turbine? All these things are possible, would be fairly cheap, and would pay for themselves by saving on energy[7] brought in from outside.

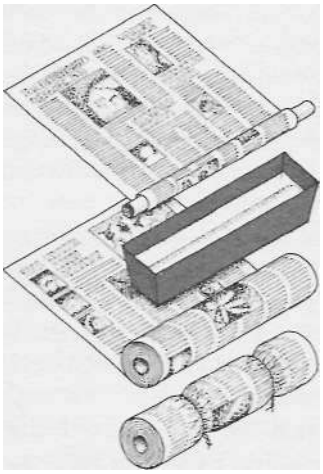
SAVING ENERGY

There is little point devising elaborate systems for getting heat from natural sources until you have plugged the leaks in the systems you have already got.

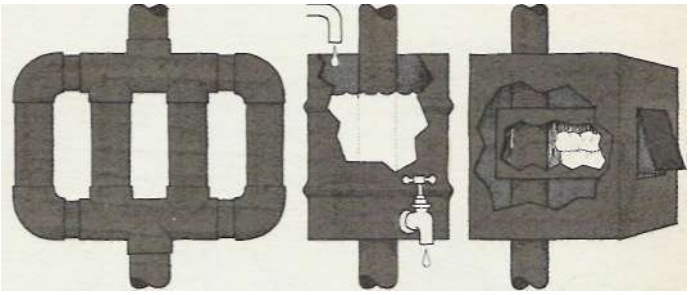
For keeping heat in a house there is nothing to beat very thick walls of cob, stone, *pise* or brickwork with small windows and a thatched roof. The thin cavity walls of modern brick or concrete block housing only insulate well if plastic foam or some other insulating material is put between the walls and laid on the joists in the roof. The big "picture windows" beloved of modern architects are terrible heat-losers. Double glazing may help but it is very expensive. The country man, working out of doors for most of the day as people were designed to do, wants to feel, when he does go indoors, that he *is* indoors, he gets plenty of "view" when he is out in it and is part of the view himself. Therefore, for country housing, big windows are a mistake.

Huge chimneys, very romantic and fine when there are simply tons of good dry firewood, send most of their heat up to heat the sky'. In a world short of fuel they are inexcusable. Long straggly houses are also great heat-wasters. A compact shape is more desirable. A round building will lose less heat than a square one, because it has a smaller surface area in comparison with its volume. A square building is obviously better than an oblong one. It is always best to have your primary heat source in the middle of the building rather than against an outside wall.

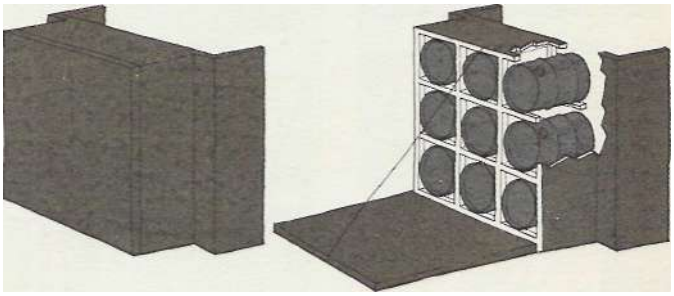
Most insulation nowadays is achieved with high-technology products, and these are very expensive. What we can do is search for cheaper and more natural materials. Wherever the cork oak will grow it should be grown, for it provides an excellent insulator and in large quantities.



Using up newspaper
Most *wood stoves and ranges will burn almost anything combustible. You can turn old newspapers into useful "logs" by wrapping them tightly round a length of wood and soaking the centre of the "log" in old oil or fat. Dead wood and all other inflammable rubbish provide additional free fuel supplies which can be saved and stored during summer and autumn for use in winter. A large old fashioned, cast iron range can supply the major source of domestic heat as well as being used for cooking meals. You can feed any methane from a waste fermentation unit or digester straight into the grate through a copper or stainless steel burner pipe.*



Making a heat exchanger
You can make your own heat exchanger. One way is to have an open water container, as shown, to provide a ready source of warm water. Alternatively, install a "doughnut" arrangement which will increase the surface area of the flue pipe and so transfer more heat to the air inside the house. You can even build an oven. One word of caution to the self-supporter building his own heat exchanger: any system which transports flue gases must be completely leakproofl as stove fumes contain carbon monoxide and can kill in certain circumstances. Your system should be made pom heavy gauge steel; thin sheets of steel will quickly corrode through.



Heat storage
Most *of the domestic energy-saving schemes on this page can be fitted or adapted to any conventional house. If you are building a new house from scratch, consider introducing large heat storage reservoirs. Being able to store heat is especially valuable if you use solar collectors or windmills as energy sources. The illustration above shows a combined solar collector and heat store. This consists of water-filled oil barrels painted black behind a glass panel.* An *insulated cover lies open on the ground: it reflects sunlight on to the glass during the day and can be hinged up to lock the heat in at night. The whole structure forms the south wall of the house. You can use rocks to store heat, by circulating hot air from a solar collector through them during the day to warm them, and then circulating air from the house through them at night, when the rocks will release stored heat back into the air and so prevent the temperature of the house from dropping too far.*

Power from Water

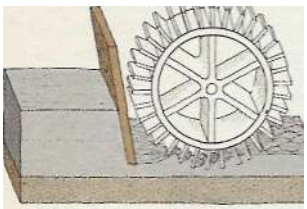
Parakrama Bahu, King of Ceylon, or Sri Lanka, in the seventh century, decreed that not one drop of water that fell on his island should reach the sea: all shouldbe used for agriculture. In wetter climes, where irrigation is not so necessary, the inhabitants would do well to take the same attitude, but change the objective a little: "let not one river or stream or rivulet reach the sea without yielding its energy potential".

Water power is completely free, completely non-polluting, and always self-renewing. Unlike wind it is steady and reliable, although of course there may be seasonal variations but even these tend to be consistent. Like wind, it is generally at its strongest in the colder months, and is therefore at its greatest strength when we most need it.

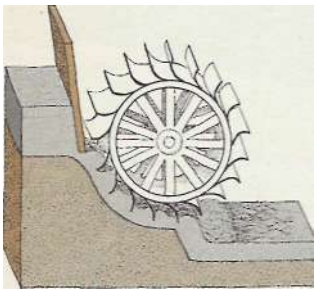
The primitive water wheels that have stood the test of centuries are not to be despised, and for many uses are better than more sophisticated devices. For slow-flowing streams with plenty[7] of water the "undershot wheel" is appropriate. With this you can take in the whole of quite a large stream, and thus exploit a river with a low head but large volume. Your wheel will be slow-turning, but if you use it for a direct drive to slow-turning machinery, a corn mill for example, this is an advantage. It is a common mistake of "alternative energy freaks" to think that all power should first be converted to electricity and then converted back to power again. Energy loss is enormous in so doing.

It may be worth your while to install a more sophisticated water engine than a water wheel, particularly if you want to generate electricity with your water power, for this requires high speeds to which more complex water engines are well suited. For small heads - from as low as a yard (91 cm) to up to 20 feet (6.1 m) - the propeller turbine is very good. As you get over 12 feet (3.6 m) you may prefer a Banki turbine.

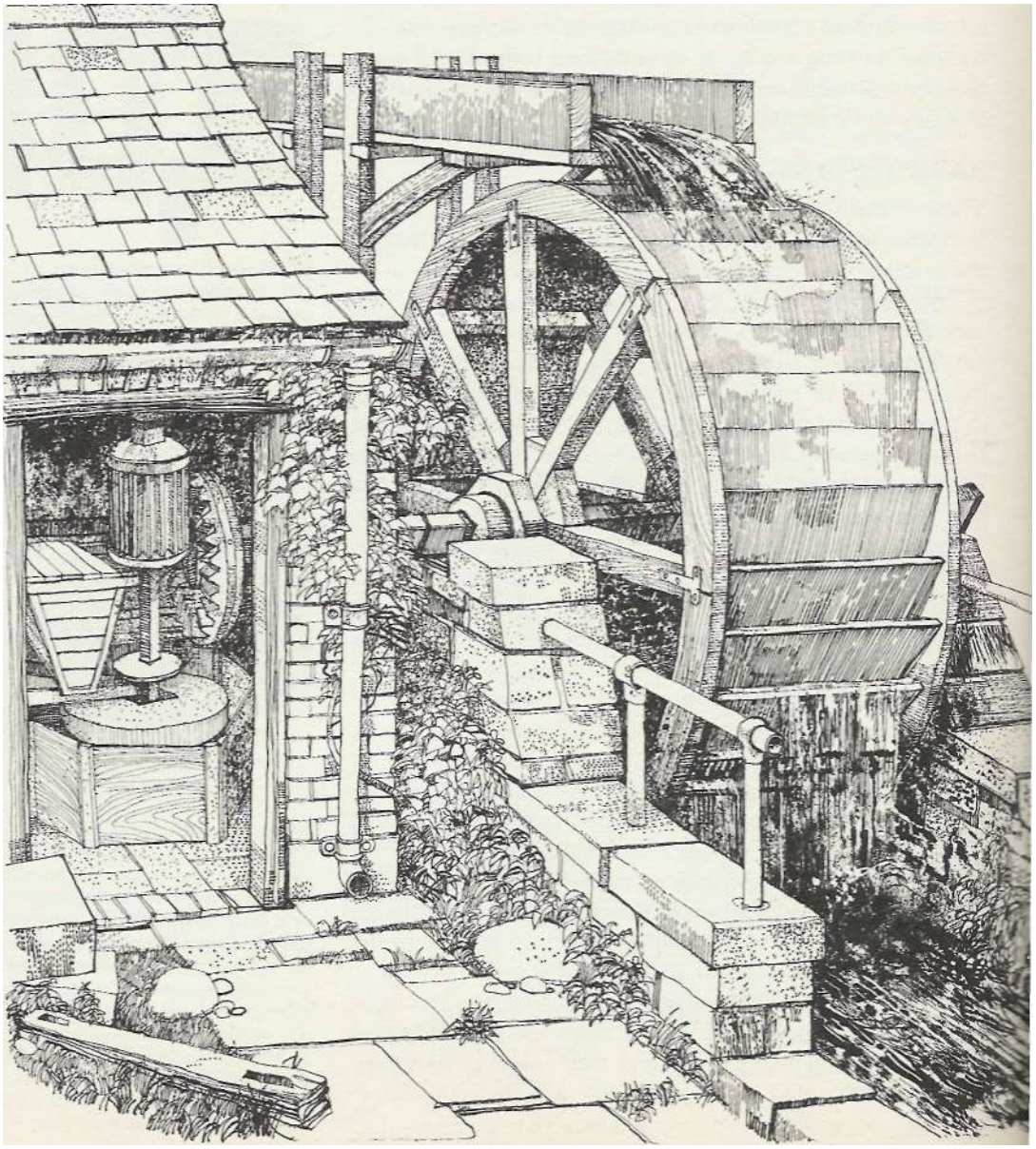
Water wheel (overshot)
The oldest method of using water power, the overshot water wheel (right) is up to 70% efficient. The water goes over the top, filling the buckets round its rim. Water wheels like this turn quite slowly but with considerable force, making them best suited for driving mill-stones (as shown) or other heavy, slow-speed equipment. Depending on flow rate, power from this wheel might be anything from five to twenty horsepower (4-16 kw).



Water wheel (undershot)
Undershot wheels are less efficient than overshot, but are used when there is insufficient head of water for it to fall over the wheel. They can produce from two to five hp (li -3kw).



Breast wheel (undershot)
An *undershot wheel with straight blades is up to 30% efficient; fitting curved blades increases this to 60%. A breast wheel makes twice the power from the same source.*



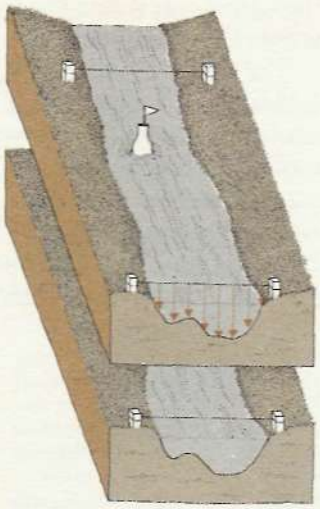
Water power

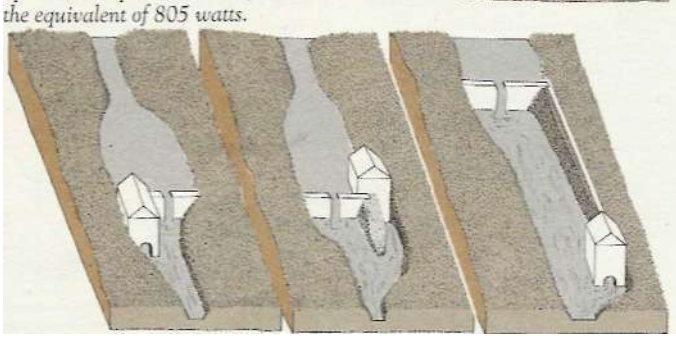
To calculate the available water power of a stream measure the flow rate of the water, and multiply it successively by the density ($62.4 lb/ft^3$), the head of water, and the efficiency of the turbine or water wheel you will be using – e.g. in a hilly area the flow rate might be $\frac{1}{2}$ ft^3 water per sec. This flow falling 40 ft through an 80% efficient Pelton wheel would give:

$$\frac{1}{2} \times 62.4 \times 40 \times \frac{80}{100} = 998 \frac{ft/lb}{sec}$$

$$\frac{998}{550\ (1\ hp)} = 1.8 \text{ horsepower.}$$

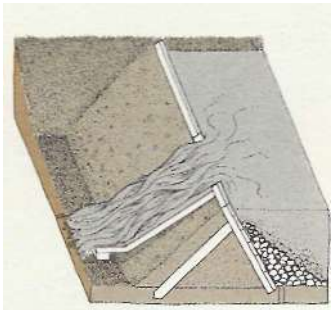
If used for generating electricity, 60% of the turbine's power might be converted into electrical power: i.e. in this example 60% of 1.8 = 1.08 hp and as 1 hp = 746 watts, this is the equivalent of 805 watts.

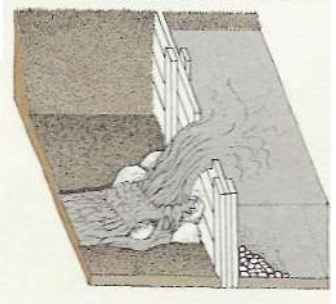


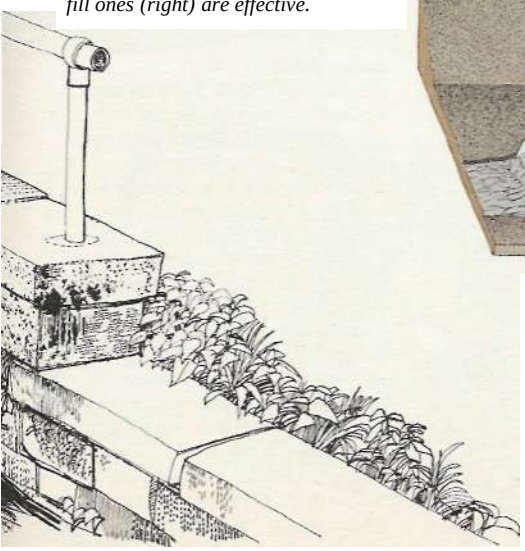


Positioning and types of dam

In *order to build up a head of water and control its flow, it is often necessary to build a dam or a weir (above) across the main stream, usually at a narrow point or where there are rapids. A head race or leat, dug along a contour above the stream, will create enough head for a water wheel or turbine to function. A dam can be a pile of rocks in a stream, although wooden dams (below right) or combined wood and earth-fill ones (right) are effective.*





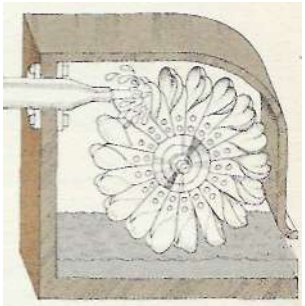


Flow rate

Water power depends primarily on the flow rate and available head of water. The flowrate of a stream therefore needs to be measured, as well as its fall, to predict the available power. A simple method is to find a length of the stream that is straight and has as constant a cross-section as possible. The cross-section of flow is estimated by taking soundings at regular intervals across it (below left) and calculating the average depth: area equals average depth times width. This should be repeated at several points to arrive at an average cross-sectional area for the chosen length. A sealed bottle (top left) is then timed as it drifts along the middle of the chosen section. Flow rate for the stream will be around 75% of the speed of the bottle times the average cross-sectional area of that length of stream. An example of a water power calculation using flow rate is given in the caption, left.

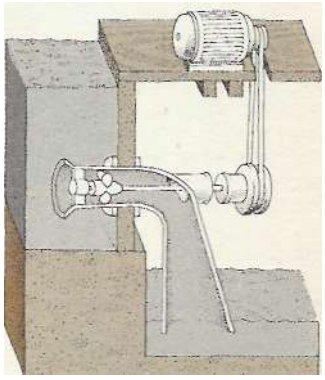
Hydroelectric power

If you are fortunate enough to have a stream available for use, one of its most valuable capabilities is the production of a free and continuous supply of electricity. It *is inadvisable to use a water wheel to run a generator because this turns so slowly that an enormous step-up ratio of gears or belts and pulleys is needed to arrive at the required generator speed. Small turbines turn much faster and need little more than a pair of pulleys and vee belts to connect them to a generator. They are less expensive to build because their smaller size means they need much less steel, and they are also slightly more efficient than water wheels. There are many different types of turbine. The Pelton wheel turbine (top right) is for high head applications where the fall is 40 ft (12 m) or more, and is up to 80% efficient. A special nozzle directs the water at high speed against a set of spoon-shaped deflector buckets set around the periphery of the turbine wheel. The Banki turbine (centre right) is for medium head, up to 65% efficient and best suited to a fall of 15-40 ft (4.5-12 m). Again a special nozzle directs water into the periphery of a spool-like wheel with curved blades. The propeller turbine (bottom right), up to 75% efficient, operates best on heads of under 20 ft (6 m), right down to 6 ft (1.8 m). It is the best substitute for a water wheel on an old mill site. In principle it is merely a propeller in a pipe. To obtain reasonable efficiency, the water must be given a spin opposite to that of the propeller. This is best done by running it through a spiral volute before entering the draft-tube containing the propeller.*



Pelton wheel

Banki turbine

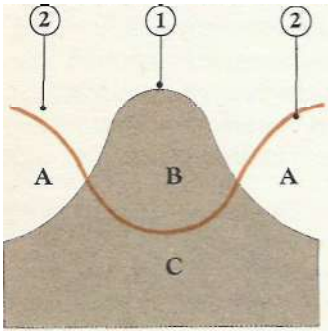


Propeller turbine

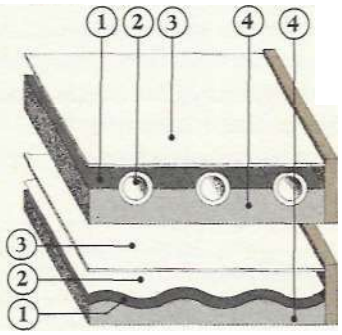
Heat from the Sun

The most practical solar collector is a wood, for woodland can collect the sun's rays from vast areas, and, properly managed, can continually convert them into energy, while to cover a few square yards with a man-made solar collector costs a lot of effort and money. But if collecting and storing the sun's heat can be done relatively easily and cheaply, as it usually can on the roof of an existing house or wall, then, if nothing more, solar energy can be used to reinforce other sources of energy. The drawback is that in cold climates we want heat in the winter and we get it in the summer, but if the winter gap is filled in with wind or water power (both at their best in the winter) a consistent system canbe evolved.

The practical choices open in temperate climates are:
1 Heating water by letting it trickle over a black-painted corrugated roof under a transparent covering which turns the roof into a heat collector. You will have to buy your transparent covering and a pump to circulate the water. All the same this will allow you to collect the sun over a large area.
2 Heating water with black-painted pipes behind transparent material. This has the advantage that there is no ohscuration

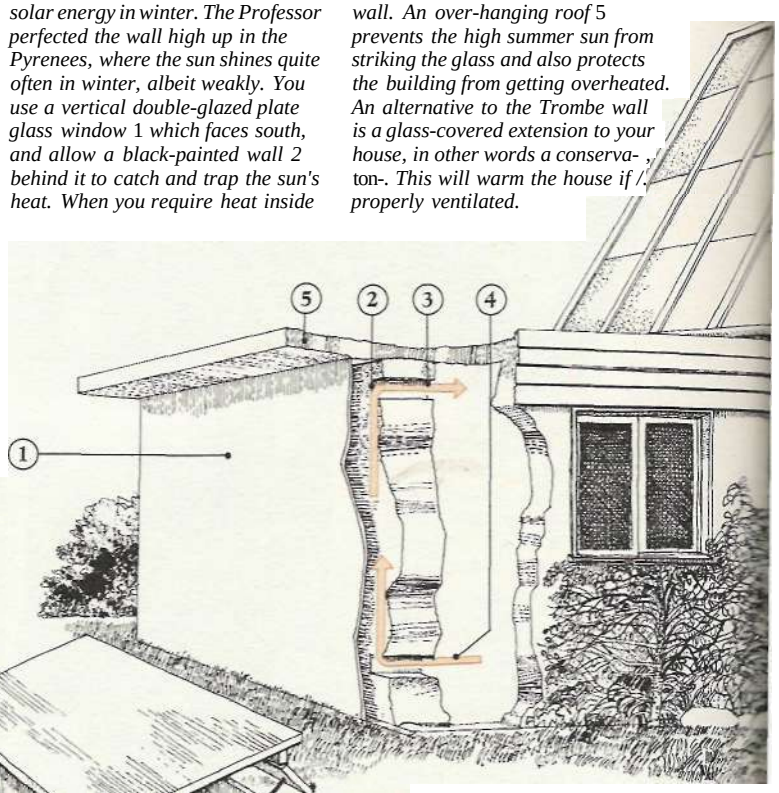


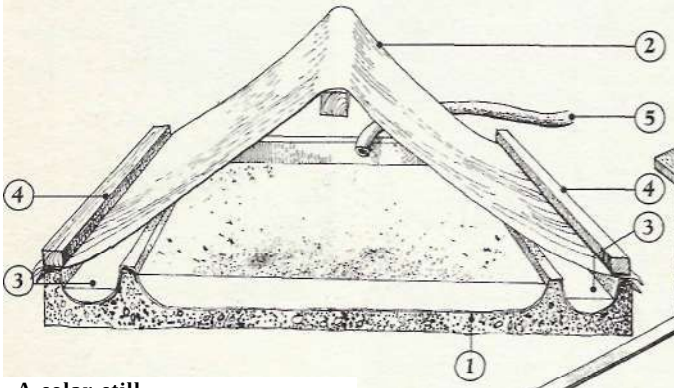
Solar energy
Solar *energy* 1 *is most abundant in midsummer while our heating requirements* 2 *are greatest in midwinter. Most solar collectors provide more heat than we need in summer* B and less *than we need in winter* A. *The productive use of solar energy* C *reaches peaks in spring and autumn. Received energy per day per m might be* 4 *or* 5 *kw hrs in summer, and i to lkw hr in winter in a temperate climate.*



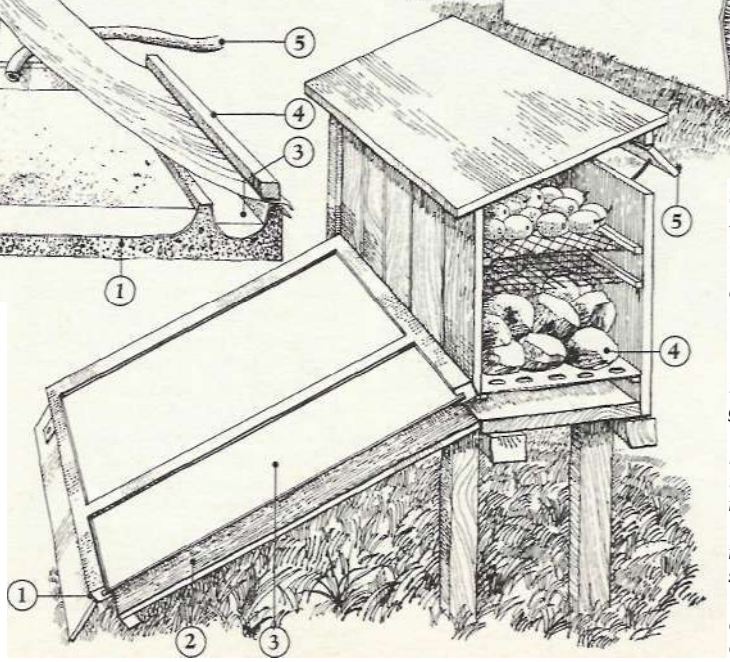
Flat-plate solar collectors
Most *solar energy collectors use a black surface* 1 *to absorb the sun's radiation and produce heat. You transfer the heat into a hot water tank, or to heat space, by passing water, or air in some cases, through pipes or channels* 2 *behind the absorbing surface. A glass or plastic covering* 3 *prevents heat loss from the front of the collector, while insulation* 4 *prevents it from the rear and sides.*

Heating air: the Trombe wall
Named after Professor Trombe, this is a clever method for making use of solar energy in winter. The Professor perfected the wall high up in the Pyrenees, where the sun shines quite often in winter, albeit weakly. You use a vertical double-glazed plate glass window 1 *which faces south, and allow a black-painted wall* 2 *behind it to catch and trap the sun's heat. When you require heat inside the house you open ventilators* 3, 4 *and these allow warm air to circulate between the glass and the wall. An over-hanging roof* 5 *prevents the high summer sun from striking the glass and also protects the building from getting overheated. An alternative to the Trombe wall is a glass-covered extension to your house, in other words a conservatory. This will warm the house if properly ventilated.*





A solar still
This shallow concrete basin, painted black or tarred 1 contains *a few inches of polluted water. A heavy-gauge polythene* tent 2 encloses *this, and condensation runs down the inside surface of the tent into apair of collecting gutters* 3. *The condensation is pure distilled water which you can syphon off. Hold down the plastic sheeting by heavy wooden battens* 4 *and close the cover ends rather like a ridge tent. You can replenish the polluted water through a hose* 5.



Solar drier
An inclined, *glazed, flat-plate solar air heater admits air through an adjustable flap* 1. *The air heats up as it crosses over a blackened absorber surface* 2, *because the heat is trapped by glass panels* 3. *The heated air rises through a bed of rocks* 4 *and then through a series of gratings which hold the produce to be dried. A flap* 5 *under the over-hanging roof allows the air supply to be adjusted or closed off. The rock bed heats up in the course of the day and continues releasing a measure of warmth to the crop after sunset, thereby preventing condensation from occurring. There is a door in the back of the unit to allow crops to be added or removed.*

by misting-up and you don't need a circulatory pump because hot water rises. But it is expensive to cover large areas.

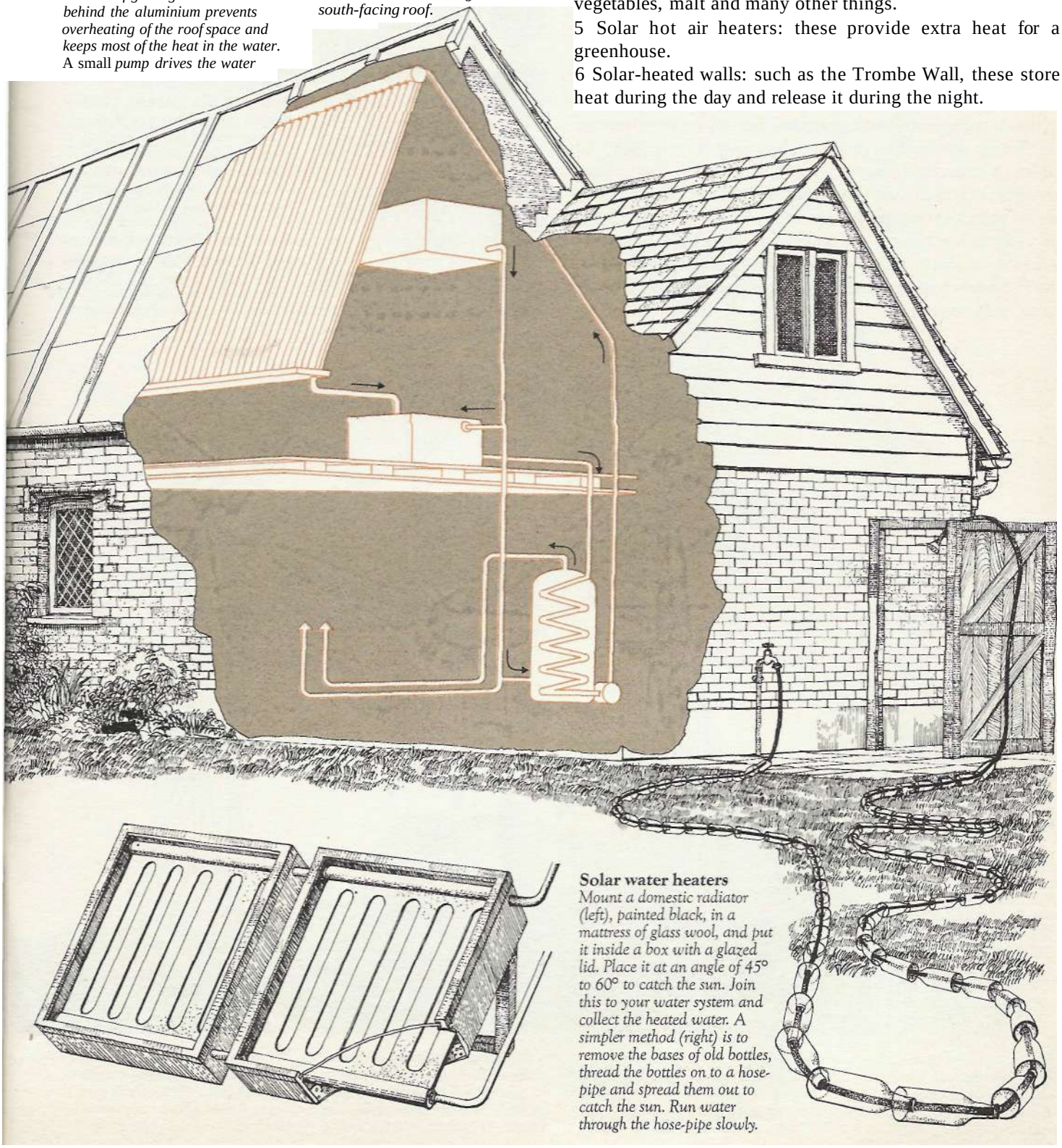
3 Solar stills: these are arrangements for using the heat of the sun directly for distilling water or other liquids.

4 Solar driers: these can be used for drying fruit, grain, vegetables, malt and many other things.

5 Solar hot air heaters: these provide extra heat for a greenhouse.

6 Solar-heated walls: such as the Trombe Wall, these store heat during the day and release it during the night.

Heating water: the trickle roof
Provide a large surface area for a solar water heater by having water trickle down a blackened, corrugated, aluminium roof behind an area of glazing. Insulation behind the aluminium prevents overheating of the roof space and keeps most of the heat in the water. A small pump drives the water round the system whenever a sensor on the roof Cells a control-box that die roof temperature is higher than that of the water in the copper immersion heater. This system is not ideal, but it is cheap enough to make it worth converting an entire south-facing roof.

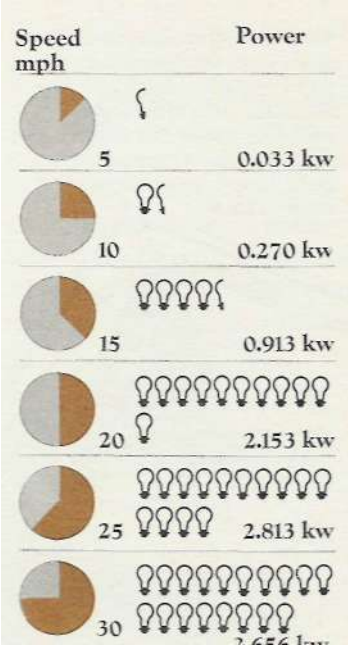


Solar water heaters
Mount a domestic radiator (left), painted black, in a mattress of glass wool, and put it inside a box with a glazed lid. Place it at an angle of 45° to 60° to catch the sun. Join this to your water system and collect the heated water. A simpler method (right) is to remove the bases of old bottles, thread the bottles on to a hose-pipe and spread them out to catch the sun. Run water through the hose-pipe slowly.

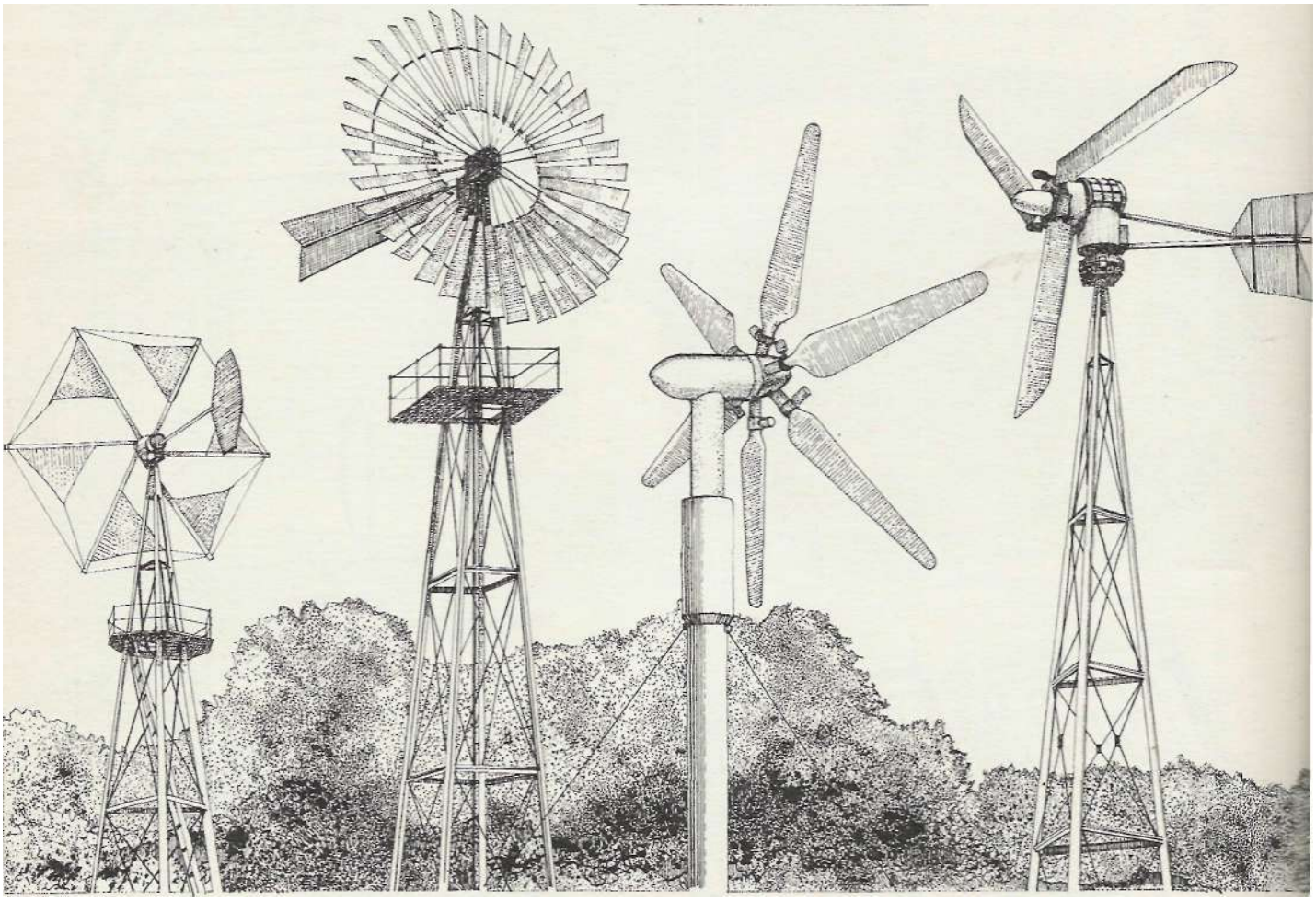
Power from the Wind

The common factory built steel pumping windmill, seen in thousands in all lands where water has to be pumped up from deep boreholes, is one of the most effective devices ever conceived by Man. Many an old steel "wind pump" has been turning away, for thirty or forty years, never failing in its job. Such machines will pump water comfortably from a thousand feet (304 m) and work in very little wind at all. The tail vane is arranged on a pivot so that they can turn themselves sideways on to the wind in a storm.

Wind power has followed the same trend as water power in that low-powered but high-speed devices are now wanted for driving dynamos to produce electricity. But the wind, of course is completely unpredictable, and so you must either accept that you cannot use a machine in calm weather, or in severe gales, or you must be able to store electricity and that is very expensive. However, if you can use the power when it is available, say for grinding corn, or store it, as heat for example, the total wind energy available over a period of time tends to be fairly constant.



How much power?
The main problem in harnessing wind is that it carries very little power when it blows lightly, but offers an embarrassing surfeit in a gale. The power of wind is proportional to its velocity cubed: in other words, if the wind speed doubles its power potential rises eight-fold. This means that a fairly large windmill is needed if useful amounts of power are to be extracted from a light breeze, and that the windmill must be protected from storm damage by having a hinged tail-vane which can swing the wind-rotor out of the wind. Or it can have removable sails or blades which can be made to twist into a "feathered" position where they act as air brakes to slow the rotor. The diagram shows how many 100 watt lightbulbs a 15 ft (4.5 m) diameter electricity-generating windmill is capable of powering.



This is a variation on a Mediterranean sail windmill. Used for irrigation water pumping by market-gardeners on Crete it is readily improvised.

This typical all-metal windmill is used for pumping water. A swinging tail-vane turns it out of the wind in a storm. Many abandoned, pre-war ones can still be renovated.

In this German water-pumping windmill, the rotor runs in the lee of the tubular steel tower; weights at the blade roots swing the blades into a feathered position in strong winds.

This electricity-generating windmill needs only three aerodynamically profiled blades. The machine trickle-charges a bank of batteries to supply low-powered appliances.

To be self-sufficient in electricity

Wind power is hard to win and store, so you should always use wind-generated electricity sparingly. Never use it for heating appliances. In order to exploit wind power you must have an average wind speed of at least 9 mph, with no lengthy periods of low winds; even so you will need battery storage to cover up to 20 consecutive days of calm. Apart from an electricity-generating windmill, you need a voltage regulator and a cut-out to prevent the battery from overcharging. Total batten- storage capacity needs to be: 20 X average current needed in amps (w7atts-^ volts) X average usage time in hours per day, measured in amp hours. Standard domestic electric appliances requiring 220 volts a.c. can be driven from a bank of 12 volt (d.c.) batteries by an electronic invertor. Alternatively low voltage appliances may be used directly. A typical 2 kw, commercially manufactured windmill will often generate at 110 volts d.c. to charge a bank of low voltage batteries, wired in series. You might get 5000 kw hrs annually from a 2 kw windmill. 1 kw is equal to one unit of electricity.

Generate your own electricity
The typical electricity-generating windmill is available in kit form or as a do-it-yourself design. The aluminium or fibreglass blades are pivoted from the hub: centrifugal-force works on the balance weights and overcomes a set of springs attached to the hub shaft, so the blades feather automatically if the rotor overspeeds. A toothed rubber belt drives a car alternator to produce up to 750 watts. Power is transmitted down the inside of the tower, either through a conducting slip ring and brush, or by a cable which can be released when it is twisted, thus providing a breakable connection. Similar arrangements might be improvised though they might suffer in reliability.

This is the simple and cheap sailwing, developed at Princeton University USA. A fabric sleeve is stretched between the two edges of the "wings".

Reading University, England, developed this vertical axis windmill. Wooden aerofoil blades are spring-loaded and fold outwards to prevent over-speeding.

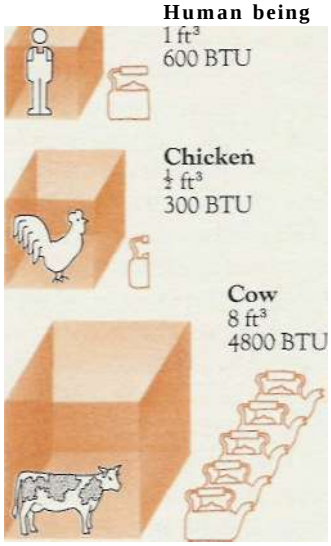
Natural Energy

Fuel from Waste

The attitude that has grown up in the Western world that all so-called "waste" from the body, human or otherwise, is something to be got rid of at all costs and very quickly becomes harder to sustain as our planet's fossil fuel comes into shorter supply. If we can take the dung of animals or men, extract inflammable gas from it in quantities that make the effort worthwhile, and still have a valuable manure left over to return to the land, we are doing very well.

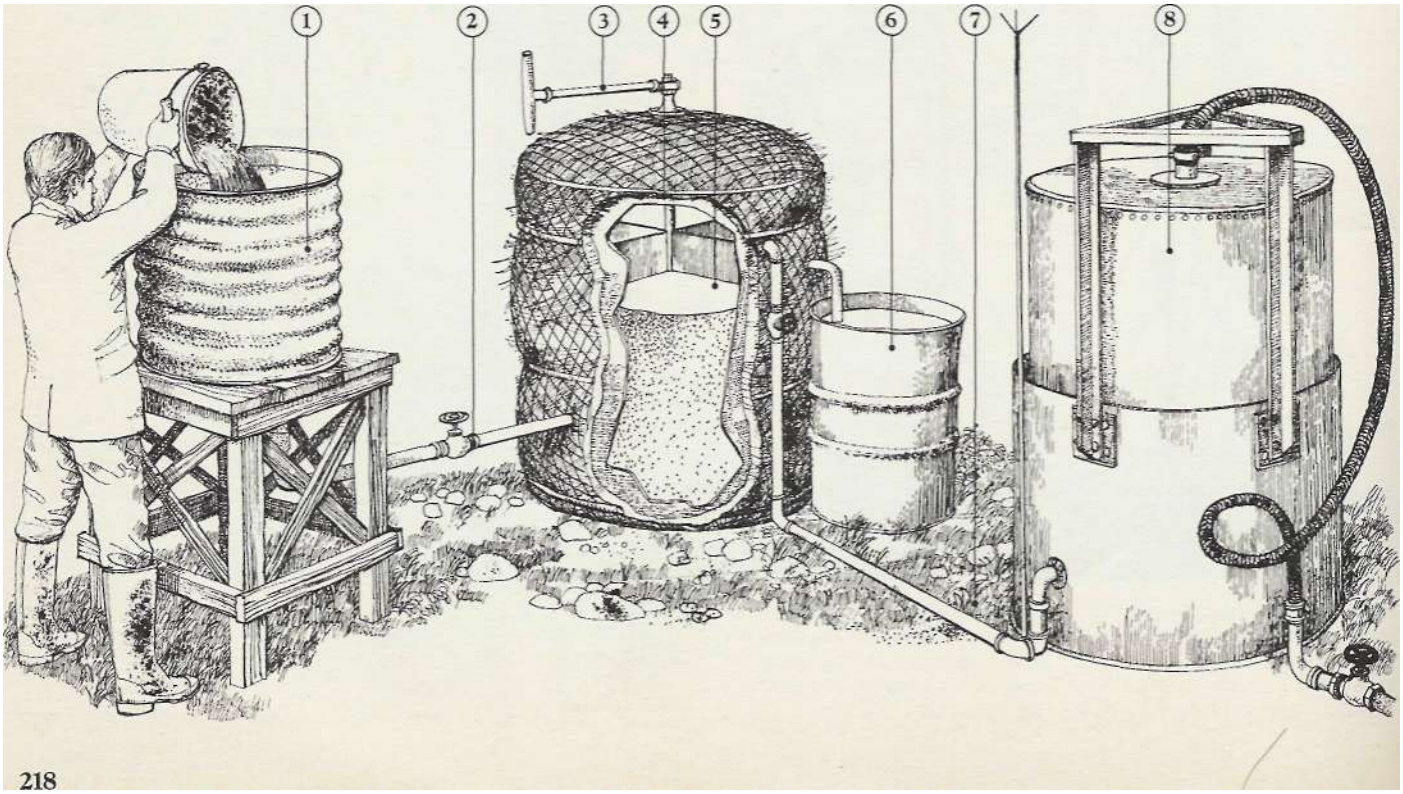
Methane is a gas which is produced by the anaerobic fermentation of organic matter: in other words allowing organic matter to decay in the absence of oxygen. It is claimed that after the gas has been produced the resultant sludge is a better manure than it was before, for some of the nitrogen which might have been lost as ammonia is now in a fixed form which will be used by plants. As the methane gas itself is quite as good a fuel as natural gas (in fact it is the same thing) and is non-toxic and safe, methane production from farm and human wastes seems very worthwhile.

Methane is made with a methane digester which is fine for animal wastes but there is a limit to the amount of bulky-vegetable matter that you can put into it. This precludes filling it with either tons and tons of straw or with the large quantities of valuable manure that result from the traditional practice (well proven) of bedding animals with straw. The spent sludge from the digester is itself an excellent manure, but my own feeling is that, rather than dump it straight from the digester on to the land, it should flow on to straw or other waste vegetable matter. There it will undergo further, this time aerobic, fermentation, and at the same time activate the bacteria which will break down the tough cellulose content of the litter.



How much gas?
The diagram above shows the amount of gas produced by the waste of different animah in a day. The gas is sufficient to boil the number of kettles shown.

The methane digester
The process shown below involves the digestion of organic wastes by bacterial action in a sealed container from which all air is excluded. Animal *manure mixed to a slurry with water is added to-a holding tank* 1 *daily. The input is fed into the digester by gravity when a valve 2 is opened. The stirrer* 3 *has an airtight joint where it enters the digester and prevents scum building up. The tank is well insulated with straw or similar material 4 as the process only works effectively at temperatures close to blood heat. Each fresh addition causes an equivalent amount of digester sludge to overflow into the slurry collector* 6. *The digestion process takes from about 14 to 35 days depending* on *the temperature of the digester, so the daily input should vary from 1/14 to 1/35 of a digester volume to achieve the desired "retention time". The gas bubbles up through the slurry into space 5, and is syphoned along a delivery line* 7 to *the gas holder* 8. An *important safety precaution is a brass* or *copper fine mesh flame trap at the entry to the delivery pipe to protect the gas holder if air gets into the line and causes a burn-back. The gas produced, called bio-gas, is a mixture of about 60% methane (the inflammable fuel component) and 40% carbon dioxide which is inert but harmless. The digested sludge makes a valuable fertilizer, being rich in nitrogen and trace elements.*



Crafts & Skills

"Whatsoever thy hand findeth to do,
do it with thy might."
ECCLESIASTES

Basketry

You can go for a walk in the country with no other equipment than a sharp knife and come back with a basket. One-year shoots of willow, lilac, elm, lime, poplar, hazel, or young ash, can all be used for the tougher rods that radiate outwards from the centre of the bottom of the basket, and vines, creepers or brambles like blackberry, snowberry, honeysuckle, dogwood and clematis can be used for the "weavers", as the more pliable, horizontal, members are called. But if you can find, or grow, osiers, which are one-year-old canes of those special straight-caned willows that are grown for basketry, you are off to a flying start. Use osiers or other tough shoots for hard basketry.

Hard basketry

To make a basket you must first form the "slath", which is the bottom. Do this by making a cross from six or eight strong rods interlocked at right angles, and weaving round their ends with a long weaver (see illustration).

Then you shove in your stakes, which are the vertical rods on which you weave the weavers right up to the top. When you reach the top you have got to finish the basket off, in other words make a border. There are two main patterns: the "trac" border (see illustration) and the "three-rod" border.

Finally you have to make the handle. This is done with a "bow", a long osier which makes the core, and one or more very long and supple weavers (see illustration).

Soft basketry

Baskets can be made from reeds, rushes, sedges and grasses. Rushes and sedges are best, being soft and pithy, and very tough and long lasting. They should be cut in midsummer. The best way to cut them is to wade in shallow water pushing a punt, cut the plants as low as possible with a sickle and lay them carefully in the punt so they keep parallel and don't bend. Dry rushes for about three weeks, in the shade if you can because the sun bleaches them which spoils their appearance. Then bundle them and tie in "bolts", traditionally with a strap 45 inches (1.14 m) long.

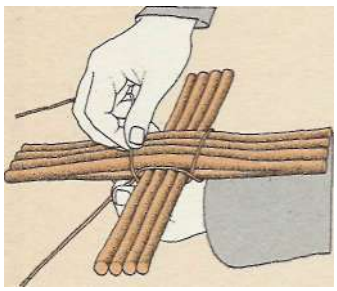
Before you use dried rushes wet them well and wrap them in ablanket for a few hours to soften. Then make longropes of plaited rushes, taking three rushes at a time and plaiting them. Avoid having them all come to an end at the same time so that you can feed another rush in as one comes to an end. Mats are made by simply coiling plaits up and holding the coil in place with waxed thread. To make a basket make a flat coil and when you get to the "chine", or bottom corner, continue the coil up at whatever angle you like until you get to the border. A handle is best made by sewing a rush rope right round underneath the basket.

The basketmaker

You *can make baskets out of reeds, creepers, osiers, and tree shoots. You can make "trugs", as opposite, out of wood.* B> mastering *a craft you gain two important things: immense satisfaction and a commodity for trading.*

Making a hard basket

You need three different types of rod: eight short stout rods for the "slath", or base; a number of strong but bendy rods for your side stakes; and some weavers, the long thin whippy rods which hold the basket together. Side stakes are generally about eight inches (20 cm) longer than the intended height of the basket. Weavers can be any length, but they should be at least long enough to go round the basket once. They come in varying thicknesses.



Soak all your rods for an hour before using them. Cut eight rods for your slath, and cut slits in four of them. Poke the other four through to form a cross. Take a weaver about four feet long and tie tightly round the cross three times and tuck the ends in.

Loop a weaver round one rod, and "pair" by weaving with both its ends. Pair until the base is the right size.

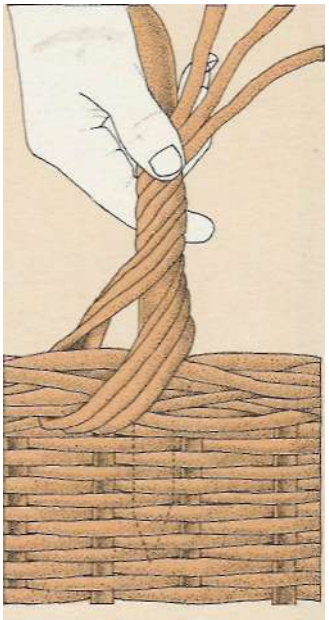
Cut the ends of the base rods.

Shove in 31 side stakes, one each side of every rod, with one gap.

Start the sides with three rounds of "waling" (above). Take three weavers, hold them behind three adjacent stakes and weave round two stakes at a time.

"Rand" up the side of the basket (above). Use long weavers and weave in front and behind each stake. Begin and end weavers behind a stake.

Finish off with three rows of waling and then make a trac border (above) by bending the stakes over.



For the handle take a good thick base rod, sharpen both ends and poke them well down into the top waling on both sides of the basket. Take three thin weavers and loop them under the waling on one side. Plait them round the rod, and when you reach the other side poke the end well into the waling.

Pottery

Clay is very often overlain with earth, and so you may be walking on it, or even living on it, without knowing it is there. Prospect where a cutting has been made, or a well, or anything that exposes the subsoil. If it looks like clay, and when wetted becomes plastic and sticky, it is clay.

Testing clay

Once you have found it you have got to find out if it is any good. It probably isn't. Wet some down to a plastic state and then allow it to dry out. If it has a noticeable scum, usually a whitish stain, on its surface after it has dried, it contains undesirable alkali and probably isn't worth using. Drop a sample of the clay into a beaker containing a 50 percent solution of hydrochloric acid. If it fizzes forget it. Too much lime. If the clay looks dark brown or black and is very sticky[7] then there is too much humus. Clay very near the surface may be like this, but there is often better clay underneath.

To test for plasticity, which is important, make some clay into a stick the size of a pencil and see if you can bend it into a ring an inch in diameter without it breaking. If you can it is good clay.

If there is too much sand in your clay it may be hard to mould or throw on the wheel. If this is so mix a fatter, less gritty, clay with your sandy clay and try that. You can screen sand out of clay, but it is a laborious job and probably not worth it.

Mixing and screening

If you want to mix it with other clay, or screen it, you must mix it with water to a pretty sloppy liquid. Throw the clay into a tank full of water (don't pour the water on the clay) and mix. You can do this by hand, or with a paddle, or in a "blunger", which is a special machine for the job, or in an ordinary washing machine. The semi-liquid clay is then called "slip". The slip can be poured through a screen, to screen it. Use a 60 mesh to the inch screen for ordinary earthenware and a 100 mesh for porcelain or china. If you want to mix two or more clays make slip of them all and then mix them up in that condition.

The next job is getting the water out of the clay again. An easy method is to let your slip sit in a barrel or tank for a few days until the clay all sinks to the bottom. Then you siphon the water off, much as a winemaker racks his wine. There is a machine called a filterpress which will then extract the rest of the water, but if you haven't got one you can place the slip in bowls of unglazed earthenware and leave these in a draughty place. The absorbent earthenware draws the water out of the clay. The water is then dried off by the air, and after a few days the clay is fit to work.

Preparing clay

If you are very lucky, you may well find a clay that you don't have to combine with anything else, or screen, and all you have to do is dig it up and let it weather, or age. All clay is better aged even if only for a fortnight, because bacteria do good things to it. Then you must mix it with water and "pug" it, which means you must tread it well with your feet. Finally you must "wedge" it. This is the process of pushing the clay away from you on a board, pulling it towards you, rolling it, cutting it up and recombining it: in fact giving it a thorough kneading just as you knead bread.

Shaping pots

There are many ways of shaping a pot. Almost certainly pottery was discovered because baskets used to be plastered with clay to make them hold water. One day a basket got burnt and the clay became hard and durable. This was the first pot made with a mould. Simple ways of making pots by "pinching", "coiling" and with "slabs" are described overleaf.

The potter's wheel

The invention of the potter's wheel was the great breakthrough, and there is really no substitute for it. You "throw" a lump of clay on the wheel, "centring" it plum in the middle of the wheel by pressure from both hands as the wheel revolves. Then you shape it with pressure from your hands, fingers, tools and so on. Remove the pot from the wheel: usually you cut it off with a piece of wire. Set it aside to dry. Then replace it on the wheel by sticking it with a little water, and "turn" it, that is spin it round and smooth off the rough edges with a steel cutting tool. Turn it twice: once with the pot the right way up, and again with it upside down.

Making a wheel

In primitive countries they still use wooden cart, or wagon, wheels as potter's wheels, and if you can get hold of one you can do this too. You mount the wheel horizontally near the ground, ideally on a short section of its original axle. Make a hole in the side of the wheel towards one edge or in a spoke if it has them. To use it you squat by the side of the wheel, put a stick in the hole and set the wheel turning. Because the wheel is very heavy -it goes on turning by its own momentum and your hands are then free to throw a pot or two.

A more sophisticated potter's wheel can be made by casting a reinforced concrete wheel, say 28 inches (71cm) in diameter and 3 *Vi* inches (9cm) high with a 1 inch (2.5 cm) diameter steel shaft about 30 inches (76cm) long through it. The bottom of the shaft should protrude a couple of inches and steel reinforcing bars should be welded radiating from the shaft so as to be embedded in the concrete. This is not the wheel you throw on, but one you kick to make the throwing wheel revolve. Then build a table high wooden frame which has a bearing let into it to house the top bearing of the shaft, and a thrust bearing at the bottom to take the bottom of the shaftvThe frame should also include a seat for you to sit on, and a table to place clay. Fix the concrete wheel and shaft into the frame. And now you must fix on

your throwing wheel. Weld (see p. 238) or braze a wheel-head, say a foot (30cm) in diameter and a *¼* to *Vi* inch (0.7 cm to 1.2cm) thick, to the top of a steel hub (a short piece of water pipe will do). Put this on top of the shaft and weld, or braze, it on. To use your wheel just sit on the seat and kick the concrete wheel round with your foot. Being heavy it has plenty of momentum.

Firing

Firing is necessary to harden the clay. With most glazed ware there are two firings: the "biscuit firing" which is just the clay and not the glaze, and the "glost firing," which is the biscuit ware dipped in the liquid glaze and fired again.

You can fire pots to flower-pot hardness in a large bonfire, although you cannot, of course, glaze them like this. Lay a thick circle of seasoned firewood on the ground, lay your ware in the middle, build a big cone of wood over it, and light. Pull the pots out of the ashes when they are cooled.

Traditional kilns are "updraught" kilns (see illustration) and you can build one yourself if you can lay bricks. "Down-draught" kilns are a more recent development and a little more difficult to build. The kiln is arranged so that the heat from the fire is sucked down through the pots before it is allowed to rise up the chimney. Much higher temperatures can be achieved using this method.

Temperature can be a matter of experience, or can be measured with "pyrometers" or "cones." Cones are little pyramids of different kinds of clay mixture which are placed in the kiln and which tell us the temperature by keeling over when they get to a certain heat. You can buy them very cheaply, but if you plan to use them remember to build some sort of a peep-hole in your kiln so you can see them.

Glazing

Most glaze is a mixture of silica, a "flux" which is generally an oxide of some metal (like rust), and alumina which is clay. China clay is the most usual form of alumina in glazes. The silica melts and solidifies on cooling to form a coating of glass on the ware. The flux helps the fusion, lowers the melting point of the silica, and provides colour. The alumina gives the glaze viscosity so that it does not all run down the side of the pot when you put it in the kiln.

Anybody can make their own glazes. You must grind the components down fine, either with a pestle and mortar or in a ball mill. The latter is a slowly revolving cylinder which you fill with flint pebbles and whatever material you want to grind. You can make a raw glaze from 31 parts washing soda (the flux-sodium is a metal); 10.5 parts whiting; 12 parts flint (the silica); 55.5 parts feldspar. Grind this, mix it and pass it through a 100 mesh to the inch (2.5cm) lawn, which is a piece of fine linen. There are hundreds of glazes and the best thing you can do is get a book on the subject and experiment with a few.

Before shaping your pot
Let newly-dug clay age for at least a fortnight. Then pug it to get the air out. The easiest way is to mixit with water and trample on it.

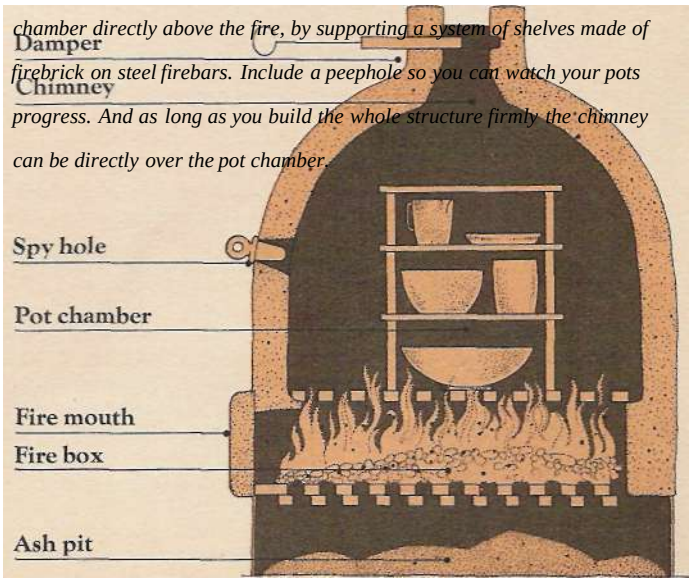
Use a wire to cut a workable lump from your store of pug.

Wedge the lump to make it a soft homogeneous mass, free of air bubbles and foreign bodies like bits of stone and grit. You can wedge in the same way as you would knead dough for. bread. Roll the clay towards you with both hands, twist it sideways and push it down into itself. Press out air bubbles and pick out bits of dirt. If you are mixing two clays wedge until your clay is one uniform colour.

After shaping your pot
Most glazes are applied after the first firing in the kiln, the biscuit firing. The commonest method is to dip your pot in a soup of powdered glaze and water, but it takes practice to avoid finger marks. You can pour glaze so that it flows over the pot. You can spray it, or paint it on with a brush.

A solid fuel updraught kiln

You *can* get *kilns which use electricity, gas or oil, but a solid fuel kiln can be equally efficient, and you can build it yourself out of ordinary bricks. Updraught kilns are the simplest. You have your fire box at the bottom. If you bum wood you can do it on the ground, but coal and coke should be burned on steel firebars so that the ash can drop through. Build your pot chamber directly above the fire, by supporting a system of shelves made of firebrick on steel firebars. Include a peephole so you can watch your pots progress. And as long as you build the whole structure firmly the chimney can be directly over the pot chamber.*



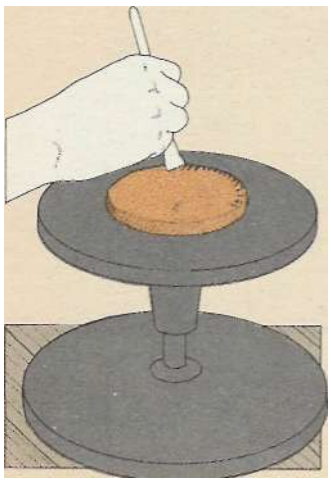
Pottery

Making pots by hand

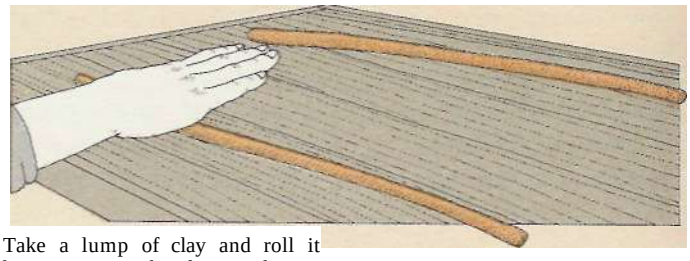
Before you begin to throw pots on the wheel you need a thorough knowledge of clay itself: what happens to it when it is pulled about, when it dries, when it is fired and so on. This vital knowledge is best gained by shaping some pots by hand before you ever try the wheel. Many potters prefer to work by hand because they can create irregular shapes instead of being limited to those formed by the wheel.

Coil pots

You can make coil pots with no other tools than your fingers simply by rolling out long sausages of clay and coiling them into whatever shapes you want. Obviously each turn of the coil has to be pressed hard against its neighbour, and the sides of the pot have to be painstakingly smoothed. If you use a lot of care and patience your pot can have as fine a finish as anything thrown on a wheel. If you use a few simple tools (see illustrations) your job will be a lot easier.



Shaping a coil pot
A turntable is a great help. Instead of inching your coil round the pot, you can hold the coil still and turn the pot round. Begin with a ball of clay and flatten it to form a base half an inch (1 cm) thick. Smooth the surface of the base with a knife and cut it to a perfect circle by holding the knife still and revoking the turntable. If you have not got a turntable make the base on a plate and cut round to form a circle. Use a modelling tool to give the base "tooth" which means roughen it so that the coil above has something to cling to.



Take a lump of clay and roll it between your hands so that it forms a sausage about nine inches (23 cm) long. Lay it on the bench and roll backwards and forwards applying gentle pressure, until you have a long coil about half an inch (1 cm) thick

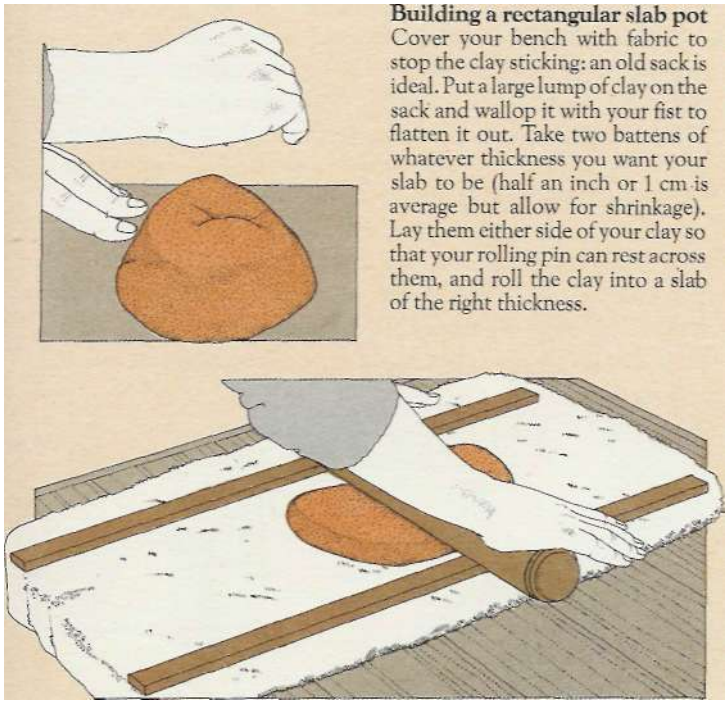
Make up some slurry, a mixture of clay and water. Brush some round the edge of the base with a toothbrush to make the coil stick. Lower the coil on and press down with your fingers on the inside and outside.

Where the coil begins to overlap itself brush on more slurry. Make the joins firm by gently pushing the clay downwards on the outside and upwards on the inside. When you need a new coil, make a "butt joint" by slicing both ends diagonally and pressing together with plenty of slum-.

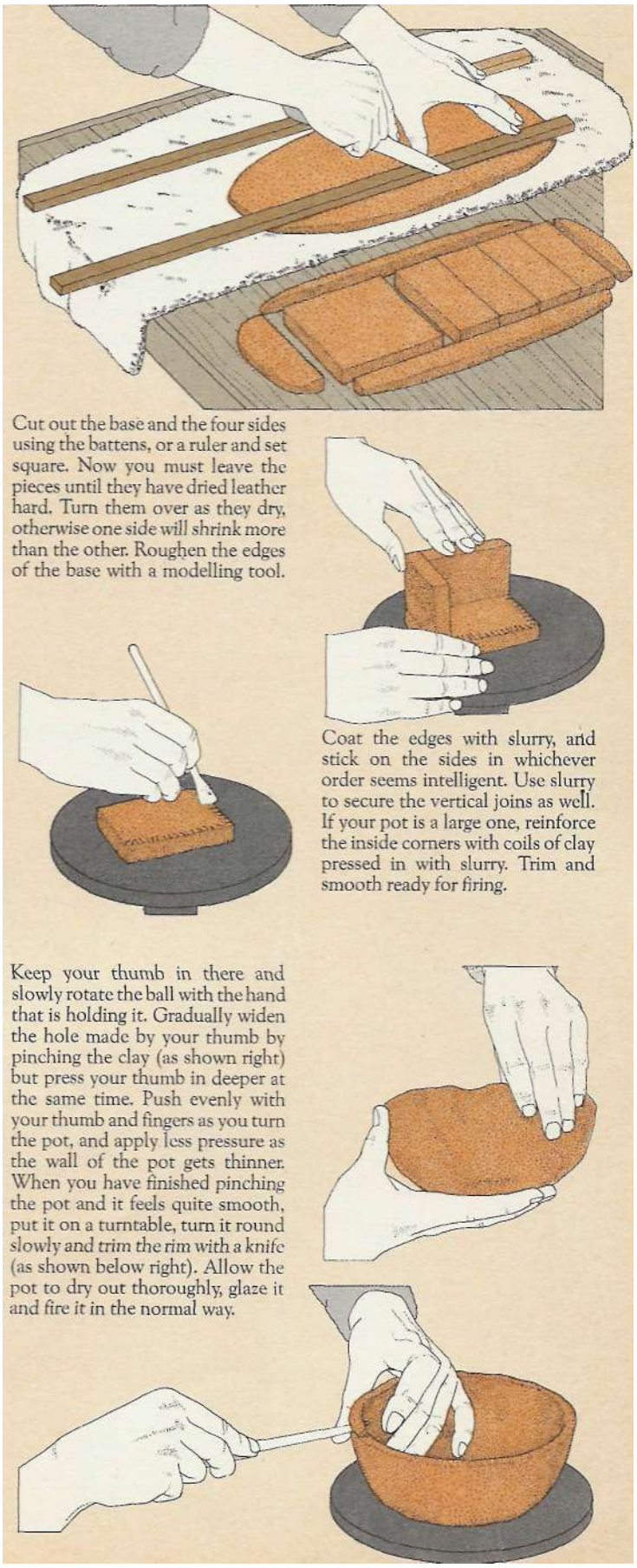
The finish is completely up to you. If you like the corrugated look leave the outside as it is, but it is worth smoothing the inside a bit to make it easy to clean. You can smooth outside and inside to near perfection with a flat piece of wood.

Slab pots

"Slabbing", as the cognoscenti like to call it, is the best way to make angular pots with flat surfaces, particularly boxes and trays, You need a coarse grained clay if your pots are to be of any size, say more than six inches (15 cm) in any dimension. All you need is two battens and a rolling pin to make a slab from which you cut the parts of your pot. If you want to make slab pots with sides which are not rectangular you can cut a set of patterns in paper, and use them to cut up your slab.



Building a rectangular slab pot
Cover your bench with fabric to stop the clay sticking: an old sack is ideal. Put a large lump of clay on the sack and wallop it with your fist to flatten it out. Take two battens of whatever thickness you want your slab to be (half an inch or 1 cm is average but allow for shrinkage). Lay them either side of your clay so that your rolling pin can rest across them, and roll the clay into a slab of the right thickness.

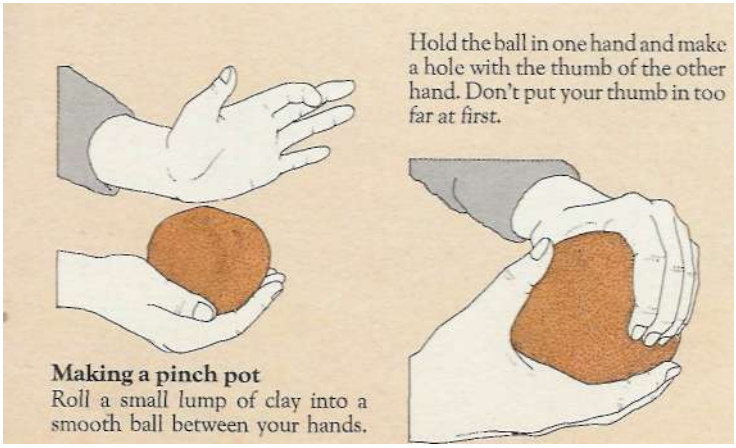


Cut out the base and the four sides using the battens, or a ruler and set square. Now you must leave the pieces until they have dried leather hard. Turn them over as they dry, otherwise one side will shrink more than the other. Roughen the edges of the base with a modelling tool.

Coat the edges with slurry, and stick on the sides in whichever order seems intelligent. Use slurry to secure the vertical joins as well. If your pot is a large one, reinforce the inside corners with coils of clay pressed in with slurry. Trim and smooth ready for firing.

Pinch pots

Pinch pots can be made entirely by hand, although a knife and a turntable help create a neater finish. Similar to the pinch pot is what I call the "thumped pot". You get a thick plank, carve a concave shape in it, lay your clay in this and thump it with your fist. Thump it out thin, keep turning it round and shaping it, and you will make a pot.



Hold the ball in one hand and make a hole with the thumb of the other hand. Don't put your thumb in too far at first.

Making a pinch pot
Roll a small lump of clay into a smooth ball between your hands.

Keep your thumb in there and slowly rotate the ball with the hand that is holding it. Gradually widen the hole made by your thumb by pinching the clay (as shown right) but press your thumb in deeper at the same time. Push evenly with your thumb and fingers as you turn the pot, and apply less pressure as the wall of the pot gets thinner. When you have finished pinching the pot and it feels quite smooth, put it on a turntable, turn it round slowly and trim the rim with a knife (as shown below right). Allow the pot to dry out thoroughly, glaze it and fire it in the normal way.

Spinning Wool & Cotton

WOOL

Wool should be selected (or sheep should be selected) for the job to be done. Different breeds of sheep give wool of varying lengths of "staple" or fibre. Long staple wool is better than short for the hand spinner. Rough hairy wool is fine for tweeds and rugs: soft silky wool for soft fabrics like dress material. There are no hard and fast rules though.

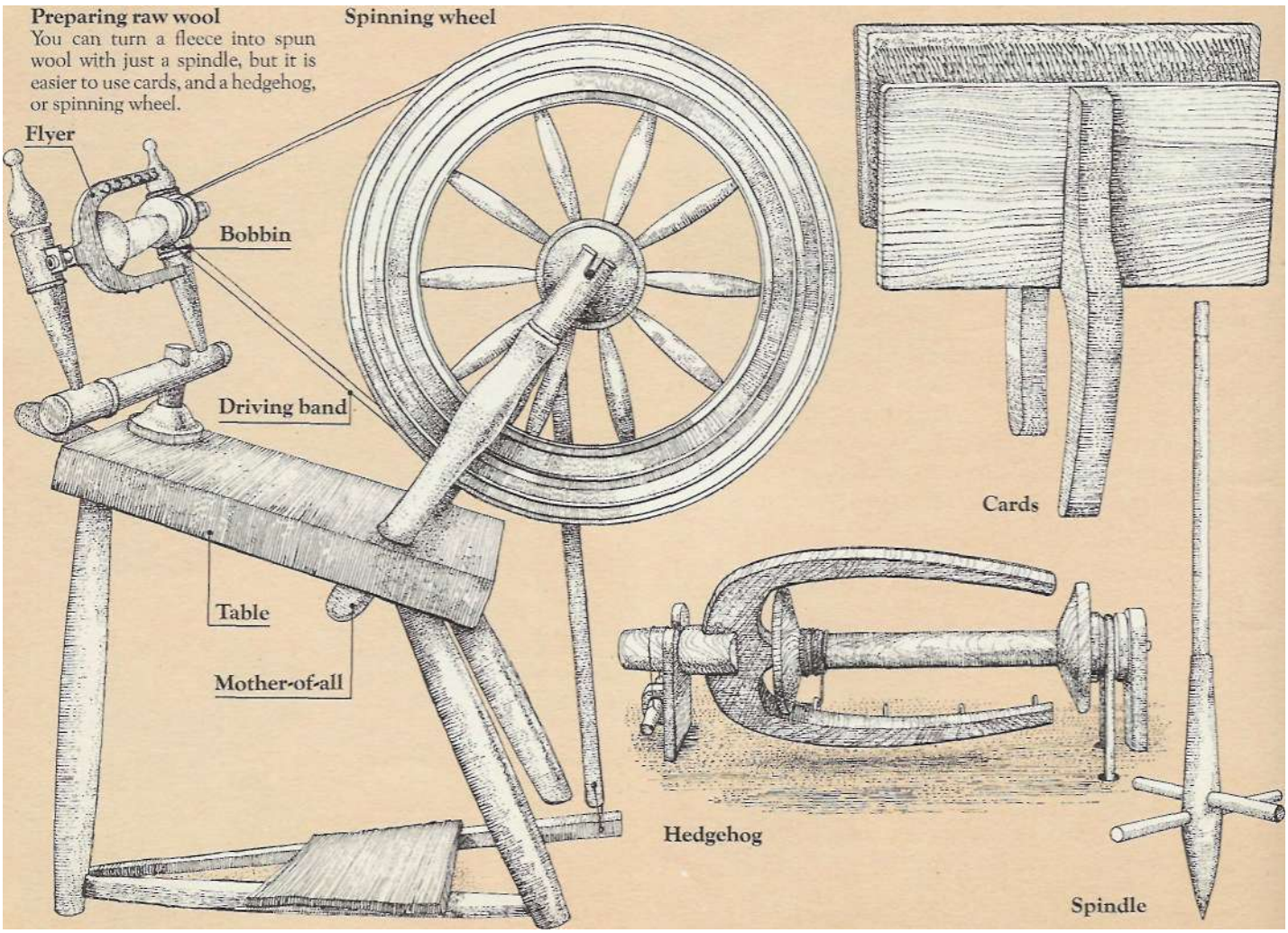
To turn raw wool straight from the sheep into yarn ready for weaving you usually begin by "teasing" (see illustration) to straighten the wool out and get rid of dust, burrs and other rubbish. Then you card (see illustration) to create "rollags", which are rolls of well-combed wool ready for spinning. Spinning (see illustrations) is done with a spindle, ahedgehog or a spinning wheel, and whichever it is the principle is the same: to stretch and twist the straight fibres of wool from your rollags to make lengths of yarn ready for weaving or knitting. The subtle feature of a spinning wheel is that the endless twine which acts as a driving band goes over two pulleys of different sizes. This means that the bobbin and the flyer which the pulleys drive, revolve at different speeds. The flyer is therefore able to lay the yarn, as it is spun, on the bobbin at the right tension.

Roving

A self-supporting friend of mine wears the most flamboyant garments, very warm and good looking and he makes them entirely from wool, with no other tools but five sticks and a needle. He spins them on one stick and weaves them on the other four. Now it is possible to spin wool without carding it first. Instead you have to "rove" it, which can be done with the hands alone. Take some teased wool in your left hand, release a little of it between your finger and thumb, and pull it out in a continuous rope with your right hand, but not pulling so hard that you break or disengage the rope. This is not as easy as it sounds and it needs practice. When you have so pulled out all the wool, bend it double and do the whole operation again. Bend it double again (sometimes you might like to triple it) and go on doing this until you are satisfied that it is fairly parallel and well teased-out. This is now a "roving" and you can spin it direct.

Types of yarn

For weaving you generally use single-ply wool. The warp yarn should be fairly tightly spun: the weft yarn less so. If you intend to knit with the yarn, double it. To do this put two full



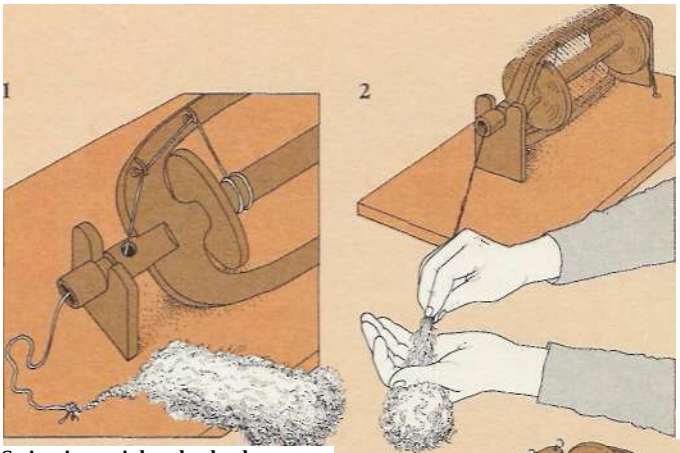
Preparing raw wool
You can turn a fleece into spun wool with just a spindle, but it is easier to use cards, and a hedgehog, or spinning wheel.

bobbins on a "lazy kate", which is simply a skewer held horizontally at each end (two upright pegs will do just as well), put the ends of the two yarns together, feed them into the spindle on your spinning wheel just as if you were going to spin, put them round the flyer (see illustration), tie them to the spindle, and then turn the wheel backwards, or from right to left. This will make two-ply wool. If you want three-ply do the same thing with three bobbins.

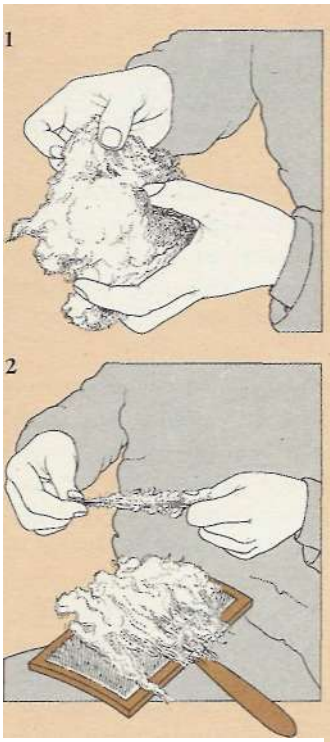
COTTON

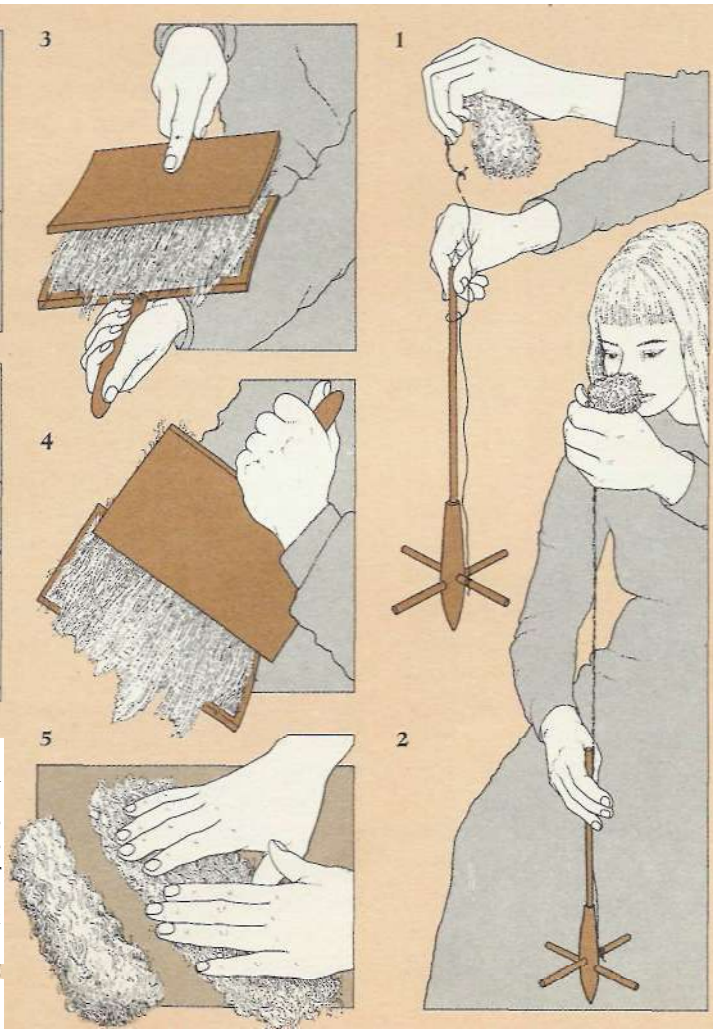
Cotton is often "willowed" before being carded. In the west this generally means being put in a string hammock and beaten with whippy willow rods. The vibrations fluff out and clean the cotton very effectively. It is then carded just like wool, but it cards much more easily, the cotton staples being much shorter.

Spin it as if it were wool, but keep your hands much closer together, treadle more quickly, and don't hold the cotton back too much with the left thumb and finger or it will kink. Angora hair, if you can get it, is delightful stuff and can be treated just like cotton. It makes amazingly soft yarn, much softer than most wool.

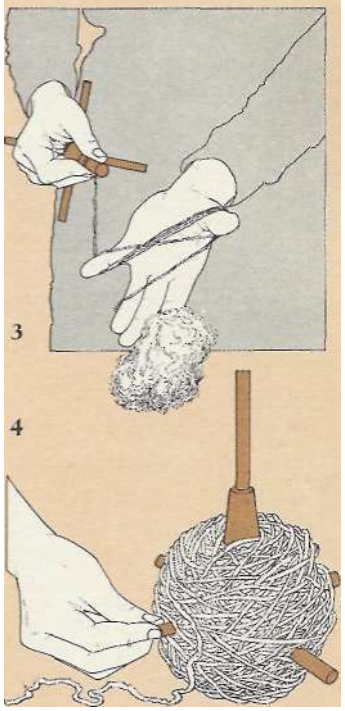


Spinning with a hedgehog
A hedgehog fits on to a treadle. lTie a string round the bobbin, loop over first two hooks, poke through and tie to your rollag. 2 Treadle, and pull unspun wool from your left hand with your right 3 When you have a good length of spun wool, stop treadling, move the string on to the next hook, hold die outer bracket still and treadle. The spun yarn will be drawn on to the bobbin.





Teasing and carding
1 To tease take raw wool and pull out small pieces. 2 Lay teased locks evenly over your left card. 3 Stroke the left card with the right until the fibres are well combed. 4 Transfer fibres from left card to right. Comb and transfer about five times. 5 Get all the wool on one card and roll it off. Make a rollag, by rolling between the card backs or on a table.



Spinning with a spindle
1 Tiesomespunyarntoyourspindle, take a turn round the handle and tie to your rollag. 2 Spin the spindle. Pull unspun wool out between forefinger and thumb of your left hand. 3 When the spindle reaches ground, haul it up wrapping the newly spun wool round your fingers. Transfer the spun wool back to the spindle. Spin another length of wool. 4 Pull out the dowels to release your wool.

Dyeing & Weaving

DYEING

Stock dyeing is best for the self-supporter, that is dyeing the fibre in the skein before it is woven. It is easier thus to get an even distribution of colour.

Natural dyes will generally only dye natural materials: they will not dye nylon and the other synthetics. But the right natural vegetable dyes, used with the correct "mordants", will dye any natural fabric with good and fast colours. (Mordants are chemicals which bite into the fabric and give the dye something to fix on.) Although aniline dyes, which are derived from coal tars and other strange chemical substances can get close to natural colours they can never quite make it. But if you want very brilliant colours, then you will probably need artificial dyes.

Some plant-derived dyes don't need a mordant, but most do. The mordants that you should be able to make for yourself or come by very readily are vinegar, caustic soda and ammonia. To get a greater range of colours you need substances like cream of tartar, alum, chrome (potassium dichromate), tin (stannous chloride), and iron (ferrous sulphate). Alum is the most useful one, and if that is the only one you have, you can still do a lot of dyeing.

To mordant with alum heat 4 gallons (18 litres) of water, dissolve 4 oz (114 g) of alum and 1 oz (28 g) of cream of tartar in a little water and then add it to the 4 gallons (18 litres). Immerse 1 lb (0.5 kg) of clean, scoured (washed), dried wool in the form of a skein and simmer for an hour, stirring occasionally. Lift the wool out and press gently.

To prepare your vegetable dye cut up your vegetable matter into small pieces, let it stand in cold water overnight and boil it for an hour. Then add more water if necessary. You will need four gallons (18 litres) of dye for a pound (0.5 kg) of wool. Drop wetted, mordanted wool into the dye all at once. The dye should be warm. If it isn't, heat it. Leave the wool in for an hour, stirring occasionally very gently. Then take it out and drain.

A few materials that make strong colour are listed below, but the field is open to endless experiments.

Yellow Bark of ash, elder, brickthorn, apple, pear and cherry; leaves and shoots of broom and gorse; privet leaves; onion skins (not very fast in sunlight though); marigold flowers; golden-rod; Lombardy poplar leaves; lily-of-the-valley leaves; bog myrtle leaves; dyers' chamomile; spindle tree seeds; pine cones (reddish yellow); barberry roots and stems (no mordant required).

Green Purging buckthorn berries; heather leaf tips; privet berries (a bluish green); bracken leaves; spindle tree seeds boiled in alum; elder leaves.

Brown Walnut roots, leaves or husks of shells (no mordant required); slow or blackthorn bark (reddish-brown); boiled juniper berries.

Red Spindle tree seed vessels; blood root.

Black Oak bark, which will dye purple if mixed with tin (stannous chloride). Oak galls make ink.

Purple Bilberries are much used for tweeds in the Highlands of Scotland and are a fine dye (no mordant required); willow roots.

Violet Wild marjoram.

Orange Lungs of oak, *Sticta pulmonacea* (no mordant required).

Magenta Lichen makes a magenta on the first dye and other colours as you enter successive dye-lots into the same dye. When the dye seems quite exhausted freshen it with vinegar and you will get a rosy tan.

BLEACHING

Fabrics can be bleached by soaking them in sour milk and laying them in the sun. A mixture of chlorine and slaked lime also bleaches and is good for flax and cotton. Wool and silk can-be bleached with fumes of sulphur. Simply hang the skeins over burning sulphur in an enclosed space.

WEAVING

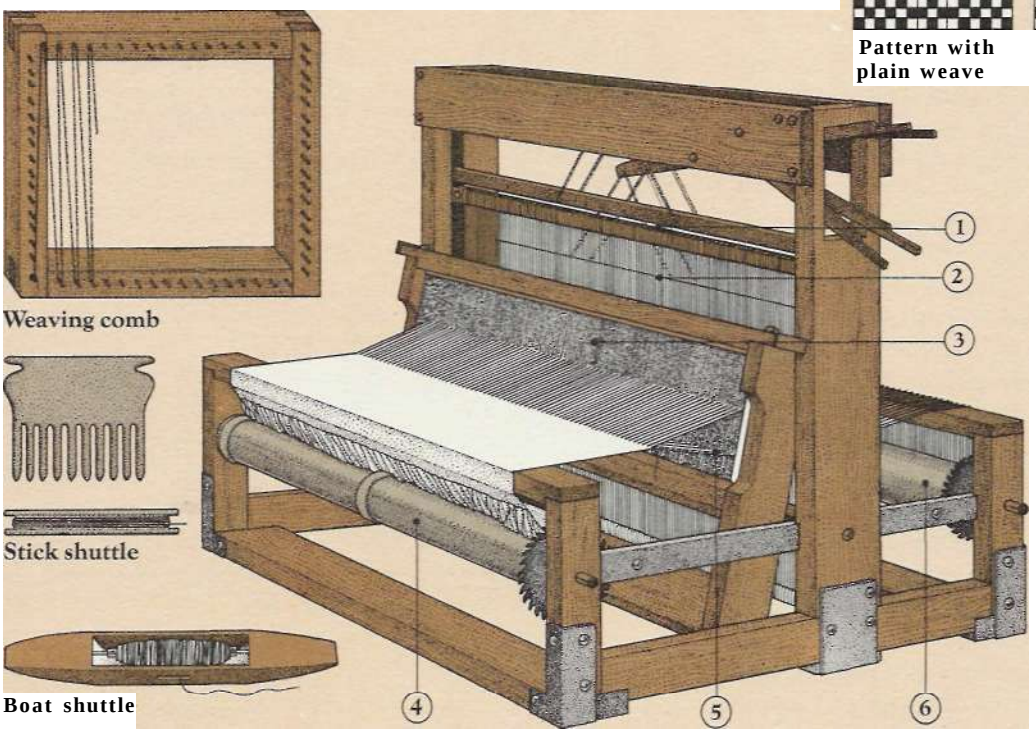
Weaving on a good hand loom is a magnificent accomplishment, and if you can do it you have made a big step towards true self-sufficiency Once you have the loom, and are proficient, you can achieve a considerable output of very good cloth. Machine-woven cloth does not compare with hand-woven, nor have machines yet been devised that can even imitate the hands of the weaver.

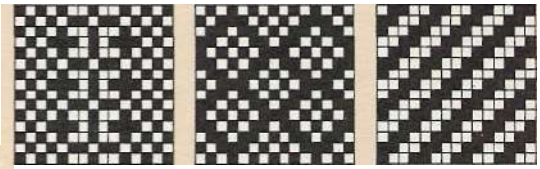
Fasten four sticks in a square frame shape, tie lots of threads over them all parallel with each other (the "warp"), and haul another thread (the "weft") through the threads of the warp with a needle or sharpened stick, going over one and under the next thread of the warp and so on. Then bring the needle back with another-thread on it, going over the ones you went under before. Keep on doing this and in no time you will see your cloth appear.

If you need to make cloth seriously you will soon find yourself inventing ingenious devices to make your task easier and your cloth better. Firstly you will devise a comb (see illustration) to poke between each pair of threads in the warp and beat the threads of the weft together so that the weave is not too loose. You will have invented the ancestor of the "reed".

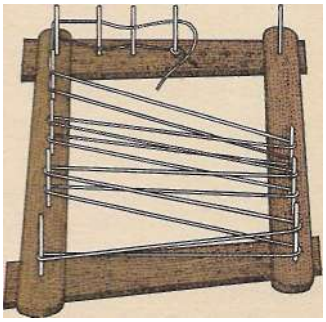
Then you will find that it is tedious to go on threading the weft through with a needle and so you will invent an arrangement of two sets of strings, with loops in their middles, hanging from sticks, and you will thread each thread of the warp through the loop in one of these strings, each alternate thread going to a different set of strings from its neighbours. You will have invented the "heddle". You will lift each set of heddl es alternately, on a frame called the "harness" and it will leave a space called the "shed" between the two lots of threads. You will be able to throw your needle through the shed so that you can criss-cross, or weave, the threads without having to pick through each individual warp thread with your needle.

The square weaver
The simplest loom is the 5-inch (13 cm) "square weaver". It makes 4-inch (10 cm) squares of cloth which can be sewn together as patchwork. String the warp as shown below and weave the weft with a 5-inch (13 cm) needle. Design your own patterns on graph paper (right): on black squares the weft goes under, on white squares it goes over.





Pattern with plain weave **Simple checks** **Diagonal weave**



Warping frame

The four harness table loom
A table loom takes up much less space than a floor loom and does all the same things. It is a little slower because the harnesses are operated with handles instead of pedals.

Key

1 *Harness*	4 *Cloth beam*
2 *Heddles*	5 *Shed*
3 *Reed*	6 *Warp beam*

Next you will find it a nuisance having to attach a new weft thread to your needle each time. So you will carve notches at either end of a stick and wind the thread round it in such a way that the stick can turn and release, or pay out, the yarn.

You will have invented the "stick shuttle" (see illustration). As you get more inventive you may invent the "boat shuttle" (see illustration), into which you can drop a reel of thread, ready wound. You will soon find that, with all your new gadgets, you quickly come to the end of your weaving frame and only have a small piece of cloth, so you will invent a roller at each end of your loom, one for rolling the threads of the warp on, the other for rolling the newly woven cloth on. This time you will have invented the "warp beam", or "warp roller" (see illustration), and the "cloth beam" or "cloth roller" (see illustration).

You will find lifting the alternate harnesses up to form your shed a nuisance, so you will connect the harnesses up to some foot pedals with an elaborate arrangement of strings. You will have invented "treadles", with "marches" or "lamms" above them to transmit the motion to the harnesses.

Then, if your life depends on weaving an awful lot of cloth, you will devise a sling device worked by a handle, which will fling the shuttle backwards and forwards through the warp without your having to touch it. By this time, you will have invented the "flying shuttle" and, believe it or not, you will be getting dangerously near the Industrial Revolution.

Now, when you come to thread your new patent loom up with the warp threads you will find that it is so difficult that you nearly go mad, so you invent a revolving spool, a "warping mill", to wind the threads of the warp around, or else a rack, a warping frame (see illustration), with pegs that serve the same purpose.

Finally you will realize that by having four harnesses instead of two you can greatly vary the pattern formed by the warp, for you can lift different combinations of warp threads. And by having two or more shuttles, with different coloured weft thread in them, you can alter the pattern in other ways.

But to learn to weave you simply must get somebody who knows how to do it to teach you: you cannot learn it out of a book, although a good book on weaving will help you.

FINISHING CLOTH

"Fulling" partially felts cloth and makes it denser and stronger. You do it by beating the cloth in water. Try putting it in the bath and stamping on it hard. If you add "fuller's earth" you will fill up the pores of the cloth.

"Raising" is done by picking the surface of the cloth,' traditionally with "teazles", which are the heads of large thistles. You can often find them growing wild, or you can cultivate them yourself. The effect of raising is to give the cloth a fluffy surface.

Spinning Flax

Flax is the most durable of all the fibres available to us. Man-made fibres haven't been invented long enough yet to know whether they will outlast flax: my guess is they won't, for quite good-looking pieces of flax linen have been dug up in Egyptian pyramids and my corlene rope won't last two years.

The crop is harvested before the seed ripens which is a pity because it means losing the oil the seeds would ultimately produce. It is pulled, not cut, then tied in sheaves and stacked.

Preparing raw flax

Flax must first be "rippled" which means pulling the heads through a row of nails with their heads filed to points. This removes the unripe seeds, which make a marvellous stock-food. Then flax is "retted" which really means rotted. Lay it in stagnant water for two or three weeks, until the fibrous sheaf separates easily from the central woody portion. You can ret in running water but it takes much longer, or you can spread your flax on grass for about six weeks and let the dew do the job. After retting dry the flax carefully.

Then you must "scutch" which is the process of breaking the stems of the flax. Do this by beating the flax on a table with a broad wooden blade, or with a special "scutcher".

"Hackling" is the next step, and consists of dragging the flax across a bed of nails to remove the "tow", which is all the short fibres, and leave the "line" which is the long ones. The tow can be used for caulking deck seams on boats, or stuffing mattresses, or it can be carded and spun to make a rather coarse and heavy yarn. The line can be spun to make linen thread.

To spin (you don't card line) you have to dress the line on a "distaff" which is simply a vertical stick, or small pole, which can be stuck into a'hole in a spinning wheel.

Dressing a distaff

Dressing a flax distaff needs considerable skill. Put an apron on (if you don't happen to be wearing your long bombazine skirt), tie a string round your waist leaving the two ends a few inches long, and sit down. Take a handful of line, such as falls naturally away from the larger bundle, and tie round one end of it carefully with the two ends of the string round your waist and secure with a reef knot. Cut the two loose ends of the string. Lay the flax out full length on your lap with the knotted end towards you. Hold the bundle with your left hand at the end furthest from you, pull a few fibres away from the main bundle with your right hand, and lay them on your right knee. Pull some more fibres away and lay them next to the first few. Go on doing this until you have made a thin, fine fan of flax on your lap. Remember that the end nearest to you is tied fast. Now grab the main bundle in your right hand and reverse the process, laying a second fan from left to right on top of the first fan but be sure to pull from the same part of the main bundle. Go on doing this, alternating hands and directions, until all the flax of the bundle has been laid out, in criss-crossing fan shapes, one on top of the other. As you work try to criss-cross the fibres, otherwise they will not pull out properly when you come to spin.

Dressing line on a distaff
Before it can be spun, line must be dressed on a distaff so that the fibres are separated out. You take a handful of line and tie it at one end with string which you have first wound round your waist. Sit down and carefully spread out a series of fans of fibre on your lap, one on top of the other. Cut the knot, lay the distaff on one edge and roll up the fans. Stand the distaff in its hole •..and tie with ribbon.

Now cut the string, take it away and slightly loosen the top end of the bundle where it was tied. Then lay the distaff on one edge of the fan, with its top where the knotted string was. Wind the fan up on the distaff, winding very tightly at the end nearest you but keeping the flax very loose at the bottom of the distaff. Then put the distaff, with the flax fan round it, upright into its hole and tie the middle of a ribbon tightly round the top. Then criss-cross the two ends of the ribbon downwards round the cone of flax until you reach the bottom. Tie the two ends in a bow.

Spinning flax

Take the yarn that you have already tied into the bobbin of the wheel and catch it in the flax at the bottom end of the distaff. Spin. Have a bowl of water by you and keep wetting your fingers so as to wet the flax. Use your left hand to stop the spin from going up into the distaff, and your right to clear knots and pull out thick threads. If you have done your dressing operation right the line should steadily feed itself through the thumb and finger of your left hand into the spinning thread. Turn your distaff as required, and, when you have cleared the distaff as far as the bow in the ribbon, untie the latter and tie it further up to expose more fibres. Keep doing this until you come to the very top of the distaff and the last few fibres.

Curing & Tanning

Animal skins become hard, like boards, when they have been pulled off the carcass and dried for some time, and then they are good for practically nothing. Early on, mankind found two ways to overcome this disadvantage: mechanical methods which produce rawhide, and chemical methods which produce leather.

To make rawhide you must take hide straight off the animal and begin working it before it gets hard. In this way you will break down the fibres which set to make it hard and it will remain permanently soft. A great deal of working is needed. Eskimo ladies, we are told, do it by chewing the hide. Undoubtedly chewing, and working between the hands, for long enough (probably pretty constantly for about a week) will do the trick.

Curing

I use a method which is part mechanical and part chemical to cure sheep-skins, fox skins, and especially rabbit skins, which come up beautifully. The end product is a cross between rawhide and leather.

Wash your animal skin well in warm water and then rinse it in a weak borax solution. Then soak it in a solution of sulphuric acid made by mixing lib (0.5 kg) ofsaltwithlgallon (4.5 litres) of water and pouring in i ounce (14 g) of concentrated sulphuric acid. Don't throw the water onto the acid or you may lose your eyes and spoil your beauty.

After three days and nights take the skin out and rinse it in water and then in a weak borax solution. If you put it in the washing machine and let it churn about for an hour or two so much the better (after you have washed the acid out of it of course). Next hang it up and let it half dry.

Take it down and rub oil or fat into the flesh side and work it. Scrape it and pull it about. Pulling it with both hands backwards and forwards over the back of a chair is a good method. Leave it hanging over a chair and pull it about every time you go past. Rub more fat in from time to time. It will become quite soft and as good as tanned leather.

Tanning

Tanning with tannin is a purely chemical method, and the end product is leather. It takes half a ton of good oak bark to yield a hundredweight (50.8 kg) of tannin, and this will cure two hundredweight (101 kg) of fresh hides. Wattle, elder, birch, willow, spruce, larch and hemlock also contain tannin. The bark must be milled: that is pounded up small and soaked in water. The hides must be steeped in the resulting solution for, from four months in the case of small hides, to a year in the case of big ones. For really perfect results it is best to soak hides in a weak solution at first, putting them in increasing strengths as the months go by.

A fool-proof method is to soak the hides in a weakish solution for say a month, and then to lay them in a pit or tank with a thick layer of bark between each skin. Then just cover the pile with water. Leave like this for at least six months.

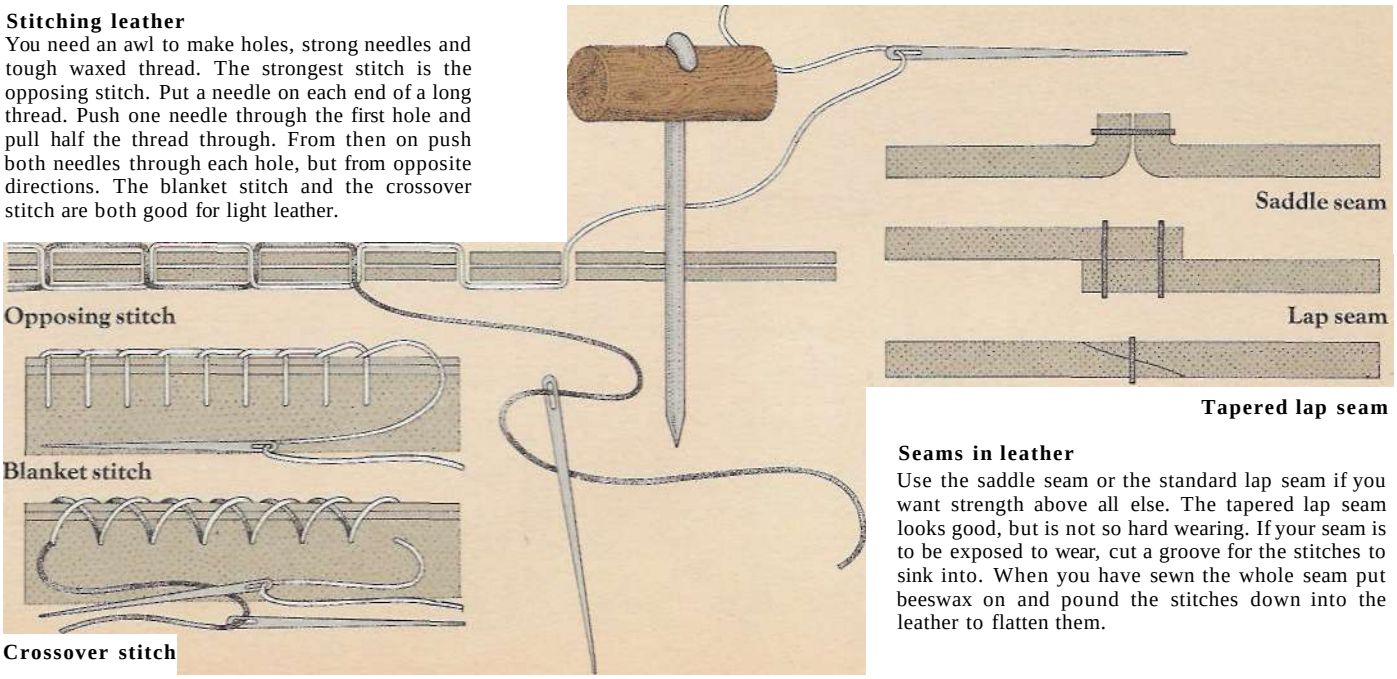
A quick way of tanning a skin is the "bag method". You make a bag out of a skin (or take the skin off whole). Hang the bag up, and fill it with tannin solution. After a week or two the hide should be tanned.

To get the hair off skins, lay them in a paste made of lime and water for three weeks, or in a lime-sulphide paste for a day. De-lime by washing in a weak vinegar solution.

Sewing leather

Sewing leather is as easy as sewing cloth: all you need are a few large needles (sailmaker's needles are fine), an awl for making holes in the leather and some strong waxed thread. Any thread dragged through a lump of beeswax is waxed thread. For stitches see illustrations.

Stitching leather
You need an awl to make holes, strong needles and tough waxed thread. The strongest stitch is the opposing stitch. Put a needle on each end of a long thread. Push one needle through the first hole and pull half the thread through. From then on push both needles through each hole, but from opposite directions. The blanket stitch and the crossover stitch are both good for light leather.



Seams in leather
Use the saddle seam or the standard lap seam if you want strength above all else. The tapered lap seam looks good, but is not so hard wearing. If your seam is to be exposed to wear, cut a groove for the stitches to sink into. When you have sewn the whole seam put beeswax on and pound the stitches down into the leather to flatten them.

Making Bricks & Tiles

If you can help it, don't *buy* clay to make home-made bricks. Instead try the different clays on your land and in your locality. You are quite likely to find one that makes a good brick, and save yourself a lot of money.

When you have found it dig the clay and puddle it. You can do this by laying the clay in a pit, wetting it, and trampling it for an hour or two with your feet. This method works very well, but any way of well working the clay with water will do. Then, when the clay is of the right consistency, solid but malleable, you can make bricks using the method illustrated.

Drying and firing bricks

In countries with a rainless dry season the easiest way to dry bricks is to lay them out in rows on level sand and just leave them. In rainier climes they must be under cover, and are usually piled up about six courses high, criss-cross to leave spaces for the air to circulate.

Bricks must dry for anything from a week to a month according to the climate, and then they must be fired. To fire bricks you must build a clamp, which is basically a rectangular pile, at least the size of a small room, made of bricks criss-crossed so as to leave cavities between them. There are two ways of using the clamp. One is to leave fireplaces sufficiently large to contain fair-sized wood fires at roughly three foot (91cm) intervals on the two long sides of the clamp. Then you plaster the whole clamp with clay except for some small chimneys at the top of the leeward side, and light fires in the fireplaces on the windward side.

If the wind changes block up the fireplaces on the new leeward side, open up the fireplaces on the new windward side, and use them. The fireplaces can be rough arches of already burnt, or half-burnt, bricks, or false arches made by stepping bricks. After firing for a week let the fires go out and allow the clamp to cool. Open up, pull out the well-fired bricks, and keep the half-fired ones to be fired again.

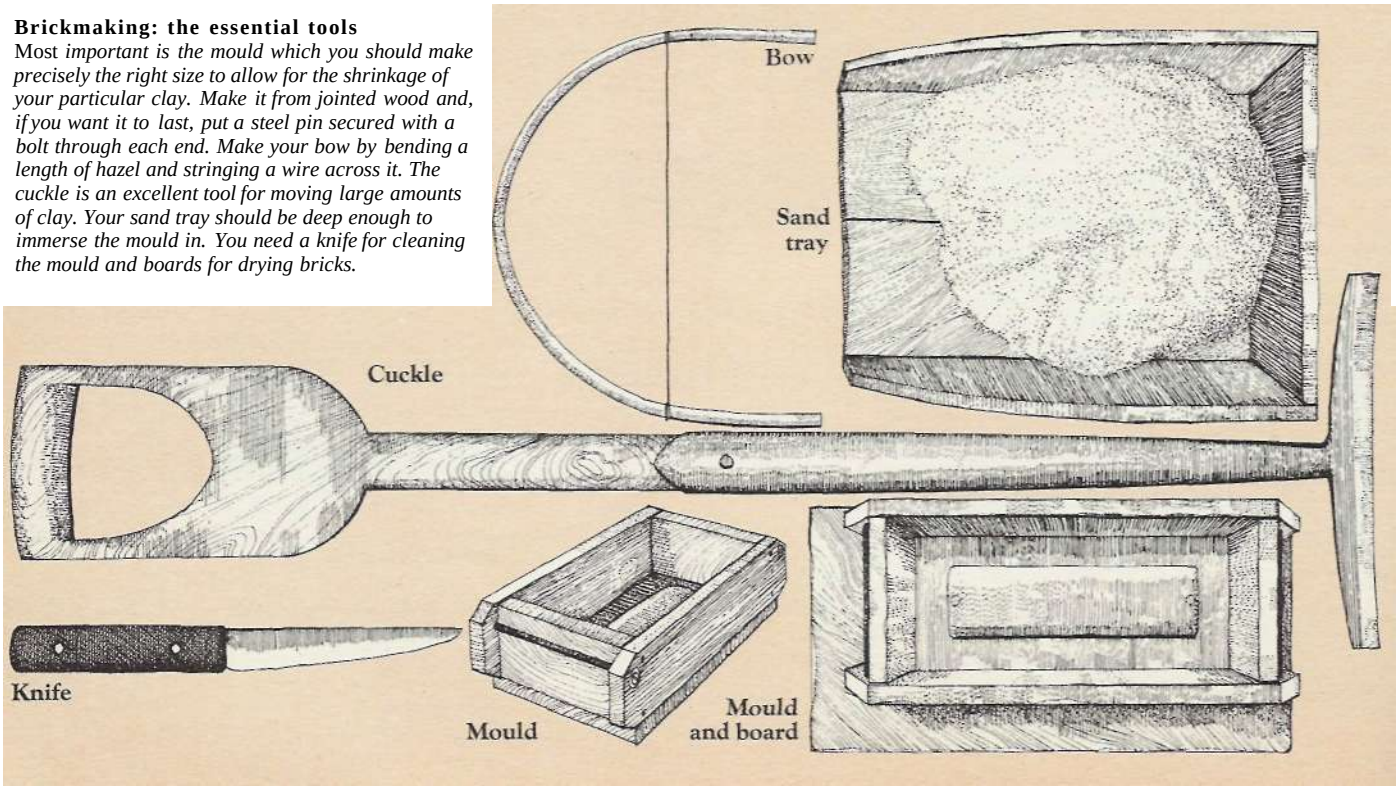
The other method, which I think is easier and better, does not require fireplaces. Instead you fill the gaps between the bricks with charcoal (coal, anthracite or coke will do). The clamp can be smaller, seven feet (2.2 m) high by any width or length you like. Plaster the whole clamp with mud except for a hole at the bottom on the windward side and a hole at the top on the leeward side. Light a small wood fire in the hole on the windward side and go away and forget it. The charcoal will quickly catch. After five or six days, when it has cooled, open the clamp and take your bricks out. You get more completely fired than with the other method.

Tiles

Tiles can be made of the same clay as bricks, but it must be carefully puddled and mixed. They can be flat, or they can be pantiles, which have a convex and concave side, or they can be, as most Mediterranean tiles are, half-cylinders. In Spain and Italy the latter are commonly tapered, because, it is said, in Roman times they were moulded on a man's thigh. These can be, and often are, made by throwing a cylinder on a potter's wheel and splitting it in half before drying and firing. Any other tile must be made in a mould.

Fire tiles in the same clamp as bricks and build it in such a way that the bricks take the weight. Tiles are not strong. And don't forget they must have holes for nailing or pegging.

Brickmaking: the essential tools
Most *important is the mould which you should make precisely the right size to allow for the shrinkage of your particular clay. Make it from jointed wood and, if you want it to last, put a steel pin secured with a bolt through each end. Make your bow by bending a length of hazel and stringing a wire across it. The cuckle is an excellent tool for moving large amounts of clay. Your sand tray should be deep enough to immerse the mould in. You need a knife for cleaning the mould and boards for drying bricks.*



Making bricks in a mould

A lot of time and practice has determined that bricks should measure 9 inches (23 cm) by 4i inches (11 cm) by 2+ inches (5 cm). The length is double the width which is itself double the height. The whole is very convenient for a man's hand. Depending on your clay and how much it shrinks, your mould must be marginally bigger in all its dimensions. So experiment and make a mould to suit your clay.

Clean the inside of your mould by-scraping round with a knife.

Coat the inside of the mould with sand as you would a cake tin with flour, by dipping in sand and shaking.

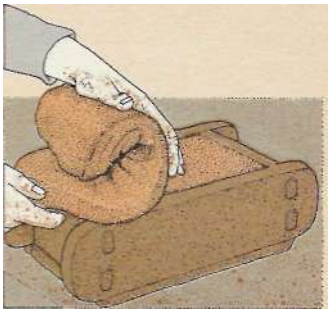
amount of clay and begin to form a "warp", a brick-sized lump.

Work warp into the right shape by rolling on a board. Sand the board and your hands to stop the clay sticking to them.

Gather the clay towards you (as shown above) roll the ends in and drop it with a spinning action so that it thuds on to the bench (as shown below). This is to knock out

Take what you think is the right all the excess air.

Throw die warp hard into the mould so the clay spreads out towards the corners.



Cut off excess clay by running your bow across the top of the mould. Peel off severed clay and return it to your pile.

Dip a length of wood in water and use it to smooth over, or "strike", the top surface. Then sprinkle the top with sand.

Punch down into the clay to push it into the corners and leave a hole in the middle.

Ram more clay into the hole and press down as hard as you can.

Pick up the mould and tap its corners against the bench until you see gaps on all sides of the clay.

Dry on a board for a month.

Working in Stone

Some stone, particularly granite, is awkward for building because it does not split easily in straight lines. Other stone, most sedimentary stone in fact, has been laid down in layers under water and therefore splits easily along horizontal lines, but they are not necessarily horizontal in the ground. The beds may have been tilted. Other stone still, which builders and quarrymen call freestone, splits easily both horizontally and vertically. This is what the builder is looking for and if he can find it he is a very lucky man. Much of the oolitic limestone from Britain's Jurassic sea is like this, and it gave rise to the superb school of vernacular building which stretches from Dorset to Lincolnshire: the huge quarries of Barnackin Northamptonshire having supplied much of the material for the great gothic churches and cathedrals of Eastern England. The Jurassic limestone of the Isle of Portland is a freestone *par excellence* as is Purbeck stone.

Freestone can often be split out with wedges instead of explosives. Holes are drilled in a line along the rock, the wedges are driven in, in sequence further and further until suddenly the rock splits along the line. If you are splitting off a big piece you can use "the plug and feathers". The feathers are two pieces of steel that you put down either side of a hole drilled in the rock. The plug is a wedge that you drive in between them. The advantage is that the feathers exert a more even pressure than the plug alone and so the rock splits evenly when it comes away from the parent rock.

Holes are driven in rock by a rock drill, which is a steel bit with an edge like a chisel sharpened at a very obtuse angle. You either hit the bit in with a hammer, turning it between each blow, or you drive it in with a percussion drill. You can drill the hardest rock in the world like this and in soft rock go quite quickly even with a hand hammer. Put water in the hole for lubrication, and get rid of the ground rock dust by splashing. Wrap a rag round the bit so you don't get splashed in the eye with rock paste.

You can break out, subdivide, and dress to rectangle, any rock, even the roughest and most intractable basalt or granite: the harder the rock the harder the work. You can build with uneven, undressed boulders, and fill the inevitable spaces with - well, just earth, or earth and lime, or in these decadent days concrete made with cement so the rats can't get in. But there will always be places where you need a solid, rectangular stone: doorsteps, lintels, hearth stones and other similar things.

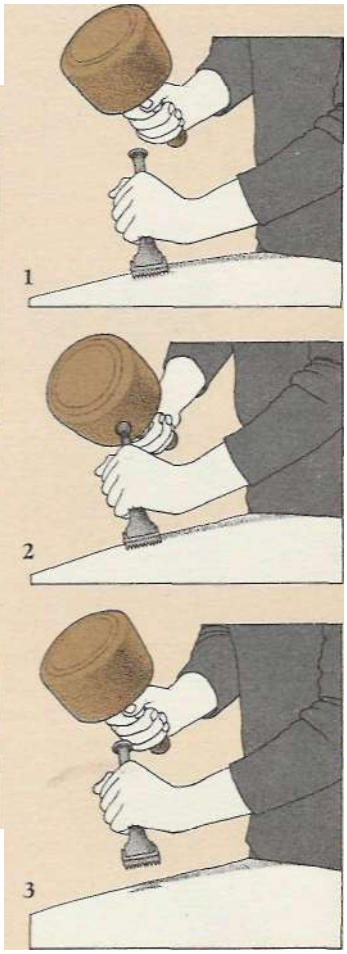
Slate is a metamorphic rock, which means it is a sedimentary rock that has undergone great heat and pressure. The original layerings or laminations have been obliterated and others have developed more or less at right angles to the first. It cleaves easily along these. Generally there are faults or weaknesses in large masses of slate more or less at right angles to the laminations of the slate. These make it possible to break out large blocks without too much blasting. Slate is the very best roofing material, and thicker slabs are ideal for shelves in larders.

Handling the mason's tools
To prepare stone you need nvo types of chisel and hammer. The points and the edging-in chisel are given sharp, direct blows with a steel hammer. Claws and other chisels must be given softer blows so for these you use a wooden mallet.

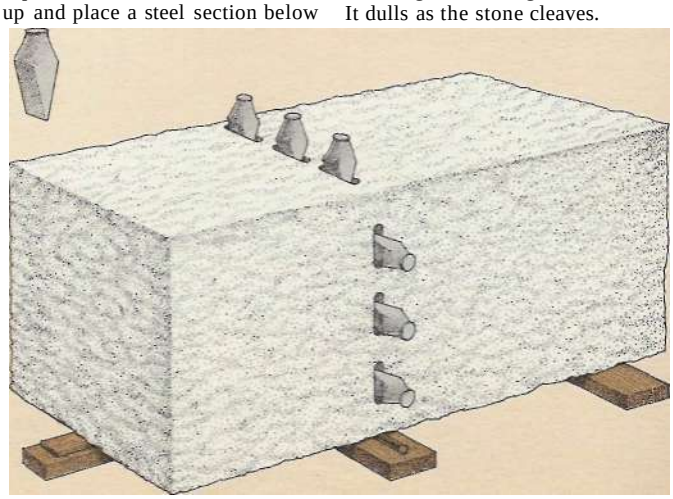
Pointing
Hold the point at an angle and hit sharply with a steel hammer.

Edging-in
To help you control the edging-in chisel, place your thumb across it. Use small hard strokes keeping the chisel in position on the stone.

Finishing a surface
Skim rhythmically with the claw or chisel: lplace tool on surface; 2 hit firmly with mallet; 3 draw back tool and mallet together and repeat.



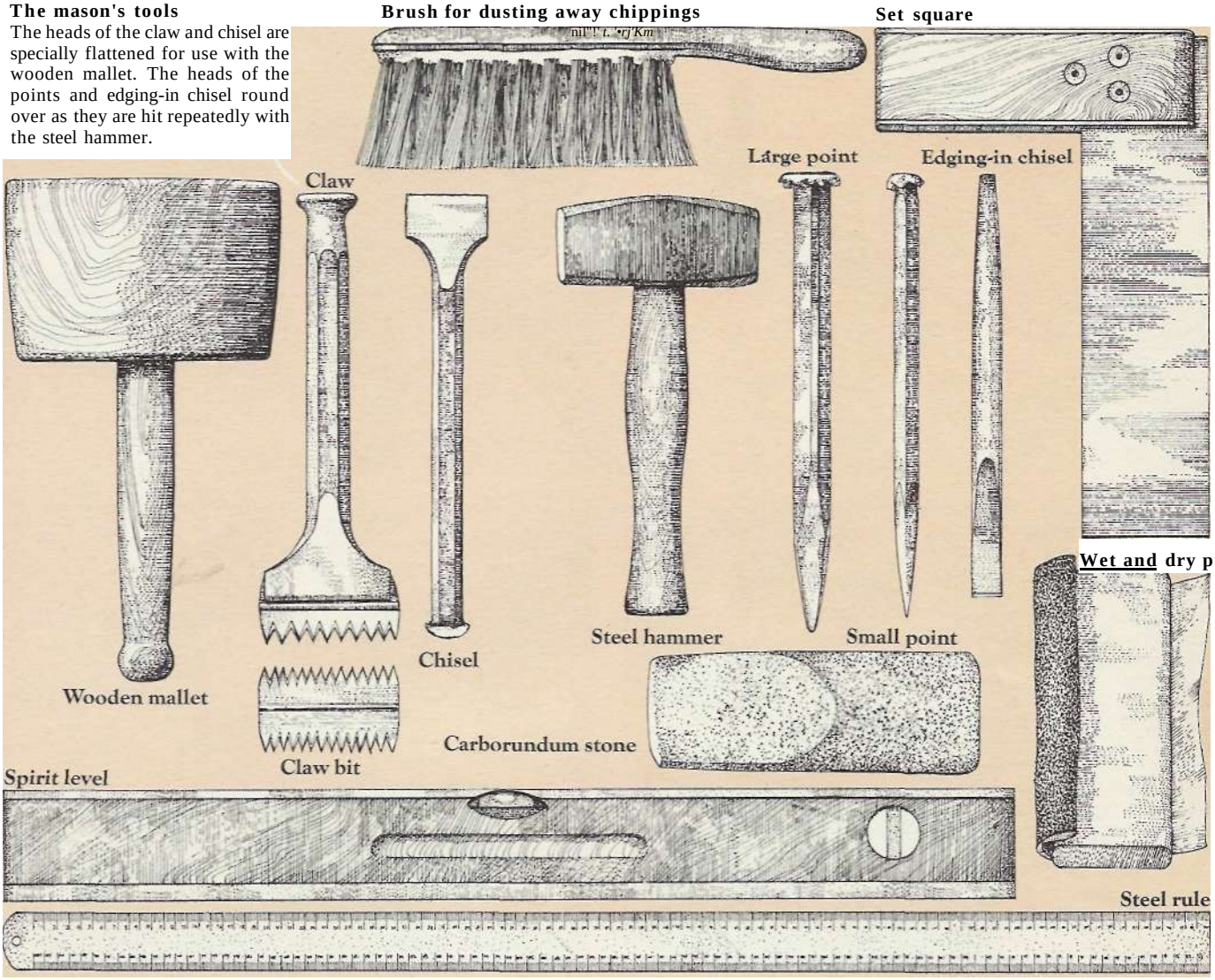
Cleaving a large block of stone
Mark round with a pencil. Drill and chisel deep V-shaped slots in the top and sides. Crowbar the block up and place a steel section below the future breaking point. Put steel wedges in the slots and hit in sequence with a steel hammer, listening to the ring of the stone. It dulls as the stone cleaves.



The mason's tools
The heads of the claw and chisel are specially flattened for use with the wooden mallet. The heads of the points and edging-in chisel round over as they are hit repeatedly with the steel hammer.

Brush for dusting away chippings

Set square



Wet and dry paper

Dressing stone
To *prepare a flat smooth surface from an unprepared stone you must follow five distinct processes.*

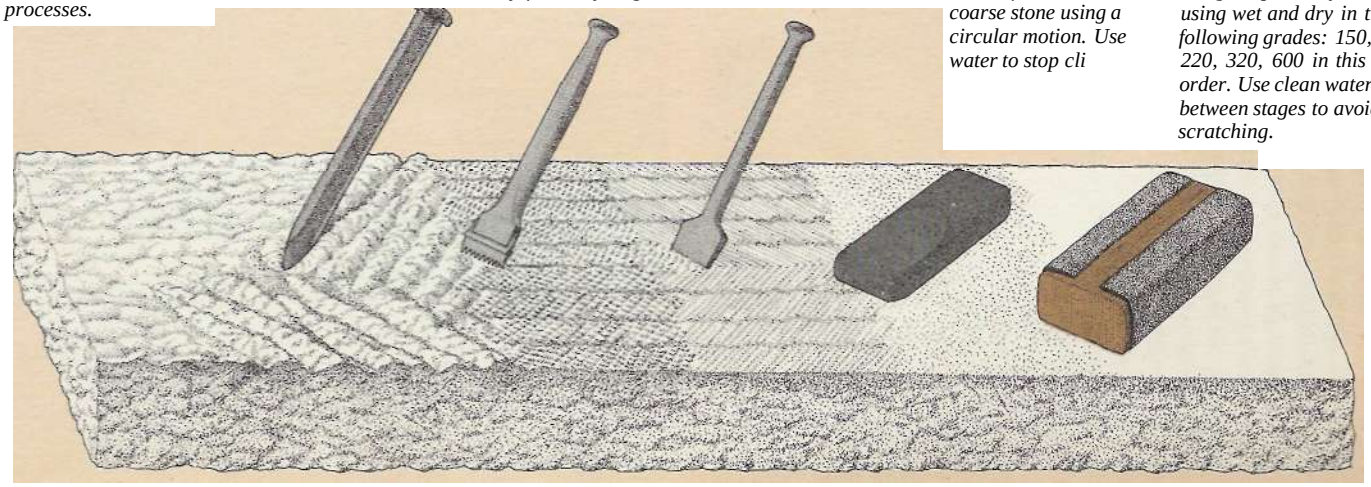
Pointing
Use points to knock off large lumps until only small lumps remain.

Clawing
Claw in neat lines diagonally across the stone, always working away from any edge.

Chiselling
Chisel *as though clawing.. Very little stone need be removed to give a smooth surface.*

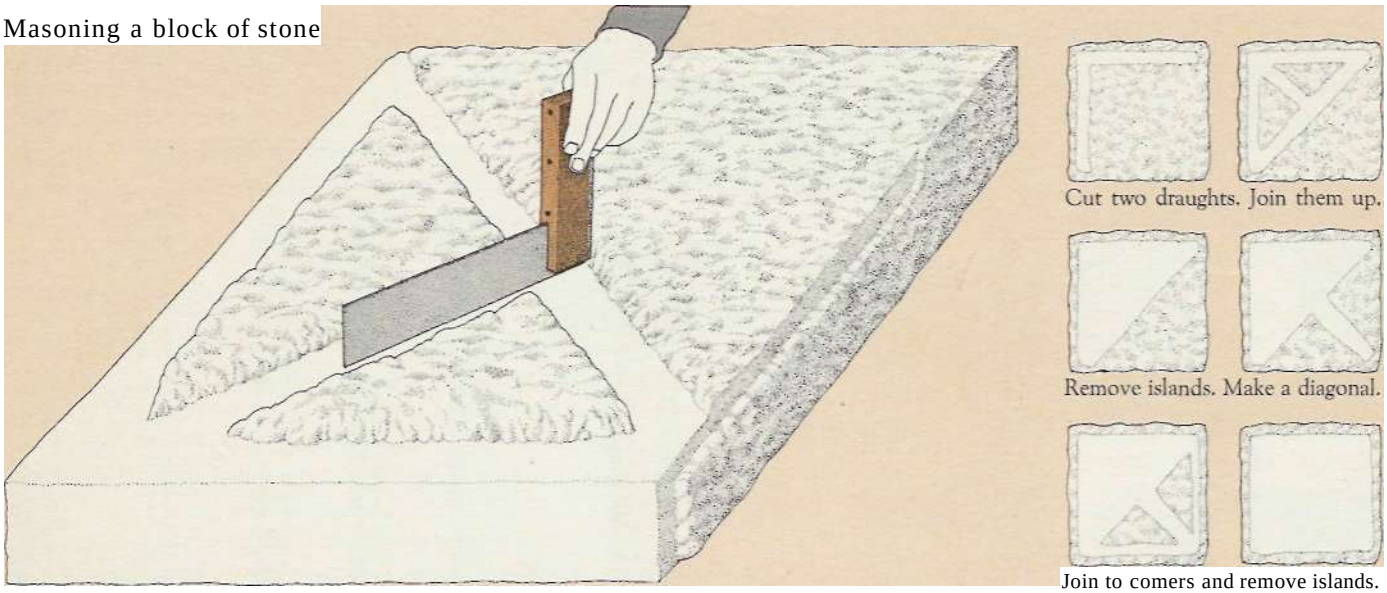
Using carborundum stone
To smooth out chisel marks, wet stone and rub surface with a coarse stone using a circular motion. Use water to stop cli

Wet and dry papering
On hard limestone, marble and granite, you can get a polish by using wet and dry in the following grades: 150, 220, 320, 600 in this order. Use clean water between stages to avoid scratching.



Working in Stone

Masoning a block of stone



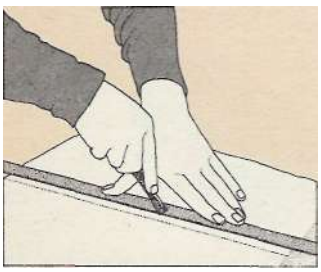
Levelling and edging
To get a smooth surface on an uneven block you must establish "draughts" or "datum lines". Choose a rough plane for your proposed surface by eye. Then mason your first two "draughts", which are simply strips chiselled down to your chosen plane. Make them parallel to two edges of the block, so that they meet in a right angle in the corner. Next join their ends to form a triangle and, if your block is large, cut the triangle in half with a fourth draught. Then with point, claw and chisel remove the "islands" thus formed. Use straight edge and square continually to check levels. Repeat the process on the other half of the surface.

To make a square edge use your edging-in chisel to inscribe a line on your top surface. If there is a border of rough stone round your top surface inscribe the line inside it.

Very carefully edge in along your inscribed line using an edging-in chisel and a steel hammer. Take off a narrow strip all the way along so that you are left with a clean, sharp edge on your block.

Then with point, claw and chisel - and be sure, always, to use them in that order (see previous page, bottom right) - remove the central island. And remember: always work away from the edge.

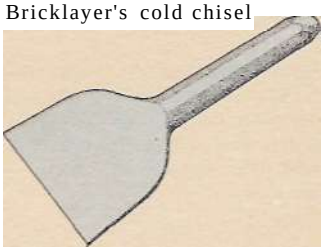
Coping stone
You "cleave" large stones (see previous page). You "cope", or split, smaller ones. You do this either when you want to take a small piece off a stone to make it exactly the right size, or when you want to split a stone into two or more pieces. Simply by coping you can make rough fence posts, corner stones, anchors for fences and so on.

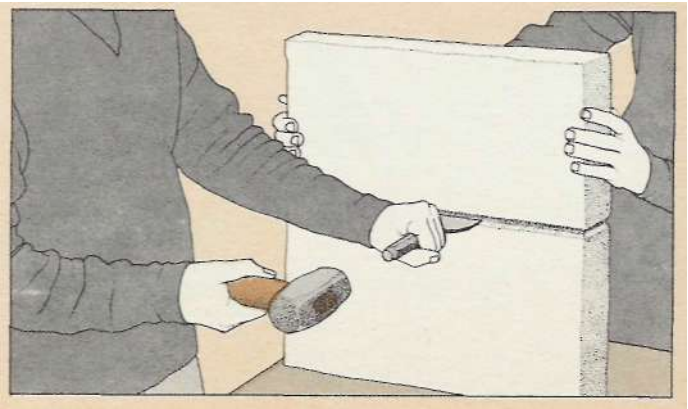


First use your edging-in chisel to inscribe two parallel lines i inch (1 cm) apart on all four sides of the stone, around the proposed breaking point.

Again using your edging-in chisel, inscribe a V-shaped channel about **i** inch (2 cm) deep between the lines on all four sides. A stone will always break at its weakest point, so be sure your stone has no flaw which will prove weaker than your inscribed notch.
Up-end the stone so that the notch is horizontal. Get someone to hold the stone otherwise lean it against your shoulder. Use a large bricklayer's cold chisel and place it in the notch. Hit hard and repeatedly with a steel hammer while moving the chisel round the stone. Carry on until the ring of the stone becomes deadened, or the stone fractures.

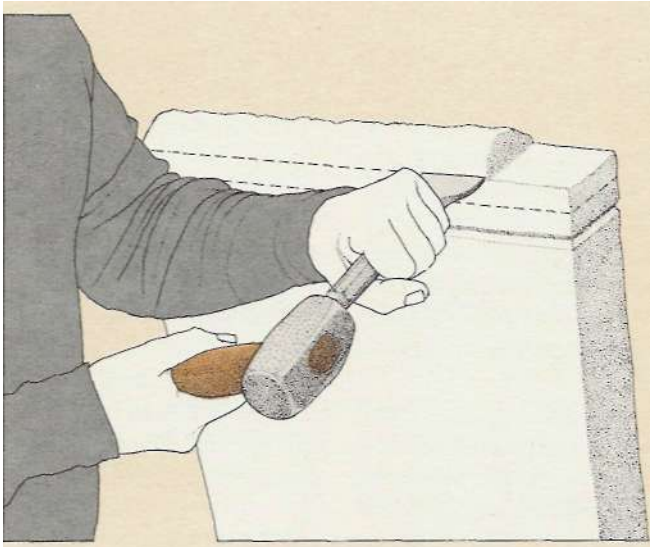
Bricklayer's cold chisel



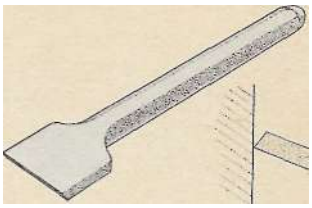


Pitching
Pitching is a method of removing stone from slabs of limestone or sandstone. You can use a special blunt-ended chisel called a pitcher, though in fact any blunt chisel will do the job.

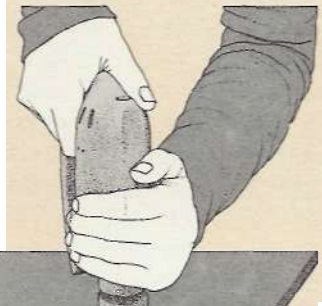
As with coping inscribe two lines 2 inch (1 cm) either side of the proposed break on all four sides, and using your edging-in chisel cut a V-shaped notch approximately 4 inch (2 cm) deep. Support the stone on the ground and lean it against your left shoulder. In this way all the shock waves go through the stone and not into the wall, or table or whatever you normally lean it against. It is vital that you get the chisel at the right angle (illustration right).



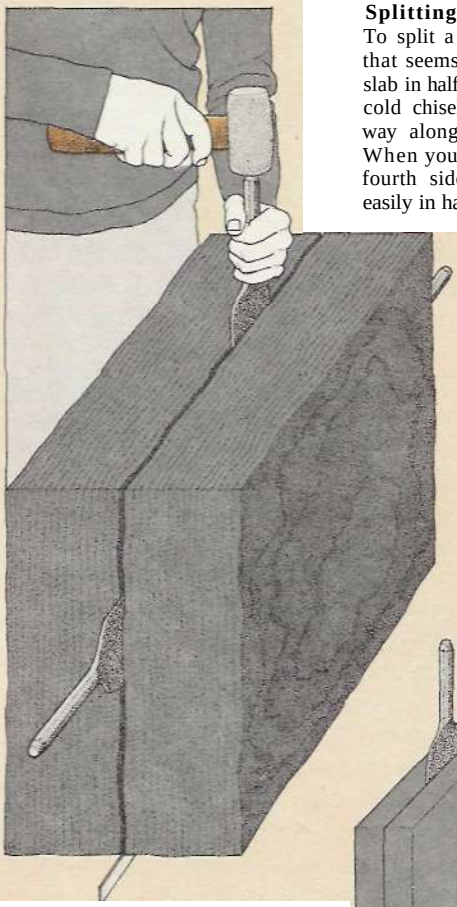
The angle for pitching
The pitcher or chisel should be held against the stone at slightly less than right angles, and given a hard blow. With limestone you will be able to pare off strips about 1 inch (2 cm) thick; with sandstone these will be IT inches (4 cm), or more. Knock off strips as necessary so that your last strip takes you into your notch. Then finish the edge off with ordinary masonry techniques.



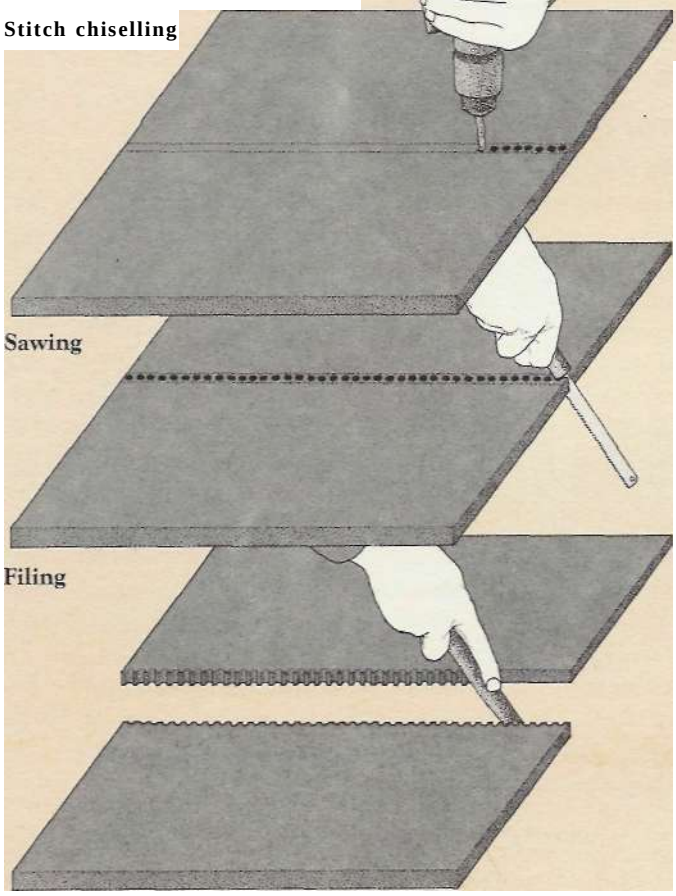
Cutting slate across the grain
Inscribe slate with two lines *i* inch (1 cm) apart. Then "stitch chisel", meaning drill a row of holes like perforations, between the lines with a 4 inch (0.6 cm) tungsten masonry bit. Saw from hole to hole using a medium blade in a hacksaw Smooth off the edges with a dreadnought file.

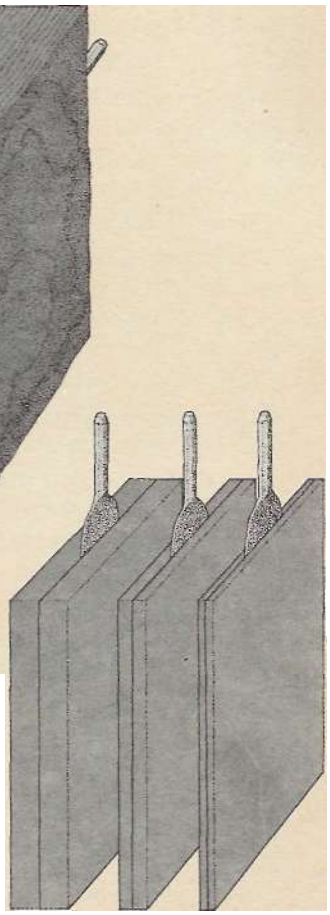


Splitting a large slate slab
To split a large slab find the grain that seems nearest to dividing the slab in half. Give a sharp tap with a cold chisel against that grain half way along each side of the slab. When you have walloped it on the fourth side the slab should split easily in half.



Stitch chiselling





Making roof slates
Take a thick piece of slate between your knees, rest it on a steel profile on the floor, whack it with a cold chisel and watch it split. Put aside one half and split the other. Carry on doing this until you have two slates the right thickness. Then use up your pile of "halves".

Working in Metal

BLACKSMITHING

To learn to be a proper blacksmith should take seven years, but you can learn to bend, shape and weld wrought iron in a few hours. To do it well takes practice though, and you will ruin plenty of iron first. If you are planning to work with iron a lot you need equipment: a forge, an anvil, a bench with at least one good vice on it, and suitable hammers, and tongs. But I have done simple forge work by crawling about on my hands and knees in front of an Aga cooker, poking bits of iron into the firebox, and hammering them on the head of a sledge hammer laid on the ground. A little knowledge may be a dangerous thing but it helps sometimes.

Blacksmiths work with ferrous metal and there are many kinds. Wrought iron is the blacksmith's classic material. It is made from pig-iron (the stuff which runs out of the bottom of blast furnaces) by persistent heating and hammering. It has enormous advantages for blacksmithing: you can shape it, split it, weld it, in fact treat it as if it w7ere clay or plasticine, provided you get it to the right temperature. When cold it is hard (but nothing like as hard as steel), tough and strong, ideal for much agricultural machinery7, chains, shackles, split-links, and the iron components of carts, boats, and buildings. It does not corrode easily.

Malleable iron is only used for a few things, like the fingers of mowing machines, which have to be shaped when cold.

Cast iron is what it says it is: cast in moulds. It is extremely hard, but brittle. It will not stand hammering and it is no good for edge tools as the edge would just crumble off, but it does not corrode easily.

Steel comes in many forms and qualities. "Mild steel" is much used by blacksmiths nowadays because they cannot get wrought iron. It is nothing like so good because it is harder to work and it rusts easily.

For forging wrought iron you need an ordinary blacksmith's forge. This is a fire tray, or hearth, with a pipe, called a tuyere, or tue iron, which blows air into the fire. The tuyere commonly passes through a water bath before it reaches the fire so that it keeps cool enough not to burn away, but sometimes it simply passes through a massive piece of cast iron. Cast iron can stand great heat without melting or burning. The fire can be of coal, coke breeze or charcoal.

If you use coal or coke, clinker will form, and hamper your work. Let the clinker solidify and remove it. Keep the fire as small as possible by wetting the fuel around its centre, and place the work to be heated in the heart of the fire. Draw wet coal in sideways as needed: don't dump "green" coal on top of the fire. The blast can be provided by a bellows worked by hand, by an electric air pump, or by a vacuum cleaner turned the wrong way round so it blows instead of sucking but don't use more blast than you need.

Different jobs require different degrees of heat.

Blood *red* is for making fairly easy bends in mild steel.

Bright red is for making sharper bends in mild steel, or for punching holes and using the hot chisel in mild steel.

Bright *yellow* is the heat for most forging jobs in wrought iron, and for drawing down and upsetting (making thinner and making thicker) both wrought iron and mild steel. It is also right for driving holes in or hot chiselling heavy work (iron or steel more than an inch or 2 cm thick).

S *lippery heat* is just below full welding heat and is used for forging wrought iron and for welding mild steel if it proves difficult to weld it at a higher temperature. It takes speed and skill to weld steel at this heat.

Full welding heat is for welding wrought iron and most kinds of steel. When you reach it white sparks will be flung off the white hot metal making it look like a sparkler.

Snowball heat is the temperature for welding very good quality wrought iron, but it is too high for steel. If you go beyond snowball heat you will burn your metal.

Tempering

Tempering is the process of heating and then cooling metal to give it different degrees of hardness and brittleness. The general rule is that the higher you heat it and the quicker you cool it the harder it will be, but the more brittle.When tempering a steel cutting tool you harden it first, by heating it to somewherebetweenblack and blood red and then plunging it into water. When you have done this you temper it by heating it again, dipping the cutting edge into water so as to cool it, then letting the colours creep down from the rest of it until exactly the right colour reaches the edge and then quenching it again.

Welding

To weld wrought iron or mild steel first get the metal to the right temperature. Then take the first piece.out of the fire, knock the dirt off it and lay it face upwards on the anvil. Whip the other bit out, knock the dirt off it, lay it face downwards on the first bit and hit it in the middle of the weld with a hammer, hard. Keep on walloping it: on the flat if it is flat work, around the beak of the anvil if it is, say, a chain link. But all this has to be done very fast. If the weld hasn't taken put it in the fire again. If the centre has taken but not the outsides, fire again, or "take another heat" as blacksmiths say.

To weld anything harder than wrought iron more modern forms of welding must be used. From the point of view of the self-supporter these are oxy-acetylene and electric arc. Neither of these are as formidable as they sound: every gypsy scrap-dealer uses oxy-acetylene and many a farmer has his own small electric welding set and can use it too. But for either gas or electric welding always wear goggles or a mask. It is possible to blind yourself permanently if you gaze at an arc or a gas flame for more than a second or two, and it is very easy to do severe damage to your eyes.

Oxy-acetylene

Oxy-acetylene tackle consists of two pressure bottles, one of oxygen and the other of acetylene. The latter gas, in the

presence of oxygen, gives off an intensely hot flame, and a flame, furthermore, that acts as a protection against oxidation for the hot metal before it cools. The two gases are brought together by pipes and then burnt at a nozzle. It is the inner flame that you must use - not the outer. The airn of the welder is to melt rod metal and use it to fuse two metal faces together, and also to fill in any spaces between them. Ideally the edges of the steel plates should be bevelled where they meet, and the space left filled with the rod metal.

There are two methods then of oxy-acetylene welding. One is "leftward", or "forward", welding. In this method the rod, which is made of metal of more or less the same type as the work to be welded, is held in the left hand and moved to the left while the torch is held in the right hand and follows the rod. The edges of the pieces of steel are pre-heated. Be careful not to keep the flame in one place too long, or the metal will be distorted. In "rightward", or "backward", welding the torch is moved to the right, and the rod follows it. Less rod metal is used with this method, and it is considered better than leftward welding particularly for joining larger pieces of steel, anything over ***i*** inch (0.6 cm).

Electric arc

Electric arc welding is a simple matter of using a very high voltage to create a spark at the top of a rod. Held between the two surfaces to be welded the spark melts them and also the tip of the rod. The material to be welded must be earthed. You can buy quite cheap and simple a.c. welding sets that work offthe mains, and also portable sets that have a small motor to generate current for them.

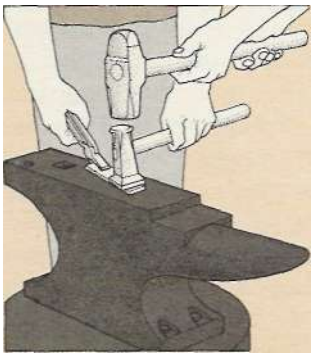
Sharpening tools

The principle of sharpening is that, if it is just a freshening up of the edge you want, you use a "whetstone", but if the tool has begun to lose shape then you put it on the "grindstone" first, grind it down to shape, and then hone it on the whetstone afterwards. Whetstones come either as slipstones, which are shaped to be held in the hand, or as oilstones which are mounted in a wooden box and used on a bench. Both should be oiled with thin oil when used. Grindstones are coarser and are frequently circular and mounted with a handle over a trough of water so that they can be kept wet.

Most sharpening stones that you can buy nowadays are artincal with carborundum embedded in them. They are undoubtedly better than anything except the best Arkansas stone, which is an almost pure quartz, grainless and hard.

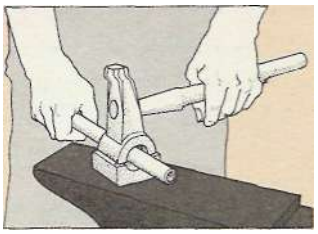
You must grind your cutting tools at the right angle. This will be a compromise between the acute angle needed for easy cutting and the obtuser angle needed for strength. Thus a chisel to be whanged with a mallet must have a more obtuse edge than one to be used for delicate carving in the hand. You can buy a guide, or jig, to help set the angle.

Using your anvil
If you want to work seriously with metal you need an anvil. Most of your work will be done on the anvil's "face", the flat section at the top. You should use the "table", the

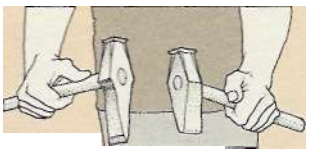


chopping, because its surface is softer and will not suffer damage. The "beak", the long pointed bit, is for wotking anything that needs a curved edge. To flatten metal, or remove marks made by a hammer or other tool, you should hold hot metal on the face of your anvil with tongs, hold a flatter over it and whack it with a sledgehammer until you achieve the desired effect.

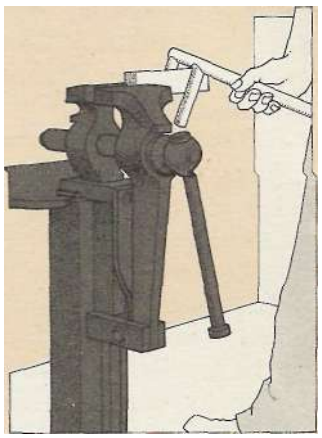
The hammer and pritehell
To make holes in any metal, and particularly in horseshoes, you should use a pritehell, which is a square-handled punch. Again use this on your anvil's face and hit it with a heavy blacksmith's Warrington pattern hammer (above), or with a ball pane hammer. If you need to make a large hole, do it over the round hole in the "tail wedge" of your anvil to avoid damaging the table underneath.
Some ofyourmost important tools will be your pincers. You need them for bending metal, pulling out nails and just holding things. The longer the handles, and the smaller the head, the greater the leverage.



The top and bottom swage
The swages are for shaping circular rods from hot iron, or for bending rods or pipes. The bottom swage slots into the square "hardie hole" in the anvil's tail wedge.



Hot sett and cold sett
The hot sett (left), with an edge sharpened to about 35 degrees, cuts hot metal. Place it on the metal and wallop with a sledgehammer. The cold sett (right), whose edge is about 60 degrees, will cut light iron or mild steel cold.



Leg vice and scroll wrench
The best vice for a smithy is a leg vice. It will stand up to heavy hammering because it is made of wrought iron, instead of the more normal cast iron, and some of the load is transferred through the leg to the floor. The front arm is held on a hinge and is opened by a spring. The leg vice is excellent for bending metal, because the leg will stand up to heavy levering. A scroll wrench has rounded jaws for pulling strip metal, especially wrought iron, into curves. Quite intricate designs can be made with it.

Building & Thatching

BUILDING

The cheapest way to construct a solid building is to use mud and thatch, and don't be put off by the way it sounds. Mud is rot-proof and fire-proof, and it keeps sound out and heat in pretty efficiently. Mud for building should be fairly free of organic matter, so dig it from well below the surface: from two to three feet (61-91 cm) is best. Save your humus-laden topsoil for growing things.

Your building should be simple, with large areas of unbroken wall, few and small windows, all loads well spread on timber plates, and no outward thrusting roofs.

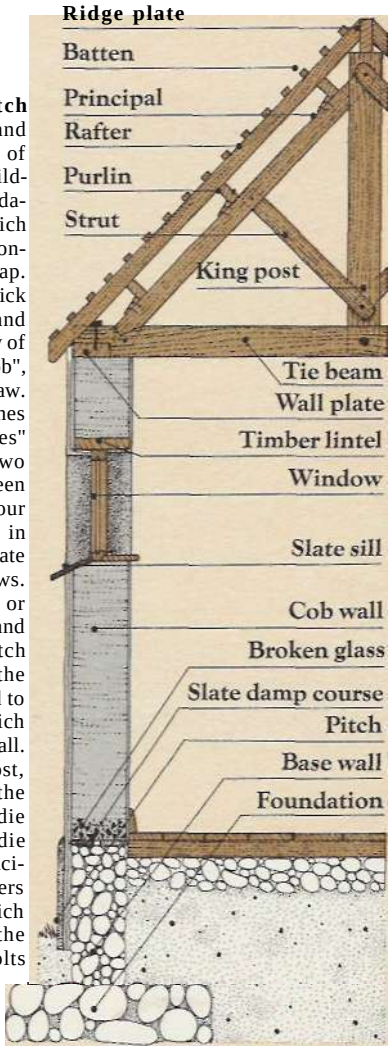
An easy but effective method of building with mud is cob building. Cob is simply clayey or chalky mud, mixed with straw and laid in one foot (30cm) layers with a shovel and trowel. Each layer is laid at a different angle from the one below it so that there is a certain amount of binding. The wall should be at least 18 inches (46cm) thick, 24 inches (61cm) if your building is to be more than one storey. You cannot build very fast with this method, for each course has to dry out to some extent before the next one is laid on it. The resulting wall is only weatherproof if you keep "its head and its feet" dry. In other words give your building a good overhanging roof and solid foundations using concrete if possible. And if you can, build a base wall of stone or brick, preferably with a damp proof course (slate is impervious to water and makes a good one), on top of your foundations up to ground level. The outside too, should be protected by cement rendering if possible: otherwise with a lime and sand mortar rendering, or at least a thick whitewash. Broken glass is sometimes embedded in the base of a cob wall to deter rats. Window sills must be protected by slate or other stone or concrete.

Rammed earth, or adobe, blocks are an improvement on cob because shrinkage takes place in the brick before the wall is built, you can make smoother surfaces and you can easily build cavity walls. The blocks are made by ramming a mud and straw mixture into wooden moulds. Dry them in the shade, so that they don't dry too quickly and crack The earth should be, like brick earth, of just the right consistency for the job: that is a benign mixture of clay and sand. The higher the clay content the more straw you should add, up to 20 percent straw by volume.

African hut

To make an African hut dig a circular trench, stand straight wall-high poles in it so that they touch one another and stamp them in leaving a space for the door. You can have one section shorter than the others if you want a window. Then on the ground make a conical roof of what is basically giant thatched basket-work. Get some friends to help you lift the roof and lash it on to the circular wall. Plaster the pole wall with mud, preferably mixed with cow dung. If you rub the earth floor with cow dung and sweep it every day it will become as hard and clean as concrete.

Building with mud and thatch
You can build yourself a warm and solid house or barn mainly out of mud and straw. To make your building last you should build foundations. "Cyclopean concrete", which is large stones embedded in concrete, is effective and fairly cheap. On top of this build a stone or brick wall to just above ground level and top it with a damp course, ideally of slate. Walls can be built of "cob", which is mud mixed widi straw. Make your wall at least 18 inches (45 cm) thick, and lay in "courses" one foot (30 cm) deep. Allow two or three weeks drying between courses. To keep rats out of your house you can set broken glass in the wall at ground level. Use slate sills and timber lintels for windows. Render die outside with cement or lime "rough cast", a lime and sand mixture. Apply two coats of pitch at the base to keep it dry. Top the wall with a timber wall plate and to this attach your tie beams, which run right across from wall to wall. Each beam carries a king post, which supports the ridge and the struts which in turn support die principals. The purlins run die length of the building from principal to principal and carry the ratters to which you nail the battens which will key your thatch. Secure the joints with suitable strong bolts and straps.

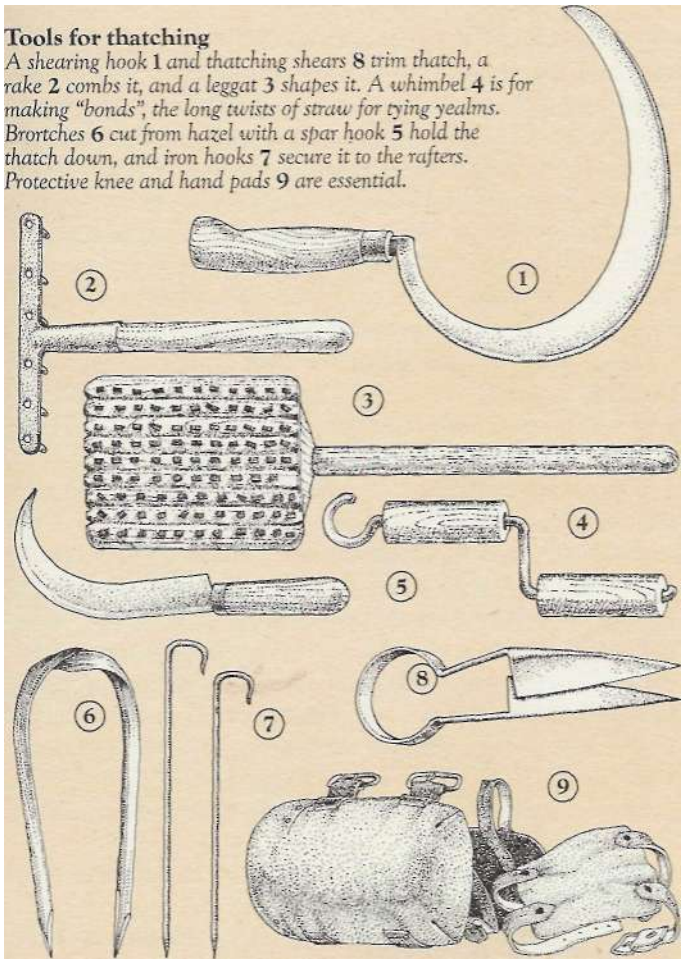


THATCHING

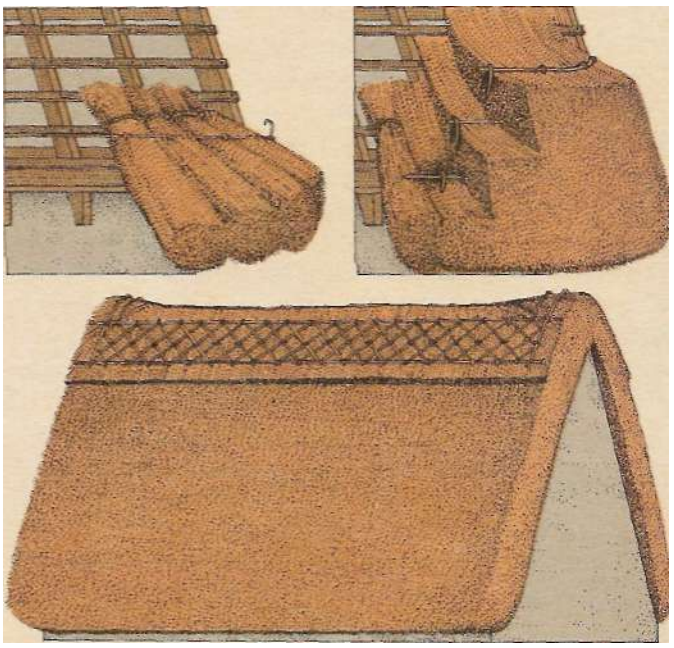
Phragmites communis, commonly called "Norfolk reed", is the best thatching material there is. A good roof of reed will last seventy years. A roof of "wheat reed" which is simply wheat straw that has not been broken in the threshing may well survive twenty or thirty years. Wheat straw that has b een threshed and stored in a stack can be used for thatching ricks. To get it ready for thatching you "pull" it by hauling some down to the foot of the stack and throwing several buckets of water on it. Then you pull the wet straw in handfuls from the bottom of the heap. Because the straw is wet the handfuls come out straight with the straws all parallel to each other. Lay the straws in neat piles about six inches (15 cm) in diameter. Tie these with twine or straw rope to make your "yealms". The secret of thatching is that each layer should cover the fastenings that tie down the layer below it, so that no fastenings are visible or exposed to the weather. In practice this means that each layer must cover just over three quarters of the layer below it.

Ricks

Rick thatching is fairly easy and uses comparatively little material. You only need a coat of thatch two or three inches



Thatching a roof
Always begin thatching at the eaves on the right hand side. Secure a short row of "yealms", straw bundles, to the roof with "sways", lengths of bendy hazel held to the rafters with iron hooks. Gather the straw together at the upper end of each yealm by pushing in a "brortch". Keep laying rows of yealms, each overlapping the one below, until you reach the ridge. Then move your ladder to the left and thatch another stretch of roof. Carry on like this until you have reached the ridge on both sides of the roof.



To thatch the ridge lay arowof yealms horizontally along it, and cover them with more yealms folded over the ridge and secured on both sides with sways, brortches and hooks. You can use hazel sways to decorate the roof.

(5-8 cm) thick to shed the rain. Lay the straw or reed, ears upwards, in a row along the eaves of the rick. Hold this first row down with one or two lengths of string and hold the string itself down with "brortches". These are two foot (61 cm) lengths of hazel or willow (I prefer hazel), twisted in the middle, bent into a hairpin shape and sharpened at both ends. Ram your brortches down over the string and bang them into the rick with a mallet, so that they hold the string down tight. Space the brortches at the intervals that common sense suggests (every thatcher has his own ideas). Now lay your next layer of straw so that it overlaps a little more than three quarters of the first layer and covers the strings. Peg this down too with string and brortches. Go on, layer after layer, until you get to the top.

You then have the problem of ridging. Make bundles of straw, about big enough to clasp in both hands, tie them tightly with string and lay them along the ridge of the rick. Then lay long straw over these bundles so that it overlaps the top layer of thatch on both sides of the ridge. String and brortch this down on both sides. Or, better still, use hazel or willow rods instead of string here, and brortch them down. Make a pretty criss-cross pattern if you like. Of course with a round rick you don't have a ridge, but a point, and this makes the job much easier. It is a very simple matter to fashion a conical cap of straw and fasten it down with brortches.

Buildings

You can thatch a building with a comparatively thin layer of straw laid on, much as in rick thatching, pretty well parallel with the slope of the roof. This makes a watertight thatch provided the pitch is steep enough but in a wet climate it is unlikely to last more than two years.

Thick thatching is quite different (see illustration). The bundles of reed arelaid onmuch nearer the horizontal, so that the coat of thatch is nearly, but not quite, as thick as the reed is long. Such a roof takes an enormous quantity of material, a lot of time, the right equipment and a great deal of skill. But if made of true reed, it will last a lifetime. It is completely noise-proof, very warm in winter and cool in summer: in fact it is, quite simply, the best insulation in the world.

If you are building a mudhouse or a barn, you can use rough, unsawn and unriven poles for the framework of the roof, and they don't have to be seasoned. Thatch is flexible and if the timber moves it does not matter. The timber will season naturally in the well-ventilated conditions of the thatched roof, and generally last at least as long as the thatch.

Working in Wood

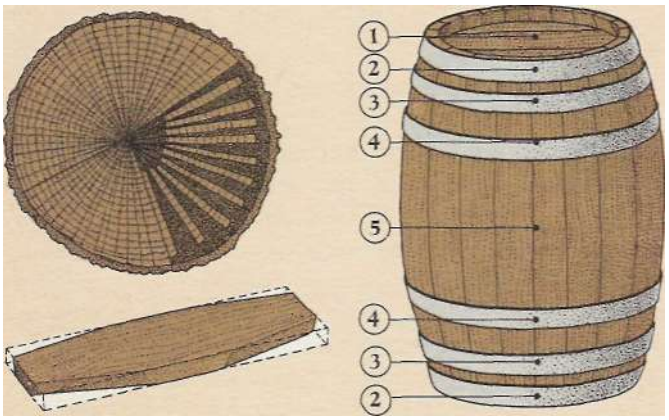
Making a barrel

We take barrels for granted, and assume there will always be enough of them about for our purposes. Sadly there will not be, because there are practically no coopers left in the Western World and all the old sources of barrels are drying up. And for the self-supporter there is just nothing to take their place. We need them for beer, wine, salt fish, pickled meat, beans and other dried seeds: in fact for innumerable purposes. In my experience you just cannot have enough.

You cut an oak tree down, cut it into logs and rive (see p. 35) the logs into "billets" or rough planks (see illustration). Pile these up in stacks in the wood and cover them withleaves so that they dry slowly. You then cut the billets into "staves" with your axe and from these you make the barrel. After rough trimming with the axe you shape the staves with a drawknife and a "jigger" which hollows them out inside. The edges of the staves must be "shot" at exactly the right angle with a plane so that when they are pulled together they will fit perfectly. If you are making a "stout cask" (a heavy one) you must boil the staves: for a "slight cask" they must be soaked.

The two "heads", the ends of the barrel, are sawn out in three or four pieces with a bow saw and the pieces are dowelled together. A groove is cut right round the inside of the staves for each head to fit into. Rushes called "flags" are put in these grooves to make the joints watertight. The hoops can be iron, or wood. Yew wood is best for this. If you use wood you should put three rivetted hoops at each station, instead of a single iron one. You can make iron hoops by rivetting Moth inch (2 mm) mild steel in a circle, and taper them by hammering on one edge only with a hammer on an anvil.

Putting the barrel together is called "raising it up". The staves are balanced together with their top ends touching and their bottoms splayed out. The top head is put in and the "raising-up hoop", one of the "chime" hoops (see illustration), banged on to hold them. The "ash runner" (a piece of round ash, steamed and bent into a circle with its ends rivetted together), is put on over this and banged down. The whole barrel is then put over a "cresset", which is an iron basket containing a fire. The fire softens the staves and makes it possible to bend them. Bang down the ash runner so that it forces the staves together. When you get it right down bang down a second runner half an inch (1.2 mm) smaller in diameter than the first. Bang down the quarter and "booge" runners (see illustration) for that end of the barrel. When the staves are as close as you can get them in this way turn the barrel over, off the fire, work the other chime hoop over the bottom end, and bang that down. In this way the staves are brought together. Before they come right together put in the other head. Then bang on the other quarter and booge runners.



The parts of a barrel
Barrels are made from billets split from a tree trunk (top left), preferably an oak. Staves (bottom left) are shaped from billets with an axe and draw-knife and then hollowed with a jigger. The top and bottom, the heads 1, of the barrel are made from sawn billets held together with dowels. The barrel is secured with three pairs of hoops, the chimes 2, the quarters 3, and the booges 4- The wide point of the barrel is the pitch **5.**

When a new barrel is complete it must be pickled by being filled with concentrated brine and sodium carbonate. This neutralizes the tannic acid in the oak. Pickle it for three days, wash it out well and fill it with clear water for a day, wash it out again and fill it. Use the same process if you have a "sour cask" (one in which beer or wine has turned to vinegar). If you get a "stinker" (an old barrel that stinks) you can cure it by pickling as above, or by burning an ounce or two of sulphur in it or, if it is really bad, by taking a head out and shaving **i** inch (3 mm) off the inside. To take a head out bang hard on the chime hoop of the other end. Then knock the hoops off the end where you want to free the head.

Obviously making a barrel is a fantastically complicated job and unless you are prepared to take weeks over it and make several false starts you are well advised to watch, or get help from, a professional cooper.

Making a ladder

Uprights for ladders should be sawn out of a long, straight, clean-grained log ideally of ash, Scots pine, spruce or thuya. Rip the log in half with a rip-saw and rough saw the planks for the uprights from each half of the log. The uprights for any ladder should be from the same piece of wood split in half. They are, as it were, mirror-images of each other.

The rungs should be oak or hickory They are riven, or split out with wedges, then placed on the spoke-shave horse and spoke-shaved down. Professional ladder-makers use a "stave block", which is like a large pencil sharpener, to shape the ends of the rungs but you can do it with a spoke-shave or even a draw-knife.

Traditionally the uprights are marked by flipping a taut string dipped in wax and lamp-black against them. This is quicker and better than trying to mark a pencil line on them with a ruler. Then rough-trim them with an axe or an adze and then plane. They should be rounded on one side and flat on the other. All ladders except thatchers' ladders are rounded only on the outside. Thatchers like their ladders rounded on the inside so that there are no sharp corners to annoy their knees.

Drill the holes for the rungs nine inches (23 cm) apart,

and drill them right through the upright. Lay one upright down, clamp it in place and drive rungs into every hole. They should stick out the other side. Lay the upright with rungs attached on its side and fit the other upright to it. Bang the two uprights tight on to the rungs, and then put an iron rod through at each end to hold the ladder together. Saw the ends of the rungs off where they stick out.

Making a lathe

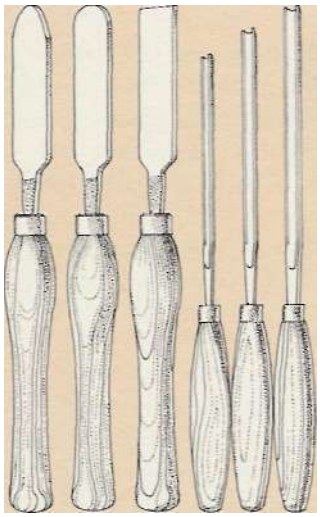
A simple wooden foot-powered lathe can be made very easily, and although it works slowly it works as well as any other lathe for wood-turning. The "chair-bodgers" of the English woods worked them until very recent years.

Plant two wooden uprights in the ground, or if you live indoors attach them to the floor, about 3 feet (91 cm) apart. Six inch by four inch (15 cm x"10 cm) posts would be ideal. Nail a block of wood to each post, just at hand height and on a level with each other. Drill a hole in each block big enough to take the ends of the "stock," which is the piece of wood to be turned. (You will have to whittle down the ends of this with a knife to make it small enough to fit the holes). Arrange a simple foot-pedal below. This can just be a piece of wood, held at one end by a pin which is supported on two short stakes.

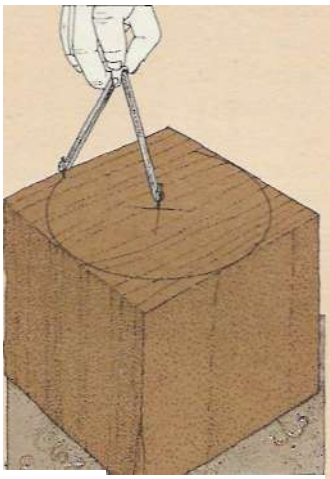
Arrange, a bendy horizontal pole of ash or other springy wood above the contraption, so that one end sticks out and can be bent up and down. You can use trees, stakes, or, if you are indoors, the rafters to support this pole. Tie a piece of rope, or rawhide, to the foot pedal, take one turn with it round the stock, tie the other end to the end of the whippy pole. Nail another piece of wood across the posts next to your stock to rest your chisel on, and you have a lathe. Depress the pedal and the stock turns one way, release it and the pole above your head straightens and turns it the other way. You only make your cut when it's turning the right way, of course.

Wood turning is skilled work (see illustrations). If you can, go and watch a skilled craftsman at work.

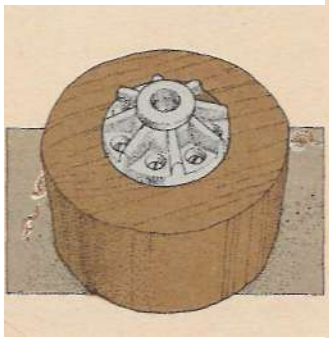
Turning a bowl on a lathe
These pictures show a bowl being turned on a simple lathe powered by electricity, but you can turn a bowl in the same way on a treadle lathe, or, rather laboriously, on a chair bodger's pole lathe (see above). If you use the latter you



must replace the stock with a rod fixed to a chuck to which the bowl can be attached. For the heavy-work of removing unwanted wood you need three gouges of differing thicknesses (above right), and for the more delicate shaping and smoothing you need scrapers (above left). Never press hard with any tool, particularly a gouge. If they stick you are in trouble. Keep your tools sharp. Factory-built lathes often have a revolving sharpener built on. Otherwise use an oilstone.



Take a block of wood, mark the centre with a cross and draw a circle with a compass slightly larger, say + inch (6 mm), than the intended diameter of your bowl.



Cut roughly round your circle with a saw. Then establish the mid point for your chuck and screw it on evenly. Use short strong screws, because the base of your bowl must needs be thicker than your screws are long. Your work will be ruined if you come down to a screw when shaping the inside.

Round oft edges with a large gouge.

Shape the outside with a smaller gouge. Use the handrest and keep the gouge moving slowly along it.

Smooth off the outside with your scrapers. Then, keeping the bowl on the lathe, rub with sandpaper, which will give the wood a gloriously smooth finish.

Move the handrest so that you can work on the inside. The unbreakable rule for hollowing wood on a lathe is: begin at the outside and work towards the centre. Start with a gouge, then scrape with round-ended scrapers only, and finally sandpaper it smooth. Remove the chuck from the lathe, unscrew it and fill the holes with plastic wood. Polish the whole thing with beeswax and glue felt on the bottom.

Wells, Ponds & Fish Farming

SINKING A WELL

The easiest way of finding water is to drill a hole with a drilling machine, and if you can get hold of one it is well worth using it. But they are expensive, even to hire, and all they really save is time and energy. If you have got some of each to spare you can dig your well yourself by hand.

In earth or soft rock

Sinking a well in earth or soft rock is very easy if laborious. You just dig in, keeping the diameter as small as you can, just leaving yourself room to use a shovel. As you get deeper, you send the spoil (dug earth) up to the surface in a bucket hauled up by a friend with a windlass, and you go up the same way. It is almost always necessary[7] to line the well as you dig to stop the earth from falling in. The easiest way to do this is with concrete rings sent down from the top. As you dig down you dig under the lowest concrete ring which causes it to fall and all the other concrete rings on top fall with it. From time to time you put another concrete ring on top. Where timber is cheap you can use a timber lining on the same principle.

In soft sand

Sinking a well in soft sand is very difficult, and can only be done using the process of "spiling", which is hammering sharpened planks down below you where you are working so as to form a lining which is already there when you dig all the sand out.

In rock

Sinking a well through rock is harder in that you have to blast it, but easier in that you probably don't have to line it. In days gone by the rock was shattered by building a fire on it and then quenching this with water. The rapid contraction shattered the surface of the rock. Nowadays we are more likely to use explosives.

Gunpowder will do, although you need a lot and it is a slow job. Gelignite, or any of the modern detonating explosives, are much better. To use either you have to drill holes in the rock. If you haven't got a compressor and pneumatic rock drill you can do this by hand with a hand drill, which is a hardened steel bit, like a long cold chisel. Hold it in your left hand, wallop it with a four pound hammer, and turn it in the hole after every wallop. If you don't turn it, it will jam. To get the powdered rock out of the hole you must pour water down, which turns the powder into a paste which spurts out with every blow. To stop it getting in your face wrap a cloth round the bit at the collar of the hole.

Drill four holes near the middle of your well floor to form a pyramid pointing down into the rock. These are your "cut holes". Drill, say, eight more holes around these, this time vertically. These are your "easers". Then drill holes all round the edge of your face. These are your "slipers".

Fill all the holes with "powder", which is the generic term miners and well-sinkers use for all explosives, light your fuses, and hope that your friend up top who winds you up with the windlass is a real friend and doesn't decide to go away and have a smoke instead.

Gunpowder is set off simply by lighting it, and if you can't buy a safety fuse, which does this job, you can make one yourself by sticking hollow goose feathers into each other, end to end, to form tubes and filling these tubes with gunpowder. In fact any kind of plastic or rubber tube filled with powder will do just as well. Poke one end of the fuse into the gunpowder in the hole and light the other end. Presumably common sense will have told you to test and time a fewfuses before you trust your life to them. And remember with gunpowder any spark will light it. A spark struck from a rock with a steel is all it needs, and, if it is in a confined space, it will explode.

Gelignite, plastic H.E. (high explosive), and all the modern detonants are quite different. If you light them they will only burn and make a stink. They have to be detonated, and to do this you need a cap full of fulminite of mercury, called a detonator. Take a measured length of safety fuse, cut one end off straight and clean, put a detonator over this, and crimp the detonator's metal case so it doesn't come off (not with your teeth, with pliers). Then cut the other end off at an angle to expose the powder inside the safety fuse, lay a match head on this powder and strike the match with the box. Light all the fuses thus and shout to your friend to start winding up the bucket. The cut holes must have the shortest fuses because they go off first, then the easers and then the slipers which go off last.

Whichever way you sink a well, when you come to water go on sinking. Even if you have to spend half of each day winding up water in the bucket, go on sinking until the water beats you, because if you don't, when there is a drought and the water table sinks, your well will go dry. When you have got your water the best thing you can do is install a steel pumping windmill (seep. 216)..Itwill pump water from a thousand feet (304 m) and go on doing it for years, free, and will need very little attention.

MAKING A POND

If you are going to keep ducks (see p. 128), or if you want to try the highly rewarding process of fish farming you will need a pond. You can just dig a hole, but if the bottom or sides are porous it will probably be necessary to puddle clay and tamp it in so as to form an impervious sheet, or else bury a large sheet of thick plastic.

Simply piling earth up in a bank to form a dam to impound water seldom works. The fill material may be too porous and "piping" will occur, meaning water will seep through and erode a hole. Or the material may contain too much clay and there will be great drying, shrinkage and cracking. If the soil is just right, and well compacted, and an adequate spillway to take off the surplus caused by rainwater is constructed, a simple earth dam may work, but where there is doubt the dam should be made of porous soil with puddled and tamped clay

embedded in it. Nowadays plastic sheeting is sometimes used instead. If your pond is for fish farming then good topsoil should be placed in the bottom for plants to grow on.

FISHFARMING

Fish are marvellously efficient producers of high protein human food: far better in fact than other livestock. This is because they don't have to build a massive bone structure to support their weight (the water supports it), and they don't have to use energy[7] to maintain their body heat (they are cold blooded). In the tropics, particularly in paddy-growing areas, they are a major crop. Modern commercial fish farming, in which only one species of fish is fed on expensive high protein in water which is kept weed-free with herbicides, is ecologically unsound and requires absurd inputs of expensive feed or fertilizer. We should all start experimenting with water ecosystems which achieve a proper balance of nature, and in which a variety offish species can coexist with a cross-section of other marine life, both animal and vegetable.

Strangely enough in the sixteenth century the matter was far better understood - even in England. At that time a writer called John Taverner wrote that you should make large shallow ponds, four feet deep and more, and keep them dry one year and full of water the next. When dry graze them with cattle, and when wet fill them with carp. The ponds growlush grass because of the sediments left by the water, and the carp benefit from the fertility left by the cattle. This is the true organic approach to husbandry. You should have at least two ponds so that there is akwa^s one. h\\l of hsh md owe dr^. Drain the wet pond dry in late autumn, and take the best fish out then to putin your stewpond near the house, where they are ready for eating. Put a lot of young fish in your newly-flooded big pond.

Carp

Carnivorous fish, such as trout, are poor converters of food into flesh. Vegetarian fish are far better. This is why Taverner and the monks of old in Europe had carp in their stewponds.

Carp will give you a ton offish per acre per year without any feeding if they are in a suitable pond. The way the monks farmed them was to let them breed in large ponds, but then to catch them and confine them to small stewponds near the house in the autumn. The stewponds were deep enough to keep ice-free and the carp were therefore easy to net. As well as being vegetarian, carp are healthy, quick growing, and they can live in non-flowing water. They need half their food from natural provenance, and can be encouraged by a certain amount of muck or rotting vegetation dumped in the water. This is transformed into the sort of food carp eat by bacterial action, but they will also eat oatmeal, barley, spent malt and other similar food.

The Hungarian strain of the Chinese Grass Carp has been tried in England, with success. In China these fish grow up to 100 lbs (45 kg) in weight: in England 30 lbs (13.6 kg) is a good fish, but they are fine converters of vegetable food. Unfortunately they need 122°F (51°C) to breed, and so are propagated in heated tanks and released out of doors, where they flourish.

Tilapia

The best fish of all for fish-farming are the African *Tilapia,* but because they are tropical fish they need warm water. Nevertheless, putting yourself out for them may well be worthwhile. Research has shown that the average family could provide all its animal protein requirements in a 3,000 gallon (13,640 litre) covered and heated pool full of *Tilapia.* The water should be about 80°F (27°C): less than 55°F (13°C) will kill them.

Tilapia mossambica, which is one of the best of the many species, can be bought from pet shops. The hen fish produce about twenty five to thirty young, which live in their mothers' mouths for the first period of their lives, and the hens bring off several broods a year. Much of their food can be supplied free with a little labour by incubating pond water, slightly fertilized with organic manure, in tanks. After three weeks or a month carefully pump this water into the tilapia pond with the organisms that it contains. The incubation tanks should be partially roofed with glass, but access for mosquitoes and other flying insects should be provided.

In temperate climates *Tilapia mossambica* can be kept in heated pools, and they don't require constantly running water. A combination of solar heating and wind/electric heating has proved successful for growing them in America. They will produce two tons of good meat per acre per year. When adult they will feed on algae or any vegetation you like to put into the water (within reason) or they will eat oatmeal. When young they need protein, which can be supplied m such forms as mosquito lawat, Tnaggots, VKOTOS, ot as (Ash meat, or blood meal. They are probably the most delicious of all fish to eat.

Trout

In Berlin most of the city's sewage is discharged into huge lakes, where rainbow trout are reared to provide a colossal tonnage offish per acre. Brown trout will not stand up to this treatment. The sewage is not eaten by the trout, which are carnivores, but by phytoplankton, which in turn are eaten by zooplankton, on which the fish feeds.

If you want to farm rainbow trout you must give them some kind of meat protein. You can buy proprietary trout food but it is very expensive. If you have a source of very cheap sea fish you can use it for trout food. Salt any of the oily pelagic fish, pile them in stacks six foot high and put boards and weights on them. This will expel the oil from them. You can then dry them in a kiln, powder them, and use them for trout food.

Several breeds offish lend themselves to farming. A lot of success is had with American bluegills and catfish.

Household Items

SOAP

The first lion I ever shot had been eating a friend of mine's donkeys in Africa. It had a thick layer of fat on it, and my friend's mother turned this into soap. She did it by the simple method of boiling the fat with caustic soda. It worked, but was pretty rough stuff.

The chemistry of soap making is to boil an alkaline with fat, which is an acid. The alkaline, or lye as soap-boilers call it, can be practically any alkali, and caustic soda will do. But there is a simple way of making your own lye. Knock some holes in the bottom of a barrel, lay some strawin the bottom, fill the barrel with wood-ash, and pour a bucketful of cold water on top of the ash. Pour on a bucketful every three or four hours on the first, third and fifth day. The water that drips out of the bottom of the barrel will be lye.

Now, to make soap take your fat and clarify it by melting it in a slow oven, straining it into cold water, and then skimming it off the water. If you haven't shot a lion practically any fat will do: dripping, lard, chicken fat, goose fat and so on. Melt the fat again, let it cool to hike-warm, and warm your lye to luke-warm at the same time. Then very slowly pour the lye into the fat (if you pour it too fast it will not mix) and stir it very gently with a wooden spoon. When the mixture begins to drip from your spoon like honey, stop pouring. Then if you want to make your soap stronger pour in a solution of borax and water (eight tablespoonfuls of borax to a pint (0.6 litres) of water) and a dash of ammonia. To half a gallon (2.2 litres) of soap mixture add a pint (0.6 litres) of the borax solution and half a cup of ammonia. Put a board over the mixture, cover it with a carpet, leave until the next day and cut it.

If you want a soap which will make you and your friends smell good, take: 1 lb (0.5 kg) good fat or tallow; 1 cup olive oil; 1 cup peanut oil; *z* cup water with 2 tablespoons lye in it; 1 cup water with perfume in it.

If the perfume is essential oil bought from the chemist, use about three tablespoons of it, but you can make your own perfume out of lavender, rosemary, lemon balm, or a score of other flowers or herbs, in which case you would probably add more. Melt the fat, add the oils and the scent to it, and warm to 90°F (32°C) stirring all the while of course. Meanwhile mix the lye and the water and pour it into the fat and oil mixture and don't stop stirring. When the mixture thickens pour it into moulds of any fancy shape you like.

Saddle soap

To make saddle soap take: 6 cups tallow; 1 cup lye; *1*\ cups water. Heat the tallow to 130°F (54°C). Dissolve the lye in the water, cool it to 95°F (35°C) and pour it slowly into the tallow, stirring the while. Just before it is ready for moulding pour in one cup of glycerine and stir.

SUGAR

From sugar beet

Cut the tops off your sugar beet and press the juice out of them any way you can: with a cider press, a car jack, or an old fashioned mangle. Boil the juice until all die liquid has evaporated and you will be left with unrefined sugar. Refining it is a complicated process involving lime and carbon dioxide. Anyway it would be madness to refine this further, for unrefined sugar is nourishing and meet for all the purposes of sugar, while refined sugar contains 99.9 per cent sucrose, absolutely no vitamins, nor anything else that is of any use to body and soul at all.

From sugar cane

Sugar cane must be thoroughly crushed so as to produce syrup. Cane is tough stuff full of fibres, so you either need a lot of strength and a mortar and pestle, or a steel crushing mill. Put the syrup into a copper boiler, over a fire which you can fuel with the spent cane. Boiling turns the syrup into what in India is called "gor", which is unrefined sugar. As I have said above it is a waste of time to refine sugar any further and it is much better for you like this.

Maple sugar

To make this you must tap the sugar maple, in the chilly month of March, by drilling the trunk and driving in a "spile", a short tube which you can buy or make yourself out of bamboo, willow, sumac, elder or anything you can hollow. Hang a container under the spile (an old can will do, or a bucket, or a plastic bag) and cover it to keep insects out.

As soon as the sap runs carry it to the "arch": to leave it too long is to spoil it. The "arch" is a boiler placed over a wood fire that needs to be kept blazing by a strong draught. The arch must be out of doors for a great deal of moisture is given off. Don't let the sap get more than a couple of inches deep. Keep the level by pouring in more sap. It is an advantage to have two boilers, and use one for the fresh sap and keep ladling the partially boiled sap into the other from which you "syrup off", meaning take the syrup.

Skim the scum off from time to time and watch constantly to see that the sap doesn't boil over. If it starts climbing up the pan add some fresh sap, or drop some creamy milk on the climbing froth, or draw a piece of fat across the bubbles. Test the sap's temperature with a thermometer. When it is boiling at 219°F (104 C) it has turned into syrup. Strain it off into jars, cover while hot andput away to cool. This is maple syrup.

If you want sugar go on boiling until the temperature is 242°F (U7°C), but if you pull a spoon out and the drip forms a thin spidery thread, that is boiling enough. Remove from the fire, leave to cool for a few minutes, then stir with a wooden spoon. When the syrup begins to crystallize pour it into moulds and you have sugar.

SALT

If you live near the sea you can make salt by simply b oiling and evaporating sea-water. You can use driftwood for fuel and nowadays the oil spillage that coats most driftwood means it

gives even more heat. A mobile iron boiler, such as you boil pig-swill in is ideal. Never use a copper boiler. The copper and salty sea-water will react against one another.

PAINT

Very good paints can be made from a mixture of sour milk, hydrated (slaked) lime, and any coloured earth pigment that you can find. The lime and the sour milk must have neutralized each other, and this can be tested with litmus paper: if the paper turns red add more lime, if it turns blue add more sour milk.

The pigment that you add to this is any strongly coloured earth, sediment or clay. Dig it out and boil it in water several times, each time in new water. Strain off the water and dry- the sediment in a warm place. Pulverize it as finely as you can and store. Mix this powder with the milk-lime mixture until you get the colour you want. Keen paint-makers keep an eye out as they travel about the countryside for any colourful-looking earth or clay, and grab it when they see it.

PAPER

It is possible to make paper of any fibrous plant, or of wood, or of cotton or linen rags. Nettles, flax, hemp, rushes, coarse grass, and tall fibrous plants like *Tagetes minuta* all make very good paper.

Ret the plants first by soaking them in stagnant water. Then chop them up as small as you can into, say half-inch lengths. Put the chopped material into a vat and cover with a caustic soda solution made up of two dessert spoonfuls of caustic soda per quart of water. Boil until the material is soft and flabby. Then put it in a coarse sieve and drain. Hold the sieve under the tap, or plunge it up and down in a bath of water. This will clear the pulp away. If you want white paper soak the fibre you now have left in a bleach solution overnight. Otherwise the paper will be the colour of the material you are using. Drain the bleach off through a fine-meshed sieve (you don't want to lose fibres).

Next you must beat the material. You can do this with a mallet, or with any kind of pounding engine your ingenuity can devise. When you have beaten it thoroughly dry add some water and continue beating the pulp. A large food-mixer or a large pestle and mortar will do very well for this stage. During this process put some pulp in a glass of water occasionally and hold it up to the light. If there are still lumps in it go on beating. If you want to make interesting papers don't beat too long and your paper will have fragments of vegetation showing in it.

You make the paper on moulds, which can be simple wooden frames covered with cloth. Cover the moulds with a thin layer of pulp by dipping them into it and scooping. As you lift the mould out of the pulp give it a couple of shakes at right angles to each other. This helps the fibres to "felt", or matt together. If you find the "waterleaf" which is what your sheet is called, is too thin, turn the mould upside down, place it in the vat, and shake the pulp off back in the water. Then add more fibre to your vat.

Now, turn the mould upside down on a piece of wet felt and press the back of the cloth to make the watersheet adhere to the felt. Take the mould away, and lay another piece of wet felt on top of the watersheet. Repeat the operations with another watersheet. Finally you need a press. Any kind of press will do. Make a "post" which is a pile of alternate felts and watersheets and put the post in your press. Press for a day or so, then remove the paper from the felts and press just the paper sheets. Handle the paper very carefully at this juncture. Then lay it out on racks to dry.

RESIN, ROSIN and WOOD TAR

Long-leaf pine, maritimepine, Corsicanpine, Americanbalm or gilead, cedars, cypresses and larches can all be tapped for their resin.

The best way of tapping is to clear a strip of bark, about four inches (10 cm) wide and four feet (1.2 m) high, off a large tree. This is called a "blaze". Then, with a very sharp axe, take a very thin shaving of true wood off at the base of the blaze. Drive a small metal gutter into the tree at the base of this cut and lead the sap, or resin, into a tin. Every five days or so freshen the cut by taking off another shaving. When you can get no more out of the first cut make another just above it. Keep on doing this until you have incised the whole blaze, which may take several years. Don't tap between November and February. If you grow conifers for tapping, clean the side branches off the young trees so that the trunks are clean for tapping.

If you distill resin - in other words, if you heat it and condense the first vapour that comes off it - you will get turpentine. "Rosin" is the sticky stuff that remains behind and it is good for many things including violin strings, paints and varnishes.

If you heat coniferous wood in a retort, or even just burn it in a hole in a bank, a black liquor will run out of the bottom. This is wood tar, and it is the best thing in the world for painting boats and buildings.

CHARCOAL

Charcoal is made, quite simply, by burning wood in the presence of too little oxygen. In other words you set some wood alight, get it blazing well and right throughout its mass, and then cut off the air. Ihave tried many ways of doing it and I have come to the conclusion that the simplest and best is to dig a large trench, fill it up with wood and set light to it. Then when it is blazing fiercely throw sheets of old corrugated iron on to start smothering the fire and then very quickly, and you will need perhaps half a dozen helpers, shovel earth on top of the corrugated iron so as to bury it completely. Leave for several days to cool, then open up and shovel the charcoal into bags. You can use the charcoal for cooking fuel, for making bricks (as I described onp. 232), or anywhere else you need a slow-burning fire.

The All - Purpose Furnace

Firewood is a renewable resource, and the best solar energy-collector in the world is a stretch of woodland. Woodland cut for firewood should be coppiced (see p. 35). In other words the trees should be cut right down every ten to fifteen years, depending on how fast they grow, and the stumps left to coppice, or shoot again. Cut over systematically in this way two or three acres of woodland will yield a constant supply of good firewood and other timber.

To burn wood effectively and economically requires several things. The wood must be burned on the floor of the furnace: not on a grid. The fire must be enclosed and there must be a means of carefully regulating the draught. A huge open fire is a romantic thing, but all it does is cheer the heart, freeze the back and heat the sky. Where wood is in limitless supply it may be justified, but not otherwise.

It is an advantage to burn wood in a dead end, admitting air from the front only. A tunnel with the back walled off is ideal. Logs can be fed into the dead end tunnel and lit at the end nearest the door, and the fire then slowly smoulders backwards into the tunnel. The draught control should be such that you can load the tunnel right up with dry logs, get a roaring fire going, and then actually put it out by cutting off the air. If you can feed your furnace from outside your house you will avoid a lot of mess inside. And if you can organize things so that your furnace can take long logs, you save an awful lot of work sawing.

Now any decent economical furnace should be capable of doing at least four things: space heating, oven baking, hot-plate cooking, and water heating, and if it can smoke meat and fish as well so much the better. We have built a furnace that will do all these things on my farm, and as the farm is called Fachongle I call it the Fachongle Furnace. But don't try to build one the same unless you know you can get, for not too much money: firebricks, a cast iron plate big enough to cover the whole furnace, and a massive cast iron fire door.

Building a furnace

We built a firebrick tunnel, four feet (1.2 m) long inside the house. It is bricked off at the back, but the front falls four inches (10 cm) short of the exterior house wall. The house wall there is lined with firebricks. On either side of the tunnel we built a brick wall slightly higher than the top of the tunnel. The bases of these need not be of firebrick, but the tops must be to withstand the heat. On top of the two outer walls we laid a steel plate. (This has since warped slightly which is why I advise you to get a cast iron plate.) This goes from the back of the furnace right to the wall of the building. On top of the steel plate away from the wall of the building we built an oven, and at the very furthest end from the wall we built a chimney. We knocked a hole in the outer wall and in that set a furnace door with firebricks. The furnace is fed through this door, and the heat and smoke has to come back to the front end, curl up through the four inch (10 cm) gap, hit the iron plate, curve back and go under the oven and on up the chimney.

Now we built a back boiler into the back wall of the tunnel, and the pipes from it come back between the tunnel wall and the outer wall, and then come out through two holes in the latter. We partially filled the cavity between tunnel and outer walls with sand to insulate and store heat.

The boiler of this particular furnace has to supply: kitchen, dairy, brewery, laundry and bathrooms, and this it does provided a good fire is kept up. To provide that much hot water with an electric immersion heater would cost a fortune. We are intending to preheat the water with a solar roof in due course so that in the summer, when we don't need so much heat indoors, we won't have to keep such a large fire.

A refinement, which is not completely necessary, is that some of the smoke and heat comes through a slit cut in the iron plate and so travels up the back of the oven, which is hollow, and over a steel plate which forms the top of the oven. The oven bakes magnificent bread providing there is a hot enough fire in the furnace.

Making charcoal in a furnace

One advantage of a Fachongle Furnace is that it will make charcoal. If you get a big fire going in it and then close the draught right down, the fire goes out and the wood turns to charcoal. A final attraction is the smoke chamber which we have built over the oven. It is too hot in there for ham or bacon but marvellous for "cook smoking" fish or meat.

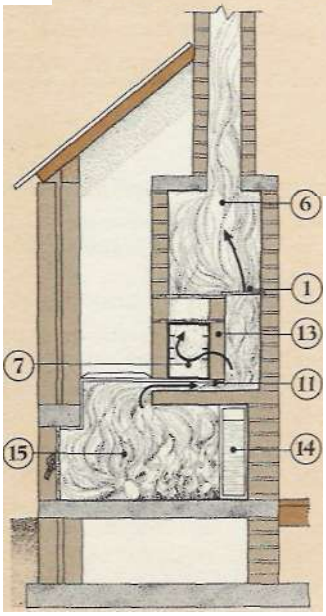
The Fachongle Furnace is a good example, I think, of the new attitude that we people who call ourselves self-sufficient have to adopt. We must learn again to trust our own intuition and judgment, and not always run to the "experts" or specialists. We must learn to improvise and make do with the resources we can get for nothing if we use our eyes, hands and brains. A commercially-produced furnace on the scale of the Fachongle Furnace would cost a thousand pounds. Our furnace is not perfect, but we are improving on it. You can only really succeed as a self-supporter if you are prepared to adapt, experiment and try your own ideas. As you go on you gain confidence in your own ability to do things for yourself, and this is one of the most satisfying aspects of the self-supporting way of life.

Many of the things that we look upon as far too difficult to be done by anybody but a specialist are not difficult at all once we actually come to do them. I think of an old friend of mine who was living in the remote outback in Southern Africa, and who suddenly found himself unable to buy petrol because of the Depression. He invented, and built himself, a "producer gas" plant to go on the back of his old lorry, which he was then able to drive on charcoal.

It worked. It was an apparently impossible task he set himself to do and he did it. We should profit by his example.

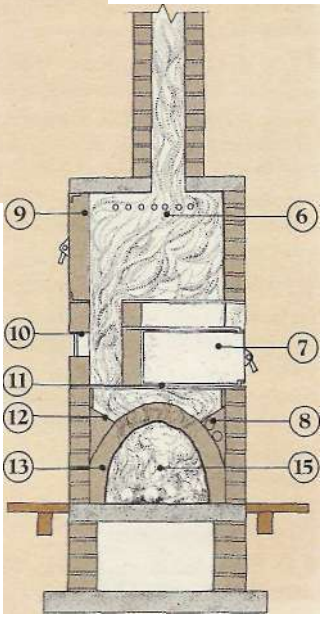
Key

1 *Damper*
2 *Oven door*
3 Hot *plate*
4 *Fire box door*
5 *Draught control*
6 *Smoking box*
7 Oven
8 *Water pipes*
9 *Smoking box door*
10 *Access door*
11 Flue *passage*
12 *Sand filling*
13 *Firebrick*
14 *Back boiler*
15 *Fire box*



A versatile furnace which you can build yourself

We designed and built the Fachongle Furnace with the idea of getting as much benefit as we could from burning wood. The furnace gives us: space heating for a large area, a lot of very hot water, a hot plate and oven for cooking, and a smoke chamber. We burn the wood in a tunnel made from firebricks. The back is closed off and contains the back boiler for water. The front comes almost up to a hole in the house wall where we have built a fire door so that the furnace is fed from outside. We built brick walls either side of the tunnel right up to the house wall, and rested a steel plate across them. The front of the plate serves as a hot plate, and over the back we have built an oven. There is a slit in the steel plate so that heat circulates right round the oven. At the very back is the chimney which widens out above the oven to form the smoke chamber. Heat from the fire comes forward along the tunnel, curls up under the hot plate and oven, and on up the chimney. It *is quite likely that your requirements will be different and will necessitate a modified design.*



Useful Addresses

General

Agricultural Development and Advisory Service (agricultural and science), Great Westminster House, Horseferry Road, London SW1P 2AE. Probably the best place for the would-be self-supporter to begin. As well as the London head-quarters, regional offices all over the United Kingdom provide advice and pamphlets on every agricultural subject. If you are thinking of buying, clearing or draining land, of suitable equipment and balanced livestock, start by getting advice and help from this Government department. Pamphlets from: Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex F1A5 2DT. (Single copies free.)

Ministry of Agriculture, Fisheries and Food, Whitehall Place, London SW1A 2HH (for advice and information on all general aspects of farming)

The Self-Sufficiency and Small Holding Supplies, Priory Road, Wells, Somerset (for a large variety of useful items)

Food from the Fields

Wright Rain Ltd, Crow Arch Lane, Ringwood, Hampshire BH24 1PA (for irrigation equipment)

Forestry Commission, 25 Savile Row, London W1X 2AY (for advice and pamphlets on woodland)

John Scott, Royal Nurseries, Merriot, Somerset (for young trees, as well as a variety of garden shrubs)

J.H.B. Implements Ltd, Ickburgh, nr. Mundford, Thetford, Norfolk (for ploughs and tractors)

Russells Ltd, Agric. Engs., Engineering Works, Railway Bldgs, Kirkbymoorside, Yorkshire (for the "Exel" precision seed drill)

R. Hunt *and Co Ltd,* Atlas Works, Earls Colne, Colchester, Essex (for the "Atlas" hand mill)

Semplex Home Brews Ltd, Old Hall Works, Stuart Road, Birkenhead (for beermaking equipment)

Food from Animals

The British Goat Society, c/o Secretary, Rougham, Bury St Edmunds, Suffolk (for buttet chums, milking, buckets, milk cartons etc)

Clares *Carlton Ltd,* Town Hall Bldgs, Wells, Somerset (for all dairying equipment)

Hansen's Laboratory Ltd, Rennet Manufacturers, 476 Basingstoke Road, Reading (for starters and pure cultures for cheesemaking)

*

Fred Ritson, Goat Appliance Works, Longtown, Carlisle (for goats and information on goats)

C. N. *Flack & Co Ltd,* Home Farm, Culford, Bury St Edmunds, Suffolk (for large white pigs)

Pig Breeders Supply Co Ltd, Checkendon, Reading, Berkshire (for housing, equipment, etc to do *with* Pigs)

Stanley Brown and Son, Poultry Farm, Chearsley, nr. Aylesbury, Bucks (for poultry)

May field Chicks Ltd, Bunkers Hill, Colne, Lancashire (for young poultry)

John Inkstei- Ltd, The Chippings, Chigwell Row, Essex (for chicken litter)

E. H. Thome Ltd, Beehive Works, Wragby, Lincolnshire (for bee equipment)

Food from the Garden

Henry *Doubleday Association,* Bocking, Braintree. Essex (for general information on soil and organic gardening)

Humus Products Ltd, Brunei House, St Georges Road, Bristol 1 (for soil analysis and composts)

J. Gtfebs Ltd, Starwell Road, Bedfont, Middlesex (for a large range of market garden tools)

Jiffy Pot *(UK) Ltd,* Trulls Hatch, Rotherfield, Crowborough, Sussex (for peat pots)

Stoke Lacy Herb Farm, Bromyard, Herefordshire (for seeds)

The Old Rectory Herb Garden, Ightham, Kent (for seeds and young plants)

The Amateur Winemaker, North Croye, The Avenue, Andover, Hampshire (for **winemaking** equipment and advice)

Food from the Wild

ASI, Importers and Wholesale Distributors, Alliance House, Snape Maltings, Saxmundham, Suffolk (for a wide range of guns, although to purchase any gun you must have a licence and go through a dealet)

Bridport Gundry Ltd, Net, Line, Twine Mfrs, The Court, West St, Bridport, Dotset (for fishing nets)

Natural Energy

University of Cambridge, Department of Architecture, 1 Scrope Terrace, Cambridge (for bulletins on all forms of alternative technology)

Intermediate Technology Development, Pamell House, 25 Wilton Road, London S Wl (for general information on alternative technology)

Tne *National Centre for Intermediate Technology,* Corwen, Machynlleth, Wales (for general information on alternative technology)

Gilbert Gilkes and Gordon Ltd, Turbine Mfrs, Kendal, Cumbria (for water power machinery)

Kent Solartraps Ltd, 10 Albion Place, Maidstone, Kent (for information on solar heating and a wide range of panels)

Conservation Tools and Technology, 143 Maple Road, Surbiton, Surrey (for a range of electricity generating windmills)

Wind Energy Supply Co, Bolney Avenue, Peacehaven, Sussex (for oil pumping and electric windmills)

WhyattBrotKers Ltd, Wayland Works, Whitechurch, Salop (for a variety of windmills)

Crafts & Skills

W. Gadsby and Son (Burrowbridge) Ltd, Burrowbridge Basket Works, Burrowbridge, Bridgwater, Somerser (for willow as well as cane)

Catterson-Smith Ltd, Furnace Mfrs, Woodrolfe Road, Tollesbury, Maldon, Essex (for electric kilns)

Cromartie *Kilns Ltd,* Dividy Road, Longton, Staffs (for electric kilns)

Wengers Ltd, Gamer Street, Etruria, S.toke-on-Trent (for all pottery equipment and supplies)

Harris Looms, Northgrove Road, Hawkhurst, Kent (for looms)

Jacobs, Young and Westbury Ltd, J.Y.W. House, Bridge Road, Haywards Heath, Sussex (for rushes and loom cord)

The Weaver's Journal, c/o Federation of British Crafts Societies, 80A Southampton Row, London WC1B 4BA (for information and suppliers)

T. J. Willcocks, Wheatcroft, Itchingfield, Horsham, Sussex (for wool carders and spinning machines)

Frank *Herring and Sons,* 27 High West Street, Dorchester, Dorset (for spinning wheels)

Eliza Leadbeater. Rookery Cottage, Dalefords Lane, Whitegate, Near Norfhwich, Cheshire (for mordants and dyeing equipment as well as dyes)

Moordown Leather and Crafts, 923 Wimborne Road, Moordown, Bournemouth, Hampshire BH9 2BJ (for leather and leather-working tools)

John P. Milner Ltd, 67 Queen Street, Hitchin, Hertfordshire (for leather and tools)

Tirana, Sculptors' Tools & Materials, 21 Goodge Place, London Wl (for all stone masonry tools, as well as clay)

Macready's Mewl *Co Ltd,* Usaspead Corner, 131 Pentonville Road, London Nl (for steel)

Buck and Ryan Ltd, 101 Tottenham Court Road, London Wl (for metal-working tools)

General Woodworking Supplies, 76/80 Stoke Newington High Street, London N16 (for wide range of British and imported woods)

World of Wood, Industrial Estate, Mildenhall, Suffolk (for wood and all things to do with wood)

Wood Components Ltd, Newbum Bridge Road, Ryton Industrial Estate, Blaydon-on-Tyne, Co. Durham NE21 4TB (suppliers of wood for turning)

R. J. Woodley, The Falls, Exeter Road, Newton Poppleford, Devon (for kick-wheels)

Useful Reading

General

Self-Sufficiency
John and Sally Seymour/Faber

The Fat of the Land
John Seymour/Faber

Food from the Fields

Elements of Agriculture
W. Fream/John Murray

Organic Farming
Hugh Chorley/Faber

Fertility without Fertilisers
Lawrence D. Hills/Henry Doubleday Association, Bocking, Braintree, Essex

The Horse in the Furrow
George Ewart Evans/Faber

Old Farm Implements
Philip A. Wright/David & Charles

Breadmaking: its Principles and Practice
Edmund B. Bennian/OUP

Tritton's Guide to Better Wine and Beer Making *for Beginners*
S. M. Tritton/Faber

Food from Animals

The Backyard Dairy Book
Len Street and Andrew Singer/Whole Earth Tools, Mill Cottage, Swaffham Road, Cambridge

Trie Story *of Cheese-making in* Britain
Val Cheke/Routledge & Kegan Paul

Goat Husbandry
David Mackenzie/Faber

Keeping Pigs
C. Chappell/Hart-Davis

Butchering, Processing and *Preservation of Meat*
Frank Ashbrook/Van Nostrand Reinhold

Natural *Poultry Keeping*
Jim Worthington/Crosby Lockwood

The World of Bees
Murray Hoyt/Bodley Head

Food from the Garden

The Complete *Vegetable* Grotcer
W. E. Shewell-Cooper/Faber

Grow your own Fruit and "Vegetables
Lawrence D. Hills/Faber

Pictorial Gardening
Collingridge Books

The Vegetable *Garden Displayed*
Royal Horticultural Society

The Fruit Garden Displayed
Royal Horticultural Society

The Living Soil
Lady Eve Balfour/Faber

Compost: for Garden Plot or 1,000 *acre Farm*
F. H. Billington & Ben Casey/Faber

Grow it!
Richard Langer/Equinox Books

The Herbalist
Joseph E. Meyer/The Oak Tree Press

Herb Gardening
Clare Loewenfeld/Faber

The Complete Book of the Greenhouse
Ian G.Walls/Ward Lock

Putting Food B>'
Stephen Greene Press, Battleboro, Vermont, USA

Amateur *Wine Making*
S. M. Tritton/Faber

Food from the Wild

Food *for Free*
Richard Mabey/Collins

Pocket Guide *to the Sea Shore*
John Barrett & C. M. Yonge/Collins

Seaweeds and their Use
V. J. Chapman/Methuen

Edible Wild Plants
Oliver Perry Medsger/Macmillan

Hou.' *to Enjoy your Weeds*
Audrey Wynne Hatfield/Muller

Natural Energy

Energy *Primer: Solar, Water, Wind and Bio-Fuels*
Portola Institute, 540 Santa Cruz Avenue, Menlo Park, Ca. 94025, USA

Radical Technology: Food, Shelter, Tools, Materials, Energy, Communication, Autonomy, Community
ed. Godfrey Boyle and Peter Harper/ Wildwood House

Keeping *Warm at Half the Cost*
Colesby and Townsend/Prism Press and CTT Series, Stable Court, Chalmington, Dorchester, Dorset

Low Cost Development of Small Water Power *Sites*
Hans W. Hamm/Volunteers in Technical Assistance, 3706 Rhode Island Avenue, Mt Rainier, Maryland 20822, USA

Direct Use of the Sun's Energy
Farrington Daniels/Ballantine Books

Simplified Wind Power Systems for Experimenters
Jack Park/Helion, Box 4301, Sylamar, Ca. 91342 USA

The Generation *of* Electricity *by Windpower*
E. W. Golding/E. & F. N. Spon Ltd (out of print, but the classic work on the subject)

The *Dutch Windmill*
Frederich Stokhuysen/Merlin Press

Practical Building of Methane Power Plants for Rural Energy Independence
L. John Fry, D. A. Knox, Andover, Hants.

Methane: *Planning a Digester*
Peter-John Meynell/Prism Press and CTT Series, Stable Court, Chalmington, Dorchester, Dorset

Crafts & Skills

Country Crafts Today
J. E. Manners/David & Charles

Studio Vista Guide to Craft Supplies
Judy Allen/Studio Vista

The Craft Business
Rosemary Pettit/Pitman

Countn' *Bazaar*
A. Pittaway and B. Scofield/Collins

Baskets and Basketry
Dorothy Wright/Batsiord

A *Potter's Book*
Bernard Leach/Faber

Spin *your own Wool,* Dye it and *Weave it*
Mollv Duncan/Bell

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Acknowledgments

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Roger Twinn
Ann Winterborham
Elsie Wrigley

"Wise and witty words share 256 pages with a
rich harvest of beautiful drawings...
knows his stuff and tells it in a masterly way,
shaming text books with his enthusiasm, humour
and authority... comprehensive and seductive...
Beauty and order pervade every page."

Sunday Times Magazine

'An invaluable manual of hope and skills...
the text sparkles with intelligence andjoie de vivre.
The explanatory diagrams and drawings are a delight."

Glasgow Herald

"The complete handbook to living off the land...
will make those brought up in a highly
technical and idle age wonder what they have
missed all these years... even the most
ham-fisted and ignorant should easily
understand the instructions."

Daily Mail

"The proper way to make a stook, lay a hedge,
milk a goat, pickle an onion, thatch a rick,
skin a rabbit, plant a potato, catch a bee swarm,
grow an artichoke, tickle a trout, build a
compost heap, prune a currant bush, slaughter
a pig, throw a pot - you name it, the book
will tell you how. It is no mere manual for survival,
but a small encyclopaedia for all the knowledge
needed by man who wants to do things for himself...
excellent diagrams and illustrations."

Sunday Telegraph

"Whatever your needs from the land, you will
find the answers here. It will not be bought
only by those living in the country and on the
way to self-sufficiency, but also by the rest of
us who would like to know how it is done,
and perhaps give it a try."

Ideal Home

"Practical and very beautiful... John Seymour's
lavishly illustrated book should finally convince
the faint-hearted and the sceptics alike that
there's no magic in being your own provider.
It's just commonsense and a way to greater
personal fulfilment."

Here's Health

"Over 250 large pages full of in-depth advice,
illustrated with a wealth of clear and
attractive drawings, take the reader into
every conceivable way of saving money and
at the same time being creative."

Countryside