The Cultivation of Fruit under Glass.[1]

BY

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THE GRAPE.

IN complying with the request of the Regius Keeper to give two or three lectures on the cultivation of fruit under glass, I think it right to treat of the vine first, because it is by far the most extensively grown fruit under glass. The course of instruction of which these lectures form a part is, I understand, for the benefit of young men of the staff of the Royal Botanic Garden, most of them beginners. I shall therefore go more into elementary details of my subject than I would do were I speaking to those who are more experienced.

What I state to-night is what I have seen and experienced, but I don't think I will state anything new to you. The truth is the most of all our experiences are built upon the experiences of those who have gone before us. We either try to improve upon what has been practised successfully or, what is equally important, we avoid practices we have seen to be failures.

There is no crop grown in this country that has undergone such a change in its cultivation as has the grape-vine during the past forty years. It is now nearly half a century since the pioneers of the last generation of gardeners began to adopt what we now know to be reasonable and sensible means to grow good grapes. The practice of putting very heavy coverings of solid

[1] Three lectures delivered in the Lecture Hall of the Royal Botanic Garden in June, 1901, as part of the Course of Instruction provided for members of the staff.

animal manure on the borders, and of digging great holes in the vine-border and burying in them dead cows or dead pigs, was seen to produce the very worst results—thick fleshy roots which perished in winter, producing bad-coloured, ill-shanked grapes.

Those pioneers who established good grape-growing were also the first to initiate what has now become a very large industry—commercial grape-growing. Most gardeners who had reached middle age shook their heads when William Thomson built his large vineries at Clovenfords to grow grapes for market, but the prices he got—7s. 6d. to 15s. per lb.—for some years in Covent Garden, were soon seen to be too good for him to have the trade all to himself. In a few years, therefore, vineyards round London were built of a size putting Thomson's into utter insignificance, and the supply of grapes brought about a reduction in the price to a minimum of 1s. per lb. At this price the crop is not profitable, and consequently the greater part of our market grapes are poor in quality, ill-flavoured, indeed almost sour grapes. We must have fire-heat in our climate to finish our grapes properly, and the high price of coal is prohibitive when the price of grapes is so low.

I do not think I need say much upon the construction of vineries. Horticultural builders have now such large establishments and comprehensive plant and machinery that they only need to be told what a glass-house is required for, and they bring the whole material ready to put together, and erect the house with its necessary heating in very quick time. With regard to heating, it is the best economy to have abundant boiler-power and abundant surface of piping. This saves fuel, and you also thereby keep up the desired temperature without strongly-heated pipes, which are so detrimental to all vegetation.

Vineries for very early forcing should be lean-to; for mid-season the span-roof is well adapted, and gives more fruit within a given space. I think, however, it is generally admitted that a line should be drawn across the middle of England, and south of that line first-class grapes are grown in span-roofed houses, whilst north of that line the finest quality of grapes are best grown in lean-to houses. Vineries in which late grapes are to hang all through our wet winters should be constructed with a

very steep pitch; flat-roofed vineries are most prejudicial to ripe grapes hanging under them in winter.

Whilst the gardener may leave the construction of the vinery in the hands of the horticultural builder, it is essential that in every detail he superintend closely the making of the vinery border. And let me here, by way of parenthesis, say on this score to you young men, that if any one of you should be placed as an assistant where new borders are to be made, do not grumble, as I have often heard young men do, at the extra work they entail. Remember you are receiving in the work a most valuable education, without responsibility as to its success or failure, whilst the head gardener is filled with anxiety as to its success.

The bottoms of vinery borders may be said to be of two kinds—

1. Where the natural drainage is good, *e.g.* gravel. In this case six inches of broken stones laid over the bottom of the border is all that is required.

2. Where the subsoil is of an impervious or water-logged nature. In this case I have made an excellent mixture of one part cement to seven parts rough gravelly sand. Mix the whole with water, and spread all over the bottom of the border, about three inches thick, on top of a layer of ashes already put down. This bottom should not be flat. The drain for such a border is usually parallel with the outer edge of the outside border, and the bottom should slope from the back wall of the vinery to the drain. The concrete bottom will be quite hard in three days, when nine inches of broken stone may be laid equally all over it, and then all the stones covered with fresh-cut sods, the grass-side put next the stones. That completes the foundation of the border.

The depth and width of border is the next consideration.

Firstly, as to depth. Deep borders are now considered bad practice. What is desired for up-to-date grape-growing is to have the very surface of the border a close net-work of fine fibrous roots to feed upon the easily assimilated finely powdered artificial manures now specially made for feeding the vine. A depth of two-and-a-half feet, exclusive of drainage, is therefore considered enough for the border when first made.

Secondly, as to width. The inside of the house is usually all border. I am much in favour of a wide outside border, for I always notice the best and greatest number of the roots are in the outside border, even when the vines are planted inside and have a good inside border.

In making a new border for planting young vines it is bad practice to make up at once the border in its whole possible width both inside and outside; it is better to make at first a width of only three feet inside and three feet outside—that will be sufficient for the young vines for the first two years, and then three feet more may be added to both outside and inside.

The next consideration is the material of which the border is made. The soil should be of the oldest pasture land, as rich and as fibrous as you can get it. I am much in favour of skinning it from the field and carting it direct to the border, granting the border is to be two-and-a-half feet deep. I should cut up the sods into large pieces, mixing with lime-rubbish and a spadeful of half-inch bones to each barrowful of soil. I should fill up the allotted piece of border with this rough mixture to the depth of eighteen inches. For the remaining depth of one foot to be filled, I should chop the sods very much smaller, measuring it in barrowfuls, and placing it in a long narrow ridge. I should then spread over this ridge one spadeful of bone-meal and one spadeful of, say, Thomson's vine-manure to each barrowful of soil, adding a good sprinkling of finely broken lime-rubbish. This ridge being now ready for mixing, the only way I should have it done, is that the men turn it all over with their hands in order that the powdered manures may become thoroughly mixed through the soil. One foot of this mixture put on top of the one-and-a-half foot of soil already put in makes the border two-and-a-half feet deep.

This work should always if possible be done in dry weather and with the soil in a comparatively dry state, and that being so, the soil should be put into the border in layers little by little, and between each little it should get a good tramping. Loose borders soon prove an evil, encouraging thick roots to get too quickly down to the bottom of the border.

We have now got the vinery and its border, and our next consideration is the vines with which it is to be planted.

The late Wm. Thomson, senior, of Dalkeith Gardens and Clovenfords, introduced a method of raising vines from eyes, which is probably a good deal practised now, and my own experience of it leads me to say it is the best method that can be adopted for the purpose of raising vines. The method is :— Take some fresh turf-sods cut in squares in the usual manner, lay them grass-side downwards on a bed in which there is bottom-heat, then take a number of vine-eyes and insert them all over the surface of the sods at equal distances of six inches square. The time for doing this is the usual time, January or early February. When the eyes have made growth six to nine inches in length, each eye is cut all round, leaving a six-inch square of turf to each. These are now shifted into another bed and placed twelve inches apart, where they make growth three feet long. They are then cut all round again. This cutting of the roots twice causes a lot of small fibrous roots to grow, and the vines are now ready to plant out in the vinery. By the time the vines have grown to be three feet long it will be the month of May, and I have always found about the middle of May is the best time to plant a vinery with young growing vines. The process of planting in this case is of the simplest and easiest :— Take a spade or wooden shovel, get it under the sod in which your vine is growing, lift and carry to the new border, lay it on the surface, cover with a little fresh fine-chopped sods mixed with bone-meal and vine-manure, and over all place a mulch of fresh horse-droppings, give a watering, and the planting is finished. So far I advocate as the best method the raising of your own vines from eyes and the planting of them out the same early summer in their permanent quarters.

We know, however, that nurserymen all over the country grow and send out yearly immense quantities of young vines grown in pots, and so a large quantity of one-year-old vines must be planted yearly. I must refer to the treatment of these also.

About fourteen months ago I had occasion to examine the roots of young vines, planted twelve months previously, and to my astonishment I found that in planting they had simply been taken out of the pots and planted with the whole ball. Inquiring who did the work, I was told the head-gardener did it himself. I did not think that any man worthy of the name of a pro-

fessional gardener could have been found to do such a thing at this date.

On receiving one-year-old vines from a nursery with a view to planting a vinery, the first thing to do is to put them in a tank of water, and let them remain there during forty-eight hours. That will kill any phylloxera that may be on the roots. The next thing is to shake every particle of soil from the roots. If you have a melon-house with a bed and slate-slabs, sprinkle over the slabs one-and-a-half inches finely chopped sod mixed with vine-manure. Spread the roots of your vines out over the soil on slabs, then cover the roots with one-and-a-half inches of the same mixture. When the vines start to grow the roots take hold of the three inches of soil over and below them. In the middle of May, the time to plant in the vinery, take a wooden shovel and lift each vine with the soil attached to the roots, and lay it in its place on the surface of the border, covering up with an inch or two more soil and then a mulch on top of all. If this shifting from melon-house to vinery is done carefully no check will be given to growth and the vines will soon reach the top of the house. The important point gained by this method is that the roots are all on the very surface, and anyone who has grown grapes successfully knows that the roots of the vines must be there if the crop is to be a success.

Various methods have been tried to keep the roots continuously near the surface, about which I would like to say a little. The first sensational exhibits of grapes were shown by the late Mr. Fowler, of Castle Kennedy, at an International Show held in Edinburgh in 1865. He produced on that occasion very large bunches, superbly finished, of Muscats and all of the finest quality of grapes, and a bunch of White Nice sixteen pounds in weight—an unprecedented weight up to that time. I was quite a young journeyman at the time, and was allowed in the situation I was then in ten days holidays. I set off to see the vineries at Castle Kennedy and if possible find out the key of the success in grape-growing. I found there the vinery borders both inside and outside were totally covered with beds of leaves, solidly built three feet deep. These beds remained for the twelve months and were removed only to have beds of fresh leaves built in their place. The roots of the vines came up most

abundantly into the bottoms of these beds, and I was told a good quantity of guano was sprinkled in the bottom of the beds for feeding. The late Mr. Johnstone, of Glamis Castle, was foreman to Mr. Fowler, and went to Glamis about that time as gardener. Lord Strathmore built a lot of new vineries, and Johnstone followed out at Glamis the same practice of having beds of leaves on the vinery borders, and with equally good results, for he carried all before him for years in the exhibits of grapes.

Looking back, however, to these two instances of ephemeral success it is seen the vines were made to make a grand effort for a few years in their youth, and then came a great collapse, for the same vines soon became enfeebled and unfruitful.

The contrast between these vines grown in a leafy medium and, say, those grown for the last thirty years at Clovenfords is most striking. The vines planted thirty years ago at Clovenfords are as full of vigour now as ever they were, and produce as fine bunches and finish the grapes as well as one would wish to see. The feeding given to the latter all these thirty years has been solely finely powdered bone superphosphates, which always seems to attract a network of fibrous roots to the surface of the border.

Some gardeners cover the outside borders with wooden shutters. The only benefit I could ever see from that was that in a district where the rainfall is very heavy, in Ireland for instance, by putting shutters in the middle of July on the borders of a vinery filled with almost ripe Hamboro grapes, the grapes hang better through the autumn from the dry border than they would if the border had been soaked with rain. Some cover the outside border with glass, which I believe is the best covering, but in ordinary dry districts the borders are best without any covering.

Heating and airing is the next consideration, and I believe a large body of gardeners have yet to give to both these points more careful study.

The fine, large, lightly-constructed vineries we have nowadays are apt to be much too air-tight. The want of air is most prejudicial to any fruit grown under glass, and to none more so than to the vine. Of course you have the usual top and bottom

ventilation, but there are often times when it is not advisable to open air at either of these points, and yet it would be most beneficial to have a little fresh air entering the house. Some of our best grape-growers, when getting a new vinery built, allow a little space between the panes at the point when they overlap each other on the roof, and by so doing a little fresh air is admitted all over the roof. In large vineries with large panes of glass, and in which labour is scarce, these little openings all over the roof are a great benefit and prevent scorching of foliage, give to the foliage greater substance, and help colouring of the fruit as well as flavour.

It is of the greatest importance to have plenty of piping in vineries. There is nothing so hurtful to vines as over-heated pipes. I would at all times rather have a house 5° or 8° below the mean temperature than force it up with very hot pipes. Abundant piping keeps up the heat without over-heating.

Muscat grapes, the finest of all grapes and the most difficult to grow, require high temperature accompanied with abundance of moisture. When in flower Muscats should never be subjected to a temperature below 73°. Through the day run the temperature up to 90° even with little air, but be sure along with such a high temperature to keep the air saturated with moisture. These conditions will ensure a splendid set of fruit. Muscats require all through a mean temperature of 70°. The foliage of the Muscat is more tender than is that of any other vine, and it will not stand the same treatment with insecticides that of other vines will do.

The Black Hamboro is our best quality black grape. The unfortunate thing about it is that it does not keep long after being ripe. It may be said at the present time to be the least successfully grown of any of our black grapes, that is to say, at our Flower Shows we find worse exhibits of Black Hamboro grapes than of any other varieties. I do not think high temperatures suit it at any stage of its growth. It requires a mean temperature of 60° to give it good flavour and develop a good bloom on the berries. From the time it begins to change colour, air should be kept on the vinery night and day.

Muscat of Alexandria and Black Hamboro are the two best

grapes, and are the most appreciated on a gentleman's table. The other three varieties of grapes equally largely grown are classed as late keeping grapes—namely, Gros Colman, Alicante, and Lady Downe's.

Lady Downe's is the best of the three for quality and good keeping. It is a good grower, and when properly treated gives good bunches, and the fruit takes on a fine finish. One peculiarity of this grape is its need of a circulation of air night and day whilst forming its seeds, or, as we technically say, when stoning.

Gros Colman is more largely grown for market than any other. It is not a general favourite on gentlemen's tables, because it too often lacks flavour. The treatment, however, of it is becoming better understood, and good finished grapes of this sort are increasing. It takes a long season to grow; it requires the same temperature as Muscat; and the fruit seems to be best when it hangs till January.

West's St. Peter's is our best-flavoured winter grape. It gives a good bunch and is a good cropper. The fruit takes on good bloom, but the berries are rather small. In a house with a steep roof built specially for keeping late grapes, I have seen West's St. Peter's hang till March. This is the only grape the late Queen Victoria would have for winter, and it was largely grown at Frogmore.

It is not desirable to have grapes hanging on the vines after early February, and the bunch should therefore, when they are wanted later, be cut with a piece of the lateral growth attached. The lateral growth is then put in a bottle of water, and the bunch stood in a cool, dry fruit room. In this way grapes, particularly Lady Downe's, are often kept until June.

The early forcing of the vine is an important object in many gentlemen's gardens. The greatest favourites and most suited for this purpose are Black Hamboro, Foster's Seedling, and Madresfield Court.

The best plan for very early forcing of vines is to grow yearly a quantity of vines in pots—they can be grown to fruit the second year from eyes—fruit them once and then throw them away. Putting in eyes yearly keeps up the succession. I should start my eyes for pot-vines, in sods six inches square, in

same way as for planting out; get them as soon as possible into 10-inch pots, and grow them as strong as ever I could in these the first year without any bottom heat, and in the autumn ripen thoroughly. The following year, in March, I should reduce the balls, slightly loosening all the roots round the ball, and pot them in 12-inch pots in good fibry loam mixed with bone-meal and an artificial manure; grow them on as strong as I could, giving occasionally manure-water, and at the end of summer ripen well again. These plants ought now to be good fruiting canes, and fit for starting for early forcing.

The early forcing of pot-vines requires and is worth a special house. The best form of house is a lean-to, not very wide, say ten feet, with a brick-built pit three-and-a-half or four feet wide and the same in depth running along the front of the house. This pit should be filled with leaves, and a little stable-litter should be added to it, and thus a moist bottom heat is secured. The fruiting pot-vines should be plunged in this about the middle of November. Care must be taken that the bottom heat is not above 80°. The heat of this bed without any fire-heat will start the vines. When they have grown to show flower, the mean temperature may be 60° to 65° during the day, 10° higher at this sunless short-day period; it is pretty well a matter of fire-heat all through. It will be a great help to the vines if the air of the house can be changed during a short time each day. By the time the grapes are colouring it will be April, when the weather will admit of sufficient airing, so essential to the colouring and ripening of grapes. Black Hamboro is really the best and only grape for early forcing. Foster's Seedling is a good early white grape.

The house in which vines have been forced may for the summer and autumn be used as a melon and cucumber house, and the back wall devoted to tomato growing. Two or three shelves on the back wall may, when the vines are in it, be devoted to forcing strawberries.

For the early forcing of planted-out vines, the vines must be of some age and well-established, and indeed gradually brought up to it. If you force young vines, for instance plants that have been out say three or four years, you get a crop and destroy them for fruitfulness for ever after. In the early forcing of vines

it is usual to start to close them up at the end of November. But my own experience leads me to say that on planted-out vines started about Christmas the grapes will be nearly as soon ripe as upon those closed up a month earlier. A week or two after the days begin to lengthen is worth three times that during the shorter days.

I will now refer to the treatment of the growth of young vines in the first year of planting. I would allow all the rambling growth possible without any stopping, in order to secure all the root-action possible. When this first year's growth is well ripened I would cut the whole down to within two feet of the ground. All being right they will grow away very strongly the second year, and when half way up the roof I would stop them. At the point of stopping another growth will start away; this should be pinched out, and the growth that succeeds it will grow much stronger. The reason for stopping the vine half way is to cause the eyes on the lower portion of the rod to plump up better. This second year's growth should again be all well ripened and then cut back, leaving three feet of the second year's growth. It is customary, when planting afresh a vinery, to plant as many supernumeraries as permanent vines. In the third year a bunch or two of grapes may be taken from the permanent vines, whilst all possible may be taken from the supernumeraries, as in a year or two they will be taken out.

A word or two as to stopping lateral growths on old-established vines. I think a great mistake is often made in restricting too much the lateral growths. The vines should be four feet apart, and this allows good space for lateral growth, which makes the laterals much stronger.

The renovation of old borders, and the attempt to improve vines which have got into a bad state, often fall to the lot of a gardener. I should never have any hesitation in stripping the roots bare of any vines in a bad way, putting fresh soil into the border, and bringing the roots up to the surface. This work should be done in the early autumn to retain natural heat in the soil. I have seen the old soil of a vinery border mixed up with fresh soil and put back again ; this proved a failure and should not be done. Some gardens are unfortunately very deficient in a water-supply. The vine, if growing in thoroughly suitable

environment, requires a great deal of water. Inside borders should never be allowed to become dry; they should get a good watering in winter, and at least two good waterings during the growing season. The watering given after the thinning of grapes should be given with manure, either by washing in artificial manure or by adding made manure-water.

If a vinery border does not dry up, the material and drainage are at fault; the vines won't thrive in it.

Perhaps I should say a few words about what varieties of grapes should be grown. I went some few years ago in the month of September to see a large garden near Northampton, and was shown into a large, lofty span-roofed vinery. In this vinery nearly every known variety of grape was growing; there were a great many bunches of grapes, but I thought it the most miserable spectacle of grape-growing I had ever seen. There was not a decently coloured bunch in the lot, as might be expected, for different varieties require different temperatures, etc. The safest guide for a gardener is to grow the varieties his employer likes. Tho two best grapes are Black Hamboro and Muscat of Alexandria. Some families will have none other, and where an almost constant supply of these grapes has to be kept up, it is the most expensive form of grape-growing; neither are late keepers, and very early forcing must be done to bring in early supplies of fruit.

Madresfield Court is one of our best black grapes, and if it is to do it must have a house to itself. I first saw this grape well grown by the late Mr. Meredith near Liverpool. He had one vinery filled by one vine of it, grown on the extension-system, and it finished splendidly, as he gave it the special treatment it requires—namely, a less restriction of growth than other vines, and plenty of air. Lady Downe's is our best late-keeping grape, and I find Appley Towers keeps about as well. The former is an old and well-known grape. The latter is new, but one that has come to stay. It is a free grower, free bearer, free setter, and finishes well. West's St. Peter's is our best-flavoured winter-grape. Alicante and Gros Colman are the only other two I need mention. The latter requires Muscat treatment to give it good flavour; Alicante does not keep beyond the turn of the year. Canon Hall Muscat is in every way the finest grape, but I have

never known it to be grown in quantity successfully away from near London. It is a sight ever to be remembered to see the span-roof vineries five hundred feet long, forty feet broad, of Mr. Peter Kay at Finchley filled entirely with Canon Hall Muscat. Something suits them there that makes them grow finer than anywhere else. I conclude by saying, however, that during the past thirty years in first-class finished grape growing, as judged by the standard of taking the best prizes at all our leading exhibitions, Scotland has taken the lead, and I would express the wish that she may long continue to hold it.

THE PEACH AND THE NECTARINE.

The cultivation of the peach in our climate can only be carried on out of doors on walls with a south aspect, and it is only in the southern portions of England that you can get peaches on open walls of a good size and of a good flavour. I have seen finer peaches grown on the open wall at Frogmore, Gunnersbury, and other places in the Thames Valley, than could be grown in peach-cases, without fire-heat, anywhere in the north of Britain.

If a gardener located in the North of England or Scotland should in his holiday go south into Kent and visit, say, Mereworth he will observe a great difference in the fruit-gardens of the two districts. The great length of walls at Mereworth is covered with splendid peach-trees. And if his visit is in the beginning of September, he will see the splendid crop of fine fruit, which probably will arouse in him, as in Johnson's Scotsman, a wish to remain where he is. We cannot all be in Kent, however, and it has struck me on my visits to Kent that gardeners have their difficulties there also, and so we must try with the usual pluck of Scotsmen, and as good skilful gardeners, to grow good peaches even under most unfavourable circumstances.

The late Lord de Vesci, whom I had the honour to serve as gardener for five years, said to me that the peach-trees on south walls in his garden at Abbeyleix, Queen's Co., Ireland, produced good crops of peaches yearly up to the date of the potato-failure, and that some climatic change must have taken place then. In 1845 the walls were covered with good peach-trees, bearing good crops—twenty-five years later there was not a peach-tree left on

the same walls, all had died out. I may mention this was a warm district, soil inclined to be light, on a limestone bottom.

It is not the cold severity of our winters that is against our growing peaches in the open in the North, it is the sunlessness and often wetness of our climate that is the obstacle. This is proved by the very large peach-orchards that exist both in the United States and Canada. In these countries the summers are very hot, so that the wood is ripened as hard as can be, and is therefore not injured by the winter's frosts many degrees below zero. The ripening of the wood of our peach-tree is the important thing we have to look to in cultivating peach-trees, and here I wish to note observations I have made—and I have heard others say they have observed the same—in relation to ripening the wood of peach-trees in a glass case without any fire-heat.

It has been my experience that where the wood of the peach-trees is ripened in a case without fire-heat, the trees should not be pruned the same as trees ripened under glass with fire-heat. It is necessary to prune the trees in a case early in January because the buds soon after become too prominent for the necessary washing and tying. Now, we frequently have some of our very coldest weather early in February. Well, if you shorten back the leading shoots in your peach-trees, in the way usually done in heated houses, and a hard frost comes afterwards, it will kill back a considerable portion of the already pruned or wounded shoot, but the frost will not affect the shoots not shortened. From that I gather that the imperfectly ripened wood in a cold case will not stand hard frosts if cut. I therefore make it a point to cut back the wood as little as possible in a cold case.

I have seen peach-trees in a cold case grown on the spur-system, but I would not adopt it. The fruit is much smaller, although I believe you get a better set of fruit by the spur-system, probably because you have a much larger quantity of flower.

The peach and nectarine lend themselves to very early forcing. Ripe fruit can be had from the beginning of May until the end of October. Mr. Chalis, a gardener of forty years standing at Wilton, wrote recently in a gardening paper that the season of ripe peaches might be extended to the beginning of December

by a system of glass copings and screens hung in front of open walls to keep out wet and frost. Wilton is on a chalk subsoil, the driest and best possible subsoil for fruit. At most places, and particularly in Scotland, it takes much watchful care and skilful working to have presentable peaches at the end of October.

The best form of house for early forcing is a lean-to house; for later crops we usually find peach-houses a continuation of a range of lean-to vineries. Span-roof houses running north and south are the best, however, for mid-season and late crops of peaches. They afford the greatest surface of fruiting space, and from the necessity of training the trees upon both sides of the span close to the glass, the fruit is finer and larger. A form of training of peach-trees in lean-to houses much advocated is that of planting the back wall with trees and then planting trees along the front of the house and training them to a curved trellis reaching to the path. At the path the trellis is a good distance from the glass, and thus all the possible light is given the trees on the back walls. This system of having trees on the back wall and along the front of house should never be adopted unless in wide, roomy houses. A good few cases have come under my notice where the curved trellis had been done away with, and the front trees trained close to the glass, as far up as it was safe without shutting out the light from the trees on the back wall. My own observations, borne out by a great deal of the best peach-growing under glass in the country, leads me to say—plant your trees only at the front of the house, and train them close to the roof to the top of the house. The trees will do much better and the fruit will be finer.

Good and proper ventilation is of the utmost importance in peach-houses. For houses where you have peach-trees in flower early in January and February, instead of opening the roof in cold weather, have ventilators in the back wall that can be closed with wood shutters. This ventilation must not open to the back of the wall, but at the top of the wall with perforated gratings.

The next consideration after the construction of the house is the making of the borders. Very cold clay subsoil, or low-lying places where the water does not get away, are most prejudicial to any kind of fruit-growing, and if peaches have to be grown on

such places, it is best to make a concrete floor (one of cement to six of sandy gravel), the surface of which should be three feet below the ground-level. This floor should slope from the back wall to the outside of the front border, with a good drain running outside and parallel with the outer edge of the front border. On the concrete floor lay lines of tile drains eight feet apart running at right angles to the main drain in front, then cover the whole floor and tile drains with nine inches broken stones or rough screened gravel, and over the gravel put a layer of sods, grass-side down. That would leave a depth of border of two-and-a-half feet, because we usually raise our borders a few inches above the ground-level. The width of the outside border should be the same as the width of house. In making up new borders for peach-trees they should be made as for vines. Give just breadth enough for the trees for two years, three feet inside and the same outside, then add three feet more to serve for another two years. Peach-trees do best in every way in a heavy marly soil. They live much longer in it and give much larger fruit than in a light soil. Indeed, peach-trees never thrive right, however well manured, in a poor soil. The soil should be taken fresh from an old pasture, chopped in pieces six inches square, and if of the right kind, the only mixture wanted is well broken lime-rubbish. If the soil is of a light nature I would mix one spadeful of bone-meal with every barrowful of soil, and with the last six inches of soil on the top I would mix a good fertiliser. I have proved Thomson's vine-manure an excellent manure for peach-trees on poor soils.

In planting a new peach-house with young trees, I should plant double the number of trees required eventually to fill it, and, adhering to my conviction that training against the roof is the best, I should plant along the front of the house dwarf-trained trees, and along the middle and half way up the roof I should plant standard-trained trees with long clean stems, thus covering the whole roof in very quick time. In a year or two some of these will need removing to give the remaining ones room to grow. This removing will be a benefit rather than otherwise to the trees removed, and in gardens of fair extent there are always some worn-out trees to be replaced or vacancies to fill up. Young peach-trees, when planted in a good well-made border,

grow grossly to wood for a year or two. One way to counteract that is to make no hole when planting, but plant on the very surface. If the trees make gross wood it is a very easy matter, and without any check to the trees, to get at some of the strongest roots to cut them, and then fibrous roots will be emitted. A plan adopted by the Messrs. Rivers, who are our best authorities on such things, is to put the peach-tree in a shallow box sufficient to hold the roots, a hole is then made in the border just large enough and deep enough to bury the box; the consequent restricted growth and feeding on the surface made fibrous where wanted, resulting in the tree becoming quickly fruitful. After a year or two the box decays, the decayed wood is removed, and the roots are extended; but the tree once fruitful remains fruitful, for we know a good crop of fruit is the best preventive for gross wood. Whatever form of planting is adopted it is a good practice to lift the trees clean out of the border and replant in the same place, keeping the roots near the surface. This surface rooting or network of roots on the surface is the key to all successful fruit-growing. I have frequently observed in lifting a fruit-tree that the ball of roots is such a compact mass of fibrous roots you can lift the tree and move it where you like, and the tree never feels the shift—as is shown by the crop of fruit the following year being unaffected by the shift.

The right time for transplanting or lifting a peach-tree—merely replanting of peach-trees is important—if you wish it to fruit the following season, is when the wood is matured. This you recognise by drawing your hand along the branch lightly, when the foliage parts easily from the branch. It is, however, a great advantage if at this stage you can shift the tree still retaining its foliage; a root-action will take place before the tree goes finally to rest—this applies only to home-shifting. If you get trees from a nursery, they should be thoroughly ripened and denuded of leaf.

The peach lends itself to early forcing, but wants gradual preparation for it, and early varieties must be chosen. Trees that you have brought into flower beginning of March this year, may be brought into flower a fortnight or three weeks earlier next year, then the following year a fortnight earlier still, and so on until you get them to flower at the end of December, which

is as early as may be done to secure good crops. At the beginning of forcing, low temperatures must be the rule until the fruit is set. Begin with a mean temperature of 45° to 50° and 50° to 55°; when in flower 10° to 15° higher through the day. When peach-trees in a house are in flower, I keep on air night and day and regulate the heat in the pipes to get the desired temperature. Following this practice I find, if the trees are in fair order and have been sufficiently ripened, nearly every flower sets without any outer aid in distributing the pollen. The fruit being set, increase the temperature to 60° mean and stop giving night-air. The fruit will not swell for a bit. When the stoning period begins the fruit seems to stand still for some weeks and should not in any way be forced, indeed if this is done the fruit drops off. Until the fruit begins to swell after stoning, the temperature should not exceed 60° at night, but this critical period being over you may advance the temperature 5° or even 10° and swell the fruit to a good size. When the fruit begins to ripen, you must give a good deal of air, and expose the fruit to the sun by putting aside or removing some leaves. This gives flavour and colour to the fruit.

Unless when the trees are in flower syringing and damping daily must be attended to, and when the trees get in full foliage, heavy syringing twice daily must be given to keep down red spider, occasionally using some safe insecticide. Too much stress cannot be laid upon the way the syringing of peach-trees is done. A mere wetting of the foliage is harmful. If the trees are in full foliage, a powerful garden engine should be used, going first over the trees one way then returning upon them in the opposite way, this to be done twice daily. You can have no successful peach-culture unless you keep the foliage absolutely clean and healthy. The damping and syringing is stopped when the fruit begins to ripen, and during the ripening period dryness with a good circulation of air must be kept on night and day.

The disbudding and pruning of a peach-tree is of much importance in its good cultivation. I have seen peach-trees on a roof a frightful thicket of wood, and of course with miserable results as to a crop. As soon as the trees have set their fruit it will be time to begin disbudding. It is injurious to the trees to take off too many at first. Take off first only the fore right buds, that

is those growing straight out from the trees, and even with those, should a fruit be at the base of any one of them do not remove it entirely but pinch the shoot and leave three leaves. In about three weeks afterwards the remaining shoots will get too thick, and then another thinning may be done, leaving on every branch of the winter-pruning, one shoot at the base on the upper side of the branch, one at the extremity of the branch called the leading shoot. I should also pinch two shoots on the under side of the branch to two leaves. This practice reduces the shoots to the least possible number, in fact it is only leaving one shoot to each branch to give fruit for next year, and as you know the branches made in the peach-tree this year give us the fruit next year. I would notice here too how important it is that you secure the shoot of this year at the base of the branch of last year; by doing that you keep your trees furnished with young fruitful wood to the centres of the trees. Inattention to this will cause very unsightly trees with fruiting wood only at the extremities. Another circumstance is to be noticed in connection with the disbudding and summer-pruning of peach-trees. In peach-trees of fairly rude health there is a tendency of some shoots about the centres of the trees to grow stronger than the rest, to grow what is termed gross. The practised eye knows them at an early stage, and they should be at once taken clean off, because they never ripen enough to bear fruit, and grow gross at the expense of the other branches, whilst if taken off the less vigorous shoots grow stronger.

Granted that the trees are growing under favourable circumstances as to the house and border, the three things to be guarded most against are:—

1. Green Fly, which shows itself at a very early stage of the tree's growth.

As a remedy for this I greatly dislike fumigating, because I have seen whole crops of well-sized peaches lying on the ground from the fumigating material getting overheated during the operation. I always use a mild insecticide, applying one, that is to say, weak, but frequently, and I use it before much fly shows itself, on the principle, prevention is better than cure. I find liquid quassia the safest insecticide for the early tender foliage of the peach. Sometimes peach-trees develop at the beginning of

their growth curled-up leaves, the inside of these being filled with fly. Insecticides applied with a syringe do not reach the fly. I find tobacco-powder dusted on them clears off the fly.

2. Red Spider.

Copious and vigorous syringing twice daily is the only sure preventive for this.

3. Mildew.

Some varieties are very subject to it. Soapy water and sulphur applied frequently keep it in check.

Dropping of the buds is probably one of the most serious things affecting the peach-tree. It happens all over the country irrespective of the circumstances under which the tree is grown. It has been long attributed chiefly to dryness at the root. A gardener who had charge of extensive peach-houses in this country, and was much troubled and puzzled over bud-dropping, went to Australia and grows peaches largely there. He says the soil in which the peaches grow there becomes at certain seasons as dry as it is possible to be, and there is never any bud-dropping. His experience leads him now to say that dryness at root is not the cause of it. Early this spring I saw peach-trees in heavy wet soil, and a large portion of the buds had dropped. I think gardeners have not discovered the cause of it. It certainly indicates weakness, and too heavy cropping of the trees is usually followed by bad bud-dropping. Trees growing vigorously and altogether in good health do not drop buds much.

The watering of the borders, especially inside ones, is very important. The borders are usually allowed to become pretty dry when the fruit is ripening and ripe, a dry atmosphere being then essential. During the autumn and winter the borders should get one or two good soakings, and one should be with good manure-water. A porous border, which is the best, will take more water than a stiff retentive border.

What I have said for the peach applies equally to the nectarine, although I think the nectarine requires rather more heat than the peach to ripen.

In a general way peaches do not do well on open walls in our northern climate, and so to obtain crops late into the autumn the walls have been covered with narrow glass houses, called peach-cases. I have had much experience with these cases, and

say decidedly they are not a success for good peach-growing. In the South of Ireland the trees in such a case come into flower in February or early March. Now we sometimes have had a heavy snowstorm in the middle of March when the trees are in full flower, and there being no fire-heat and a cold, leaden, dull sky, the result is no crop. At another time a favourable setting may give a crop, but a wet, sunless autumn admits of no good ripening. I put two pipes into one of these cases and all was changed. Good sets, well ripened fruit and wood, and much larger fruit.

The peach-cases at Dalkeith under my charge at present were put up thirty-five years ago, and much was expected from them, but I am sorry to say they have not been a success even when good crops are secured, for the fruit lacks size and flavour from want of heat. Probably one of the best late cases and houses of this kind is at Drumlanrig. The south boundary wall of the garden there fell down, and instead of building a new wall, a span-roof case or orchard-house with some heating in it was put up instead as a boundary. It was too large to devote entirely to peaches, but these, with the finer kinds of plums and the best varieties of pears, do splendidly in it. The heating of peach-cases costs only the initial cost of putting in the pipes; the heating required for a short time when the trees are in flower, and for a short time in autumn to ripen the wood, is easily applied without any extra tax on the ordinary heating apparatus.

There is a large variety of peaches now, and if one had only one long house with little heating and no means of forcing, one might, by a good selection of earliest, mid-season, and latest varieties, secure a supply of ripe fruit from the end of June until October.

Hale's Early is one of our best for early forcing. Stirling Castle is another old favourite for forcing. Royal George forces well too. Violette Hâtive is a very good certain cropper. Bellegarde is another good cropper. Grosse Mignonne and Noblesse are the two finest flavoured peaches. Walburton Admirable and Sea Eagle are the two best late peaches.

The following varieties of nectarines are good:—Precoce de Croncels, Lord Napier, Elruge, Humboldt Downton, Victoria, Pine Apple.

THE PEAR AND THE PLUM.

Glass cases or glass coverings of some kind should be much more adopted than they are for growing the finer kinds of plums and pears in our cold northern districts.

I have had heavy crops of pears every year from pear-trees in pots grown in the following way :—About the end of February I placed fifty pot-pears in a late vinery, keeping a lot of ventilation on both top and front night and day. This constant air prevented the vines from starting, and at the same time the pear-trees opened flower, and the abundance of air helped them to set. They set abundantly, and I then took them out of the vinery, plunged them in a sunny place, and with feeding they grew fine crops. The trees were out of the vinery in good time to let it be started, and the trees were under glass during only the short time required to set the fruit ; in other words, to protect the blossom from frost.

The best varieties of gage-plums are worthy of a glass house or case in our northern climate. I have had very heavy crops of gage-plums by the following method :—Plant against a south wall. On top of the wall put a glass coping projecting twenty-one inches. Along the whole length of the outer edge of the coping fix an iron rod, on the rod a good quantity of rings, and to the rings attach a canvas curtain which reaches to the ground. The glass coping was a permanent fixture, the curtain was fixed up when the trees opened flower. The curtain was not allowed to cover the trees through the day, only at night to protect from frost ; through the day it was tightly drawn together. Young plum-trees grow very much to wood, throwing up strong watery shoots. To counteract this I examined the roots, and often lifted the trees every autumn, cutting away strong roots, keeping the roots near the surface, and putting amongst the roots each time fresh fibrous loam. Doing this for a few years in succession made the trees very fibrous rooted and the wood of medium thickness clad all over with flower-spurs. Plum-trees in this state, and with good protection from frost, cannot fail to yield good crops even under unfavourable circumstances, and in this the skill of the gardener shows itself.

The best varieties of plums and pears are, however, worth a case or house. Heating with pipes is not required for these fruits unless in a very sunless season such as our last one. Heat in the pipes would, in the absence of sun, swell the fruit and ripen the wood. In addition to paying careful attention to the roots of the trees to make them fruitful, the plum requires disbudding and laying in yearly young wood, for it usually bears on the two-year-old wood, not on the one-year-old wood as in the case of the peach. If the laying-in of young wood is neglected for a few years in plum-trees, particularly the best kinds, the trees become just so many thick bare sticks.

The watering of borders, especially inside ones, must be carefully attended to, and, as in the case of the peach, one or two good waterings in winter are essential. Fly and scale are the two most troublesome insects to plums. The fly is easily kept in check with syringings of weak soapy water. A weak solution of paraffin kills the scale.

I would restrict the growing of pears under glass to a few really good useful sorts, and particularly to those varieties that come into use quite late. Beurre Rance is worth giving a good bit of glass-space to itself. It is one of our best late pears, but it comes to no good growing on the open wall in the North. It grows a large size under glass, and with enough of it can be used from January to March. Glout Morceau is worth growing under glass in the North for December and January. Nec Plus Meuris is another valuable late pear, and worth glass-room. Marie Louise and Doyenné du Comice are two of our finest pears, and in cold districts well worth growing under glass. Either horizontal or dwarf trained would do for back walls of houses, but I think the cordon-trained pears are most suited for growing under glass ; they are more easily managed in the matter of the roots, and thereby kept more constantly fruitful than larger trees.

The following varieties of plums I have found to give very heavy crops, either under the glass cope projecting from the top of the wall I have described, or in a lean-to house, or a span-roofed orchard-house, without fire-heat :—Boulouf, Bryanston Green Gage, Coe's Golden Drop, Early Transparent Gage, Green Gage, Jefferson, Kirk's, Late Transparent, Reine Claude de Bavay, Stint. These are all plums of first-class quality and free bearing

under glass, and of course nothing but the best varieties of plums are worth going to the expense of putting glass over. In the southern counties of England, glass is not required even for these best varieties. Splendid crops are produced on open walls, and I have seen good crops on orchard-standards. If restricted to one or two varieties, I should grow Early Transparent, Jefferson, Kirk's, and Stint.

THE APRICOT.

I knew of a good south wall covered with apricot-trees, and fairly fruitful considering they were in a poor soil. It was thought, however, that covering them with a glass case would improve the crop in every way, and a narrow lean-to house was put against the wall and over the trees, but the apricot-trees did not bear so well as they had done on the open wall, and after a few years the trees died out altogether, showing that closing them in a glass house does not suit them.

I belive a very successful way to grow the apricot under glass is the following :—Erect a structure of the nature of an open shed and roof it with glass. Make the roof a good width and of the same flatness as an open shed. The apricot-trees to be used should be standard-trained with long clean stems, long enough to reach from the ground to the top of the shed. The trees should be planted at the mouth of the shed, the roots would be in the open border. This procedure meets what seem to be the two important requirements of the apricot—the roots are in the open border, and the trees are fully exposed to the air, with sufficient glass to better ripen fruit and wood and make the fruit larger. The apricot does best on heavy soils, should be well surface-fed with manure, and requires abundant moisture at the roots. Apricots do well on the open wall in many parts. It is only in districts where they do not do on open walls that glass sheds or copings should be used. Some would say let us have the finest varieties, such as Moorpark, or none at all. I say in unfavourable districts grow such varieties as Breda and Kaisha. Owners of gardens will much appreciate these, when it is a choice between them and none at all. These latter are the hardiest and most free bearing of all apricots.

THE FIG.

The cultivation of the fig under glass was, up to very recent years, generally considered a very secondary affair. The back of a vinery, or back of some house the front of which was devoted to the growth of other things considered then of more importance, was considered just the right place to plant fig-trees. I wish to say here that I have seen some splendid examples in different parts of the country of immense fig-trees on the back walls of vineries, giving large crops of very large figs, the borders for the roots in all cases being restricted to about a width of two feet. Well-grown ripe figs, however, have in recent years come to be considered our best and most to be desired fruit. It is said, from a gastric point of view, that a person may eat ripe green figs who could not eat any other fruit. We find, therefore, that in gardens where the fig formerly gave one crop of fruit in the year on the open walls, houses specially for growing the fig have been built; I instance one in such a very mild district as Fota, near Cork. And we need not wonder, for the fig does not require a high temperature, and if grown under glass in the desired temperature, it gives in the year two full crops of ripe fruit.

The form of house best adapted for early forcing is lean-to; for later crops the span-roof is best, as it gives the greater fruiting space. The roofs of the houses should be trellised in the same way as for vines, and the fig-trees trained all over the roof so as to ensure short-jointed well-ripened wood. In making borders for fig-houses, if the site is a cold clay subsoil, a concrete floor must be made, sloping to a drain running along the front of border if the house be a lean-to; or, if span-roofed, the drain should be under the pathway and the concrete floor sloping from both sides to the pathway. To have each tree growing in the most fruitful and favourable circumstances, instead of filling up the whole border with drainage as for vines, you must intersect the border with brick walls, dividing it up into as many spaces as you mean to plant trees. This restricts the root-space and prevents the roots of one tree growing into another, and thus you can control the roots of any tree you wish. These sections or root-spaces must be made in size according to the size of the tree to be

grown, or according to size of roof-space. I have seen a fig-tree covering the whole back wall of a very large vinery, and the roots confined to a space six feet long by two feet broad; fresh soil was put in each year, and with good manure waterings heavy crops were grown each year. The intersections being built, two tile-drains should be laid on the concrete of each compartment, and about eight or nine inches of broken stones laid over the whole floor for drainage, with fresh sods, grass-side down, laid all over stones.

What kind of soil do figs grow best in? The fig has a tendency in good rich soil to grow too gross wood. That does not ripen, and hence will not give fruit. A light soil well mixed with lime-rubbish is best. The depth of border for fig-trees should not be more than two feet, and in making a new border eighteen to twenty inches will be deep enough to begin with. The roots should be all on the surface of the border, and should get very frequently top-dressings of soil, bone-meal, and approved artificial manure. By this, in course of years, the border will get deeper, but the roots ever in the right direction keeping upward.

I will now treat of the raising of the young fig-trees and preparation for planting.

Raising plants from cuttings is the best method. Select for cuttings straight, short-jointed, well-ripened wood of the previous season. Each cutting should be eight or nine inches long with a strong terminal bud, and in detaching the cutting from the plant take with it an inch or two of the two-year-old wood. Insert the cuttings singly in four-inch pots, and plunge in a bottom-heat fairly strong, but the atmospheric temperature should not exceed 60°. This proper balancing of atmospheric and bottom-heat is very important. Should the atmospheric temperature be high the cuttings shoot into growth before making roots. It is better that they make roots first and the growth afterwards—sturdy and short-jointed. The time for putting in the cuttings is the middle of February, and they must be shaded until rooted. When four-inch pots are filled with roots, shift into six-inch pots, using turfy loam but no manure. The cuttings will grow away quickly now without bottom-heat. At this stage it is important to prepare your young plants with a good clean stem of twelve inches, otherwise the plants will

throw up suckers, and the trees will always remain a bunch of suckers. A clean stem of twelve inches with three buds at the top, one for leader and two for shoots right and left, should be your one-year-old plants. These are not considered the best for planting in the border. The best practice is to give another shift into an eight-inch pot in soil of a poor nature, and grow to the desired height, with a leading shoot and two side shoots again. Thus we have now two-year-old plants in rather small pots, with two tiers of horizontal shoots and a leader. The object in keeping them two years in pots is to get them into a fruitful condition.

The best time to plant figs is in the spring when they are about to start into growth, and although the two years or longer preparation of the plants may point to planting them in the open border with ball intact, I prefer to shake out the ball and to spread out the roots, keeping them very near the surface. I have seen fig-trees established in pots, the ball put into the border whole, with the result they grew almost none at all. The border before being planted should be made very firm. This makes the roots grow fibrous. A loose border makes the roots grow gross and go to the bottom of the border, and in turn makes the wood gross and unfruitful.

When a house is planted with young fig-trees comparatively small, there will be an abundance of light all over the house sufficient to admit of a number of fig-trees being grown in pots alongside the planted ones, and thus full use of the house will be made. Figs grown in pots give a good quantity of fruit. They require much attention in watering, and to be liberally supplied with manure-water. Fig-trees fruited in pots should, at the end of their fruiting season, that is in the autumn, be turned out of the pots, a good portion of the soil shaken out of the ball, any strong roots cut away, and then be repotted in good turfy soil mixed with lime-rubbish and some bone-meal. They should then stand in a cool house for winter. A top-dressing with a good artificial manure when they are growing will be beneficial.

On starting a fig-house keep the mean temperature 55°, raising through the day 10° more, or 15° with sun-heat. The temperature should be 60° at night when the trees have burst into growth, and there should be a corresponding increase of

temperature by day. When the season advances and less fire-heat is required the night temperature may be 60° or 70°. The leaves of the fig succumb more quickly than almost any other fruit-tree leaves under glass with a dry fire-heat atmosphere to red spider. Syringings and the preservation of a very moist atmosphere must be constantly attended to, and air should be given on all possible occasions through the day. I have observed that the fig when in full growth requires a great deal of water at the root, that is to say, if the soil is of the porous nature it should be. As to the pruning and general treatment of old-established fig-trees, pruning should be done in winter when the trees are dormant and do not bleed. During the summer, however, is the time to pinch and regulate the growth. Overcrowding of the branches must be guarded against. Lay in young growths, watching to keep the trees well furnished to the centre, and to give the young growth full light to ripen. Cut out old wood no longer fruitful. Pinching back young growths to three leaves makes fruitful spurs all over the tree. The first crop of figs is on the ripened wood of the previous summer, the second crop is on the wood which has grown along with the production of the first crop. The summer-pruning and pinching must, therefore, be done with a view to secure both of these. Some shoots should be allowed to grow to keep the tree furnished and take the place of bare branches worn out, and at the same time a considerable portion of the shoots should be bruised at the point when about five eyes long. Fig-trees in summer are too apt to get overcrowded with growth; this should be strictly guarded against. When the trees ripen and drop their leaves, the borders may be kept dry, but not too dry.

Figs growing in small allotted root-spaces to each tree will be benefited by taking out the width of a spade of soil all round the outer edge of the space right down to the bottom of the border and filling in again with fresh turfy loam mixed with lime-rubbish and bone-meal. Removing also the whole of the old surface of the border, and putting on bone-meal with a little artificial manure and a little fine-chopped turfy loam, will cause a quantity of new fibrous roots to develop. By repeating this yearly the trees will be kept just vigorous enough to make good short-jointed fruitful wood. Give manure-water and plenty of water when fruit is swelling, and you will get fruit of good size.

There is a great variety of figs, and out of about fifty varieties I have found the following the best :—

Brown Turkey, Negro Largo, Pinge de Mel, St. John's, White Ischia, White Marseilles, Black Ischia.

THE STRAWBERRY.

To be successful with early forcing of strawberries, you must get runners early, grow them quickly on, and have good plants in the autumn with stout crowns well matured. In gardens where forced strawberries are grown in large quantities, plantations of strawberry-plants are now specially made for the purpose of getting early runners.

The plan adopted is :—In July, layer as many runners as are required in four-inch pots and prepare a south or warm border. At the beginning of September plant it with these now well-rooted runners taken out of the pots. Planting thus early the plants get well established before winter. The following May they will throw up flower-spikes. As soon as these show they should be all cut off; this will throw the whole growth of the plants into producing leaves and runners instead of fruit. Runners are got this way a fortnight earlier than from the older plantations, a matter of the greatest importance. The middle of June is a good time to begin preparing young plants for forcing. Several methods have been tried for the early rooting of runners, but the plan found to work best and which is most generally adopted is to fill clean two-and-a-half or three-inch pots with good rich soil—and a large number of these being filled in the potting shed can be conveyed on a handy spring wheel-barrow to the border of strawberries—then with trowel proceed to plunge the pots between the lines and place a runner on each pot, pressing it in with a stone the size of road-metal, and leave the stone on pot. The weather at this season is usually very dry, and so watering of runners must be daily looked to even although the pots are plunged. In about a fortnight or three weeks' time these little pots will be well filled with roots, and the transference into their fruiting-pots should be proceeded with forthwith. The middle of July is a good time to put them in the fruiting-pots.

Experiments have been tried in the past with different sized

pots for fruiting forced strawberries. Pots six inches in diameter are now considered the best for the whole quantity to be forced; seven-inch pots for the latest batches are considered to take less watering, but I am doubtful about it. Both six-inch and seven-inch when the season is advanced will require saucers, and six-inch with saucers will produce fruit quite as good as seven-inch pots. All the pots should be carefully washed and carefully crocked. Cover the crocks with moss, and over the moss sprinkle soot, which is a manure and a preventive against worms. Strawberries require a heavy loam, but this very often cannot be got. Get the best fibrous loam you can, chop up in small pieces, mix a six-inch potful of bone-meal to every barrowful of soil, and also add some fresh horse-droppings passed through a half-inch sieve. The soil and pots now being in readiness, take the young strawberry-plants carefully out of the three-inch pots, put them in the six-inch in such a way that the top of the three-inch ball will be half-an-inch below the rim of the six-inch; fill in the pack firmly round the ball, finishing by leaving quarter of an inch under the rim to hold water. The plants should be watered with a rose immediately after potting, and stood for a few days in a shady place where the full day's sun will not reach them; after this they should be stood in a warm sheltered place where the full sun reaches them. I have always found the plants grow better standing on boards, coal-ashes, or dry bottom, much more so than standing on the ground. Of course, wet and dry localities make a great difference in this; in a dry place on gravelly subsoil they will do well standing on the gravel walk; in a wet locality with damp, cold subsoil the plants do much better raised from the ground.

When the plants are growing they must stand sufficiently apart from one another to allow full development of the foliage, and if they show a tendency to develop several weak crowns to a pot, remove all but one to make a good strong crown. If the weather is dry through the autumn, they must be carefully looked to twice a day for watering, and when the roots reach the side of the pots, clear manure-water should be given them; soot-water being one of the best for strawberries. Keep the pots carefully weeded, and do not allow runners to get ahead on them. By the end of September the pots will be well filled with roots, and

the crowns well developed. Should the weather become cold and wet in October, the plants are better protected from it in some way, indeed put into their winter quarters.

A good place to put them for winter is in a peach-case or orchard-house, where they can remain undisturbed till well into spring. In the absence of these put them in cold-frames plunged in leaves to protect the pots from being cracked with the frost. Even in some large gardens, however, glass protection cannot be spared for them, and they are then built up in ridges, putting the pots on their sides, packing in amongst ashes or any material that will keep out the frost from cracking the pots. Care must always be taken that the roots do not get dry. I have seen a batch of strawberry-plants good in every way and splendidly prepared for early forcing, with fine ball crowns, yet having been allowed to get dry before starting to force, they never threw up flowers, and had to be thrown out after occupying bed and shelves for six weeks.

I do not know any crop that requires more watchful care than a very early batch of pots with ripe strawberries, and yet it gives more pleasure to succeed with them.

The strawberry-plants now prepared being all that could be desired for early forcing, that is with good crowns and pots full of roots, the next thing is how to begin the forcing. In most gardens there are no special houses for this. Pits, frames, peach-houses, and vineries must be used for them, and with this accommodation I have frequently picked a dish of ripe fruit in the latter end of February. The best place I have found for starting early batches of strawberry-plants is a brick-built pit, heated with a flow and return, and deep enough to be filled nearly four feet with leaves. No dung should be used; the leaves alone give the gentle bottom-heat required—namely, about 75°. If even a little dung be used with the leaves I find it a failure. The bed being duly prepared before, the latter end of November is the earliest time to plunge a batch of plants in the leaves. The heat of the leaves will be sufficient for the first fortnight, then heat may be put in the pipes to keep a temperature of 50° to 55° mean, 10° more by day with aid of sun. Keep steady at that until they throw up their flower-trusses, then they must be removed to a shelf in a house near the glass, and I have found

the best success at that period of very short day by keeping the mean temperature not less than 60°. The time of removal from pit to shelf is suitable for giving a little top-dressing to the surface of pots with artificial manure mixed either with soil or sand. Some prefer to give the top-dressing when putting them in at the beginning. This top-dressing is essential. It makes fine foliage, not liable to red spider, and helps the vigour of flower-spike. The plants being now on the shelf and in flower, to get them to set well the air must not be close and stagnant; as a rule, however, at that cold season in most of our houses sufficient air gets in at not too close places.

After the fruit is set they may be shifted to a higher temperature or the temperature increased, but try and give what air you can. You must now feed the plants to get good-sized fruit, not strong doses but weak and often. Soot-water is one of the best for pot-strawberries. A change of manure-water is best.

A good plan for feeding strawberries, especially as the season advances and pots on shelves dry up much quicker, is to place well enriched soil underneath the pots. This may be done in three ways:—Firstly, a little square sod sprinkled with artificial manure may be put under the pot; secondly, fill a saucer with a hole in bottom with a soil mixed with manure, and place the pot upon it; thirdly, half fill a six-inch pot with enriched soil, and stand the pot in it. In all three cases the soil under the pot-plant gets filled with roots and helps the size of the fruit very much. It is a mistake to leave more fruit on a pot than will swell to a good size. What you grow strawberries in pots for is dessert, and they should be a fair size.

Mildew, green fly, and red spider are the three things that injure most the foliage of strawberries under glass, and my experience leads me to say (we force 6000 pots annually) that if the plants are properly attended to at the roots with water and the manures best adapted to them, you will have very little, if any, of these pests on your plants. I have proved Veltha to be a certain preventive for mildew, and also a powerful manure for the plants. The fruit should be supported to prevent hanging over the pot-edge.

Steven's Wonder, Auguste Nicaise, and John Ruskin are the kinds I found best for very early forcing. Scarlet Queen, Royal

Sovereign, and Leader are best for later. I am fond of President too. After the strawberries are forced put them in some cold frame, and later on plant out; they will throw a very large crop the following year, then clear them out.

A word as to packing:—Line the box with wood-wool and cotton-wool, put strawberry-leaf or lime-tree-leaf round each fruit, place them husk-end down in a single layer in the box, and pack close enough to prevent shaking. I prefer wood-boxes to tin-boxes.

THE PINE-APPLE.

The first consideration for the cultivation of pine-apples is the house or structure for growing them in with least trouble and expense. I have seen during the past thirty years a good many different ways and structures for growing pine-apples throughout the United Kingdom, but have not seen one so good in every way as the pinery at Dalkeith. It may be described as a low three-quarter span-roof house seven feet high at the apex or span, and just wide enough for a bed to hold three lines of pine-apple plants in fruiting-pots, and a path two and a half feet wide running at the bottom of the back wall. The bed in which the pine-pots are plunged has a bottom-heat chamber underneath heated with hot-water pipes. The floor of the bed over the heated chamber consists of thickish stone flags. The reason for using such flags is that they retain heat better than a thinner material would do, and fluctuations in heating from the pipes underneath being too cold or too hot are not so readily felt, and therefore a steady bottom-heat is kept to the pines—a matter of great importance. Tan bark is used in the bed for plunging, and this house has always a very neat and clean appearance inside, a great contrast to the insides of pineries where dung and leaves are used or where the planting-out system is adopted. In some large gardens span-roofed houses are used for pine-growing, but they require much more heating, and that is a matter of great importance in our long, cold, sunless winters, and I think pines get drawn in span-houses. The nearer the pines are to the roof the better. Stubby, thick-necked pine-plants alone produce good fruit.

The structure best adapted for growing young pine-plants from suckers onwards as successionals is a brick-built pit with top and bottom-heat. The temperature in winter does not require to be high, and these pits are easily heated, and in case of very hard weather frigidoms can be run over the lights.

Pine-growing is becoming limited to a very few places amongst British gardens. It is expensive, especially with such dear fuel as we have been having lately, and the pine-apples now imported are abundant in quantity, of fine size and looks, and very cheap ; they are, however, very deficient in flavour when compared with our home-grown ones. The public generally are not good judges of first-rate fruit ; this is very noticeable in the quantities of good-looking but poor-flavoured grapes sold. I think, therefore, the wealthy leaders of society who wish the best of everything will want the best grown British pines and British hothouse fruit, as being superior to anything else.

The great decrease in British pine-growing has also restricted the varieties grown to what are the best, and they number only three or four. The Queen is the best flavoured pine, but can only be grown for summer fruit, that is from May until October —it is no good for winter. It takes the least room, growing in smaller pots than others, is of a dwarf habit, a free grower, certain fruiter, comes quick to maturity, and has a beautiful golden colour.

The smooth-leaved Cayenne is the best winter pine, that is for producing fruit from October until May. The fruit is larger and the plant is larger, requiring a pot one-and-a-half to two inches more in diameter than the Queen.

Black Jamaica is the finest-flavoured winter pine. It grows strong ; fruit rather small, and of a dull colour. This variety is always much appreciated in dessert.

Charlotte Rothschild is the next best winter pine, and is rather taller-growing than the others, and has fruit similar to Cayenne.

To keep up a succession of pines all the year round, these varieties are sufficient.

Pines have been grown in very varied soils. I have seen a large number grown in nothing but peat, I think because it was the most convenient, but the fruit was very small and the plants grew

to leaf and did not fruit well. Some think heavy clay is the best. It will be found, however, that where any good pine-growing is done, the soil is of rather a light nature and fibrous. The soil I prefer for pines is an old fibrous sod, neither too light nor too heavy, and to each barrowful of soil I add an eight-inch potful of bone-meal. This is really all the mixture that is required for pines. If the soil is clay, or of a heavy retentive nature, fine lime-rubbish must be added to keep the soil open.

Suckers and crowns are the two sources from which pine-plants are raised. The crowns are only taken when suckers cannot be had. Suckers make far the strongest and best plants. There is never any difficulty getting plenty suckers from Queen-pines in summer and autumn, but there is often a difficulty in getting enough suckers from smooth Cayennes. With the latter it will be found necessary often to put the old stools, after the fruit is cut, in some warm pit to grow and produce suckers. It is a great mistake to remove the suckers from the old plants before they have grown to a good size; good suckers always make the best and quickest plants.

I shall treat of Queen-pine suckers first. Plenty of them should be had in August and September. Cut them clean at the base and remove the bottom leaves. Six-inch pots will be large enough for the most of them, seven or eight inch may be used for larger suckers. The pots should be well cleaned and crocked; the suckers should be placed well down in the pot; the soil, not of too wet and pasty a nature, should be firmed well with a blunt stick, leaving sufficient room under the rim of the pot to hold water. The pots should then be plunged in a handy succession pit with bottom-heat of 90°. Put them wide enough apart to prevent drawing and to ensure the essential stubby growth from the first. Shading and dewing will be necessary until they have made roots, after that discontinue shading and give enough water to water the whole ball. Give a good deal of air at this time to make them sturdy and prepared for winter. The temperature, say in September, may be 65°, but as November approaches reduce to 55° to 60° according to weather; the bottom-heat in winter should also be reduced; 75° keeps the roots nice and healthy.

These rooted suckers should now from the middle of November

till the middle of February be kept at rest, and the best temperature for that is 55° atmospheric, 75° bottom-heat; keep the plants dry at root, almost no watering at the roots will be required, and no moisture in the air.

From the middle to the end of February the suckers should show white healthy roots all round the sides of the pots, and be ready for a shift. I practise putting them in their fruiting-pots at once. Ten-inch is large enough for Queens. Let the full number required be thoroughly cleaned and well crocked, get all the soil prepared, and have everything in readiness before beginning to pot. The plants should be well watered before repotting. Fresh tan should be at hand too, for the best way to treat the plunging material is to throw the new tan on top of the old and then to turn them over together and thoroughly mix them with forks; this mixing of old and new tan prevents the bottom-heat rising too high. Everything being now ready, the transference into fruiting-pots and the plunging of the plants in the bed where they are to grow may proceed together. The soil for potting should not be of a wet but rather of a dry fibrous nature, and should be well rammed with a blunt stick round the ball. The plants should be plunged two feet apart every way. The bottom-heat should not be allowed to exceed 90°; if it does, move the plants from side to side, and thus make an opening all round the pot. For the first fortnight after potting, the plants will not require much water, if any, and the weather still being cold a mean temperature of 60° will do. These plants will now be grown on all summer. When the weather gets warmer a mean temperature of 70° should be maintained, shutting up in the afternoon at 90°, and giving them a syringe. By the end of August the plants should have well filled the pots with roots, and the object now is to preserve the roots and plants in a healthy state all winter. The plants must be sparingly watered in September and liberally given air in good weather; at the end of the month they should be at rest in a dry atmosphere with a temperature of 55° to 60° and a bottom-heat of 75° to 80°. They will need almost no water from October until January.

The pine-plants being rested safely until January are called fruiting plants, and now, say middle of January, should be removed to their fruiting quarters. Fresh tan must be added

and mixed as before with the old, and the plants plunged in it two feet apart. The plants must now get water to moisten the whole ball, adding to it manure-water and guano or artificial manure. The temperature should be 60° to 65° at night and 70° through the day with fire-heat, 80° with sun. The moisture must be increased by damping paths, walls, etc. Care at this season must be taken in watering not to let any plants get too wet. As the season advances a temperature of 70° mean should be maintained, and shutting up at 85° or 90° may be practised. The plants will throw up the young fruit in March and come into flower, and during the flowering period the house may be kept drier and there should be no syringing. Flowering being past, give more moisture and shut up with high temperatures from sun-heat. During May the fruit will swell rapidly. At the beginning of June the fruit will change colour, when more air and less watering and moisture will be requred ; attention must, however, always be paid to the keeping up of the bottom-heat.

To maintain a supply of ripe pines all the year round suckers must be taken and plants potted on at frequent intervals. Three lots of Queens will be required for summer, and two lots of smooth-leaved Cayenne for winter. Cayennes are much shyer of throwing suckers than Queens. Get all the suckers you can by October, and if you have not enough for your purpose use crowns in spring. In the month of March get what suckers you can also. These two lots will give the fruit for the winter and spring months. The method of growing the Cayenne from suckers until it has ripened its fruit is the same as for the Queen, excepting that the Cayenne, being a stronger grower, requires a pot two inches larger for fruiting in. The Cayennes being the winter-fruiters, you keep them growing when the Queens are resting ; that is, as I have said, you lower the temperature for the Queens and keep them drier in winter. The Cayennes you keep at a mean night temperature of 60° to 65° in winter and 10° higher through the day. Give them sufficient water and manure-water to keep them growing and to swell their fruit.

To have ripe pines all the year round should not be attempted unless there are good pineries and good accommodation for growing them ; and if there are good pineries there is no more trouble in producing pines in winter than in summer. I have

only seen pines grown on the planted-out system at one place, namely Frogmore. They grow and fruit right enough, but the pits all opening and worked from the outside with sashes seemed to me wide, unhandy things to work. The pot-system in a neither very wide nor high pinery is the best, and where the pinery is an up-to-date structure pine-growing is simplicity itself.

Scale and bug are the two insect-pests that infest pines, and the only way to effectually banish these is to destroy the plants and begin with a clean fresh stock from the suckers onwards.