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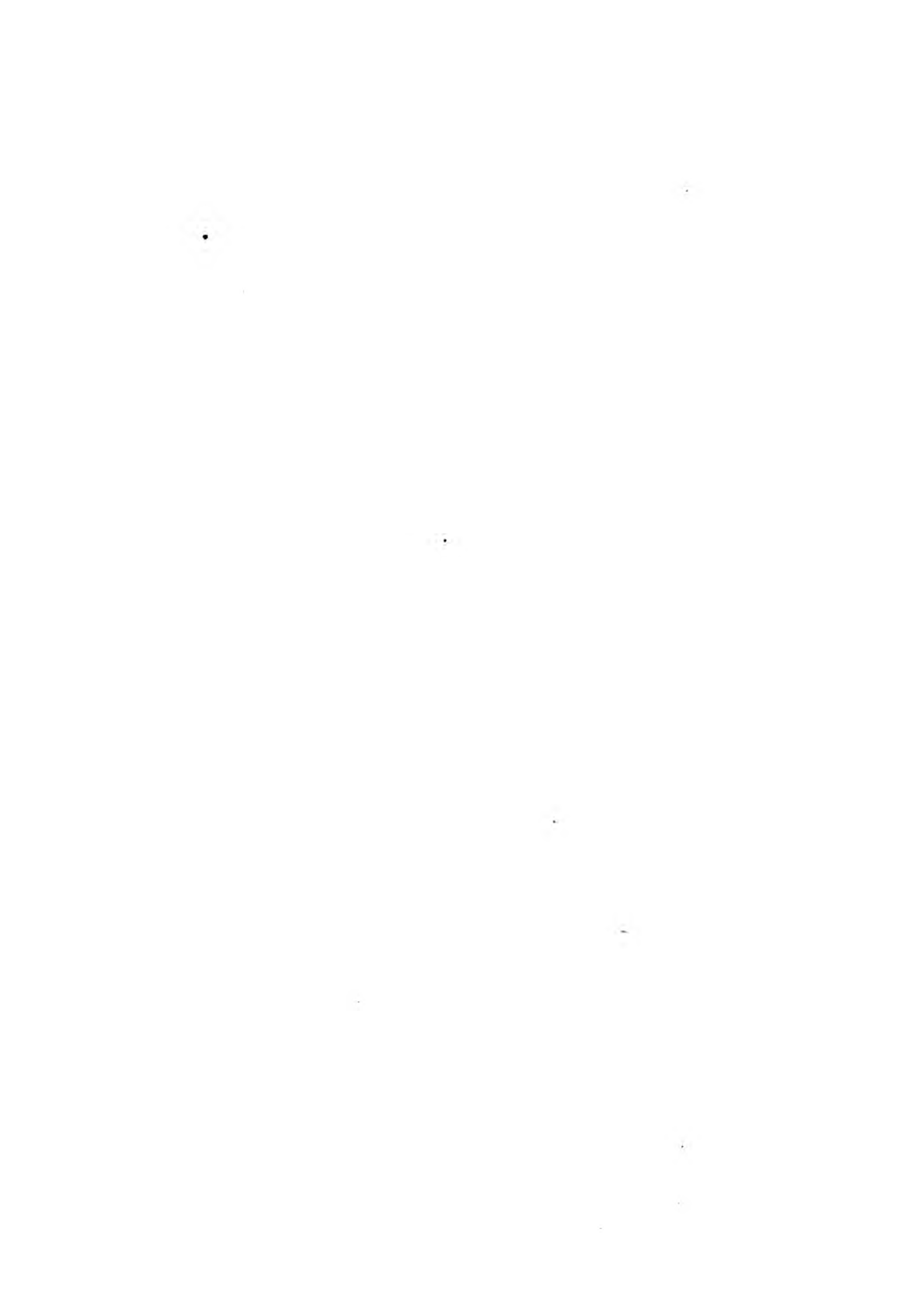




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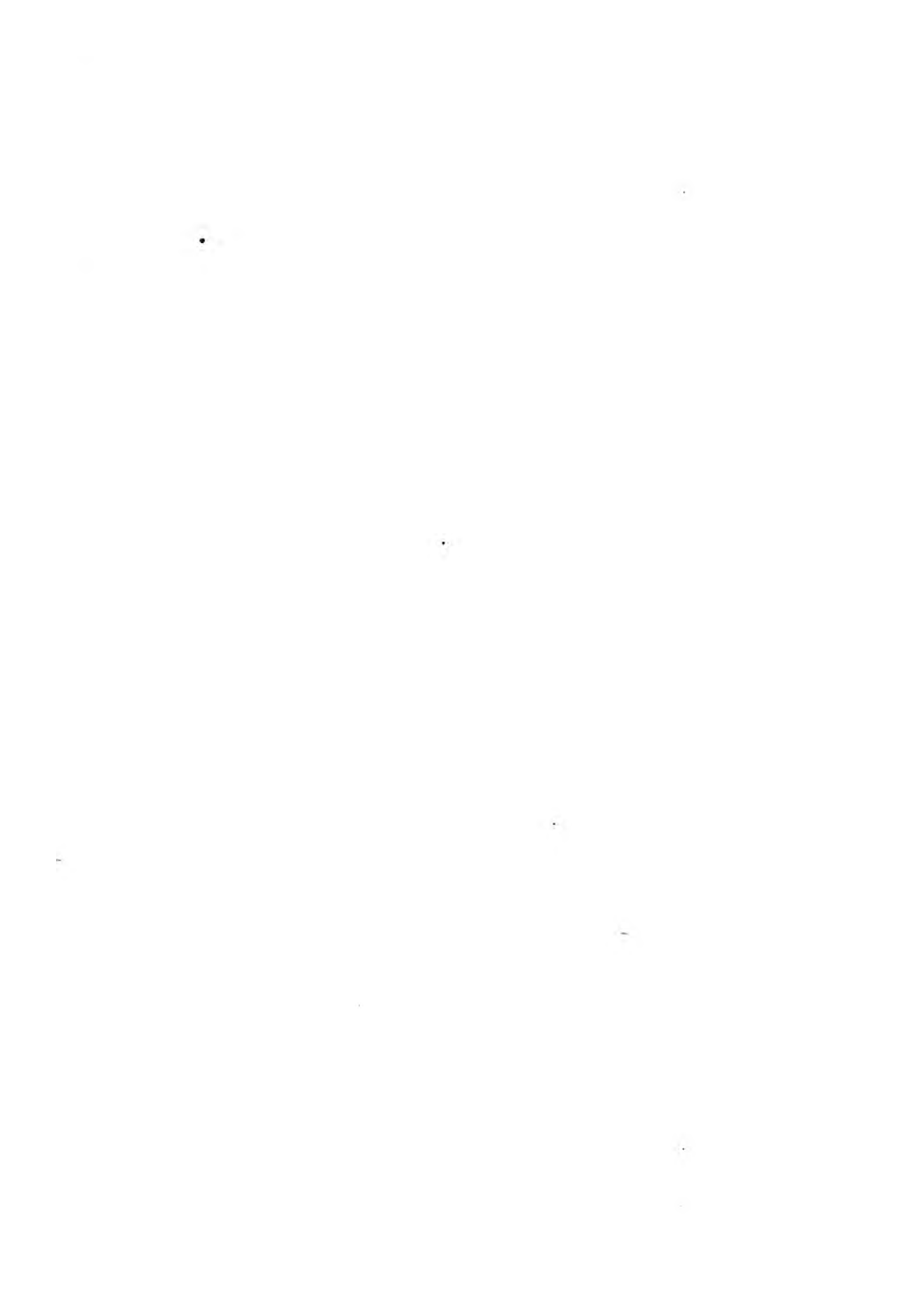
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T R E A T I S E

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P L A N T I N G,

G A R D E N I N G,

A N D T H E

Management of the HOT-HOUSE.

C O N T A I N I N G,

- | | |
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| <p>I. The Method of Planting Forest-Trees in gravelly, poor, mountainous, and heath Lands; with particular Directions for raising the Plants in the Seed-Bed, previous to their being planted out.</p> <p>II. The Method of Pruning Forest-Trees; with Directions how to improve Plantations and Woods that have been neglected.</p> <p>III. On the Soils most proper for the different Kinds of Forest-Trees.</p> <p>IV. The Management of Vines, comprehending their Cultivation upon Fire-Walls and in the Hot-House; together with a new Method of dressing, planting, and preparing the Ground.</p> | <p>V. A new and easy Method of propagating Pine Plants, so as to gain half a Year in their Growth; together with a certain Method of destroying the Insect so destructive to Pines.</p> <p>VI. A certain and easy Method of raising Mushrooms without Spawn, by which the Table may be plentifully supplied every Week in the Year.</p> <p>VII. A new Method of cultivating Asparagus.</p> <p style="text-align: center;">A N D,</p> <p>VIII. The best Method of cultivating Field-Cabbages and Carrots for the Purpose of feeding Cattle.</p> |
|--|--|

By JOHN KENNEDY,
Gardener to Sir THOMAS GASCOIGNE, Baronet.

Y O R K:
Printed by A. WARD for the AUTHOR.
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T O

Sir THOMAS GASCOIGNE, Bart.

THE fruits of my labours,
whatever they may be, be-
long to you: your goodness and ge-
nerosity have already greatly over-
paid them; yet I never durst have
petitioned for your patronage and
protection for these Sheets, which
I presume to offer to the public,
but from a perfect conviction of
their utility: being sufficiently ac-
quainted with your knowledge in
my profession, and more so with the
rigour with which you would treat

iv DEDICATION.

the errors of your own servant,
when they regarded the public.

I have the honour to be, with the
utmost respect and gratitude,

S I R,

Your dutiful Servant,

JOHN KENNEDY.

P R E F A C E.

THE many publications on Gardening and Planting, which have been offered of late years to the public, might have discouraged the Author of this Treatise from the present attempt; but as most of those that have fallen in his way, treat the subject in too general and speculative a method to be of service to practitioners, his intention in the following sheets is not to deliver himself systematically, but, in the most explicit manner, to lay before the public facts that have been successfully reduced to practice by himself.

Each particular subject he means to treat of, he will take up from the beginning, and give the most minute directions as to the method of culture, labour, and management; together with the seasons that each particular work is to be performed in.

The

The planting of poor wastes, moorlands, and apparent barren mountains, has been but seldom treated of, and in very few places attempted.

The success the Author has had in planting such grounds, even in the north of Scotland, has induced him to treat that subject rather largely; and he flatters himself that, if his directions are followed, extensive tracts of land which are now useless may become ornamental and profitable.

A general system of gardening not being the intention of this Treatise, the Author will confine himself to the management of Vines, Ananas, Asparagus, and a new method of raising Mushrooms without spawn.

The directions given on those heads being very different from the general practice, may perhaps make some rather diffident in following them; but the Author avers that they are what he has followed with the greatest success for many years.

Agri-

P R E F A C E. vii

Agriculture being now the object of so general attention, the Author has added to this Treatise the cultivation of Field-Cabbages and Carrots, induced thereto by the great crops he has himself raised, and the great advantage they are in feeding of horses, cattle, &c.

The instructions given in this Treatise upon Planting, Gardening, and rural Oeconomy, are the result of many years experience; should they meet with the approbation of the public, the Author will consider himself as well rewarded.

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E R R A T A.

Page 5, line 25, for and, read they.

Page 50, line 23, for that come, read come.

Page 88, line 16, for which are, read which is.

Page 105, line 21, for replaced, read removed.

Page 168, line 8, for circular, read regular.

Page 231, line 23, for hard clay, read hard clay bottom.

Page 240, line 20 and 21, for next pruning season, some more of those that have long bore old wood, read every pruning season some of those that have long bare wood.

Page 291, line 2, for and if, read and made.

Page 325, line 23, for point, read paint.

Page 328, line 5, for boles, read holes.

Page 364, line 20, for trench, read trenches.

A
T R E A T I S E
O N
P L A N T I N G, &c.

C H A P. I.

*The Method of raising Wood on Rocky,
Hilly, Waste, and Heath Lands.*

THE extensive tracts of rocky, waste, and heath lands in this kingdom, if converted into plantations of thriving trees, would prove a certain benefit to posterity, as well as a pleasing reflection to those who are at the expence of performing so great and good a work. To assist the generous planter in his patriotic design is the intention of this first chapter. I shall suppose the tract of country, now in view, to consist of rocky, hilly, and heath land, with little

A

or

or no foil. Such unpromising ground may be covered with wood in the following manner.

The labourers should be provided with light ax-hoes, broad at one end and narrow at the other. With the broad end pare off the grass or heath as thin as possible; then with the narrow end stir the ground to four or five inches, if you can, picking out such small stones as are loosened by the hack in stirring the ground, always avoiding large stones; but where these, or pieces of rock intervene, at three feet distance from the rock make as many places round as you can, for no ground should be lost; and although the trees are near on one side, they will have sufficient air to grow to maturity.

This work should be done in summer, that the places stirred may have the advantage of the first rains in autumn to moisten them; for there is no planting in such grounds until they are moistened after stirring, as all rain runs off before the surface is broke.

There

There is nothing more to be done until the planting season, which should be as early as the weather will permit; for if done late, a dry spring would be of bad consequence.

When you begin to plant, take up no more trees at a time than can be planted in one day, taking care not to expose the roots to the sun or wind.

The best method is to sow and plant the trees alternately. So when you plant, the places for seed should be left until the season for sowing in spring.

The trees fit for planting in such places are,

At the summit of the hills, Scotch Firs and Larches. This is the proper situation for Larch, it being an inhabitant of high and cold places. A great reason for its growing crooked, is its being planted in low situations and good land, where it grows too fast, and is not able to support its large head.

The west, north, and north-east aspects should be planted with Scotch Fir and Larch; and towards the bottom of the hill, in the same aspects, Beech will thrive. If there are six inches of soil, sown or planted Oaks will grow very well; and though the soil be poor, clumps of Sycamore for ornament will grow beyond expectation, as they will receive the moisture from the higher grounds. This may be seen in natural woods.

The other aspects should be planted with Beech, Hornbeam, Sycamore, and all the bottom with Oaks: if three or four Mountain Ashes are planted in different places, it will add to the beauty of the plantation; but the wood is of little value.

The common wood, or rough-leaved Elm, will grow in a very poor soil to great perfection, and may be planted next to the Beech. These must be planted very thick. There are many Firs and Pines brought from America that thrive in poor land. Of these there have been no large plantations made; what have been
been

been planted are for ornament, and the wood of them does not seem to differ much from the Scotch, which we are sure comes to a great size in a very poor soil, and at a distance they have much the same appearance. The beauty of such plantations is only to be seen from distant views. The seeds of the same sort of trees should be sown in every other place left vacant in planting. At the top, where the Scotch Firs and Larches are planted, there should be no places left, as these trees are of a very quick growth, and the seeds of the Fir kinds are subject to be devoured by birds. The young plants also, for the first year, are very subject to be thrown out of the ground by frost. And, what is more material, they would be smothered by those planted if they should meet with no mischance.

In sowing, you may put some acorns amongst the planted Beech, as they are near of a growth. They will grow from seed where they will not thrive when planted, and, penetrating into the cavities with their young fibrous roots, will find sufficient nourishment where there is lit-

the appearance of a tree's growing. In natural woods we often see fine Oaks in such situations, and there is no doubt such trees were from seeds accidentally dropt.

It should be observed, that all trees thrive better in clumps than when mixed. If mixed, they should be with trees of an equal growth, which is seldom considered. It has been a common practice to mix Scotch Firs with Oak and Beech (the Scotch Fir is of a very quick growth for ten years, the Oak and Beech of a very slow growth for near that time) to keep them warm and to encourage their growth. The practice is very wrong, and quite contrary to the present system of thick planting. If the Firs are planted at six feet distance, with an Oak between, they will smother the Oaks in a few years; and if taken away sooner, they do not answer the end they were planted for. If the Oaks are planted alone at three feet distance, they will thrive much better, for they suffer more from the cold when the Firs are taken away, than any advantage they can receive from their warmth while they

they remain. When the Firs are taken away, your Oaks stand at six feet distance, which is too much, as the intention of planting thick is frustrated, which is to prevent pruning and to keep the trees warm, both which are of the greatest consequence to plantations on poor land.

Where there is so much rock, and indeed no appearance of earth, there is no possibility of stirring the earth with a hack; yet we must not despair of raising trees and shrubs, which is evident to be seen in natural woods where trees and shrubs are seemingly growing out of the stone. No art can pretend to plant in such places; but nature shows us what she can do, and by following her dictates we may accomplish what has been thought impossible.

In all rocks there are openings and cavities, and by the moisture falling from the higher parts of the rock into the bottom of the openings, there is sufficient nourishment to vegetate seeds; and when they are once in a growing state, the young roots will find cavities and openings

ings to push into, and also nourishment sufficient to make a tree, bush, or shrub. It cannot be so certain to get trees and shrubs to grow in rocks as in earth; but it may be depended on that many will grow, and to a great size. The only method is to drop feeds into the cavities.

The best season for dropping feeds into rocks is as soon as they are full ripe and dry; but there are so many mice and other vermin about such places in winter, not overstocked with provision, that they destroy every thing within their reach. To remedy this as much as possible, the feeds may be so prepared as to be sown or dropped in March with good success.

The preparation of the feeds for dropping amongst rocks, and sowing plantations on all kinds of poor land, will be treated of under that head.

In order to drop the feeds amongst rocks, let a man take a few of the following feeds, and drop three or four of a kind into each cavity, observing to drop the larger feeds into the deepest cavities, such
as

as Acorns, Beech-mast, Hornbeam, Evergreen Oaks, Yews, Mountain Ash, Hollies, Haws; and into the lesser openings Broom, Juniper, Furze, Birch, and Wood Elm.

These places should be gone over next spring, as there are many accidents to prevent the growing of the seeds. There will be no occasion to have any regard to drop the same sorts of seeds into the holes as they were dropped the spring before; for if both grow it will be of no bad consequence, as we often see two trees of different kinds growing in natural woods on bare rocks.

It may seem ridiculous to drop seeds into rocks; but it is evident many fine trees are growing in such places, and it must have been from accidental dropping. This is no more than following nature, and she has taught us what is to be done to cover such places as have been left naked and disagreeable.

It may be objected, that there are many trees in natural woods, on rocks, that
produce

produce seed, and yet there are many bare places on the same rocks. But it may be remarked, that many of the seeds falling into one cavity may intice vermin to destroy the whole, and many places where none fall. The small quantity that is dropped into each place is no great temptation to vermin, and the regular dropping prevents any being missed.

I must here be understood as speaking of such places where there is very little earth, and of bare rocks where there seems to be no earth, and where it seems almost impossible for any thing to grow, and where the spade could be of no service. But I am certain, if the directions given are followed, a fine forest will succeed a barren mountain, which will be a great pleasure to the present possessor, a profit to posterity, and an advantage to the kingdom in general.

Having given directions for planting the barren mountain where there is little soil, I shall now take under consideration gravelly hills, heaths, and commons, where
there

there is so much earth that little holes may be made to plant and sow in.

Make the holes at three feet distance as deep as the soil will allow, and one foot broad, if the ground is not very stony, at top. The readiest method is to pare off the surface with a paring spade; but if stony, the broad end of the ax-hoe will be the best. If grass, pare it off as thin as possible, lay it aside, dig out the earth, and lay the pared surface into the bottom, laying in the earth in the form of a mole-hill, to remain until the season of planting and sowing. This work should be performed early in summer for the rains to moisten the earth, which is always very dry when turned up, and there is no danger of weeds growing on such land. The earth being laid up round will have more advantage of being mellowed by the weather, and when the planting season comes there is nothing to do but to level the ground even with the surface and plant.

A man can make three hundred holes in a day, and two men may plant a thousand, and do them well.

If

If the surface be coarse benty grass or short heath, which is often the case in such poor land, pare it off with the hoe as thin as possible (the paring spade should not be used, as it takes too much of the scanty soil) and throw it away, for in such dry ground any thing that is light keeps it open, and is of very bad consequence by making the ground lighter and drier.

The holes being laid in this position, will be in good condition to plant after the first autumn rains for most kinds of deciduous trees. They should be planted as soon as the leaf is decayed. They may be planted in open weather the beginning of winter, but never in the spring on such dry ground.

Oak and Larch are an exception from the general rule, for although they are deciduous plants, their proper time of planting is late in spring,

Oak thrives best when it is removed in the spring just before the bud begins to push; that is, about the beginning of march, This should always be observed
in

in the removing of Oaks that have been trained in the nursery for four or five years, as a great deal of the success depends on their being removed at a proper time. I have planted Oaks of six and eight feet high the latter end of April with good success, but it was into a fine strong loamy soil.

The young plants of Oaks that are intended for bare ground should be planted at the same time with the trees from the nursery; but if there is the appearance of a dry spring, they must be planted before the ground is dry, or they will infallibly perish.

As it is best to plant all kinds of trees by themselves, it can be no inconvenience to leave the ground designed for Oaks until the proper season. It will be an advantage; as the other sorts of trees should be planted sooner, there will be more time to finish planting.

If there are any small crooked Oaks in the nursery, and seemingly good for little, prune their stems and plant them by themselves,

selves, and after they have been planted two years, in any of the winter months cut them down an inch below the ground, and they will make fine straight shoots next summer. The latter end of June, or the beginning of July, let them be gone through, and all the shoots but one of the straightest and strongest be sliced off with the finger and thumb, closing the earth round the remaining plant; they will come easily off at that season, but if they stand much longer, we shall be in danger of tearing the bark off the stool, which would spoil the tree. There must be no knife made use of; for, if cut, they will push many shoots at every amputation, which would be of bad consequence, as they must be cut again, and by that means will form a bunch round the root of the tree, which would be of great detriment, if not wholly destroy it. It will be necessary the next summer to go over them at the same season and strip off any small shoots that may have sprung, after which no further care will be wanted. This is foreign to what I purposed treating of, but I have seen such Oak plants thrown away as good for nothing. I have
 planted

planted such, and treated them as here directed, and have had a clump of fine trees, straighter and finer than those planted with their heads. It is my opinion that all planted Oaks which do not thrive, if they were cut down as above, would make fine trees. I have done so with some, and they answered very well.

The Larch, although a deciduous tree, should never be planted in winter, and in most autumns it is too late before it loses its leaf. The best season is the beginning of March, both for large and small trees. They should be planted just before the buds begin to push. It is a resinous tree, although not an evergreen, and has small fibrous roots like all kinds of Firs and Pines, whose roots should never be cut unless they have been long out of the ground.

None of those should be planted when the wind is high, nor when the air is frosty; their strong roots are hard and brittle, and the small roots, if dried by frost or wind, never recover, and it is from those small roots the tree is first put in a growing

growing state: This is often the loss of the tree, as the large roots are so hard that they seldom push until the tree is growing. Young Larches have only small roots, and require no cutting if planted soon after taken up. If the small roots are dried it is of bad consequence, and is the reason they so often miscarry when kept long out of the ground. All kinds of resinous plants should have their roots wrapped in wet moss, if they are to be carried to any distance.

All kinds of Pines and Firs should be planted early in autumn or in the spring; the latter is preferable, as early in autumn the ground is generally too dry, and after the rains have fallen it will be too late, as the frosts may be expected soon, and should they be very severe it will throw the young trees out of the ground.

The Scotch Firs are an exception from the general rule, for they may be planted with safety from September to April; but in poor land that is hard and dry it would be of great service to put some grass, stubble, or any light stuff round them to keep
out

out the frost, as they are as subject to be thrown out of the ground as the other kinds.

It should be observed, never to plant in such dry ground, as here treated of, when very dry; neither should it be planted when very wet. Two days after rain it will be in good condition, that is in high ground; but there are some very poor lands that are flat, so that the water has no way to run off; such places should be planted in spring.

Although the ground in general be very poor, yet in those places where the water lays, it is richer and generally of a strongish loam, although shallow, and a clayey bottom. If the water can be got off, so as only to be wettish, and not to stand to cover the surface, Oak will thrive well in such places, and grow faster than in any other ground. I have had them shoot three feet in one year (the second year after planting) and very straight and strong, although the whole ground was several times covered with water the first winter after being planted.

B

When

When such places are planted, the holes must not be made but as you plant; for if the holes were to be made as before directed, the bottoms would be full of water, the tree would stand in a quagmire, and it would be impossible to fasten it. If the tree is planted six inches above the level of the surface it will be better, and the ground made up round the tree in the form of a round-topp'd mushroom.

In these places we must deviate from the general rule for planting poor land. The trees planted here must be such as have been trained in the nursery for four or five years, and of a pretty good growth. The reason is, that the small fibres of young trees are easily rotted; so that such trees as are planted in this ground must have all their small roots pruned off. The strong roots will bear the moisture, and push fresh roots sooner than in any other ground. It will be absolutely necessary to plant such places in spring, and it may be performed ten days later than in any other grounds, for there will be sufficient moisture for them all summer.

There

There must no places be left for sowing here, for the moisture would rot the seeds. Spruce Fir and the Swamp Pine will thrive well in such places; and the Plane Tree will grow if there is a foot deep of soil. All the kinds of the Poplars will do very well; but I think they should all give place to the Oak, which will thrive to admiration.

Poplars of all kinds have come into great esteem of late years, being found very fit for all kinds of country business. Several gentlemen have made floors of them for their chambers, and they answer very well; but they will not be of long duration.

As wood is scarce in many places, a small space might be allotted for a plantation of Poplars; and as they are of a quick growth, they will come to use in a few years, and save better wood. They will grow in any land that is not very hard and dry; but as the intention of planting them is that they may soon come to profit, it would be adviseable to plant them in a swampy rich soil.

The best method to propagate them is to cut them into truncheons of a yard long, and with an iron bar let them into the ground level with the surface, fastening the ground round them. They will push out many shoots next summer, which should be all pulled off by the hand the end of June or soon in July, only one of the straightest and strongest being left to grow to a tree. There will be more shoots push next summer, which should be pulled off as before (for they are very subject to push out suckers) after which they require no further care; for if they are planted at six feet distance, they will prune themselves, and grow very straight, and to a very great size in thirty years.

Some sharpen them like a stake, and drive them down with a mallet, but that is not a good method; for if in driving they are scratched by stones or roots, the bark decays on that side, and often causes a blemish in the tree after it has grown several years. When the bark is not broke, they push roots all along the truncheon to the very surface, and make much finer trees than those planted with roots;
neither

neither are they subject to be blown up, which the others are.

In plantations where under-wood is designed, some clumps of Poplars will answer extremely well; if the ground is inclined to wet, they will be fit to cut much sooner than any other wood, so should be kept by themselves.

The sowing tree-seeds by the plow has been some time in practice, and is certainly a good scheme; but to use the plow in poor gravelly land, that is covered with short heath, and has never been in tillage, will answer no end; or if the field or common is rough with coarse grass, and little soil, it will cost ten times the expence to bring it into order for sowing or planting, than making the holes for planting as before directed; and the trees will thrive much better than when the coarse grass and heath are plowed in, unless the ground is worked until they are quite rotten, which would require a good deal of labour to no purpose.

Where there is some poor land that has been in corn for some years, and is designed for planting, there the plow will be of great use, and a very profitable way of working; and the field may, with a small expence, be put in a good condition to encourage the trees for many years, even until their own foliage becomes a manure to them; and a crop of under-wood may be expected.

Plow the ground in autumn as soon as the corn is off; let it lay all the winter to mellow; plow in the spring again as soon as the ground is in condition, and get it in order for sowing turnip or rape seed, which should be sown as early as possible, and very thick. As soon as it is grown flush, that is just before the plants begin to shoot (for they will all shoot that are sown so early and thick) feed them off with sheep; as soon as they have eat them quite bare, plow the ground again, and if there should many weeds grow, which is hardly to be expected in poor gravelly land, plow it again just before winter. When it is dry, let it lay all winter rough until spring.

If

If you sow the prepared seeds, the middle of April is a proper time; but if the seeds are sown without any preparation, they should be sown the beginning of March. As early in spring there is always a great hurry of business, it will be a great relief to have a few weeks more to perform the same work; and, besides the other advantages, this is one for preferring the prepared seed,

Just before you intend to sow, plow and harrow the ground; and if the field is so large as to take several days work, plow no more than you can finish in a day.

The ground being plowed and harrowed, mix Beech-mast, Ash-keys (the Ash-keys should be buried a year in a pit, mixed with sifted coal-ashes, as they never come up the first year) Sycamore, Hornbeam, common Black Cherries, Spanish Chestnut, Maple, and Acorns, and sow them broad-cast all over the field; then plow the field with a very shallow furrow (three inches) and scatter all over it some Birch and rough-leaved Elm-seed.

The

The proper timber trees for such land, with under-wood, are Oak, Beech, and Spanish Chesnuts, which are all much of a growth; and although this is not the proper soil for the Oak, it will answer very well when sown. Notwithstanding there are all those kinds of seeds sown in the broad-cast way, and covered by the plow, it would not be amiss, at thirty feet distance, to plant three of the timber-tree seeds in a triangle of six inches distance, and then there will be a certainty of having the trees, which are to grow to timber, at a regular distance (which might be marked as the labour would not be much) and room for the under-wood to grow so as never to be over-topp'd by the timber-trees. The whole should then have a single stroke with a bush harrow. If any large weeds, such as thistles, docks, or wild mustard, should grow, they should be pulled by the hand when young; as for any small weeds, they will be of service in winter, to prevent the frosts throwing the seedlings out of the ground, and will not grow in summer to be any ways detrimental to the plants. They will keep out the drought,

drought, which will be of great use in such ground.

The trees designed for timber should have nothing of the tree kind grow nearer them at first than three feet ; and the third year after sowing there should be only one plant left in a place.

The whole ground should be gone over the third year, and all the plants that are for under-wood, and nearer than a foot, should be drawn up, and the ground fastened round the remaining plants.

As there will be a number of young plants drawn they should be planted in a nursery prepared for them in tolerably good land, and trained for some years to plant in good ground.

All kinds of Firs and Pines must have no place where under-wood is intended ; if allowed to grow scattered about the field they spread a vast way, and by the closeness of their branches destroy every thing under them ; and if they are cut
down

down after they are grown to a size, they make a large gap.

This is the only method to get under-wood in poor gravelly land. It will be long after sowing before it is fit for use; but after it has been cut the first time it will grow better every cutting, and last many years.

Ground thus managed with the plow would make a fine wood sown after the following manner: Make the holes at three feet distance; put three or four seeds in a hole, at four inches distance, in form of a square. To the west, north-west, north, north-east, and east make a skirting of Scotch Firs; then another of Larches, in the same aspects; then Beech, Spanish Chestnuts, and Acorns. All the seedlings may grow to the second year, when all should be drawn but two of the best. The third year the best should be left, and the other taken away.

There must neither spade nor fork be used in taking up the supernumerary trees, for if the roots of the trees that are to remain

main are disturbed, it will greatly damage their growth. If a proper season is minded they will draw easily. After a very hard frost, when the ground is thoroughly thawed, they will draw with the hand. When the plants are all drawn, fasten the ground round the plant that remains with your foot. The plants taken up in this, and all sown plantations on poor land, must be carried to the nursery.

A poor cold clay, that has been in corn, and is of no great value for that purpose, will answer to make a plantation with under-wood. It will not be very vigorous for some years; but after the roots have got good hold of the ground, it will shoot fast, and last many years.

Oak is the only timber-tree to be encouraged in such a soil. Its progress will be slow, but it makes fine wood. The acorns should be sown four in a place, at six inches distance from each other; and the places should not be nearer than thirty feet, to allow room for the under-wood.

Ash,

Ash, Poplars of all kinds, Tree Sallow, and Birch are the proper under-wood to be planted and sown in such land. The Poplars and Sallows, for planting in clay, should be cut to eighteen inches long. As the clay is hard and dry, there will be little moisture to encourage their striking roots at a greater depth, they should therefore be let down as before directed in making plantations of them.

The ground should be plowed early in autumn, as deep as the plow can go, with a thin furrow, and lay all winter to mellow.

The Poplars and Sallows may be planted any time in winter, and the seeds sown the middle of April. This land must not be plowed in the spring, as it would be too stiff for the seeds to vegetate in at first.

The Acorns being planted at their proper distances, also the Sallows and Poplars, let Ash, Birch, and rough-leaved Elm-seed be sown all over the field, and covered with a single stroke of a bush-harrow.

The

The Poplars and Willows should be planted at eight feet distance ; but none of them should be planted nearer the Acorns, that are to remain for timber-trees, than ten feet.

In such a plantation it would be very beneficial to prune the Oaks for ten years. It would make them have fine straight stems, and of a great value. As they are at so great a distance, there would not be a great number in a large field, and the labour and expence would be trifling. Where under-wood is intended, the timber-trees should never be nearer, for if they are, they will in a few years quite smother the under-wood, so as to render it of little value.

There is another advantage in pruning the Oaks ; their stems being long, and their heads small, the under-wood will thrive all around them as near as it should be allowed to grow ; which will not be the case if they are not pruned. They will then have short stems and very large heads, and will destroy the under-wood for thirty feet round them.

In

In countries scarce of firing, and where poles and rails are wanted, under-wood will pay the proprietor triple more than the best fields of corn, even allowing for the expences of planting, fencing, and the rent of the land from its being planted to the first cutting, after which there is no labour but keeping up the fences; so the profit will increase, and the Oaks for timber still remain a great estate to succeeding generations.

CHAP.

C H A P. II.

On Sowing Tree-Seeds with Corn.

SOWING tree-seeds amongst corn is an exceeding good method, for it prevents the vermin from destroying the trees as they come out of the ground, as most trees bring up the seed with the first leaf, and all birds are fond of them, and often destroy whole fields of sown trees. This method should not be attempted on fields that have been in grafs; but such as have been in corn some time.

If it were rich deep land, it would be a good method to have a good crop of under-wood; but bare poor land is what is treated of here, so shall give such directions as to have a field of good timber-trees.

The ground should be plowed in autumn, and early in spring sown with a thin crop of oats. If the feeds are dry,
and

and not prepared, they should be sown at the same time; but if prepared seeds are used, which are much preferable, the middle of April is the proper season.

The large seeds may be planted with a setting-stick, not too sharp at the point, at three feet distance, three or four seeds in a place, at four inches apart and two inches deep.

The rough-leaved Elm, Larches, Scotch Firs, Silver and Spruce Firs, and Pinasters must not be planted with the setting-stick, but the ground hollowed out half an inch, and three or four seeds dropped into each place at four inches distance, and pressed a little down with the hand, then covered with mould level.

The proper seeds to be sown, even in poor land, amongst corn, are Oak, Beech, Black Cherry, Spanish Chestnut, Hornbeam, Silver and Spruce Firs, the Scotch Fir, Larches, and Pinaster; and, if the ground is inclined to sand, Sycamore, Horse Chestnut, and Limes may also be planted.

Although

Although the ground is not the proper-est for all the trees here mentioned, the growing corn is of so great service to them, that they will thrive beyond all expectation.

There should no tree-seeds be sown where the surface is not quite rotten. If any gentleman chooses to be at the expence of paring and burning fields or commons that are in grass, or short heath, let him sow it with turnips, eat them off with sheep early in autumn, and plow it as deep as the soil will allow as soon as clear of the turnips. In spring sow it with a thin crop of oats, and with the tree-seeds at the proper season, March for dry, and the middle of April, if prepared.

If the ground is free of large stones and tolerably even, so as to be easily plowed, the expence will not be great, and if the season answers, the turnips will repay the charges; but there can be no expectations of a great crop from such poor land. It is for the advantage of the tree-seeds that I would advise this method of working.

All the Pine and Fir kinds do much better sown amongst corn than any other way, and indeed it is the only proper way of sowing them, for the stubble is of great service to them; it prevents, in a great measure, the frost throwing them out of the ground, which all sorts of Firs and Pines are subject to when sown any other way.

All the different kinds of trees should be sown separate; and all the aspects from the south-west to the south-east should be sown first; a skirting of Scotch Firs, forty feet broad, if the plantation is large; then another of Larches, of the same breadth; and if all the other sorts were sown in the same form, the different shades would be a great beauty.

The reason for sowing the Scotch Firs and Larches to the west, north, and east points is, that as they are very hardy, and grow quick, they will be a great shelter to the other trees, and keep them from the cold winds which blow from those quarters, which often bends them and makes them grow crooked.

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When the oats are cut, the labourers should be careful not to tread on the trees, and the oats should be cut high, that none of the seedling-plants be topt. The long stubble will keep the trees warm all winter. The oats should be carried off the field by men as soon as they are cut, for it will be impossible to bring carts or horses into the field without destroying many of the young plants.

Trees sown amongst corn will grow more that year they are sown than they will any other way in two, and be very straight. I have had Oaks grow eight inches from the seed in one year, in very poor land.

Unless there are thistles, or such strong-growing weeds, (which should be pulled by the hand when young) there will be no occasion to hoe or clean in such grounds, for the stubble and small weeds will be of great service to keep out frost and drought, which is of great importance to the young trees on such dry ground.

The young plants should be thinned the second and third years, as directed in the

other sown plantations; after which they will require no further trouble for many years.

It may be imagined that *sown* trees left at three feet distance would be so thick as never to grow to timber; in tolerably good soil it would be improper, but in poor gravelly and sandy land they grow very slow for several years, and never begin to make any great progress until they shelter and keep one another warm; they also grow much stiffer and stronger in the stem, and their side-branches do not extend near so fast as in good land. So that their being sown thick is a very great advantage, and the only method to make them thrive.

There is nothing further to be done until the plantation becomes quite a thicket, then every other tree must be stub-felled. They will be fit for many uses.

The trees to be taken away (as they will not be drawn weak on such ground) may seem very good plants for transplanting; but that must not be attempted, for it will be impossible to take them up with
any

any thing like a root for planting, without greatly hurting the roots of the trees that are to remain on the ground; it would greatly retard their growth, and the trees taken up would have little chance of growing, being taken out of so close a situation; and it would be impossible to avoid cutting these roots very short, as the trees are only three feet distance, with their roots spreading all over the ground.

All the plantations here treated of must be thinned in the same manner when they are grown up; then the trees will stand at six feet distance, which will be sufficient room for them to grow to timber. After some trees are taken away, and the remaining ones are at six feet distance, their side-branches will still near meet, and be sufficiently warm; and they will decay as the tree advances in height, and by their closeness will prune themselves.

It will be a great temptation to lovers of trees and planting, who have plantations going on, to thin their sown plantations. When the trees are about six feet high they are then of a proper size and
 C 3 age,

age, and would be very fit for to transplant into any ground that is tolerably good; but then, the plantations they were taken from being on poor ground, they would never thrive; but stunt and grow crooked bushes, as may be seen in natural woods on poor ground. Where the trees are thin they make no progress; whereas where they are very thick, in the same wood, and on the same soil, they are very straight and tall; for which reason no temptation must prevail to thin them at that age.

Where under-wood is of great value, and where there have been large plantations made on poor land, when they come to be about sixteen feet high, if there was a hundred yards cut clean off by the ground, then a clump of trees to stand of the same size, and so on all over the plantation, this would be profitable to the present proprietor, and advantageous to the country; and as the trees stand in large clumps they will thrive very well, and the under-wood will grow very fast after the first cutting.

C H A P III.

*On Planting Moors and Commons covered
with long Heath.*

THERE are large hills, moors, and commons covered with long heath; such places are of more value than is generally imagined; the heath which grows on them plainly shews the ground is fertile, and if they had been planted some years since would have been fine forests, and not one sprig of heath to be seen; it is the best soil for planting in England, and will bring trees to as great perfection as our best land, and with small expence.

This soil, in appearance, is a light, black, peat earth; but it is of a far superior nature; for on that black, loose, mossy earth grows little heath, only a strong benty grass, and a little soft mossy earth below the grass, then a hard kind of peat, which is very barren. Whereas that on which long heath grows is of a great depth,
and

and of a fine moist clammy nature. On this soil most of all the kinds of forest-trees known in England will grow, even all the kinds of Poplars, which shews that it is of a very fine moist nature.

The planting or sowing in such ground is much easier performed than in the best land. There is nothing further requisite than to pull up the heath about a foot's breadth, and if you sow with the large tree-seeds, such as Acorns, Spanish Chestnuts, or Beech-Mast, they may be planted with the setting-stick (as the pulling up of the heath has loosened the ground sufficiently) two inches deep; four or five seeds in a hole, three inches apart.

Where the smaller seeds are sown, such as the Silver and Spruce Fir, the Scotch Fir, the Pinafer, Weymouth Pine, and Larch Tree, after the heath is pulled up, chop the ground with the spade, and drop four or five seeds into the place, at three or four inches distance, then gently tread it with the foot; and nothing further is required in sowing on ground where long heath grows.

Such

Such ground requires less labour to plant than any other: There is no occasion to make the holes until they are just going to be planted, and they need not be any larger than just to receive the tree roots.

The heath is of great advantage to the young trees, and makes them thrive exceedingly if it is higher than the trees planted, which I would advise. If the heath is eighteen inches or two feet high, the trees should be a foot or thereabouts; the heath will then keep them warm, and will protect them from all winds until they have got good roots; so there will be no occasion to plant so thick as on the poor bare land. Six feet will be a proper distance; the trees will grow very fast, and by the time they have got a foot or two above the heath their branches will near meet, and as the trees advance the heath will decay. The trees growing closer will prune themselves, and there will be no further care requisite.

If the ground is a flat moor, it should be planted to the west, northern, and east
aspects

aspects with Scotch Firs and Larches, as before directed upon poor land, for shelter.

If a hill, or rising ground, which is generally the case, the highest ground to the west and north should also be planted with Scotch Firs and Larches, to shelter the other trees from the north winds; but the plantation of them should be small, as it would be bad policy to use much of this ground for any trees but the Oak, which thrives in such soil better than in any other.

If such rising ground is in sight of a gentleman's house, there may be some clumps of the different kinds of Firs and Pines planted for ornament, as they are very beautiful at a distance in the winter. The Silver and Spruce Firs will grow to an immense height in such soil.

Although I have given directions for sowing and planting the different kinds of forest-trees on such ground, it is to shew it may be planted and sown with such where gentlemen are inclined so to do; but as the Oak is by much the finest and most

most valuable wood, it should have the preference, especially on ground so proper for its growth.

I made three different plantations amongst long heath (where the ground answered the description given) in the same year. The first was sown with Acorns and Scotch Fir-seed; the second was planted with seedling Oaks a foot high, two years old, and Scotch Firs from the seed-bed of that year's sowing, but were thinned to two inches in the seed-bed, and were fine stiff plants; the third was planted with seedling Oaks, three years old, (eighteen inches high) but had not been removed from the seed-bed. The heath was near two feet high, and very strong.

In the first, sown with Acorns and Scotch Fir-seed, many of them came up very well; but the mice, which were very plentiful amongst the heath, destroyed many of the acorns, so that many of the holes were quite empty, and many had only one tree. Next winter many of the young shoots of the Oaks were cropped by the hares. They were to make good for three years before

before all the holes were full, which was a good deal of trouble and expence.

The growth of the plantation was very irregular; the Firs in some places spreading over the Oaks, and where they had been sown the last time, to make up the deficiencies, not so high as the heath. The young shoots of the Oaks were weak, being drawn, but very straight, and when they got above the heath they were slender for some years. So that I think planting good young plants is better than sowing acorns in such ground. The heath had no bad effect upon the sown Firs, they grew fast and strong, and there were few of them destroyed by the mice; there were many to take away, and those plants were much better than those sown in seed-beds according to the common method, and fit to plant in any ground; so that if a plantation of them were intended and sown alone, they would answer full as well as planting amongst heath.

Where the seedling Oaks and Firs were sown together, the Firs did not get the better of them for some years, but their
side-

side-branches at last spread so, that it became absolutely necessary to take them away. The whole were accordingly taken away, and replaced with Oaks of sixteen inches high (two years old) from the seed-bed. They all throve very well, and a few years after the plantation was pretty equal, only the planted Oaks were stiffer than the sown, and not so tall. No Firs should be sown nor planted with Oaks, let the ground be good or bad.

In the second plantation, both Oaks and Firs did very well; but in six years the side-branches of the Firs over-topp'd the Oaks; and the seventh year there was a necessity of taking all the firs away, which was done, and Oaks of three feet high, that had been removed from the seed-bed into the nursery two years, planted in the room of the Firs. They all grew very well, but the first-planted Oaks were the finest trees at ten years after, which is a good reason for making all plantations for timber of small trees; for unless it be for pleasure, where large trees are planted for ornamenting pleasure grounds, without any regard to timber, the small-planted
trees

trees will in time make the finest woods, and in less time than those that are planted large.

The third plantation, planted with Oaks only, of three years old, eighteen inches high, and had never been removed from the feed-bed, grew extraordinary well, and was the finest of all the three. There was no further trouble with it.

The heath decays as the tree advances in height; and as they grow thick, the under-branches decay, and they have in general fine straight stems.

There was on the same hill I planted on, a plantation of Scotch Firs, which had been planted sixty years. At the time the Firs were planted, such high grounds were thought to be fit for no other kind of wood. They were fine trees, and many of them were cut for use. The wood was pretty good, but not come to its full growth. There was not one sprig of heath on all the ground the Firs were planted on, and if it had been any other kind of wood but Firs, there would have been

been good feeding for cattle and sheep, and good shelter.

Although, in all plantations where sowing the seeds is recommended, I have given directions for sowing all the kinds of Fir and Pine-seeds, yet the sowing them on the place they are to remain in, on poor ground, is not the best method, (unless amongst corn or long heath) as they are so apt to be thrown out of the ground, especially on poor ground, where they grow very little the first year, and are very small; and the ground being naturally very loose, they are froze in winter below the roots, and many of them thrown out of the ground, and some of them are raised so as to stand like a spider, with a very small part of their roots in the earth. Those that stand so will grow, but their being raised so retards their growth much, and they will look red and shoot little until their roots have got hold, which will not be for a year or two. A little soft moss spread over the holes when they are sown, is of great use to prevent the frost's penetrating the ground below the seedling's roots; but that is attended with
some

some inconveniency, for it must be at least an inch thick, or it will be of no service; and then it encourages grubs and other vermin to lodge under it, and they very often destroy the young plants as they come out of the ground. The best method for all the Fir kinds is to sow them and plant them from the feed-bed.

The compost for the feed-beds, and the method of sowing and managing them, so as to make them fit for planting out the first year, will be fully explained under the article of sowing all kinds of tree-seeds.

If there was any moss spread over the holes and places where the Fir and Pine-seeds were sown, it must not be removed when the supernumerary trees are taken up, unless the stem of the plant that is to stand be earthed up to the top; for it will be very tender by growing through the moss, and would be in great danger of perishing by the cold winds in spring. Earthing up the stem is more advantageous to the tree, and will greatly encourage its growth; but will be attended
with

with a good deal of labour, as the ground should be a foot level round the plant. If the mofs be left, the stem will harden as the mofs decays, and the plant will thrive very well.

The difference between planting and sowing Firs is trifling, for both in rocky and poor land the holes and places are made the same for planting as sowing; and it will take very near as much time to sow a hole as to plant a single tree into it; and the advantage is very great in favour of planting, for the many reasons before given.

A man may, with care, plant four hundred in a day, where the holes are made, and do them well. As they are planted, it would be of great service to them to lay some long grafs, heath, or mofs round each; it will not be much trouble, as the parings which come off when the holes were made will be near at hand. It will keep out the drought in summer, and prevent the frost from loosening the mould in winter; for although the frost is not so detrimental to the planted tree as to the

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seedling plants, the tree will thrive much better when the mould is not so light about it.

Firs and Pines are in general planted all the winter months, especially the Scotch Fir, and very often with good success; yet it is not the best method in poor ground, for the reasons before given. Early in autumn is the best season for planting them in hard dry ground, provided the holes were made early, and had some rain. It is the nature of the Fir to push roots immediately after they are planted, if the weather is free from frost for some time. It will be a great advantage to trees of any kind to be well settled on dry grounds before winter; but there is none of them that get fresh roots but the Fir kinds. Firs may be planted to the end of April, but at that season they should not be long out of the ground.

Where there are large plantations of Scotch Firs that come to maturity, they bear seed in great plenty when about thirty years old. If there is any waste ground joining the Fir wood, that is covered with
heath

heath four or five inches long, if it was inclosed, and kept from cattle and sheep, in a few years it would be very full of fine young plants, and will serve for a nursery for several years, and still there may be sufficient trees left to grow into a wood. When the trees are grown to eight and ten feet high, the young plants that spring yearly will not be fit for planting, as they will be drawn weak; and although some of them should be stiff short plants, they will be in danger of perishing when taken out of such close places. So if there are many of these trees wanted, it will be the easiest way of propagating them to take up yearly all the young trees that are fit, until there is a sufficiency got; then they may be allowed to grow into a thick wood without any further care; and as they grow fit for use, may be thinned as wanted. There will be a great many to cut out, but there is no need of thinning them to any regularity or set distance, for the thicker they grow they make the finer wood. A great many will be over-topp'd and decay, but that is not minded in countries where those woods all grow from self-sowing, and are the finest timber.

If the heath adjoining the Fir wood be long, when inclosed it will answer to make a wood, but will be of very little use as a nursery, as the length of the heath will draw up the trees weak, and they will be void of branches on the sides until they are grown above the heath, so will have long weak stems, and will not be fit to plant. They may be allowed to grow from the first coming up. They will grow very fast, and soon be fit for use. But such grounds as produce long heath, may be better employed than with Fir-trees, as has been treated of in planting ground covered with long heath. I have heard of sowing Fir-seeds broad-cast amongst heath, as corn, without any further trouble, and that it has succeeded very well.

This is somewhat similar to what has been just now treated of, and I make no doubt the hint has been taken from that, or by seeing the seeds of trees come up in the grounds at a distance from the trees that bear seed.

But

But there is a great difference between ground around, and even at a distance from, feed-bearing trees being full of young plants, and sowing in ground where there is no supply. Round a feed-bearing tree, there will be plenty of young trees if cattle are kept off; and where there are vacancies, it may be replenished next year; whereas the seed that is sown at random there must many perish, and many more be destroyed by vermin; and as there is no supply, there may be many places empty; and as there is not the advantage of trees full of seed to make up the deficiencies, so there must be a want, if not made good by sowing fresh seeds, which would be troublesome and expensive, as perhaps there would need repairs for years; so that the expences will be greater than following the directions given for sowing Fir-seeds amongst long heath, which is little trouble, and so easy that it may be performed by any labourer at a very small expence. A little quantity of seed will sow a great deal of ground. One man will sow and make the places for several hundreds in a day; and there is almost a certainty of success: And what is

more advantageous, if four or five good seeds are put into each place (as directed for sowing Fir-seeds amongst long heath) at three inches distance, there is a probability of having three or four good plants to spare in each hole for making more plantations.

What has been said of the success of the inclosed waste has been done frequently. There are many objections against sowing the seeds at random. It were to be wished that some public-spirited gentleman would try the experiment, not only with the Fir, but several other kinds of tree-seeds. It would be a great advantage if it answered.

The preparation of tree-seeds is of a great advantage, as it will greatly prevent their being destroyed by vermin, which is the only great objection for not sowing all poor land instead of planting; for sown seeds grow much better than planted trees, especially the larger sorts. The best season for sowing all kinds of Acorns, Beech-mast, Chesnuts, &c. would be the autumn, as soon as they are quite dry, were
it

it not that they have to lay all winter in the ground before they vegetate; and the mice, who are very dexterous in finding them, often will destroy a great part of them; and very often what they do not eat, they will collect from different places into holes of their own making, leaving many places in the field without a seed, as I have often found to my great disappointment. To prevent as much as possible these inconveniences, the prepared seeds, with equal success, are sown late in the spring, and are a very little time in the ground before they come up, and after they have begun to vegetate, the mice are not so fond of them.

There is also another great misfortune that tree-seeds sown in autumn are liable to, that is, if there should come a few weeks of fine weather in the end of January and the beginning of February, it will cause the seeds to come up early, before the hard frosts are over, which is the destruction of many of the young plants, and sometimes of the whole. This does not, however, often happen, as there is seldom such fine weather at that season; but it is

a misfortune seeds sown in autumn are rather liable to, which the prepared seeds prevent, as the danger is over before they are sown.

The small birds are great enemies to all the tree-seeds that are small, the Fir and Pine kinds in particular, and which bring up the seed with the first leaf; but as there are few of them on uncultivated heaths and commons, where there are no trees, they may easily be destroyed.

The crows are the most mischievous, and will destroy a large plantation in a short time; for as soon as they find a field or common sown with tree-seeds, they will root with their bills, and scratch with their feet, until they get at the seed, although two inches deep in the ground, especially Acorns and Beech-mast, which they are very fond of. The best method I could ever find was to shoot some of them, pull off some of the feathers, scatter them about, open the crop, put some gunpowder on the inside, and drop the carcasses about the field. This will frighten them for some time, and as the prepared
seeds

seeds are soon out of the ground, it will be a great means to save them from those enemies, who are not so fond of them after sprouting.

The seeds of Acorns, Beech-mast, and all kinds of nuts should be kept in dry sand all winter, in a place that is not damp, for the dampness would make them shoot too early in the spring for sowing; nor in a place where there is any heat, for that would make them pine, but in a dry airy place. The Sycamore, rough-leafed Elm, and all the kinds of Firs and Pines, should be kept dry without any sand.

The rough-leafed Elm is generally sown as soon as dry after it is ripe, and frequently comes up the same season, but sometimes not till next spring, and then for the most part so early, that many of them are cut off by the frost. If this often happens to them in warm nurseries, they would stand a great chance of being all destroyed if sown in fields or commons of poor land, as it is so late in the season before the Elm-seed is ripe; for even those that come up would be so small and weak
that

that they would be all thrown out of the ground, and those that did not come up would perish by wet and cold. But if the seeds are thoroughly dried, and kept from damp, they would do very well to be prepared and sown in spring, at the same time the other tree-seeds are, which is of great use; for they are very fit for many places on poor land, grow much better from the seed than when planted, and is a profitable good wood.

The preparation of tree-seeds, so as to have them vegetate before they are sown, is what has never been practised, nor known, and is of the greatest use to save the seeds from vermin and frost in spring, and from being injured by the frosts in the winter following.

As to the sowing seeds in spring, that has already been shewn, and as they have all the advantages of those sown in autumn, and liable to none of their disasters, it is a great improvement; for as the severe frosts in spring are over before they are sown, and they, by being prepared, are near as forward as if they had been
sown

sown in autumn, they have time to grow to a good size, and to have their roots well fixed in the ground, and are not liable to be thrown out of the ground by frost next winter.

The preparing and vegetating tree-seeds before they are sown, is only following nature; for the seeds that are blown by the wind from the trees into different places, those that grow are laid up by chance in security, and vegetate by the warmth and moisture of the places they lay in, sooner than any that are sown in the common way in the spring, although sown as early as the weather will allow; and it is only doing what is every year practised, although it has never been thought of.

Hawthorn and Holly-berries are buried in autumn as soon as they are pulled, and lay a year, and then are fit to be sown. The pulp of those berries is hard and dry, and takes a long time to rot, and until that is quite rotten, there can be no vegetation; and if no art is used, they take a year; but, as soon as they are pulled, if they

they were mixed with fresh grains, and turned over every three or four days for one month, and then lay all winter covered, so as no frost can come at them, and turned over sometimes to prevent mouldiness, which would destroy them, they may then be sown in the spring with the same success as if they had been buried a whole year.

The only danger in having tree-seeds sprouted before they are sown, is having their sprouts rubbed off in sowing; but of this, unless the persons employed are extraordinarily heedless, there is no danger.

The proper time for sowing Hawthorn and Holly-berries, that have been buried a year, is the beginning of March; but by the hurry of other spring business, it may be sometimes the middle of April before they can be sown; by that time they are sprouted a good length. I never found it any detriment to their growing, for it has happened to me several times.

I mention the Hawthorn, as every one is acquainted with the nature of its management,

nagement, and knows it will grow very well when sprouted before sown. If the tree-feeds are managed as directed, they will not be so much sprouted as the Hawthorns, and so will not be in any danger, but will answer every thing that has been said of them, for there is nothing advanced but what I have practised often with good success.

This method prevents many of the mischances that sowing tree-feeds are liable to; for as feeds sown on hills, commons, and fields, ought to be done with great care, so it would be very troublesome to have the whole to go over for a year or two to make up deficiencies; besides the irregularity in their growth.

The composition for preparing the feeds to vegetate is soft pit sand (sharp sand will not answer) and fresh grains from the brew-house. The sand should be got in summer, and made very dry, and laid by until wanted. The grains must be fresh from the brew-house, but must be spread, turned, and dried until they are just of a clammy moisture; then they should be mixed with
dry

dry sand in equal parts, until there is sufficiency for the quantity of seeds to be prepared. After the sand and grains are mixed, they must be rubbed between the hands, and laid in a heap for four days, then turned over every day for a week, then let them lay four days in the heap; and if then there is no mouldiness, but a fine clammy moisture, it is fit for use; but if there is the least appearance of mould, it must be turned twice a day for three days, and then lay four days; and if then there is no mould, it may be used without danger, for there is nothing that can be of the least hurt but the mouldiness.

When the composition is ready, have some boxes of different sizes, according to the quantity of seeds. If the quantities are small, garden-pots will do as well.

For the large seeds, such as Acorns, Beech-mast, &c. lay an inch of the composition at the bottom of the box or pot, then a layer of seeds; fill up all the vacancies quite level, then a layer of seeds; and so on till the whole be finished. The Fir-seeds may be mixed with the hand and
laid

laid in the box, first laying half an inch of the composition in all the boxes or pots you lay feeds in. The Elm-feed, Sycamore, and any other small soft feeds, should be rubbed between the hands with the composition, and so laid into the box, laying half an inch of the same stuff over all the tops of the pots or boxes, and place them in a dry place, where no wet can come at them, and if it were where they could have the benefit of the sun it would be better, but if that cannot be conveniently done, they will do very well without. If they have the sun, the boxes or pots should be turned every week, that each side may have the same advantage.

The large seeds, such as Chestnuts, Acorns, &c. should be put into the composition the middle of February; the Fir and Pine-seeds, the beginning of March; and the Elm and such other soft feeds, the middle of March. They will all be ready for sowing the middle of April. Great care must be taken to keep them from wet and mice; the wet would cause them to mould and entirely spoil them, and if mice

could
 find

were

were to get into the boxes they would destroy the feeds in a short time.

If the holes were made before winter, as has been directed, they will be in fine order for sowing the middle of April; and as at that season the sun has a good force, and the holes being moist and mellow, the feeds will be above ground in a little time.

When the feeds are to be taken from the pots and boxes, great care must be taken not to rub off the sprouts. The best way to carry them into the field for sowing, is in little boxes with a handle; and as a small quantity will sow a great deal of ground, there should not be a great many taken out at a time; and it will be necessary to take some of the composition in the box with the feeds, to prevent the young shoots being hurt by the sun and air, which would greatly damage them.

This work should never be done when the wind is high, nor when the air is frosty; a calm dull day is the best; but if the sun shines, if not frosty, it will do very well.

If

mould. A man may perform a great deal of this work in a day, and there is not the least doubt of success.

The propagation of trees to plant in poor ground, has never been made a different article from raising trees in general; but it is very different, and very easy. In raising trees, they are moved from the seed-bed, the roots dressed, and planted in the nursery, that the tap-root may be destroyed and made fit for moving, that the roots may spread horizontally, and not go too deep into the ground; but in poor land they are to be planted from the seed-bed, and the tap-root is to be preserved, (which seems a contradiction) for it is on its length and strength that the chief part depends; for without it there will be little hope of success in planting on poor gravel, in heaths, commons, and rocky places, where there is little earth.

Prepare some beds of good earth, and add to them a large quantity of sand; let them be well worked over three or four times, so that the mould and sand be well mixed a foot deep at least. It would
be

be best to do this the beginning of winter ; and let them lay all the winter in small ridges, that the frost may mellow them, and that the sand and the mould may be well incorporated. Early in the spring dig them over and lay them flat ; then, just before you intend to sow them, dig them over again. This seems a great deal of labour, but the success of the plantations, planted from trees here raised, will make it all well bestowed.

At the same time there should be a good heap of the same sort of mould and sand that the beds are made of, as near as can be to them ; and, if it can be had, a third part of black mould, from old woods, where sticks and leaves have rotted for some time. This should be all well mixed, and turned over several times to mellow. This is to cover the seed-beds after they are sown ; for taking the mould out of the alleys to cover the beds (as is the common method) is not right ; for it is so trod in sowing the seeds, that it is very difficult to break it to cover the seed ; besides it makes the alleys so deep that the sides of the beds moulder down,

and many of the trees are lost, at least they stand so dry that they make no progress.

The beds being ready, they should be sown with the prepared seeds the middle of April, as they are the properest, being forwarded in their growth by being vegetated before they are sown, so will be fine plants in autumn, when they are to be planted in the fields where they are to remain.

The seeds may be brought in the boxes or pots they were laid in. The small seeds may be sown all over the beds, composition and seeds together, but not too thick, and covered half an inch with the mould that was thrown in a heap for that purpose. The large seeds, such as Acorns, Chesnuts, &c. may be taken out of the boxes, and placed on the bed with the hand, at three inches distance, and covered with the same mould as the others, two inches thick; so they will require no further trouble, but to keep them clear of weeds until they are taken up for planting. As the seeds were prepared, there should none be sown but what have sprouted,

sprouted, that there may be no vacancies in the beds, if the mice can be kept away.

As soon as the small-seeded plants are come into the third leaf, they must not be suffered to stand nearer to one another than three inches, that they may grow strong and stiff, and have a free air in the feed-bed, which is of great utility to them when they change their quarters to a poor cold heath or common.

The reason of their growing to the third leaf before they are thinned, is that they may be of use, and by standing a year in the beds they are planted in, will be as fit for planting in poor land as those in the feed-beds. It may be imagined that at that age they will be too small and tender, and will not bear transplanting; but they will, and grow very well, if carefully planted. So if there is occasion for more trees than can stand in the feed-beds, they should be planted; and there is this advantage, that as they must stand another year in the beds they are planted in, before they will be fit to remove into the commons where they are to remain

for good, so that there will be a provision of trees for two years, equally good, from the same sowing; but if they are not planted, they must be pulled out of the seed-bed, for there they must not stand closer than three inches.

If the young plants, thinned from amongst those sown, are intended to be saved, there must be some spare beds, the same as the seeds were sown in, and the evening before the seed-beds are to be thinned, they should be well watered, to make those that are to be drawn come up easy. There will be some that will break in drawing; but that must not be regarded, for it would be quite wrong to loosen them, as it would damage the plants that stand in the bed more than the value of those that will be broke. Draw only a few at a time, make a hole with a setting-stick, and let them down the whole length of their single straight root, (for at that age they have no fibres) and close the earth gently to them; for their stems are very tender. Great care must be taken to let down their root straight its full length, or they will not be fit for planting on
poor

poor land; but will answer very well for plantations on tolerably good land.

After they are planted they should have a little water every other day for eight or ten days, but they must have very little at first; for as their stems are tender much water would rot them. If the weather is clear, they should be shaded for three or four days, and then they require no further trouble. I have had very good success several years in this very way, and never allowed seedlings to grow too thick in the seed-bed, which is frequently practised. The bad consequence attending such management is too obvious to want any explanation.

There is one thing I cannot omit taking notice of. It is the general opinion that all trees should be raised on a ground similar to that they are intended to be planted in. This is certainly wrong; and I dare say that most, if not all, the nursery-men in England will join in the same opinion.

The whole of what has been treated of is planting on poor land, on which it is very

very certain a wood may be raised both by planting and sowing; but it would be an odd attempt to make a nursery to transplant from on such ground. The seeds, when sown in such places, find nourishment for their small little roots to supply their little heads, whose progress is slow until they gather strength, and when they get to three and four feet high, their own warmth makes them grow faster than could be expected; and in the holes that are sown, the plants that are to spare in them are not fit for planting in such ground, they have little heads and small fibrous tufty roots, and would be all thrown out of the ground in winter, at least so loosened as never to make a tree.

If an animal was to be only half fed, from its first having life, for one year, I believe that such an animal would never grow to be of a large size of its kind, if afterwards it was put into better keeping; but suppose it was put to harder fare, I believe it would make a poor figure. If this same animal had been moderately fed for one year, and then put into worse feeding, it would have been a better beast.

Thus

Thus it is with trees; if they are sown in such poor hard dry land, they are hindered from the beginning, and it would be some years before they would recover, were they transplanted into good ground. What then must be their case when transplanted into the same sort of ground, perhaps into a colder situation? I have been longer on this point than I intended, because it is often recommended that the nursery be as near as possible to the ground the trees are to be planted in,

All public nurseries in the kingdom, that are of fame, are on fine light good land; and many years experience shews that all kinds of trees and plants bought from them thrive very well, although for the most part planted in much worse ground than where they were raised.

It would not be right to raise trees for planting in poor land on ground made very rich with dung; but it would be much worse to pretend to raise them on a very poor soil. If the beds for sowing the seeds are made as here directed, they will produce fine plants for the purpose, and there

there will be no doubt of their success when planted in the very worst ground.

The management and sowing the seeds, as also the raising of the trees, for planting poor land, are all fully explained.

We now proceed to the planting, which may be either alternate, or wholly detached. I would recommend alternate planting and sowing, unless where it is otherwise directed; that is, all the Fir and Pine kinds should be *all* sown or *all* planted; but planting them is much the best, as it is almost impossible to save the young seedling plants from being hove out of the ground on poor land in winter; so it would be better to let the Firs, Pines, and Larches be two years old before they are planted, but they must not be moved from the seed-bed, but thinned as before directed. Their roots are small and tufty, and easily managed, and may be spread about when planted without cutting any of them, which will cause them to get good hold of the ground, and be in no danger of being thrown out of the ground by frost.

All

All the deciduous trees, but the Oak and Larch, (which are much better to plant in spring) may be planted from the decay of the leaf, in any of the winter months when the weather is mild, to the latter end of February, after which it will not be proper to plant in poor land and in hard dry ground; for if the spring should prove dry, which it often does, those planted later would be in great danger of being lost.

All the trees must be planted from the seed-bed of the same year's growth; but those that were thinned from the seed-beds and planted out, will be so much retarded by being moved, that they will not be fit for planting till the succeeding winter. Those that were sown in the seed-bed, and not planted out the first winter, their tap-roots will become so strong and stubborn, that they will be difficult to manage in planting; and on the tap-roots being properly disposed depends the success of planting in poor land. If there are any left that may not have been wanted, or that there is not time to plant, they must not be left for another year, but

but must be taken up, have their roots dressed, and planted in the nursery in the common method, to make other plantations in good land; for there should none be planted in poor ground, but from the seed-bed of that year's sowing.

The planting in poor land is quite different from planting where there is plenty, or even a moderate quantity, of soil; for where there is so little as two or three inches, if the roots are planted lower than that, there is nothing for them to strike into but gravel or rock, where it is impossible for them to thrive,

The holes being made as before directed, make them flat at top, and if they are two or three inches higher than the ground, so much the better; for they will sink down level with the other ground in a little time, as their being higher is only from the earth's being stirred. Take up the trees from the seed-bed carefully, taking great care to break none of their roots, and take no more up than can be planted in a day; lay them in a flat basket with some moss over their roots, and carry

ry them into the field or common where they are to be planted.

Open the hole five or six inches lengthways, which may be done by only striking the spade into the middle of the hole after it is flattened at top, which will be the length of the tap-roots if they have throve well. Lay in the root two or three inches deep as the ground will permit, at its whole length, horizontally, and then raise up the plant at the neck, in the same manner as in the laying of trees; fasten the earth to the plant, keeping its top upright; after the plant is fastened, loosen the top of the ground with the spade, this prevents it from cracking and is of great service; for if the top of the ground be left hard, two or three dry days make it open as deep as the roots, and dries the roots, and so ruins the whole plantation.

In light ground, where trees are raised, they will have but very few roots but the tap-root, (and that is the reason that it is made so light to prevent short tufty roots) which will be full of small fibres, none of
which

which should be cut off, so that great care should be taken to keep them from sun and wind, which would soon dry them, to the great detriment of the plant, for it is from them the tree begins to strike roots. As they are very small, they are very soon dried by either sun or wind. If it should happen by any accident they are, cut them off one inch distant from the tap-root; but it will be more beneficial to the tree if there is no occasion for any of these amputations.

The laying the roots at their whole length horizontally, prevents the roots from ever attempting to run down into the gravel, which they would, if planted in any other method, and is the reason that plantations on gravelly and rocky grounds have hitherto made so little progress.

This method of planting on poor land is entirely new, and as it is so different from all kinds of planting hitherto practised, it may seem very wrong, as dressing and cutting the roots are the first things recommended by all that have given directions

rections about planting. But let those who have such ground to plant, only follow the directions given with accuracy, and they will find them answer beyond their expectation.

The laying the roots horizontally prevents the trees from being raised out of the ground by frost; and as the roots will, by this method, run just below the surface, they will have all the advantages it is possible for them to have in such shallow ground; and this is the reason that trees raised on poor soil are not fit to plant again in the same sort of soil, as their roots are short, and seldom have a tap-root.

It would be adviseable to plant so that the bend at the neck of the tree be always against the sun; for if the tap-root be very strong, and as there is no great depth of earth to make it fast, it may throw the top of the tree aside. If it does, (which seldom will happen if properly planted) the sun will draw it straight; but if the bend was to the sun, and happen not to be upright, the tree would never be
straight.

straight. Were it not for that reason, it would be indifferent how the trees were placed.

There should be two men employed in planting; one to open the ground, and the other to put in the tree, as it would be a great loss of time to lay down the spade so often. They should have a little box or basket with a handle, into which they should put a few trees at a time, with a little moss over their roots. This will be very handy, as the man that plants must use both his hands in planting. This work should never be performed when the wind is high, nor when the air is frosty.

There is another method of planting poor land that is either in short grass or short heath, which is very expeditious, and also very advantageous, for it effectually prevents the drought from penetrating in summer, and the frost from hurting the roots in winter. Two men will plant five or six hundred in a day with ease. This sort of planting should be done in winter when the ground is full of wet;
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the best season is after a deep snow is gone off with a sudden thaw; and at that time little work can be done in any other grounds, as they will be too wet to plant in.

The trees are to be raised and managed in the same manner in every respect as the other trees for planting on poor land, with all the precautions concerning their roots. A man with a spade makes a nick a little longer than the root of the tree in the grass or heath, two or three inches deep, as the ground will allow, laying in the roots at the whole length horizontally, pressing the ground close with the foot, and with the spade nicks the ground cross and cross all round the plant. This prevents the nick from opening, which, without that precaution, it would be very apt to do in summer when the weather is very dry; it also prevents the wet from running off, which it does where there is a descent, and the grass is not nicked. If the ground is very shallow and not rocky, this is the best method of planting; but if the ground is very stony, it is not practicable, as the stones would render it very

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troublesome to make the nicks, which interruption would often happen in the middle, so as to prevent the roots from being laid horizontally or straight.

The trees for such plantations, that have not their roots dressed, should never be brought a great distance, for it will be impossible to prevent their small fibrous roots from drying, if they are kept long out of the ground ; but if we cannot avoid bringing them from some distance, they must be carefully taken up and packed in wet moss. They will do very well for five or six days ; but if they lie much longer, their small roots will begin to mould, and must be cut off before they are planted, or their mouldiness will destroy the large roots. If they come packed in moss, they should not be unpacked, but taken out as they are wanted, and planted as soon as possible.

It has been a common practice to send to the north for seedling-trees, where they are bought at a very cheap rate for planting out in poor land. In general the success has been bad, and there are many
good

good reasons for its being so. By chance there may be tolerably good success, but it is a very bad practice; for these trees are sown as thick as they can grow, so that they have no free air, and by their closeness and their own warmth they are drawn up weak, and their stems are very tender, like a plant that is earthed up to blanch. This is easily to be discovered by observing the lower part of the stem, which is of a languid green for want of air, and the top quite of another colour where the air had a free passage.

When trees thus raised are taken from their close warm situation, and exposed singly to all weathers in poor cold ground, or in any ground, many of them will perish, although ever so carefully planted; and as all their roots must be dressed, (as they will be either mouldy or very dry) they have none of the advantages of those seedlings raised according to the directions before given. Ours are stiff and strong, for as they were not allowed to grow nearer than three or four inches in the seed-bed, the air passes freely amongst them, and their stems are as hard as if

they had been planted out two or three years, which is of great service when they are planted in the fields.

It is impossible that trees raised in the manner here directed can be sold so cheap as those that grow so thick as to be pulled up by handfuls from the feed-beds. But it will be more to the purchaser's advantage to give ten shillings a thousand for trees thus raised, than to give one shilling for those that are sown and grow so thick. There is more than that difference to the nurseryman, as twenty will grow in the thick feed-bed for one in those that are properly managed.

There are many thousands of Scotch Firs sold in and near London (and many other places in the country) that are brought many miles, and are some months out of the ground; these are sown in the feed-bed as thick as grass. Besides the other disadvantages they have in common with other forest-trees, as Oak, Beech, &c. they are very subject to be rotted in their stem even with the ground; and although they appear green at top, and the small
 roots

roots they have are fresh, they decay and go off as soon as planted out and exposed to the air.

If any such trees are purchased, the best method to manage them would be to dress their roots, and plant them in the nursery at six inches distance, and in a year or two those that grow will be good plants; but as many of them will decay, it would be troublesome and very expensive to have them to go over for a year or two to make good the deficiencies, if they were at first planted in a large common. This is mentioned by way of caution, as some gentlemen may think they have made a good purchase by getting so many thousand trees for so small a sum, much less than the expence of raising them would be; but those that make such bargains will find to their great disappointment they have paid very dear, and had better have got good plants, if they had paid a much greater price.

What has been treated of is only for the raising of trees to plant out the first year, from the seed-bed, into poor barren ground,

ground, and is different from the management of raising trees to be transplanted from the seed-bed into the nursery, to be trained for some years to make plantations on different kinds of ground, where there is a sufficient depth of earth to make holes.

Such trees need not be thinned to so great a distance in the seed-bed as those for planting poor land, as they should be taken from the seed-bed and have their roots dressed, and planted in rows at a small distance, to stand a few years, and then to be removed again and dressed top and bottom, and planted at a greater distance, where they may remain until they are taken to plant in the fields to make plantations to grow for timber. It is a great advantage for all kinds of seedling-trees to be so thin in the seed-bed that the air may pass freely amongst them in the summer; they do not grow so tall, but there will be very few of them but will grow, and be much better when removed.

There are many gentlemen who are at the expence of trenching in all kinds of ground intended for planting. If it is a
poor

poor shallow foil it is wrong, because the gravel must be thrown up or there can be no trench, and the little mould there is will be lost, and nothing left for the trees to strike roots in but gravel, mixed with a small quantity of earth, so small that it will not be visible in a dry summer. They stand but a poor chance to grow. If the trees were planted according to the directions before given, (without trenching) they would thrive much better than it is possible for them to do in the trenched gravel.

If the ground be clay, and a small quantity of earth at top, it is of very bad consequence to trench; for to make even a very shallow trench there must be a good deal of clay thrown up. If the earth be mixed with the clay it will be lost; if laid in the bottom, it is turned down lower than trees should be planted in such ground (or the trench must be so shallow as to be next to no trench); so that the trees in that case will be planted in clean clay, and will languish many years before they reach the good ground laid in the bottom in trenching, and often so as never to recover,

cover, which I have frequently seen. To plant in clay, where the soil is very shallow, the same method should be followed as planting in poor gravel.

If the ground is good, trenching is attended with a great expence to no purpose; for if the trees are small, or large, if the holes are made six inches wider than the roots all round, for the young roots to strike into, they will grow as well as if the whole had been trenched, as the trees growing on rocks where there is very little (and what there is very hard) fully demonstrates; for the roots twist and twine round the stones, and penetrate the earth between the stones, which are extremely hard; as also by tree roots going down into hard clay, which fully shews there is no occasion to trench for timber-trees.

Besides the trenching there is another expence saved. Good land, when trenched, plowed, or dug, grows full of strong weeds, and must be kept clean, or they will greatly impoverish the ground; and this will require to be performed for some years.

I have here deviated from what I purposed, but as I have seen plantations made at a great expence by trenching, in all the different kinds of soils here mentioned, I have planted on all the same sorts of soils according to the directions here given, with better success and at a small expence.

CHAP.

the advantage the trees receive will more than compensate for the trifling difference in the expence.

When the trees are taken up to be planted, all the strong branches should be cut off quite close to the bole, and all the small ones left at their whole length. The latter end of June, or the beginning of July, the whole plantation must be gone over, and all the young shoots that have sprouted, where the branches were cut close to the stem when the tree was planted, should be pulled off by the hand. They will come off very easy at that season; but if they grow much longer, they will be so hard that the bark of the tree will be in danger of being torn in endeavouring to get them off, and there should none of them be cut, for if they are they will push out a whole bush of sprouts next year at every amputation, and sometimes the same autumn, which will occasion double labour, as they must be pulled off; besides, they grow to a bunch or knob on the bole, and cause a blemish in the tree.

In

In any of the winter months the whole plantation must be pruned; all the largest of those small branches that were left when planted must be cut off quite close to the bole, but care must be taken not to leave the stem too naked, that is, there should be small branches left regular all over it. Care also must be taken to leave no branch near the top of the tree equal to the main shoot. This will prevent all forks.

In July following, the young shoots must be pulled again, and if there is any great distances on the bole, where there are no branches, a young shoot may be suffered to grow to fill up the vacancy, and in the winter they must be pruned as they were before. This work must be performed regularly winter and summer, until the trees have got sufficient length of stem.

As the trees grow in strength, there should a foot or two of the bottom of the tree be cleared of all branches every year, and never any more suffered to grow; but this should not be too hastily done, for all trees grow much better, stouter, and stronger when the stem is well furnished
with

with small branches ; for when it is too much divested of them it grows too tall for its strength, becomes top-heavy, and unable to support itself ; is easily twisted by the wind, and if it is not broke, is so damaged as never to make a good tree, and will be all shaken when cut. If trees are thus managed for a few years, there will be no blemishes, they will be very handsome, as well as very valuable, and when cut no fault will be found with their having been pruned.

This method of pruning will answer very well for all kinds of forest-trees but the Elms, which require a different method to make them fine trees.

The English Elms are propagated from layers, which if properly performed they will have good roots, and be fit to take up a year after they are laid. All the kinds of Elm will grow very well by layers.

The English Elm is the finest tree of all the kinds of Elm, and grows in proper soil to a very great size ; its layers do
not

not take root so soon as the other kinds. If it was laid in the autumn as soon as the leaves are off, it would greatly encourage the rooting, for the young twigs that are to be laid are hard and dry, and by being in the ground all winter they are softened, and root much better. When they are taken up, they should have their roots dressed, and planted as soon as possible, as their roots are small and dry fast. The side-branches, of which they are very full, should be all cut off at three inches from the stem from top to bottom.

In the beginning of July they should be all gone over carefully, and all the shoots pulled off but two of the smallest from the side-branches that were shortened, for as they will push many on every shortened branch, they will both rob the main stem, and be too heavy for the plant to bear.

In any of the months next winter the side-branches must be thinned and cut close to the stem, so as to stand regular all round the bole, at a foot distance at the bottom, and at eight inches towards the top; and the side-branches on the main stem

stem of last summer must be shortened to three inches.

Next July the sprouts that shoot from where the branches were cut close should be pulled off as before, and the top-branches that were shortened should also be thinned.

As the tree grows tall and strong, it should be cleared at bottom of all branches and kept clean. This should be done every year to get a clear stem; as the side-branches, that were left at a foot distance all round the stem, begin to grow thick, they should be cut close off to the stem; and if it is not near the bottom some small ones should be allowed to grow, and the side-shoots that are shortened upon the main stem should always be thinned the year following.

This work should be regularly performed winter and summer until the tree has got sufficient length of bole, and they will be fine straight trees, free from all blemishes.

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The common rough-leaved Elm is a good forest-tree, and for many uses is preferable to the English Elm; and it has another great advantage, that it will grow in very indifferent ground; but it has a great tendency to grow crooked, to have a large head, and to have very strong side-branches. It may be pruned as the English Elm; but I know of no method so good to keep them straight as thick planting, and by that they may be brought to be fine trees. They should be planted first at three feet distance, and in four years every other tree may be taken up and removed into another plantation, and planted at six feet distance, which is sufficient room for them to grow to timber.

All the other kinds of Elms may be managed as the English, for they are all of them of the same nature as to their culture, but far inferior as to their utility, especially the Dutch, which thrives very well for twenty years, and then in general is at a stand; besides, the wood is of no great value.

The Elms of all kinds, although they have never been pruned, and are grown very rude, may be reduced to order without any detriment to the wood; but the whole bole will push young shoots after they are pruned, as well as where there are branches cut off, and so will take a good deal of labour to keep them clean for three or four years.

If the trees are strong and stiff in the bole (for they may be pruned at any age) the head should be left handsome and round, and that will also greatly hinder the shoots from growing so numerous on the bole, and they will sooner give over growing; but if the bole is slender, the top should be lightened to the very last year's shoot, but none of those towards the top should be cut close; and it will be necessary to leave some branches two or three feet long, but they should be as equal round the bole as possible.

The pruning of Firs and Pines may be performed with tolerable safety; but it is not to be recommended as a good practice. The best method is to plant them in
clumps,

clumps, even on good land, at ten feet distance tree from tree, and they will prune themselves. But if Silver or Spruce Firs are intended for ornament, they should have fifty feet at least, and they will make a fine shew; but as the ground round would look naked for many years, the number intended to stand should be planted first, and then the spaces between may be filled, so that they may stand at ten feet distance; but they should be removed before the branches meet, for if they are destroyed it spoils their beauty.

If there is a necessity to prune Firs or Pines that hang over and spoil better trees, it should be done in the winter, and no branches should be cut nearer than two feet to the bole; for if they are cut close they make a blemish, but if cut long they decay gradually and do no hurt.

The method of pruning here directed may seem to take a great deal of labour, and be a very great expence, more than the advantage the trees will repay. By being pruned the trees will be of a much greater value, and the expence will not be much,

if regularly performed every year. As to the pulling the young shoots at the proper season, for then they will come off very easy, a man will go through a great many trees in a day, even if they are large; for although the directions are long, they could not be abridged to be made plain, as they are not in general practice; but when once they are regularly carried on, they will not be expensive, and will answer beyond the most sanguine expectation.

When the trees are small and can be easily bent, they may be pruned and pulled by the hand, standing on the ground; but when the trees are become strong and stiff, it is not a good way to bend them, for although they may seem to receive no hurt, it certainly strains the bark on both sides, and must be a great detriment.

When the boles are so weak that they cannot bear a ladder, and are too stiff to bend, the best way is to have a light pair of steps six or eight feet high, which will be sufficient length to clear the bole until it is strong enough to bear a common ladder; and the common pruning-irons will
dress

dress the tops. There should be three sizes of them ; they are called half-moons.

The management and right ordering plantations on good or even middling land is of the utmost consequence ; and unless they are properly taken care of will never be very fine timber. Trees on good land will thrive, and there will be many fine ones amongst them, although there is no care taken of them after planting ; but there will be many bad ones to one good tree. If they had been dressed, they all or the most part of them would have been good timber.

There are to be seen in natural woods, and also in plantations, many meer bushes with boles not a yard long, which would have been good trees, had there been a little labour and small expence bestowed on them. When the following directions are put in practice, they will remedy all those evils, and save many a tree.

On poor land (as has been before related) thick planting will answer the ends of pruning and dressing ; but on good

ground it will not answer to make good trees, unless proper care be taken of them; and they must be treated in quite a different method from those on poor ground; for as the trees grow much faster, they will require care and labour to keep them in order, but no great expence if regularly performed.

If trees on good land are planted thick, which is the best method, they must be pruned regularly summer and winter, as directed, for they must never be allowed to grow to be thickets, for that would draw and spoil them entirely: And as they are planted thick, in order that they may be removed when they want room, as well as to encourage their growth when first planted, so as all the trees are regularly pruned, when they are to be removed there will be little to do but to dress their roots, and plant them in another plantation. If they are to carry only a little way, so that what is taken up in the morning can be planted in the afternoon, their roots will require but little dressing, (if properly taken up) although there be no earth carried with them; but if there were
small

small flat balls carried with them, which it would be easy to do, as they will have good flat roots, there would be no occasion to cut any more than the small straggling roots that were cut with the spade in taking them up.

The expence of carrying them with balls will not be great, and gentlemen that are fond of planting would not regard such a trifle to have another plantation as large as the first, which in two years it will be impossible to distinguish which is the best, or to know which was the first planted.

All plantations on good land should be planted thick, and managed in this manner, and if they are they will be fine trees. But there are many plantations on good land, and planted thick, that are never pruned, nor a tree removed, so are now meer thickets of small, tall, and unfightly trees.

CHAP.

C H A P. V.

On thick Planting, and the Management of Woods that have been neglected.

THICK planting has been recommended and practised many years; but the method of dressing and thinning is very seldom properly performed. The prejudices against pruning are so great, that we frequently see thickets of small drawn-up trees of immense height, without a possibility of ever having good boles.

For the advantage of those gentlemen that have such thickets within a possibility of recovery, that is, from six years old to twenty, the following directions will be of use for making fine trees of what, in a few years, would be past redemption.

If a plantation has been planted five or six years, and planted at three, four, five, or

or six feet distance, (for the distance should be according to the goodness of the ground) and this neglected ever since planting, we shall find, if the trees have throve any thing like, they will all be meer thickets. It will not be proper to remove any trees to plant into another place from such a thicket directly, for as they have been long so very close, and have had no free air, they will be very unfit to remove, because their stems will be very tender.

First, let all the large branches be cut off close to the bole, and all the other parts of the tree be dressed according to the directions for pruning. Let this be done for two years, and then every other tree may be removed with safety, and planted again. The pruning of the trees left in the old plantation must be continued until the trees have got sufficient length of bole. The trees that were replaced, if they were carried without earth, will want little this year; but if they had balls there will be little difference, and they must be treated accordingly, and they will still make fine trees.

If

The winter following all the trees that are designed for under-wood should be cut clean close by the ground; they will shoot very fast and grow very thick. The timber-trees should not be left nearer than fifty feet to each other, for it is impossible to have good under-wood if they are nearer.

If the under-wood is only designed to remain for a term of years, that is, until the trees grow up, the timber-trees may be left at ten feet, if the ground is very good; but if it is only middling land, eight will be sufficient.

A plantation converted into timber-trees and under-wood that is to remain on good land, will be of more value than any other way it can be employed; for in countries where firing is scarce it will every fourteen years yield a great profit to the proprietor, much more than good corn crops, if their whole value was calculated to the greatest nicety. And as the timber-trees are still growing, and will have very tall boles if they were managed as directed, they will be of very little detriment

ment to the under-wood, and when they are of age to cut will be of great value.

If the plantation be seventeen or eighteen years old, never pruned nor dressed, and planted at three or four feet distance, there must be great caution used to bring it into order. The trees will be very tall and slender, and have very few side-branches, and those that are will be mostly at the top and very long; their roots will be all intermixed, so that there will be no possibility of even stubbing any of them without hurting the roots of those that are to remain.

The only method that can be taken with trees that are thus tall and slender, is to cut out every other tree close to the ground, and the long side-branches, some of which will be very thick, should be cut off at a foot from the bole of the tree, that there may no blemishes be made in the bole. The heads of the trees should also be thinned and lightened, for they will be all top-heavy, and be much hurt by the wind, which will have great power on them.

As

As they have had only every other tree cut off, if they were three feet distance at first planting, they will now be only six feet distance, which is too little, if the land is very good; but it will be best to let them remain so for two or three years, and by that time the trees that are to stand for timber will be hardened a little, and have got some little strength.

Before there are any trees cut, the best that are to stand should be marked, and those that are to be taken away may have their side-branches cut off at random; but those that are to remain for timber should be dressed according to the directions for pruning. When those that are to stand have got some strength, the other trees should be cut off close to the ground.

It will be many years before such trees recover, and never will make such good trees as if they had been dressed sooner; and this is all that can be done for plantations that have been so long neglected.

The trees that were cut off will shoot strong, and make good under-wood for
some

some years; that is, till the trees get some side-branches, and grow to a size to smother it. But in such thickets, as the trees are so tall, it would be very improper to thin them to such a distance as to make a lasting crop of under-wood and timber-trees; for as they are very tall, and not strong in proportion to their height, the wind would shake them so much, if it did not break them, that they would be in great danger of being, what is termed by the wood-workers, *shaken*, which greatly lessens the value of the tree.

The under-wood will shoot very fast, five or six feet the first year, and will be of great service to the standing timber-trees; in three years time it will be as high as the boles of the trees; but as their heads will always be above, it will not draw them, and they will grow very strong. Before the under-wood is fit to cut, the timber-trees will be a good deal proportioned in their bodies to their height, and the winds will not hurt them when the under-wood is cut.



As the under-wood will be very thick, it will prevent any side-shoots growing on the bole of the timber-trees, so that after the third year there will be no occasion to prune them, nor in summer to pull off any of the side-branches; for if there should any side-branches sprout on the bole after that time, the thickness of the brush-wood, which will be very close, will smother them, so that they will decay next year. There will then be no further trouble.

All trees that have been neglected, and have great side-branches, although they grow in avenues or single trees, may be brought into order, so as to increase the size of their boles, but they will not be very tightly, as all the large arms should be cut off a foot from the body of the tree; and it will be absolutely necessary to pull off the young shoots in summer, that shoot from the places where the large branches were cut off; for as they stand so open, they will push many strong shoots, which will be more detrimental to the tree, if not pulled off, than if it had never been cut; for there are often to be
seen

seen trees that have had large branches cut off, and then neglected for four or five years, and then cut again, with their whole bodies one continued blemish. This is the error that the workers in wood so justly complain of, and it is in general imputed to the pruning of timber-trees; but it is not regular pruning, but the neglect of performing it properly that is the occasion of this disaster.

It should be observed, that none of the directions here given will answer with any of the turpentine kinds, as they never shoot after cutting; so if there are any thickets of them, the best way is to thin them gradually at two or three different times, and leave them as regular as possible. All the Pine kinds will thrive and grow to find timber at eight feet distance on the best of ground; and all the sorts of Firs at ten feet distance. The only way to have fine trees of those kinds is to keep them thick, for they extend their side-branches to a great length when they have room to spread, and do not grow so tall and straight in their boles as when they are confined.

Plantations of eighteen or twenty years old, that have been neglected and are very thick, may be brought to order by following the directions for that purpose, which will preserve many good trees; but if it is in a country where firing is scarce, and of consequence under-wood of great value, they would turn to more profit to cut them all down an inch below ground, for they will grow very fast and very thick.

In the beginning of July, some stools that have fine shoots may be marked at forty or fifty feet distance, of the kind the most proper for the soil, or what the proprietor likes best, (if there are different kinds of trees in the plantation) and all the shoots but one pulled off by the hand. They will come off very easily at that season, as the wood will be very thick. In the winter, stub a root or two the nearest to those that are to stand for timber, that they may have free air. They will make finer trees than if they had been treated in any other manner.

It will be necessary to examine their bottoms next summer, and pull off the shoots

if any more have grown. They must be pruned and dressed as other trees; and as they have free air and warmth they will grow amazingly, and in ten years time be much finer trees than they would have been at that age if they had not been cut down.

Plantations that have been planted on tolerable or even very good land with trees from the nursery, of five or six feet high, and do not seem to thrive, whose bark looks reddish, and push many small side-shoots, and whose leading shoot often decays, after they have been planted three or four years, if they do not take to growing, cut them off an inch below the ground in any of the winter months. They will push many shoots next summer; in the beginning of July pull them all off but one of the strongest; fasten the earth about the shoot to prevent the wind breaking it, which is the only danger it is liable to; they will then grow very freely and soon be fine trees.

This method will answer very well for all kinds of deciduous trees, the Oak in

particular. They will shoot a yard the first year, and be handsome straight trees; whereas before they did not shoot two inches, and even that killed in winter, because it never came to maturity.

This must never be attempted on trees that are planted on poor land, because all trees on poor ground are seemingly hide-bound for some years after they are planted, and never make any progress until they have been some time at a stand; if they were to be cut down they would make shoots, but they would be very weak; the wood would not be ripened, as it would be long before they shoot in the spring, and they would be in danger of being killed in winter.

The bottoms of all trees that are cut down must be carefully kept clean of all shoots; they must be pulled off by the hand; this must not be neglected for two or three years, for if the young shoot that is encouraged grows well, which there is no doubt but it will, there will shoots come from the bottom for some time. These must be pruned and dressed according

ing to the general rules for pruning and dressing forest-trees.

There are many kinds of wood very beneficial to be raised where public works are carried on, at or near the place, which occasions a great demand for wood.

Where there are coal-pits whose roofs are bad, and require a great deal of wood for supports, it would be of great advantage in such places to allot twenty acres of good land to be sown with Ash-seeds, which grow very fast. After they are come to a proper size, if the ground was quite cleared as they were wanted, there would be an immense quantity of wood. They would be fit for such uses in about twenty years after sowing; and if the field was begun at one end and cut regularly, before they were all gone over, that which was first cut would be fit for use, if the demand was not very great.

The sowing of Ash-seeds will be of great profit in such places where much wood is wanted. The best method to have it come to maturity soon, is to sow it

in a field that has been corn a few years, the soil rich, and in good condition. Give it a winter fallow, and as soon as it is dry in spring plow it again, and let it lie until the beginning of April. The seeds being prepared, sow them broad-cast all over the field, and then a thin crop of Oats; harrow the whole.

The corn must be cut high, and all the precautions that were given in the directions for sowing amongst corn observed. In the winter they should be thinned where too thick, and in the summer, for a year or two, have the large weeds pulled from amongst them, and they will require no more trouble.

As they grow thick there will be no occasion for pruning or dressing; only when any part of the field is cut in the winter, the next summer all the shoots, but two or three of the best, should be pulled off from the stools, and those left should be at as equal distances as possible. There will be no occasion to pull them any more, as the thickness of the wood will smother what springs after the first summer.

summer. This should be done every cutting. There should never be any trees weeded out, for that, in a few years, would spoil the whole field; for as the wood will be very close, the young shoots that sprouted from the tree which was cut would want free air, be drawn up weak, and grow crooked.

Under-woods of Beech and Hornbeam will be very profitable where much charcoal is wanted; for if they are cut clean they will grow very fast from the stools, and be of a good size. Although they be very thick, there is no occasion for doing any thing to them after they are cut; only clear the ground of all rubbish, and let them grow as nature directs, and they answer very well.

There are many compositions recommended (and all of them would be a great expence if used for a large plantation) as fit to cover the places where large branches have been cut off; and that by applying any of them, they will prevent any blemish in the tree, although the bough cut off be very large and cut close. This I cannot agree

agree to, as I have seen it often tried, and never found it answer. If any of them are laid on too hot it burns the bark all round the amputation, and makes the wound larger, and the bark rises so that it is long before it begins to cover. If it be laid on too cold it never joins well, but cracks and falls off. If they are laid on just of a right warmth, they will stick until the bark grows over the wound, but there will be a dead place in the body of the tree, although the bark in time will cover the wound.

There can no large branch be cut close to the bole without making a blemish. When the bark on the bole of any tree is bruised, or rubbed against by carts or any other accident, if the loose bark is pared off immediately, and a composition of equal quantities of clay and cow-dung be mixed so thin as to be laid on with a brush, as paint, all over the wounded place, and as soon as it is a little dry lay a plaister of the same composition, made pretty stiff, about half an inch thick all over, and dash it with a little dry mould to prevent its cracking, there will be no blemish;
but

but if the application is not made before the wound dries, where the tree was hurt there will be a blemish, but the bark will grow over better and sooner with this than any of those compositions that are so highly recommended—and at no expence.

The laying the first on so thin and with a brush is, that there may no part be missed, for it penetrates into all the sides of the tree, close to the sides of the sound bark, and it also prevents the stiff plaister from dropping off by the heat of the sun, which it would do if a thick plaister was laid first on the wounded place.

If any favourite detached tree should have the misfortune to have a large arm or branch split, so as to hang almost by the bark of one side, let all the fractured places be brushed over with the thin stuff, and then half an inch thick of the same be laid all over. Raise the branch to its proper position, so that the bark fits all round, and then secured with props, so as to prevent the wind shaking it; then apply a plaister of the same, pretty stiff, all round the branch six inches above and below

low the splinter, which should have a coarse cloth lapped all round to prevent its cracking, and fastened with a small rope wrapped quite close. It will unite and grow, and in a few years be as sound as even.

The composition of cow-dung and clay is better for all wounded places in trees than any of the grafting waxes used for that purpose. Although this has no connection with planting, it is often of great service to trees that meet with accidents. If a branch is broken by the wind, and slips off a good deal of the bark, lay on the thin stuff with the brush first, and then a plaister of the same made a little stiffer, taking care to let it be an inch wider than the wound, and be quite thin at the sides to prevent its coming off by the heat of the sun, and it will answer beyond expectation. There is no danger in laying it on, and, if it is well fastened to the tree, it will stick until the wound is covered with new bark. After the plaister is laid on, and a little dried, if it was brushed all over with some of the thin that was first laid on, it would prevent its cracking and fill

fill up all the cavities, so that no air could get between the plaister and the tree; which if it does, the whole falls off and will be of no service.

The dung and clay should be mixed some time before it is used, and worked several times that it may be well united; if it was for three or four months it would be the better; but there will be no occasion to keep it moist all that time; for after it is brought to proper order and laid in a heap, it will require no further care until a day or two before it is wanted,

CHAP.

CHAPTER VI.

On the Soils proper for the different Kinds of Forest-Trees.

THERE is a proper soil for all kinds of trees in which they thrive, and most of the directions for planting stop there. The variety of trees would be confined to a very small number, if the same kinds of trees did not thrive and grow in many different soils.

For the information and satisfaction of those whose soil is not the best, and may be thought not to be fit for many kinds of trees, I have here added a list of the common sorts of forest-trees, with an account of the different soils and situations they will grow and thrive in.

The observations were at first taken from natural woods, and improved by following

lowing nature in many successful experiments; so that if all the trees are planted and sown in soils according to what is here mentioned, they will thrive; and if managed after planting as directed for pruning and dressing, will make very fine trees.

Oaks will thrive in clay if the acorn be sown. They grow very slowly for some years; but they make fine trees, and are the best of wood. If planted from a nursery where the land is good they seldom thrive, but grow stunted and crooked; but if planted from the seed-beds that are made to raise trees for poor land, they will grow very well, and after the first year shoot freely. In strong loam they may be planted at six or seven feet, from the nursery, and after the first year will grow very well. In light loam they may be planted from the nursery or other plantations when of a large size, and will grow freely even the first year. In fat rich earth they grow well at all ages, and make fine shoots; if the acorn is sown in such ground they make the finest trees. In black moorish land, where long heath grows, they grow faster, and have finer shoots, than in any other.

The

The acorn sown thrives well in sandy loam; but they must be planted young, or sown; for if they are large they grow hide-bound and never thrive. Acorns sown round the bottoms of hills will thrive and grow fine trees, although the ground be very indifferent.

Poplars of all kinds will thrive in bogs and all moist grounds; they will grow to a great size in good land, but the wood does not deserve such quarters, unless they are planted by way of ornament for the variety of their leaves. The American Poplars are amazing fast growers, and are beautiful trees, but the wood does not seem to be much better than the other sorts. All the kinds would answer well to be planted thick in moist grounds for coal-pit props, or where wood was much wanted for fencing of plantations and inclosures. The wood of late is much used in different kinds of husbandry for its lightness; and some have made chamber-floors of it. The wood is of short duration, and is not of value to make large plantations in any other grounds but wet places,

places, where other wood will not thrive, and there they will turn to great profit.

The Alder wood is of so little value, and the tree of so little beauty, that it is not worth cultivating in any place but meer bogs, where little else will grow. They may be propagated in such places by large truncheons drove or pushed into the ground.

Ash is a tree of great use and value; in good land they grow very fast. A gentleman may plant Ash and see the same trees cut and sold for three and four guineas each. It will grow in hard clay, but the wood is not very good; in strong loam it will make fine trees; in light loam it grows amazingly fast, and in fifty years after planting there will be trees of great value. It will grow very well in moist soils, but in hard dry ground the wood is not good, neither does it grow to a great size. The Ash is not esteemed, because it is long before it is green, and loses its leaves the soonest of all the forest kind. It is a wood much used in all sorts of husbandry work; so that there should be a large

large plantation in good land, in a proper place that is not near nor much in view of the mansion-house, as they are very un-
 fightly in spring.

Beech will thrive in all kinds of soils that are not wet; it will grow amongst hard rocks where there is hardly any soil; it will grow in clay; but there they should be planted from the seed-bed, in the same manner as trees planted on poor gravel. If they are planted from the nursery at four years old they will do pretty well, but if they are much older, there will not be one in ten that will grow. If they are planted in clay, or even in strong loam, they should have only the large side-branches taken off. If they are trained in the nursery, or taken from other plantations, and have been regularly dressed and pruned; they may be planted in good light soil, when they are large, with success; but even then they should have all the small side-branches left on, for they do not thrive well when they are much divested of their branches. In the nursery they should not be much pruned. It is a tree of great use, and very profitable to make large plantations of.

The

The favourite soil of the Beech is a dry light soil, of a foot or eighteen inches deep, with a gravel or stony bottom, and a high situation. In such ground it will grow very beautiful.

Birch will grow in any soil or situation, on the hardest rocks, and in the softest bogs; those on the hard rocks never grow to very large trees, but the wood is pretty close; those in bogs and wet land grow to large trees, but the wood is spongy, and the trees will not live to a great age; those on middling land will make fine trees, and live to a good old age. The wood is tolerable, but is not of value to make large plantations of, unless where coal-pits or forges are near, to both which they are of great use. They are also very beneficial to make common railing for fencing on wastes and commons that are planted or taken into tillage, because they grow very straight and long, and are easy to split when too thick. A plantation of them planted very thick on moist ground that is tolerably good would be advantageous, as they would grow very fast and straight, and would be soon fit for many uses. The

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favourite

favourite soil of the Birch is a light black earth, of a foot deep, and a gravel or stony bottom; in that they will grow tall and straight, with a remarkably white bark and fine heads.

The Horse-Chestnut will thrive in all dry soils where there is a moderate depth of earth, and a gravel or stony bottom; there they will grow to a great magnitude. The leaves are handsome and the flowers are beautiful, but the wood is of no great value, so it is only fit for pleasure. A few clumps in the skirts of plantations are very pretty. They should never be planted near walks nor houses, as they make a constant litter from their first budding until the leaves are all gone. It is a tree not fit to plant for profit.

The common rough-leaved Elm will thrive in most soils but hard clay and standing water; yet it will thrive by river sides, where the soil is light and sandy, (as it generally is) although the roots are three parts washed bare by the water; but the wet is only temporary and goes off soon. It is an excellent forest-tree, and
is

is of great utility both in the husbandry way and cabinet work; and it has this advantage over all the other kinds of Elms, that it will thrive very well in indifferent ground. Its favourite soil is a light black earth, of a loose nature and a hard bottom; in such a soil the roots will run a great way; and the trees will grow to a great size, and be very straight, if planted thick. They are raised from seed and from layers; many prefer the seed, but if the layers are rightly managed there is little difference, if they are moved once or twice in the nursery. They may be planted out from thence, or from other plantations that have been properly managed, after they are large, with good success. It is an excellent tree to make large plantations of, and will turn to great profit, as it will thrive so well on very indifferent ground.

The Dutch Elm is a tree that grows very fast when young, if the soil be good; and as it shoots immense quantities of side-branches, they require a good deal of labour to keep them in order. It likes a good depth of soil, a good rich loam;

there it will thrive and grow very fast for twenty-five or thirty years, but after that time it generally is at a stand, is stunted, and makes no figure; the bark grows rough and the wood is of little value, so large plantations of them would not be very advantageous, especially as they require good land, which may be better employed.

The English Elm is the most beautiful of all the forest kinds, and grows to an amazing great size. It will grow in a strong loam where there is a good depth of soil above the clay, which is generally the bottom where the top soil is a strong loam. As all these trees are raised from layers, they should be trained in the nursery for some time before they are planted out. If they are properly managed, the roots will be so trained as to run horizontally, and if they are so ordered, they will grow to very strong trees in a stiff loam; for after the roots are flat they will run along just below the surface, and never attempt going into the clay, which is a great enemy to them, for they stunt as soon as the roots touch it. They will thrive very well

well on a light black earth, and on light loam that is of a moist nature they thrive the best of all. Such loam has always a sandy bottom; and although the Elms are trained so that their roots are quite flat, and the large ones as they extend run just below the surface, there will be many small roots a great depth in the sand. They will thrive surprizingly in soft sand, but then they should be planted young and pretty deep. Their leaves are not of that dark green when in such sandy land; they lose them sooner in autumn, and are out earlier in spring. It should be observed, that their situation be on the lowest ground, that the moisture may fall to them; for although they do not love to stand in wet, yet they like a good deal of moisture, and they always thrive best in that situation. It is a tree very fit to make large plantations of, as the wood is very valuable, and will turn to great profit, if the soil be proper and of a good depth; but on poor land and shallow soils they thrive the worst of any of the forest kind.

The Witch Elm is generally mistaken for the common rough-leaved Elm, which

grows wild in most woods, and is fine wood; whereas the Witch Elm is a soft spongy wood, not much better than a Sallow, and grows almost as fast. It grows very tall, and small in the bole to its height. It will thrive in an indifferent soil if it is pretty deep. It grows best in a good light loam. It is only fit for hedges, to cover arbours, or (planted very thick) to cover old walls in summer, or any other disagreeable object, for all which it is very fit, as its branches and leaves are very thick. It is not worth cultivating for any other use.

There are some other varieties of variegated Elms that are for beauty and ornament in pleasure grounds, but of no great value as forest-trees, so are of no consequence at present. They are propagated from layers, and budding on the common rough-leaved Elm. They require a good deep soil, and not too rich, or they lose much of their beauty.

The Lime tree is a very beautiful growing tree, and is very fit for shady walks and clumps for ornament, but, like the
Horse-

Horfe-Chefnut, makes a constant litter, which is the reason it is not now in much esteem. Its wood is foft and of no great value, but for carvers and fuch trifling works, fo is not a fit tree for large plantations. It will thrive in foft fand, and any light foil that is dry. Its favourite foil is a fandty loam, in which it will grow to a great fize, and if it has room to fpread will be very beautiful,

The Sycamore is a fine growing tree, and the wood is of great ufe for turners, and many other things in the furniture and husbandry way; it is alfo a very ornamental tree in plantations, and in clumps where the ground is fit. It thrives beft in a fandty loam. It grows very well in all light dry foils that are of a moderate depth. It is worth propagating for profit where the foil answers.

The common Maple will thrive in all poor dry grounds, even where there is but little earth. It is a wood of no great value, and feldom grows to a great fize, and is not fit to make plantations, neither for profit nor beauty; it is very good for to
convert

convert into under-wood, as it shoots very strong and very quick from the stools after the first cutting.

Maple (the Norway) is a good tree, the leaves are handsome and make a fine shade. The wood is much of the same nature with the Sycamore, and will thrive in all the same sorts of soils. It is a very good tree to plant for use.

The Mountain Ash is a very handsome tree; the leaves, flowers, and fruit are all very pretty. The tree grows to a good size, but the wood is of no great value. The leaves and flowers make a very beautiful appearance in summer, and in the autumn, when the fruit is ripe, they are of a fine red colour. If three or four are planted in little clumps in different parts of the plantation they would be very ornamental. It is not a tree to plant for profit. It will grow in very poor land, and thrives in most soils, even amongst rocks and in stiff clay.

Laburnum (the Scotch) is one of the beautifullest trees of the forest kind; its
bark

bark is remarkably green; it has a fine shining leaf; and when in flower is all over a bright yellow. It grows to a great tree if planted in good, light, rich earth; it will thrive in all light soils that are moderately deep. It is a very valuable wood, and will yield great profit to make large plantations of, near a great town or water carriage, as it is too beautiful a wood to use for any work but the cabinet business. For clumps in pleasure grounds, Laburnums and Birches would be very beautiful, as the bark of the one is white, and the other a dark green. They are both much of the same growth as to height, and both their leaves are very fine.

The Spanish Chestnut will thrive in all good soils that are not wet; it will grow in sandy loam, and in very poor dry ground; but there it must be planted young, that is from the seed-beds, as directed for planting poor land. It may also in such soil be propagated from the nut. It makes a fine shade, grows to a very large tree, and is a good durable wood; it is useful for all kinds of country business,

self, and is valuable to make large plantations.

It may be objected that sowing the nuts or tree-seeds on poor land is contrary to the directions given for planting poor land, and the reasons that are given for its being done in that manner are, that all seeds *sown* go down with a tap-root, which they certainly do if the ground is good, or if even it is a hard clay; but in gravel or stony ground the tap-root cannot get far before it meets with some obstruction and is turned aside, after which it spreads and runs amongst the stones and along the top of the gravel, as may be seen in natural woods. Trees that have been self-sown in stony ground, their roots run many of them on the top of the ground; or if they are covered when young, when they grow large they rise above the surface, so that most of the roots are seen above ground, and they run the same as if they had been planted and laid horizontally; so that planting and sowing in bare ground is no ways contradictory.

The

The Walnut. Its proper soil to plant in is a fine, rich, light, black earth of two feet deep, (if it can be had) with a gravel or stony bottom. In such soil the trees will grow to be very large, and bear great quantities of fruit, and very good. It will thrive on a strong loam if there be a good depth of it, but it will not bear much fruit, and what there is will not be good. It will grow very well in a sandy loam, and bear great crops of fruit, which will be small but very good. It will grow and thrive very well as a timber-tree on all deep soils, although inclining to clay, but will bear very little fruit, and those will not be very good. It is a wood of great value, and in proper soils no tree yields more profit. It is too beautiful a wood to use in any business but furniture and ornamental works, so that if they are not near a market it lessens their value, which should always be considered where timber-trees are planted for profit.

Cherry (the common Black or Wild) is an exceeding good forest as well as fruit-tree, and in places where distilleries are near, their fruit yields great profit. It grows
to

to a great size in all kinds of good soils, and will bear fine fruit equal in flavour to the finest cherries. It will thrive in very indifferent ground, provided it has a dry bottom, (for wet is a great enemy to it) but the fruit will be small. In such soils it should be planted from the seed-bed, as directed for poor soils. It will grow in all soft moist sands, and in strong loam it will grow to a great tree, but the fruit will be hard, dry, and bitter. It is a tree that will thrive in almost any soil but where there is standing water. It is very beautiful when in blossom; some clumps of them properly placed in large plantations would add great dignity to the whole; and as the wood is very valuable, they deserve to be encouraged in all plantations.

Platanus or Plane-tree (occidental and oriental) are two species differing only in the shape of their leaves; and as botanick distinctions is no part of the plan of this work, but plain and easy directions how to manage and bring to perfection all the kinds of trees mentioned, I shall class them together, as their wood and culture are much the same. They are very beautiful,

ful, have fine leaves, and grow to a great magnitude. There have not as yet been any large plantations made of them, but there are many fine trees growing in several parts of England. The wood is much the same as that of the Sycamore, and they will thrive in much the same kinds of grounds; but to have them grow to perfection they should have a good, rich, deep loam, not too stiff; in such soil they will grow to an enormous size, and when such a soil happens in a plantation, some clumps of them would add greatly to its beauty.

The Hornbeam is much of the nature of the Beech, and will thrive in all the same sorts of soils. I can assign no other reason for its being generally neglected in plantations, than that the Beech is a much handsomer tree, and grows much straighter in the same kinds of ground and situations. The Hornbeam, if planted thick, will grow very straight and tall, and make a fine tree. There is no wood fitter to cut down for under-wood; it grows very quick and very thick.

The

The Crab is a tree that grows to no great size, and large plantations of them would not be prudent. They are a fine, hard, durable wood, and are useful, especially for many things belonging to mills. It has the finest blossom of all the flowering kinds, and a few of them properly disposed in a large plantation would be very beautiful. They thrive best in a good rich loam, and there will grow to a pretty good size; they will also grow in very indifferent soils that are dry. If they are planted thick, they will grow tall and have fine straight stems; but their greatest beauty is their fine spreading heads, so if they are planted for beauty they should have room to spread.

The Larch tree is a very beautiful plant, and makes ample amends for its not being an evergreen, by its fine appearance in the spring. Most plantations of them that have been planted are in low grounds, good land, and warm situations, which is very wrong; for in such places they grow too fast, like a plant that is drawn, under glass, for want of air. Such places are not their proper situation. As they were of foreign
 growth,

growth, it was imagined they were tender, which they are not. They are very hardy, will resist the greatest cold, and will thrive exceeding well in high situations, and in very poor land, and there will grow to fine large trees and good wood, which they never will in rich soils; for they grow so fast that they cannot support themselves, and so are always crooked. If designed for wood, they should be planted in clumps pretty thick, for they spread prodigiously when they have room or are detached, or planted promiscuously amongst other trees, which they overgrow in a little time; this has been the common practice in planting them. There is no tree they can be mixed with to succeed but the Mountain Pine; they are the most agreeable companions, for they are inhabitants of cold high mountains, and in such situations will grow very equally. The Larch will thrive in any soil or situation; it will thrive very well in a strong clay, and I have seen them growing very freely where one third of their roots were in the water. This was in an island, the surface of which was not a foot above the level of the water, and of consequence most of the
 roots

roots were in wet ground; so that they may be said to grow in any place where there is mould for them to strike root. If they are planted in clay they should be planted in the same manner as trees on poor gravel. They should never be removed when they are large, for they thrive badly for some years if they grow, which is very hazardous, although they are taken up with large balls. I have been told the wood is very good (but there are no trees come to proper age in England to judge of its goodness) and that it hardens in water, for if it is always wet it will last for hundreds of years; which, if true, it would be worth propagating, if only for the use of water-works.

The Common Spruce, the Norway Spruce, the White and Black Spruce, are all different species of the same tree, and the same management and culture will answer to bring them to perfection. They are all fine trees and grow to be very large, and when our plantations of them come to maturity, we shall have as good wood as any that is brought from Norway or any other part of the globe; and as there are
great

and small, none of which should be cut, but planted again as soon as possible, and it would be right to plant them a foot higher than the level of the ground, if it is very wet; they will strike root and grow immediately, and will have good hold before winter, and then the wet will not hurt them. As the trees are large that are planted in the marshy and mossy ground, they may be planted at twelve feet distance at first, so they will require no further trouble.

Silver Fir is a beautiful tree and grows to a great magnitude, but must have better ground than the Spruce. If it is planted in a light black soil, after the third year from the seed, it will grow very fast; it will thrive in light loam, and will grow in sandy loam, but not to a great size; it makes a handsome detached tree, and will spread its branches a great way, and will be very ornamental. If a plantation for timber, twelve feet will be sufficient, and they should be planted in large clumps. I have seen Silver Firs of sixty years old that were almost a hundred feet high, and thick in proportion. The soil was light and fine,
not

not much more than eighteen inches deep, and not very rich.

The Pinaster is not much different in its appearance, at a distance, from the Scotch Fir, and while young they seem to be much the same; but as there is no plantation of them old enough to try the goodness of the wood, it cannot be determined if it is any better than the wood of the Scotch Fir; it is equally hardy, and will thrive in the same soils and situations, and may be planted round the skirts of plantations to shelter other trees.

The Swamp Pine has only this advantage over the others, that it is supposed to grow in wetter places than them. As to its wood and beauty, it is, to view, not much different from the Pinaster, is as hardy a tree, and will thrive on hard dry ground as well as in bogs. The Scotch Fir will grow in very wet ground.

The Mountain Pine (commonly called the Scotch Fir) is what we are best acquainted with, and is known to thrive in poor gravel, rocky mountains, and in all

kinds of soils and situations; but in low situations and good land the wood is not so good as when the soil is but indifferent and the situation high, which makes it valuable. I knew two plantations of Scotch Firs that were planted at the same time; sixty years after they were planted they were cut. The one was on a rising ground, which was shallow and very poor; the other was on a low ground, which was strong, and all the winter covered with water. That on the low ground the trees were in general four inches more in diameter than those on the rising poor land, but the wood was not so good; it was white and spongy; the other was firm and of a good red colour, and of much greater value.

The Weymouth Pine is the beautiful-
lest of all the Pine kinds, but is tenderer
than any of them; by the growing of the
wood it seems to be finer than any of the
others, but as yet there have none been
cut of a sufficient age in England to know
its goodness; neither have there been ma-
ny large plantations planted of them, for
what has been planted are mostly for plea-
sure,

ture, and most of them in good ground and warm situations, where they have throve very well. They will also grow in indifferent soil, but should be sheltered from the north and west winds.

K 3 CHAP.

C H A P. VII.

On American Forest-Trees.

MOST of the common kinds of forest-trees in England have been treated of, and the manner of propagating and bringing them to perfection; but there are numbers of American tree-seeds brought over every year and sown in England, many of which are fine plants and promising. In the year 1772 I had a collection of tree-seeds from America, amongst which were many sorts of Oaks, which were sown in very indifferent soil, but a warm situation; most of them grew very well, and made shoots much superior to what I expected in such ground.

The woods in America are, in general, on very rich, fine, deep ground; and by a gentleman who was very curious in planting and observing the progress of wood,
and

and who had resided many years in America, I was assured that trees of all kinds, in that country, grew as much in one year as they did in England in three. He also affirmed, that if a wood was stubbed, and brought into corn, and kept so for some time, and then laid into grass, in a few years it would be all a wood again.

It is well known that it is not so in England; for if a wood is destroyed and taken into corn, and kept for that use for some years, when laid into grass, if it continues never so long in grass, there grow no timber-trees; thorns, broom, and furze will grow, and cover a field in a few years if not prevented, where such shrubs are near, and even sometimes where there is no such thing; but that is easy accounted for, as the wind and birds may and do carry the seeds; but timber-trees never grow there, unless a wood is near that has trees bearing seeds, which may scatter their seeds there as well as in any other field.

I am far from being against the introducing and propagating of foreign trees, as
many

many of them are great beauties, but I would not have planters be too sanguine, and plant large plantations of foreign trees on the recommendation of foreigners, for all or most nations are partial to their own country, and recommend the produce as far superior to what they see in other places, without considering what it is that makes the difference.

It must be many years before the goodness of the wood can be determined by young trees raised from the seed and planted in England. The best method would be to procure some wood that has come to maturity in the country the seed comes from, and of the same kind, and it would be necessary to know what kind of soil and situation the wood grew in, for the soil alters the wood very much.

If the wood is good and fit for any particular use, then it would be worth the while to plant the foreign and some English trees of or as near the same sort as possible, in the same soil and situation, in clumps, the trees planted alternately; this would be a fair trial as to growth. Then
it

It would be right to consider whether this foreign wood is better than the English that grows on the same soil; if it is, and grows faster, it is a great acquisition, and fit to plant for profit.

Some years since I raised from seed the American and the common Spruce Fir; the American grew taller the three years they were in the nursery, but not so strong as the common. They were then planted into little clumps in a rich light loam. The first year neither of them made much progress, although they were taken up with good balls of earth, and were not a quarter of an hour out of the ground. The second year the American made a shoot of two feet long; the common a shoot of fifteen inches, but near twice as thick. The third year the American shoot much the same; the common twenty-two inches and very strong. The fourth year the American kept still to two feet; the common gained an inch. They both grew much the same for many years; the American was the tallest, but the common was much the strongest plant.

There

There were the same year, and near the same time, some planted on a dry, poor, sandy soil. They both made very poor shoots for several years, but the common was the best, and of a much darker green.

I have taken notice of this difference, because most that have wrote on planting, of late years, greatly recommend the American kind of trees, as being of a much quicker growth than the same kinds that are English; that is, that an American Oak, Ash, Beech, &c. will grow much faster than an English Oak, Ash, or Beech.

I have at this time Oaks of different kinds, Ash, Beech, and Birch, from American seeds, and the same sorts that are English, growing in the same nursery; there are some of both sorts that make long shoots and strong; and in many of them there is no material difference. I believe it is more from the richness of the soil than from the trees, that causes the great difference in the growth of wood in England and America.

There

There are many kinds of American Oaks that have been raised from seed some years since in England, and are planted out, and are fine thriving trees, and grow much faster than the generality of the English; but as they were new trees, and greatly recommended for their beauty and quick growth, they were sown in the best soils, and planted with all care in the warmest situations. But if they had been planted in ground of less value, perhaps they would not have grown faster than the common English Oak; and if they did, it would be very material to know if the wood was equally good, for the quantity will not make up for the quality, if it is of an inferior nature.

Every one knows that all the kinds of forest-trees we have in England, that are of quick growth, their wood is of very little value, as Poplars and Willows of all kinds; but there may be seminal varieties in seedlings of all kinds of trees, as the quality of the wood may be equally good, and yet grow much faster; for in large plantations of all kinds of trees there will be many that will shoot as much in one year as the generality

generality of the plantation do in two or three, where there is not the least visible difference in the soil. Whether this is owing to a seminal variety, or to some superior quality in the ground where such plants are planted, I do not pretend to determine; but if, upon the nicest observation, there cannot be discovered the least variation from the others that grow so slowly, I think it would be surprizing if it proceeded from a change in the seed, but rather from some hidden quality in the soil.

Those that are curious in trees, when they observe a seedling-tree that is remarkably different, and has some good qualities which they would wish to preserve, the best method is to convert it into a stool, and raise plants from layers (for all forest-trees will grow from layers) which is a more certain method than grafting; for all trees partake something of the stock they are grafted on, as can be easily proved from the dwarfishness of the Apples grafted on Paradise stocks, and Pears on Quinces, with many others.

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Those that are accurate in botany can distinguish many species from seedlings, sown at the same time, of any kinds of trees or plants; and it is owing to their ingenuity and discoveries that makes us possessed of so great a variety of beautiful plants of all kinds.

The only difficulty in seedling-trees is to know which is the best wood; as in all kinds of seeds some improve, some degenerate, and many keep to their kind. But when there are many visible differences in plants from the kind that was sown, there is no doubt but the very nature is altered; and although they may seem to be improved by being more vigorous than the others, perhaps the wood may be much inferior. In flowers and other inferior plants, their goodness is soon discovered, and in general (especially in flowers) the strongest and freest growing are the worst; but in trees it will be a long time before it can be known, not before the trees are fit for cutting; for there are many kinds of wood which is good for nothing until it comes to its proper age, which is then very good; and many kinds that are pret-
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ty good when young, but when old are good for little. For which reasons it will not be prudent to plant large plantations for profit with trees, let them be never so well recommended, until the goodness of the wood is well known.

I have been informed by several gentlemen, that have been many years in America, that in the large and fine growing woods there the soil in general is a fine light loam of a great depth, such as is in our valleys by river sides, and are perfectly dry. If a large plantation was made on such ground in England, (for if there are only a few trees planted they will never make fine timber) and if the water does not lay on it in the winter, which is often the case, they would grow very fast and be fine trees. Some years since I made a plantation on such a soil, which was not liable to be wet in winter. The plantation was mostly the English Oak; they in general made shoots two feet long the second year after planting; the shoots were proportionably strong. They continued to grow very quick, so that in a few years they were such large and fine trees, that none
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who saw them would believe but they were much older.

There are now growing at Lord Downe's at Cowick, in Yorkshire, what are there called the large American Oaks. They are growing in small clumps; they are about thirty years old; the most of them are fifty feet high and upwards, two feet diameter at bottom, fine straight stems, clear bark, and grow freely. The seeds were sown where they are now growing; they were kept clean and dressed carefully for some years. There are no English Oaks growing near them; if there had, I am of opinion they would have been as large as the Americans, for there are some English Elms growing near them which are much larger; which makes me believe it is more the soil than the kinds that makes the quick growth of trees. His Lordship's park is a rich, light, deep loam, and a warm situation.

CHAP.

C H A P. VIII.

On the Management of grown Woods.

ALTHOUGH the intention of this publication is only for the planting of poor lands, and converting them into profitable forests, as such ground is of very little use and of no value, it cannot be supposed that trees on such ground will ever grow to the perfection and size of trees on rich soils; so that every gentleman of landed property should allot a few acres of good land for planting for the good of posterity, and the advantage of his country. It will not turn to the planter's immediate profit; but there are few of that parsimonious disposition who will do nothing for futurity, who are really gentlemen; and all those that are lovers of trees, as most gentlemen are, their pleasure in seeing them grow will be very great, and give them more joy than any other

other amusement. *These are trees of my own planting* are words I have often heard repeated with great content and gladness.

Although I have treated a good deal already on the thinning of plantations on good land, I must again repeat a caution. The methods of planting good land is skilfully and plainly taught by many able authors, so as to want no instructions but some cautions. Plant thick and prune carefully according to the directions given for pruning, and just when the side-branches begin to meet remove every other tree, for if they stand until they are become a thicket, it makes them tender for want of free air, and when exposed are in danger of being lost. The removed trees should be planted in large clumps, or in a new plantation, for trees from such places should never be planted as detached trees, nor in single rows.

The trees that are taken up must not by any means be divested of all their side-branches, as is often practised; for if they have been well managed, they will be stiff and strong, and very able to support them-

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selves with the side-branches on; they keep the trees warm, and encourage their growth greatly; whereas, when taken clean off, the top or leading shoot grows very long even the first year after planting, and always so weak that it is not strong enough to support itself, so grows crooked; but where many or all of the side-branches are left on, it grows not so much in length, but quite strong and upright. It is owing to the stripping of young ones that there are so many crooked trees in plantations that are planted from nurseries with trees eight or ten feet high.

I have planted trees twenty feet high with so many of the side-branches on, that by the middle of summer it would have been very difficult to know at a little distance, but that the trees had been growing in that place several years. If trees that are very tall and have stiff boles are to be removed, if they are stripped (which is very often the case) of all their side-branches, they grow to a great bush at top, and are in danger of being broke; but if there had been many large branches

left

left pretty thick on the bole, the tree would bear the wind much better, as it would then have all bent equally, been in no danger of being broke, and made a finer tree.

The difficulty of planting trees that have been a long time in a thicket, is, that they have very few side-branches, and those that they have are very long. They should be shortened to two feet long, and the top, which is generally very bushy, should be thinned by cutting out some of the largest close to the bole, and shortening the others gradually, so as to draw the tree to a leading shoot. But it is bad planting them; for as they have been so long deprived of free air, and been very warm, they are in great danger of being lost, so that it is only in case of necessity they ever should be planted; and when they are, the only place is in a wood, where there is a large vacancy by a tree's being dead, or being cut out for some particular use. There they may succeed, but hardly any where else. In such places they are of great service, as it is difficult to find trees that are tall enough but from such thick-

ets, and there they are in no danger of being shaken by the wind, as they are protected by the trees all around. If the vacancy is large, that is, forty or fifty feet diameter, which is often the case where a large tree has been cut out, it would be right to plant four or five in the middle pretty close; for it would be to no purpose to plant within twenty feet of the side, unless the tree that is planted is taller than the trees that are growing round the vacancy.

It is a common practice in natural woods to cut out trees for particular uses. This is very wrong; for it would be of more advantage to the owner to purchase what wood is wanted, even at a very dear rate, than mangle his wood; for if the wood was not well managed when young, it is probable the cutting out of a large tree may make a gap of twenty or thirty feet. No young tree can be got up even in that great space, for the trees that are round will spread their side-branches, which were kept up by the tree that was cut, and in a few years will meet; so that if even a tree from some other place was to be planted
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in the opening, unless it was higher than the trees round it, it would soon be overhung and destroyed; so that there is not the least probability of any shoots that come from the stool of the tree that was cut off ever getting up so as to come to perfection, even although all the side-branches of the standing trees were cut, which would be a great detriment to them, more than the value of the planted tree, even if it should thrive very well. It is owing to this bad practice of cutting out trees, that there are so many crooked trees in natural woods.

There is another great objection against the cutting of trees in grown woods. There are generally cattle allowed to feed in them, and if the owner causes fences to be made round where the tree was cut, to save the young shoots, (which I have seen) they are little regarded after the first making; and indeed if they were it would be to little purpose, for if the young shoots were never so well preserved, before they could come to any height the place is quite closed at top, and they grow crooked unfightly bushes.

If the wood is come to its full growth, and is to stand some years, it is a great loss; for when the whole of the wood is felled, the shoots from the tree that was cut before will be so bent by the overhanging of the trees, that they will be so crooked as to spoil many of the young trees round them, if they are not cut down, and if they are, it is wasting the stool to no purpose. If the wood is fit to cut, and is left because it is beautiful, and the owner has no mind to part with it, the vacancy must either remain empty or be filled with a crooked bush, which are sufficient reasons to put an end to that bad practice.

If a little wood is wanted, let some corner that is most out of sight be cut down and afterwards planted, or the stools managed as before directed, and then there will be woods both beautiful and profitable. No gentleman should allow their woods to be cut and mangled, as most of them are in the north.

It is a custom when Oak woods are cut to leave many small trees, which is a bad practice;

practice; for if the wood was thick and good as it ought to be, (and would have been, if well managed when young) these small trees will have long slender boles, and are very liable to be broke by the wind; if they should escape being broke, they are often so twisted and shaken that they never make good wood. If they should meet with none of these misfortunes they will grow to great bushy heads, and over-hang many of the young trees.

When a wood is cut, if there are any stiff young trees, and four or five of them can be left in a clump, it will answer very well, and they will grow fine tall trees; but if they are left detached they will grow no taller. If they meet with no misfortunes (for they are liable to many) so that they grow fine trees, they will take up a great deal of room, for nothing will grow straight that their branches over-hang.

Either in natural or planted woods the trees may stand so thick as eight feet distance, if the natural wood is managed with

with care after cutting, and the planted wood carefully pruned for a few years after planting.

Those that are fond of pleasure or profit can have no prospect so agreeable as a well-dressed wood, where the trees are tall and straight, and not a foot of ground lost, the trees growing in a circular pleasant form, which is agreeable even in winter to walk in, and in the summer is a pleasant shade; at a distance it is a beautiful carpet in the air, far surpassing the most elaborate works of what are called pleasure-grounds. All this may be accomplished by following the directions before given.

I make no doubt but it will be very agreeable to all or most gentlemen to blend pleasure and profit, provided it can be done without expence, and at a very little loss. There are some trees that are of little value, but very beautiful. If some small clumps of them were interspersed in a plantation with taste, they would be very ornamental, and the little room that should be allowed them would not be a great

great loss, as they would be of some value when cut, and a great beauty when growing.

This may be done in all plantations, even in the poorest barren ground; for the most beautiful of the flowering-trees will thrive in the very poorest dry ground and coldest situation.

If the plantation is on a poor heath or barren hill where there is little soil, there may be planted clumps of Hollies and Tree-Box; for although they are not flowering-trees they are beautiful evergreens, and will grow to a great size in poor dry grounds. The Mountain Ash and Crab-tree will also grow in such places. If these four are properly planted they will be sufficient to add great beauty to a plantation that is seen at a distance.

The Hollies should be planted at four feet distance to prevent their bushing and to make them grow tall; there may be ten of them in a clump. The trees round them should be at ten feet distance at least, as they are slow growers for several years; then

then at some hundred yards, according to the largeness of the plantation, three or four Crab-trees, which should be planted at ten or twelve feet distance, that they may spread and have large heads. The trees round them should not be too close to them, at least ten feet distance, as it would draw them up and spoil their beauty. Then some Tree-Box, which should be planted thick to make them grow straight and tall. None of the clumps should be planted in rows, but as irregular as possible.

To beautify plantations on good land the same trees should be recommended, with the addition of Horse-Chestnut, common Black Cherry, Silver and Spruce Fir, (if no part of the plantation is planted with them). Plantations thus planted will make fine pictures at a distance, and give joy to the beholder, and pleasure to the owner. They will have a chearful agreeable look.

These clumps should not be too numerous, so as to look like patches, but be planted at a great distance, and placed so
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as to add beauty to the whole foliage, for nothing is so disagreeable, nor hurts elegance so much, as plantations planted in little patches. Large clumps of a sort are noble and have a pleasant look. The light green of the Box will add beauty to the gloomy Fir, and the shining dark green of the Holly will make the fine green of the Larch still more cheerful.

If woods, hedges, and fields were managed as they ought to be, the whole country would be a delightful garden. The expence would be trifling considering the advantage, for they would grow much better. And as all gentlemen that are fond of real rural scenes (and I believe most are) should have the grounds in their own occupation in such order that every wood should be a grove (instead of a heap of rubbish over-grown with thorns and briars); every grass-field a lawn, only detached by a clean fallow, or a good crop of grain, to diversify the scene. And there might be some art made use of, by decorations of evergreen, and detached trees and shrubs at proper places, to add beauty to the whole.

Even

Even in plantations that are converted into under-wood, where all ought to be a thicket, there might be some small ornaments made round the outfides, such as small clumps of Hollies, Laurels, and flowering-shrubs; which may be so placed as to be seen by surprize, and not as if they had been designedly planted.

C H A P.

Even in plantations that are converted into under-woods, where all ought to be

C H A P. IX.

On Fences, and their Management.

HEDGES are the most useful as well as ornamental things belonging to a country; but the method of managing them, in most counties in England, is very erroneous. There is an old common tract of scouring and laying them when they are grown so bad as to be of little use.

The method of planting them is much the same, without considering the nature of the ground, whether it is wet or dry, a strong clay, sand, or poor gravel. To have good hedges it would be right to plant them in very different ways. There will be many objections made by the country men in general, as it would put them out of their old way; but let any gentleman or farmer only try, and they will find it turn to their advantage.

Before

Before I begin to give directions for the planting the hedges, it will be necessary to give some instructions concerning the raising the plants.

The Berries are in general too soon gathered. They should not be pulled before the leaves are all off the trees. When they are gathered, they should be thrown into a heap, and lay for six weeks; then they should be buried in a pit that is quite dry, and should have an inch of sifted coal-ashes in the bottom, and then a layer of berries, and then of ashes, until all is finished. The pit should be raised a foot above the level of the ground, and a small trench made all round to prevent the wet getting into the pit. Coal-ashes is better than sand or mould to mix with the berries, as it prevents all mouldiness, and hinders mice from destroying them, which often happens.

The berries which are gathered when the leaves are on the trees, will grow, but as they are not then full ripe, many of them will mould and rot; and those that
grow,

grow, will not make vigorous plants, which is their greatest qualification.

Here they must lay two winters and one summer, until the time of sowing (the beginning of March); then they may be sifted from the ashes, or sown all together, which is much the best way.

The ground fit for sowing them should be light and rich; and as there are many that do not come up before the second year, all that come up the first year should be drawn in the winter; most of them will be fit to plant out for hedges.

The reason for drawing out those that come up the first year, is, to let those that come up the next have free air and room to grow. The seed-beds should not be destroyed for three or four years, for if the large ones are drawn, those that come up last may stand in the beds until they are fit for use.

Every time there are any drawn out of the seed-bed, it will be necessary to dig the alleys, and lay a little earth all over the
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the beds, because in the drawing there will be many of the seeds raised out of the ground.

If quicks are wanted in a hurry, they may be made to come up the first year; that is, *many of them*, which will be fit for use next winter.

As soon as the designed quantity of haws are gathered, mix them well with twice as much fresh grains from the brewhouse, (old grains will not answer) and lay them up in a round heap, covering them all round with half an inch of grains. There they may remain for ten or twelve days, by which time they will be in a gentle heat; they must then be turned and laid up as before, and lie as long, by which time most of the pulp will be rotted off; then they should have another turning, and a good deal of sand mixed with them, and rubbed between the hands, and laid up close, and covered two inches thick with sand to keep them from frost. They must be under cover; an open shed will do. These must be sown in March.

If

If there is a hedge to plant in poor gravel or sandy soil, pare off the grass as thin as possible two feet wide; take out a spade of earth and put in a quick, which should be cut eight inches long, and laid in sloping, so that the top should not be above two inches out of the ground; then dig on a foot and lay another in the same manner, and so on to the end; then there will be a straight row at a foot distance. Open the ground two inches distant from the first row, and plant another quick in the same manner between every one of those first planted, so that there will be another straight row two inches wide of the first, and the quicks at six inches distance.

Let it grow at pleasure for two years, by which time the shoots will be a good length; so that they may be platted into one another, and then with a pair of garden sheers cut off all the long straggling branches. There is nothing further requisite for two years; then it should be platted, and cut as before. If the hedge is to grow tall, provide a hedge-bill with a long handle, and in winter

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switch off all the long side-branches that over-hang the bottom of the hedge, and keep the top narrow, and it will be a good and neat fence for many years.

In such grounds there is no occasion for ditches, so there will be no scouring, and the dressing will be a very small expence, as a man will switch and dress as much in a day as he could scour in a week. Scouring in such dry ground never stands well.

In all poor gravel and sandy land, if a little very rotten dung can be spared to put to the root of each quick, it would be of great service, and would encourage their growth greatly. If the hedge is to be kept clipped, which is the best way to have a good fence on such poor land, (for they grow very slow after laying) it should be clipped every year after the second plating. The expence of clipping will be less than where scouring is wanted, and it may be performed in winter when little other business can be done in the fields.

If the ground is strong clay there will be water to carry off, so there must be a ditch.

ditch. The best method to have a good hedge is to make the ditch and throw the best of the earth up behind, and so form a border, and plant the hedge in the border a foot from the face of the ditch, in the same manner as that planted on poor land.

The slope of the ditch on that side the quick is planted should be faced with the turf that is cut off the top of the ditch. The turf should be a spade deep, and the first should be laid as low as the bottom of the ditch (if two inches lower it would be better) to prevent the water undermining it, which it frequently does where there is a bare space left below the turf, so that the whole tumbles down.

The advantages of planting the quicks in this manner are many, and attended with only one inconvenience; that is, there must be a few thorns pricked in the top of the slope, to prevent the cattle setting their feet on it, and to hinder them from cropping the quicks and pulling down the slope.

If the ground is good and no water to carry off, it would make a much better fence to plant on the level ground, as on poor land; for besides growing much better, there is no expence in cleaning and scouring the ditches. It is three years longer in being a fence than if there was a ditch, but after it is fenceable, there is no further trouble than annually to switch off the long branches that over-hang the hedge bottom, and makes it soon naked when they are not taken off. The over-hanging of the top-branches kills all the bottoms; the hedge grows so thin that it is not fenceable, and then it must be laid; but by this annual trimming it will be very good for many years, and will grow much taller, and be a much better shelter, where it is wanted for that use.

If on good land there is water, and a ditch is necessary, make it the same as in clay land, and plant the quicks in the same manner, and if turf can be got it would be right to face the slopes on both sides, as the light mould will tumble down with frost and rain and fill the ditch bottom soon. If the ground is wet, planting
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in the face of the slope is the best method; but if it is boggy quicks will not thrive; they grow cankered and stunted, and never will make a fence.

In boggy grounds Willows will make a good fence with little trouble. If a ditch will carry off the wet, make one as before directed; but if it will not there is no occasion for any. Provide good strong truncheons of the large growing kinds, three feet long; with an iron crow make holes two feet deep and eighteen inches distant, and plant one into each hole, making it fast with the foot. This may be done in any of the winter months. The first year they will shoot many strong shoots; let some of those be platted a foot from the top of the truncheons, so then the fence will be two feet high; let all those that are not platted in be cut off, but not too close. The next year plat some of the strongest shoots a foot higher, so that the hedge will then be three feet high. Next year cut all the upright shoots a foot from the last platting, for there will be no occasion for platting them any more.

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Thus

Thus there will be a fence four feet high which cannot be broke through. All the side-branches must be cut every year, and in a few years they will grow very thick and strong, and be as good a fence as a quick hedge.

All hedges that are designed to be clipped should be platted the third and fourth year after planting, as it binds them so that they cannot be broke through; but those that are to grow high, and are afterwards to be laid, should not be platted at all, for they would be so intangled that it would be impossible to separate them. Those on gravelly poor land make but bad fences when laid, so that the best way is to clip them; but if that is thought too great an expence to the farmers, if they will carefully keep them thin at top, and cut off all the side-branches that overhang, they will last at least twenty years and more, and be in a good condition to lay after that time.

In good land and clay grounds, laid hedges will answer very well. The cutting the boughs that hang down will be
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of great service to those that are to run up to height, and are to be cut down and laid. By the trimming of them annually they will remain good fences longer than can be imagined till tried.

Hedges that are laid are in general spoiled in the bottom by weeds and grass the first and second year after laying, because there are many root-weeds and grass in the bottom of old hedges which have great roots, but have been prevented from growing in summer by being smothered by the hedges hanging over them; but when it is cut close they grow very fast, and almost or quite cover the whole hedge, which is of great detriment to the young shoots.

The best method to manage them is to lay the hedge first, then with a stubbing-hoe clean all the ground on both sides, taking up all the roots of briars, which run great lengths and do a deal of hurt; also all root-weeds and strong benty grass. Then face up the slope with turf from the ditch, always observing to let the first spade of turf be laid even with the bottom

tom of the ditch, and never to plaister the mould up to a point against the quicks, but lay it in between and at least a foot beyond the hedge. And there should be eight or ten inches flat between the slope and the hedge, which should be kept as clean for two years as if it were a new-planted one, and by that time the hedge will be even with the face of the slope, and prevent weeds growing to hurt it.

In five or six years, if the ditch should want cleaning and facing, give the turf that it is faced with a moderate slope; but by no means carry it nearer the hedge than it was at first. Let the mould be broke down amongst the roots of the hedge, and laid flat at top. This encourages its growth greatly; but when the mould is laid up to a point against the hedge, it deprives it of all moisture; and when one side is covered up a foot the other is quite bare. By being laid up in that way it is very liable to slide down, and is often much damaged by heavy showers.

It is frequently disputed whether live or dead stakes are best in a laid hedge. I
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an of opinion dead stakes are best, for this reason, that the live stakes shoot much stronger and faster than the branches that are laid, and grow quite upright. In a few years they over-hang the winders and kill them, and although they meet at top there are great gaps in the bottom. It will be of service, where there is any, to cut them close down to the binding of the hedge for two years, as it will encourage the growth of the winders, so that the whole will be much closer.

If live stakes could be left regular at two or three feet distance, a good hedge might be made with a very little trouble. The winders should be laid in very thin, and all the shoots that grow upright on the top of the stakes should be rubbed off at least four times in a summer. This will cause the stakes to push many strong side-shoots, which all grow almost horizontally, and will soon meet,

To rub off the top-shoots of the live stakes would be a trifling expence; a man might go over a large farm in a day, if all the

the hedges were laid in one year, which never happens.

If hedges were managed as here directed, the expence would not be so much as it is in the common way, because they would last much longer, and be much better fences.

It is the common practice to plant trees in hedges; and is recommended as beneficial; but it is an exceeding bad practice, and spoils the hedges, for they grow to short boles and large heads; so far as the branches hang the fence is very weak, and the trees are never of great value. It destroys and wastes much ground, as little will grow under the drop of their branches, and the roots run a great way into the fields when in grass, which are very troublesome when taken into tillage.

The best method is to plant a few trees in the corners of the fields, and where hedges meet. If all the four corners are planted, it will make a handsome clump; and, as the trees may be planted thick, they

they will grow straight and tall, and make fine timber, which they never will do in hedge-rows.

If the fields are large the clump in each corner may be made so that when grown up it will be fine shelter for cattle in winter; and the fields may be kept separate by a coarse rail.

Trees thus planted will be more beautiful to the country, less damage to the farmers, and more profit to the landlords. As they will be of course very irregular, from any eminence at a distance the whole country will look like an entire wood, beautiful surpassing imagination.

There is another improvement that would render the face of the country beautiful and sweet, viz. to plant red and white roses in all hedges. Honey-suckles are often planted, and are very sweet and pretty; but they are such great runners, and grow so thick, that they destroy all the quicks, therefore I would not recommend them. Sweet-briar will be full as fragrant, and be no detriment to the hedge.

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The common wood-rose is pretty in hedges; but it grows so vigorously that it is hurtful to the quicks. The red and white spindle tree might be planted in hedges that are to grow high; their berries are beautiful in winter. And if some hollies were scattered at a distance they would look cheerful.

It is a common practice, (and as hedges are managed there is no avoiding it) when a hedge grows thin in the bottom, to draw cut thorns into it to stop the gap; but in reality it makes it larger, for the cut thorns are drawn in very thick to serve the present purpose, which kills the live wood, and in a few years the whole bottom of the hedge is stuck with dead thorns, when the top is thick, strong, and vigorous. The cutting up of the side-boughs that hang down annually prevents all this; but if by any accident there should be an open in the bottom of an hedge, stick in a few small stakes and wind some live branches to them, and it will be close in a year's time, as the stakes will make the gap good in the mean time, and be no detriment to the hedge.

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Perhaps it may be thought there is so much to be done, that it will take more time, and be a greater expence, than a farmer can afford of either. To do every thing that is here directed it will take less time, and not be half the expence that hedges managed in the common method cost; the fences will be much better, last longer, and look much neater.

CHAP.

It is not intended to give directions for making a nursery fit to raise all the curious trees and plants that are introduced into England, and which thrive very well when taken from the nurseries where they are raised with skill and art, and when they are carried into very different soils and situations all over the country thrive very well; that would be a task too elaborate for the brevity of this treatise; besides it would be too expensive for gentlemen, as it is the quantity that makes it worth the ingenious nurseryman's trouble and care to cultivate such plants. The bringing the common kinds of forest-trees to perfection, and making them fit for all kinds of soils and situations, is what I shall give directions for, and the choosing a proper soil for that use; or, where it cannot be had, to make one by art, fit for the purpose, at as little expence as possible.

It is a general opinion that all nurseries for raising trees should be the same, or very near the same, with the soil the trees are to be planted in; but this is setting out on a very wrong principle; for, as I said before, all the capital nurseries in
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land are on a fine light sandy loam, or they are made so by the nurserymen, who certainly are the best judges; and, as a proof of their judgment, all the trees that are taken from such nurseries, thrive when planted on much worse ground than where they were raised.

I have said more on this subject than I first intended, and am obliged to add a few words more, to prevent a notion that has long prevailed. I know there are many gentlemen so prepossessed in that opinion, that they will not allow any other kind of ground for their nurseries, than what is nearly similar to the soil they intend to plant, and this is the reason why so many bad-thriving plantations are to be seen in many parts of England.

If a plantation is to be made on a poor gravel or a stiff clay, what kind of a nursery would such ground make? all the plants raised on such ground would be poor, small, hide-bound, starved things, very unfit for planting in any land, but more so in poor gravel or clay.

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To this it may be objected, that I have given directions for sowing the seeds of trees on such ground, as the best method for raising wood in such soils. There is a great difference between sowing where the plant is to remain, and sowing to raise plants to be transplanted: Those that are sown in such ground to remain, twist and twine their small roots amongst the stones and gravel, so as to protect themselves from frost in winter and drought in summer; but if such plants were to be planted with the greatest care, they would be very liable to suffer much from the drought the first summer, and be entirely thrown out of the ground next winter, as they would have so few short roots that could make no resistance.

It is very wrong to enrich nurseries with dung. Although the nurserymen dung their ground very plentifully, they do it with great judgment, and never plant trees until it is well rotted, and mixed with the mould, so as to be quite incorporated, and generally take a crop of pease or beans before they plant; for if trees were to be raised on a bed made rich with

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dung,

dung, they would grow so vigorously, and be so full of juices, that if they were even planted in very good land, they would be in danger of being lost for want of a sufficient quantity of nourishment, and most of them would be, what is called in the common planting phrase, hide-bound.

The proper soil to make a nursery to raise forest-trees, is a light sandy loam of two feet (if it can be got) or eighteen inches, which will be a sufficient depth to prevent drought in summer affecting the trees, and the frost hurting them in winter.

An old pasture field that slopes gently to the south is the best situation, for low and flat grounds are not proper, as they are liable to be over-blown in winter in deep driving snows, which will be apt to break many of the young trees. Besides, if the snow be blown very thick (which often happens) it will lay much longer than on a rising ground, and be very detrimental to the young plants.

Trenching

Trenching is always recommended for making a new nursery, but it is not always needful; for if the field that it is intended to be made on be a clean grass free of moss, plowing will answer; if mossy, trenching will not be sufficient; for the moss, although turned down two feet deep, is long in rotting, and turns to canker, which is very destructive to young trees.

If the best spot that can be found is full of root-weeds, bushes, or any kind of rubbish, it will be necessary to trench, and pick out all the weeds and roots, for there is no possibility of keeping young trees clean where the ground is full of root-weeds. But it is seldom that needs to happen, as the nursery may be made at a distance from the house; and if a convenient spot can be found in a bye corner of the pleasure-ground it will not be disagreeable, especially to lovers of planting, if it is kept in good order, and its being so much in view will cause it to be kept clean.

If the field is a fine clean grass, and in pretty good condition, plow it out early in

the spring, and sow it very thick with the common grey pease : When they are come into full bloom, plow them all in as deep as the plow can go, and let the ground remain until they are rotten, which will be in six weeks if they are well covered; then harrow it well with a heavy harrow; then plow it across, and in three or four days harrow it again; then before winter plow it, and let it lay rough all winter to mellow. In the spring, harrow first, then plow; then harrow it well with a heavy harrow, and it will be in good order for sowing and planting all kinds of forest-trees in the nursery way.

If the field is mossy, pare and burn it as soon as the season will permit: Plow it directly, and sow it very thick with turnip or rape-seed; and when it is grown flush, eat it clean off with sheep. As soon as it is eaten bare, plow it as deep as the plow can go; and when the weeds begin to grow harrow it first; then plow, and let it lay all winter. In the spring, plow and harrow, and it will be fit for use.

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If the ground is a place that is full of root-weeds and roots of bushes, trench it early in the spring, and pick all the roots as clean as possible. As soon as it is finished sow it with pease in rows, that the weeds may be kept clean, for in such ground there will many annual weeds come up. As for docks, nettles, and quickers they must be taken up with a dung-fork, for they cannot be destroyed by hoeing. As soon as the pease are in bloom plow them in, and when they are quite destroyed plow the whole, and harrow well to get out the weeds, if any remain: Let it lay rough all winter. Plow in spring, and it will then be in good order.

If a convenient spot cannot be found that is of a proper temperature, it must be made so by art: A stiff loam, or a light black earth, are the only soils that can be made into a good nursery. When better cannot be had a sandy soil will do; but it requires a great deal of rich composition to make the trees flourish.

If a grass field and a stiff loam, (a field that has been in corn is very unfit to be made into a nursery) lay all over the field, upon the grass, a good quantity of sand, two inches thick at least; and if this was done in the beginning of winter, to be washed in with the rains and snows, it would be the best method: After it has lain some time it will crust over and dry at top, and will be liable to be washed off with the rain if the ground has a declivity, which it should have. To prevent that, give it a good harrowing across the field, and that will open the ground so that the sand will mix much better. Early in the spring plow deep, and get from old woods where leaves and sticks have rotted, the bottoms of old wood-stacks, and the cleaning of streets, a large quantity, and lay all over the field as soon as it is plowed; and when the swarth has laid long enough to be rotten, plow across, harrow well, and plow again; then sow with rape, and manage as before directed, and it will be in tolerably good order.

If a light black earth, lay an inch of strong loam all over; plow immediately,
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and then lay some more loam on and harrow it very well : When it has laid some time in that state, cross-plow and harrow, sow with rape, and manage as before.

By following some of these methods according to the nature of the soil, there will be a good nursery fit to raise all kinds of common forest-trees ; only where the seeds are sown, for the planting of poor gravelly land the ground should be made lighter than any other part of the nursery, for the reasons before given.

There are many kinds of forest-trees, such as the Elms of all kinds, that are propagated from layers with great success ; and indeed all kinds of forest-trees will grow by layers, so that those who are curious, and find a seminal variety that is remarkably different from the original, the only way to have it preserved genuine is to convert it into a stool, and raise plants by layers.

It has been objected, that forest-trees raised from layers do not grow so vigorous
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and straight as plants that are raised from seed. There may be some truth in this assertion, but not so much as is generally believed; for it is owing more to the method of laying, than the nature of layers, that occasions this remark. If layers are made from young straight shoots, they will grow as well as seedlings; but when laid from small shoots of a side-branch of an old tree, it is very difficult to make any thing of them but bushes; yet they will take root very well, and this is a good reason why layers are much better than suckers; for all plants that are to be kept low and bushy, if a sucker was to be laid it would not alter its nature, it would still grow tall and straight; but if the young shoots of an old branch are laid, they will take root and grow, but never shoot freely: If a fruit-tree, it will bear very plentifully; and if a flowering-plant, it will flower much better than plants that are raised from suckers, or plants raised from cuttings of vigorous young wood.

In the nursery there should be a quarter allotted for the use of planting stools; and as the whole success depends on the fineness

ness of the young shoots that are to be laid, the place where they are to be planted should be light and rich; rich, to encourage the young shoots to grow strong and vigorous; and light, that they may make good roots when laid. The stools should not be planted too thick; for although they may seem thin when first planted, if they thrive as they ought to do they will be very large in a few years, and have many layers; so that they should have room to be laid, and also to let the air pass between them: If they are planted in rows, which is best, they should not be nearer than eight feet square.

As to the quantity of ground necessary for a nursery, that depends on the planting which is intended. The trees that are to be planted in poor gravel, bare, stony, and cold poor land, will take up a great deal more of ground in the seed-beds than if they were sown in the common old method; but as they are to be taken from the seed-bed, and planted out for good, there will be less ground necessary for them than if they were to be transplanted

transplanted from the seed-bed into the nursery, to remain for four or five years.

It should be considered what sort of ground, and what quantity of each sort, is to be planted; that must determine the size of the nursery. It would be much to the advantage of all seedling-trees to have the beds they are sown in lay fallow all the year before they are sown; and to any country gentleman that is fond of planting, half an acre of ground more than is absolutely necessary will not be of great consequence.

The beds which the seedlings are raised in for poor land must be quite cleared every year. They must be taken up with the spade carefully, so as to break none of their tap-roots; if any are broke by accident, they must be trimmed, and planted in some convenient place of the nursery, to stand for some time until they are fit for planting in ground that is deep enough to admit of making holes to plant them in, and they will be as good as any for that use, as all trees that are taken from the seed-bed

bed to plant in the nursery should have all their tap-roots cut off.

There should be no more sown in those beds than can be planted every season, for they will not be fit to plant in very poor ground next year; but if there are more than are wanted, or can be planted, they should be taken up, have their roots trimmed, and planted in the nursery. They will be much better for that purpose than those that are raised in beds that are sown very thick, and stand so all summer.

As soon as the beds are cleared they should be thrown into little ridges, and lay so till the beginning of May, when they should be dug over and laid flat, and remain so all summer, for the advantage of keeping them clean; for if they were to remain in ridges, many of the weeds would be buried in hoeing, and so grow again immediately. But it will be greatly to their advantage to throw them into small ridges before winter, to mellow them for sowing in the spring.

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This management will be of great service, for it will make them produce as fine and vigorous plants as if there had never been any thing sown in them; and by thus managing them they will be in good order for many years, by only laying a little of the compost every other year upon them, as will be directed to be made for the recruiting the nursery-ground, which must be greatly impaired by being constantly full of young trees.

The following composition, if properly made and laid on, will keep the nursery in good order, so as to produce all kinds of forest-trees as strong and vigorous, and free of all blemishes, as if the ground was just taken in, and not use one grain of dung, which is a very scarce commodity in the country, especially where the gentlemen are farmers, and fond of improvements, as most of them are at this present time.

If the nursery ground is stiffer than could be wished, add sand to the following articles, if inclining to sand, (which
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is the best) add some good rich loam, and it will make so good a composition that its effects will surprize the most sanguine expectations; and every place affords the materials, which may be procured with little trouble. Collect docks, nettles, grafs, (which should be cut before they come to seed) straw, stubble, rotten wood, leaves, and shovelings of the stable-yard, and make a ridge of them two feet thick, six feet broad, and in length as you can get stuff, or according to the largeness of the nursery.

If the ground of the nursery is light, lay a layer of good loam, four inches thick, the whole breadth and length of the ridge; then another layer of the above things, two feet; and then another layer of loam; and so on until there is a ridge eight feet high: Let it lay until winter, and when the first deep snow falls trench it all over, laying all the snow in the middle. It may then lay till the middle of summer, when it should be turned again, taking great care to keep it clear of weeds between the turnings. The first hard frost in winter turn it again, laying all the frozen parts
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into the inside, and it will be fit for use in the spring.

Some time before the tree-seeds are intended to be sown, lay two inches of the composition all over the ground, and prick it over two or three times to mix and incorporate it with the old ground. By being thus worked it will be much moister (if the season is very dry) than land that has been less worked: It will also be necessary to prick the beds over just before they are sown; and if they are very mellow it will be much better not to rake the beds, but only to level them even with the spade; then sow the seeds, and with a flat board press the bed level, and cover it according to the size of the seed.

It would be a good method to have a large heap of stuff, the same as the beds, mixed ready to cover the seeds, which is much better than taking the earth from the alleys for that use; for it is trod a good deal in sowing the seeds, and if the ground is wet it is rendered very unfit for the purpose; besides it is of great detriment to the seeds on the sides of the bed

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to have deep alleys, as they will be much drier than if the ground was flush, and they will not thrive so well as those in the middle.

After there is a sufficient quantity of the above things collected to make a provision for three years, it will be proper at some distance to begin a new heap, which may be gradually increased as the materials can be got; but it need not be turned until there is a quantity sufficient for three years more, and only kept clear of weeds during the time of collecting; so that by having two heaps, one fit for use, and one in gathering, there will be always a provision for keeping the nursery in good order. It will be of great service to the composition that is using, to give it a turning every winter when it is hard frozen, turning all the frozen parts into the middle; but this must not be done when it is covered with snow; for although it was absolutely necessary to have snow to mix with the straw and other hard dry things to make them ferment and rot at the first turning, it would be very prejudicial now; it would rob it of its salts,
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and make it of little value if any snow was mixed with it.

This composition is much better for a nursery than dung, as it will have all the advantages of being kept in good heart, and will cause none of those pernicious misfortunes to young trees that dung is very liable to do: Besides, it is attended with no expence except that of collecting it, which is very trifling. And there is this great advantage where there is a composition of this kind made, that it will keep the grounds in order, as all those pernicious weeds, docks and nettles, will be cut and kept from seeding.

The nursery must be put into a regular form; and as it is absolutely necessary to be kept clean, it should also be neat, and if at a distance from the house it will be an agreeable walk. No gentleman will be at the expence of having a good nursery who is not fond of trees and planting, and to such it is very agreeable to see a collection of plants of different ages growing, and some just rising out of the ground,
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which will in time enrich his family, and beautify his estate and country.

Perhaps some may think too much has been said about the preparation of the ground, the method of sowing, and the composition for recruiting the ground after it has been used, and that the trees may be purchased at an easier expence than by following all the directions that are here given; and that the chief thing which those that raise forest-trees for planting should study, is to have them good, and fit for the different soils they are to be planted in; but such thoughts will be found to be wrong grounded, as the generality of those who raise forest-trees are at a greater expence than the work that is here mentioned will cost, and in general come far short of the success, which will attend those that follow with accuracy what has been directed, besides the advantage of having fine trees of all kinds to supply whatever designs they intend to carry into execution.



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CHAP.

CHAP. XI.

On Vines.

THE cultivation of Vines, and the bringing the fruit to maturity, has been much studied of late, and not without success; but, from a long and assiduous application, I have discovered many things that are not in common practice, which I hope may be of service to the public. I shall begin with the raising of the plants, and go through the management of them on common walls, (for the benefit of those who reside in countries where they will ripen without help) on fire-walls, without glass or covering; on fire-walls, with glass or some other covering; in glass-houses or stoves built on purpose for them, called vineries, and in stoves that are used for pines. I shall also recommend a method to prepare the borders for planting them, very different from what is in common practice, together with a particular method

method of obtaining good plants that will be very fruitful. I begin with the choosing of them, which is cuttings, they being much better than rooted plants, and, if managed as directed, will bear fruit sooner and much better.

The method of procuring good Vine Cuttings has not been attended to with that attention which is requisite, as the chief part of the success depends on their being good. These should be taken from plants near the bottom of the wall, good bearing plants that have their eyes round and plump, their joints short, and the wood quite round. Cuttings with these properties will be very fruitful, whereas cuttings from the upper parts of the wall, although they may seem to have most of the properties of those cut from the bottom, are far inferior, being in general longer jointed, the wood softer, and more apt to shoot into great rambling wood. When they are taken off, there should be an inch of the old wood to each, which should be cut sloping. Three eyes are a sufficient length; the top should al-

so be cut sloping from the eye, and a quarter of an inch above it. Being thus prepared, put them into light dry ground (not too near together) up to the last eye, pressing the ground close to them; and before the frosts come on, cover them over four inches thick with dried fern, or dried pease-straw, and let them remain until you want them in spring. They must not be touched with the knife then, for it will cause them to bleed, and spoil them entirely. Some may think that all this precaution is not necessary, and that a cutting taken from any part of the wall, if it has the properties (as to outward appearance) of those taken from the bottom, is equally good; but let those who think so only try the experiment, and they will find their error; the bottom cutting will shoot less vigorous wood, but be much more fruitful.

Cuttings are much the best for making all kinds of vine plantations. It is objected they are longer in bearing than young plants, which I never found to be the case; for if young plants are brought
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from any distance, it will be necessary to cut off all the small fibres, which will so far impede their growth, that the shoots from the cuttings will be stronger, and bear fruit sooner and much better.

Where there is an old plantation of Vines, and a strong plant is wanted for any particular place, if it is taken up carefully with a good ball, and planted immediately, it will answer very well; but this is only moving from one part of the garden to another a few plants; and if the Vine be very old, it is difficult to be done with success.

The common method of planting Vines (or cuttings of Vines, for there have been some walls planted with cuttings) is to plant them at seven or eight feet distance, and so train the side-branches to fill the wall; but there is a better way to have finer grapes, and to have them bear sooner.

Prepare some good hot dung as for a mellow bed; make it up in the same form, but two feet wider than the frame

that is to cover it; two feet high will be sufficient, but it should be well troden to prevent the heat being too strong at first. Stake it all round the sides with stakes two feet long, and wind them with straw ropes very close to the top. Procure some fresh tanner's bark from the tan-pits, (if the bed is to be covered with a three-light mellon frame, which will hold eighty plants) two good loads of bark will be sufficient, and so in proportion. If the bark can be made dry before it is laid on the bed, it will be better; but as the weather is generally very uncertain at that time of the year, (February) it may be dried on the bed. Lay it on a ridge in the middle of the bed; set on the frame and glasses, and give it air: as the bark dries, draw it to the back and fore side of the frame till the whole is dried; then take off the frame, and spread it all over the bed; set on the frame and glasses; let them lay close until the heat is risen, which will be in three or four days, when it will be of a moderate temperature, if all has been performed as directed.

Prepare

Prepare some mould a little lighter and richer than is generally used for mellons. Take penny garden-pots, and into each put one of the cuttings, but be sure there be an inch of mould between the bottom of the pot and the lower end of the cutting. There should be only one eye left out of the mould, and the top of the cutting should be sloping to one side of the pot. When planted, plunge them into the tan half the depth of the pot at first, (for they require little heat for some time) put on the glasses, and give them air night and day as long as there is any steam in the bed.

Give them no water while the steam is strong in the bed, for (although they have air) they will be all wet with it in the night. It will be proper to shade them in the day if it is very hot.

When the buds begin to push, (by which time the steam will be gone) give them a little water at the bottom when the mould appears dry; but care must be taken to give it sparingly, and often, for too much at a time would rot them. It will

will be of great service to them to sprinkle them all over twice a-week in the evening, and shut the glasses close; but they must have air in the morning early to dry the wet before the sun becomes hot, for if they are wet it will scorch the end of the bud, and prevent its growing. They will require little water for the first three weeks.

When the heat begins to decline, which will be in about five weeks, (for the bark will grow mouldy, and then it loses its heat) take all the pots out, and stir the bark down to the dung; level it, and plunge the pots up to the top; put on the glasses, and give a little air; for although there will be neither heat nor steam for three or four days, there will be a rancid smell, which will be very prejudicial to the plants, and turn them yellow.

When the heat rises, if it is moderate, which it generally is, there will be no further trouble with it, for it will last long enough to bring the plants to perfection: but if it should be very hot, which
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sometimes happens, the pots must be raised until the violent heat is over, and then they may be let down, only stirring the bark deep enough to plunge them to the top. They will now require a good deal of water and air if the weather is warm.

If they push more shoots than one, take them off as soon as they appear; put a stick to that which is to remain, and tie it up as it advances in height, for it will be of great detriment to the plant, and retard its growth, to let it lie down. The frame should be raised as the plants grow high, so as to keep the glasses a foot from the top of the plants; but the bottom of the frame should be kept close, so as no air can get in (which will be easy to do, as the bed is broader than the frame) by sticking a few stakes round, and stuffing straw between the vacancies.

As the plants advance in height they will push out side-branches at the eyes, which must be constantly picked off as they grow; but not in the common method, which is to break them off close to the
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the eye. They must be pinched off a joint above the eye, and then they will push again at that place, and never hurt the bud that is to remain for next year's shoot. When they are taken off close to the bud, it often pushes, and that joint is lost, which, if near the bottom, is of bad consequence; and although it does not push, there often comes one, sometimes two side-branches just by the eye, which weakens it greatly, and renders the place very unfightly. This should be observed in taking off the side-shoots of Vines of all ages, that they push again much sooner when they are pinched off at a joint than when they are taken off close, and will require a little more labour to keep them clean; but by this method the eyes are all saved; and as they push much weaker when they are pinched off at a joint than when they are taken off close, the Vine buds for next year are much stronger, and consequently the fitter for bearing good fruit.

The bed for the Vines should be made the beginning of February; and, if all succeeds well, they will be fine strong plants

plants four and five feet high the beginning of June, at which time we should begin to harden them; first by taking off the glasses morning and evening, and giving them air all night; for if great care is not taken they will be stopped in their growth and turn red, which will be of bad consequence, as then they will not strike root after planting. There is no other difficulty in keeping them growing than being cautious, giving them air gradually, and not exposing them to the sun above an hour in the morning. Take off the glasses at five o'clock at night, let them stand so till ten o'clock, and after they have been used to that management for ten days they may stand uncovered all night, and have a great deal of air in the day-time. If a dull soft day happens they may be uncovered all day.

When they are so hardened that they can stand the sun, they are then ready for planting, which will be about the beginning of July, and they will have time to strike root in the common borders before winter, and will be very fine strong plants.

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The common method of preparing borders for Vines is to mix lime rubbish and hard stuff with good earth, which I have found, by many years experience, to be wrong, and not a fit composition for them. Borders in general for all kinds of fruit-trees are made too deep; two feet is quite sufficient; the breadth ten feet at least. When borders are made deep it encourages the roots downwards, where neither sun nor air can have any influence, and of consequence the fruit is not so well flavoured. If they are properly prepared there is no danger from drought, which is the only thing that can hurt shallow borders. In making of all kitchen-gardens it is a common practice to set out the borders and walks; then to empty the walks of all good earth, and to fill them up with all the rubbish and stones that are found in making the garden. The roots of most trees run much further than is generally imagined, especially Vines; and when they meet with that bad stuff it cankers them, and infects the whole tree. This is a good reason why espaliers and other fruit-trees, planted round kitchen-gardens, so often decay; for the borders are seldom
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above six feet broad, and if they are planted in the middle they have only three feet to run on the side next to the walk before they reach this rubbish, which cankers their roots and infects the whole trees. To make a good kitchen-garden, and to give all the trees an equal chance, would be to take levels of the whole; and, if it can be conveniently done, it should slope all to the south; but if the ground will not admit of that, and some part falls to the north, there should be a large covered drain where the falls meet.

If the bottom is clay, it will be much better to raise the level than dig into the clay. None will attempt to make a kitchen-garden in a spot where there is not at least eight or ten inches of tolerably good mould. It would be much better for all the kinds of trees and herbage that are to grow in it, to let the clay, gravel, stone, or sand remain, and bring earth to make the ground of a sufficient depth, as it will be less expensive; and there is no necessity that the east and west walls should be level at the top, nor that they should fall regularly to the bottom; for if the
garden

garden is highest in the middle, and falls to the right and left, it will be no offence to the eye, nor detriment to the ground, provided there be a fall to the south.

If any little heights intervene they should be taken down, so as to make the bottom of the ground have the same level with the top; for that is of more consequence than is generally imagined. If the bottom be clay, and there is a hollow dug, it holds water; and when the roots of trees reach the place, they are rotted. A height has the same effect, as it stops the water, throws it back, and makes the ground all round very wet. Hills of stone or sand are also of bad consequence, for the roots are either stopped by them, or they run into them, which is much worse. If the bottom has no obstructions the water passes off regularly, and the roots of trees and plants meet with no impediment under-ground, so that all things will thrive well.

When the levels are fixed upon, the walks should be staked out and dug over, and cleared of all weeds, stones, and roots,

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as deep as the bottom of the other parts of the garden, and left six inches lower than the level, which will be sufficient to lay gravel, or any other kind of hard stuff, to form the walks, for grass walks are very unfit in kitchen-gardens; but if any gentleman prefers them to gravel, they should be left only two inches lower than the kitchen ground and borders, which should be filled up with sharp sand to lay the turf upon, as it will make them much drier for walking on in winter, will greatly prevent the worms from working in them, and keep them from growing too flush in summer, which they would do, as the ground is all made good below. They should also be laid a little round to make the wet run off.

If the kitchen-garden is a small one, the walks should be narrow in proportion. In that case the whole ground may be trenched, and the walks emptied either for grass or gravel, as the owner chooses, and the soil that is taken out of the walks may be scattered over the kitchen ground.

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If the walks are thus formed and made good, the borders may be contracted to what breadth the owner pleases, and it would be no detriment to the trees on the walls; if the gravel was laid close to the wall. But it would be so far a loss, that there would be no south borders for planting things to stand the winter; and every five or six years it would be necessary to take up the gravel to add some fresh composition for the encouragement of the trees, which should be prepared some time before it is used. By this management the trees will thrive very well, and the garden will be exceeding neat. If the gravel is laid close to the wall, or the borders contracted, there should be at least ten feet distance from the wall, made as good, and in the same manner, as if the borders were of that breadth, which is sufficient for the roots, provided they meet with no obstruction after they have run that length.

This digression is for the advantage of those who are making new kitchen-gardens, as it will be of great service to espaliers and dwarf apple-trees on the sides of the walks, and of great use to the wall
trees;

trees ; for although the borders are twelve feet broad, which is wider than can be afforded in a small kitchen-garden, besides it is in no proportion, and very unseemly to see a short narrow walk and so broad a border ; and if the trees are so planted, that the roots be made to run horizontally, they in a few years will reach the side of the walks, and then the roots are liable to all the misfortunes that they would have been, had the border been narrower ; only then it would have happened sooner, which any one may see that will be at the trouble to examine into the bottom of a rubbishy gravel walk, although the border was fourteen feet broad. If ever there have been thriving trees on the wall, the roots will be found cankered, and full of knobs and bunches. I do not pretend to say it is from that reason that trees do not thrive ; they are liable to many other misfortunes, and often decay before their roots extend half way over the border : but it is my opinion that most of the thriving trees of six and seven years old, that go off by canker, are infected from that cause.

I am confident that those who please to try this method of making their kitchen-gardens, will find their trees flourish much better than by any method that has hitherto been practised; and the wideness of the borders, which has been introduced of late years, is a certain reason that what is here directed will be of greater service. But to return to the making the borders for Vines.

If the natural soil is a light sandy loam (which is the best) with a clay bottom, raise the ground so as to have a sufficient depth, (two feet) which is much better than digging down into the clay, although it should be necessary to have a step or two into the garden. Spread six inches of rotten dung all over the top of the border; open a trench two feet deep; lay three inches of the dung in the bottom; and when the border is a foot high, lay in the other three inches, and then fill up the border to its level; leave the last trench open, and in about three weeks work it back again; only when within four inches of the dung that is laid in the bottom, it should be dug over, and the
dung

dung and the soil well mixed. The dung that is laid in the middle will mix in the course of working, but none of it should be brought to the top. This last trenching should be at least six weeks before the border is planted, in order that the ground may be well settled.

Half a year at least before planting, make up the following composition, the quantity according to the number of Vines that are to be planted: Two loads of good fresh loam from a pasture, two loads of rotten wood that is become earth, one load of sharp sand, and one load of very rotten dung; lay it in a long ridge four feet broad at bottom, and quite narrow at top. This must be turned often, until it is so well mixed that none of the ingredients can be distinguished. If this was made up in the beginning of winter, and turned over when hard frozen (without snow) it would be of very great service to it.

The borders, composition, and plants being now all ready, provide flat flags or strong slate a foot square. For as many

plants as the plantation consists of, make holes a foot square, one foot deep, and at two feet distance; lay the flags or slates into the holes, scatter the mould that was taken out of the holes all over the border, and lay an equal quantity of the prepared compost down at every hole; put into the hole, upon the flag, so much of the composition as that, when the plant is put into it, the ball may be covered an inch. Take the plant carefully out of the pot, loosening the roots gently; but great care must be taken not to break them; then place them in the hole eight inches from the wall, their heads inclining to it; fill up the hole with the composition all round the ball, as high as the top, pressing it gently with the hand, and so proceed until the whole is planted; then give them a good watering, and a little after cover the ball an inch over the top with the composition; fasten the plant to the wall with two or three nails, according to its length; spread an inch of rotten dung all over the border, and prick it in four inches deep. If all has been managed as directed they will grow a good deal after being planted, therefore must be fastened
to

to the wall, and have the side-shoots picked off as they advance in height and push out; but as the lower part of the Vine will have given over pushing side-shoots, those now at the top may be broke close off, as all that part will be cut off in pruning, but is now allowed to grow to strengthen the lower part of the Vine, which grows much stronger than if they were stopped at the top; for when they are, they push many vigorous side-shoots.

The use of the flag is to turn the roots horizontally at their first growing; and as the plants have been raised in pots, the roots are prevented from taking a downright position; and although the bottom of the border is hard clay, there will be no occasion for any rubbish or stones being laid in it, for the roots will run horizontally, and never attempt going into the clay.

If cuttings are taken off and preserved, as before directed, during the winter, and planted, as above, against either common or hot walls, they will answer very well. They should be planted in the beginning

of March; they will do much better than those that are raised in a separate place, and taken up and planted against the walls afterwards; but they will be two years longer in bearing fruit than those that are raised and trained in heat, and will not be so strong the third year as those raised in heat will be the first. Vines are much better never to be removed.

About the beginning of August nip off the end of the leading shoot; for if it is done sooner they will push out so many side-branches, that it will weaken the plants greatly, and they will cease growing. As soon as the leaves grow red, which will be about the end of September, prune them, and most of them will be strong; cut them, according to their strength, into one, two, or three eyes; let the slope of the cut be opposite to the eye, and a quarter of an inch above it; and as you cut them, have some clay at hand, (a little softer than for grafting) and over every cut give a very thin cover. This will be of great service to them; for the wood of young Vines is soft and spongy, and their hearts opener than those
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that are come to maturity. The thin coat of clay prevents wet and frost from penetrating them; and being cut a little above the eye, although the frost be severe, it never damages the bud, which often happens when cut close to it.

If the plants raised in pots are planted against a flued wall, (for they will do very well on common walls, in countries where they ripen without assistance) it will be of great service to add a little fire to them for two months after they are planted, as it would encourage their growth greatly, and ripen the wood much better.

The border which has been prepared and planted is supposed to be a sandy loam, which is certainly the best; but as that cannot always be had, it will be necessary to give some directions for preparing all the different soils which can happen, at least those that are fit to plant Vines in.

If it is a strong loam, which always has a hard clay, but in general a good depth of soil, a composition of light black earth, sharp sand, and coal or wood ashes, (if
coal

coal ashes, they must be sifted through a fine riddle, as any pieces of coal would canker) and it will make the border in good order.

If the ground is in grass, and a strong loam, open a trench two feet deep, pare off the grass two inches thick, and lay it in the bottom of the open trench; then two inches of rotten dung; then six inches of the natural earth, two inches of the composition, four inches of natural earth, two inches of dung, two inches of natural earth, and four inches of the composition: Let all be well mixed (only the turf at the bottom should not be disturbed) to incorporate the different strata, and they will then be fit for planting.

If the ground is sandy, or a light black earth, (the same materials will answer for both) a good quantity of a strong loam and rotten dung, the dung and loam equal to a third of the natural soil, and well mixed, will make it in good order for planting.

A hard dry gravel is thought the properest soil for Vines of any, and not without
good

good reason, as most of the finest wines are produced from such grounds; and I have been informed that the finest of the Spanish wines are produced from grapes that grow wild on the rocks without any cultivation; and from those observations it was recommended to mix lime rubbish and gravel with the soil on borders that are intended for Vines, and the directions seem very rational; but experience, and the observations of many years, has made it plainly appear to me to be a wrong practice. The grapes in those countries are small, and the great heat brings them to perfection; but even there those sorts are not esteemed for eating: Besides, they are not allowed to grow above three or four feet high, and to carry a few clusters on each branch, which no ways answers clothing a wall of ten or twelve feet high from top to bottom; the wood, foliage, and fruit must be supported to bring them to perfection; and I have found, by long practice, that Vines thrive, and carry large and good-flavoured fruit, when planted in borders prepared as here directed. I have tried many compositions, and all hard
 stuffs,

stuffs, such as gravel, rubbish, &c. and they never produced so good-flavoured fruit. I have been informed that all the vineyards round Rome are on a fine rich deep loam, and are manured with the ashes and the cleanings of the streets, and that they produce the best of eating grapes. It was from this hint I first began to alter the preparation of the borders for Vines, which has been crowned with many years success.

If the ground is a hard gravel, add four loads of rotten dung to sixteen loads of good strong loam and eight loads of the natural soil; mix them well, and after the border has been worked all over in that manner it will be fit for planting.

In all the different soils that have been treated of, the same manner of planting must be observed that is directed in the first; for the goodness of all fruit depends greatly on having the roots run horizontally and shallow, and none more than Vines.

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If the cuttings raised in heat are designed for a hot-house adapted for Vines, or a stove that is employed for Pines, the best way would be to plant them as soon as they are fit, for it is impossible to harden any thing that is brought up under glasses so as to make it endure the open air, without giving it a check; and as they are both covered with glasses, the plants will suffer nothing by being planted as soon as they are ready. Those in the hot-house that are for Pines, will thrive and grow beyond what many will imagine; and those that are planted where there are no Pines, if they are managed in the same manner, will answer beyond the most sanguine expectation. The preparation of the ground for them shall be treated of when we come to give directions for the management of Vines in stoves and vine-ries.

Great care must be taken the next spring, when they begin to shoot, to keep all shoots that come from the bottom rubbed off as soon as they appear, and none allowed to grow but those from the buds left in pruning. They should be carefully

ly kept to the wall, and all the side-branches nipped off, and allowed to run to the end of July; they should then be stopped. There will be some little clusters of grapes this year; but the encouragement of the Vines is the only thing to be regarded, so that there should be moderate fires kept.

I found by the experience of many years that moderate fires, which would bring the fruit to perfection in September, are a great advantage to young Vines, as they ripen the wood, and make them fit for pruning early in autumn. Young plants that are vigorous grow much longer than old ones, and when they have no assistance they are not fit to cut till late in the season, which is of very bad consequence to them; for they should not be pruned at a time when there is a probability of frost, but it should not be deferred till spring; for although they are late in shooting, if they are pruned any time in March, which is as soon as it can be done with safety, and at that time they have no appearance of vegetation, yet as soon as they begin to push (and sometimes before) they will bleed

bleed much, altho' every gardener knows how to stop their bleeding, and may prevent their receiving any damage; yet their bleeding, when cut in spring, shews evidently it is wrong, as they never bleed when cut in the autumn.

If the wood is not sufficiently ripened by the end of July, (which it generally is) keep on the fires ten days longer; then let them out gradually, and they will be fit to prune in the middle of September, without danger, as the frosts seldom are very hard at that season.

The Vines will now be strong and vigorous, and, at this cutting, every sixth plant may be left a yard long, and those between, to three, four, and five eyes, according to their strength. In order to get the wall covered with bearing wood, cut them sloping as before directed, and nail them; then spread some very rotten dung four feet broad from the wall, and prick it in with a dung fork (a spade should never be used nearer than four feet of the wall); then all is finished for this season.

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The next spring, about the end of March, make on the fires, slow at first, but increase them gradually, so that when the Vines have shot about an inch, the wall should be milk-warm all over, and should never be much hotter.

Rub off all branches that attempt to shoot from any part of the Vine, except from the eyes left in pruning; carefully nip off the side-branches, and keep the young shoots nailed as they grow.

There will this year be a tolerably good crop of grapes; and as soon as they can be distinguished, mark the wood for next year, which should be the shoot next the old wood; and when those that have fruit, and are not for next year's wood, are grown two or three joints beyond the fruit, top them; but those that are designed for the next year's wood, although they have fruit, must not be stopped before the latter end of July, which will cause them to grow strong and vigorous for next year's crop. The fruit on them will be smaller and later than those that were stopped, but they will come to succeed the
others,

others, and it will be a great advantage to the wood.

When the fruit is out of blossom, and as large as a pin's head, if the weather is dry and warm, they should be watered twice a-week; but if there be showers, once a-week will be sufficient, until the fruit is come to its size, after which it should have no more water at bottom; but if the weather is very dry, and there is little dew, if the whole wall was sprinkled in the evening, once a-week, it would increase the size of the fruit.

There is nothing further requisite until pruning time, but to keep them clean of all shoots that attempt to shoot from the old wood and the side-branches, which must never be neglected. It would be of great advantage to both fruit and Vines, at the beginning of the year, to lay some short grass close to the wall, four feet broad and two inches thick. This will keep them moist after watering, and prevent the ground from cracking, which frequent watering occasions; for if it cracks, the roots of the Vines being near
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the surface of the ground, it would destroy all the small fibrous roots, and greatly damage the fruit, and retard their growth.

When the grapes are all shown, and the next year's wood fixed on, if there are any shoots that have no fruit, pull them off. If they come clean off (as they should) they will leave a small hole in the old wood, which should be immediately filled up with worked clay; for very soon after the shoot is pulled off it begins to bleed, after which it will be difficult to get the clay to stick: if it bleeds, it will hurt all the fruit on that branch, and greatly weaken the Vine. By this method there will be no useless wood on the wall to weaken the tree, nor to crowd the branches that bear fruit, or those that are for next year's wood, which is often the case.

The next pruning season, some more of those that have long bore old wood may be cut down; so that by cutting some down every pruning, the bottom of the wall may be kept as well covered with strong wood as any part of it. A great quantity of good cuttings cannot be had from

a well-managed wall; but when many plants are wanted, if the side-branches of those that bear fruit are nipped off at a joint, as directed for the wood of next year, there may be a good many got.

The fruit being all gathered, and the pruning season come, the lowest shoot on the plant of all those Vines that were left six feet long last pruning should be cut to four eyes long, to keep the bottom of the wall in good bearing wood; and the top shoot of the same plant to five or six eyes, to fill the middle of the wall with young wood; and all the shoots between the top and bottom shoot cut off close to the last year's wood. There should also, at this pruning, be some more shoots, six feet long, laid in exactly in the middle between those before left.

All the other branches should be cut to five and six eyes, according to their strength; observing that a weak shoot should never be left with more than three eyes.

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As soon as the Vines are pruned, let them be nailed, the border cleaned, and the ground forked over four feet broad from the wall; the other part of the border dunged two inches thick with very rotten dung that has been turned several times, and is very mellow: this should be dug in with the spade.

When the Vines begin to shoot next spring, great care must be taken to rub off all shoots springing from the old wood; for those shoots that were laid in long, and had the branches cut close to the old wood, will push out many shoots at every amputation, and many will also spring from other places on the old wood, which must never be suffered to grow.

The keeping clean, and pinching off the side-branches, is every year the same, so need no more to be repeated.

On the proper disposition of the wood at this season, depends the beauty and regularity of next year; so that great attention should be had to the following directions.

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There being now on the wall two sorts of long shoots; one two years old, which has a young shoot of five eyes at bottom, and another much of the same length at top, the eye next the old wood should be marked for next year's wood on the low shoot to supply the bottom of the wall; and the fifth or last eye on the top shoot, to furnish the top of the wall. The last laid in shoot, which is all young wood, must have the lowest and highest eyes encouraged for next year; and all the other plants on the wall should have the eye next the old wood trained for next season.

There will be some shoots that have no fruit on them; if they are not marked for next year's wood, they should be pulled off to give air to the fruit and wood: there will be a hole in the old Vine where the shoot came out, which must instantly be filled with well-worked clay; for if not stopped, it will soon begin to bleed, after which it will be difficult to make the clay stick. If it be allowed to bleed, it weakens the Vine, and spoils the fruit.

All the branches that have fruit, and are not for next year's wood, should be stopped as soon as they have run two eyes beyond the last cluster: those for wood should not be stopped before the end of July.

The next pruning, the wall will be full of good bearing wood, so that it should be left regular, and the shoots cut to four, five, and six eyes, according to their strength. There should this season be some rotten dung spread four feet broad from the wall, and forked as before directed.

If Vines are thriving, and carry great crops of fruit, they will only require dung every other year after the fourth; but it will be better to dung one year half the breadth of the border next the Vines; then miss a year, and dung the other half.

There is now only one difficulty remaining in the management of Vines on walls, and that is to keep the bottom of the wall full of good bearing wood, which it is impossible to do if the Vines are planted at a great distance.

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There was a necessity to run some shoots a great length, to furnish the top of the wall until the other wood mounted gradually, which it is now supposed to have done.

Those branches that were laid in six feet long, and at six feet distance, having one shoot at bottom and another at top saved for wood, and of consequence the middle being now all bare, cut them down to the ground. Those cut down will push out many shoots from the bottom, which must be all pulled up but one of the strongest on each plant, and it will be a fine strong shoot for next year.

The next pruning season there should be some more of the long shoots cut down, and managed in the same way as the others; and every year there will be some old plants that may be cut down, so that the wall may be kept in good bearing wood at the bottom for many years. There is no difficulty in keeping the middle and top of the wall in young wood.

There cannot be many good cuttings obtained from a Vine-wall that is properly managed; but if plants are wanted, pinch off the side-branches in the same manner from the fruit-bearing branch as they are from the branches that are designed for next year's wood, and there will be more good plants; but unless the plants are wanted, the best way is to break off the side-shoots close to the eyes of those that are not for wood. They do not shoot so soon as when pinched off at a joint above the eye, so require less labour. It may be thought that more dung is recommended than necessary, and that it will spoil the flavour of the fruit; but if rightly considered, there must certainly be a great supply to support plants on a wall twelve feet high, covered with luxuriant branches, fruit, and such great quantities of leaves as there are on a well-managed Vine-wall. Where this is not observed, the wood is very small, the clusters little, and the skin of the fruit very tough, and of a very bad flavour; but where they are properly supplied with rotten dung that has been prepared at least a twelvemonth, they will continue many years in the greatest

The reason for this difference in cutting these young trees is, that if they were all short there would be little or no fruit ; if they were all cut long, there would be so much wood that the wall would be crowded, and not have room sufficient to contain the wood, so as to have proper air, which would spoil the next year's crop ; by this management there will be a good deal of fruit, and the Vines remain in good order for the next year : And it will be absolutely necessary to pull off the barren branches that are not for the year's wood, as there should be no wood but what is useful left to weaken the plants, and those that are chosen will not be proper to force them early in the spring, as they will not then be strong enough ; but if the fire is put to the beginning of April, and kept on a month before the glasses are used, it will be much better for them. When the glasses are put on, give moderate heat at first, and there will be a tolerably good crop of grapes, which will be ripe the end of July.

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never should be used until the Vines are of a good strength, which will be the fourth year, if planted in the common method; but if from cuttings raised in heat, they will be fit the second year, if managed as follows: As soon as the plants are fit for planting, without being hardened plant them on the fire-wall; put on the glasses and a gentle fire; if they have succeeded well in the raising they will be fit to plant the beginning of June. Give them moderate heat and air, so as not to draw them, and they will be fine strong plants by the end of August, when the fires should be put out, and more air given to harden them,

If they have all thriven they will be very strong. As soon as the wood is well hardened they should be pruned, which may be done about the end of September.

They must be cut very different from any thing yet mentioned. Begin at an end, cut the first to four eyes, the next to ten, and so on until all are finished; nail them immediately, and dress the border,

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The reason for this difference in cutting these young trees is, that if they were all cut short there would be little or no fruit ; and if they were all cut long, there would be so much wood that the wall would be crowded, and not have room sufficient to lay in the wood, so as to have proper air, which would spoil the next year's crop ; but by this management there will be a good deal of fruit, and the Vines remain in good order for the next year : And here it will be absolutely necessary to pull off all barren branches that are not for next year's wood, as there should be nothing but what is useful left to weaken the plants.

It will not be proper to force them early in the spring, as they will not then be strong enough ; but if the fire is put to them the beginning of April, and kept on that month before the glasses are used, it will be much better for them. When the glasses are put on, give moderate heat and air, and there will be a tolerably good crop of grapes, which will be ripe the latter end of July.

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It will do the Vines no hurt by forcing them so young, provided it is done moderately; and as this year the wood will be ripened much better and sooner, they may be pruned early, and so have the heat applied sooner in the spring.

Those who delight to have grapes very early, should begin in January to apply the heat; for it is much better to begin early and work moderately, than to keep them very hot, as it does less damage to the Vines, and there is more certainty of a crop; but it is impossible to force in so much bad weather as generally happens in those cold months, without hurting the plants; so that those who choose to have them early in the season, should have two separate lengths for that use. Those which were forced early this year should have no glasses put on them the next year, but should have a moderate fire applied the beginning of April, and continued until the end of July.

In the pruning season, that which was forced early should be cut short; that is, have few eyes left on a shoot, in order that they

they may push strong wood for next year, as the preparation for the next early crop is what is to be regarded this season. Those who prefer a good crop to having them very early, may force the same wall with glasses for many years with good success.

The beginning of March is a good season to begin to apply the heat, if the weather will permit. It is much better to have the fire at the wall ten or fifteen days before the glasses are put on; but it will be dangerous to keep them long without glass at that season; for, after they begin to push, and the shoot is just coming out, if the frost should catch the top of it, all hopes of a crop are frustrated for the season. Give a good deal of air every day, especially when the sun is hot; for if drawn they drop their fruit after it is formed, before they come into blossom. There should be little or no water given until the fruit is out of blossom, and then they should frequently have a little; but at first it should be given in the morning, when there is the appearance of a fine day and little wind.

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As soon as they are watered, the glasses should be opened a good deal to dry the surface of the ground before night; for when the glasses are shut, there is a great steam, which is very prejudicial to the young fruit, and often makes it drop off; but when half grown, it is of great service, and then they should be watered in the evening, and the glasses shut immediately.

When the fruit is as large as a small pea they will bear more heat, and the glasses need not be opened so soon in the morning, and may be shut close at night before they lose the sun; but in the middle of the day, if the sun is hot, they should have a considerable quantity of air. In dull days a little will be sufficient; but if it is even a cold day, they should have a little to rarefy the air, otherwise the fruit will not be good.

When the grapes are come to their size they may be kept pretty hot and close, if they are wanted very early: by that management they will grow very large, and fine to look at, but will not be so high-flavoured.

flavoured as when they have less heat and more air.

When the fruit is in blossom they should have no water; and the place kept as dry as possible, for they are then in the most critical situation, as they at that time receive great quantities of the steam (if there is any) that rises when the glasses are shut; so if great care is not taken, many of them will drop off; to prevent which, if two or three little holes were made in the back-wall with shutters, they might be opened in the night when the fruit was in blossom, and it would keep the place quite dry.

When glasses are used for grapes on fire-walls, and the fruit is not required early, there should be two lengths, which will be sufficient to make a regular succession. The frames and glasses should be moveable; and those that were forced with glasses, if properly managed according to what has been directed, will be little worse. As soon as the fruit is gone the glasses should be removed, and the Vines cut, which will be about the beginning
of

of September, when they should be nailed, and the border dressed.

Those Vines that had glasses over them last year, and are to be this year without, should have fire put to them any time between the 25th of March and the 1st of May, and in every respect managed as directed for fire-walls without glasses. By this means there will be as good a crop this year as if there had been no glasses the year before, and the Vines will be very fit for glasses the next spring; and those which are forced by fire only, this year, will gain strength if they were any ways drawn. They will also succeed those under the glasses, and there will be a sufficient quantity to supply a moderate family from the middle of June to the end of October.

I have had several crops of fine grapes by the following method: I applied the fire to the wall the 1st of April, and worked it to the end of May without glasses, in the same manner as if there had been no glasses intended. At that time, the grapes being just out of blossom, I put on

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glasses, and managed them in the same manner as I have directed for Vines under glafs, and had very fine crops. The berries were very large, the fruit had a much finer flavour than those that had the glasses put over them sooner, and were ripe the latter end of July.

Proper heat and air are the only things to be considered to render fruit of a good flavour; and unless these two elements are used properly, grapes will never be good. They may be obtained early by the strength of heat, and by a large quantity of water they may be swelled to a large size, but they will be insipid. A fine large cluster of grapes makes a fine appearance when the berries are plump and large; but in eating they taste flat, and have no flavour, which is a great disappointment; but those who follow the directions here given, with accuracy, will obtain fruit rich and good, which cannot fail to give both satisfaction and pleasure.

The directions for the management of grapes on fire-walls forced early, and those forced late, may seem much the same; but

but when compared they will be found very different. The wood of the first will be much weakened by having early fruit, which it is impossible to prevent, as the inclemency of the weather in the winter months will not permit giving them sufficient air to keep the wood strong; so that the management of them next season (although fire is requisite) is not with regard to fruit, but to recruit the wood; and make it fit for forcing early the next year with glasses; whereas those that are not forced early will have a good crop under the glasses, for at that season proper air may be given to keep the wood in good order. The year following there may be as good a crop as if there had been no glass over them the preceding year. As to the forcing of the young Vines that were raised in the hot-bed of tanner's bark, it was only to encourage their growth, as it is directed to be done with moderation, although, at the same time, there will be a good deal of fruit.

Grapes may be forced with paper covers instead of glass; and if the wall be lighted the beginning of April, and
worked,

worked, as if no covers were intended, to the beginning or middle of May, they will answer very well and bring the fruit forward; but when they are used early they are liable to many misfortunes from the weather; and in a stormy night of wind and frost, if the covers are torn, (which sometimes happens) much damage may be done to the crop. Fruit raised under paper covers are not so high-flavoured as when under glass, and by the faintness of their light they draw and tender the trees much more, especially in dull days, when much air cannot be given.

Having treated fully of fire-walls with and without glasses, I now proceed to hot-houses built on purpose for Vines, called Vineries.

There are many sorts and forms of Vineries which bring good crops of fruit. Some of them have the Vines planted on borders in the house, and many are planted on the outside, and taken in at holes left for that purpose.

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If the house is intended to have grapes very early, it is best to have the Vines planted on a border in the house: If for a large crop, and of a good flavour, they are best planted on a border on the outside, for there the roots have the advantage of sun, air, and natural rains, which is much better than any artificial waterings, although ever so skilfully performed.

A Vinery built on purpose should have no tan-pit, although many hold it best, as it gives a natural moist heat, which is by some said to be better than the dry scorching heat produced by fire. A soft moist heat is best for all kinds of fruit in the open air; but is not so where the air is confined, for many reasons too numerous to mention, so shall only take notice of two. If there should be a great heat in the bark when the Vines are in blossom, the steam that rises from it causes many of them to drop off. When the bark has lost its heat at top, which it soon does, it must be often stirred up, which causes a very bad smell, and a great steam rises, if it is fresh and hot. If there is
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not much heat, it has a musty smell, which will infect the fruit, unless there are air-holes to carry off the steam at night when the house is shut up. If that be the case, the moist heat of the bark is lost, therefore would be better without it.

A good Vinery should be all flagged, and the flues so constructed that they may give a good deal of heat with little fire. There should be a flue all round the house, which should stand above the level of the floor, and as there is no tan-pit, it should stand off the walls at least two feet, that the heat may be equal on both sides, which it cannot be when close to, or in the wall. There might be a single flue all along the middle of the floor, and one in the back wall, independent of each other. A little fire will keep a house warm if thus constructed.

A house built after this method might have the border made between the flue and the fore-side of the house thus: A brick of breadth laid a foot from the flue and raised one foot, the other foot sunk;

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that the top of the flue, which should be too feet high, would be a foot higher than the surface of the border. The forefide wall of the house should be built on arches supported by small pillars, (which there would be no difficulty in doing, as there is no flue in the forefide) so that the roots of the Vines might have liberty to strike into the border on the outside, which might be made ten feet broad. The arches should be all so low that their tops may be within the border. The Vines should be planted on the inside of the border, a foot from the brick that supports the mould, by which means the roots would soon be without the house, and have all the advantages of free air and proper moisture; and at the same time would be secure from the frosts affecting them, if they were forced early. If they are thus prepared and planted they would bear forcing much earlier.

It will be necessary to have a shed at the back of the house, into which there should be a door for a passage in very cold weather, and to give air in hard frosts when

when forced early. It would also be very beneficial to have three air holes in the back-wall above the flue, to carry off the great heat in very hot days when the glasses are opened; and there should be a door at each end of the house for the convenience of passing.

The frame for supporting the Vines should be at least two feet from the glass, which is much better than when it is nearer; for when they are too close to the glasses it is impossible, in very hot days, to prevent the sun from burning the leaves and scorching the fruit; besides they have a free air when distant from the glass, ripen much better, and are not so subject to rot. The frame should have the same slope with the glasses, that the Vines may be all of an equal distance from it. There should be no glass in front; and indeed there will be little room for any, if the house is built as directed.

The Vines may be trained straight up in front like an espalier, until they are at a proper distance from the glass where the frame is fixed.

If the Vines are forced very early, it will be proper to cover the border on the outside of the house four or five inches thick with long dung, straw, moss, or any such light covering, which will keep the froit from penetrating to the roots, and there will be a free communication with the plants in the house and the roots on the outside.

It must be remembered that all Vines should be planted in the same manner that was directed for the first against fire-walls, that their roots may run horizontally, and with the same compound; and that the side-branches every where should be pinched off at a joint above the eye, as before directed.

If this house is planted with plants raised in heat, they should be managed and planted in the same manner, and at the same time, with those under glasses on fire-walls; only with this small difference, that in the pruning the first plant should be cut to one eye; the next to ten or fifteen, if strong; the next to four eyes; and

and so on to the end; that is, one, ten, four.

The reason for this difference in pruning is, that here they may be managed so as to grow much stronger than on a common fire-wall. They have also much further to run, so that the house should be furnished as soon as possible, to keep good wood in all parts of it.

It would be of great service to the Vines to take the glasses off the house as soon as the fruit is gone; but this should be done with care, as they should be hardened gradually, which may be done before the fruit is all gathered; for, after the grapes are all cleared for ripening, there will be no occasion for much heat, so that they may have air night and day.

When the leaves begin to grow yellow they should be pruned, fastened to the frame, and the glasses put on before the hard frosts and heavy snows fall; for, as they are not perpendicular, the frost and snow would hurt them; nevertheless they

they should have free air night and day until the heat is applied.

The next spring the shoot that was cut to ten eyes should have the bottom eye and the tenth encouraged for next year's young wood ; and as there will be eight eyes between them which may have fruit, they must be topped two joints above the cluster. That which was cut to four eyes should have the fourth encouraged for young wood ; and if the other three have fruit, they must be topped as before ; but if any of them, or those on the long shoot, are barren, pull them off, and stop the hole with clay, as before. The shoot that was cut to one eye will be very strong, and run to the backside of the house.

The next pruning season the strong shoot from one eye should be cut to the whole breadth of the house ; and it will be full of bearing wood ; the shoot from the top of the plant that was before cut to four eyes should be cut to reach the middle of the house, and the bottom branches to four, five, and six eyes, as they are of strength.

Now

Now the whole frame is covered, there must be young wood left regularly all over at proper distances, as before directed, and at the pruning season shortened as they are of strength.

A house for Vines built after this manner is much better for forcing early than a common fire-wall, as there is proper conveniency to give warm air in very hard frosts, and in the very dampest weather it may be kept perfectly dry; for, when there is a long time of dull, damp, rainy weather, it is very difficult to keep the fruit on a fire-wall from moulding without over-heating the wall, which has often been the destruction of both Vines and fruit.

In the cold winter months, when the forcing is begun, the fires should be made very moderately at first, and have a good deal of air in the day, and a little at night, for some time; for unless the buds push strong at first there are little hopes of a good crop.

A week after the fires are made, it will be proper to give a little water to that part of the border which is within the house once a-week, and it should be kept just moist at all times when the glasses are on the house, although there is no fire; otherwise the roots will decay.

After the fruit is out of blossom, and about the largeness of a small pin head, it will add greatly to the size of the fruit to sprinkle all the floor over in the evening in fine weather, and shut up the house directly, which will cause a fine moisture like a dew; but care must be taken to give air early in the morning to dry both fruit and leaves before the sun begins to shine hot upon them, or it will burn the leaves and scorch the fruit.

It will be of great advantage to the fruit to give the border a good watering every week after it is out of blossom, until it is full grown; after which they should have none, neither should the floor be any more sprinkled, but kept quite dry, and have a good deal of air, which will make the fruit of a much better flavour than when they

are kept very hot, but they will not be so early by ten days. After they are full grown the air should be admitted gradually; for if there be too much given at first, so as to check the growth of the Vines, it quite spoils the flavour of the grapes; and this is the reason why fruit that is forced under glass should never have them taken away until all is gathered.

Great care should be taken not to draw the Vines weak; for if they are, there is no other remedy to recover them but a year's rest; that is, they must be all cut very short, and have no fire put to them before the beginning of May; and then it must be moderate, and have a great deal of air. It will be of great service to sprinkle the floor often to encourage the young shoots. They should also have a great deal of water on the border, both on the outside and inside of the house, as it is not the fruit which is to be regarded this season, but the strengthening of the Vines for another year.

It will be a great disappointment to a gentleman to have few or no grapes for a whole

whole year, who had great plenty the season before; and as every gardener that has the least knowledge of plants must see when they are drawn weak, as soon as that is visible he should give more air and less heat, but this must be cautiously performed; for if, from a great heat and little air, the system was to be changed to the other extreme, it would check the growth of the plants, and not only spoil the next year's wood, but the fruit of this year also.

There are few gentlemen that will be at the expence of having two such houses. If the Vines are forced early one year with care, and the next year not until the beginning of May, as the plants would last many years, and bring good crops every year; because at that season the weather is fine, and they may have a great quantity of air to strengthen them; for, as I said before, it is impossible to force very early without drawing the plants.

Vines in such houses are subject to push out many shoots from the old wood, which should be constantly rubbed off; they

they also push roots, which should be taken off as soon as they appear.

Grapes in a hot-house that is used for Pines, in general appear large and fine to the eye, but are mostly inferior in flavour to those on hot-walls, with or without glasses, as they cannot be managed as they ought to be, the Pines requiring a very different culture, and being the principal crop.

There should be a good border made in the front, on the outside of the house, of the same materials as before directed, which should be four inches lower than the level of the ground, except a foot next the wall where the Vines are planted, which need not be above an inch. When they are all planted, cover all the border with gravel or sand, so that the walk before the stove may be neat and clean.

If they are plants raised in heat, which are the properest, plant them four inches from the front wall of the stove, in the same manner as they are planted in all other places. Where Vines are intended in a pine-stove, there should be a round
hole

This work should be performed in the morning, when there is an appearance of a fine day, that the wounds may be dried before night by the heat of the sun. This should be performed with sharp-pointed scissors, and great care taken not to wound any of the berries that are left.

Those that use covers for their pine-stoves are in no great danger of having their grapes hurt by frost; but they are liable to be scorched by the sun when they are close to the rafters. The covering of stoves is attended with many inconveniences, such as breaking of glass in high winds, let the covers be of what sort they will; in wet weather, in treading the sand or gravel into a quagmire; and in very hard frosts, when the covers cannot be taken off for several days. In that time, perhaps some hours of sun every day is entirely lost, also the expence of time in covering and uncovering. All these things render it very troublesome.

I have not used a cover for a pine-stove these thirty years, although I have had them under my care part of that time,
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even in the north of Scotland. There is no difficulty in keeping Pine-stoves without covers where there are no grapes; but as they are now introduced into almost every house, it is necessary to know how to manage them without being at the trouble of covering.

There are few stoves for Pines but where the plants stand at four or five feet from the glass. Fix iron pins of a foot long three or four in a rafter, according to the breadth of the house. There must be an eye of an inch square at the end of each pin, through which place a rod to fasten the Vine. It will then be so far from the glass as to prevent the frosts hurting the grapes, and they will have a freedom of air, and not be so subject to rot. The Vines hanging thus lower will be no detriment to the Pines, altho' it will shade them a little; but as it is in the summer months it will be no disadvantage, as at that season there is sun and heat sufficient, although a little shaded by the leaves of the Vines, and they will be all off before the autumn when sun is wanted. If they have

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not dropped they may be pulled off, without any injury to the Vine.

Grapes in Pines-stoves are for the most part planted promiscuously of early and late sorts; the early have in general their berries much closer in the cluster than the late, and are not so fit for the hot-house.

If the large late kinds are taken into the hot-house, they are much higher flavoured than those that ripen soon; for as they push much later than the early sorts, the Pines are put into their proper order for the summer long before the grapes are of any size; so that there will be little or no steam until the autumn, when the grapes will be mostly ripe. As the weather in the summer is warm, the Pine-house has a great deal of air, and consequently the grapes will be much richer; and as there is no long continuance of damp weather at that season, they will not be so subject to rot. There will be this advantage also, although they are late in ripening, they will be of no additional expence.

The

The fire-wall may be forced to bring much earlier fruit than the plants in the Pine-stove; for the Vines that are in it will not push early, unless they are taken out of the stove as soon as the fruit is gathered, (which is very troublesome, and the Vines are in danger of being hurt) and kept out some time. As soon as they are put in again they will push, but it will be difficult to keep the frost from the roots if they are put in early.

If the Vines are planted in the inside of the Pine-stove they will push soon and be early; but it is not a good method, for there they can have no water but artificial waterings; and although it is done with judgment and care, it is far inferior to natural rains which supply them in winter. When in the inside of the stove they must be kept damp when they are not growing, or the roots will mould and decay.

If the fire-walls are properly built they should be fifty feet long for Vines to one fire, which should be in the middle, draw both ways, and have dampers so as to throw all the heat one way or both, as

shall be necessary. One side may be planted with the early kinds, and the other with a later sort, that will ripen on fire-walls without glasses. As they will be every other year without covers, it would be wrong to plant them with any Vines that will not ripen without glasses.

The side that has the early Vines may be forced early (two months) before the others, for it will be no detriment to them, as all the heat may be kept from the side that is not covered by the damper. It will be much better for the late Vines not to force them before the beginning of March, as then there will be more certainty of a crop, and the fruit will be much better.

To have a regular succession for forcing, there should be two lengths of fire-wall in Vines, and one half of each length planted with the early sorts, and the other half with late.

If the early sorts are forced to bear very early, the glasses may then be put on the other side, and all the heat thrown that way.

way. If it is a cold wet season it will be of great service.

The black, red, white, and brown Frontiniacs are all very fit for a hot-house, having full as high a flavour as when on an open wall with fire; the pores of the berries are much closer, and do not admit of so much of the steam when the house is shut up at night as most of the other sorts of grapes; they never ripen equally without glass, and I have had them in greater perfection in Pine-stoves than I could ever bring them to on fire-walls amongst other Vines. They all grow very close in the cluster, so should be thinned, as before directed, when very young, which adds to their fragrancy, as then the sun gets to all parts of the berries. The red Frontiniac is the highest flavoured, and the most esteemed of any known in England.

The Tokay is an exceeding good grape for the hot-house. It is the only proper place for it, as it is so long in ripening after the other sorts, that it would cause the fire and glasses to be kept on at least a

month longer, which would be a detriment to the other plants; and, besides the expence, they will not come to perfection without glafs, fo are not fit to be planted where there is not a constant cover.

The brown Hamburgh is a fine large grape, and grows to a great weight, even four, five, and sometimes to fix pounds a cluster; but it is not of fo high a flavour as thofe already mentioned, yet is a good fruit.

The Burlake is a fine large grape, and fit for the Pine-ftove. It ripens very late.

The Raifin Grape grows to large cluf-
ters; the berries are alfo very large. It
ripens the lateft of all the grape kinds,
will hang long on the Vine, and after it
is cut may be kept a month in a dry place
where there is a good deal of air.

There are fome other forts that will
anfwer very well for the Pine-ftove; but
thofe here mentioned are the beft, and
will be fufficient to fupply the table a
long

long time after all those on the fire-walls are gone.

The following grapes ripen on fire-walls with or without glass, but are not fit for forcing early: Red, royal, and black Muscadines; white, red, and black Frontinac; black Sweet-water, black Hamburgh; all these are fit to plant on one side of the fire-wall, to be forced alternately with and without glass; and that year the glasses are used if you begin about the beginning to March, the grapes will be ripe in July.

The year the glasses are not used, the middle or end of April is time enough to put fire to them, and then both sides may be worked together. The early sorts will be ripe the middle of July, and the late will be all finished by the beginning of October.

It will be proper to plant the following grapes on fire-walls by themselves, and they may be forced every other year early, so as to be ripe the beginning of May. The Sweet-water, brick-coloured Grape, black Cluster, white Muscadine, and the
Miller's

Miller's Grape ; many others will answer as well, and perhaps much better, than those here mentioned, but I have not had them under my care.

I shall not mention any other sorts of Vines, as I do not copy from any book, but only relate what has succeeded under my own immediate direction.

The last-mentioned grapes will all ripen on common walls in the south of England, and come to perfection.

CHAP.

C H A P. XII,

On the Ananas.

THE culture and management of the Ananas, or Pine-Apple, is brought to so great perfection of late years, that it may be imagined it cannot be now improved, and may seem quite unnecessary to say any thing respecting its propagation; but as there are many things concerning them which are unknown to the generality of those concerned in Pine-stoves, for their instruction I shall give easy and safe directions for raising the plants, and bringing them to fruit much sooner than by the common method.

The common method with the crowns is to cut off the soft pulpy end that is twisted out of the fruit, and pull off a few of the under leaves, and lay them some time in a shady dry place to harden; then plant
them

them in small halfpenny pots, and plunge them into a bed of tanner's bark, made ready in the breeding-stove for that purpose.

It is certain that a plant lying so long in drying, after it is deprived of its nourishment (the fruit), must be a detriment to it, and greatly retard its growth, for the leaves become soft and languid like any other plant that is much dried in a sunshine day, and were it not for the nature of the leaves being strong, and of a very different texture from woody plants, it would shew its wrong treatment as much as those would were they treated in the same manner.

The cutting off the soft end that is twisted out of the fruit deprives the bottom of the plant from ever pushing out a root, for it remains to the last just as it was cut off, and the pulling of the leaves from the bottom destroys most or all of the small little knobs that are formed between the leaves, and are the rudiments of the roots, all of which grow when treated in the method here directed.

Those

Those also that are managed in the old method are very subject to rot if taken off late in the season from the fruit, as then they cannot be so well dried. Whereas those that are planted in the new method are in no danger if taken off in the middle of winter, and they are no trouble, nor do they require any place to be made on purpose for them.

The fruiting Pines are, or ought to be, put into fresh heat in the spring, which will be a fine moderate warmth by the time there are any Pines fit to cut; and as there is always near a foot in front of the bed between the flue-wall and the pots that stand in the foreside of the pit, it will be space sufficient to hold many crowns, though of no use in the present method, neither should there be any other use made of it; for if any pots were to be plunged there, unless they were very small, they would deprive the foreside row of heat; and if the plants in them are of half the height of the Pines, they prevent the free circulation of the air amongst the pots, which would be a great detriment to the fruit.

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As soon as you can procure the crowns (the sooner the better after being separated from the fruit) make a hole in the bark with a setting-stick, two inches deep, then put in the crowns, and make them fast in the bark.

When the crowns have been fifteen days in the bark they should have a little water once a week, and may be planted within two inches of each other, and the crown that is next the fruiting plant may be placed within two inches of it, so that there may be three rows of crowns all along the fore-side. It will be the best method to carry them all on as the crowns can be got, for after they begin to grow it will be of great service to them to be sprinkled over with water twice a-week, as it will keep the tan moist; but this cannot be done where there are any plants lately planted, for if they get any water before they begin to grow it rots them. If there are any crowns that are taken off in winter, they may be planted into the bark in any place amongst the plants where there is room and air, and not very hot, where they may remain until there are some young plants to shift, when they may

may be taken up and potted. The crowns that are taken off last in the general crop must not be planted in the front of the fruiting-pit, but be disposed of in the same manner as those taken off in winter; for the house must be all removed as soon as the fruit is cut, so that they would not have time to get root.

Before any of the pots are removed raise the crowns out of the bark carefully with a stick, so as to break none of their roots. The pulpy part that was twisted out of the fruit will be all rotted off, and the bottom will be smooth and sound, and in good condition to push roots. There will be many of the under leaves also rotten, which must be pulled off; then there will be a good stem, hard and sound, with many knobs for pushing roots; besides there will be many fine roots which have struck while they were in the bark, which will receive no check in being removed. Cut the end of four or five rows of the small leaves round the bottom, that they may decay before the next shifting, in order to get more stem to push out roots, for the longer the stem is the more vigorous

rous will the roots be, and the plants will grow very fast. Plant them into large halfpenny pots, taking care to lay the roots smooth, and plunge them into a moderate heat, giving them a little water the next day, and they will require no more for some time.

They should be shifted again into penny pots before the roots are much matted round the pots, which will be in about six or eight weeks. None of the roots must be disturbed, but taken carefully out of the small pots and planted into the larger ones, having first put two inches of mould into the bottom of those pots. Let the mould be carefully put round the ball, so as not to break it, yet to make the plant fast, so that there be no vacancy. Plunge them into a tolerably good heat, and give them a little water; but they should have no more for a week, for Pines should never have much water after shifting, until they begin to grow again.

This work may be done in any of the winter months as safely as in the summer. A moderate heat, a little water, and fresh
air

air should never be omitted, if the weather is ever so cold, for it is against nature to imagine a plant can live and be in good health without fresh air. Although Pines do not so soon discover the want of it as many other plants that are more succulent or soft-leaved, yet they equally suffer for want of it.

If the plants have had no misfortune and are thriving, they will require to be shifted into threehalfpenny pots in the month of May, when they will be strong plants, and be in no danger of what the gardeners call *running* (fruiting). I cannot say positively that this shifting will entirely prevent it, as perhaps a few may fruit; but I can say, with truth, that there will not be twenty in five hundred, which is next to nothing. Notwithstanding this, those that have had a check by cold, or been too much heated, will be liable to fruit. It sometimes happens that old plants will not shew fruit at the proper time, though they appear large and in good health. This often happens when the roots of the fruiting plants are burnt all round the side of the pot and go

no further. There are roots sufficient to support the plant for a time ; and if they do not get too much water at that juncture, having a good heat, they will soon push fresh roots, and keep growing instead of shewing fruit, which they seldom do until the pots are full of roots. This is the reason why some plants are so late in fruiting ; and is also a convincing proof that shifting young plants, before the roots are matted round the pots, is a good method to prevent their fruiting.

The suckers should remain on the stools, or old plants, after the fruit is cut, until the whole crop is finished ; then they should have a good deal of water, especially if there is a moderate heat in the bark. As the old plant has nothing to feed but the suckers, they will grow to a large size before all the crop is cut, which will be about the end of September, if the plants fruited at a proper season.

Although the tan is in seeming good order between the pots, yet underneath it will be dry, husky, and mouldy, if the plant has had no water for some time before

fore the fruit be cut ; so that as soon as the fruit is off it should have a large quantity, it will run through freely, moisten the bark, and cause it to ferment afresh, which will greatly encourage the growth of the suckers. If they are low in the pot they will strike roots and be fit to pot as soon as they are taken off, which may be done with safety, if there is a proper heat to plunge them in ; for as they have been long on the old plant their stems will be hard and dry. As soon as they get roots they are almost ready to drop off, so there will be a very small wound where they are taken off the old plant, and no danger of rotting ; but if there is only a few that have roots, it will not be worth the trouble of potting a small number. Cut the roots off and plant them with the unrooted suckers, as hereafter shall be mentioned. If the roots are not cut off they are apt to rot when planted in the bark, and are detrimental to the young roots when they push.

Some time before the suckers are intended to be taken off, there should be a place prepared in the breeding-stove for

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their reception. The bark should be trenched over, and as much new bark added as will make a moderate heat, and at the top there should be at least a foot of old bark without any mixture of new; and when very dry, it should be watered until it is moist.

This should be done seven or eight days before the suckers are taken off, that the heat may rise before they are planted; for if the bark be quite cold they will be in danger of rotting; and, which is full as bad, if the heat was to be violent it would burn the stems, and retard the plants three months, if it does not quite spoil them; but if only a small quantity of new bark be added, there will be little danger of its being too hot.

As soon as the bark is a little more than milk-warm, take off the suckers from the old plants and plant them immediately with a setting-stick in the prepared bed, just as they are taken from the stools. They may be planted in rows at six or eight inches distance as they are in largeness, and four inches asunder in the row. They should

should be four inches deep in the bark, and if made fast it will be of great service to them to be planted that depth, for it will rot the small leaves round the bottom of the plant, so that they may all be taken off when they are potted. They being planted in this manner a small space will hold many plants, which will give an opportunity of preparing the beds for their reception when they are potted.

They must have no water for twelve or fifteen days after they are planted in the tan, by which time they will have begun to push roots. They then should have a little water, if the weather is warm, twice a week; but if dull and cold once a week will be sufficient. When they begin to grow freely they must be watered frequently; and it will greatly encourage them to sprinkle them all over once or twice a week if the weather is fine, and a good deal of sun; but in dull days they require none, as the air is then sufficiently moist.

In six weeks they will be fit to pot, therefore must be carefully taken out of

the bark with all their roots uninjured; then pull off the dead leaves; but care must be taken to pull off the leaves no higher on the stem than it is of a dark brown, for if they are taken off until the stem is white they are in danger of rotting. All the small leaves round the bottom that are not decayed should be ended, to make them rot before the next shifting, that they may be pulled off to get a good strong long stem to push vigorous roots. As many of the suckers will be very large, and have made roots five or six inches long, they must have penny pots at their first potting. They should not remain longer in the bark than to make roots of that length, for if the roots are longer they must be either cut off or twisted round the pot, or put into pots too large for them, all of which are very detrimental to their growth. If there should be a root too long to be laid even, it is better to cut it off at a joint than to twist it round the pot, or to plant the sucker in too large a pot.

By allowing the suckers to remain so long on the mother plant, they grow
much

much faster than if they were taken off as soon as the fruit was cut. They also harden in the stem, and as they grow hard they also form small knobs on the sides of their stems, which push strong roots immediately on their being planted in the bark, and the stem, by being hard, is in no danger of rotting. By being planted directly when they are taken off, they lose no time, so are not retarded in their growth, which they do when taken off and laid to dry, which is the common method of treating them. Before they are planted the leaves are shrivelled, and it is some weeks after they are potted before they recover their proper position. The small knobs that are on the stems, which are the rudiments of the roots, are all dried and lost; fresh knobs must therefore push before there can be any growth in the plants, which makes it evident that the method here directed forwards the plants almost a year, and is much easier and more certain than the common method that is in general practised.

Before the suckers are taken out of the bark, there should be a proper bed ready,

and the heat pretty strong ; for as they are to be planted in penny pots, and the roots not supposed to reach the sides of the pots (for reasons before given) they will grow much better if the heat is pretty good.

As soon as they have been plunged a day they should have a little water to settle the mould to the roots, but will require no more for ten or fifteen days. After that time they should be watered at least twice a week, and if the weather is dry and hot it will greatly encourage them to sprinkle them with water once a week, unless it be late in the season, when the nights are long. Their being shut up without air supplies the leaves with moisture without sprinkling, as the house will be sufficiently damp all that time. Neither should there be any water allowed to fall into their hearts in the winter ; but it is an advantage to pour it in amongst the bottom leaves, in watering, even in winter, as it washes out all the dirt and nastiness which is very apt to lodge in their bottoms, and sometimes rots them off close to the pot, or decays the plant so that

that the fruit stem becomes crooked, and the fruit grows defective on that side.

As soon as the roots are come round the pot, so that they can be taken out without danger of breaking the ball, they should be shifted into larger pots. Eight or ten weeks is the usual time for shifting, but you may judge to a certainty by turning the plant out of the pot carefully, at least so far as to see in what condition the roots are; for they should not be allowed to remain till the roots are matted, for then there is so much small soft woolly stuff grows amongst the roots, which is absolutely necessary to be taken off, and in doing it many of the best and strongest roots will be broke, and the ball often greatly diminished, which is wrong, and retards the growth of the plant. If the woolly stuff is not taken off it moulds, and very often destroys the roots after there is fresh mould put round them, and it prevents the roots from coming to the sides of the pots.

They should be carefully taken out of the penny pots and planted in threehalf-penny

penny ones; and if the heat is declined, a little fresh bark should be added and worked up with the old, which will renew the heat. This work may be performed safely in any of the winter months.

This second shifting should be about the beginning of December or February, according to the time the suckers were taken off in autumn.

This shifting keeps them growing all winter, and greatly prevents their fruiting; for the reason of many young plants fruiting is, a want of earth to support their roots, want of moderate heat to keep them growing, and of water to keep them moist; for if they are in small pots, the pots are soon full of roots, and must be often watered. If there is not a good heat they are in danger of being rotted, and if they are not watered they are sure to fruit; but if they are shifted and kept growing, and have a good deal of air, they will be fine plants, and produce much better fruit than those that are drawn tall, and to the look seem much finer.

About

About the middle of May the roots will again be all round the sides of the pot ; they then should be shifted into twopenny pots in the same manner as before directed ; but it will be necessary to examine the roots, to be certain of their being in order for shifting.

As the weather will now be warm, (if a tolerable season and a good deal of sun) as soon as they have been plunged a day they should have a little water, and in about six days they will require a little more, and after that they must be watered frequently, according to the warmth of the weather. When the bark becomes dry at the top, it loses its heat, so that it would be better to water them all over with a watering-pot and rose often : This keeps the bark in a moderate ferment, and the plants grow freely. They should have a good deal of air ; for if they are drawn at this season they never will bring good fruit. When two or three dull days happen together they should have some air every day, if it were only for an hour, although the house is not so hot as it ought to be ; for as at this time of the year there

there is no fire, in dull weather the stove will be very cold, and it may be imagined there is no occasion for air; but it is very necessary; and even in frosty weather, when there are fires, if the stove is cold, yet it should have fresh air, which should be admitted by the back-doors into the shed.

After this shifting they may remain longer than they did after any of the former, as they have now a good large ball of earth to support them, so may now safely grow in the same pots to the middle of August, when they may be planted in the pots they are to fruit in; at which time they should have all the small straggling roots cut off close to the ball.

There is a great advantage in putting the fruiting-plants early into their fruiting-pots, as there will be much fine weather after that time, (the middle of August) they may have a good deal of air while they are getting new roots; and as the bark will be warmer at this shifting than after any of the former, there will be an opportunity, when the weather is
fine,

fine, of giving a good deal of air, the plants will thrive, grow stiff and strong, and produce good fruit; and as the pots will be full of roots early in autumn, they will seldom fail of fruiting at a proper season.

Before the plants are shifted into fresh pots the bark-bed should be worked to the bottom, all the rotten tan taken out, one third of new added, and it should be well mixed with the old. This thorough stirring is necessary at this season, that the bark may keep a moderate heat all winter; but it frequently happens that the heat is violent for some time, and if the pots were plunged up to the rims it would destroy all the roots, (and sometimes most of the stems) which would be a great detriment to the plants, and would be a long time before they recovered; for as long as the violent heat continues they will push no fresh roots; and if any quantity of water is given during that time, they are in danger of rotting. When a misfortune of that kind happens, the best method is to take the plants out of the pots, cut off all the rotten roots, and
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what is spoiled of the stem; plant them into threepenny pots, and plunge them up to the rim into the same heat, and they will soon push fresh roots. As soon as the roots are come round the pot, so as to be taken out without breaking the ball, they should again be put into the fruiting-pots: This will retard them, but not so much as if they had been left in their old pots with their rotten roots, and their fruit will be better and larger. They should have little water for some time after they are put into the little pots; for as long as the bark is very hot it will cause a great moistness all round the pots, which will be sufficient for them for some time, as they have no roots; but when the heat begins to decline, and the roots are advanced to the sides of the pots, they should have a good deal.

To prevent any misfortunes of this kind, the pots should be plunged only half way at first; and when the heat rises, which will be in four or five days, if it is very great they may remain in that position for a month or two; but the time must be just as the violence of the heat continues.

As

As soon as the heat declines the pots should be taken out, and the bark stirred eighteen inches deep, and the pots plunged to the top. If the bark was stirred any deeper it would cause the heat to be as great as it was at first, which would be a great loss, as the pots could not then be plunged to the rims; for they always push fine strong roots just at the neck of the plant, and when the pot is only half plunged they want heat to encourage them. The heat after this will remain moderate all winter, and the plants be in a slow growing state, so as to be in vigour to show their fruit.

There is another method to prevent burning, which may be done with less trouble; for it is not always that the tan heats so violently, and there is little danger of its ever doing so, unless the old bark is very dry and not much rotted. When that is the case, a very little bark will make a great heat when the bed is stirred from the bottom. The plants should not be shifted into new pots, but removed into some convenient place until the bed is made ready, and then set level on the bark
for

for ten days, by which time the heat will be come to its greatest height. The plants may then be shifted, and plunged half way, or to the rims, as the bark is in condition. While they remain on the bark they will require water every day, if the weather is hot, and a good deal of air. They should not be crowded too close, but stand at the same distance as if they were plunged; for when they stand thick the leaves get a wrong position, and are long before they come right again, (if ever) which makes them very unfightly.

When the heat is become moderate, and the plants plunged to the rims, they may remain in that condition to the end of February, giving them moderate waterings, and as much air as the weather will permit, keeping the heat of the house to a moderate temperature; for there are many large and fine plants spoiled by keeping the house too hot at the time of their showing fruit, for it causes the fruit-bud to be small, and the stem to run to a great height, and to be so very weak that it has not substance sufficient to feed the fruit.

The

The beginning of March the plants should be all taken out of the bed, and a little new bark added to the old, and worked up so as to be well mixed, to make just a very moderate heat; for at this season, when the pots are full of roots, if the heat was strong it would spoil the whole crop; for if the roots are now burnt there is no recovering them. The dead leaves should be pulled off all round the bottom, the earth stirred a little all over the top of the pot, and raised close round the neck of the plant, and an inch of very rotten dung spread all over the top of the pot; for as the earth in the pot has fed the plant so long, it must be much spent; but the dung being washed down amongst the roots with the water, it will add fresh vigour to the plants, and cause the fruit to grow freely.

They should now be plunged to the rims, and have a good quantity of water, not too much at a time, but often: they should also have a good deal of air, and when the weather is hot and dry it will greatly encourage the fruit. If you sprinkle them all over with water twice a-week,
this

this may be continued until the fruit is come to its full growth ; after which they should not have one drop. The fruit then cuts hard, dry, and fine, and is of a delicious high flavour ; but if watered after that time they are full of a watery juice, flat, and insipid. As they show at different times there will be many full grown, when there are some not come to half their size, so that it will be necessary to give these water, but the sprinkling should be given over.

The crowns which were shifted in May will require to be shifted the beginning of July ; but as it will be impossible to get them strong enough to bring large fruit this season, it will be better to keep them over the year, and if well managed they will be strong fine plants.

If they were to be managed in their shiftings as is directed for the suckers, most of them would fruit, but they would be much smaller than the fruit of the suckers ; for if the fruiting plants had no misfortune, the suckers taken from them in the autumn will be larger when taken off
than

than the crowns are now. The stems of the suckers are also prepared for rooting before they are taken off the mother-plant, and grow much faster than the crowns. It will be much better to keep the crowns growing for another year, as they will then be strong fine plants, and will produce large good fruit.

If it is intended to keep the crowns growing, when they are to be shifted in July, cut off all the roots round the ball, and lessen it so much that there will be an inch of fresh mould all round the ball, when planted in the same pot they were taken out of. Plunge them in moderate heat; and two days after they are plunged give them a little water to settle the earth; but they should have no more for ten or twelve days, by which time they will begin to push fresh roots, and will require to be refreshed with water according to the heat of the weather, and they should have a great deal of air. They will not look so green and pleasant to the eye, as those plants that are kept with little air, whose leaves are long, small, and thin, and drawn quite upright. Their leaves will

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be short and broad, and grow almost horizontally.

The middle of September they should be shifted into pots a size larger; but none of their roots cut off. The ball should be put in whole as they came out of the other pots, and plunged into moderate heat. Little water will serve them in winter, as they have a good ball of earth to support their roots, and if they are kept in a moderate heat they will grow all winter. One great reason of many crowns fruiting in the spring is, their being planted into small pots to stand all winter, and generally plunged into a good heat in the autumn, which presently fills the pots with roots. The strength of the mould is soon spent, and then they have nothing but water to support their roots, which if given in any great quantity, and the heat declining, they grow yellow and sometimes are rotted. If they do not get water, their being dry stops their growing, and makes them set for fruit, and as soon as they are put into larger pots and fresh heat in the spring, they shew fruit directly. The best method to prevent their
fruiting

fruiting is to give them only a moderate heat, and to keep them just moist; and if the heat declines any time in the winter, the plants should be taken out of the bed and a little fresh bark added. This will renew the heat to be about milk-warm, which is sufficient for them at this time of the year.

The beginning of March they should be taken out of the pots, and a good deal of the roots cut off, so that there may be a sufficiency of fresh earth round the ball when they are put into penny pots; for it is absolutely necessary to shift them at this time, to give them fresh earth to grow in, as that they have been in all winter will be much spent. It is also necessary to plant them into less pots; for if they were to be put, at this shifting, into pots a size larger than those they are now in, (as the ball should be no more broke after this) the pots they must be planted in to fruit would be too large, and take up too much room in the stove to no purpose; besides, the plants would not thrive so well if they were in such large pots. A just proportion between the plant and pot is neces-

fary to be considered for the encouragement of its growth.

About the middle of May they will require to be shifted into twopenny pots, as before directed; the roots should be examined, and, if necessary, should be shifted sooner; for the roots must not be allowed to mat, as the ball should not be broke.

As they will now have a good supply of earth to nourish their roots, they should remain in these pots until the middle of August, when the suckers of a year old are shifted for fruiting; and then put into threepenny pots, and plunged in the same bed. As they will be much thicker of leaves than the suckers, it will be proper to mix them; they will look better, and there will be more air amongst the pots than if the crowns were to be plunged all together.

If they are shifted and managed as here directed, (and meet with no accident) they will be strong, short, stiff plants, with broad leaves growing almost horizontally, and

and will shew fine fruit-buds with short stems, and produce a large rich-flavoured fruit.

Many admire crowns, as they make the handsomest plants; they are much thicker of leaves than the suckers, and are more lightly; but if the suckers are properly managed they will produce as good fruit at one year old as the crowns will at almost three, so that there are two years saved and much trouble. If the plants which are in fruit should meet with the misfortune to have their roots burnt, (which may happen to the most skilful and careful) if not very much damaged they will push fresh roots and ripen their fruit, although it will not be so large; neither will the flavour be high, the suckers will be very small, and not fit to produce fruit at a year old. For fear of an accident of that kind, it will be proper to have some crowns every year coming on of a year old, to prevent being destitute of good fruit.

When a misfortune happens that the suckers are ivery small, they will also be

very late, and should remain on the old plants as long as it can be done with convenience, as they will grow much faster on the mother-plant than they will after taken off, besides the advantage of their stems being hardened. They should be planted in the bark, when taken off as before directed, and managed in all respects as the crowns that are kept to three years old.

It may be objected to this management, that the often shifting will retard the growth of the plants, and that they would be much larger if they had been less shifted. Granted; they would have been much taller, but would not have half the substance. A short-leaved strong plant will produce a much larger and better fruit than those that are longer leaved; they indeed are more showy to the eye, as they are of a darker green, and look more vigorous; but they produce smaller fruit; neither are they so high-flavoured as plants that have more air.

Having gone through the management of the plants in all their different
ages,

ages, I shall now proceed to give some directions about the moulds they should be planted in at the different times of shifting, which has succeeded very well with me for many years.

To make good mould for Pines, there should be in readiness the following simple moulds, that they may be compounded some time before they are wanted: Good light loam surface, all together, that has laid in a heap some time, so that the grass is quite rotten, and has been turned several times; rotten dung that has been turned until it has become as small as mould; light rich wood-earth that has been turned four or five times; rotten bark from the stove (sifted) that has laid a year, and been turned several times; and good sharp sand, and if the sand was turned once or twice it would be better.

The turning of the different moulds, before they are mixed, is of great use to them, as it meliorates all their different particles, and makes them fit for mixing. It should be done in the winter, when there is hard frost and no snow, (for snow

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is very bad for all compositions that are not made of long straw, leaves, &c. and to them it is of great service) the frozen parts should be turned into the middle, and the small to the outside, that it may get the benefit of the frost and air to mellow it. They should be made into ridges of four or six feet broad at bottom, as there is room, and brought to a sharp point at top to throw off the rain, which is very detrimental to all compositions. In that form it is also more convenient for turning, and every turning it should be turned inside out.

Having all these moulds, tan, dung, and sand prepared, a proper composition may be made of them for Pine-apple plants of all ages. It should be made up some time before it is used, and turned several times, so that the different kinds may be well mixed and incorporated.

Mould for crowns and suckers at their being potted when taken from the tan-bed, where they were planted to strike roots.—Three wheel-barrows of light wood-earth, one barrowful of sifted tan,
one

one barrow of loam, half a barrow of sand, and one barrow of rotten dung; this is the proportion. The quantity must be according to what is wanted; but it would be much better if there was as much mixed at a time as would serve for two or three years; for the longer all compositions lay, the richer and better they are; and the oftener they are turned, it adds to their fertility; for it would be possible to fertilize very poor soil by throwing it into long ridges and often turning it, which must be owing to the airy particles that are imbibed by its loose surface.

Mould for the first shifting.—Two barrows of wood-mould, two barrows of loam, one barrow of dung, one barrow of tan, and half a barrow of sand.

Mould for the second shifting.—Three barrows of loam, one barrow of wood-earth, one barrow of dung, and half a barrow of sand.

Mould for plants that are to be planted into their fruiting pots; or plants that are large, and may want shifting out of course

course.—Four barrows of loam, two barrows of wood-earth, two barrows of dung, and one barrow of sand.

The crowns that are to be shifted in May, and to have their roots cut off round the ball, should have a mould a little different from any of the former, that they may grow strong, and their leaves broad and thick. I have found the following composition answer well: Two barrows of loam, two barrows of dung, one barrow of wood-earth, and a barrow of sand. This will also do very well for them when they are planted into larger pots to stand the winter.

In the spring, when the ball is reduced, they should have the following composition: A barrow of loam, a barrow of wood-earth, a barrow of dung, and half a barrow of sand; and in their other shiftings the moulds before-mentioned will do for them.

When fruiting plants are damaged in their roots, so as to render it necessary to take them out and plant them into little pots,

pots, the following composition will make them soon push very fine roots, so that in a little time they may be placed in their fruiting pots again : One barrow of sifted tan, two barrows of wood-earth, one barrow of dung, and half a barrow of sand.

I do not pretend (as I said before) to assert that those which I have mentioned are the very best compositions for Pine-plants, or that some other mixtures may not be better ; but I advance nothing upon credit, nor direct any thing but what I have practised with success many years. I have found those compositions answer as well as I could wish ; the plants will thrive, and produce large fruit.

The culture of the plants has been treated of at large from the crowns being taken from the fruit, and the suckers from the mother-plants, to their being put into order again for fruiting. I hope those who follow the directions with accuracy, will find that there has been nothing advanced but what is practicable, and will answer. There may be, and daily happen, accidents that prevent the success of the best-concerted

concerted schemes, and the best directions may be frustrated by a very small accident or neglect, so that no scheme or directions should be given up as impracticable or improper, because they do not always succeed. All those that are the least acquainted with gardening in general, and hot-houses in particular, are sensible that under the care of the most skilful practitioners they are liable to many misfortunes, and they may be very sensible how and when they happen, although too late to remedy them for a season. I know of none that has been of worse consequence than too much heat; for, by what I have seen, ten places out of fifteen, where plants have been in bad condition, it proceeded from too much heat and too little air, for they do not require so much as is generally imagined; and although the roots seem hard and dry they are soon burnt, after which it is a long time before they begin to grow again. When the roots are burnt the mould must suffer. It is much the best way to throw it away and fresh pot them. The old burnt roots, that are all through and round the mould, must be detrimental to the young roots,
if

if the mould was not the least damaged, which is seldom the case.

The white insects on pine-plants are very pernicious, and have been the ruin of many plants that would have produced good fruit if they had not been infected; for when they are full of them, the fruit never has that good flavour as when the plants are clean. Besides the damage they do to the fruit, they greatly retard the growth of the plant, and make them very unfightly. Those that are infected, if they are not kept under by cleaning, will destroy the whole plant. If they are cleaned by hand they are much trouble and a great expence; for it takes a great deal of time to brush and clean them, and in doing it the leaves are often broke and the sides scratched, so that the leaves decay in patches, which makes the plants very unfightly: And what is worse, after all that trouble and expence they are as bad in a few weeks as they were before; yet, if they were not cleaned when moved, they would grow so dirty that the insects would quite destroy the plants.

Many

Many things have been tried and advertised as effectual remedies to destroy them; and all those remedies have been so positively asserted as infallible, that it may look like an imposition on the public to offer any other remedy; but in support of what I now publish, and for the satisfaction of the public, I shall give an account of some few effects of a sure and safe remedy, having from repeated trials found it effectual, otherwise should not presume to publish it.

For many years, when I lived with William Salvin, Esq; of Croxdell, the Pine-plants were every year in a most dirty condition, and every time they were to move or shift a deal of time was spent in cleaning and brushing them; yet for all the pains that was taken with them they every year grew worse; for the bottoms of the fruiting-plants, when they were moved in the spring to stir the bark and add a little new to refresh the heat, were as white as if they had been first wetted and then dusted with meal; and amongst the white stuff were many of the white creeping vermin, some of them very large, some small,

small, and all the leaves full of white specks. I tried every thing I could think of, but to no purpose; and every thing that was advertised, but to no effect; so that I despaired of ever finding a remedy. At last, however, I had the good fortune to succeed, and in one summer had not a single speck in one house, and greatly lessened in the other that was so very dirty, and on which I could not perform the operation that spring completely; but it was done in the autumn, and they were very soon both clean, and remained so. This was six years before I left the place, (ten years ago) and there was no occasion for any repetition of the remedy.

I tried its efficacy on several hot-houses which I had built for gentlemen, and it always succeeded. Some of my intimate acquaintance, to whom I communicated the secret, (for then I had no thoughts of publishing) have all tried it, and found it answer. Some of them, at a distance, have informed me so by letter.

I made an experiment at Sir Thomas Gascoigne's, Bart. when I came to the
place,

place, May-day, 1771. The fruiting-plants were just shifted into fresh heat, and the young plants into larger pots. They had been cleaned before they were plunged, but there were many insects all round the bottom leaves. I applied the remedy; they went off insensibly, and there have been none in Sir Thomas's hot-houses since.

I also tried another experiment, which is a convincing proof that none of those insects will live where this remedy is used. Sir Thomas had a quantity of plants (in 1772) from abroad, crowns and suckers, which were very full of vermin. I applied the remedy without cleaning, and planted them in the middle of the hot-house amongst clean plants. They dropped off the infected plants, and did no damage in the house, which is a certain proof they were all killed.

Sir Thomas's stoves were all new, so there was no place for the vermin to lodge in, neither had the infection been violent, and of so short a duration, (two years) that the vermin were in the pots and
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on the plants. The house was not smoked, neither was the tan sifted, only the mixture applied, which I did by way of preventing the spreading of the insects, with an intent to go through the operation in the autumn; but as I found, long before that time, they were all destroyed, I proceeded no further, and have never seen one since.

The white speck on the leaves of Pines is the spawn of the white creeping insect, and is deposited on the leaves of the Pines much in the same manner as the caterpillars are on the leaves of Cabbages. I have viewed them in a good microscope, and found all the parts of the vermin complete, under the white scale, when taken off at a proper age, without being bruised, and when they come to a certain period they force the scale from the leaf, and so descend to the bottom to grow to maturity.

Many have thought the white insects on the leaves to be inactive and not capable of moving; but that is impossible. They have no life at their first appearance on

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the leaves; for if brushed off soon they leave no mark on the leaves, are extremely thin, and quite dry; but when they have remained some time on the leaves they become thick in the middle, and, if brushed off at that age, a soft gluey matter comes from them, which is the bruised insect arrived to a substance; but the skin is so thin and tender that it is broken by a slight touch. That they have life is evident; for where they stick to the leaves, although brushed off before they come to maturity, the outer rind of the leaves is eaten through, and the place becomes quite white and dry. That they fall off when come to such an age is certain; for many of those white spots may be seen on infected plants that have not been cleaned. What makes me so very particular in this is, that many imagine the white speck to be an insect of itself, and the white creeping vermin to be different; but it is no more than the parent of the other, and what does all the mischief, so must be destroyed. As a proof that the white speck is the spawn, there is often to be seen on infected plants a small white scale on the very end of a leaf,

leaf, and not another near it. No insect can breed without feed, and there must be something to form that white speck. They are very small at their first appearance, and grow gradually to a certain size.

The white creeping vermin may with propriety be called the Pine-bug; for it lodges amongst the bottom leaves of the plants, and in the least hole or chink in the house. If the stove is old, and has been infected some years, there are thousands of them, and their spawn lodges in the crevices and amongst the tan; all of which must be destroyed.

Where there is only one stove, the latter end of August or the beginning of September is the only time that the operations for a thorough cleaning can be performed, as there is no making a perfect cleaning of plants in fruit.

Those that have breeding and fruiting-stoves separated, should begin with the young plants the beginning of March, and then the plants will not be retarded in their growth. The crowns may be

put, after they are dressed, into the house that is cleaned; and the suckers, as soon as they are taken off, then there will be time and opportunity sufficient to get the fruiting-house perfectly cleaned, which should be done as soon as possible, in order that the fruiting-plants may be put into their fruiting-pots in good time:

All the young plants must be removed out of the house to some convenient place where they can remain with safety for near twenty days, for so long will it take to get the house compleatly ready for them. The weather at that season being sometimes very cold and hard frosts, they must be in a place where they can be protected from the inclemency, and have some heat. The flue of the fruiting-stove will be the properest place; and although attended with some little inconvenience, it will be only for a short time.

They should have a board set under them, which must have some bricks under it, to make a vacuum between the flues and the plants; for if they are set
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on the bare flues it will dry their roots too much and cause them to fruit. They must have a little water every day while they stand there.

When the plants are removed, throw out all the tan, and remove it to some distance from the stove; then make the house as clean as it can be made with a brush and broom; after which provide three or four chafing-dishes, into which put some red-hot cinders, set them in the bottom of the pit in the stove, and throw into each an ounce of rock-brimstone broke into small pieces; then shut up the house close, and let it remain so until next morning. The same operation must be performed for three days, which will effectually kill all the vermin and their spawn that are lodged in the crevices of the house. If there are no chafing-dishes, garden-pots will do as well.

As the stove is empty, it would be right to point the inside; and point and stop up all the crevices in the plaister; but before that is done, all the inside of the house should be washed with a sponge dipped in

X 3 vinegar,

vinegar, which will take off all the steam left on the rafters and glaſs by the ſmoke of the brimſtone. After all the wood is painted, and all the cracks of the plaſter pointed and white-waſhed, give the houſe a good deal of air night and day to dry the paint and white-waſhing. There ſhould be nothing put into the ſtove for fix or ſeven days, by which time the paint will be quite dry, the fulphureous ſmell quite gone, and no vermin of any kind left alive in the ſtove.

The tan that was carried out ſhould be all ſifted through a coarſe riddle, the rough put into the ſtove, a layer of new bark fix inches thick at the bottom, then a foot of the riddled bark, and continued until the pit is full, leaving an open trench at one end; trench the whole bed over, mixing it well. Lay it level, and let it remain ſo to heat. In about a week or ten days it will be come to its full heat, and ready to receive the plants. The reaſon for ſifting the bark is, becauſe there are many of the live vermin amongſt it that will all go thro' the riddle with the ſmall tan, which ſhould

should not be used amongst any mould that is for the stove, or where there is any heat, those that are alive will soon be killed by the cold; but as there will be much of their spawn amongst it, if used where there is heat they will soon come to life, and be as troublesome as ever; therefore it should be carried and thrown upon grass-land, for which it is very good if the land is of a clay or stiff nature; but is very pernicious if of a gravel or sandy kind. If there is no such use for it, it may be thrown into the fold where cattle are fed, where, being mixed with the long straw, it will make good dung.

The ingredients proper for killing the white insects on Pine-plants.—Four pounds of flour of brimstone, one pound of Scotch snuff, two ounces of the leaves of Walnut dried and ground to powder, and finely sifted; this is the proportion. The quantity must be according to the number of plants that are to be dressed. Let them be well mixed; then take the plants out of the pots, cut off all their roots close to the stem, which examine well,

well, for sometimes the vermin eat holes into it, and many of them will lodge therein. If there are any holes, pick out the vermin with some sharp-pointed thing, and fill the boles with the mixture, for there is often spawn in them as well as vermin. Take some of the mixture in the hand and rub the stem well; then drop some of it between every leaf, take some of the mould that was made up for the crowns and suckers at their first potting, after taking them out of the tan, and to four barrows of the earth add one pound of the mixture: Let the earth and it be well mixed, and then fill halfpenny and penny pots, according to the largeness of the plants, and plant them, taking care to keep the plants upright after the mixture is put in between the leaves, that it may not be scattered. They then should be plunged into the bed according to its heat, either half way or to the top; they will bear more heat than those plants that have roots, and they require it to make them strike.

They should have no water for ten days after they are plunged; then they should
have

have a little, for by that time they will begin to have some roots, and the water must be poured slowly into the hearts of the plants, that it may not force out the mixture from amongst the leaves, but carry it down clofer to the bottoms. After the water has been so poured for five or six times, it should be given more freely, to wash out the mixture from the heart of the plant, which must be in about twenty days after they have been plunged, after which there should be no more water poured into the heart, but in amongst the bottom leaves. This mixture will no ways hurt the leaves nor retard the growth of the plants.

As soon as the roots will keep the ball together, they must be shifted into larger pots to bring them to a regular course; but there will be no occasion to use any more of the mixture neither in the mould nor to the plant, for the vermin will be effectually destroyed, and never give any further trouble. When the plants are to be plunged the bark should be stirred no deeper than just to receive the pots; for as it has been so lately stirred and mixed
from

from the bottom, if it was now stirred any depth the heat would be greater than the plants could bear.

If the plants that are in fruit are very dirty and full of vermin when they are removed in the spring, in order to add fresh heat after the dead leaves are pulled off and the mould in the pot stirred at top, spread a little of the powder over the top of the pot, and put some in between the leaves, which will preserve the fruit-stem from vermin, and consequently the fruit and crown; so that the fruit will be clean to go to table, and many of the vermin will be killed, but the house will not be quite clear; for the live vermin have many recesses amongst the roots and bark where the infection is great, and has been of a long standing.

As soon as the fruit is cut take off the suckers, and rub the lower part of the stem well with the powder, putting it in amongst the small leaves at the bottom, also between every leaf, and into the heart; for there many of the live vermin often lodge. They then may be put into the
the

the bark in the clean stove very safely to strike roots.

When the plants are dirty the under leaves of the crowns are generally very dirty also. When they are taken off the fruit, some of the powder should be rubbed on the under sides of the leaves, and dusted between every leaf, heart and all, and then may be put into the bark in the clean house.

When the fruiting-house is cleared of the fruit, it must be treated in every respect the same as has been directed for the breeding-stove, and then I am in hopes there will be an end of those troublesome vermin, which have been a great plague to Pine-plants for many years.

If any plants, crowns, or suckers come from abroad, whether any vermin appear on them or not, it would be right to dust them before they are put into the stove. If any single plant in the stove should by any accident escape being cleaned, lay some of the mixture all over the pot and
between

between the leaves, and the insects will soon follow their companions.

Where there is but one stove there is an unavoidable necessity of retarding the next year's fruit, for there is no doing any thing then with the plants in fruit, but what is before-mentioned, and that is only a superficial operation. It will not be sufficient to clean plants that are much infected, for there is no meddling with the roots of plants that are in fruit, neither is there a possibility of fumigating the stove or riddling the bark, for it would keep the plants in fruit too long out of heat, and stunt them.

If there is no partition between the fruiting-plants and the young ones for next year, the young ones should not be shifted after May, but have plenty of air, water, and a moderate heat, to keep them growing all summer until the fruit is all cut, for then they must have all their roots cut off.

As the fruit should be forwarded as much as possible and cleared, it will be better

better to lose a few infected fruit than be too late in getting the plants for next year cleaned and put in order, as they have all fresh roots to make; and there is no doing things effectually if any infected plants are in or near the stove.

The case is very different in having plants that never have been dressed, which are much infected, in pots near clean plants, and plunging a dressed plant that is full of vermin amongst them; for the live vermin, whose spawn dirties the leaves of the plants, lodge in the pots amongst the roots and in the tan, and there is no possibility of being certain of coming at them with the powder. Those in the pots may escape into the tan and soon increase their numbers, so that all the labour that has been bestowed will be lost.

When a plant is taken out of the pot, and all its roots cut off, there are none of the vermin that are come to life but what will be destroyed; for if any of them are lurking amongst the bottoms of the leaves they are sure to be killed as soon as the powder touches them, which is easy to accom-

accomplish; as there is no shelter for them; but in pots of infected plants they have many recesses, and may secrete themselves so that none of the powder can touch them.

The powder is so strong a poison for that insect, that it soon kills it; and I am of opinion that in two years the most infected house might be cleaned by sifting the tan once, and using the powder at every shifting, and putting some between the leaves; but this is only conjecture. Although I tried it in the spring mowing, and found them greatly diminished, I had not patience to go through the experiment, as I had got one house clear by the first-mentioned operation.

If any person chooses to try the remedy in this manner, there should be the same quantity of the mixture in the mould as before directed; and when the plant is taken out of the pot, and the roots dressed, the ball should be dusted all round, and then filled up with the mould, and the same quantity put between the leaves.

This,

This, in all probability, would kill all the vermin that are in the pots at the time of the operation ; but if the house is much infected there will be great quantities ; and when the powder, by length of time and watering, may have lost its strong poisonous quality, there will be many in different parts of the house, which may increase and come into the pots.

This is only what seems probable to me, and would be a great advantage to those that have only one house, that the plants might then be shifted at their proper time ; but as I cannot assure a complete cure, only opinion, I shall proceed to give such directions as will be effectual.

If there are a few late fruit in the house, it will not be worth while to wait for their ripening ; a bed may be made for them in the Melon ground, which will be very easy. If there are any pits for Melons there, fill one end the length of a four-light frame, which will hold a good many plants, with old bark from the stove, and if it is cold add a little new ; mix them well, and set the frame on the
top

top of the bark. If the depth of the frame is not sufficient for the height of the plants, raise the frame with bricks, and close up the vacancy with tan on the outside, which may lie sloping to the side of the pit. Plunge the plants in the bark, cover them with glasses, and they will ripen there as well as in the stove. By being covered with mats at night they may be kept to the middle of November, by which time all that are good will be ripe.

The sooner this is done the better; for if a frame or two will hold all the crop that is left, it would be worth while to clear the house by the middle of July, (as there is no new erection nor expence, only a little labour) then the next year's plants would be very little retarded.

The bark the plants are plunged in will be very useful. As soon as all the fruit is cut, let it be sifted, lay the round under cover, mix it with half as much new, and turn it once or twice, and it will be much better than all new to refresh the bed the next time the plants are potted, and to fill
up;

up ; for by being turned from the bottom it will be sunk a good deal below the level of the pit.

When the house and bed are prepared as directed for the young plants in March, and the heat come up, the plants must be all taken out of the pots. The young plants must be treated in the same manner that the small plants were in the spring. The large ones that are for fruit next year should have all the mould shaken clean off, and all the small roots cut close to the stem, and only a few of the finest white short roots left on, that they may stand an inch or two within the sides of the pot. Examine and rub the stem as before, and dust all the roots that are left ; but they must not be rubbed, for it would break all the young fibres and cause the roots to rot ; yet it is necessary they should be dusted, as there is a probability of their being infected with the spawn ; then dash with the hand, between every leaf, as much of the powder as a small nut-shell would hold, and keep the plant upright after the powder is put into it.



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The

The mould directed for plants whose roots were so much burnt as to require shifting, is very proper for both old and young plants at this potting.

To four barrows of mould add one pound of the powder, and let it be well mixed. Threehalfpenny pots will be a proper size for the fruiting-plants, a little mould being first put into them. The plant should be held up by the hand, and the mould put in amongst the roots, so that there may be mould between them, and none of them close together. They should all lay easy, and not be twisted, and kept an inch or two from the sides of the pots. The mould should be fastened all round the sides of the pot, the plant made fast at the neck, and plunged as soon as possible.

The day after the large plants are plunged they should have a little water, which should not be poured amongst the bottom leaves, but all over the tops of the pots. They will require no more for ten days, by which time they will begin to have some young roots, so that they must

must be refreshed with water according to the heat of the weather, and the water should be poured in amongst the bottom leaves.

They should have a great deal of air until they have got fresh roots; for if the days are hot, and they have little air, their leaves will draw up, and many of them will decay. Those who have covers for their stoves would do well to cover them all the middle of the day; and, if it is fine weather after they have got roots and want water, it will be of great service to them to be sprinkled all over once or twice a-week.

The young plants should be planted in penny and halfpenny pots, according to their size, and plunged into the bed; but should have no water until they begin to have some fresh roots, which will not be so soon as the large plants, for the large plants being in larger pots and deeper in the bark, and having a much longer length of stem to push, they strike root sooner than the small plants, whose stems are short and pots little.

It will be fourteen or fifteen days before they want any water, and then only a little, which must be poured in amongst the lower leaves, because there are no roots but what are close to the stems, and they must be managed in every respect the same as the plants that were dressed in the spring.

As soon as the young roots will hold the ball together, they must be shifted into larger pots; the fruiting-plants into the pots they are to fruit in, and the succession-plants into threehalfpenny pots. Great care must be taken not to break the ball, for that would greatly retard their growth; for as the plants are shifted before the roots mat, or any small woolly stuff grows, there is no occasion to disturb the roots to break their small fibres, which will grow as soon as they are shifted into larger pots.

The large plants that are planted in their fruiting-pots should have the same mould as those that were before cleaned and shifted at the proper season; but the young plants should have that which was directed

ed for plants at the second shifting; and if they meet with no misfortune their balls need not be reduced in spring, but only removed into larger pots.

If they are managed as directed, the pots of the fruiting-plants will be full of roots in a little time after they are shifted, and produce good fruit, but will be later by a month or six weeks.

Where there is only one hot-house, the greatest difficulty is the keeping the plants while the stove is cleaning and getting ready, for which reason it should be done as soon as possible; for if the weather is very cold and frosty it will be very difficult. If there are but few fruit, that it is not worth making a bed for them, it would be better to throw them away than to be too long in clearing the stove.

If the house is cleared at the latter end of July or August, the shed of the stove (as all stoves have or ought to have one) will answer very well. They must be left in the pots, not crowded, and have air every day, but no water; for if any
water

water be given them, they having no bottom heat, it would kill all the roots, which would be of great disadvantage, as then there would be no fresh roots to leave on the fruiting-plants. It would also turn the plants very yellow, and rot the hearts of the young plants, which are much tenderer than the large ones.

I am convinced that stoves which have been only a few years built, and not much infected, may be cleared by dashing some of the powder amongst the leaves, and lying a little all over the tops of the pots. I have cleared several by that method; and by following the whole of the directions the most infected hot-house will be as clean as if there never had been any vermin in it.

C H A P.

C H A P. XIII.

On Mushrooms.

TO pretend to raise plants without seed is a contradiction to nature; but what is here meant in the raising of Mushrooms, is to produce them on beds made for that purpose, without spawn being planted in them, as is the common method of propagating them.

Mushrooms are wanted in every family, and in most places where there is any thing of a garden there are beds for raising them. In some places they succeed very well for a year or two, and then there is often a loss for a season, sometimes longer.

The getting of good spawn is frequently attended with great difficulty; and when it is got, if the bed is not in proper
order

order to receive it there is a very great disappointment, which may and often happens to those who are well acquainted with the different methods which are now in practice for propagating them.

There is no plant that is raised by art, where nature has given so many hints to facilitate its propagation as the Mushroom; and yet it is still in its infancy. There is not in common practice (that I know of) any certain method to raise them so as seldom to fail of producing a good crop.

If the beginning of the summer is warm and dry, and afterwards there fall kindly warm showers, the fields produce them in plenty; whereas if the beginning of the summer is cold and wet, and afterwards becomes warm and dry, there are few or none.

On hot-beds where Cucumbers and Melons have been planted, and have not been successful, there is often a quantity of Mushrooms.

In

In large dunghills that are laid in the fields, where there is a good deal of long straw, which has not laid wet in the fold, in a dry warm season there will be much spawn and some Mushrooms.

In stable-yards, where a good many saddle-horses are kept in the stables, whose litter is thrown out long, and a large quantity every day, if the season is dry and no wet lies in the place where the dung is, the bottom of the dung will be full of spawn in the autumn.

If a quantity of litter, that is just moist, (four or five loads) be mixed with light loam or sand, and thrown in a heap in a dry place, it will produce spawn in three months.

All these examples make it evident that Mushrooms may be produced without spawn being planted, and that they grow in places where there never were any before, as all must allow.

By what means this plant (if it is proper to call it a plant) grows in such places

I do not pretend to demonstrate; it is certain no plants grow without seed. There is no new creation.

The seeds of Mushrooms being so very light, it is not improbable but that in the fields where Mushrooms grow, it is carried over the whole ground, and lodged in every little hole and crevice, where it grows as soon as it meets with proper materials. The reason why Mushrooms do not grow in all the places where such stuff lies is, because it is not in proper order, being too wet or too dry, or the season so cold that the seeds cannot vegetate.

It may have been imagined long before this, considering the many and great improvements in the propagation of all kinds of plants, that Mushrooms would not have been forgotten; and those hints that nature has given would have induced some of the many ingenious to attempt bringing them to perfection without spawn.

It was from these observations that I was encouraged to make some trials; and although I did not succeed at first, so as
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to produce a good crop, yet I found something might be accomplished, and by perseverance I discovered a composition that produced finer Mushrooms, more in quantity, and the beds continue much longer in bearing than those planted with spawn in the common way.

I have used no spawn for many years, and have never failed of a good crop. I shall give a full account of the method I have followed, and if the directions are observed accurately, can assert it to be a sure way to bring them to greater perfection in quality and quantity than any other artificial method I have seen practised; they are superior in thickness to those that grow naturally in the fields.

The proper times for making the beds are as follow: To have them in winter, the beds should be made the beginning of July. For a spring crop, the beginning of December. And to have plenty all the summer there should be another bed made the beginning of March. These three beds will produce them every month in the year.

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If the beds are made according to this new method they last much longer than those planted with spawn.

Before we proceed to give directions for making the beds, it will be proper to say something of what are the proper places for them.

Those that are very fond of Mushrooms in winter, may be certain of having them in great plenty if they will be at the trifling expence of building a shed against a south wall, with a pit three feet deep and four feet broad, the length according to the quantity that is wanted. Thirty feet long will produce sufficient for a large family.

There must be a flue all round the pit, two feet deep and eight inches wide, and a vacuum of an inch on the inside next the bed, which should be left open at top, that the heat may come up to warm the top of the bed, which it would not if the vacuum was close.

The

The vacuum all round prevents the heat from drying the sides of the bed; for if the flue had no vacuum the heat would destroy all production for a foot round at least; and when the bed is covered with straw and litter (as it must all winter) to keep off the frost and cold air, the straw should be laid all over the flue and vacuum, which will cause a gentle heat all over the top of the bed, and greatly encourage the growth of the Mushrooms.

There will be no danger of the straw firing, as a very little heat will be sufficient to keep the Mushrooms growing.

Where there is a hot-house for Pines the shed will answer pretty well for making a Mushroom-bed for the winter and all the season. As the fires are kept on they will grow very well; but it is too cold for the summer's production, for they love the glassy heat of the sun, or an artificial one, although they cannot stand its bright rays.

In winter they will grow in dry cellars and produce a good crop. They will also thrive

thrive extremely well in the end of a stable where there are a good many horses kept. They will thrive and produce a great crop in a shed facing the south, from the beginning of April to the end of September; but will produce nothing in winter, as the air is too cold for them, although the bed be covered ever so well with straw and litter.

The materials and method of making the beds, either for winter or summer, or which of the above-mentioned places they are made in, being the same, I shall only give directions for making that in the flued pit for winter use.

The middle of June provide some fresh litter from the stables. A bed thirty feet long and four feet broad will take ten cart-loads. It must not be what has laid long and is turned black; but if mouldy and long will answer very well to mix up with some fresh, at the rate of three parts fresh to one of mouldy. Throw it up in a heap under cover, for it must get no wet, and let it remain for eight days, by which time it will have a gentle warmth, and it

is

is then fit for use. Get some fresh tanner's bark; a thirty-foot bed will take three large cart-loads. It should be laid in a heap under cover ten days at least, for bark is much longer in heating than dung. When it has been in the heap six days it should be turned over, that the outfides may be in the same condition as the middle; for the outside of bark never heats when it lays in an open heap; when it has just come to a moderate heat after turning, it is in order for the bed.

Old bark from a pine-stove that is dry and round will answer if it is watered a little, and thrown into a heap to ferment; but it is not so good as the new. It was from such I had the first success. I then mixed it with an equal quantity of new, and it answered much better than when it was all old: but there being a disadvantage in taking so much round bark from the stove, I tried all new, and found it much better than either of the former.

At the same time there should every day be saved from the stable the horse-droppings, which should be kept as whole,
dry,

dry, and clean from straw and hay as possible. They should be laid under cover, and spread two inches thick. The place where they are laid should be airy and dry, for the drier they are when laid on the bed, the better. If they are got before any of the other materials, and kept dry and not moved, they will be no worse.

To make the bed, lay a layer of the dung that was shaken up, two feet thick, the breadth and length of the bed. It must be made very equal, and pretty firm, but not trod; then a layer of bark, four inches thick; over that a layer of the same dung, a foot thick; and on that a layer of bark, two inches thick; and on that six inches of the shortest of the dung that was thrown up, which finishes for the present.

When the bed has been made ten or fifteen days it will then have a gentle heat; lay another layer of bark, two inches thick; and on the top of that a layer of the horse-droppings, three inches thick (they should be taken up carefully and as little broken as possible); and on the

the top of the droppings an inch of the shortest of the dung from the heap that was shaken up. This finishes the bed.

The bed should remain so for six or eight weeks, by which time it will have a moderate heat, if all has succeeded as it ought, and will be fit to lay the mould on. It should be just milk-warm. The mould should be laid on three inches thick, but must have no water, until, upon examination of the mould, there appear little white strings amongst it, which will be in about three weeks after. It must then have a little water once a-week, and if it was made milk-warm, or taken out of the cistern in the hot-house, it would be much better. In about three or four weeks after the white strings appear, the Mushrooms will begin to come. The bed should then be refreshed with water often, but not much at a time; for if there is much given at once it will kill all the Mushrooms that are above ground, and greatly damage the bed.

A bed thus made will continue to bear very plentifully for half a year, sometimes

a whole year, and produce much finer and larger Mushrooms than any of those that are produced in the fields.

The mould proper to lay on the bed is two parts of very rotten dung sifted, two parts of fine light loam, and one part of rich black kitchen-garden mould broken fine; and all well mixed.

If a winter bed, it must be constantly kept covered with dry litter three inches thick; first shaking all the dung out of it; and then three inches of clean white straw, and a gentle fire kept when frosty and cold weather, or when there has been long dull rainy weather, which is very prejudicial to them; for they rot as they come out of the mould. In such weather it would be very proper to take off the litter, and lay on the straw next the bed, as by that means it will admit a free air and prevent mouldiness; but in frosty weather the litter should be next the bed.

If the winter bed is made in the shed of the Pine-stove, it should be made at the

the same time and manner as the other, covered with the same sort of mould, and managed in every respect the same. But as there will be two fires in the shed all winter, which will keep it warm, there will be no occasion to lay any litter, only a very thin covering of straw.

The bed must be made against the north wall of the shed, for the stove-wall would be too hot. The fore-side of the bed will dry much faster than that against the wall, and must have a little water oftener, for very little water will serve the back-side, as a great dampness comes through the wall, especially if most of the shed is under ground, as it generally is.

Those that have no shed with a pit, nor a stove-shed to make a winter bed in, may make them in a dry cellar, at the inside end of a warm stable, or in the corner of any outhouse where there is a constant fire.

There will be no occasion for any cover in a cellar in winter, as there is no cold air; and in a stable the air is both damp

If a shed with [356]
 and warm. They will require little water
 in a cellar, and hardly any in a stable. If
 in a house where there is a constant fire,
 they will require a little water but no
 cover. In all the places where they are
 made, they are all of the same materials.

Those that choose to have Mushrooms
 in the spring and summer only, should
 make a bed the beginning of December,
 and it will come into bearing the end of
 March or the beginning of April, and will
 produce great plenty all spring and sum-
 mer. They should be under cover facing
 the sun, but never exposed to its rays, nor
 to rain; for it is impossible to manage a
 Mushroom-bed right where it is exposed
 to rain. No covering of mats or straw
 is sufficient to protect it.

Suppose the bed had been watered in
 the morning, and in the afternoon a
 strong thunder-shower should fall, it
 would go through all the covering, and
 perhaps destroy the bed entirely. Many
 a good bed in full bearing has been so
 spoiled by such an accident, that it never
 produced a single Mushroom afterwards.

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If a shed with a pit thirty feet long has the fire-place in the middle on the back-side, and made to draw both ways, and to come up the middle to divide the pit in two, and one of the ends made every June, there would be sufficient for a middling family all the year.

When an old bed is destroyed, if it has worked kindly and been managed well, the tan that was laid above the first layer of dung will be very dry, white, and mouldy, and should be saved, it being exceeding good for laying two inches thick on the new bed, below the three-inch layer of horse-droppings. It will cause the bed to bear three or four weeks sooner, and the Mushrooms to be much larger and thicker in the flesh; for the whole top of the bed will become one solid mass of spawn.

When the old beds are pulled to pieces there will be much fine spawn in them; but let not that tempt any one to lay it on the new bed, for it will entirely spoil it. Although by such means you might get Mushrooms rather sooner, they would be

small and bad, for the waterings that would be necessary to bring these bad Mushrooms forward would prevent the production of any new spawn.

Beds made in cellars or houses where fires are kept, and in stables, will not produce Mushrooms all summer; for as the weather grows warm the air in the cellar grows cold, and the beds in stables will be too moist if horses are kept there all summer, and too cold if there are none; so that after April there will be few Mushrooms on any of them,

Mushroom-beds made after the manner here directed are far superior to those made in the common way. They produce much finer Mushrooms, last much longer in bearing, and have greater quantities on them at a time.

I have gathered great quantities of Mushrooms from beds made according to this method, which were much whiter than those gathered in the fields, a great deal firmer, and when they were as close as the smallest buttons that grow natural,
 many

many of them were four and five ounces weight.

If all be managed as directed, you will be sure of succeeding ; but if any should fail, let them not despond at the first trial, there being a possibility of erring, tho' no great probability, for I have not omitted the least article in the preparation of the materials, making and managing the beds : but information from books written with the greatest candour may be difficult, until a little practice renders it easy.

C H A P.

that it was any ways inferior in taste to that raised in other parts of the kingdom.

The third P. **C H A P. XIII.** not all of the same kind. Battersea is a loam of a great depth. *On Asparagus.* The soil at Pontefract is richer, deeper, and more sandy, and also very deep. The ground at Pontefract is richer, deeper, and more sandy, and also very deep.

THE common method of managing Asparagus beds, is so well known, that it is not necessary to say any thing on that head; but there are several places in England that are remarkable for having larger Asparagus than the common run of the country, as Battersea and Gravesend, near London, which some may attribute to a different management, which is not the case, but the goodness and depth of the soil. I think that Pontefract, in Yorkshire, is greatly preferable to the above places in the goodness of its soil, and might produce larger Asparagus.

The largeness is the thing so much talked of at the above places, for I never heard that the best judges ever asserted that

that it was any ways superior in taste to that raised in other parts of the kingdom,

The ground in the above places is not all of the same kind. That at Battersea is a loam of a great depth, The soil at Gravesend is very light and sandy, and also very deep. The ground at Pontefract is richer, deeper, and finer than either of the above. It also inclines to a brown sand, is the best soil I have ever seen, and I am confident, if the Asparagus beds were managed as they are near London, they would produce much larger than any in the kingdom in the common way.

I have seen and taken notice of the dressing of the Asparagus beds at Battersea and Gravesend, but cannot say there is any material difference in their method from the general run used about London, only they lay a deeper cover of earth than is commonly practised in most places, the reason for which is, that their soil is lighter. As I see so little difference in the method of the culture of Asparagus in those two places, from that of their neighbours,

bours, I can attribute their superior size to nothing but the superior goodness of their soil.

It is evident that the soils of the above-mentioned places, notwithstanding their difference, are all very good, and produce fine Asparagus, which is a plain demonstration that there are different soils that the same sorts of plants may be planted in, and that they will thrive equally well in them all, which is a thing that should be paid more regard to than generally is the case.

It is a general error in writers who treat on these subjects, to mention only the soil that such and such plants will grow the best in, and that in such a manner as to leave their readers to think that they will not grow at all in any other kind of soil, which often discourages people from sowing, or planting many different kinds of roots, shrubs, and trees, in soils where, though they do not attain to the greatest perfection, they may become very useful, profitable, and ornamental, and sometimes to as great perfection as they do in that

that foil which was thought peculiar to them.

Asparagus will thrive in all light, rich, deep soils, and all sandy soils may be made rich with rotten dung, so as to produce very good Asparagus; and in every place it is planted in, if it is not light and rich by nature, it must be made so by art; so that there is no place in England but where good Asparagus may be had, and at no great expence, as there are few places but where the proper materials may be had to make such a foil, which is what I shall give directions for in the common as well as the new method, for growing it to a very large size.

As the largeness of Asparagus is what is greatly admired, it may be brought to grow to a very large size in every gentleman's garden; but many will object, especially those who have small kitchen-gardens, and have little ground to spare, that it takes a much greater space than in the common method; yet I do not know, if the product was to be weighed, but that the largeness would make up for number,
 though

though I have not as yet tried that experiment.

In any part of the garden where no wet stands in the bottom, (for where water stands Asparagus will never thrive, as it kills all the roots in winter, they striking down to a great depth) make a trench two feet broad at three feet distance from the border; three feet from that another; and so on for as many rows of Asparagus as are intended to be sown.

Dig and carry all the earth out of the two-foot trench, which may be disposed of in different parts of the garden where the ground is low. The trench should be two feet and a half deep at least.

If the soil in the garden will not allow such a depth, some of the earth taken out of the trench may be laid on the three feet between the trench to heighten the ground, for it will not be very material though the ground be a foot higher than the other parts of the garden; but the bottom of the trench must not be dug lower than the other parts of the bottom.

Lay

Lay in the bottom of every trench three inches of good rotten dung, to which add three inches of the natural mould, if it is light; but if of a stiff nature, none of it should be put in. If there is any mould added, mix the dung and mould well by pricking it over three or four times with a spade.

The proper time to do this work is the beginning of February, that the mould which is laid in the trench may be well settled before the middle of March, which is the proper time to sow the Asparagus.

The summer before this is intended to be done, the composition for filling the trenches should be prepared, and turned several times, that it may be well mixed and incorporated before it is used.

The materials of which I have made the composition, with the greatest success, are as follow: Sludge from a river that runs slow and is muddy; but the best is where the tides flow and ebb; though if neither of these can be got, the sludge from

from the bottom of an old pond that has not been cleaned for a long time will answer very well. Light peat-mould that lays at top and is very soft, if it is difficult to get, as it is in many places, the bottom of wood-stacks, or the places in woods where much leaves and sticks have rotted, the light mould to be got there will do. Light rich loam from a common pasture. Fine rotten dung that has laid two years, and has been turned several times, and reduced to a fine mould. Sharp sand from a pit, or river side, which is better. These are the ingredients.

The quantities of each, to make a good composition, are two loads of sludge, one load of soft peat-mould, a load of loam, two loads of rotten dung, and two loads of sharp sand. This is the proportion. The quantity must be according to the number of rows of Asparagus to be sown. If the ground, where the seminary is to be made, is of a light nature, there should be two loads of loam and one of sand; but then there must be more of the natural earth and more rotten dung laid in the bottom.

Asparagus

Asparagus will thrive exceedingly well in this composition, and grow to a great size beyond what can be imagined. The trenches should be filled with the prepared stuff as soon as they are dug out, which should be laid in lightly, and within three inches of the top, that it may settle equally. It should be a foot below the level of the ground between when the seeds are sown. Make a drill in the middle of the trench two inches deep, and at a foot distance drop four good seeds an inch from one another; press them gently into the ground, and cover them with mould two inches deep.

If all the seeds grow, leave only two of the best, and if the spring and summer be very dry, give them a little water once a week, and keep them clear from weeds. If a thin cover of moss was laid round them it would prevent the ground cracking after watering.

In the autumn, when the stems are decayed, cut them off two inches from the ground, stir the surface gently that the crown of the plant may not be hurt, and then

then lay on an inch and a half of the same composition that the trenches were filled with, the whole breadth of the two feet, raising it a little higher in the middle to carry the wet off the crown of the plants.

It will be necessary this winter to cover the whole two-foot trench with light litter from the stables, as the roots are near the surface; but this is no more to be practised. This finishes the first year's work.

The beginning of March take off the litter, and dig it into the three-feet left between the rows; prick up the surface in the trench where the Asparagus is sown, and lay over it an inch more of the same compost it was sown in.

There should be as much of the composition made at first as will fill up the trenches at least two inches higher than the ground between, which should be turned over twice a year, for it will be three or four years before it is all used.

It

It is quite unnecessary to repeat the keeping clean from weeds, as that should be always understood.

In the autumn, when the stems are decayed, cut them off four inches from the ground, and lay over the whole trench four inches of the composition, raising it a little round in the middle.

The crowns of the plants will now be near eight inches below the surface, so there will be no occasion for any long covering; but as the plants are still in danger from frost, it will be right to cover them a foot wide with two inches of sharp sand, which should be laid round to carry off the wet in winter, to prevent its hurting the buds. This finishes the second year's work.

In the spring the sand should be spread all the breadth of the two-feet trench, and two inches of the compost added to it; then prick it over with a fork to mix it well with the sand. This work should be done the beginning of March, and let lie until the end of April before it is raked.

In the autumn there should be four inches of the compost laid all over the trench that the Asparagus is sown in, which should be two inches higher in the middle than at the sides, so that the crown of the roots will be a foot under the surface, and there will be no occasion for any further cover to keep out the frost. This ends the third year.

The next spring fork the rows, and let them lay a month before they are raked. This spring the heads will be large and fine, and there will be great temptation to cut, but it would be much better to defer it until the spring following.

The next autumn there should be four inches of the compost laid all over in the same manner as before, so that now the two-foot trench will be an inch or two higher than the ground between.

As the roots will now begin to come to the hard ground between the rows, there must be some provision made to encourage them to spread, that they may grow strong and supply the buds, which
will

will now be very plentiful and very luxuriant.

Any time in the winter there should be a trench opened at the end of the three-feet between the rows, the same depth that the Asparagus was sown in. If the ground is light and tolerably good, only a third of the natural earth should be carried off; but if stiff, one half at least. There should be six inches of good rotten dung laid in the bottom, then eight inches of the natural mould, and on that a layer of dung, and so on until the ground is four inches higher than the ground the Asparagus is in, (for it will sink to its own level). If the ground is stiff there should be less mould laid above the dung, and an inch or two of sand added; then it will be necessary to mix each layer of dung, sand, and mould, by pricking it over twice with a fork.

The next autumn there should be four inches of the compost laid over the trench, which then will be just so much higher than the ground between. If there is any of the composition left it may be laid all

over the ground; but if there is none, an inch of rotten dung will answer as well.

In two years after this it will be necessary to spread an inch of rotten dung all over the ground in autumn, and fork it in, taking hold of the ground three or four inches, and let it lie rough all winter; but the middle of the row, where the Asparagus is sown, should always be highest, and lie round. This should be repeated every third year; and by being thus managed the Asparagus will last for twenty years, and be much larger than what is sown or planted in the beds in the common way.

As to the proper age to cut Asparagus, there should be none cut before the third year; but as the intention of sowing and managing it in this manner is in order that it may be very large, there should be none cut before the fourth year; and none even then but a few of the largest heads, which will give it strength to grow to the size intended.

The

The many directions here given may seem tedious, and to require so much labour that it is not worth the trouble. There is not a great deal more than generally is used (or should be) in preparing of ground, for planting in the common way, as trenching and dunging is always practised; for after the trenches are emptied and filled again with the compost, there is much less labour in the dressings than is used in the common method. But, as this is a new way, I have not omitted the minutest article in the directions, by following of which, Asparagus will be brought to a surprizing largeness.

I have often heard gentlemen complain that they could never have good Asparagus in the common way, their soil not being fit for its production. This does not come within my province; but for the advantage of such as are so situated I shall lay down a method, by following of which good Asparagus may be obtained, let the natural soil be what it will.

A clay bottom is very bad for Asparagus; so where that is the case, in all the

ways of sowing and planting, it will greatly add to its growth to lay two inches of coarse gravel, or some stones broken very small, in the bottom of every trench. The bottom should be very even, and have a good fall to carry off the water (if clay); for if there is not a free passage it rots the roots of all plants that are permanent, and it affects none so much as it does Asparagus; so that unless the ground is dry at the bottom, and of a good depth of soil, all endeavours to have it good will prove in vain.

All the best Asparagus grows in light soils. If the ground is naturally stiff it must be made light; for which purpose there should be as much sand and coal-ashes, finely sifted, mixed up as will make at first laying twice as many inches as there is of the natural soil (for sand and ashes will not raise the ground in proportion to what is laid in, when well mixed with the mould); the sand should be the sharpest that can be got; for soft sand, laid in stiff clay, only binds it faster.

Mark

Mark out the ground that is intended to be sown, and open a trench as deep as the ground will allow; lay in the bottom six inches of good soft cow-dung that is not rotten, but has little straw amongst it; then six inches of the natural soil, and on that six inches of the sand and ashes, which should be well mixed (but the dung should not be disturbed); then lay on three inches of rotten dung, three of mould, and three of the sand and ashes, which should be all well mixed; then three inches of mould, two of dung, and four of sand and ashes, all well mixed; let them remain thus until sowing time. This should be done the beginning of winter, and it will be in fine order, and bring very good Asparagus.

It should be sown in drills two inches deep, and covered with an equal quantity of rotten dung, sand, and good light mould, well mixed.

The beds should be covered with light litter the first winter; the second, with two inches of rotten dung, which should be forked up, and mixed with the earth
on

on the beds in the spring; the third winter there should be a good covering of dung, sand, and good light earth laid all over, which will be sufficient to keep out the frost.

There should never be any thing planted in the alleys, neither should they be deep; but the beds should be laid round, the alleys dug every winter, and some earth thrown over the beds out of them, the most of which will be raked off in dressing. They should have at least an inch of rotten dung thrown over them every third year, which should be forked up in the spring, taking hold of three inches of the mould on the bed. This should be done the beginning of March, and lay rough until the beginning of April before it is raked.

If the ground intended to be sown be gravel or sand, a fine rich loam should be used instead of sand and ashes; but rotten cow-dung will answer better than horse-dung; and if all the layers of dung, except the last, is not so very rotten it will be the better.

After

After all the ground is trenched and well mixed, there should be an inch of very rotten dung, two of loam, and one of good black mould, laid all over, and pricked over at least three times, that they may be well mixed. This work should be done in the beginning of winter, and by lying rough it will be in good order for sowing in the spring.

If the natural soil is either a light loam or a fine black mould, there will be no occasion for any thing except dung; but in all sorts of soils there should be a good layer of dung in the bottom of the trench, as the lower parts of the beds cannot be mended after the Asparagus is sown; and when the roots get to the bottom (as they soon will) they will grow strong, and greatly increase the growth of the plants.

It is a wrong method to plant Asparagus, for the roots should never be cut, because they are of such a nature that they never make so good roots as when they are sown where they are to remain.

It

It is natural for Asparagus to rise in the crown as it grows old, for which reason there should be a good covering of earth laid on at different times, that it may be in a condition to resist the frost without a covering of long dung, which is very prejudicial to it, especially on stiff land. Those who prepare and manage their beds thus will have good Asparagus, let the natural soil be what it will.

Asparagus draws a great deal of nourishment from the ground every year. It is a very luxuriant plant, and should have some supply every other year, or it will in a few years be very small; but if properly supported it will be very good for many years.

Forcing Asparagus, and having it in the winter months, is much in practice. It is sometimes (when the plants are good) pretty large, and looks tolerably well, but it is impossible it can be good; for the buds are forced out by the heat only, without having any supply from the roots, except what juices were in them; and they strike no new fibres, therefore can draw no nourishment from the mould they

they are planted in; for when the buds that were formed before planting are all shot, there is an end, and the plant decays.

Good Asparagus may be obtained, at a trifling expence, from the beginning of March until the beginning of May, of a fine colour and good taste. This is no part of what I purposed to treat of; but, as it is not in common practice, I shall give directions how it may be brought to perfection.

Build a pit thirty or forty feet long, six feet broad (inward dimensions), and three feet high. Before the flues are begun the foundations should be laid two feet four inches broad; that is, eight inches for the flue, four inches for its inside support, and sixteen inches outside wall, which may be built either of stone or brick, as most convenient; but the support and cover of the flue must be brick.

When the wall is three feet high all round, begin the flue, which should be two feet deep; and after it is covered
should

should have six inches of stone or brick built over it before the capping is laid on.

If the ground this pit stands on be clay, there should be a foot of loose stones, broken small, spread all over the bottom, and on that a foot of brush-wood, cut small, and a drain through the wall at the bottom, to carry off the wet; but if it is sand, gravel, or rock, two feet of brush-wood will be sufficient without a drain.

The fire-place should be sunk a foot lower than the bottom of the pit, to give room for an ash-hole below the grate, and sufficient height to the fire-place, that there may be a rise of eighteen inches at least before the flue comes to the level, which should go all round, and the chimney stand over the fire-place, which should stand without the square of the pit. The flue at first should go along the end, and be carried within four inches of the outside of the wall, to prevent its being too hot at first going off; but should, as soon as past the end, be brought gradually into the square, to have only the four inches support the remainder of the way round.

When

When the whole is finished, and the bottom prepared according to the ground it stands on, the pit should be filled with the same composition that was made for the trenches for large Asparagus. This should be done at least two months before the time of sowing; for it will sink greatly, and it should be just a foot below the caping when the seed is sown.

It may be sown thicker than that in the trenches; but five rows will be sufficient in the six-foot bed, as the rows on the outside next the flue must be at least eight inches from the flue, for the heat will dry the roots too much if nearer.

The first year after sowing it should be covered with litter, in the same manner with that sown in the trenches; and managed, as to covering, with the composition, after the same manner (which need not be repeated). When it is finished, which will be the third year, it should lay round the sides, next the flue, an inch above the caping, and the middle four inches higher.

It

It should not be forced before the fourth year. The fires should be made the beginning of February, but very slow at first, and increased gradually. If the season is not very severe there will be Asparagus fit to cut the latter end of March.

There should be a wood frame made like that which supports the tilt of a wagon laid over, that it may be covered with mats at nights and in cold wet days.

When the fires are made strong it should have a little water all round the sides next the fires every day, and the whole bed should be kept moderately moist.

As the forcing will waste the Asparagus much more than that which grows in common ground, these should have a little rotten dung laid over them every year, and it would be proper to provide two such places in order to have a constant supply; for if it is forced every year it will not last a long time, as the heat will force all the buds to sprout, so that it should have rest every other year to recover strength.

The

The forcing of Asparagus in the winter months, by planting it on hot-beds made of dung, is brought to as great perfection as it can be, unless a better method be found that it may have the advantage of roots and fibres to encourage its growth, as well as heat to force the buds to shoot, which I hope to accomplish.

Where tan can be conveniently got, it makes a much better bed for forcing winter Asparagus than dung; for after the tan is brought to a proper heat it keeps so a long time, and is not so apt to burn the roots as dung beds; which, after they have come to their heat, decay much sooner than the bark, and occasions much more trouble in lining, as the heat must be kept up at that season, or all is soon lost.

The roots of Asparagus are soft, succulent, and fibrous; and when cut, broke, or disturbed, are very subject to rot. If it does not rot, it pushes out small slender roots, which spread and entangle one amongst another, so that they never make such vigorous shoots as when the roots are straight and strong, which they are
when

when sown and never disturbed. This is a good reason for being at so much trouble in preparing the beds before sowing, also for laying so great a quantity of dung in the bottom of the trench; for planted Asparagus will never strike their roots so deep as what is sown.

Asparagus seed is very hard and dry, and long in coming up; yet it is of such a nature that, if sown very early, and hard frosts or much rain happen afterwards, it is apt to rot; or if the season is mild at first, and it comes up soon, and a hard frost succeeds, it cuts off the young shoots close to the ground, which is a great detriment to the plants, for there are few roots to support them, and a good deal of the substance of the seed is spent in producing the first shoots. Those that come after are very weak, and it is a year before they recover their strength.

The best method is to prepare the seed three weeks before the time of sowing, which then may be three weeks longer deferred, by which time the hard frosts will be over, and the seed will be as far
advanced

advanced as if it had been in the ground in a mild season.

To prepare the seed, mix an equal quantity of dry sand and fresh grains from the brewhouse; rub them well together, lay it in a heap four or five days, then rub and mix the seed with it, and put it in a little box or garden-pot, covering it over an inch at top with sand, and set it in a dry airy place; in six days examine it, and if it inclines to mouldiness rub all over again, and it will require no further trouble, but will be sprouted, and in good order for sowing in three weeks.

C H A P. XIV,

On Cabbages.

THE cultivation of Cabbages for feeding cattle is of great benefit; and its advantages are so great, that it is surprizing that it has not become general long before this, especially as there are several gentlemen that have brought them to great perfection, and found them very profitable.

In several conversations I have had with farmers on this head, most of them pleaded the following objections: That it was too expensive, and that it impoverished the land; that it also required more dung than they could afford. So far they were quite wrong, for it takes no great labour, and it greatly improves the land; and if they are properly managed it serves for a summer

mer fallow, and there will be a very good crop after Cabbages without any dung.

If they are well managed and brought to a large size, there will be more weight on an acre of good Cabbages than there possibly can be on an acre of the very best Turnips. They are easier to cultivate; for they are not subject to the fly, which in dry seasons often destroys whole fields of Turnips. Whereas, if winter cabbage-plants are planted, they seldom require any water; and for the spring plants, if the season is ever so dry, a good watering at planting will suffice to make them grow.

Cabbages are of great use in deep snows and hard frosts, when Turnips cannot be got; and I have been informed that if all the rotten leaves are taken off, and the sound Cabbages given to milk-cows, that they affect neither butter nor milk. This I cannot assert as a fact that I have seen tried, but I had the information from an ingenious gentleman of veracity.

It is well known by every person that has given Turnips to their milk-cows,

that they give the butter so strong a taste, that in a few days it is hardly eatable, even by those whose taste is not very nice. In markets it is generally the first question, Is it Turnip butter? and if it is, no gentry will purchase it, and it is always sold cheaper. If feeding milk-cows with clean Cabbages will remedy this, it will be an acquisition to the public, and a very great advantage to the farmer.

Cabbages will thrive in all soils (except in poor gravel) which is a great advantage to the farmer, as gravelly grounds are fittest for Turnips. In the strongest clays Cabbages may be brought to great perfection; and as that is not a soil fit for Turnips, there they must be a great improvement; for if most of the farm is strong clay, and unfit for Turnips, in years when hay is scarce it will be a great advantage to have a good crop of Cabbages.

If Cabbages are intended to be planted on a very stiff clay, suppose bean or wheat stubble, the field should be plowed as soon as the corn is got off; and then again just before winter, in the same manner; and
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if the spring is dry it will be of service to harrow it well; but that should be done just before it is plowed, for it will become very fine by harrowing after the winter's frost; and if much rain should fall before it is plowed, it will run all together and become quite stiff; so that it must be plowed as soon as possible after harrowing. Before the last plowing there should be eight or ten loads of good rotten dung spread over each acre; then plowed, well harrowed, and planted immediately.

Plants that have been sown in the autumn, and pricked out in beds four inches asunder, are the fittest for clay ground, as they are larger and hardier than those that are sown in the spring, and they may be planted three months sooner, which will be a great advantage, for they grow very slowly for some time in such ground; but after they have got good hold they will grow very fast.

All Cabbages should be pulled and carried to a fold, or some convenient shed, to be eaten, it being very improper to allow cattle to go amongst them; for if they are

confined to ever so small a space they waste and destroy them greatly; and that is the reason the farmers say it impoverishes the ground, for the crop is carried off and spent in another place; but they should consider what a quantity of dung is got in the fold, the cabbage ground having no need of it, which is a great advantage.

A good crop of beans may be had on clay ground after Cabbages without any dung.

If it is intended to have beans, the Cabbages should be all cleared off by Candelmas, and the ground plowed and sown as soon as the weather will permit; but if after plowing it was well harrowed, and the beans planted with setting-sticks, there would be a much better crop, and a quarter of the seed would be sufficient.

This is practised in many places in the south, where both labour and ground are much dearer than in the north, and they find it turn to good account.

They

They plant them eighteen inches, sometimes two feet, row from row, and three inches in the row. Two women, with a bag in their aprons to hold the beans, plant them very quick. They have two lines beginning at opposite ends, each planting the whole of their own line, so that they are ready at both ends to shift the lines. They make the holes with the setting-stick, and drop a bean in each; and when the field is planted, harrow it all over.

When the beans are two or three inches above ground they should be hoed in the row, to destroy the weeds that are in the line of the beans, and then a furrow drawn with a plow between the rows. This furrow should be drawn as soon as the beans are hoed, for if they are any taller they will be in danger of being broken. It may lie until the beans are a foot high, and then be drawn up to their stems with a hoe. By this method of working the ground is kept quite clean, and will be almost as good as another summer fallow. The goodness of the crop will pay all the extraordinary expences
triple,

triple, besides the advantage of the ground being kept clean.

If the ground intended for Cabbages be a strong rich loam, (which is the very best for them) they will grow very large; but it should be plowed before winter, and lie rough to mellow. If it is to be planted with winter plants, which is also the best for this soil, it should be harrowed, dunged, plowed, harrowed, and planted in succession as soon as can be; but if it is to be planted with spring plants, it should be harrowed as soon as tolerably dry in the spring, and plowed directly; for if it is not plowed before planting time it will be full of weeds. Just before the season for planting, which should be as soon as the plants can be got to a good size, it should be dunged, plowed, and harrowed, and then planted.

Little dung will be sufficient for such ground, and a good crop of barley will grow after the Cabbages, without dung.

If the ground to be planted with Cabbages be of a sandy nature, or a light loam

loam of a good depth, they will thrive extremely well. It would be better to plow it before winter; but if plowed early in spring it will answer.

Ground of this nature answers the best of any for spring plants, it being naturally soft, and they will take root much sooner than in any other kind of soil, and it should be dunged and plowed just before it is intended to be planted. After it is plowed it should be well harrowed, and then a shallow furrow drawn by the plow at four feet distance from one another, and the Cabbages planted in the bottom of it at two feet and a half distance.

When the Cabbages are grown to have three or four inches of stem, the weeds should be hoed between the plants in the rows, and the loose earth that was thrown up in making the furrow, should be drawn close up to the stems.

All the Cabbages that are planted in the different grounds that were winter plants, about the end of June should have two furrows drawn by the plow between every

ry

ry row, throwing the mould up to the Cabbages; after which it should be drawn quite close to the stem by a hoe. It will be the middle or latter end of July before it will be necessary to draw the furrows and earth up the spring plants.

When Cabbages are planted in a fine light sandy soil that is of a good depth, if the ground is kept clean, and the Cabbages cleared off by Candlemas, the ground may be put in good order to produce a fine crop of Carrots.

When Carrots are intended after Cabbages, the Cabbages should be pulled up by the roots, for their roots would be very troublesome in the Carrot ground. The ground should be plowed as deep as possible and lay rough.

The seed for winter plants should be sown at two different times, for there is often three weeks difference, or more, in the season. The first sowing should be about the latter end of July, and the second about the 18th of August.

If

If the autumn is very fine, which often happens, those sown first will be too large; and if they stand through the winter many of them will run to seed in the spring; but if the autumn prove cold and frosty, as it sometimes does, those last sown will be too small and weak, and unable to resist the cold winds and hard frosts.

When the plants have got four leaves they should be pricked out into beds in an open spot in the garden or in the fields (where hares and rabbits cannot come at them) at four inches distance every way. If they are planted near walls or hedges it draws them, and they have long stems, which makes them weak, and is a great detriment; for it is the strong stiff plants which make the large Cabbages.

All those that are the least acquainted with gardening know that, if the season is dry, all young plants, when first planted out, should have water, and it would be very superfluous to direct it; but this is designed for the farmer, (not the gardener) who is supposed not yet to have come to a perfect knowledge of managing plants
of

of this kind. If the season is very dry when the young plants are planted out, they should have a good watering in the evening or morning after planting; but if ever so dry should have no more. It is much better for them to be stiff and short, both for standing the winter and planting out in the spring, than those that are flush, tall, and tender, which watering or a wet season makes them.

The ground which the young plants are pricked out in to stand the winter, should be a good natural soil not made rich with dung; for then the plants grow too fast, and are so thick that they are drawn; and if it comes a hard winter they are in danger of being lost.

If there are no winter plants, and the whole is to be planted with spring plants, they should be sown as soon as possible, in a spot of good ground that lies pretty warm to bring them forward. They should not be sown too thick, and it would be worth the labour, after they are come up, to thin them by hand to four inches distance, as the trouble would be all saved
in

in the planting, besides the advantage of the plants being much larger; for when they are very thick they are long stemmed, crooked, and very troublesome to plant; which they are not when thin.

The season for planting plants that have been kept over the winter, is any time from the beginning of March to the end of April; but the sooner they are planted the crop will be the better; for in that early season they have a good chance to get rain after planting; and as the ground is for the most part moist they will require no watering when planted, which is saving more labour and expence than the transplanting of the plants costs in autumn, besides the advantage of the plants having almost three months longer to grow.

If sharp frosts should ensue after the Cabbages are planted in the fields it will not hurt them, for the moving makes them more hardy than if they had not been transplanted.

It

It will be the beginning or middle of June before the plants that are sown in spring are strong enough to plant out. It is wrong to plant them small in the field; for if the ground is not fine it will be very difficult to make them fast, and at that season the weather is generally hot. If they are not good large plants they will stand a bad chance, although they are well watered when planted. If the weather is rainy and dull, it will be much better for them, and if there is an appearance of rain it will be right to wait a few days; for it is much better planting if the ground is wet at top, as it prevents the mould running into the hole, which is very troublesome in planting. If a good deal of rain should fall just at the time of planting, (but it very seldom happens that a sufficiency falls at that season to moisten the ground deep enough for the roots of the plants) it would even be a great service to them to be watered when the weather is dull. One quart will be of more advantage than a gallon when it is hot and dry; and if in a few days it should be very hot, and continue so for a long time, they will require no more watering.

If the ground has been well prepared, and is very tender and fine, it will have a good deal of moisture in it; and if some rain has fallen they may do without water; but if the ground is rough and lumpy, water is absolutely necessary, although there has been a good deal of rain.

If Cabbages are managed, on the different soils, as here directed, they will be a profitable crop, and few will be without them after they have experienced the great advantage they are of in winter feeding.

No cattle are fond of eating vegetables when they are frozen; so that if the Cabbages are carried home and laid in a cow-house singly, where cattle are kept, the heat of the place will soon thaw them; but if they lie in a heap they will continue frozen, although in a very warm place. It will require no great room to thaw them; for after a few are thawed, and the cattle fed, some may be laid all along behind them, to be ready against these are eaten. This will be very little trouble, the cattle will be much better fed, and there will be no waste.

C H A P.

C H A P. XV.

On Carrots.

CARROTS are another very beneficial vegetable for feeding, and many other profitable uses. The cultivation of them in all the different soils they will thrive in will be very advantageous to the farmer. I shall endeavour to give such plain and easy directions for the propagation of them, as, I hope, will be successful, allowing for the common accidents of seasons.

All the farmers may keep their horses from the beginning of September to near May-day with Carrots and hay, without one grain of corn, which must occasion a great saving of oats.

The following is an absolute fact: That three acres of Carrots, on a soil that is not the

the very best for the growth of them, supported twenty-four working horses, thirty grown swine, and several young horses and cattle, from the end of October to the beginning of April. The horses were worked every day, looked well, and were fat. Besides there were quantities frequently given to the milk-cows during that time, which had no bad effect on the milk; and they gave a greater quantity at a meal than if they had not had Carrots, and the butter was sweeter than of those which were fed with the best hay only.

The labour in keeping Carrots clean is not much different, nor more expensive, than that of Turnips, where Turnips are hoed and kept clean as they should be.

Turnips will be something like a crop, although they are not hoed, and are full of weeds, and there are many places where such slovenly work is seen; but the occupiers of the grounds suffer for their negligence, both in the loss of Turnips and the dirtiness of their grounds, as the seeds blow all over the farm; but unless

C c Carrots

Carrots are kept clean and hoed to a proper distance, they will be good for nothing.

I am of opinion that there are few farmers, after they have found the great advantage Carrots are of in feeding, but will endeavour to have some acres of them, which requires no great art, if the whole farm is not a hard clay or a shallow gravel; in that case it is in vain to attempt their propagation.

Carrots will thrive on sandy grounds of all kinds; light loams, strong loams, light black moulds, and all kinds of land that is of a loose open nature.

The ground which Carrots are sown on should never be dunged that year; but they should follow a crop that has been dunged the preceding year; for the ground must be in good heart, or there will be little profit. There is no crop that prepares the ground so well for Carrots as Cabbages; when Carrots are intended after Cabbages, before the Cabbages are planted the ground should be well
well

well dunged previous to the last plowing.

The Cabbages should be all got off by Candlemas, and as soon as the ground is tolerably dry it should be plowed as deep as the plow can go, and lie rough until near the time of sowing. It then should be well harrowed with a large harrow, which will make it fine at top. It must be plowed again directly, for if rain should come before it is plowed, all the fine mould at top will run into a hard crust, and all the advantage of the early plowing will be lost.

There are some kinds of soils (which have been mentioned before) that Cabbages will thrive on, that are not fit to be succeeded by Carrots; but as Carrots are so advantageous a crop, if there is any ground in the farm that is fit for them, it should be so contrived as to be planted with Cabbages, that the Carrots may be sown after them.

It is a good method, where there are large quantities of Potatoes propagated, to

The best soil for Carrots is the black
plant first Potatoes, which are always
dunged with long dung. To prepare the
ground properly, it should be plowed as
soon as the Potatoes are taken up, to mix
and rot the long dung that they were
planted with. It should lay rough all
winter; early in the spring harrowed,
then dunged according as the ground is in
heart; then plowed, harrowed, and plant-
ed with Cabbages, to be managed as be-
fore directed, and sown with Carrots next
spring. All those crops will thrive on
the same sort of soil, and produce good
crops of each kind.

If the crops are sown in this succession,
the Potatoes should be kept very clean,
and no weeds allowed to seed on the
ground; for if they do they will be very
troublesome in the Carrot ground. The
Cabbages the next year must also be hoed
and kept clean, and well plowed between
the rows, which is almost as good as a
summer fallow; by this management the
Carrot ground will be in such good order
next spring, that the hoeing will be easy,
and the crop good.

The

The best soil for Carrots is the black deep sandy grounds that are in low bottoms by river sides; there they grow large and fine, and prove a very profitable crop. If such ground can be had, the labour will be trifling. Supposing it had produced Cabbages the year before, it should be plowed when the Cabbages are got off, and lie rough until the time of sowing the Carrots, and should then be harrowed with a large harrow, plowed immediately, and harrowed, the seed sown, and then slightly harrowed with a bush-harrow.

If the ground intended to be sown be a deep but hungry sand, it should be managed in the same manner, but sown as early as possible; for if the plants do not get good hold of the ground before the dry weather comes on in the spring, they will come to nothing; but if sown early, there will be a fine crop.

Sandy loam is a very good soil; such ground is always of a good depth, and a fine crop may be expected. It should be treated much in the same manner as the

former, only it will require a little more harrowing before the seed is sown.

If stiff loam, Carrots will thrive very well; but it will require a good deal more working to reduce it; for rough ground is very unfit for Carrots.

If stiff loam has not produced Cabbages the year before, it would be much better to be fallow for a summer; and if it is not in good heart, to have five or six loads of very rotten dung per acre spread over it in summer, and plowed in directly. It should be kept very clean.

This method will be much condemned by the generality of the farmers, as too expensive, on account of the two winters and one summer's working and dunging also for one crop; but I am sure it will pay very well, for it will produce a very good crop if the season proves temperate.

If there is a more proper spot I would not recommend such soil, only in case of necessity, that it is the best in the farm,
that

that those who have not a fitter soil may not despair of having good Carrots.

Black mould, and all loose earths, will answer very well for Carrots; but they should be sown early for the same reasons that were given for sowing sandy ground.

If the best ground in a whole farm is all stiff and next to a clay, it is very unfit for Carrots; but at a small expence it may be made to grow them tolerably well; and the ground will also be greatly improved for all other kinds of grain, and last many years.

The following composition, prepared and laid on, and plowed and harrowed two or three times afterwards, will mix with the natural soil, and bring it into good order for sowing. If the season is not very wet there will be a good crop.

Twelve loads of sharp sand, four loads of light loose earth, and one load of rotten dung, all well mixed, and turned at least twice before it is laid on. Twelve loads to an acre will do pretty well; but
to

to make the ground very good it would take sixteen.

All the expence of this must not be reckoned to the account of the Carrots, for next year a good crop of Turnips may be had, if the ground is plowed and laid rough all winter, and properly worked in the spring, and sown at the usual time.

The ground that is intended for Carrots should always be plowed in the autumn, and lie rough all winter; but if they are to succeed Cabbages, these should be all got off by Candlemas, and the first time the ground is tolerably dry it should be plowed, that it may get some frost to mellow it.

If the ground intended for Carrots is of a stiff nature, it should be well harrowed with a large harrow, every time just before the plowing; but it should be dry when both harrowed and plowed; for wet plowing is very detrimental to all ground, but much more so to ground where Carrots are to be sown.

The

The reason for so much harrowing is, that the ground may be all very fine the depth of the plow; for if the surface be only fine and rough below, the clods will stop the small roots of the Carrots in their going down, and make them forked and good for nothing.

If the ground was quite hard it would be much better for them than rough; for, when rough and loose, the small end, as soon as it meets with the least obstruction, (if the mould is loose) the root bends, and so grows into many forks; whereas if the ground is all equally hard and free of stones, they will strike a great depth into the hard ground.

The ground should never lie any time after the last plowing before it is sown; for if dry weather should set in, the seed will lie a long time before it comes up, and a great deal of it will not appear until there is rain. The weeds at the same time will grow, and there is no hoeing until the Carrots are all up. In that case the largest of the weeds must be pulled by the hand; for if they are permitted to
grow

grow until the carrots are visible, they will be too strong to cut with the hoe; and if then pulled they will draw many of the Carrots out of the ground, for there are many of the annual weeds that spread their roots very much when they are permitted to stand to grow large.

When the season will permit, the earlier the Carrots are sown the better: if the ground is tolerably dry, they may be sown the beginning of March, for after they are come up they will stand a hard frost without sustaining any injury.

They should be sown as soon as possible after the ground is plowed for the last time. The method to proceed is this: plow and harrow; then sow and harrow again.

If the soil is stiff (which it will not be if it has been managed as directed) a heavy harrow should be drawn over three or four times before it is sown, and then harrowed twice over with a light harrow after it is sown. A pound and a half of seed is sufficient for an acre; but those
who

who have not been accustomed to sow it had better use two pounds. They are easily cut out in hoeing, if too thick.

The seed being very light, the husks that adhere to it make it very apt to stick close, and render it hard to separate; therefore the best method is to mix it with twice as much sand as seed, of a different colour from the land that it is sown in; if the land is of a red colour use white sand, and red sand, if the ground is of a whiteish colour; rub it between the hands until the husks are mostly broken off; then the seeds will fly more regularly, and the sand will shew where the ground is sown. It is more difficult to sow than Turnips, but a little practice will make it easy.

The best method of sowing Carrots is to prepare the seed before sowing; and then, if sown as directed, it will be all up as soon as the annual weeds, and may be hoed before the weeds come to any height, which is of great advantage, and saves much labour.

To prepare the seeds: Take three parts dry sand and one of fresh grains from the brewhous, mix both together, rub it all over between the hands several times, and then lay it in a box. This must be repeated daily for four or five days; then it should lie four days, and be rubbed again; in four days more it should be examined, and if there be no signs of mouldiness it should be covered an inch thick with dry sand, and remain for fifteen days, by which time it will begin to sprout, and be in proper order for sowing.

If there be any signs of mouldiness when the seed has lain eight or nine days, (for it will be right to examine it about that time) it must be all turned out of the box and rubbed over; and if it appears to be wet, it should be spread a few hours in an open airy place, but not in the sun, and then put up again, and afterwards there will be no danger of its moulding.

As soon as the Carrots are fairly up they should be hoed with a three-inch hoe. If the weather is favourable they will grow very fast, and in six or eight weeks will want

want hoeing again, which may be performed with a six-inch hoe, and left at that distance.

Two hoeings will be sufficient for the prepared seeds, if the ground be in tolerably good order; for before any weeds can grow after the second hoeing, the plants will cover all the ground and prevent them.

When the Carrots are taken up they may be laid in any dry place; but where there is a quantity it would be best to build a shed, or hovel, on purpose for them. It may be a double roof, or a shed against a wall. If against a wall, it must be well secured at top between the wall and the shed, for the wet is apt to come in there, and run down the rafters, and spoil the whole.

A detached hovel is the best with a double roof, the side walls of which should be about six feet high, and the breadth of the house ten or twelve feet; for if it was much broader there would be too great a body of Carrots, and they would

would be apt to heat. The side-walls would be better if made of whins very close, as they admit a free air and keep out the frost; for a wall would make it very damp.

The roof should be thatched, as it will keep out the frost much better than any other kind of covering. The floor should be a foot higher than the ground round, in order to keep the Carrots dry; and if the ground is wettish, it should be raised with dry rubbish, that there may be no damp at bottom.

The shed, or hovel, should be got finished in the beginning of the summer, that all may be perfectly dry; and as soon as possible a good quantity of sand laid in, in dry weather, the sharper the better.

There can be no particular time fixed for taking up the Carrots; but as soon as the tops begin to grow yellow it should be done.

The weather should be dry and fine; for if they are taken up wet it will be
very

very bad for them. They should never be taken up when it is frosty.

A number of men should be employed to take them up with dung-forks, and women sufficient to cut off their tops at an inch from the Carrot, and put them into carts to be conveyed home.

If the ground is light and sandy, and the weather dry, they will be very clean; but if the ground is of the loamy kind, the mould adheres to them, which should be rubbed off with the hand, and care should be taken not to break the rind. Those that are cut or broke, should be thrown by for present use.

When they are brought home there should be an inch of the dry sand spread over about six feet in length of the floor, and some very dry wheat-straw laid up at the end and both sides of the house. Then the Carrots should be brought in and laid even on the floor a foot thick, and a wall of them made straight up at six feet distance from the end of the house. A little sand should be sprinkled in amongst them,

them, and some at both the sides; then another foot of Carrots and sand, as before, until they are within a foot of the top of the house. The last layer should be covered two or three inches with sand.

When that layer is finished another should be begun in the same manner, and carried up after the same method, until the house is filled, or the Carrots housed, taking care to lay sand on the floor at the beginning of every layer, and to fill up the sides of every layer with sand, to protect the Carrots from frost and air. If the side-walls of the hovel, or shed, are made of whins, the air will pass all round the sand that is laid on the outsides, and keep the whole dry.

It will be necessary to have two doors in the shed, or house, if it is of any length, for the conveniency of housing the Carrots; for it would be very troublesome to go the whole length of the house with every basket of them.

Carrots laid up in this manner will keep very well till May, and be as firm and
good

good as when first taken out of the ground.

The horses that have not been accustomed to feed on them will be very nice at first, and will not eat them; therefore they should be cut small, and mixed with their corn, and they will soon grow so fond of them as to leave corn and feed on the Carrots.

There will be no occasion to cut them after the horses have taken to eating them. Cows and young cattle will feed on them very freely at first. The swine want no invitation, and for them they want no washing.

Unforeseen accidents sometimes happen, so that there will be poor crops of Carrots. This is common to every thing that is sown; and although all the directions are followed, and the soil proper and in good order, the season may be so bad and contrary to them that there will be few; but this will seldom happen.

Accidents of this kind often happen in all the common courses of gardening and husbandry that have been in practice for many years, and allowed to be a good and substantial reason; but in things that are new, if the season is ever so bad and contrary, the fault is laid to the new projects as being of no utility, only speculative, and without any real existence but in the brain of the projector.

Let no such prejudices as these affect them that intend to make trial of growing Carrots; for although they should be unsuccessful in the first, and even in the second attempt, let them persevere with resolution, and they will find their labour well rewarded, for they are in general a more certain crop than any thing that is sown for feeding, and of greater profit than any one can conceive that has not tried them.

The truth of this I can assert by what I have seen, and by what has been done at Sir Thomas Gascoigne's, at Parlinton, where they are the most advantageous and profitable

profitable vegetable for feeding that is sown or planted in England.

Great advantage may be had from the cultivating of Carrots in large quantities, as they feed working horses, cattle for fat, young cattle, and swine, without corn, which must greatly lessen the consumption of oats.

The kinds of Carrot-seeds proper to sow in fields are the large red-horn Carrot, and the long large orange.

If the ground is shallow the horn-carrot is the only seed fit to sow; they will go down as far as the soil will permit, and grow to a great thickness, so that many of them will weigh four or five pounds, and even in such ground will be a very profitable crop.

If the ground is sandy and deep, the large Orange Carrot is the best kind. Although it is a hungry, poor, sandy soil, if it is sown early it will produce a good crop, if it has been managed according to the directions here given.

If

If the ground is a good, deep, sandy loam, such as the soil is in general about Pontefract, in Yorkshire, they will grow to an immense size, and produce a crop advantageous beyond imagination.

In such ground, if hoed to a proper distance, which should not be less than ten inches, and kept clear of weeds, they will grow to be ten and twelve pounds weight.



F I N I S.

