

GODETIA DUCHESS OF FIFE.

FIRST STEPS IN GARDENING

A CONCISE INTRODUCTION TO PRACTICAL
HORTICULTURE, SHOWING BEGINNERS HOW
TO SUCCEED WITH ALL THE MOST POPULAR
FLOWERS, FRUITS, AND GARDEN CROPS

BY

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AND

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ILLUSTRATED WITH ORIGINAL PRACTICAL PHOTOGRAPHS

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1913

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PREFACE

SIGNS have not been wanting of a demand for a book that shall deal concisely with all the most popular flowers and garden crops.

To be at the command of the million such a book must be cheap.

In *FIRST STEPS IN GARDENING* short essays are given on favourite plants, and the culture of various useful crops is summarised.

Moreover, an entirely original feature is introduced, namely, illustration by practical photographs. Thus Nature is made the teacher.

WALTER P. WRIGHT.

EDWARD J. CASTLE.

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FIRST STEPS IN GARDENING

SECTION I.—POPULAR PLANTS

Step I.—How to Grow Daffodils

TO the novice in bulb growing, the fact that all Daffodils are Narcissi, but that many Narcissi are not Daffodils, seems somewhat of an anomaly. However, the seeming contradiction is easily reconciled by recognising that the popular Daffodil forms only one section of the great genus *Narcissus*, a section which has as its chief distinguishing feature the possession of a large corona or trumpet. Thus the Poet's *Narcissus* is not a Daffodil, because its crown is short and small; on the other hand, the wild *Narcissus* of our meadows and streamlet sides is a true Daffodil. The outdoor culture of the various sections differs but little, and what is written here may be taken as applicable to the whole genus.

Fortunately, the Daffodil is not fastidious as to soil, though it gives of its best in a good deep loam of a holding nature. Sandy soil needs the addition of thoroughly decayed cow or farmyard manure some time in advance of planting, and clay is benefited by digging in long, strawy dung, old lime rubbish, and road grit. A dressing of lime is advantageous on almost all soils, and land broken up from grass should be dressed with fresh gas lime or Vaporite, to rid it of leather jackets and wireworm, the latter being a terrible pest in pasture land. Vaporite is preferable to gas lime if little time can be devoted to the preparation of the ground, as gas lime requires to lie on the surface for several weeks, to rid it of its excess of ammonia.

The latter is especially disliked by Daffodils, hence strong stable manure should be buried so deeply as to avoid all possible contact with the bulbs. With land that has no need of manure to lighten it, or increase its holding properties, the best fertiliser to use is bone meal. This should be applied at the rate of 1 oz. to 2 oz. per square yard, according to the quality of the soil, and may be pointed in just prior to

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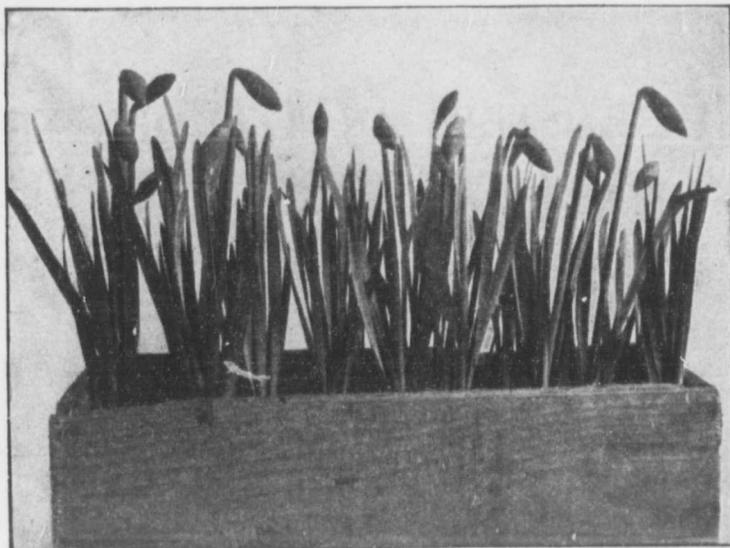


FIG. 1.—A BOX OF VAN SION DAFFODILS READY FOR LIFTING AND POTTING.

planting, or dusted in the holes round the bulbs. On heavy land basic slag may be used instead of crushed bones, 6 oz. to the square yard being a fair dressing.

As many varieties and species of Daffodils commence making roots very early in the season—Van Sion, for instance, pushes new roots before July is out—it is obvious that early planting is advisable. As a general rule, a September planting will give the best results, but the Daffodil is of such an accommodating nature that good flowers may be gathered from bulbs planted as late as December. The rule should, however, be to plant as early as circumstances permit. The depth of planting is regulated largely by the size of the bulb, and also, to some extent, by the nature of the soil, deeper planting being advisable in sandy soils than in heavy ones. A covering of 2 inches of soil for small bulbs, and 3 inches for large ones, may be taken as a generally safe guide; but the practice, adopted by many expert growers, of covering each bulb with soil equal to one and a half times its own depth is worthy of recommendation to the beginner. The measurement should not include the neck of the bulb. The placing of sand beneath and around the bulb is not advised, excepting in the case of the Hoop Petticoat or *Corbularia* section of *Narcissi*. Instead of sand, a sprinkling

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of bone meal should be given, and the ordinary soil used for filling in.

The position of the bulbs is worth a little consideration, as the Daffodil rarely does well in an open, wind swept, sun dried spot. In fact, shade and moisture are essential to success with many sorts, and all need a moist root run. For this reason, the bulbs are especially suited to planting in grassy dells, and also in lawns which do not come under the mowing machine's sway too early in the year. The grass has the effect of conserving moisture about the roots, and also of nullifying the drying effects of spring wind and sun. October is a good month for planting in grass, as then the autumn rains will have probably softened the surface. The

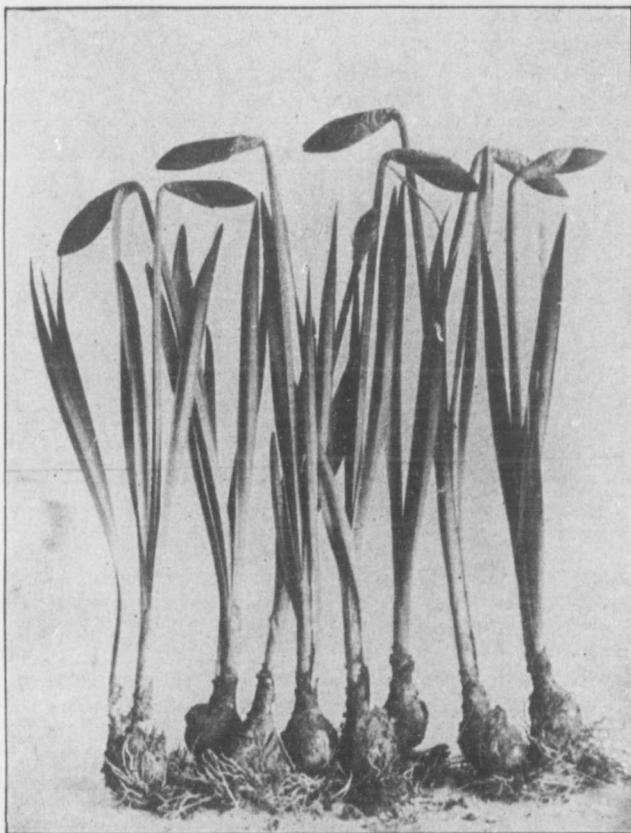


FIG. 2.—THE DAFFODILS AS LIFTED FROM THE BOX.



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approved method of planting in grass is to toss the bulbs above the head and plant them in the positions in which they fall. Messrs. Barr and Sons sell a special kind of dibber for planting bulbs in grass, and this is worth buying when numbers of bulbs are dealt with.

Generally speaking, the Daffodil needs no protection in winter, but many growers like to mulch their beds, about the middle of November, with light litter; or a few sprays of evergreens are sometimes used. This prevents the soil being beaten down by rains, and also checks the loosening and lift-

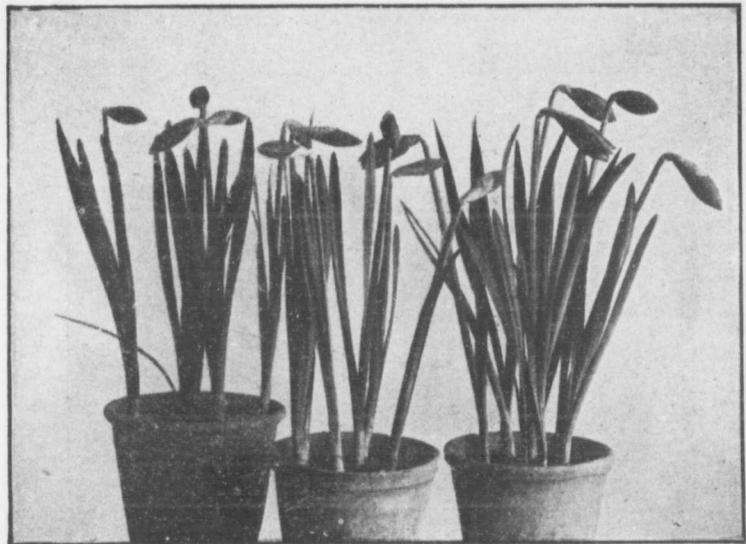


FIG. 3.—FIVE OF THE BULBS ARE PLACED IN 5-INCH POTS.

ing tendency of frosts. In spring, all covering should be removed, and the beds very lightly broken up with a hand-fork or hoe. Growers of exhibition flowers also give a sprinkling of a potassic manure, such as sulphate of potash. This may be used at the rate of $\frac{1}{2}$ oz. to $\frac{3}{4}$ oz. per square yard, and will greatly brighten the colours of the flowers.

Of the true or large trumpet Daffodils, the following may be recommended for general purposes and bold effects; *Horsefeldii*, *Victoria*, *Emperor*, *Empress*, *Queen of Spain*, *Glory of Leyden*, *P. R. Barr*, *Grandee*, *Henry Irving*, *Princeps*, *obvallaris*, and *Telamonius plenus*. Of the shorter crowned, or so called *Chalice* or *Star Narcissi*, a good dozen are Sir

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Watkin, Leedsii, Cynosure, Stella, Eggs and Bacon, and
Codlins and Cream of the Incomparabilis section; and
Minnie Hume, Mrs. Langtry, Barrii conspicuus, Orphée,
odorus, and o. rugulosus; the latter two are Jonquils. Of



FIG. 4.—AND THIS IS WHAT FOLLOWS.

the Poeticus type, Gardenia flowered, double; and ornatus,
single, are the best, but the old Pheasant's Eye is pretty, and
very cheap.

Bulbs of Van Sion and other early sorts may be placed
in boxes, and lifted and potted for early bloom. See Figs. 1
to 4, pp. 8, 9, 10, 11. See also Step II.

Step II.—How to Force Dutch Bulbs.

OWING to the rise and progress of the bulb growing industry in Ireland and the eastern counties of England, the term Dutch bulbs is in danger of becoming a misnomer, but probably it will always stick to those bulbs which were formerly imported almost exclusively from Holland. Of these, the chief are Hyacinths, Narcissi or Daffodils, Tulips, Crocuses, and Snowdrops. There are, or were, many others, such as Scillas, Chionodoxas, Spanish Irises, Ranunculuses, Anemones, Gladioli, etc., but the above are the chief sorts generally grown in pots or boxes in frames and greenhouses.

Of Hyacinths, there are two chief sections, early Roman and the named Oriental varieties. The Romans are obtainable in August, and are potted and boxed in millions by trade growers for supplying early autumn and winter flowers. The amateur does not generally desire flowers as early as this, his ambition being, as a rule, to have a good display with which to rouse the envy of friends during the Christmas season. For this purpose, an early October potting gives blooms in ample time, if a warm greenhouse is available. The bulbs are small, and as the flower spikes are not tall, 5-inch pots give the best effects in the greenhouse. Four good bulbs, or five small ones, should be placed in each 5-inch pot, barely burying the crown of the bulb.

Oriental or large flowered Hyacinths are best purchased in named varieties, though, if funds are short, excellent results can be obtained by buying a good bedding mixture, or bedding bulbs in separate colours. Such bulbs are small, and should be planted three in a 5-inch pot or five in a 6-inch pot. A very fine effect is produced by thickly planting a few 8-inch pots with these bulbs, the result being miniature flower beds, invaluable for greenhouse decoration. If named varieties are purchased, a single specimen should be placed in a 4½-inch pot, and if fed well will throw a grand spike. A few good sorts for single pot culture are Grand Maitre, Marie, Charles Dickens, and the King of the Blues, blue; Baroness Van Tuyl, La Grandesse, L'Innocence, white; Roi des Belges, Robert Steiger, Gertrude, red; Moreno, Gigantea, pink; King of the Yellows, and MacMahon, yellow.

In Narcissi or Daffodils there is a very wide choice of sorts, but a start is generally made with the section known as Polyanthus Narcissi. Of these, Paper White and Double Roman are the favourites, and both can be had in bloom at Christmas by potting in September. As these are more useful for cutting than for greenhouse decoration, they are

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generally grown in boxes, but a few 5-inch pots of Paper White will be found of service for vases. Grand Monarque, Soleil d'Or, Jaune Supreme, White Pearl, and President Harrison are other first rate Polyanthus Narcissi, but they bloom much later than Paper White and Double Roman. As most of these possess very large bulbs, the novice is apt to obtain a poor display by allowing them too much room; if placed in boxes so that the bulbs almost touch each other, the flowers will not be overcrowded.

Most of the large trumpet or Daffodil section of Narcissi are amenable to pot or box culture, but they strongly object to forcing. When the flowers are in the bud stage, a little heat may be given to hasten their expansion, but forcing before the flower buds are well in evidence generally results in failure. Of the stronger growing sorts, such as Emperor, Empress, Horsefieldii and Sulphur Phoenix, four bulbs in a 5-inch pot generally give a good display; five smaller bulbs may be used. The weaker growing sorts, such as Cyclamineus, triandrus albus, Corbularia, and minimus, should be placed about twelve together in a 5-inch pot; medium sorts may have some intermediate treatment. The largest bulbs should protrude through the soil about a quarter of their length; the smaller ones should be buried $\frac{1}{2}$ inch under the soil.

Of Daffodils for general pot or box culture, the following are all good. Early: Van Sion, Queen of Spain, Golden Spur, and Henry Irving. Medium and late: Empress, Emperor, Barrii conspicuus, Horsefieldii, Madame de Graaff, Stella superba, Sulphur Phoenix, P. R. Barr, Maximus, Glory of Leyden, and obvallaris. Poeticus ornatus and the double Gardenia flowered Narcissus may also be grown in pots, but the latter detests heat in any shape or form.

The most popular Tulips for pots are the Van Thol section, which are obtainable in scarlet, white, and yellow colours. These should be potted in September for Christmas flowering, six bulbs being placed in a 5-inch pot. For successional flowering, White Pottebakker, Vermilion Brilliant, scarlet; Joost van Vondel, dark red, white flame; Keizer's Kroon, scarlet, bordered yellow; Chrysolora, yellow; Fabiola, white, purple flakes; Rose Gris de Lin, singles; and La Candeur, white; Rex rubrorum, scarlet; Tournesol, yellow and red; and Yellow Tournesol, doubles, can all be recommended. As a rule, four or five bulbs should be placed in a 5-inch pot, but Tournesol makes useful plants if the bulbs are placed singly in 3 $\frac{1}{2}$ -inch pots. La Candeur is very late.

Snowdrops, Crocuses, Scillas, and Chionodoxas do not call for special attention. They should be placed thickly in 3 $\frac{1}{2}$ -inch pots, and will then be found useful as edging plants. Single and double Snowdrops may both be grown, and the

blue and white forms of *Scilla Sibirica* are both worthy of general culture.

The soil in which bulbs are grown should be of a distinctly sandy nature, some of the *Narcissi*, notably the white Hoop Petticoat *Narcissus*, thriving well in almost pure sand. A good general compost is made up of fibrous loam 2 parts, thoroughly rotted leaf mould 1 part, with enough coarse sand to give the whole thorough porosity. If the loam is poor, bone meal, 1 lb. to 1 bushel of compost, should be well mixed in. In addition to this, it is advisable to cover the drainage

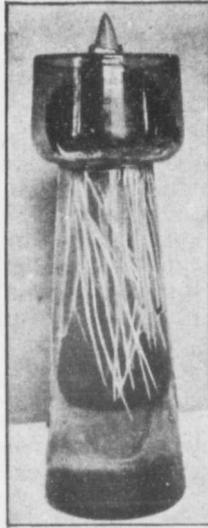


FIG. 5.—A HYACINTH AS TAKEN FROM THE DARK CUPBOARD.



FIG. 6.—LEAVES COMMENCING TO EXPAND.

crocks with a little old manure. This will keep the roots cool and moist, and also feed the bulbs at flowering time.

After potting, the bulbs should be watered in, allowed to drain, and then covered with a layer of coal ashes, soil, or cocoanut fibre refuse. The latter is preferable, on account of its cleanly and pleasant character. A layer which rises 4 inches above the pots will be none too much, the object being to exclude light, and also, by weight of the covering, to prevent the bulbs pushing themselves out of the soil when making roots. When the pots have been so plunged for a month or six weeks, the covering should be removed, and a careful examination of the growth made. If top growth has started, and the roots are well working round the side of the ball

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of soil, the bulbs may be removed to a cold frame. Here they should be shaded from strong light for a few days, and after a fortnight's sojourn in the frame, taken into the greenhouse.

In the greenhouse, water must be supplied in abundance, the soil never being allowed to become at all dry. This is important, dryness at the root frequently leading to blindness in Narcissi, *i.e.* the flowers shrivel and turn brown while in the bud state. Feeding may be practised as soon as the flower spikes are visible, liquid manure, made from cow or



FIG. 7.—FLOWER SPIKE
SHOWING.



FIG. 8.—IN BLOOM.

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farmyard dung, being the most generally useful. Green fly is troublesome to Tulips, and must be kept down in its early stages. Staking must be attended to, and the temperature should range between 45° by night and 55° by day. A cool, dry atmosphere will prolong the life of the flowers when expanded.

Hyacinths in glasses should be placed in the dark for a few weeks, at the end of October, so that free root action may develop before leaf growth starts. See Figs. 5, 6, 7, 8.

Step III.—How to Have Fine Violets.

EXCEPTING where frame culture is practised, the Violet is probably the most neglected flower in the garden, most persons being content to rely on beds or clumps nine to twelve years old. From such beds it is quite impossible to gather fine flowers. Small blossoms, on exasperatingly short stalks, are produced in fair quantity, but the really large, finely formed, long-stemmed Violet must be sought elsewhere. There is another reason, too, why Violets invariably do badly in gardens, and that is because growers in general have a firmly rooted conviction that the plants love shade and loathe the sun. Nothing could be further from the truth.

Years of experience teach that there is no place that suits the outdoor Violet as well as one which catches the full burst of the morning sun, and escapes the direct noon-day rays in summer. Even a border fully exposed to the

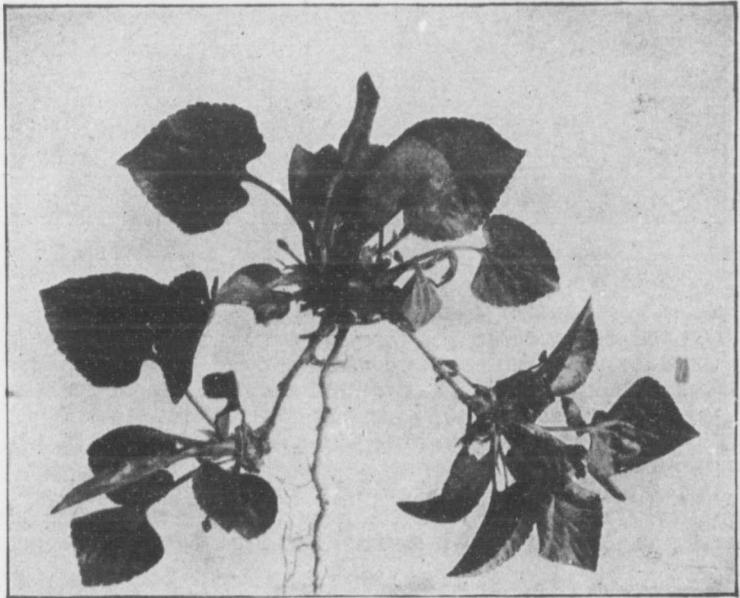


FIG. 9.—VIOLET RUNNERS.

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FIG. 10.—VIOLET RUNNERS PEGGED DOWN TO ROOT.

sun is preferable to a shady northern one, and the earliest Violets of all may well be grown beneath a south wall. Red spider may be troublesome here in summer, but may be kept at bay by copious root waterings and overhead sprinklings, and in favourable seasons flowers may be picked from such a site all through autumn and winter. If no south wall, or, better still, a frame is available, a layer of bricks may be arranged round a few plants in the most sheltered part of the garden, and covered with an old frame light or window sash in October, when early flowers may be expected.

Almost any soil but a heavy clay will grow Violets, and that may be made suitable by lightening it in autumn with road grit and leaf mould. The latter is excellent to add to most soils, but should give way to rich farm-yard manure when very poor or sandy land is being planted. The digging and preparation of the land must be done during winter, or by the beginning of March at the very latest, as April is the ideal month for forming Violet beds or borders.

Young plants for the beds may also be prepared in the autumn, though spring is the generally favoured period. There is no question, however, that autumn propagation is

best for outdoor Violets, as the plants are thoroughly rooted for planting out in April. Division of the old roots is practised by some growers (Fig. 12), but it cannot, especially when roots are really old, compare in the matter of results with striking runners, as the small plants thrown out on long bare stems round old plants are called (Fig. 9). When these are taken off in autumn, they should be inserted in a bed of sandy soil, and if this is raised 6 inches above the surrounding ground level, so much the better. The runners may almost touch each

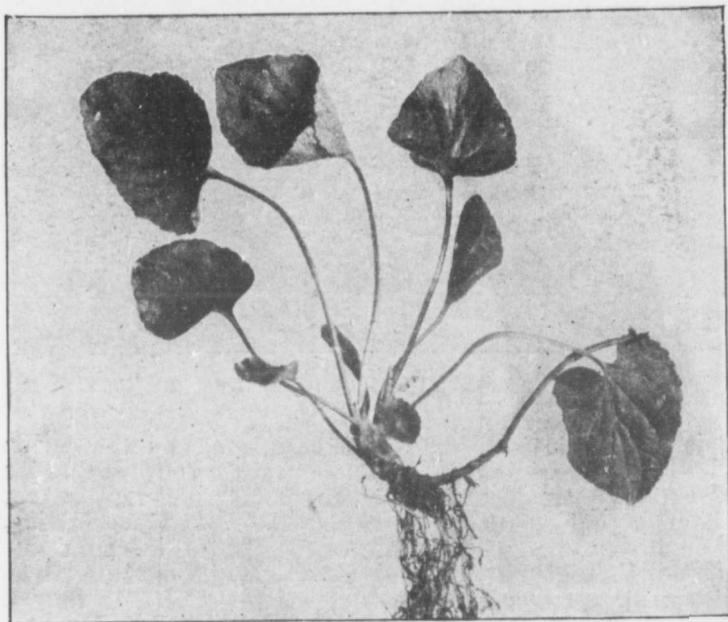


FIG. 11.—VIOLET RUNNER ROOTED, DETACHED AT X, AND READY FOR PLANTING.

other in the bed, and if inserted firmly should need no further attention until early April, when they should be planted in a bed or border previously prepared for them. A foot each way is sufficient space to give the weaker growing sorts, but the newer, stronger varieties, like Princess of Wales, may well have another 3 inches. Runners may also be layered while attached to the old plants (Figs. 10 and 11), and planted out when rooted.

Summer culture will consist of weeding, hoeing, watering, and sprinkling each warm night with a rosed can.

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Runners, too, must be removed on sight, unless a few are wanted for autumn propagation. These are, however, better obtained from an older bed, as they greatly weaken one year old plants. Some few should be always inserted each autumn, as no plants give such fine blooms as those produced by maidens or first year plants. A mulching of lawn mowings, decayed leaves, or short manure will be found beneficial during the hottest weather by preserving moisture about the plants.

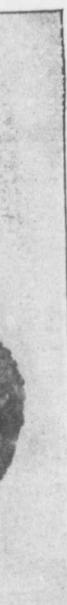
Violets for flowering in frames require very similar treatment to those grown for outdoor blooming. The chief initial difference is in the time of propagation. As plants which have already flowered in frames are generally drawn upon for purposes of propagation, it is obvious that autumn striking is out of the question. Indeed, it is a moot point if runners should be struck at all. They are often produced so late that they fail to make good plants during the summer, and this is one of the most frequent causes of amateurs' failures with Violets in frames.

Where dung is used in the frame, flowering finishes sooner, and runners are produced earlier in the season. In these circumstances runner propagation may be practised, a cold frame with a bed of sandy soil being necessary, and shading from bright sunshine. The runners should root in about a fortnight or three weeks, and should then be hardened off a little, and planted out in rows, as before advised.

Where runners are not usually well in evidence by the first week of April, it is well to rely upon division of the old plants. This may be carried out at the end of March, dividing each plant into two, three, or four portions, according to size, and planting the divisions closely in a bed of sandy soil (Fig. 12). Three weeks later they should be well rooted, and making new leaves, when they may be planted out as recommended for others.

The summer culture of frame Violets does not differ from that of outdoor varieties up till the middle of September, when each plant should be cut round with a sharp spade, ready for transference, a week later, to a frame. A good watering should follow the spade.

A frame that has grown Cucumbers or Melons may well be utilised for the Violets, as it will need no preparation beyond cleaning the walls and light, forking over the soil, and adding sufficient loam, leaf mould, and coarse sand in mixture to bring the plants close to, but not touching the glass. The plants should be placed well clear of each other, watered in, and left uncovered until severe frost threatens, when the lights should be put on, and covered with a mat or two if anything more than 10° of frost is registered.



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Winter treatment will consist in removing decaying leaves, dusting flowers of sulphur on mildew affected ones, and stirring up the surface soil occasionally to prevent greening; practically no water will be required from start to finish. The lights should only be closed during really frosty weather, and should be removed entirely for an hour or two on bright, sunny days.

The best double varieties for frames are Marie Louise,



FIG. 12.—VIOLET DIVISIONS.

lavender; Lady Hume Campbell, later, and rather darker; and Comte de Brazza, pure white. Singles: Princess of Wales, dark blue, very large, a strong grower, and should be planted quite 1 foot from the glass; Wellsiana, smaller, reddish blue; and the Czar, dark blue; this should only be given frame room when space is plentiful.

Outdoor varieties may include Marie Louise, Lady Hume Campbell, and Neapolitan among doubles; Comte de Brazza cannot be recommended, owing to its flowers becoming "rusty" in bad weather. Of singles, the Czar is the best all round and the hardiest variety; White Czar is a good companion; and Princess of Wales may be grown if large, long stemmed flowers are desired.

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Step IV.—How to Bud and Prune Roses.

JULY is generally considered to be the month *par excellence* for budding Roses, but there is a little work to be done in the spring, March or April, which has a great bearing on the future of dwarf plants, and is not without effect on standards. With dwarf stocks, that is, young plants raised from seeds or cuttings of the Brier, this work consists of cutting the growth down to the ground level, with a view to originating three strong shoots. With standards, all that is necessary is to reduce the shoots that have pushed on autumn planted hedgerow Briers to two or three of the strongest and best placed.

If grown on well these shoots should be in prime condition to receive buds in July, the exact time being determined by the ease with which the bark parts from the wood. To ascertain this, make a T shaped cut in the bark of one of the shoots, as near as possible to the main stem, and gently raise the edges of the bark with the handle of a budding knife, or piece of smooth, sharpened wood. If the bark leaves the wood readily the time for budding has arrived, and suitable buds may well be sought for. These will be found towards the base of current year's shoots on older standards or bushes, and to secure them it is a good plan to cut away the shoot, all but about two buds. Place the shoot in water, and proceed to the standard to be budded. Next trim off all leaves and prickles, retaining 1 inch of leaf stem below each bud, and with a very sharp knife essay to cut out a bud from the shoot. Start $\frac{1}{2}$ inch above the bud, allow the cut to reach its maximum depth, about one third the thickness of the shoot, immediately beneath the bud, and bring the knife out $\frac{1}{2}$ inch below the latter. This will give a piece of bark 1 inch long.

Carefully extract the wood from this bark by an upward peeling movement, and then slip the bark down under the edges of the T cut in the shoot of the standard. Cut the top of the bud bark square with the top of the T, and bind a broad strip of Raphia firmly, but not too tightly, round the shoot, taking care not to cover the bud. About three weeks later the buds should be examined, and the ties removed if signs of growth are visible. If the bud fails to show signs of growth in a month from budding, it may be assumed to have perished, and another should be inserted. If the buds break into growth they should on no account be allowed to produce flowers, but should be pinched back

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when they have made three or four leaves. Well selected buds, properly inserted, should, however, give no trouble in this respect, but should remain quite dormant until the spring. About the end of January, the Brier shoots may be cut back to within 6 inches of the bud, and when the bud has started into growth, about April, the whole of the Brier may be cut away down to the bark of the bud. If the Rose, as it now is, is growing in a windy place, it will be well at this pruning to fasten two or three strong sticks, about 18 inches long, in such a manner that the bud growth may be tied to and supported by them. As an alternative to staking, the points of the bud shoots may be pinched out when a few good leaves have been made, or before the shoot is so long as to be in danger of twisting out by the wind.

By the following spring the newly budded Rose will fall

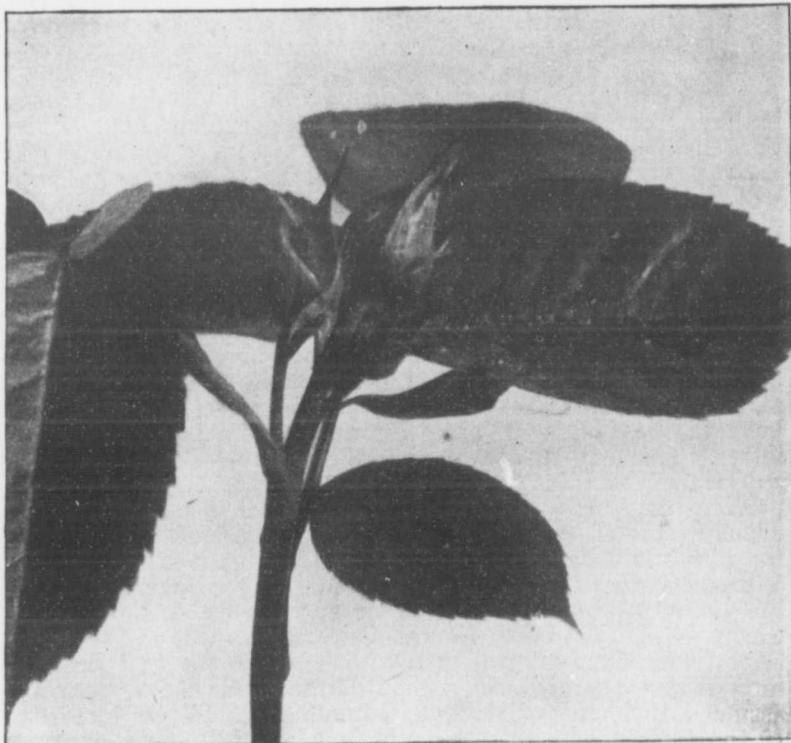


FIG. 13.—ROSE WITH SIDE BUDS. (See page 24.)

into line with its older brethren, and come up to be pruned with them about the end of March or beginning of April. Young growths will probably push several weeks before this date, but they will arise only from the tops of the shoots, and can be ignored or left to the mercy of an early March frost. Below these precocious growers are the buds on which we must rely for our Roses, and on just how many of these we rely will depend greatly on the class of Rose. For practical purposes we may divide spring pruning into three sections, 1, hard; 2, close; and 3, moderate.

Section 1 is practised only by the exhibitor, and consists of cutting all new growth back to within two buds of its base. Section 2 is suitable for weak growing Roses, in order that the number of shoots they produce may be commensurate with their strength. Such Roses as A. K. Williams, Baroness Rothschild, Frau Karl Druschki, Gustave Piganeau, Madame Gabriel Luizet, and Xavier Olibo, are

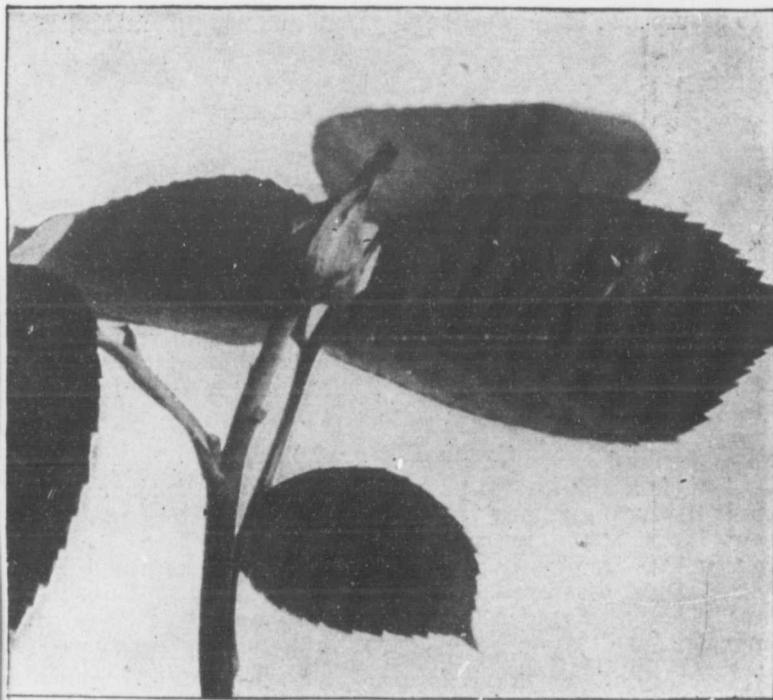


FIG. 14.—ROSE WITH SIDE BUDS REMOVED.

examples of varieties calling for close pruning, which in this case means shortening the young shoots to about five buds.

The great majority of Roses come under section 3, and are cut back to about eight buds. Any weak shoots in this section may be shortened to four or five buds. A few typical Roses which are pruned in this manner are Alfred Colomb, Ards Rover, Captain Hayward, Caroline Testout, Chas. Lefebvre, Fisher Holmes, Grüss an Teplitz, John Hopper, Mildred Grant, Mrs. John Laing, Niphetos, Prince Camille de Rohan, and practically all the Teas and Hybrid Teas.

The golden rule in Rose pruning is to cut weakly growers back hard, and strong, vigorous growers only moderately. This seems contradictory, but it is easily understood when it is reflected that the whole strength of a weakly Rose will be concentrated on four or five buds, whereas the vigour of a strong growing Rose will be spread over eight or nine shoots.

Disbudding is entirely different from budding. It means the removal of superfluous flower buds in early summer in order to secure fine blooms. See Figs. 13 and 14, pp. 22 and 23.

Step V.—How to Fight Rose Enemies.

THE Rose possesses several enemies, both insect and fungoid, some of which are almost sure to favour it with their attentions, even in the best of seasons, while in a bad year so many of them may combine as to prevent the plants from carrying out their natural functions. Among insects one of the first to be troublesome is the

Green Fly or Aphis.

This is a well known pest, and needs no description; neither is it likely to give any trouble when the migratory insectivorous birds arrive in quantity. Before that time, however, green flies frequently swarm over young shoots and foliage, and, if not destroyed, render the latter dirty and unsightly the whole season. Quassia extract, and soft soap and paraffin, are two easily prepared and effectual remedies, but several applications are frequently necessary to effect a clearance. A pound of soft soap should be boiled in a quart of water, and when well boiling a pint of paraffin should

be stirred in. Place when cool in a bottle, and dilute with warm water, at the rate of $\frac{1}{2}$ pint to 12 gallons, for use.

Rose Maggots.

There are several moths which favour the Rose as a nursery for their young, and the larvae of some of them get to work very early in the life of the young foliage. The chief of these is popularly known as the Rose maggot. It is about $\frac{1}{2}$ inch long, dirty white in colour, with a black or dark brown head. It commences operations by fastening the leaflets together with a kind of web, and then, secure from observation, feeds at its leisure. After a while it transfers its attention to the buds, and many a promising prize bloom has been ruined by its attacks. Hand picking is the only remedy, and this should be commenced in May on the foliage, and early in June on the flower buds.

Rose Chafer.

This is a gorgeous, green and copper coloured, beetle-like insect, with an abruptly truncated tail, and a small, pointed head. It feeds on Rose pollen, and to obtain this tears the petals of Roses in pieces, light coloured flowers suffering most. The chafers should be removed by hand and destroyed, or they may be shaken on to a sheet.

Sawflies.

Several of these seem partial to Roses, some eating the foliage, while the larvae of at least one bore down the pith of young shoots, and so destroy them. The latter may be got rid of by cutting off all shoots which suddenly wither, and burning them; care should be taken to cut the shoot below where the browned pith shows the point of infestation to be. The leaf feeders may be destroyed by sprinkling Hellebore powder on the foliage, or, when few in number, by hand picking.

Thrips and Red Spider.

Both of these are favoured by hot, dry weather, and rarely put in an appearance until summer fairly arrives. Liberal watering and feeding are the best preventives, and the best remedy is a dusting of black flowers of sulphur, sprinkled on the underside of foliage when wet from dew or syringing.

Scale.

This pest forms tiny brown lumps on the stems of Rose shoots. These lumps are the dead female insect, and beneath her shell-like body the young scale hatch out. Remove the brown lumps with a pointed stick, and scrub the bark beneath them with a strong solution of soft soap.

Leaf-Cutter Bee.

This is a short and broad bee, possessing a sting, and injuring Roses by scooping out the edges of the leaves, as shown in the illustration (Fig. 15, below). With these semicircular pieces the bee forms its tunnel-like nest, generally in a hollow tree. When the sides of the nest are finished,

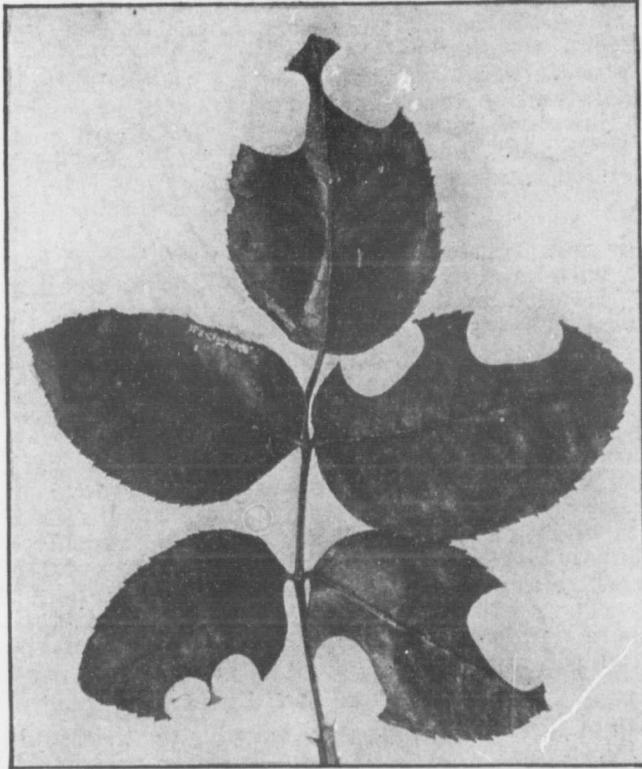


FIG. 15.—ROSE LEAF ATTACKED BY THE LEAF-CUTTER BEE.

the bee cuts out some more or less circular pieces of Rose leaf (see Fig. 16, page 27), and with these stops up the ends. If numerous, the bees may be caught with a butterfly net.

Fungoid pests are scarcely as numerous as insect enemies, but there are quite enough of them to drive the unfortunate grower to the verge of distraction. Of these, the most common and deadly is mildew

Mildew.

This appears very early in the year in some seasons, and in others is much later. A cold wind and dryness at the roots are the two chief causes. Flowers of sulphur, rubbed into the spots or patches as they appear with the finger and thumb will check the disease, and eradicate it if persevered with and if cultural methods are not neglected. Sulphide

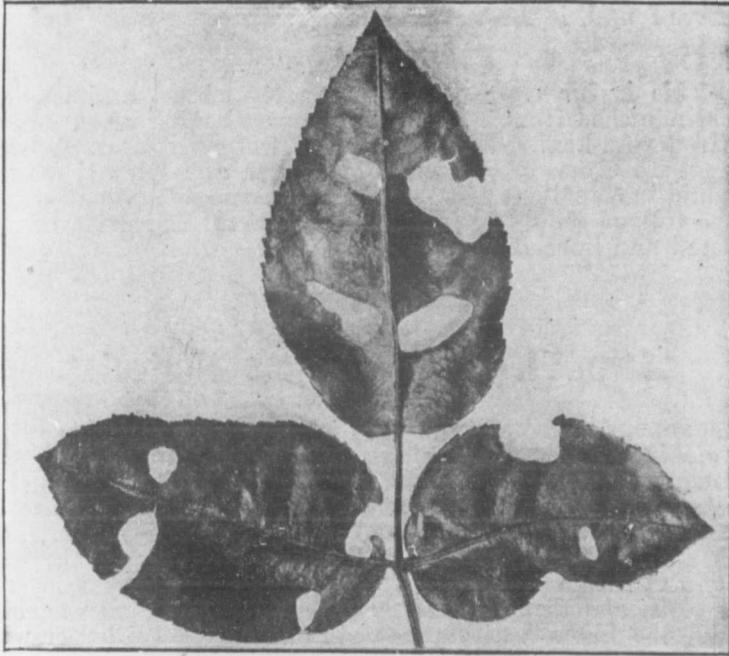


FIG. 16.—ROSE LEAF FROM WHICH THE LEAF-CUTTER BEE HAS TAKEN STOPPERS FOR ITS NEST.

of potassium, $\frac{1}{2}$ oz. to a gallon of water, is also effective, while Lysol, a proprietary preparation, has been found useful when other remedies have failed.

Rose Rust.

This is peculiar in that it singles out some varieties as special favourites, and ignores others. It appears as tiny, orange coloured spots on the undersides of the leaves early

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in summer. The spots rapidly increase in number and turn brown. There is no known remedy, but collecting and burning diseased leaves is a palliative.

Leaf Spot.

This is not very common in England, but is capable of doing much damage when once it gets a start. It forms large, black blotches on the leaves, bordered with red, and is favoured by damp, stuffy weather. Hard, well-thinned growth is rarely attacked, and this, and burning any diseased leaves found, is the best preventive.

Black Spot.

This is far more common than the above, and may be distinguished from it by the black spots having no bordering of red, and having fimbriated instead of even edges. Spraying with 3 ozs. of carbonate of copper and 1 quart of ammonia in 50 gallons of water checks the spread of this disease. The foliage should be well wetted, and all fallen leaves collected and burned.

Step VI.—How to Grow Auriculas.

BROADLY, Auriculas are divided into two great classes, Show and Alpine, the former being again split up into Grey-edged, Green-edged, White-edged, and Selfs. The chief distinction between the Show and Alpine Auriculas is the presence of a thick, meal-like paste round the tube in the former, and its absence in the latter. It is this paste which makes the Show Auricula unsuitable for outdoor culture, as rains remove it, and disfigure the flowers. With protection against rain, the Show Auricula is a very charming border or window-box plant, as, despite its general culture in pots and houses, it is quite hardy.

The Alpine Auricula is an ideal border plant, neat and compact in habit, early in flowering, sweetly-scented, and of showy colours. It is also one of the very best plants for the cold greenhouse, and can be so readily raised from seed that all should grow it. The Show section also reaches perfection in a cold greenhouse; in fact, heat is not required by the Auricula at any stage. For ordinary purposes, seedlings of Alpines are suitable, but the real lover of Auriculas will invest in named varieties of both sections.

Auricula seed is slow to germinate, and many a pan has been emptied in ignorance of this fact, which would have

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yielded plants later on. Experts hold that the seed should be sown as soon as ripe, or in the autumn, but new seed is seldom on offer until the spring, so that the ordinary grower must depend upon a sowing at that season. April is a good month to choose for this, and a cold frame, preferably with a north or eastern exposure, is the best receptacle for the seed pan. A handlight in the open garden also answers very well.

Seed pans should be more than usually well drained, and a very sandy compost used. Soak this before sowing, scatter the seeds thinly, cover with coarse silver sand and a pane of glass, and stand the pan in a sheltered corner of a cold frame. About a month after sowing, some of the seedlings usually appear, but some, and these are generally the best, may not show signs of life until twelve months after sowing. Hence the advantage of pricking out individuals as soon as they are large enough to handle is obvious. About four seedlings round the edge of a 3-inch pot is a good shift from the seed pan, and the next move should be singly into 2½-inch pots.

If it is intended to only grow a few of the choicer seedlings, they may be left to flower in these small pots, when selections can be made for house, frame, or border culture, according to their merits. As an alternative, the plants may be put out in the borders, or grown on in pots. In the latter case, a cold frame with a northern aspect should be chosen, and the plants kept well supplied with water, encouraging a damp atmosphere by standing the pots on a bed of constantly moist ashes. The Show section is increased by offsets, which are removed from the parent plants when large enough to readily detach, and inserted round the edges of small pots. A sandy compost is essential, and watering must be done with extreme caution, or the youngsters will rot instead of rooting. A bell glass or close cold frame is an excellent place for rooting offsets. If a variety is chary of throwing offsets, the top of the plant should be cut off, and inserted as advised for offsets. The effect of the removal of the top will probably be the pushing of several offsets by the old plant. Alpines may also be increased by offsets, which are generally yielded freely.

During summer all Auriculas should be kept in a frame facing north, or where shade from bright sun can be obtained. About the end of September, the frame can be turned round to face the south, and should remain in that position all the winter. If wintered in the frame, the plants should be kept as dry at the roots as seems consistent with safety from shrivelling, and a mat should be laid on the glass during severe weather. In February the plants should be

top-dressed, using a compost of good loam 2 parts, dried cow or fowl manure 1 part, leaf mould 1 part, and a liberal dash of quite coarse sand. Growth will follow this top-dressing, and the plants will then take plenty of water.

Potting should be done in May or June, and $4\frac{1}{2}$ -inch pots are the most generally useful size to employ. Most of the old soil should be shaken away, and the old tap-root cut off with a sharp knife below where fresh rootlets are being emitted. A good potting compost is 4 parts of fibrous loam, rather heavy in nature, 1 part each of leaf mould, old mortar rubbish, and dried cow dung, and 1 part of coarse sand and nodules of charcoal in mixture. The whole should be thoroughly mixed, and pressed firmly round the plants when potting. When finished, place the plants in their summer quarters, and keep the frame close and shaded for a few days.

The Auricula has two chief foes: green-fly, and an insect like a mealy bug, which clusters round the roots. The first is easily kept under if watched for and checked on arrival, or is quickly killed by a light vaporisation. The second should be sought for at potting time, and, if seen, the roots should be washed in warm, soft, soapy water. Fir Tree oil is also an excellent remedy for this pest; it is used in warm water. Perseverance is required to exterminate this pest, and when once it has been noticed it is advisable to keep a little methylated spirits and a camel's hair brush in the frame; then, when a bug is seen, it can be touched with the spirit-laden brush and killed.

A dozen good sorts of Show Auriculas are: Gladiator, Mrs. Henwood, and Rev. F. D. Horner, green-edged; Richard Headley, Amy Robsart, and Colonel Champneys, grey-edged; Heather Bell, Frank, and Acme, white-edged; and Black Bess, Buttercup, and Ruby, Self. A dozen good Alpines are: Don Carlos, Defiance, Firefly, George Lightbody, Sam Barlow, Marie Corelli, Dean Hole, Mrs. Harry Turner, Edith Lodge, Lord Dudley, Diadem, and Duke of York.

Step VII.—How to Have Sweet Peas for Six Months.

THE six months over which it is possible to have Sweet Peas are May, June, July, August, September, and October. Perhaps it would be well to take off half the first month, May, and place it at the end of October, thus making the

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six months range from mid-May till mid-November. In this arrangement we have to throw ourselves upon the clemency of autumn frosts, but they are often kind, and, in any case, we have the first part of May to fall back upon should the possibility of a six months' display of Sweet Peas be questioned.

For the very earliest blooms we must rely on autumn sowing, and where the soil is fairly light and the situation not too exposed the practice is an excellent one, and one, moreover, which is likely to see considerable development. The middle of September is quite soon enough to sow, and the last week of October not too late. Well dug and manured ground should be chosen, and if the dung is put well down, say nine inches below the surface, it may be greener and ranker than is advisable for spring sowing. In this state it will generate a little mild and helpful heat.

Drills are preferable to clumps for autumn sowing, chiefly because they can follow the line of a sheltering building or hedge, and present an unbroken front to a wind that would whistle round clumps in all directions. Mice and birds, too, have to be reckoned with, and hungry wireworm, so that it is well to adopt fairly thick sowing, say 1 inch between the seeds, or thirty-six seeds to the 1-yard run. Flat bottomed drills should be used, and when sowing is finished the surface of the rows should be 1 inch below the surrounding ground level if the land is light.

The seedlings should be protected by a layer of dry soil from the potting shed, placed on either side of them as soon as they are 1 inch high, and short, bushy stakes should be inserted closely on each side of the row when the plants are 3 inches high. These short boughs must be supplemented by longer ones, 8 to 9 feet high, as growth advances, and when March winds and sunshine dry up the surface soil the hoe should be constantly run along the rows. Occasional dustings of nitrate of soda, 1 oz. to the 1-yard run, will be very helpful when April showers are falling, and will assist in the development of fine flowers by the time May is in.

As an alternative plan to autumn sowing for producing early flowers, starting the seeds in a greenhouse is practised. Five-inch pots are nearly filled with a light, rich compost at the middle of January, five seeds are placed round the edges of each pot, covered with 1 inch of soil, and pressed firmly home. They are stood in a greenhouse, whose night temperature is about 40°, and kept nicely moist until the young plants are 1 inch high.

At this stage they should be taken to a cold frame, and kept close for about a week, after which time air should

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be given gradually, until by the beginning of March, the lights are kept tilted night and day. Hardening off after this may be rapid, so that the plants may be set out in their flowering quarters by the first week in April, or even earlier in sheltered districts. The balls may be planted without



FIG. 17.—A CLUMP OF SWEET PEAS READY FOR THE FINAL STAKING.

disturbance to form clumps, or divided up and the plants inserted in rows.

Whichever course is adopted, subsequent treatment should be on parallel lines to that advised for autumn sown seed, except that, the weather being hotter and drier, the greenhouse raised plants will require liberal waterings to keep them going until their roots get well hold of the soil.

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Both sections will need feeding, watering, and mulching during the blooming period, and the flowers must be picked before they fade, or the season will be a short one. With good management both sets of plants should bloom on until the autumn.

In order to ensure our six months' display, we will not depend entirely on either of the above, but make a further sowing outdoors from the middle of March until the middle of April, the former date in light soils, the latter in heavy ground. Flat bottomed drills, or round stations sunk 3 inches below the ground level, should be prepared, and the seeds dropped in 3 inches apart, pulling up eventually alternate seedlings, should all grow. Earthing, staking, watering, mulching, and feeding should, as usual, follow growth, and the plants may be topped once, or even twice, should there appear to be a likelihood of their flowers coming in before they are wanted.

As it is probable that frosts will rudely break in upon the blooming period of these late plants, an eye should be kept on the weather, and all sprays bearing half or three parts developed flowers cut when frost threatens. These will open quite well in water if placed in a warm room, and if, after all, the threatened frost fails to appear, no harm will have been done.

Step VIII.—How to Layer a Carnation.

OUTDOOR Carnations are generally layered in July or early August, the earlier date being better, as more time is allowed for rooting before the cold weather approaches. It is not advisable to commence layering until blooming has all but finished, otherwise flowering shoots might be layered instead of growing ones.

Before commencing to layer, the following should be provided: a quantity of finely sifted soil, mixed with road grit or coarse sand, if at all heavy; a sharp, not too heavy knife; some layering pins, either the wire ones sold by nurserymen, or forked twigs cut from Pea boughs, an old garden besom, or Bracken stems; and, if much layering is to be done, a kneeling mat.

Commence by evenly arranging the shoots to be layered so as to cover all the available space, then cut away superfluous ones entirely, retaining the best and strongest. Now carefully strip all the leaves from the lower part of each stem, until only a tuft, comprising about three or four

joints, is left at the top. Lightly stir up the surface soil round the plant with a handfork, scatter on a 2-inch layer of the prepared compost, and proceed to notch the layers. This is done by inserting the knife blade about $\frac{1}{2}$ inch below the third or fourth joint from the top of the shoot, and pulling it upwards through the joint, to form a tongue. The base of the tongue should extend almost to the centre of the stem; its tip will, of course, taper to nothing.

A slight bending of the shoot will cause this tongue to open, and in that position it should be pressed into the prepared soil, and held in place by a stout layering pin pushed in just behind where the cut was made. Heap a little soil over stem and layering pin, and pass to the next shoot. Treat this in the same manner, and so on until all the shoots on the plant are layered.

Two slight variations in the method of layering detailed are practised. One is to remove the tips of the leaves of the shoot layered with a sharp knife; the other is to cut away the extreme tip of the tongue. The first is supposed to check the flow of sap, and cause it to accumulate near the tongue; the second is favoured as presenting a greater surface for the emission of roots. Neither is strictly essential, but the latter certainly gives very fine results in the way of roots.

When all the shoots are layered, a good soaking should be given through a rosed watering can. This will settle the soil in place, and if supplemented by daily sprinklings for a week or so during dry weather will be all that the layers require, until, as rooted plants, they are transferred to their flowering quarters, or to a cold frame for wintering.

Indoor Carnations are layered in a similar manner to outdoor, as regards notching, tonguing, and pegging into prepared soil. A zinc collar is used to hold the added soil in position when shoots are layered into the pot in which they are growing; or smaller pots of compost are stood upon the large one. Another method of layering indoor Carnations is to plunge the plants in pots, or plant them out, in a frame of soil, and tongue and peg down the shoots in the usual way.

Step IX.—How to Grow Annuals.

GENERALLY speaking, annuals are the most despised and most useful plants in the garden. They are despised chiefly on account of their cheapness, almost all of them being obtainable in penny packets. They are useful because of the ease

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with which they can be raised, the many positions they will fill, and their value for supplying cut flowers. Probably the only annual that is prized at its real worth is the Sweet Pea, and a head need contain no grey hairs to recall the time when Sweet Peas were on a par with other annuals.

Undoubtedly much of the annual's unpopularity is directly due to its being the victim of bad cultivation. Because a packet of seeds costs only a few pence, care in sowing and cultivation is deemed unnecessary. In the human kingdom the poor thrive; in the vegetable kingdom they may be expected to do likewise. It is only the seeds which cost a shilling or more per packet which should need care and attention. This is, presumably, the argument employed, and so the poor annual loses caste.

Those, however, who know the annual at its true worth, and treat it accordingly, also know what excellent results are obtained from it, what a splendid stopgap it is when other plants fail, and over what a lengthy season it will flower when intelligently sown and tended. Too often annuals are sown in the poorest ground in the garden, so thickly together that they have no chance of showing their true character, and left unthinned, unstaked, and unwatered. No wonder that under such conditions they gain the reputation of being "weedy" (Fig. 18, page 36).

To get the best results from annuals, the ground for their reception should be deeply dug and well manured; the plants would never have been credited with fugacity of flowering and precocious seed formation had they not been badly treated in the matter of soil. If a reserve plot of ground can be devoted to raising the seedlings so much the better, as the grower will have them all together under his eye, and be able to thin, water, and destroy insect pests as needed. This work is somewhat difficult when a score or so of clumps are being raised among the occupants of an herbaceous border.

A fine surface should be secured, and the seeds sown thinly in rows. Such large subjects as Nasturtiums, Sweet Peas, Convolvuluses, and *Martynia fragrans* should be placed about 3 inches apart in drills 1 inch deep. Finer seeds, such as those of *Godetias*, Stocks, Candytuft, and annual Larkspurs, should be mixed with silver sand, and evenly distributed in a drill made by pressing a rake handle into the soil. The seeds should be covered by raking lightly with an iron toothed rake, the soil should be firmed with the back of the rake, and a good watering given with a rosed can, unless the weather is showery.

If the ground has been well tended in previous seasons, weeds will seldom be troublesome before transplanting time, but any noticed between the rows should be removed. It is

not wise to pull up any weeds, or to use a hoe, until the position of the rows is plainly marked by the appearance of the young seedlings. As soon as these are through the ground, a very small hoe may be used to lightly stir the soil between

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FIG. 18.—A GODETIA FROM AN UN-THINNED CLUMP.



FIG. 19.—A GODETIA FROM A CLUMP PARTIALLY BUT INSUFFICIENTLY THINNED.

the rows, or one of the tines of a flat handfork will do the work excellently.

When sowing has been thinly done, there should be no need to thin the plants before they have made their second or true leaves; the thinnings may then be planted elsewhere if required; otherwise, they can be thrown away. In thinning,

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leave the retained plants about $1\frac{1}{2}$ to 2 inches apart, firm the soil round them, and give a good soaking of water to assist them in recuperating after the disturbance caused by the departure of their neighbours. A layer of soot between the



FIG. 20.—A GODETIA FROM A WELL THINNED CLUMP, FLOWERING AFTER BEING TRANSPLANTED.

rows will be of benefit in keeping away marauders, and also feeding the plants when showers fall.

While the plants are strengthening in the seed beds, prepare their flowering quarters by taking out a depth of 18 inches of soil, stirring up the bottom of the hole thus made, and then returning 1 foot of the displaced soil mixed with 4 inches of well rotted manure. Place 2 or 3 inches of the

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finest portion of the soil over this, and the site will be ready for planting in a few days. Beds or borders to be filled with annuals may be treated in the same manner, bastard trenching being adopted in their case.

Unless planting can be done in showery weather, defer the operation until the sun has left the site. Plant firmly, just a little lower than before, and water in with a rosed can. All such plants as Mignonette, Godetias, Helichrysums, Stocks, Asters, and Candytuft, should be allowed 1 square foot of space each; Larkspurs, Shirley Poppies, annual Chrysanthemums, African Marigolds, Lavateras, and Sweet Tobaccos should have 18 inches of space; plants generally used for edgings, such as Nemophila, Limnanthes, Sweet Alyssum, Saponaria Calabrica, Virginian Stocks, and Ionopidium acaule, should be placed the distance of their own height apart.

During the summer, efforts should be made to remove dead flowers, give stakes as required, keep the plants free from weeds, and assist them by occasional sprinklings on the surface soil of artificial manure, or with soakings of liquid made from fowl, sheep, or horse droppings. March and April are the great months for sowing annuals, but successional sowings all through May will greatly prolong the flowering season. To provide plants for blooming early the following spring, the hardier annuals should be sown in August and September, and either wintered in nursery beds or planted out in sheltered borders.

Those readers who would know more of this interesting subject, and also obtain full information as to the best kinds to grow, with heights and colours, should purchase a copy of "Pictorial Practical Flower Gardening," post free for 1s. 2½d., from Messrs. Cassell and Co.

Step X.—How to Get Fine Chrysanthemums.

To get the best results from Chrysanthemums, the finest and newest sorts should be bought, and, owing to their comparative ease of culture, it is well to confine one's attention solely to the Japanese sorts. These will be purchased as cuttings or rooted plants in spring, and must have liberal treatment from the time of their reception until the flowering period.

It is customary to strike cuttings of exhibition Chrysanthemums singly in small pots, those 2½ inches in diameter sufficing for all but the very strongest, and for these 3-inch

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pots may be used. Some exhibitors favour early striking and a long season of growth, but this should depend entirely upon the cuttings, it being useless to put in weak, puny cuttings when the weather is, to say the least, unfavourable. By waiting a few weeks, both the weather and the cuttings will improve, and it will generally be found that later cuttings catch up, and even surpass, very early ones. Thus, quite as good plants are obtained from a batch of cuttings put in in the early part of January as from those struck in November.

In selecting cuttings, never take those growing out of the stem, or any which have been drawn up and made spindling by sojourning in a conservatory during their growth. It is best to remove all such, and depend upon cuttings thrown up after the plants have been cut down and placed in a cold frame. When these are about 3 inches high they should be severed as close to the soil as possible, divested of their lowest leaf or leaves, and placed on a base of sand in the middle of a 2½-inch pot filled with sweet, open, sandy, compost. The soil should be well firmed round the cuttings, and, after a good watering, the latter should be stood in a propagating frame in a greenhouse.

A successful strike will be proclaimed by the erect attitude of the cuttings, and the formation of new leaves at their apices. When this takes place, air should be admitted in increasing volume to the propagator, until the young plants show no signs of flagging, when they may be removed to a light shelf in the house proper. A little hardening here, with repotting if growth is rapid, will fit the plants for a cold frame, whence, in April, they may be transferred to a bed of ashes, in a sheltered position outdoors.

If all has gone well with the plants they will need a further repotting about the end of March, so that when they take to the open air at the end of April they will be in 6-inch pots. For this potting, the following compost is recommended: good fibrous loam 4 parts, leaf mould, well decayed manure, wood ashes, and old mortar rubbish 1 part each, and ½ a part of coarse sand. This should be made fairly firm around the old ball of soil, using a potting stick to press it well down at the sides, near the pot.

The second or third week in May should see the plants ready for their flowering pots, and the same compost may be used as recommended for 6-inch pots. Ample space should be left for watering, and the soil should be well firmed with the potting stick. Much damage may, however, be done by ramming wet soil, so that neither the balls of the plants nor the compost should be wet at potting time. A small stake may now be given to each plant, and a few

sprinklings with a fine-rosed can or syringe until a recovery is made from potting. The plants are now stood in their summer quarters, in an open sunny spot, where we may leave them for a while, and give a little attention to breaks and buds.

If a Chrysanthemum cutting is allowed to grow unchecked, it produces a flower bud at the end of its stem when about 18 inches high. This is, of course, too early for flowering, but on the bud being removed, eyes in the axils of the upper leaves burst into growth, and produce shoots. As the plant thus breaks or branches out the bud is called a break bud. With some varieties; such as F. S. Vallis, Bessie Godfrey, and W. R. Church, this break bud occurs at the right time to ensure fine exhibition flowers. With others, such as Mrs. Barkley, Nellie Pockett, and Godfrey's Pride, the break bud appears too late to secure good quality flowers in time for November shows, so that the point, about $\frac{1}{2}$ inch or so, of the shoot is pinched out early in April. This has the same effect as removing the bud, *i.e.* it causes side shoots to push.

These side shoots are reduced to three in number, and if intended for bearing first crown buds they are not again pinched. If, however, what are known as second crown buds are required, the flower bud which appears about the middle of July in the point of each shoot must be removed. This will, as before, cause new shoots to issue from the leaf axils, and they should be gradually reduced until each old stem carries only one new shoot, *i.e.* the plant will still possess three shoots or stems. The bud which will form on the top of these shoots is called a second crown; the bud that caused the break is called the first crown.

Crown buds are always surrounded by growth shoots, and what is called taking the bud consists of gradually removing these, and leaving the bud in possession of the stem. Terminal buds are surrounded by other flower buds, and the removal of these constitutes taking a terminal bud. From the middle until the end of August is the general time for taking buds, but the exact date varies with the variety.

When the buds are all taken, feeding should begin in earnest, ringing the changes on soot, farmyard liquid, and nitrate of soda, not more than $\frac{1}{2}$ oz. of the latter to 1 gallon of water. Clear water should always alternate with manure water, and should precede the latter if the plants are dry when the time for feeding arrives. Green and black fly must be kept down, earwigs captured, and the plants sprayed with sulphide of potassium solution, $\frac{1}{2}$ oz. to 1 gallon of water, once or twice before housing; this will keep mildew at bay and check rust. Housing should be done about the end of September.

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Step XI.—How to Grow Tuberous Begonias.

If it is intended to grow tuberous Begonias in pots in a greenhouse, there is no question that the best plan to adopt is to purchase a few good named varieties, and from these work up a stock. There are some superb Begonias on the market, both double and single, and anyone who has once grown them will never again want to give up greenhouse space to seedlings.

The tubers should be purchased in spring, in a dormant state, and started into growth by placing them on a layer of leaf mould and sand, kept constantly moist, in a warm corner of the greenhouse. As soon as the young shoots are about 3 inches long, they should be taken off with a heel, *i.e.* a small piece of the old tuber, and struck as cuttings in a propagating case. If no increase is wanted, all the shoots pushed may be allowed to remain, taking care, however, that they are not unduly crowded.

If propagation is not meditated, the tubers should be potted up as soon as the shoots are 1 inch long, using a pot very little larger than the tuber, and only slightly burying the latter. A compost of equal parts of loam, leaf mould, and coarse sand will suit at this stage, the object being to promote rapid root action. At subsequent pottings a more holding compost should be employed, an excellent one being made up of fibrous loam 2 parts, dried and powdered stable manure 1 part, and a good dash of coarse sand. Good plants may be grown in 6- and 8-inch pots, but large, old tubers will need a larger size to flower in. Feeding should be practised all through the flowering period, and shade need only be given to preserve the blooms, as Begonias revel in sunshine.

When the plants begin to get shabby, they should be stood in a sheltered but sunny spot outdoors and receive gradually decreasing supplies of water, until the foliage yellows and the stems fall off. This ripening outdoors will ensure plenty of flowers the following year, and assist the plants to winter properly. Many growers winter the tubers in their pots beneath a greenhouse stage, but the practice is an untidy one, and frequently results in loss, and attacks by insects. A better plan is to shake the tubers free from soil, arrange them closely together on a little cocoanut fibre refuse or sand at the bottom of a deep box, and cover them with more fibre. So protected, they will pass the winter in an outhouse, provided wet does not get to them.

If a stock of Begonias is wanted for bedding purposes,

they can be easily raised from seed by the possessor of a warm greenhouse. A start made at the middle of January will furnish nice little plants, which will bloom very well the first year, and splendidly in succeeding seasons. If raised later than the middle of February, the plants had better be flowered in a reserve bed, or some unimportant part of the bedding arrangements, the first season, as some of them may bloom disappointingly.

As Begonia seed is exceedingly fine, special care is needed in sowing it. A more than usually well drained pan should be prepared, half filled with rough compost, and then filled to within $\frac{3}{4}$ inch of its top with finely sifted leaf mould and sand in equal parts. This should be pressed down evenly with a board, watered by a gentle immersion in a tub of water, and allowed to stand half an hour. The Begonia seed should then be mixed with a 2-inch potful of fine silver sand, and the mixture sprinkled evenly over the surface of the pan; no covering of soil or sand will be required.

Place the pan in a propagating case, or cover it with a closely fitting pane of glass, and stand it on the hot water pipes. As soon as the tiny seedlings are discernible above the sand, prepare other pans similarly to the first, and with a lucifer match, notched at one end, gently transfer the little plants to their new abode. The very finest rose should be used to water the young plants in, and they should be kept as warm as possible for a fortnight after pricking out. If allowed 2 inches of space all ways in the pricking out pan, the next shift may be into $3\frac{1}{2}$ -inch pots, whence the plants may be bedded out.

About the middle of May the young Begonias should be transferred to a cold frame, and given gradually increasing quantities of air until the lights are left off day and night. If the plants have been growing, as is advisable, in a moist, humid atmosphere, a mat should be thrown over the frame during bright sunshine for a few days after bringing them from the greenhouse. By the first or second week in June the weather should be sufficiently genial to trust the plants outdoors, when they may be used as desired in the bedding plans. Probably 6 inches apart will be enough space to allow the plants the first year, at which distance they should make a good display.

During the flowering period, it is a good plan to place a label to each plant, recording its colour, and giving it one, two, or three marks of excellence, according to its deserts. As soon as frost blackens the foliage, clear away all dead leaves and stems, dig up the tubers with a fork, lay them on a bench in a shed to dry a few days, and then store them in boxes of cocoanut fibre refuse for the winter. In the follow-

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ing spring they should be brought into the greenhouse, and started as advised for pot Begonias, afterwards potting, hardening them off, and bedding out as before.

Those who have no greenhouse space to spare in spring may start bedding Begonias in a cold frame, and plant them outdoors as soon as the shoots are $\frac{1}{4}$ inch long. Probably this will be about the middle of May, or a little later. If the tubers are then buried 2 inches under the soil there is little danger of harm from frosts, and the subsequent plants will be sturdy and vigorous.

Step XII.—How to Manage Dahlias.

THE Dahlia is essentially a plant for the man whose garden soil inclines to heaviness, as it requires a good holding medium and plenty of food to do itself justice. A sandy soil must be enriched with plenty of heavy, decayed farm-yard manure a few weeks before planting time, and will, moreover, need constant assistance from the water can in hot, dry weather. The situation would not appear to be so important, as while the Dahlia undoubtedly appreciates its share of sunshine, it will thrive, the old decorative varieties particularly, in partial shade. A very open, wind swept site must be avoided, or the tender branches may be wrecked just when they are carrying their flowery burden.

The Dahlia readily lends itself to increase, seeds, cuttings formed of young shoots, and tubers detached from the old rootstock, all being employed with success. The first two of these methods can only be carried out by the owner of a greenhouse, or frame on a hot-bed; the latter may be practised in the open garden. Seeds are used in the production of new varieties, and by the person to whom any Dahlia is a Dahlia, or who wants plenty of flowers, mostly single, for cutting. Cuttings are used by the exhibitor who wishes to obtain the finest possible flowers, and also by the ordinary grower who wishes to increase a favourite variety. Division is, perforce, resorted to by the person who is unable to practise either of the foregoing methods, but whose stock of plants does not equal his requirements.

Seeds are sown about the middle of February, very thinly over the surface soil of a seed pan, covered with $\frac{1}{4}$ inch of fine, sandy compost, and placed in a warm corner of the greenhouse. The seedlings are pricked out into pots, potted on again as required, hardened in a cold frame, and planted out at the end of May.

Cuttings are produced by standing old stools of tubers in a greenhouse or on a hotbed, covering them with leaf mould or other light soil, and keeping the whole nicely moist until shoots commence to push. These are taken off when about 3 inches long, inserted singly in small pots, and struck in a propagating case, or a deep box covered with glass. They are eventually hardened off, and planted similarly to seedlings. The end of February is soon enough to start stools in a greenhouse; the middle of March should have passed before placing any in a hot-bed frame. Old stools that are used for supplying cuttings may be hardened off and planted out in the same way as their progeny.

Tuber division propagation is practised at planting-time, and may be carried out to any extent, provided that each tuber is severed, stripped off, quite close to the old flowering stem. This supposes planting dormant tubers, and such is a capital and labour-saving plan. It should be done about the middle of April, and each tuber should be covered with 6 inches of soil. A variant of this plan is to start the tubers in boxes in a sunny window, and plant them out at the end of May.

The site for the reception of all the plants should be well and deeply dug and manured, and 1 yard of space all ways is advisable for each plant. Early staking should follow planting, three sturdy stakes placed in a triangle being the best method. Even at this early period some growths will have advanced so much ahead of their fellows as to suggest that the latter had better be removed, a suggestion that it is well to carry out. Any inward growing shoots should also be cleared away, and the plant limited to three or four stout stems.

Summer culture will consist of tying in growth before wind has a chance to break it, watering in dry weather, keeping down weeds, mulching with decayed manure when blooms are being produced freely, and preventing earwigs from spoiling such flowers as are expanded. Hollow Bean stalks or Bamboos, pieces of oily rag, empty matchboxes, and flowerpots with a little hay or crumpled tissue paper in, are all famous as earwig traps.

The succulent nature of Dahlia growth renders it rather tender, so that the plants rarely escape the first severe frost. As soon as growth is blackened it should be cut down to within 18 inches of the ground, and the plants carefully taken up with a fork. They should be stood, roots upwards, in a dry shed for three or four days, and may then be stored for the winter in the most suitable place that the grower has at hand.

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fine soil or ashes, being then placed on the floor of an attic, spare bedroom, or even a shed. More roots will give greater trouble, and will probably winter best on the floor of a closed shed or outhouse. If the floor is at all damp, some rough boards should be laid on it, or perhaps a good layer of straw would meet the case. On this some dry soil should be placed, the Dahlias packed closely together thereon, and covered with other soil or ashes. Frost must be kept from the tubers, and they should be examined once a month to see that they are neither rotting through damp nor shrivelling through drought.

Step XIII.—How to Arrange and Preserve Cut Flowers.

If an arrangement of cut flowers is to remain in good condition over the longest possible period, it is essential that a few simple details be observed. The first of these is the health of the plant from which the flowers are taken. Blooms from an unhealthy plant, or one that is flagging from want of water, are scarcely worth cutting; they will die almost immediately. Closely related to this point is that of cutting when the plant and the flowers are at their freshest. This, in the case of the plant, will be early morning or evening, when the sun is not shining directly on it. With the flowers, the anthers determine the youth or age of the blossom, and its probable durability. If the yellow dust, called pollen, in the anthers is observable, it is a sign that the flower is approaching maturity, and will quickly fade.

Care should be taken to cut all flowers, *i.e.* none should be broken or pulled off. The Geranium blooms illustrated on page 48 show the value of cutting. The faded truss was pulled from the plant in the manner common to florists and gardeners generally, and at once placed in water. The other truss in the illustration was cut and similarly treated. The photograph was taken the following morning. Cutting is not sufficient with some flowers, *e.g.* Hellebores or Christmas Roses, and flowers with hard and woody stems. Of these the stems should either be slit up for a few inches from their base, or have the bark removed from the same portion. Any flowers that are pulled or broken should be cleanly cut before placing the stems in water.

Flagging flowers may be revived by placing the ends of the stems in quite hot water, nearly boiling, for a few

minutes. This will soften the ends of the stems, which should be cut off before arranging the flowers. A few drops of liquid ammonia in warm water will hasten the revival of cut flowers which have been packed and posted.

Many flowers, notably such as are arranged in long spikes,



FIG. 21.—BUDS OF SHIRLEY POPPIES AT THE RIGHT STAGE FOR CUTTING.

like the Lily and Gladiolus, may be cut when only the lowest bloom on the spike is expanded; the buds will open in water if the ends of the stems are cut off on alternate days, and the water is occasionally changed. Sweet Peas, Phloxes, Godetias, Mallows, Primulas, Cinerarias, and Poppies will all open their buds in water. In fact, by far the best way to deal with Shirley Poppies is to cut them in the bud state: they will then travel quite safely, and open in water as well

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as if on the plant. The illustrations show Poppy buds so treated, the flowers expanding on the morning following their insertion in water.

In arranging cut flowers, the two great faults to avoid are overcrowding, and using too many colours. The individual flowers should stand sufficiently clear of each other to show their respective shapes, and, as a rule, not more than two colours, besides foliage, should be used. Nor should



FIG. 22.—POPPY FLOWERS WHICH OPENED IN WATER.

the shape of the flowers employed vary too greatly, *e.g.* Lilies and Chrysanthemums are scarcely likely to make a happy combination.

Foliage is an important consideration, and with very many plants there is no foliage that suits the flowers better than their own; Carnations, Daffodils, and Roses are good examples. Maidenhair Fern is far too generally used, to the exclusion of other pretty and often more suitable foliage. In most cases it will be found best to place the foliage in position before arranging the flowers; it will then help to keep the latter in position. It is very annoying, after having

completed a nice arrangement of, say, Sweet Peas, to upset the whole affair by introducing what is deemed to be necessary foliage. Many persons arrange a mass of bright colour in a vase, and then tone it down with greenery. Much the better



FIG. 23.—GATHERING GERANIUMS.

The left hand stem was pulled, and the truss is flagging: the right hand stem was cut, and remained fresh. (See p. 45.)

way is to place the greenery in position, and then build up to it; this is invariably nature's way.

There are many mechanical aids to floral arrangement on the market, and there is no question that some of them greatly facilitate and improve the decorator's work. They should

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be sparingly and carefully used in vases of clear glass, as should the very handy twisted lead strips that one can make at home, and the equally helpful wet sand. In opaque vessels the latter is one of the best aids the decorator can employ, as not only can stems be arranged in it as desired, but it prevents vases, etc., from being readily tipped over. Wire may be sparingly used to hold long-stemmed flowers in position, but no abuse of it should be tolerated.

From time to time various chemicals and secret preparations have been placed before the public with claims to increase the longevity of cut flowers. None is, however, worth the money charged for it, and it is very doubtful if anything will preserve flowers in good condition better than clear water. A few drops of ammonia are useful in preventing bad smells arising, particularly when Mignonette, Wall-flowers, Stocks, and the Cabbage tribe in general are used. Charcoal will accomplish the same end; but salt, carbonate of soda, alum, and camphor are useless.

Cutting off a small portion of the stems daily, renewing the water at the same time, and keeping the flowers out of draughts on the one hand, and dry, hot places near fires on the other, will do much to prolong the life of cut flowers. It is also advisable to remove them from living rooms when the gas is lighted, and stand them in a cool place. A daily damping with clean water from a scent spray will aid in maintaining freshness.

Step XIV.—How to Have a Gay Garden for 2s. 6d.

WITH almost all the hardy and half hardy annuals obtainable in penny packets it becomes an easy matter to have a garden gay with flowers for 2s. 6d.

All may be raised in the open garden, from the middle of April until the end of May, and will give a long succession of flowers in beds, borders, on fences, or over arches. The covering of fences and arches may be entrusted almost entirely to Sweet Peas, and we may well set 6d. apart for the purchase of six packets of these popular annuals. Two other climbers in the Japanese variegated Hop and Nasturtiums will leave us with 1s. 10d. to purchase twenty-two different sorts of flowers for beds and borders—surely sufficient to satisfy the most exacting!

Even with twenty-two different annuals to purchase we shall find that many really good and choice things have to be left out of our list. Still, the selection must be made, and the following will be found to comprise plants of all colours and heights, and suitable for all positions: *Tagetes signata pumila*, *Scabious*, mixed or *King of the Blacks*; *Mignonette*, *Kochia scoparia*, *Saponaria Calabrica*, *Phacelia campanularia*, *Helichrysum*, mixed or *Silver Ball*; *Gypsophila elegans*, *Godetias Duke of York* and *Duchess of Albany*; *Ricinus Cambodgensis*, *Rhodanthe Manglesii*, *Shirley Poppy*, *Phlox Drummondii*, *Nigella Hispanica*, *Nemesia strumosa* Suttoni, *Ten-Week Stocks*, *Virginian Stocks*, *Asters*, *Clarkia pulchella*, *Delphinium Ajacis*, and *Lavatera trimestris*.

From this selection we may pick twelve sorts suitable for forming large beds, either alone or in combination. These are *Scabious*, 3 feet, various colours; *Tagetes*, 9 inches, bright orange; *Phacelia*, 9 inches, deep blue; *Phlox*, 12 inches, various colours; *Shirley Poppy*, 3 feet, various colours; *Ten-Week Stocks*, 12 inches, various colours; *Nemesia*, 12 inches, various colours; *Mignonette Miles' Spiral*, 12 inches; *Lavatera*, 3 feet, rose purple; *Helichrysum Silver Ball*, 2 feet, white; *Godetia Duchess of Albany*, 12 inches, white; *G. Duke of York*, 12 inches, vivid carmine; and *Asters*, *Victoria*, 18 inches, various colours.

Six sorts suitable for small beds would be *Virginian Stocks*, 12 inches, various colours; *Saponaria Calabrica*, 6 inches, deep rose; *Rhodanthe*, 12 inches, rose and yellow, everlasting; *Nemesias*, *Tagetes*, and *Phlox Drummondii*. Most of these can be used as edgings or carpetings to taller subjects, also for the front row of a border. *Delphinium Ajacis*, *Kochia scoparia*, and *Ricinus Cambodgensis* make excellent dot plants for these low growing annuals. The *Delphiniums* can be had in mixed colours, 2½ feet high, or in dwarf double blue or white forms, 18 inches high. *Kochia scoparia* grows about 2 feet high, is green during summer, but bronze or crimson coloured in autumn; it has light, feathery foliage. The *Ricinus* will grow to 4 or 5 feet in good soil, and produces large, vivid crimson leaves.

Returning again to our twenty-two packets, we may select the following twelve for growing in clumps in the border: *Nigella*, 9 inches, blue; *Gypsophila*, 12 inches, white, splendid for cutting; *Clarkia*, 18 inches, rosy purple; and *Delphinium*, *Kochia*, *Ricinus*, *Lavatera*, *Stocks*, *Shirley Poppies*, *Phacelia*, *Scabious*, and *Mignonette*. In addition to these, any plants left over from bed filling may well be utilised in the border.

The bulk of the plants enumerated may be sown where they are to flower, but as this system is generally inconvenient, owing to other plants occupying the sites at sowing time,

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it is preferable to sow seeds on a separate border, and transplant the seedlings to the beds when both are ready. Poppies and Mignonette transplant very badly, even when great pains are taken, so it is well to sow seeds in their flowering quarters as early in April as circumstances permit.

For all other seeds, including Sweet Peas, a narrow sunny border, with a slope to the south if possible, should be chosen. Fork the seed bed over lightly, and add plenty of leaf mould and road grit if the soil is at all heavy. All the seeds should be sown in drills, which should be very shallow, the depth varying with the size of the seed, and about 3 inches apart. Make the bed fairly firm, protect from cats and birds, and transplant the seedlings 3 inches apart all ways as soon as they begin to crowd each other in the rows. It is not necessary to prick out the small growing plants singly, as several in a clump give a finer and quicker effect. One transplanting should suffice to prepare the plants for permanent positions, to which they should be transferred in showery weather.

The beginning of April is soon enough to commence sowing the hardiest kinds; the second or third week in the month will best suit the others, the majority.

Step XV.—How and When to Bed Out.

BEDDING out, in its strictest sense, only applies to putting out plants for summer flowering in the garden. Autumn and spring bedding are also practised, but, as the plants employed are already in the open, their insertion in their flowering quarters is not called by gardeners bedding out.

The time for bedding out may well be allowed to depend upon the season more than is often the case. The last week in May is the period most generally favoured, spring frosts having by then usually said their adieux; but it is unwise to adhere religiously to this date, irrespective of weather conditions. A cold north or east wind frequently does as much harm to tender bedding plants as a moderately severe frost, and if such prevail at the appointed time for bedding out, the plants may well be kept where they can be protected a little longer.

In all cases, the hardiest subjects should be put out first, such as Geraniums, Fuchsias, Marguerites, *Centaurea ragusina*, *Cineraria maritima*, *Koniga variegata*, Petunias, and Lobelias leading the way. Both hardy and half hardy annuals may also be put out early, the rear being brought up

by Begonias, Coleuses, Alternantheras, Heliotropes, Mesembryanthemums, Dracaenas, and what are generally termed subtropical plants. If the bedding out is finished by the end of the first week in June, or even of the second week, it will probably be quite as successful and early in effectiveness as that of the man who finished before May was out.

Adequate hardening off is half the battle in bedding out, and properly hardened plants will grow away from others twice their size if the latter are put out from a warm place. What may be termed progressive hardening off should be adopted, viz. a steady progress from warm propagator to close greenhouse, from close to airy greenhouse or a position near the door, thence to close frame, well aired frame, frame with the lights off, and finally a sheltering wall. Even standing plants closely together in batches in the open may be recommended as a hardening process where no wall or similar shelter is available. Plants so hardened should take the field in a condition to throw down the gauntlet of defiance to all but the bitterest wind, the most unseasonable frost.

If the beds have been well and properly dug, the actual placing of the plants in the soil should take but little time. There is no need to dig large holes with a trowel in a freshly turned bed. Just insert the trowel up to its handle, give it a strong pull forward, insert the plant in the opening thus made, firm and level the soil, and pass to the next specimen. Firm planting is essential for all plants, especially Geraniums and others which run to leaf at the expense of flower in loose soil. Again, firmly inserted plants preserve their equanimity in the face of a twisting, loosening wind in a manner denied to their less securely planted brethren.

It is always advisable to lay out all the plants on the bed or border in the positions they will ultimately occupy before planting is done. Not only will this frequently suggest slight improvements, rearrangements, or modifications of the original scheme, but it will show if a sufficient number of plants is available to well fill the space. One of the greatest annoyances of bedding out is that of removing planted specimens from a bed because the supply runs short when bare spaces still remain to be filled. If there is a superfluity, plant two weak specimens as one, and so strengthen the whole arrangement.

Feet, even large sized ones, readily sink into the loose surface of a newly dug bed, and it is well to give them no opportunity. A fairly long and wide board should be used for standing on when planting; or two short ones, one for each foot, may be even better. The impress of the boards should be removed as planting proceeds with the trowel, so that the surface of the bed presents a fine and level appear-

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ance at the finish of the operation. A careful planter will remember the edges of the bed, if in grass, while planting; but should these suffer at all, the edging iron should be brought into play, and an even edge secured. To show this to advantage, the soil near it must be removed with the Dutch hoe, throwing the cleared portion to the centre of the bed.

In some seasons the soil is so dry and dustlike at bedding out time, that holes fill again as fast as they are made with the trowel. In such cases the bed should be well watered at night and planted the following morning. In all seasons watering in of bedding plants is advisable, as this causes the soil to settle round their roots, and creates conditions favourable to growth. If cold winds are being experienced, and planting is finished towards evening, the soil only of the beds should be wetted. Damping the foliage of a plant lowers its temperature, and unless the atmospheric conditions are favourable to drying the leaves may remain wet and cold all night, thus giving the plants a decided check. When beds are planted early in the day a gentle spraying overhead is beneficial, as it prevents excessive transpiration, and so enables the plant to better set about repairing any injury done to its roots.

Step XVI.—How to Have a Well Stocked Herbaceous Border.

IN order that an herbaceous border should fulfil its mission of providing flowers for garden decoration and vase-filling practically all the year round, special pains must be taken in its preparation and planting. The site should be trenched where possible, and a good layer of well decayed farmyard manure worked in with the second spit. This should be done some time in advance of planting, so that the soil may have a chance to become sweetened and pulverised.

Planting is best done in October or November; failing then, it is well to wait until the end of February or the beginning of March. Nearly all perennials move well at either of these periods, though there are some few, such as the old Madonna Lily, Pyrethrums, and German Irises, that are best planted as soon as flowering is over. A time should be chosen when the surface of the soil is fairly dry, as not only is planting in sticky soil unpleasant, but it cannot be properly carried out, owing to the mould adhering to places where it is not required. Planting should be little

deeper than the point which the collar of the plant shows was previously practised, though it is always well to plant thus deep, as newly worked soil will settle down a good deal. Firm planting is essential to success, but the surface soil



FIG. 24.—OLD FLOWERING BRANCH OF YELLOW ALYSSUM WITH YOUNG GROWTH SUITABLE FOR A CUTTING.

should be lightly pointed over with a fork after treading is finished, in order to let air and rain in freely.

Any large clumps may be divided at planting time, splitting them up cleanly with a sharp spade or axe, and retaining the outside portions in preference to the wornout centre part. When division is not practicable or advisable, increase

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may be effected by making cuttings of the young growths, in the manner shown in the illustrations (Figs. 24, 25, 26, pages 54, 55, 57). This work is best done in spring, or when the growths are a few inches long. They should be prepared

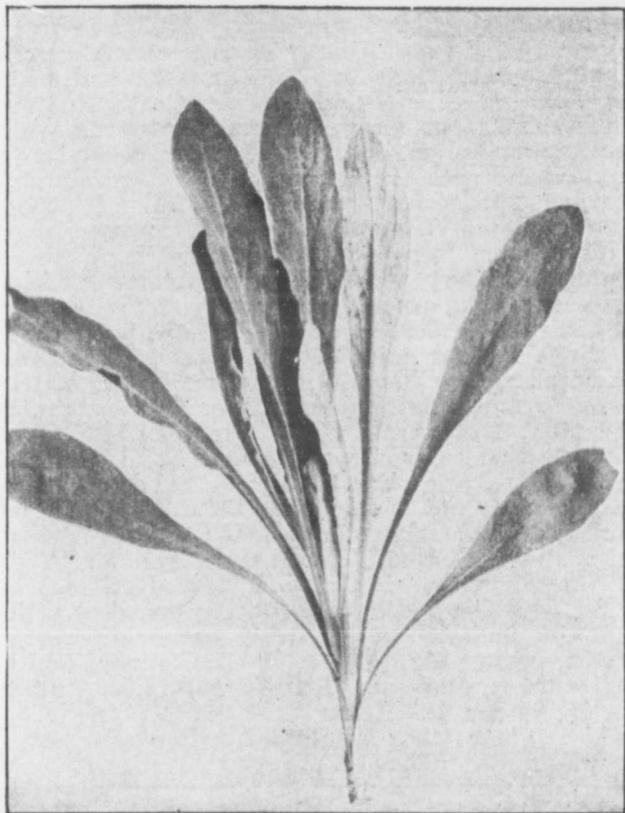


FIG. 25.—YOUNG GROWTH OF ALYSSUM PREPARED AS A CUTTING.

as shown in Figs. 25 and 27, and inserted closely, in rows laid with sand, in a semi-shady border. When rooted they should be transferred to their flowering quarters. Michaelmas Daisies, Phloxes, Chrysanthemums of all sections, Alyssum, Arabis, Forget-me-nots, Violas and Pansies, Sweet Williams, and very many more plants, may be so increased.

Gaps will appear in the best planned herbaceous border,

therefore a few packets of showy and easily grown annuals should be reserved for their filling; in fact, places may well be left for some of them, especially Sweet Peas and Shirley Poppies. The value of bulbs should not be overlooked, and many a border owes much of its brightness to a liberal planting with bulbs which have been gently forced in the greenhouse. Nor should plants with pretty foliage be forgotten, as their value for vase filling is very great. A selection of the *Thalictrums* or Meadow Rues, annual and perennial grasses, *Achillea Millefolium*, Fennels, Goat's Rue (*Galega officinalis*), Tansy or Ginger Plant (*Tanacetum vulgare*), *Aquilegias* or Columbines, *Spiraea Filipendula*, hardy *Geraniums*, and such shrubs as *Berberis Aquifolium*, *Symphoricarpus racemosus*, *Jasminum officinale*, variegated Japanese Honeysuckle, and Japanese Maples, will give a great diversity of foliage suitable for cutting.

Of plants for the general filling, the following will give a display over a long period, and will be found suitable for all positions in the border. Plants for the first and second rows: *Ajuga reptans* and *A. Genevensis*, blue; *Anemone Alpina sulphurea*, yellow; *A. nemorosa*, white; *A. narcissiflora*, cream; *A. Apennina*, blue; *Campanula Garganica* and *C. pulla*, blue; *C. glomerata pusilla*, blue or white; *Claytonia Sibirica*, pink; *Gentiana acaulis* and *G. Bavarica*, blue; *Cyclamen Coum*, rose; *Erinus Alpinus*, pink; *Erythronium Dens-canis*, pink and white; *Aster Alpinus*, purple; *Corydalis lutea*, yellow; *Erigeron aurantiacus*, orange; *Geranium Endressi*, pink; *Meconopsis Cambrica*, yellow; *Forget-me-nots*, *Primula cortusoides*, pink and white; *Saxifraga Hostii*, white, dotted pink; and *Senecio Doronicum*, deep yellow.

Plants for the third and fourth rows: *Achillea Ptarmica* The Pearl, white; *Armeria cephalotes*, pink; *Aquilegias*, various colours; *Amaryllis Belladonna*, pink; *Anthericum Liliastrum*, white; *Aster Amellus*, blue; *Gypsophila paniculata*, white; *Cheiranthus Marshallii*, yellow; *Dielytra spectabilis*, pink; *Doronicum Austriacum*, yellow; *Centaurea montana*, blue; *Eucomis punctata*, greenish white; *Gillenia trifoliata*, pink; *Geum coccineum*, scarlet; *Hieracium aurantiacum*, orange; *Funkia grandiflora*, white; *Gentiana Andrewsii*, blue; *Geranium sanguineum*, red; *Lychnis Viscaria flore pleno*, rose; *Monarda didyma*, red; *Polemonium coeruleum*, blue; *Ranunculus aconitifolius*, white; *Muscari comosum monstrosum*, violet blue; *Papaver nudicaule*, various colours; *Primula Japonica*, rose; *Senecio pulcher*, rose and *Tradescantia Virginica*, blue and white.

Plants for general filling in: *Campanula persicaefolia*, white; *C. Trachelium*, blue; *Bocconia cordata*, white; *Galega officinalis*, white and lilac; *Lysimachia thyrsoides*,

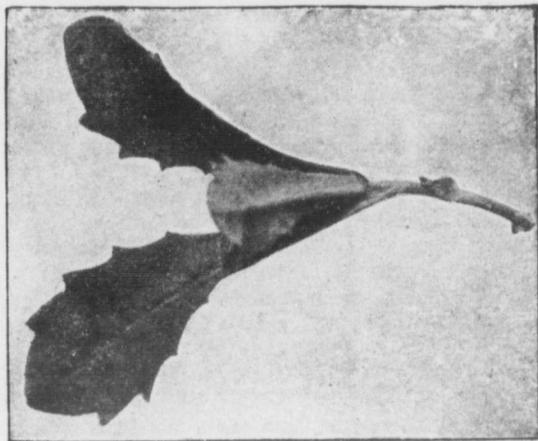


FIG. 27.—THE SAME SHOOT MADE INTO
A CUTTING.



FIG. 26.—A SHOOT OF DOUBLE ARABIS AS SEVERED
FROM THE PLANT.

yellow; *L. clethroides*, white; Irises in variety; *Baptisia Australis*, blue; *Lupinus arboreus*, yellow; and *L. polyphyllus*, blue and white; *Phloxes* in variety, *Rudbeckia grandiflora*, yellow and purple; Tree Paeonies in variety, Lilies in variety, *Gladioli* in variety, *Montbretias*, red and yellow; *Delphinium formosum*, blue, and named varieties; *Chrysanthemum maximum* and *C. uliginosum*, white; and *Kniphofias* or *Tritomas*.

Plants for the back row: *Epilobium angustifolium*, rose; *Solidago speciosa*, yellow; *Echinops commutatus*, white; *Cnicus altissimus*, purple; *Centaurea Babylonica*, yellow; *Eremurus robustus*, pink; *Helianthus* Miss Mellish, *Rudbeckia Golden Glow*, and *Helianthus giganteus*, yellow; *Lilium giganteum*, white and purple; and *L. pardalinum*, orange.

Step XVII.—How to Grow Climbers.

APART from the utilisation of space that would otherwise go unadorned, there is no question that the judicious employment of climbing plants in the garden adds greatly to its attractions. If we confined ourselves to climbers in the strict sense of the word, *i.e.* those plants, like the Ivy and self-clinging Virginian Creeper, which attach themselves to supports, our choice would be very limited; but when we take the word "climber" in its widest or garden sense, the wealth of material at our disposal becomes almost embarrassing.

Very little of it is, however, utilised. We see the same climbers in garden after garden with a regularity that would be monotonous did not the very frequency of their appearance enable us to institute useful comparisons—comparisons between climbers possessing flowers and foliage in profusion, and climbers of the same species or variety conspicuous chiefly by reason of bare stems, and evidently only one step removed from the rubbish heap.

A well grown climber is a joy to its owner; a poor one is an eyesore, and, on account of its harbouring insect and fungus pests, a menace to other plants. Unsuitable positions are responsible for many climber failures, unsuitable soil and bad pruning for still more; but unskilful or improper planting has probably killed more climbers than all other causes combined. This is more particularly true of climbers planted against house walls. Rarely is the site properly prepared, either in the matter of size and width,

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or the addition of suitable soil, and still more rarely is the garden hose or liquid manure can brought to assist the unhappy climber when it is making its annual summer fight against drought, mildew, and red spider.

No climber planted near a house wall should have less than a cubic yard of space provided for its roots. If the staple soil can be removed to this extent, and old chopped turves and well decayed manure substituted, so much the better. Failing this, the ground should be dug to the extent advised, and as much good soil as possible given for the plants to make a start in. If a gravel walk meets the house wall, a few ornamental tiles may well be set in a semicircle round the bed that holds the climber; this will greatly facilitate watering and feeding, which must be done with no stinting hand, otherwise will the good work which started with the bed be nullified.

Unless a wall faces west, it is rarely that a creeper receives much atmospheric moisture in summer, certainly not a tenth part of what it requires to thrive on.

This being so, weekly soakings may well be the rule all through the summer, utterly ignoring the rainfall. After the soaking, a few gallons of liquid manure should follow, and there is little better for this purpose than house slops, which may, in this case, be used as collected. If, several evenings



FIG. 28.—A CLEMATIS WELL PRUNED.

Note the leafage from bottom to top.

per week in dry weather, the garden hose is requisitioned to give the climbers a good washing, their vigour and floriferousness—especially those on a south wall—will be a revelation.

Tying and nailing are operations which need not be

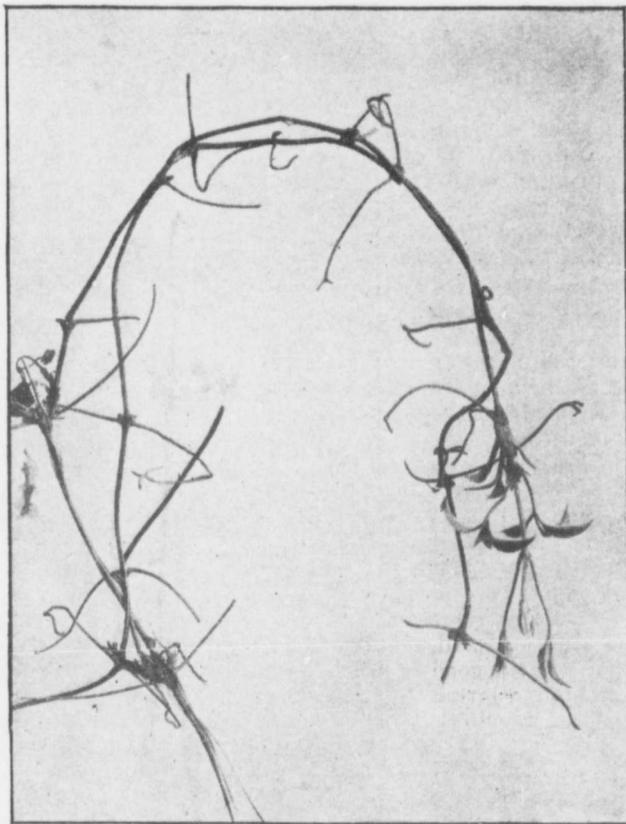


FIG. 29.—A CLEMATIS BADLY PRUNED.

Note the extent of bare stem.

dilated upon, but pruning is a different matter. The sort of growth a typical climber, the Clematis, makes when unpruned may be seen in the illustration, Fig. 29, above. What the same plant will do when properly cut back in autumn or winter the companion illustration, Fig. 28, shows. The Clematis here figured is of the lanuginosa section, which,

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with the well known *Jackmanii* and *Viticella* groups, should be cut hard back, say to within a yard of the ground every year. Clematises of the other sections, such as *patens*, *Florida*, and *montana*, flower on wood made the previous year, so should only be pruned to make necessary room for laying in new wood.

Another illustration of a *Clematis* is given to convey a further lesson in pruning and training. Even when a climber has been so far properly planted and tended as to have covered a house wall with flower and foliage, it is rarely indeed that it carries either leaf or blossom within a yard or two yards of the soil. Such was the case with the plant shown in illustration, Fig. 30, page 62. It is a *Clematis montana*, and though it annually wreathed a house front in white blossom, the display terminated with painful suddenness within 6 feet of the ground.

This is characteristic of the vast majority of climbers met in gardens, and has come to be looked upon as a natural sequence to planting a climbing plant against a house. How easily such a state of affairs may be rectified is well shown in the companion illustration, Fig. 31, page 63. This photograph was taken within four months of the other, and the metamorphosis was effected by simply training new shoots downwards, instead of allowing them to follow their own sweet will, and climb towards the sky. As all the shoots trained over the bare space will flower in the spring, the improvement effected in a house front by this simple means may be imagined.

Of course, all climbers are not so tractable as the Mountain *Clematis*, but many annually yield shoots just as readily trained in any desired direction. Where they do not, a few strong shoots should be encouraged near the ground, and cut back to a point where the side shoots which cutting will originate may be disposed to the best advantage. The *Rose* is an excellent example of plants that may be treated in this way; many varieties of climbing *Roses* annually produce gross, thorny, sucker-like growths from near their base, which, if cut back as suggested, would yield side shoots sufficient to cover several square yards of wall space.

The early training of all climbers should be so conducted as to well and expeditiously cover as much space as possible, remembering the lower as well as the upper part of the wall. When available space is filled, subsequent pruning will consist of removing old wood in favour of new when dealing with plants which flower on shoots made in the previous year; and in spurring in, to a few eyes, all new growth made by plants whose flowers are borne on spring or summer shoots of the current year.

Step XVIII.—How to Stock and Manage the Cold Greenhouse.

THE cold greenhouse may be considered as the big brother of the cold frame, but, like most big brothers, it can be



FIG. 30.—CLEMATIS MONTANA BARE AT THE BASE.

trusted with many more things than its smaller confrère. In the first place, its cubic capacity is considerably greater, and therefore it is more airy, and less likely to become damp in winter. Then it is generally somewhat warmer than the

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cold frame, and allows of readier and more pleasant access to its occupants.

It does not attempt to compete with the warm greenhouse in the variety of exotic plants cultivated, but it gives far



FIG. 31.—CLEMATIS MONTANA AFTER ONE SEASON'S CORRECTION OF THE BASAL BARENESS.

less trouble in winter, and may be almost, if not quite, as gay if well stocked and intelligently managed. Its two great bugbears are cold and damp. The first is set at nought by only cultivating such plants as will bear a cold snap without a shiver; the second is robbed of its terrors by careful watering and judicious ventilation. As the temperature of the

inside of a cold greenhouse varies little from that outside, it is possible to open its ventilators in weather that tightly closes those of its heated brother. Apart from the existence of a dense fog and the actual presence of frost, the ventilators in a cold greenhouse, if placed so that cold winds can be avoided, may be opened a little every day in winter.

Watering in winter will be scarcely worthy of the name, many of the plants going a fortnight or three weeks on one application. This indifference towards water will generally allow the cultivator to select a sunny morning for giving what moisture is necessary. And only what is actually necessary should be given; there should be no over-filling of pots or slopping on the floor. When the watering is finished, open should go the ventilators, or at least those on the sunny side of the house, and half an hour later all water that has drained from the pots should be mopped up. A cemented floor will facilitate this operation. Care should be taken not to water the foliage, and every decaying or decayed leaf should be removed. If left it attracts moisture, and generates a white mould, which quickly does damage.

Should any plants get frozen, they should be shaded from sunshine with a heavy mat, and well syringed with ice-cold water. This will induce a gradual thaw, and the plant will suffer no harm. It is better, however, to keep frost at bay by laying a few mats on the glass on cold nights. This will keep out about 20° of frost.

Upon the stocking of a cold greenhouse its success or failure largely depends, and the subject should have careful consideration by the prospective owner or builder. Trouble is invited by hankering after such plants as are generally accommodated in a warm structure, and, however great the temptation to have a few of these, it should be resisted. The attempt to grow those few will result in great injustice to the many. Some ultra clever cultivators successfully keep such plants as Heliotropes, Geraniums, Abutilons, Fuchsias, Lobelias, Coleuses, and other legitimate warm greenhouse subjects in a cold house in winter, and this proves that it can be done; but it is best not attempted by novices.

Dutch bulbs, or what are known as such, are perfectly fair game, and Tulips, Hyacinths, Narcissi, Crocuses, Snowdrops, Scillas, Spanish Irises, Chionodoxas, St. Brigid Anemones, Fritillarias, Dog's Tooth Violets, Ranunculuses, Lilies, Spiraeas, Lilies of the Valley, and Ixias may all be employed in quantity.

Such shrubs as Rhododendrons, Deutzias, *Choisya ternata*, Kalmias, Guelder Roses, Lilacs, pot Roses, *Laurustinus*, the ornamental Pyruses and Prunuses, *Pernettyas*, *Skimias*, Winter Cherries, Azaleas, Heaths, *Epacris*, *Daphnes*,

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and many others will give a wealth of flowers in early spring, and, as they will not be unduly forced, may be expected to bloom every year if well exposed outdoors in summer. As winter approaches, the pots should be plunged in ashes outdoors, and brought in as room is found for them. Repotting should be done when new growth succeeds flowering.

Of plants for general purposes, the various British and exotic hardy ferns will be found among the most useful. Such native evergreen ferns as the Hartstongues, preferably the crested forms; *Polypodium vulgare* Cambricum, *Aspidium Lonchitis*, *A. angulare*, *A. aculeatum*, in their tasselled or fringed varieties; and their exotic relative *A. falcatum*, the deservedly popular Laurel fern, may be grown in pots all the year. So, too, may the American Maidenhair, *Adiantum pedatum*; *Asplenium bulbiferum*, *Onoclea sensibilis*, and *Struthiopteris Germanica*. Many others may be grown in outside borders, and lifted and potted when wanted. The best stage at which to pot up such ferns is just before the fronds commence to unfold, then they are quickly in full beauty. When shabby, such ferns should be again planted out to recuperate.

This question of lifting plants is a very large and important one, and where a well filled garden can be drawn upon, the cold greenhouse need never lack flowers in late winter, early and late spring, and early summer. Some cultivators prefer to lift and pot selected plants in autumn, plunging the pots during the winter in ashes, and taking them in as required. This is a good plan with the very early flowerers, such as Christmas Roses or Hellebores, yellow winter Jasmine, Winter Heliotrope (*Petasites fragrans*, a gem for the cold greenhouse); Snowdrops, and Crocuses, but with later flowering plants it is not essential, as many of them can be lifted when in bud, and will give a good account of themselves if well watered, and shaded a little, should the sun be bright.

Wallflowers have been lifted and potted when the flower buds were quite large and coloured; despite this, the plants bloomed for several weeks. Hellebores, Polyanthuses and Primroses, Violets, Auriculas, Dielytras, Doronicums, Brompton Stocks, Forget-me-nots, double Daisies, Hepaticas, and practically all bulbous plants, such as Snowdrops, Tulips, and Daffodils, may be lifted and potted when the flower buds have formed, or even, in some cases, when the flowers are expanded.

Chrysanthemums should be grown in quantity, particularly the late varieties, and a few dozens of Michaelmas Daisies in small pots will also be useful. Roses, again, do

well in the cold greenhouse; tuberous Begonias may be grown on a large scale in summer, and pot Conifers, green and variegated, will be found invaluable in winter. The latter can be plunged in the garden during summer. Hardy annual grasses, such as the Haretail, *Lagurus ovatus*; Quaking Grass, *Briza maxima*; Job's Tears, *Coix lachryma*; and Mist Grass, *Agrostis nebulosa*, may be raised from seed, and will be useful for foliage, as will a few pots of Creeping Jenny, variegated Periwinkle, variegated Ground Ivy, and *Thalictrum adiantifolium*; the latter is an excellent substitute for Maidenhair Fern.

The roof should not be overlooked, for there are many beautiful climbing plants available for covering it. Blue and white Passion Flowers are splendid, as are *Lapageria rosea*, and its white form. *Plumbago Capensis* will thrive, as will *Solanum jasminoides*, Clematises in variety, *Cobaea scandens*, and climbing Roses.

Primula obconica is a charming plant for the cold greenhouse. So, too, are *P. malacoides*, *P. Kewensis*, and *P. verticillata*, all beautiful flowering plants. They are easily raised from seed sown in May.

Step XIX.—How to Manage the Warm Greenhouse.

WITH a properly heated, lighted, and ventilated greenhouse there are few plants which an intelligent amateur gardener need fear to tackle. Even those which are reputedly hard to grow should be taken in hand, for in their ranks are many of the choicest greenhouse subjects, while the fact that one possesses a plant that baffles the skill of a neighbour adds a zest to gardening which is worth an effort to realise.

Hot-water pipes and an efficient boiler are so superior to any other system of heating a greenhouse that there is no need to look beyond them when the structure is anywhere in the neighbourhood of 12 feet by 8 feet. Smaller houses than this are often heated by oil and gas stoves, and many of these, when intelligently handled, are good. The great thing with them is to practise perfect cleanliness, burn the best oil, and allow for the escape of fumes.

The management of a hot-water boiler and pipes is extremely simple. Care should be taken to keep the furnace bars clear, the flues free from soot, and the feed cistern always half full of water. Too great a bulk of firing is

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a mistake; it is apt to get out of hand, especially on the sunny mornings which frequently follow frost, and, moreover, does not give, proportionately, so much heat as a furnace only half full of fuel. Sharp bends in pipes are best fitted with a small air tap, to allow of the escape of any air which the circulation of water causes to collect at such places. Unless this air is got out of the pipes, circulation is impeded, and the pipes get cold beyond the bend.



FIG. 32.—AN OLD ASPIDISTRA TURNED OUT OF ITS POT,
AND READY FOR DIVISION.

(See page 69.)

Temperatures will vary with the subjects grown, but a minimum night temperature of 45° should be maintained in winter if plants are to flower then. As the spring advances, gradual rises of 5° by night should be allowed until a minimum temperature of 60° is reached. At this stage the propagation of most plants may be undertaken, as when the house is properly damped down, a warm, humid atmosphere will be obtained. With the sun gaining power, increase in the temperature will be so rapid that some means will have to be adopted to prevent the heat rising to a dangerous degree. This is accomplished by fitting a roller or other blind outside the glass roof, to be lowered when

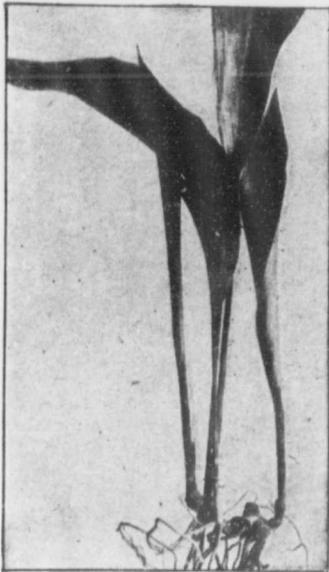


FIG. 33.—A PORTION OF AN OLD ASPIDISTRA.

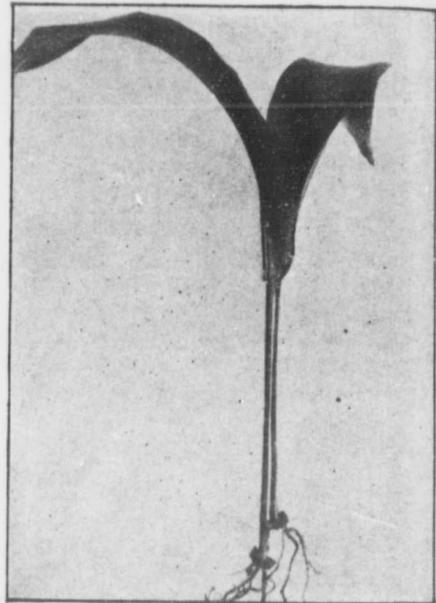


FIG. 34.—SINGLE LEAVES OF ASPIDISTRA DETACHED.

the sun is at its brightest. The blind should not, however, be lowered until the sun shines fully on the house, and should be raised again immediately it has left the glass. This, with throwing plenty of water on the floor and walls, syringing between the pots, and opening the door and ventilators fully, should keep the house reasonably cool on the hottest day.

As before mentioned, propagation may start when the night temperature reaches 60° , which will be fairly early in spring. Cuttings and seeds are the chief methods of propagation employed, and the treatment of the former is fully described in Step XXV. Seeds are sown in pots when in small quantities, and in pans or boxes when large numbers of seedlings are required. In all cases the receptacles should be well drained by placing large crocks in the bottom, covered with a layer of smaller ones, and on these the rougher portions of sifted compost, or a few half decayed leaves. Sandy soil should always be employed for seed raising; the seeds should be sown as thinly as possible, and never covered with soil beyond three times their own depth. Many fine seeds, such as Begonias and Primulas, need no

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covering of soil—nothing but a pane of glass placed over the pan after sowing. Seeds are best raised in the shade and dark, but the seedlings should have all the light possible, short of direct sunshine, from the time they make their first appearance. Shading should follow each transplantation and repotting.

Division is another favourite method of propagation. The extent to which it may be practised must depend largely upon the plant operated on, and the amount of increase desired. An extreme case of division is shown in the illustrations herewith given (pages 67, 68, 69) of an *Aspidistra*. Here a plant is turned out of its pot, and the rhizome or thickened rootstock which connects its leaves is severed, until each leaf stands apart as an individual with a few roots. The leaves thus treated are then made up into potfuls according to their size, large and small leaves being kept separate, or used with the tall ones in the centre of the pot, and the small ones surrounding them. Each leaf, under good treatment, will push a new one in a short time, and some capital pot plants will be obtained. Many ferns and grasses, *Anthericum*, *Cypripedium*, *Primulas*, *Eucharises*, and bulbous plants generally may be divided in varying degrees.

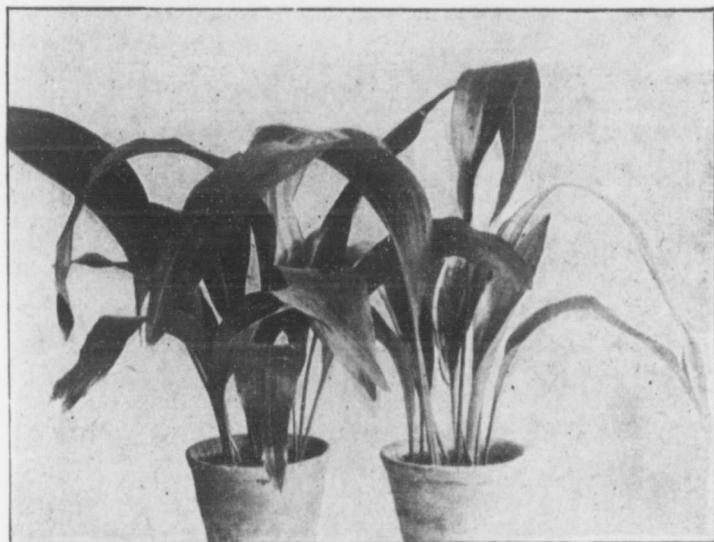


FIG. 35.—ASPIDISTRA LEAVES POTTED TO MAKE NEW PLANTS.

In whatever way a plant is propagated, an effort should be made to keep it stocky and well furnished with lower branches. Seedling plants, if well grown, branch out naturally early in their career, but many of them make much better plants if their tips are removed as soon as growth is a few inches high. This is called pinching, and its adoption is quite essential to the production of well formed, dwarf, and bushy greenhouse plants.

It is more especially applicable to plants raised from cuttings, and a glance at the illustrations will make the process and its results clear. If a Fuchsia cutting is inserted, it makes a more or less straight and unbranched stem. If its tip is pinched out as soon as growth proclaims rooting to have commenced, it will throw out side shoots, as shown on pages 71 and 72. These should be allowed to extend a few inches, as such extension will assist the rooting system, and then be pinched again. Just how many pinchings a plant should receive will depend upon its habit of growth, and the size of the pot in which it is flowered. If bloomed in a 5-inch or 6-inch pot, such as is intended with the plant illustrated, page 72, about three pinchings should be enough to secure a bushy, well balanced plant, and so on in propor-

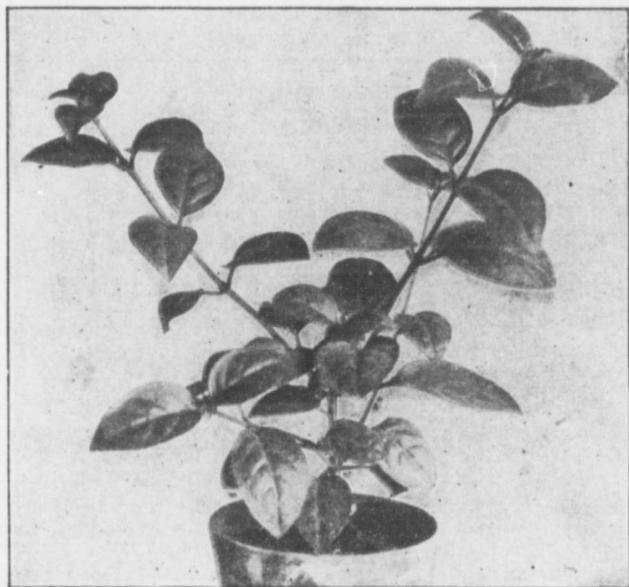


FIG. 36.—A YOUNG FUCHSIA GROWING LOOSELY.

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tion to the size of pot. The final pinching should be given about eight weeks before the plant is required to be in full bloom.

There are many greenhouse plants besides Fuchsias which are benefited by pinching, all such as Heliotropes, Petunias, Marguerites, Geraniums, Pelargoniums, Coleuses, Bouvardias, Salvias, Solanums, Abutilons, Eupatoriums, and Genistas being amenable to such treatment. Repotting, when necessary, should be done after new shoots have pushed from the pinched stems. Pinching should never be allowed to spoil the natural habit of a graceful plant. Its use is to build up a good foundation, on which the plant should be allowed to rear its own superstructure.

What are the best plants to grow in a warm greenhouse, with full details of their culture, may be learned from "Pictorial Greenhouse Management," price 1s. 2½d., cloth 1s. 9d., post free from Messrs. Cassell & Co.



FIG. 37.—THE FUCHSIA (FIG. 36) PINCHED.

Step XX.—How to Have Pretty Window Boxes.

CONSIDERING the ease with which a pretty window box can be made, and the small expense at which it can be kept filled the whole year round, it cannot be said that window box gardening receives its fair share of attention. In the country the neglect is generally more pronounced than in the town; and yet the countryman has material galore close to his hand, material which is practically inaccessible to the townsman.

Take the materials with which Nature alone provides the country dweller for window box making. Larch boughs,

gnarled Oak boughs, Fir cones, Oak galls, Acorn cups, Walnut shells, and Hedge Maple bark, to mention a few which readily occur. With these and a wooden box from the grocer's a handy man can turn out ornaments fit for a palace. Certainly there is no need to fall back upon cotton reels for ornamentation, as is sometimes done in villages.

As the box will have to stand a fair amount of rough usage, the sides and bottom should be securely nailed together.



FIG. 38.—A YOUNG FUCHSIA BREAKING AFTER THE SECOND PINCHING.

The bottom, too, should have a few holes burned through it with a poker, and if a wedge shaped strip of wood is fastened under the bottom at each end the life of the box will be considerably prolonged. A little consideration may also be given to the size of the box, as if this is narrow or shallow good results cannot be expected. A length of 18 inches, a width of 9 inches, and a depth of 10 inches will give a box capable of holding and sustaining three rows of plants. This size should be independent of the ornamentation, which may consist of any one or a combination of the materials

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mentioned, or virgin cork, stamped metal work, or fancy tiles.

Sufficient pebbles, broken bricks, or cinders should be placed in the box to cover the bottom, and a layer of dried moss, half decayed leaves, or, preferably, stable manure placed on this drainage, as it is called. The soil should come next, but should not be carried higher than within 1 inch of the top of the box. It will be well, too, to see that the soil used is the best obtainable, as it will have to feed many hundreds of hungry roots. Well decayed top spit from a meadow or common is the stuff to use, and if it contains plenty of fibre nothing but a little road grit need be added. If the soil is poor, mix in a third of its bulk of dried cow manure.

With regard to filling the boxes with flowers, much will depend upon individual taste. Boxes to give a spring display should be planted in October and November with such bulbs as Snowdrops, either alone or in conjunction with *Scilla Sibirica*, *St. Brigid Anemones*, *Crocuses*, such *Daffodils* as *Stella*, *Orange Phoenix*, *Poeticus ornatus*, *Victoria*, *Emperor*, and *triandrus albus*; *Hyacinths* such as *Grand Maître*, *Norma*, *Baroness Von Tuyll*, *Robert Steiger*, *Roi des Belges*, and *Marie*; and such *Tulips* as *Cottage Maid*, *Proserpine*, *Tournesol*, *Yellow Prince*, *Keizer's Kroon*, and *La Candeur*.

Those who object to bare soil all the winter may fill up in autumn with *Primroses* and *Polyanthuses*, *Violas* or *Pansies*, red and white *Daisies*, *Forget-me-nots*, *Silene pendula compacta*, *Wallflowers*, *Arabises*, *Aubrietias*, *London Pride*, and similar subjects; or they may depend upon such shrubs as *Golden Privet*, *Retinispora pisifera*, *R. p. aurea*, *R. plumosa*, *Cupressus Lawsoniana Golden Gem*, *Euonymus Japonicus* in its gold and silver variegated forms, *Aucuba Japonica*, *Laurustinus*, green and variegated *Box*, and *Veronica Traversii*. Trails of green or variegated *Ivy* will give a finished appearance to such boxes, and *Crocuses* will grow well between and in front of the shrubs if kept well supplied with water.

For a summer and autumn filling, planting should be done about the second or third week in May, and new soil should be given then to last the year round. The secret of success with summer window boxes is water in unlimited quantities, with liquid manure in alternation when the occupants have fairly got hold of the soil. Constant watering means hardening of the surface soil, and this should be counteracted by pricking the soil over once a week with a steel pronged kitchen fork.

So numerous are the plants available for filling summer

window boxes that only a brief reference can here be made to a selected few. Geraniums, Marguerites, Calceolarias, and Lobelias are, of course, standard fillings, but they should not be used to the exclusion of other things quite as pretty and showy. Fuchsias, especially such as Princess Beatrice, Flocon de Neige, Lucy Finnis, Frau Emma Topfer, Scarcity, and Charming, are among the best window box plants;

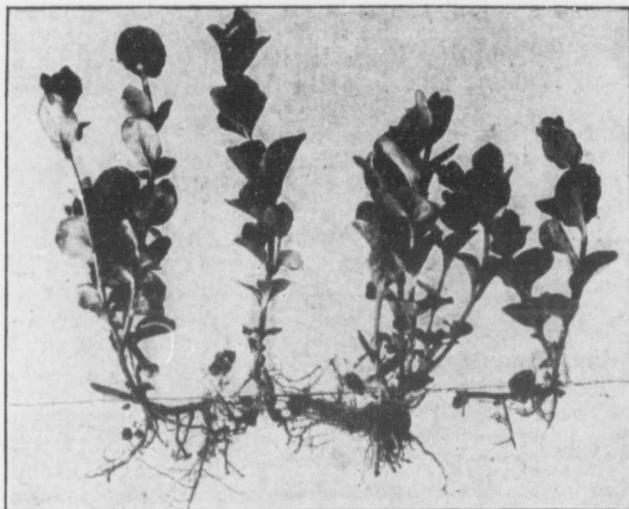


FIG. 39.—PORTIONS OF CREEPING JENNY READY TO PUT IN A WINDOW BOX.

Godetias, white and carmine in mixture; Verbena Miss Willmott, Ostrich Plume Asters, Schizanthuses, tuberous and fibrous Begonias, Scented-leaved Geraniums, Rhodanthe Manglesii, Ten-Week Stocks, Heliotrope, and Mignonette are all effective, attractive, and long lived.

To climb round the window frame, Coboea scandens, Canary Creeper, Nasturtiums, or variegated Japanese Hops can be used; while to drape the fronts of boxes Ivy-leaved Geraniums, Campanula isophylla alba, Sedum Sieboldii variegata, Creeping Jenny, green and variegated Tradescantia, and Gnaphalium decurrens are six useful plants.

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Step XXI.—How to Pot Plants.

THE welfare of a plant depends in a great measure on the manner in which it is potted. This is easily understood if we remember that it is from the soil that the plant gets most of its food and drink.

When we put a plant into a pot we owe it special care and attention, because we are growing it under unnatural conditions to suit our own purposes. An animal that is free may be able to find its own food, but an animal that is chained up or caged cannot provide for itself, and must be fed by its owner. So a plant that is growing in the open can not only spread its roots freely, but be watered by rain, whereas one in a pot under glass or in a room cannot extend at will, nor be watered from the clouds.

The stage at which to shift a young plant which has been raised from a seed or cutting into a larger pot is when it has filled its present one with roots. This can be judged fairly well by observing when roots push out of the drainage hole, but in case of doubt the best thing is to turn a plant out of the pot, which never does any harm if the soil is moist and the method of handling correct. The way to do it is as follows: Spread the fingers of one hand across the top of the pot, passing one on each side of the stem; turn the plant upside down, rap the edge of the pot on some hard substance to loosen the pot; then, taking hold of the bottom with the other hand, lift it right off. If the soil were very dry when this were done the soil would fall away directly the pot was removed, but if moist it will not do so; it will remain of the shape of the pot, with the roots running through it. If the roots are seen to be in two or three layers on the outside of the ball towards the bottom, the plant wants a larger pot.

It is a good rule, in repotting a plant, to allow an increase of 2 inches. Pots are made in various sizes, and from a 3-inch pot a plant may be shifted to a 5-inch, from a 4-inch to a 6-inch, from a 5-inch to a 7-inch, and so on. The pots should be clean both inside and out—inside, because otherwise the roots will cling tightly to the sides; outside, for the sake of appearances. They should be washed and stood in piles to dry before being used. If quite new they should be soaked in water for a few hours, and allowed to dry.

The first step is to provide for drainage. There is a hole in the bottom of each pot, the object of which may not be clear to a beginner. He may say: "Why not do without a hole, then the water will not escape, but remain in the pot, and so save trouble in watering?" The reason why this would

not do is that if water collected at the bottom of the pot it would soon become stagnant, and make the soil sour. The roots would then die, and the plant become unhealthy. When water is given to a plant in a pot it gradually soaks through the soil to the bottom and passes out, but it leaves the soil moist behind it, and that is all we want.

Having the hole we must cover it with something, otherwise the soil would block it; and this covering is called the drainage. Broken flower pots give excellent material. Choose a piece about twice the size of the hole, and put it in hollow side downwards; then put in a few smaller pieces in such a way that they overlap the large one. Cover these with $\frac{1}{2}$ inch of clean moss, a few flakes of leaf mould, or some of the lumps of soil. This "drainage" will allow water to pass freely, but it will not permit the fine soil to clog the hole. Sometimes the drainage becomes fouled by a worm working up into the pot. His presence is soon discovered by the soil becoming rolled. Mix a teaspoonful of mustard in some water, use it, and the worm will depart in haste.

When a plant has only passed a short period in a pot, it will not be necessary to remove any of the ball when re-potting; but in shifting a plant which has passed a long time in its previous pot, the old soil on the outside and at the base of the ball had better be carefully broken or cut away, as more fresh soil can then be got into the pot. Put a little soil over the drainage, set the ball on it in the centre, and then fill up all round it with fresh soil. Be careful to make this firm, otherwise the water will rush through instead of sinking slowly. Leave a space of 1 inch at the top for watering.

In potting bulbs, such as Hyacinths, Tulips, and Narcissi, the soil must not be made hard, otherwise the roots will not penetrate it freely, and the bulbs will be pushed up out of the soil. It should be moderately firm.

Step XXII.—How to Water Plants.

BREAD is often poetically termed the "staff of life," and the same simile may well be applied to water in connection with the growth of plants. Without water in abundance, the most skilful potting and planting, the best composts, and most costly appliances all avail nothing, as seed germination, leaf formation, and fruit production all depend directly upon the presence of water.

Good drainage is, however, essential where water is in

constant use, as unless the latter has free egress, soil is soured and rendered unfit to play its part in plant nourishment. If thorough drainage is assured, much of the worry consequent upon the proper application of water is avoided, and it then becomes almost impossible to apply too much moisture to a well rooted plant during its growing season. Therefore all soil, whether in pots or in outdoor borders, should be well drained before plants are committed to its care.

With plants in pots, the most common mistake made is that of allowing too little space for the reception of water; consequently some portions of the soil are never thoroughly wetted, and plants puzzle their owners by refusing to grow in a satisfactory manner. As a guide to the space to allow between the surface of the soil and the brim of the pot, it may be stated that in a 3-inch pot a space of $\frac{1}{2}$ inch should be allowed at potting time; this will, after a few waterings, settle down to about $\frac{3}{4}$ inch, but will rise again a little as roots push into the soil. Larger pots should have proportionately more space allowed, for it should be remembered that they contain much more soil, and will require much more water to moisten it.

In watering a pot plant, always fill the pot to the brim, and in summer allow the water to overflow a little, as it will then do no harm. In winter, overflowing is dangerous, as creating too much moisture in a house, and should be avoided. In summer, if there is any suspicion that a plant is dry, give it a thorough watering; do not give it a little, on the ground that it is partly dry, as such dribblets are apt to deceive the waterer next day. If a plant is so dry that the foliage droops, either stand it in a tank of water, or fill it up several times and syringe it. A plant that has become so dry as to need this treatment will probably have developed a fissure between the ball of soil and the pot, and this should be closed by pressing the soil down with the thumbs. If neglected, this fissure will convey all applied water direct to the drainage hole, without permitting it to linger long enough to refresh the roots.

In winter, water should only be given to a plant when it is really needed. To ascertain this, rap the pot hard with the knuckles, or better still, a 6-inch length of smooth, hard wood, such as a piece of Chrysanthemum stake. If the rapped pot gives out a clear, ringing sound, water is generally required. If, on the other hand, a dull, heavy sound is emitted, the soil is sufficiently wet. Experience in applying this test can be gained by filling a pot with wet soil and another with dry, tapping them sharply, and noting the difference. When a house contains many plants in flower in winter, it is well to mop up moisture from the floor about half an hour after

watering has been performed, otherwise damping of the blossoms will result.

The surface soil of pot plants should be stirred up with a pointed label occasionally, to counteract the hardening or compacting tendency of constant watering, and to prevent the formation of moss. Rain water should always be used where possible, and should be of the same temperature as the house in which the plants are grown. Failing rain water, a tank should be provided in the house, and filled up every morning after watering is finished. Very hard water may be softened and increased in manurial value by stirring in nitrate of soda at the rate of $\frac{1}{4}$ oz. to 1 gallon of water; this may be used with advantage at every watering.

Outdoor plants only require watering in periods of drought, ordinary dry spells not affecting them injuriously, but causing them to send their roots farther from the sun-scorched surface of the ground. It is little use pouring in cold tap water from a hose, and much better results are obtained by turning the hose into storage tubs in the morning, and using the chilled and softened water at night. A mulching of decayed manure placed round plants that it is intended to water is useful in annulling the evil effects of the hose, if the latter is directed on to the mulch. In any case, sufficient water should be given to thoroughly soak the ground, and the Dutch hoe should be used occasionally to prevent undue compression of the surface soil.

Step XXIII.—How to Prepare Good Potting Soil.

THE first essential in the making up of good potting compost is loam—loam of a sandy, fibrous nature. There are some gardeners who use the word loam to denote the ordinary soil of the garden, but this is not at all suitable for potting plants in. Owing to its lack of fibre it would soon run together when watered, and become a compact, sodden, and mud-like mass.

The loam that is used for potting purposes should be cut from a common or old grass meadow; if the latter, one that is grazed by cattle rather than one kept for hay production. Only the top spit, *i.e.* the portion containing the grass, should be used for potting purposes, and this should not be cut deeper than 9 inches—less is better than more.

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would probably grow, under the influence of heat and moisture, and give considerable trouble. It is therefore placed, grass side downwards, in a stack outdoors until the contained vegetation has decayed beyond the power of resuscitation. If cut from a poor pasture, it is wise to place a layer of farmyard manure between every two layers of turves, and many good gardeners make a point of sprinkling sufficient gas lime on each layer of turves to just whiten the surface; this kills such pests as wireworm, leather jackets, cockchafer grubs and other larvae and insects which hide in soil.

When the grass has decayed sufficiently, the turves are chopped down with a sharp spade, and further broken up with the hands into various sizes, according to the purpose for which the compost is wanted. For almost all kinds of potting it is well to divide such broken up loam into two parts, one consisting of the lumpy, fibrous portion, and the other of the finer particles set free by the chopping and breaking. In the actual potting the rough portion is placed over the drainage crocks, and at the bottom of the pot and round the ball of the plant generally, the finer soil being retained for filling up chinks and giving an even surface when potting is finished.

But loam alone is not generally sufficient for plants. It may contain too little vegetable matter to produce healthy foliage, and it may lack porosity owing to clay entering into its composition, the said clay having a tendency to cake when watered, and crack when suddenly dried. To prevent this, and ensure the free passage of water at all times, an addition of sand is generally necessary, though this may be dispensed with when a sandy loam is used, or when lime rubbish, broken brick, or charcoal are employed, as they often are, in the formation of special composts.

There is a great variation in sand, and the sort generally used by amateur gardeners, viz. the fine, floury white sand, is far from being the best for mixing in a potting compost. The ideal sand for this purpose is a coarse, grey crystalline sand, whose particles are so large that they can be readily counted; there is a red brown sand almost equally coarse. Failing these, the sort that the builder uses in the making of mortar may be employed if it is well washed, or recourse may be had to road grit, the residue left by heavy rains at the side of roads. Sweepings from gravel walks are excellent for fern composts, and even broken cinders are not to be despised when other porosity promoters fail.

Extra vegetable matter is added to loam by mixing in leaf mould or dung, the former being generally preferable. Dung, thoroughly decayed and rubbed through a sieve, is, however, very valuable in making up composts for plants which

are required to do a large amount of work in a short time, such as annuals used for the summer decoration of green-houses. It is not advisably used with leaf mould, or luxuriant foliage, at the expense of flowers, would probably be the result.

The leaf mould after which the heart of the gardener hankers is that made from Oak leaves, but, failing Oak, he will be satisfied with Beech or Elm leaf mould, and may even use a mixture collected from shrubbery and orchard at a pinch. Whatever leaves are used, they should be collected in the autumn, and stored in an outdoor position where they will be thoroughly exposed to all weathers. They may be enclosed with a few light posts and wire netting, watered if very dry, and trodden down to promote fermentation and hasten decay. Leaves are useful for placing over the drainage crocks in pots when only half decayed, but only attain the proper condition for incorporating with compost when they can be readily rubbed into small flakes by the hands. It is always well to sift leaf mould through a square meshed sieve, to remove small sticks, which would otherwise set up a fungoid growth in the compost.

The proportions in which the above ingredients are used in the compost need vary but little. The standard mixture for the great generality of plants is made up of 2 parts of loam, 1 part of leaf mould, and $\frac{1}{2}$ part of sand, the whole thoroughly incorporated. With foliage plants, *i.e.* ferns, Dracaenas, palms, etc., the ingredients may vary thus: Three parts of loam, 2 parts of leaf mould, and 1 part of sand. This is calculated to give fine leaves, and to remain sweet under the moist conditions generally afforded to such plants. For hard wooded plants, such as Heaths and Azaleas, peat should displace the leaf mould in the latter example of compost, and the whole should be well firmed when potting. Powdered, rotten wood makes a very good substitute for leaf mould, but sawdust should never be used.

Whenever potting materials of the best kind cannot be obtained, artificial manures should be added to the compost. There are many of these on the market, and all give good results if used according to the manufacturers' directions. When satisfactory compost is available, the presence of artificial manure in the soil is not advisable, retaining such to help the plant in the production of its flowers when it has made plenty of roots.

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SECTION II.—FERNS.

Step XXIV.—How to Grow Greenhouse Ferns.

CONSIDERING their graceful beauty and all the year round utility, ferns receive a very inadequate amount of attention. What few one finds in amateurs' greenhouses generally have to fit their lives so much to the conditions deemed to be essential for Tomatoes or flowering plants, that they are miserable burlesques of what they should be. Exposed relentlessly to sun and draught, rarely repotted, and never fed, no wonder their fronds are pale and undersized, and that they fall victims to thrips and scale.

If treated rationally, there is no class of plants amenable to greenhouse culture that gives better returns than ferns, either for supplying cut foliage, beautifying the greenhouse, or filling vases in rooms. For the latter purpose, some sorts of ferns are superior to almost any plant that grows. But the plants must have a little consideration. They must be shaded, watered, fed, and even repotted at times, and, as they are not quite immune from insect attacks, they should occasionally be looked over with a view to ridding them of enemies. Besides scale and thrips, already mentioned, slugs, cockroaches, and the annoying greyish beetle known as the Vine weevil all prey on young and old fern fronds, and must be sought for and destroyed.

Soil plays a very important part in fern culture, chiefly because of the large amount of water that is required to keep the plants in good health. It must be of such an open nature that moisture passes readily through, without souring it, and of a sufficiently indestructible character as not to readily decompose though kept saturated. Peat has been found to best fulfil these conditions, and for a long while peat and sand formed the bulk, if not the whole, of fern composts. Modern practice, however, has shown that good loam is far better than bad peat, and leaf mould, has, and rightly, been deemed worthy of representation in fern compost.

As peat is capable of resisting moisture over a long period better than loam, it should always be used when obtainable in good quality, but the spongy, dusty refuse from Orchid peat—stuff that is often sold as peat for ferns—is no better than leaf mould, and though it may be used instead of the latter, it should never form the bulk of the compost. Fibrous

loam is much better than this, and if well decayed grass sods are pulled to pieces by hand, and the dusty portion sifted out through a $\frac{3}{4}$ -inch square mesh riddle, material little inferior to peat will be obtained.

Of this, or peat, $\frac{1}{2}$ bushel should be spread on the potting bench, and covered with 1 peck of sifted leaf mould. Over this should be distributed 1 gallon of very coarse sand, to which has been added a handful of small nodules of charcoal; if the sand is not really coarse, a couple of handfuls of finely broken brick, about the size of Sweet Peas, should be given. The whole should be thoroughly mixed together, and thrown into a conical heap. This will cause the rougher portions to fall to the bottom of the heap, when they should be put aside for covering the crocks. If the heaping up is practised two or three times, quite a useful lot of coarse material will be collected.

As potting must be firmly done, the compost must be on the dry side when used, otherwise the potting stick will so tightly compact it that water will not be able to find its way through. Drainage should be little in quantity, but carefully arranged, and the crocks covered with the material mentioned above. On this the ball of the fern should be placed, adding soil round between it and the sides of the pot, and ramming this well down with a tapered potting stick. Plenty of room should be left for supplying water, and the crown of the fern should be kept higher than the general level of the soil.

The general culture of properly potted ferns presents no great difficulty. The plants delight in a very humid atmosphere, and this should be at all times maintained. A great assistance in this respect is given by covering the plant stages with sheets of corrugated iron, and on these placing a good layer of beach gravel or coal ashes. Syringing among the pots and over the fronds is also very helpful, but Gold and Silver Ferns should never be wetted overhead, and many of the Maidenhairs are injured by syringing late in the evening or in the dull days of winter. Shade is important, if the beautiful dark green so characteristic of well grown ferns is desired, but fronds for cutting may be hardened and rendered longer lived by the judicious admission to them of early morning and afternoon sun.

Watering need puzzle nobody in summer, as if the soil is good and the pots are well drained, too much moisture cannot well be reasonably given. In winter more discretion is necessary, but pleasantly moist and never dry should be the condition of the soil, unless the ferns are cut down and resting, when an almost dry soil for a few weeks will suit them best. Feeding should cease altogether in winter,

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but may be practised to great advantage during the growing season. Soot water and cow manure, either in mixture or in alternation, may be given twice a week in summer, and a weekly dressing of Clay's Fertilizer will be found to have a splendid effect on the colour of the fronds. Repotting once in two years suits the majority of ferns after they have reached 5- or 6-inch pots.

Ferns are eminently suited to basket culture, but the baskets must be always watered by immersion, water from a can rarely doing much good. The sides of the baskets should be lined with the fibre of peat; the compost may be as before advised. The following are a dozen suitable ferns for baskets: *Adiantum Capillus-Veneris*, the British Maidenhair; *A. assimile Aethiopicum* and *A. Edgeworthii*, two other Maidenhairs; *Asplenium bulbiferum* and *A. caudatum*; *Davallia bullata Mariesii*, the sort often used for Japanese fern balls; *D. elegans*, *D. Fijiensis*, and *D. Canariensis*, the Haresfoot Fern; *Nephrolepis exaltata*, and *N. davallioides furcans*, one of the very best, but requiring plenty of room; *Platynerium alcorni*, the Stagshorn Fern; and *Polypodium subauriculatum*.

Of ferns for growing in pots, the great army of Pterises, including *P. tremula*, *P. Wimsettii*, *P. Cretica* and its crested form; *P. serrulata*, the popular Ribbon Fern; *P. s. cristata*, *P. Smithiana*, and *P. longifolia*, are all indispensable. *Asplenium bulbiferum*, *A. b. minus*, *Adiantum cuneatum*, the common Maidenhair; *Lomaria gibba*, a very distinct fern; *Onychium Japonicum*, the so-called French Fern, invaluable for cutting; *Nephrodium molle*, *Polypodium aureum*, *Platynerium grande*, *Pellaea hastata*, *Lygodium scandens*, a fern that will climb up strings; *Woodwardia radicans*, *Aspidium falcatum*, the Laurel Fern, and those recommended for baskets will make up a nicely varied collection.

SECTION III.—PROPAGATION.

Step XXV.—How to Strike Cuttings.

ALTHOUGH the natural method of increasing plants is by seeds, millions are raised every year from cuttings.

A man who finds himself growing old cannot cut off a finger and raise himself a new body, but the same man can

take a slip from a Geranium when he sees that it is getting past its prime, and make an entirely fresh plant of it. What is more, the new plant will have all the vigour of youth, and produce much finer flowers than its parent.



FIG. 40.—A CUTTING OF CLEMATIS LANUGINOSA.

As an example, take a Dahlia. This plant forms a root-stock capable of living for many years, and unless killed by damp or cold will grow for several successive seasons; but its flowers will not be so fine as those borne by a young plant

taken from the old rootstock in spring in the form of a cutting.

There is nothing much more interesting in gardening than raising plants from cuttings. The person who succeeds in



FIG. 41.—CLEMATIS CUTTING POTTED.

striking a cutting feels a glow of pride and satisfaction. He has added to the beauty and fertility of the earth.

Very few vegetables are propagated by cuttings. They can be raised very quickly and cheaply from seeds. Tomatoes and Cucumbers (which are classed with vegetables for practical

garden purposes) are often raised from cuttings for winter use. Potatoes are also propagated in the same way at times, the young shoots being taken from the tubers. Seakale is extensively propagated by cuttings of the roots; in fact, this is the most profitable way of increasing it. With these and Horseradish our list of vegetables is complete.

Of creepers, *Clematis lanuginosa* varieties and *C. montana* strike readily from cuttings (pp. 84, 85).

Turning to fruits, we have several of considerable importance which are raised from cuttings in the ordinary routine.

The Gooseberry is one. Cuttings of the firm shoots of the current year's growth, about 1 foot long, are inserted in the open ground in September, all the buds except four at the top being removed in order to get a clean stem a few inches long. A year afterwards the young shoots are shortened back, the plants are given more room, and sturdy little bushes result.

Red, White, and Black Currants are also commonly propagated by cuttings. Red and White Currants may be treated just like Gooseberries, but Black Currants should be put in with the buds intact, as shoots from beneath the soil are not a disadvantage, as in the case of Gooseberries.

Raspberries may be increased by cuttings, but divisions of the old stool with roots are better.

Blackberries are often increased by cuttings, although generally by layers or divisions.

The larger fruits, such as Apples, Pears, Plums, and Cherries, are almost always increased by buds or grafts. We will consider these methods later on.

It is when we turn to flowers that we find the largest number of different plants that are grown from cuttings. Hundreds, indeed, it might be said thousands, of kinds are propagated in this way. It would be impossible to describe them all individually in a few pages, so we will refer briefly to some of the main principles.

Cuttings of hardy plants that are woody, such as Roses, may be inserted in very firm soil in the open ground in autumn.

Cuttings of plants of which the shoots are thin and soft, such as Chrysanthemums, Carnations, Fuchsias, Shrubby *Calceolarias*, and Snapdragons (*Antirrhinums*), root most surely if air is kept from them for a few days by a bell glass, hand-light, or inverted tumbler. But this is not absolutely necessary in the case of any one of the plants named.

Soft but very thick, fleshy cuttings, such as the popular flower garden "*Geranium*," should not be kept close in this way, or they will rot. They should be inserted out of doors in the full sun during summer.

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In nearly all cases of soft cuttings a shoot about 3 inches long is the best. It should be a young growth without blossoms or flower buds (with very rare exceptions—the Hydrangea is one). It should be taken off by cutting the stems through just underneath one of the small swellings called joints. It should be buried 1 inch deep in the soil, and the base should be made quite firm by pressing it against the soil with a short blunt stick.

Anyone who is learning to strike cuttings should take hold of the edge of one of the leaves of the first few which he puts in, and give a gentle tug. If the edge of the leaf comes away between finger and thumb the cutting is firm, but if the cutting comes out of the soil the operator knows that he is in the wrong, and must try again. Only a few experiments of this nature ought to be necessary. A little experience and observation soon teach the right way.

When the cutting has been in the soil a few days, a ring of hard matter forms at the base. This is called the "callus." Hence the expression "The cuttings have callused." Next tiny roots show on the ring, and extend rapidly if the soil is neither very wet nor very dry, but just damp, as it should be. Signs of growth are seen in the upper parts, which soon show the shape of leaves, and then the cultivator knows that his cuttings have become plants.

In winter or spring, when natural heat is limited, cuttings root very slowly. For this reason what is called a "propagator" is often used. It provides warmth (commonly referred to as "bottom heat") underneath the cuttings.

SECTION IV.—LAWNS AND EDGINGS.

Step XXVI.—How to Have a Weedless Lawn.

To have a weedless lawn, one must sow grass seeds, and also devote a little time to the preparation of the ground. All soil contains a greater or lesser number of weed seeds, and unless these are got rid of before sowing the grass, their eradication afterwards is a matter of infinite trouble. When turves are laid to form a lawn, the destruction of indigenous weeds is less important, because turves bring so many weeds of their own with them that a few more matter little. But no man who wants a weedless lawn would use turves, so that grass seeds only will have attention here.

The two great months for sowing grass seeds are September and March, but it is foolish to wait until either of them has arrived before commencing operations. On light soils September is the month *par excellence* for lawn making; on heavy soils, March should be chosen. The chief reasons for making this distinction are that on heavy soils Clover and the more tender grasses sometimes die off in winter from a September sowing, and that on light soils a March sowing frequently fails to give a crop sufficiently established to withstand a hot, dry season. If heavy soils are well drained, a September sowing will be safe, and if light soils have the assistance of a lawn sprinkler, there is no objection to sowing in March.

In either case, preparations should be put in hand several weeks before sowing is done. The middle of July is a good time to commence ground operations for sowing in September; the middle of January is a suitable period to prepare for a March sowing. Land that has been used for vegetables or flowers will need little preparation beyond lightly digging over and levelling. If a lawn for ordinary ornamental purposes only is needed, levelling may be done with the eye. If a tennis or croquet lawn is desired, a long, straight board called a straightedge, a few stout stakes or pegs, and a spirit level will be required. The pegs are driven in until the straightedge and spirit level declare them to be of uniform height, when the soil is taken from or added to as necessary. Deep digging should be avoided as much as possible, as it tends to unsettle the ground.

After the first rough digging and levelling, the ground should be allowed to lie fallow for a few weeks, to give weed seeds a chance to germinate. The seedlings should be hoed down when 1 inch or so high, and at intervals as they appear, until sowing time arrives. In this way land should be thoroughly cleared of weeds, and if good grass seed is sown the lawn should remain weedless. One or two rakings may also be given to clear off large stones; these are especially prominent after heavy rains.

At the end of August the work of actual sowing may be taken in hand. As the soil will be rather loose on the surface, and grass seeds require a firm and quite level seed bed, a light roller should be passed over the ground, after raking off all stones. Two rollings should be given, the second crossing the first at right angles, or, as gardeners term such rolling, "athirt and across" the land. Should the roller reveal any slight depressions, such should be filled with soil, as grass seed will not germinate when buried at all deeply.

By the middle of September sowing should, if possible, be finished. As grass seed is very light, it is easily deposited

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in heaps by any wind that may be blowing; therefore it is a good plan to mix it with fine, fairly dry soil. About 1 lb. of seed per rod should be allowed if a really good lawn is required in a short time; 1 lb. to 2 rods will make a fair lawn. If 1 lb. of seed is well mixed with a barrowload of fine soil, and the whole is then distributed evenly over 1 rod of ground, no covering of the seed will be necessary. After sowing, the roller should be passed over every inch of the seed covered ground, or the seeds will fail to germinate.

Where birds abound, some protection will be necessary, as many birds are exceedingly fond of grass seed. If the lawn is a small one, old netting from the Strawberry beds will answer admirably. Black thread, strained from short sticks at close intervals, is a fairly effective guard against birds, but useless in a cat infested neighbourhood. Here, failing netting, stout stakes should be driven in round the edges of the lawn, and strong twine stretched between them and across the lawn. A few strips of bright tin or pieces of broken mirror fastened to the twine will complete a good bird and cat scare.

As soon as the young grass is 1 inch or so high, all protectors may be removed, and as worm casts will probably show in number, a light roller may be passed over the ground to press them down. Shortly after, cutting may commence, and unless the machine is a new one, and the ground very firm, a scythe had better be used for the first mowing. Afterwards mowing and rolling should be done regularly, as these are the chief factors in forming a fine lawn.

In spite of all precautions, it may be found that a few weeds make their appearance with, or soon after, the grasses, and these should be diligently sought for, and removed while young. Subsequently, the growth of the grass should be so dense that weeds would find growth to be impossible. Rolling is a great deterrent of weeds, as it causes grasses to spread at the bottom, and form an impervious mat.

Step XXVII.—How to Make Garden Edgings.

THE style of edging most suitable for a given garden path or walk will depend upon the character of the garden. A severely formal style of garden must have an equally formal edging, and the choice will largely rest between one of the many pretty tiles on the market, and a narrow grass border—a verge, as gardeners term it.

Of the two, the tile is far the more durable, and if well set in cement by a practical man will give no further trouble. For this purpose a pinnacle pointed tile is unsuitable, as when its points go—as go they will—it will be found almost impossible to remove it and insert another. If a pointed tile, or one with any fanciful and easily broken ornamentation is chosen, it should be merely placed in a trench, not set in cement. It is much better to chose a tile that has a fairly level and strong upper edge, such as the popular rope-twist pattern, and have it properly set. Tiles of this description will bear a loaded barrow on them without injury.

The other formal edging mentioned, the grass verge, should be made of fair width, or its upkeep will be a nuisance. Not only will the mowing machine protest against cutting it, but the person who clips its edges will experience such a difficulty in standing on it to wield the shears that it will rapidly crumble away beneath his feet. One frequently sees these grass verges less than 1 foot in width; such are mere travesties of a verge, and should never be tolerated. Eighteen inches gives a much better verge, but 2 feet is better still, and 2 feet 6 inches infinitely to be preferred. Few are the verges that do not lose at least 1 inch a year—many annually lose much more—owing to the traffic across their edges, and the need of using the edging iron to keep them straight. Thus it is easy to guess what the 1 foot verge will be like in, say, ten years. Some new and energetic gardener might even hoe it up for a weed!

Above all things, that abomination of the suburban garden, the grass verge edged with tiles, should be avoided. The grass verge that is not capable of retaining the soil at its edge is not worthy of the name; certainly, association with an edging tile, especially a blue, pointed one, must make it hang its head in shame through life. Yet there are scores of such combinations in Suburbia. Of course, the edges of the grass are always ragged and untidy, and the whole affair presents a bedraggled appearance.

If the soil is light, and inclined to crumble, it can invariably be kept in position by using the edging iron in a slanting position when cutting the edges. In any case, never allow soil to accumulate on the gravel near the grass edge, and keep the gravel so low there that the edge shows as a clear, bold line, 3 inches or so above the gravel. Nothing detracts more from the smartness of a place than to allow the gravel to rise nearly to the level of the grass.

A few years ago, Box would have had to be taken into consideration as a formal edging, but it has gone out of fashion, except for edging beds occasionally in the formal flower

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garden. A well laid and kept Box edging is, however, not to be despised, and in a neighbourhood where Box does well, such as on the chalk, it might be tried. Clipping twice annually would keep it in good condition, and an occasional replanting would check any tendency to grossness, and give an opportunity for filling up gaps.

Of informal edgings the rock border is quite one of the best. It need not be more than 2 feet or 2 feet 6 inches wide, and should never be straight. The stones employed should be of fair size, the largest being placed towards the back to ensure that part being highest. If such a border is skilfully and naturally arranged and planted with a good variety of rockery and alpine subjects, it will be an attractive object throughout the year.

The irregular stone edging is first cousin to the above. To make it, rough stones varying in size between 1 foot or 15 inches square and 9 inches or 1 foot square should be used, in not too strict alternation. By square is, of course, meant quite roughly square, a square that is sufficiently elastic to stretch to oblong, oval, or triangular, according to the inequalities of the stone. The stones should be firmly sunk in the ground, in the most picturesque and informal manner possible, and at their base should be planted various Sedums, green and variegated Periwinkles, green and golden Creeping Jennies, Cerastiums, Aubrietias, Arabises, Alyssum saxatile, mossy Saxifrages, evergreen Candytuft, Alpine Phloxes, Helianthemums, and other similar plants. Violets look well in large clumps near such an edging, and early flowering bulbs are excellent. A broad and rough stone edging covered with Ivy looks well in some positions.

If plants alone are used for an edging, there are few to beat the Sea Pink or Thrift, Statice Armeria, for all round effectiveness. At all seasons of the year its neat, evergreen foliage is tidy and pretty, while for several weeks in early summer it carries hundreds of bright, rosy heads of flowers. It only grows a few inches high. Lemon Thyme, *Thymus citriodorus*, is another neat edging that is always appreciated. It should not be allowed to flower, but cut over annually when the flower buds are formed. There is a variegated form of this, which is even prettier than the type. An occasional splitting up and replanting is necessary.

Pinks are favourite plants for edging, and if split up and replanted every two years never get untidy. *Euonymus radicans variegata* is a pretty, low, trailing edging, which will cover stones or soil equally well. Hardy Heaths, such as *Erica tetralix* and *E. Mediterranea*, are useful taller edgings which give acceptable flowers as well as neat foliage;

annual clipping is necessary. An edging of Stonecrop, *Sedum acre*, growing over small stones is not to be despised, and its more robust relative, *S. stoloniferum*, is also commendable as an edging, with stones or brick burrs in a dry place where little else will grow.

There are very many other plants suitable for edgings, and the reader who is interested and does not find an edging to suit his tastes among the foregoing, should invest in a copy of "Pictorial Practical Flower Gardening" (Cassell and Co., Ltd.), which treats the subject fully.

SECTION V.—WEEDS AND INSECTS.

Step XXVIII.—How to Baffle Enemies.

THE enemies that worry the gardener are legion, but fortunately they are generally represented only in exact ratio to his thoroughness or otherwise. The careful and diligent cultivator rarely finds that enemies, either insect or animal, give much trouble; the sloven, on the other hand, frequently finds that crops of pests are far more flourishing than other crops in his garden. As, however, many garden enemies, or their progenitors, can fly, it is well that the careful cultivator should know what to do when unwonted activity on the part of his slovenly neighbour causes them to seek new pastures.

In briefly dealing with the most generally encountered garden enemies, we may well divide them into two sections, viz. above ground and underground pests. This division must necessarily be somewhat arbitrary, as some of them, to wit the earwig and slug, might just as rightly be placed in either section. However, this is a hair that we need not wait to split, for the division has the great merit of convenience in dealing with the repression or destruction of the various pests.

For curiously we find that each division numbers twelve members, the underground ones being: rats, mice, moles, wireworm, millipedes, leather jackets, slugs, snails, earthworms, eelworms, ants, and cockchafer grubs. The first three can be either caught in traps or poisoned, though the third is such a wary customer that to trap it needs more than ordinary care. Iron jawed spring traps are the best, and gloves should be used not only in setting the trap but also in touching the ground or anything in its neighbourhood. A wire cage trap, baited with a bloater's head, will invariably

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catch rats, and the break back trap is generally found most successful with mice. The virus system of poisoning has been found very effectual.

The whole of the other nine pests may be exterminated with Vaporite. This is dug into vacant land, raked into cultivated, or dibbled in at the rate of about 1 oz. per square yard. The latter method is especially suitable for ridding lawns of ants, wireworms, leather jackets, and earthworms. Gas lime is sometimes used for ground pests, and is doubtless a good insecticide, but the bulk needed and the difficulty of obtaining it in country districts are against it; besides, it is dangerous in unskilled hands. About 1 bushel per square rod is an average dressing. In using Vaporite for slugs, snails, and millipedes a little should be sprinkled over the ground at night when the pests are feeding. Its use is preventive as well as remedial.

The twelve most generally encountered above ground pests are birds, caterpillars, cats, earwigs, greenfly, leaf mining maggot, scale, thrips, red spider, Rose maggot, weevils, and woodlice. Unfortunately, we have no real equivalent to Vaporite for above ground pests, but a strong solution of Quassia, or a very dilute preparation of paraffin may be regarded as approaching a general panacea. Both of these are preventive and remedial; preventive by rendering the food plants of pests obnoxious, remedial by burning the soft bodies of the pests themselves.

Quassia extract is made by boiling 1 lb. Quassia chips, 1 lb. soft soap, and a wineglassful of paraffin in 2 gallons of water. When cold, strain, add 4 gallons of water, and vigorously syringe on affected plants. Paraffin is used by pouring a wineglassful into a 3-gallon pail of hot water, and vigorously churning with a syringe until a milk coloured emulsion is made. This is then sprayed on the plant, taking care to keep the solution well churned up the whole time of using. Either of these solutions may be used when caterpillars, green or black fly, scale, thrips, or red spider are present; also to prevent their attacks, and those of birds, leaf miner fly, weevils, and Rose maggot.

Special remedies for Rose maggot and leaf mining maggot are to crush the first in its rolled up leaf, or pick it off the buds in June, and to trace the second by the white tunnel it makes in the leaf, and crush it *in situ*. Weevils are small, beetle-like creatures which do much damage by eating foliage and roots; killing all beetles on sight is the best remedy. Birds should be shot, or caught in one of the excellent wire or wicker traps on the market. Birdlime is also useful for catching them, and can be easily made by boiling linseed oil until it thickens and becomes sticky.

Earwigs are caught in empty match boxes, dirty oil rags laid near their haunts, hollow Bamboo and Bean stalks, or flower pots containing a little old, dry hay. The latter trap will also catch woodlice, especially if a little cold boiled Potato is placed on the hay. Cats are best kept at bay by a dog. A sharp little terrier will generally rout the bravest cat, and do practically no harm to the garden; indeed, the cats will get to know of his presence, and go "the other way round."

Step XXIX.—How to Keep Down Weeds.

UNDOUBTEDLY the best of all ways to keep down weeds is to be always, as some folk term it, "tinkering about" on the ground. The "tinkering" may consist of a bout with hoe or rake, a pricking up with a short-tined garden fork, a visit to plants requiring staking, or just a look round to admire the result of our handiwork in general. Whatever it is, it is bad for the weeds, for such are almost sure to come under observation at such times, and to observe is to destroy with the well regulated, properly balanced gardener.

Of systematic methods of keeping weeds down, undoubtedly the best is to keep a sharp lookout for their roots at digging time. In this way such perennial pests as Bearbind, page 96, Dandelion, bulbous and creeping Crowfoot, Nettles, Docks, Couch, Thistles, Bishop's Weed, page 95, Ground Ivy, Cow Parsley, and wild Convolvulus, may be all but exterminated. Some tiny root, such as the creeping stolon of the Couch or Nettle, or the deep down point of the Dock's ground anchor, is sure to be missed by the keenest eye, so that the good work done by fork or spade should be supplemented, later on, by the hoe.

The hoe is such an important tool that it is well worthy of a moment's consideration. The oldest form is the draw hoe, a tool worked by a chopping motion while the operator walks forward; a modification of this is the swan-necked hoe, used in the same manner, but involving less stooping. In contradistinction to this we have the Dutch or push hoe. In using this the workman starts at the end of the patch and walks backwards. In this way the weeds are left on the surface of the ground for the sun to wither, instead of being trodden in again, as often happens in carelessly done draw-hoeing. The only other we need consider is the Sproughton. This will cut when either pushed or pulled, and, moreover, has a point for extracting tap-rooted weeds. It is rather

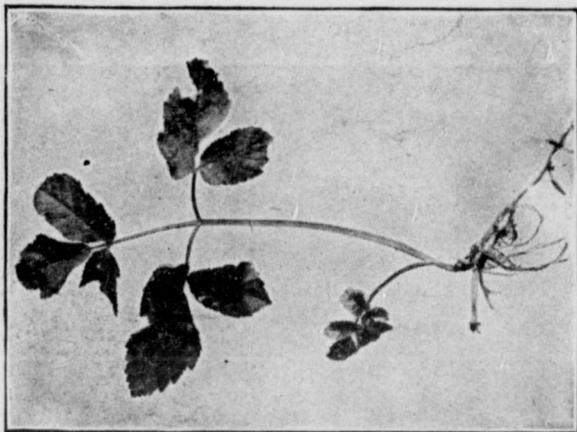


FIG. 43.—BISHOP'S WEED.

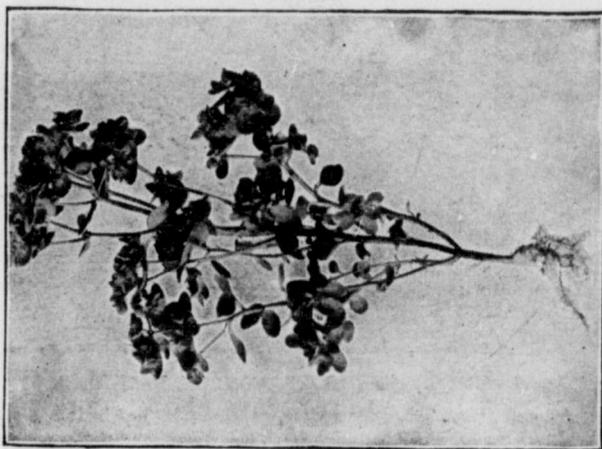


FIG. 42.—SUN SPURGE.

heavy for a person of slight physique, otherwise it is a most excellent tool.

The great times for using either of these hoes is early spring and late autumn, the early spring hoeing destroying

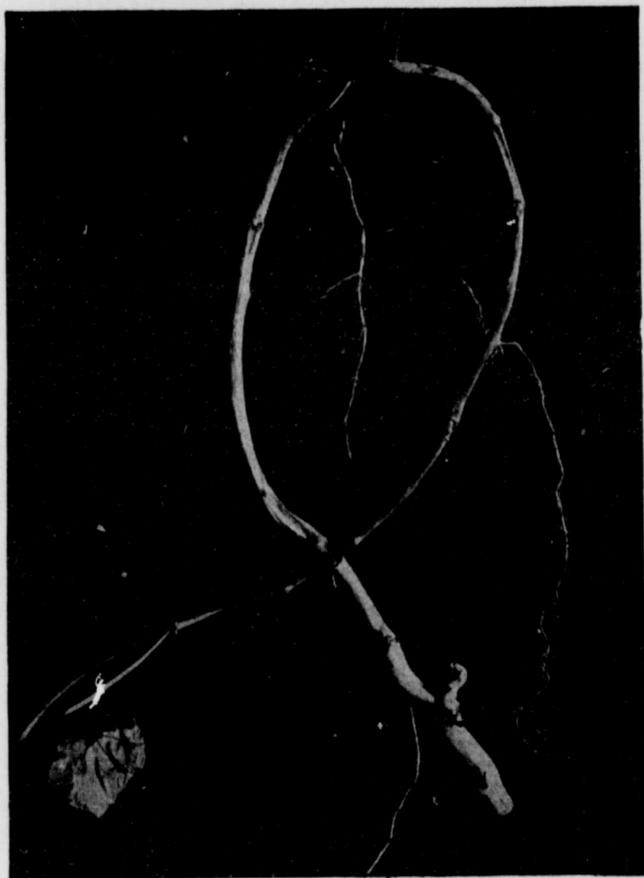


FIG. 44.—UNDERGROUND BRANCH OF BEARBIND.

The white, thickened "root" is really a stem, as shown by leaf buds and leaves.
The bundles of fibres are the true roots.

weeds galore in the seedling stage, and the autumn hoeing preventing stray crops growing which have been carried in by summer winds. If thoroughly done, and perennial weeds are not neglected at digging time, these two hoeings should do

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much to keep the garden free of weeds. The tidy cultivator will not, however, be satisfied with such relief as they bring, but will keep the hoe going more or less throughout the entire growing season. There is no doubt that the best way to keep down weeds is to set a day apart every fortnight for their destruction. The business need not take a whole day, but when the appointed morn arrives and is dry, the cultivator should take the Dutch hoe in hand and carefully scrutinise the whole of the garden, paying particular attention to the neighbourhood of herbaceous plants. If no weeds appear, he may give the ground a gentle prodding to advise those below it to keep where they are.

With regard to weeds on walks, there is really no need to have any, with the modern weed killer so cheap, effectual, and easily applied. A strong dose given when the sun is bright and the surface of the gravel dry will clear a walk for the whole year. The killer must be kept from contact with grass, Box, or other live edgings, as it has not yet been educated up to the point of discriminating between useless weeds and useful plants. An old knife is the best tool for removing weeds near the edges of such walks, and a draw hoe, owing to the way it disturbs the gravel, the worst.

Weeds on lawns should also come under the knife, enclosing a given area, and thoroughly clearing that before moving on to another patch. Patent weed extractors, valuable to backs which ache readily, are on the market, as are apparatus for poisoning the weeds in their bed. Daisies, Plantains, and Dandelions may frequently be destroyed by dressings of lawn sand, obtained from the nurseryman; or an application of nitrate of soda, $\frac{3}{4}$ oz. to 1 square yard, dusted on in showery weather in spring, will often have the same effect. If used in dry weather, the nitrate should be washed in with the hose twelve or twenty-four hours after applying.

SECTION VI.—FRUIT.

Step XXX.—How to Grow Cordon Apples and Pears.

THE cordon trained fruit tree is an inestimable boon to the owner of a small garden who would grow his own Apples and Pears, and also Currants and Gooseberries. In its simplest form it is a straight wand, trained either perpendicularly,

horizontally, or obliquely, but there are double cordons, which bear branches running horizontally on either side of the short main stem. This kind is especially suitable for training on low wires alongside of walks, and makes a very pretty edging when in flower or fruit.

The upright cordon may be used to form an edging to paths, but is more generally employed to cover walls or fences. If trained obliquely, such cordons can be used on quite low walls, and will give a greater quantity of fruit from a given area than any other form of tree. Single cordons, if obtained of good length, make handsome pillars when supported by a pole, and may be utilised to form arches. However employed, they come quickly into bearing, and yield large and handsome fruit.

Planting is done at the usual time, autumn or winter, and it is well to get the trees in as soon as they can be obtained from the nursery, which will generally be early in November. As the heavy crops carried put a great strain on the trees, it is imperative that the site be well prepared, adding new, fibrous loam if the soil is poor in quality. Farmyard manure is not advisable, owing to its tendency to promote rank growth. Any feeding necessary may be carried out when the trees are in fruit. If much bending is required to get the trees into position, it should be deferred until May, at which time the stems bend easily, owing to the sap working freely.

As cordon trees must of necessity bear on spurs, owing to there being no room to lay in side shoots, it follows that pruning must be done with a view to originating and retaining as many spurs as possible. Trees on walls are generally planted 18 inches or 2 feet apart, and this allows of summer shoots extending sufficiently to form good, plump buds at their base. To these buds the new shoots should be cut back at the winter pruning, but it is well to adopt a modified form of pruning before the shoots have a chance of crowding those on neighbouring plants. This is called summer pruning, and consists of pinching about half of each shoot away; or the work may be done with knife or sécateurs.

This pruning takes places with most fruit trees in July, but the first week in August is early enough to commence upon cordons. If done earlier, a second growth is made, and this, in view of the limited space, is not desirable. If secondary growths push, they should be pinched back to a single leaf, the object being to concentrate the energies of the trees upon the basal buds, and allow as much light and sun as possible to reach the latter. At the winter pruning the side shoots are cut back to the best of these buds which is near the main stem, and thus the foundation of a fruiting spur is laid. Very little pruning is necessary with cordons

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as they get into years, but an occasional thinning out of the fruit spurs may be advisable, cutting a few of the oldest ones clean away.

Watering must on no account be neglected in hot, dry weather, and liquid manure in quantity will be appreciated. Before the weather becomes really hot, a mulching of decayed manure should be spread for about 1 yard round the base of each tree, and all applications of moisture should pass through this. The great point to bear in mind with a cordon tree is that it is an unnatural production—a kind of pocket Hercules—and that to keep up its strength, liberal treatment is necessary.

The following varieties are generally grown by nurserymen as cordons, but other favourite sorts may sometimes be obtained. Apples (dessert): Beauty of Bath, Cox's Orange Pippin, Hornead Pearmain, King of the Pippins, Early Harvest, and Golden Reinette; (culinary) Cox's Pomona, Cellini, Stirling Castle, Lane's Prince Albert, Lord Suffield, and Newton Wonder. Pears: Louise Bonne of Jersey, Jargonelle, Souvenir du Congrès, Conference, Thompson's, Doyenné du Comice, Seckle, Winter Nélis, and Josephine de Malines, the latter a fine flavoured, late variety. For cooking choose Catillac.

Step XXXI.—How to Bud and Graft Fruit Trees.

MANY people speak of all fruit trees not raised from cuttings or seeds as "grafted." They do not know that there is such a thing as budding.

Now, in point of fact, the vast majority of the young Apples, Pears, Plums, Cherries, Peaches, and Apricots which are sent from nurseries to market and private gardens every year are not grafted, but budded.

Why do nurserymen prefer budding to grafting? Because it can be done more economically. A given number of workmen will bud 100 trees where they could not graft fifty, and thus there is a saving in labour.

If it be asked whether budded trees are equal to grafted ones it may be answered that they are. When the proper stocks are chosen, and the work is properly done, budded trees make splendid specimens.

In the formation of young trees it cannot be doubted that budding is a practice that has come to stay. It is easy to

learn, and quick to put into practice. It is done in summer, and if the buds should fail there is still a chance of working the stocks without losing a season, for grafting may be kept in reserve, and practised the following spring.

Grafting comes in for large, established trees when desired to change the varieties. This is frequently the case in gardens. The sorts originally selected are not, perhaps, well suited by the soil, and do not give satisfaction. To remove the trees would be to admit dead loss. It is therefore common to head them back, and put on grafts of another variety which is likely to do better.

To begin at the beginning, we must say a few words about stocks. Why are not large fruit trees grown on their own roots, the same as Gooseberries, Currants, Raspberries, and other soft fruits? Fruits raised from seed are extremely variable. As a rule they are of no value. Pips are often sown, but it is only in rare instances that the varieties which mature are worth anything. Trees raised from cuttings do not make large, fruitful specimens quickly; moreover, they are often bad rooters.

What we call stocks are allied plants which have no value for fruiting, but which, owing to their excellent growth or root system, form a good base. As an example, take the Paradise stock. This is a very healthy grower, and forms a mass of fibrous roots close to the surface. Varieties of Apples budded or grafted on to it soon make strong, sturdy trees, and come quickly into bearing.

The principal stocks used for fruit trees are :

For Apples, the Broad-leaved Paradise and the Crab. The former is good for bushes, the latter for standards.

For Pears, the Quince and the Pear. They have the same qualities as the two Apple stocks.

For Cherries, the Mahaleb and the Gean or wild Cherry.

For Plums, the Mussel and the Brompton.

For Peaches and Nectarines, the Mussel.

For Apricots, the Mussel.

In private practice stocks are not used much; they are almost exclusively confined to nurseries. They are raised from cuttings or layers, and budded when two or three years old. A cross cut is made through the bark, and a perpendicular cut is made by drawing the knife up to meet it. This cut resembles a capital "t." With the smooth, bone handle of the budding knife the edges of the bark are carefully raised, so affording space for the bud. The latter is sliced from a shoot of the current year's growth with a sharp knife, the pith extracted, and the bud slipped in. Let it be observed that when the word "bud" is used growth buds, not flower buds, are meant.

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After the bud has been placed in, it is tied gently, but firmly, with soft worsted. The tie is loosened when the bud is seen to be swelling, but otherwise nothing is done until spring. When the bud begins to grow it is tied to a small stake to prevent the wind blowing it out, or to a portion of the growth of the stock, which is left for that purpose when the stock is cut away. In autumn this stump of stock is removed, and thenceforth the fruit holds sway.

From the middle of July to the middle of August is about the best time for budding. In a dry summer it is wise to wait for rain.

Except for nursery hands, it is much more useful to learn grafting than budding, although no opportunity should be lost of learning both. Grafting is done in spring, the first half of April being generally suitable. But preparations should be made for it before then. It must be remembered that the young growths of a fruit tree—which are the portions used for making the grafts or scions—begin to swell their buds long before April, and as it is important that they should be kept dormant they must be taken off in February or earlier. Tie them in a bundle, and put them in a cool shed or cellar, or partly bury them in the soil under a north wall.

The time to put the grafts on is when the bark of the tree, on being scratched, shows a brown stain. This is a sign that the sap is moving freely. The heads of the trees may be cut back to short stumps, which should be pared smoothly over with a sharp knife.

Crown grafting is a very good method to adopt. The way to do it is as follows: Place the edge of a sharp knife against the bark for a length of $1\frac{1}{2}$ inches and press it through. Partly raise the bark along both edges of the cut by tapping in a piece of bone or a small chisel. Do not split the bark in this operation. Now take the graft or scion—which should be about 4 inches long, should contain three or four buds, and should have the lower part pared down to form a wedge—and slip it down underneath the bark. Tie it in with raphia. Put a second graft in on the opposite side of the stump. To complete, exclude the air with a coating of wax or pug.

The following is a good wax: Resin, 4 parts; beeswax, 2 parts; tallow, 1 part. Melt the ingredients together in a pot over a fire or lamp, and paint on with an ordinary brush.

To form pug procure some pliable clay and blend it with cow manure, adding a little chopped hay to prevent cracking. Plaster it round the graft with wet hands to a depth of 2 inches.

If the district is subject to strong winds it is well to tie a stick to the tree stump, and attach the scion to it. Unless this precaution is taken the grafts may be blown clean out.

Step XXXII.—How to Prune.

THERE is, perhaps, no subject in connection with gardening that has been more talked about than pruning.

Why do we prune? We prune fruit trees in order to get a sufficient number of fruiting branches; we prune shrubs and hedges in order to secure a suitable shape.

Pruning is often done when it is not needed, and it is sometimes overlooked when it is urgently wanted. Bad cutting is common in the case of fruit trees. If growers would remember that careful pruning and training when a tree is young increase fruitfulness and save trouble in after years, they would give attention to their trees when planting. In a great many cases they neglect the trees until they have made several years' growth, and have got into so bad a state that much time and trouble are required to get them right.

We have learned that fruit trees are raised in nurseries by budding and grafting. As a rule, they do not leave the nursery until they are three years old. When sold they are generally clean and healthy. The training, so far as it has gone, is good, because it has been done by experienced men. The purchaser has only himself to blame, therefore, if the trees do not do well afterwards.

Let us consider what we shall do when we receive a fruit tree. It is a young Apple, perhaps trained as a standard—that is, with a clean stem 5 or 6 feet long, and a head of about half a dozen young branches. After planting it carefully our best plan is to cut back the shoots by two thirds; for instance, to remove 16 inches of wood from a shoot of 24 inches long. The object of this apparently wasteful proceeding is to secure a strong break from the lower buds on the branches, and so get a good foundation.

It may be urged: But the nurseryman has already laid the foundation of the tree, why should we spoil his handiwork? We do not spoil it; we carry it a stage farther. With all his care in lifting the tree, and with the best of handling from the time it leaves his hands until it is planted (which trees do not always get by any means), a certain number of roots are broken. Now, root restriction generally leads to flowering, and flowering to fruiting. As fruit is our object all seems well, but it is not so in reality. Fruiting the season after planting generally throws the tree into a weakly state. If prevented from bearing the first year it forms plenty of roots, establishes itself firmly, makes sturdy young branches, and does well.

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suffers from it a hundred will benefit. If from any cause planting cannot be done until spring, and the district is a dry one, it is wise to leave the pruning until growth has started. Cold east winds sometimes follow spring planting, and these may be succeeded by a hot, dry summer. In such circumstances trees pruned while dormant break very badly.

The result of pruning a young fruit tree as here advised will be to cause it to form more branches. This is well up to a certain point, but it must not be carried too far. A crowded tree does not bear regular crops of large fruit. A dozen branches are enough. If more form cut them out, beginning with those that grow inwards or downwards. Every branch should go upwards and outwards. If the main branches are 1 foot apart they will do, always provided the side shoots are pruned in.

A fruit grower who prunes, thins, and shapes a tree for the first year or two of its existence in his garden will have a very easy task in the future. When he cuts he should cut boldly with a sharp knife or sécateurs. He should cut to wood (not fruit) buds on the outside of the branches; and he should not leave a long stump ("snag"). He should cut as close to the bud as he can without injuring it.

If, as is possible, the young tree throws out a great many very strong shoots he should not cut these hard back, because that would cause more to spring from below, and result in a crowded tree; instead he should bare the roots 3 or 4 feet from the stem, and put a knife or saw through all the thick ones that he finds. This root pruning will check the overgrowth.

If the grower can find time to go over his trees in summer (say about the middle or end of August), and shorten the side shoots to about six leaves, it will help the trees to swell fruit buds. The stumps can be cut back in autumn.

There is an idea that all kinds of trees require entirely different systems of pruning. This is not so; the same general principles apply to most of them. There are, however, one or two exceptions, and it may be well to refer briefly to each of the kinds individually.

Apples.—What has been said applies to most Apples. An exception may be made, so far as summer pruning and autumn shortening are concerned, in the case of the few sorts, such as Irish Peach and Lady Sudeley, which bear their fruit chiefly on the young wood. On these the young wood may be left uncut. The remarks about early shortening and shaping apply to them, however.

Cherries.—After the early pruning and shaping it is best to avoid cutting these in autumn or winter. As a rule they do not require much pruning, and the use of the knife then leads

to gumming. If the trees threaten to become crowded, thin out the offending branches in summer when the sap is flowing freely. There is less danger of gumming then. Morello's fruit best when left unpruned.

Apricots.—These are generally trained on walls. The branches should be kept about 1 foot apart, and the young wood laid in.

Currants, Black.—These bear on the young wood, which must not be cut back. On the contrary, cut out old wood, which gives little or no fruit, to make room for fresh growth.

Currants, Red and White.—These are best restricted to a limited number of mature branches, and the young wood cut in. They bear differently from the Black. Summer pruning is good.

Gooseberries.—These may be treated like Red Currants with success, but a little young wood may be left where it does not crowd the tree. A mass of branches is bad, as it makes gathering slow and painful.

Peaches and Nectarines are generally trained on walls or wires. They bear on the young wood, and must not, therefore, be hard pruned, except as concerns removing old wood which has fruited to make room for young shoots that have not, but will do so the following year if given plenty of room.

Pears may be hard pruned. When a tree with about a dozen branches standing well clear of each other has been secured by early attention, an autumn pruning of the young wood will keep it in order.

Plums need scarcely any pruning when once they have been well shaped. They form fruit buds on twiggy shoots standing close to the main branches, and much cutting is best avoided, except in thinning crowded trees. Breastwood should be spurred back, but summer pruning is always best.

Raspberries should be pruned every year, cutting out the old canes which have fruited, and leaving the best of the young ones that have grown that year to bear the following season.

Nuts.—An open, basin shaped bush is the best. When this has been secured by early shaping all that is needed is to shorten the young wood to 3 or 4 inches long.

Step XXXIII.—How to Manage a Strawberry Bed.

A NEGLECTED Strawberry bed yields a very poor return to its owner. It is overgrown and weedy. The plants, being

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crowded together, are weak, and the fruiting crowns are so small that a large crop of plump fruit is impossible. Frequently the bed is so full of leaves that the outline of the rows is lost. With proper management the rows will be well defined, the crowns large, and the berries big and juicy.

In starting to make a bed, mark out the piece of ground, dig it deeply, and work in a dressing of well decayed manure. In the absence of yard manure, use a mixture of kainit and superphosphate in equal parts, 7 lb. in all to the square rod, but take care to dig it well in. The digging should be done as soon after the vegetables or whatever crop has been grown upon it have been cleared off, so as to give the ground time to settle down before planting time comes.

Strawberries may be planted out of pots, weather permitting, almost any month in the year; but there is no better time than August or early September. The plants get well rooted before winter, grow rapidly in spring, and bear fruit in less than a year from the time of planting. Allow them 30 inches by 18 inches, that is, 30 inches from row to row, and 18 inches from plant to plant in the row. In order to make sure of getting the rows straight, it is well to plant with a line. Plant firmly, just covering the roots, but not the base of the leaf stems.

In severe, frosty weather the young plants are occasionally squeezed out of the ground. In this case place the ball of the foot on the plant, and gently, but firmly, press it in again.

When the plants begin to grow in spring, weeds will grow too, and therefore hoeing should be regularly practised.

In June or July "runners," as the stems which extend from the plants and creep along the ground are termed, may appear. It is wise to remove these at once, in order to concentrate the strength of the young plants on the crowns.

In the case of older plants, from which it is desired to propagate, we may let the runners go on. They will form young plants 1 foot or so from the old ones, and if some small pots, filled up to the very top with soil, are put beneath them, and a stone is placed on the plantlet to keep it in position, roots will form. In about six weeks there will be plenty of them, and we can then cut the runner through, for the young plant is now capable of feeding itself.

Well, we have hoed our new bed of Strawberries, and kept down the runners. This should result in vigorous plants, which will probably produce flowers in June or July, and these will be followed by fruit. In some cases Strawberry plants never bloom, even when large and strong. These barren or blind plants should be pulled up and thrown away. They should never be propagated from, as the young plants will probably be barren too.

Immediately that the young fruit is seen, a bundle of straight, clean straw should be procured, and a coating of it laid between the rows, under the bunches of fruit. The object of this is to prevent soil being splashed on to the fruit during heavy rain. Some people use short grass cut from lawns in mowing instead of straw, but although it is often convenient it is not advisable to use it, as in wet weather it sticks to the fruit and makes it disagreeable.

The straw will not prevent the weeds growing, and as it is of no use after the fruit has been gathered, it should be removed and the weeds hoed down. In autumn the bed should be dressed, that is, all stumps of runners, old decaying leaves, and weeds should be cleared away, and the ground dug. Everything will then be neat and tidy for the winter.

If this course of treatment is followed a Strawberry bed will be fruitful for several years, but old plants do not produce such large fruit as young ones. On this account many gardeners do away with the plants after the third year's bearing, having taken care, of course, to have a fresh bed made up of young plants ready to take their place. This is certainly the best way to get a good supply of large, delicious Strawberries every year.

Step XXXIV.—How to Grow Melons in a Frame.

MELON culture in frames is just sufficiently difficult to put the grower on his mettle, but with plenty of manure and a sunny season it is not beyond the power of even the amateur to produce Melons weighing several pounds, and of a flavour far superior to that the imported specimens bring over with them. In a cold, sunless summer or autumn, Melon culture in frames heated only by dung is beyond the ability of even the expert gardener. Shoots and leaves are produced in abundance, but eatable fruits are generally nil.

Very much indeed depends upon making an early start, and where plants are got into position by the middle of April, it takes more than an ordinarily bad summer to prevent the careful cultivator securing a crop of ripe fruits. After the middle of May Melon planting in frames heated only by dung is too much of a lottery to be recommended. It is just possible that a few ripe fruits may be secured, but the probability is in favour of green, undersized specimens, requiring ripening by the kitchen fire.

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seeds should be sown soon after the middle of March. A warm greenhouse or a freshly made hotbed is necessary to ensure the speedy germination of Melon seed, and, unless germination is speedy, rotting generally sets in. The seeds should be sown in the centre of 3½-inch pots, placing two seeds in each pot, and pulling out the weaker plant as soon as one takes the lead. There are two alternatives to this plan; one is to sow the seeds on the hotbed where the Melons are to be grown; the other, and infinitely the better, is to purchase young plants early in April.

As soon as the seeds are sown, or about three weeks before it is intended to put plants out, a start should be made in preparing the bed. About two loads of fresh, strawy manure will be required for a one-light frame, and in proportion for larger ones. This should be placed in a heap to ferment slightly, and turned, outside to inside, on alternate days for a fortnight. The object of this turning is to get rid of the violent heat generated in the first stages of fermentation. If the manure is not very fresh and strawy, two turnings, at weekly intervals, will probably suffice.

By the first week in April the manure should be ready for forming into a bed, which should be done with a fork, distributing the rotted and undecayed portions evenly throughout the bed. No treading is necessary, but the whole should be firmed, from time to time, with the fork. With the bed finished, place on the frame, and close the light for a few days.

When the heat in the bed has declined to 85°, about ½ bushel of the best loam obtainable should be placed in the centre of each light, disposing it in a cone shaped heap. Loam of a fairly heavy nature is the best for Melons, *i.e.* one that is yellow in colour, but which owes its colour to clay rather than to sand. If from a grazed pasture or common where animals have access, no manure need be mixed with it, as manure induces a rank, unfruitful growth. The knowledge of this fact induces some cultivators to place a large slate under the hillock of soil, but such is not necessary.

Some three or four days after introducing the soil, the heat of the bed should have sunk to about 80°, at which stage planting may safely be done. The young plant should on no account be buried deeply, or decay at the collar will inevitably set in. Just bury the ball of soil and no more, and when planting is finished, scrape away the soil from around the lower part of the stem of the plant, and replace it with a handful of coarse sand and nodules of charcoal, in mixture. This will ensure the free drainage of water from round the stem, and probably ward off the dreaded canker disease. The plants should be watered in, and the frame kept close for

a few days, or until it can be seen that growth is commencing.

As it is necessary to set the whole crop of fruit to be carried by each plant at one operation, pinching and training are very important items. A simple plan to follow is to pinch the main stem to two good leaves. This will result in a double lead, a shoot springing from each leaf axil. These shoots should be allowed to almost reach the top and bottom of the frame respectively, and should then be stopped, each to six good leaves. No further pinching should then be practised until after the female flowers have formed and been fertilised.

These female flowers will appear on the side shoots originated by pinching the leading growths, and when from six to eight are expanded at one time, or seem likely to expand during a period of a couple of days, an effort should be made to set them. This is effected by selecting a male blossom, *i.e.* one with no embryo fruit or swelling at its base, removing its petals, and inserting the central portion, the stamens and anthers, inside the female flower. After giving it a gentle twist round, it may be removed and thrown away. Use a fresh male flower for fertilising each female, and before inserting it see that its pollen is sufficiently dry to deposit a yellow powder on the thumbnail when tapped.

Only one fruit should be allowed to set on each shoot, and six fruits are a good crop to allow a single plant to carry. All fruits beyond the selected six should be removed, and any shoots not carrying a fruit should also be cut off. In addition to this, when it is seen that the retained fruits are commencing to swell freely, the shoots that bear them should have their tops pinched out, retaining only one good leaf beyond the fruit. As side shoots form, these should also be stopped at one good leaf, the object being to concentrate the whole energies of the plant on the fruits.

Melons require an abundance of water at the roots, and sufficient over the foliage to keep red spider in check. But there are two distinct periods in Melon culture when an almost dry *régime* must be practised. The first of these extends from the time that the flowers commence opening until the fruits are as large as a Filbert, during which time it is not advisable to give water at the roots, nor syringe more often than when closing the frame in the afternoon. The second period of drought begins when a faint, perfumed odour announces that ripening of the fruit has commenced, and finishes with the gathering of the crop. At both of these periods, a thorough syringing may be given in the middle of the day if red spider appears likely to be troublesome.

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Step XXXV.—How to Grow good Grapes.

THE amateur gardener who sets out to grow Grapes in a greenhouse, with all the garden paraphernalia that a greenhouse generally contains, handicaps himself very considerably at the start. The best Grapes are grown in houses specially built for and devoted to their culture, and the owner of the average greenhouse can scarcely hope to compete with these. Still, he may easily attain a fair amount of success, and by exercising skill and patience half pound bunches of good sized berries may be had in abundance, and pounders in slightly less profusion.

Failing a small house specially given over to a Vine or Vines, an effort should be made to devote one side of a structure to Grape culture. This should be the south or warmest side, and it will generally be found more profitable to plant three Vines along the side of a 12-foot house than to give up the space to a single specimen. Planting three rods or Vines means that subsequent pruning and training must be carried out on the short spur system, at once the most unnatural and profitable of all methods of Vine culture. One rod only could be planted, but that would mean training on what is known as the extension system—a system which has built up the fine old Vines at Cumberland Lodge and Hampton Court, but which is now looked upon as obsolete.

The first point requiring attention is the preparation of the border, and if good results, unattended by shanking and other worries, are to be obtained, this preparation must be thorough. The soil of the house should be excavated to a depth of 3 feet, and wheeled away, as it is useless for Vine growing. At the bottom of the excavation, a layer of broken bricks or large stones, 9 inches deep, should be placed. Over this is laid a covering of turves, with the grass, which may be undecayed, downwards. The border is then filled in with prepared compost. The bulk of this should consist of turfy loam, chopped into pieces as large as the fist, a sixth part of lime rubbish or finely broken bricks, and the same of charcoal or wood ashes. If the loam is not of tip-top quality, a 6-inch potful of $\frac{1}{2}$ -inch bones may be added to each bushel of compost. Animal manures should be avoided.

With the border properly prepared, planting will be the next step, and this must depend upon the time that the Vines are received from the nursery. October is the best planting season, but from then until the middle of November may be utilised. If it is not possible to plant by the middle of November, the operation should be deferred until between

the middle of January and the middle of February; later planting than this is not advisable, as the sap will be moving, and the Vines will bleed when cut. In a 12-foot house, the Vines, which will consist of a single rod, should be planted 24 inches from each end, with one in the centre; this will give the side shoots—laterals—equal space for extension on all sides. More space than this is better than less, if the Vines are to be permanent ones. Plant firmly, and only a trifle deeper than the nurseryman did.

To the novice it will seem a pity that the nice, strong, brown growth that the Vine brings with it must be wasted, but it should be cut back, and hard, too, if the Vine is to have a satisfactory career. As a rule, this cutting back should be as low as possible, 6 inches of stem being ample to leave when the side of the house is of glass. If, however, 2 feet or 3 feet of wall rises above the border to support the eaves of the house, the cutting back should be to near the top of the wall. The idea is to originate side branches only in such positions that they will receive the full benefit of light and sunshine. This cutting back should be done as soon as planting is finished.

During the following spring and summer growth should be encouraged as much as possible, allowing the young shoots to ramble at will. They may be temporarily secured so as to prevent interference with others, but no pinching or stopping of either the main growth or side shoots should be practised. Autumn should be devoted to ripening the growth made, to this end admitting all the sun and air possible, and even giving a little fireheat on dull, wet nights. At any time after the leaves have fallen, pruning may be done; and here, again, the grower must take his courage in both hands.

If all has gone well with the young Vine, it should have made a leading growth of from 15 to 20 feet, and as thick as the middle finger. It seems folly to cut the greater part of this away, but so it must be, and if we study our Vine's future welfare, we shall not leave more than 5 feet of the beautiful new stem. All side shoots which have pushed from this, and also from the older wood, must be pruned in to one eye or two eyes of their base, thus laying the foundation of the future fruit bearing spur.

The work of growing, ripening the wood, pruning in the side shoots, and cutting back the leading growth must be repeated in the next season. This time the cutting back of the leading growth may be influenced by the length of roof space to fill. If only 3 or 4 feet beyond the point of the second cutting back of the rod, this, the third cutting, may be done at a point which is about 6 inches short of the length of the

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roof. If, however, the roof is a long one, only about 5 feet of new rod should be retained, filling the remainder of the roof space from the next season's growth.

The Vine will now be in a condition to carry Grapes, and these will be borne on the shoots which will issue from the newly formed spurs. Probably more shoots will push than are wanted, and superfluous ones should be cut cleanly out, as spurs are not advisedly retained closer than 18 inches apart on each side of the rod. If more than one shoot issues from a spur, the weaker should be rubbed out. Tie the strongest to the roof wires, and when it shows an embryo bunch of Grapes, pinch out its tip two or three leaves beyond the bunch. Other shoots will then push from the one that carries the bunch, and must be pinched to one leaf.

When the young berries are nearly as large as Sweet Pea seeds, they should be thinned out with a pair of scissors, removing all near the main stem of the bunch, all on the under sides of side stalks, and as many of the others as will allow room for those retained to develop. A second thinning a month later is advisable, as the first is rarely sufficiently severe.

Summer routine will include the watering of the border when necessary, and applying liquid manure when the berries are growing freely. The atmosphere of the house must be kept at all times in a moist condition, or red spider will be troublesome. To this end damping down, *i.e.* wetting floor, border, and all available surfaces—but not the Vines—must be practised twice or thrice daily, according to the power of the sun.

Air must be given with discretion, leaving a chink on at the apex of the house all night when frosty weather departs. This must be increased as the sun shines on the house, until by the middle of the day all the ventilators may be half open in summer weather. When the berries commence to colour, still more air must be given, leaving the front ventilators open half way all night. Rather drier conditions may also obtain, but some damping down must still be practised, or red spider will put in an appearance.

The border must never be allowed to become dry in summer or winter, the Vines should be thoroughly ripened each autumn, and rested by keeping the winter temperature low. Pruning each shoot to one or two buds should be done soon after the leaves have fallen, the house and Vines should be thoroughly washed and cleaned each winter, and the border have the top 6 inches displaced by fresh, sweet loam.

There is only one Grape the ordinary amateur should tackle, that is Black Hamburgh. If a white one is wanted, Foster's Seedling or Buckland Sweetwater may be tried.

SECTION VII.—VEGETABLES.

Step XXXVI.—How to Dig, Trench, and Manure.

IN order to make our soil capable of bearing the heavy crops which we intend to grow on it, we must cultivate it thoroughly.

Now cultivation would be only half done if we dug without manuring, or manured without digging. The one supports the other, and makes the perfect whole.

In digging ground well we give it the power of holding a great deal more food, consequently we put it into a better state for nourishing the plants. Well dug ground will give double the weight of crop of badly dug ground. In digging the tool should go nearly straight down, so as to shift as great a depth as possible with each spadeful.

Trenching, however, is an improvement upon digging, because it still further increases the food-containing capacity of the soil.

Where chalk, sandstone, or gravel lies within a few inches of the surface, trenching cannot be done. In such cases the soil must be deepened in another way, namely, by the addition of leaf mould at the surface, and by mulching with manure.

Digging is generally done in the spring, because people whose days are occupied in other ways can find no opportunities of digging by daylight in autumn or winter. Autumn is best, however, because the manure which is put in has plenty of time to decay.

A very simple way of digging a piece of ground is to mark off a strip across the piece, throw the soil from it into a barrow, wheel it to the other end, and then, filling up the first gully with soil from a second strip, work backwards to the farther end, where the soil to fill the last gully is all ready for filling in.

Experienced diggers manage without a barrow. They contrive to turn the first strip over in such a way as to leave a slight gap between the loose soil and the sharp edge of the undug soil. With the second strip this gap becomes wider, and the manure is laid into it. The next spadeful covers the manure. Diggers should always keep this gap in front of them.

With practice the loose soil is laid quite evenly. It must

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not be left in a series of mounds and hollows. That is bad workmanship. It is also bad if the manure is only partly buried. It must be quite covered.

The surface soil should not be broken to a fine "crumb" in autumn digging. It should be left in lumps. These will be partly broken down by the weather before spring, and when the time comes to sow a fine level tilth can be obtained quickly and easily with a rake.

Trenching should also be done in autumn if possible. There are two common ways of doing it. One is to mark out a strip as in digging, but about 2 feet wide, throw the soil to a depth of 2 feet into a barrow, and wheel it to the other end. Then take another 2 feet strip, turn the top layer of soil into the bottom of the first trench, and the under layer or subsoil on to the top of it, thus filling up the trench. So proceed right through, and fill up the last trench with the soil taken from the first.

This method of trenching brings the under soil to the top, and answers where the subsoil is good, but not where it is stiff, yellow clay. In this case a modified system, called bastard trenching, is better. Mark out a 2-foot wide strip as before, but only wheel away the top layer; and instead of taking the subsoil out, break it up and mix with it ashes and burnt refuse, lay on a coat of manure, throw on the top soil from the next strip, and so proceed to the end.

In either system of trenching leave the surface rough. Moisture will get into the lumps, freeze, and expand, thus shattering the soil. If there is any wood ash from a garden fire, mix it with soot and throw it on in the winter. In February spread on a dressing of superphosphate at the rate of 3 oz. per square yard. In spring soil treated like this will be in splendid condition, and it will grow bountiful crops.

Very light soil is best dug or trenched in spring, but it should be done as early as possible, so that sowing can be proceeded with in good time.

We have seen that digging and manuring are very closely associated. Let us give a moment's consideration to manures. Manure is plant food. Too much or too little food is bad for a human being. Too much or too little manure is bad for a plant.

There are two classes of manure commonly used: 1, natural manure, such as the old bedding of horses, cattle, or pigs, and the droppings of sheep and fowls; 2, chemical manure, such as superphosphate, kainit, and nitrate of soda.

Natural manure is good for most crops if laid up in a heap until it has heated and decayed. Often two uses can be got from it. It can be made up into a hotbed to raise plants,

and after it has served that purpose it can be allowed to decay, and dug in as manure.

Lime may be added to fresh manure, but not to decayed manure.

The drainings from a heap of manure may be caught, and used as liquid manure.

What is the right quantity of manure to use for a given quantity of ground? Three barrow-loads per square rod is a liberal dressing. This quantity may be given to ground that has been stinted of manure and is in a poor state. Two barrow-loads will suffice for soil that has been regularly manured.

If ground has been heavily manured for several years, a dressing of lime, at the rate of 1 lb. per square yard, will be good for a change.

Artificial or chemical manures are a great help to the gardener. They yield potash, phosphoric acid, and nitrogen in a more concentrated form than yard manures.

They do not, however, form humus, as decaying natural manure does; nor do they warm the soil in the same way.

On poor ground they are best used in conjunction with yard manure. On ground which has been dressed with natural manure for several years they may be used alone.

The most common commercial forms of chemical manure are :

To yield potash.—Kainit; sulphate of potash.

To yield phosphoric acid.—Superphosphate; ground bones or steamed bone flour; basic slag.

To yield nitrogen.—Nitrate of soda; sulphate of ammonia.

These are in the price lists of nearly all manure dealers. Let us consider how we can make the best of them.

Kainit, which looks like coarse, dirty salt, contains, as a matter of fact, a great deal of common salt. It does not yield much potash, but it is very cheap, and if dug in in autumn is good for most vegetables.

Sulphate of potash is much more refined, and costs a great deal more. It yields far more potash than kainit, and is more suitable for damp, heavy land. A smaller quantity of it can be used than of kainit. It may be dug in in autumn, late winter, or early spring, but the earlier the better. We will consider the quantity presently.

Superphosphate is a cheap and very valuable manure. It acts more quickly than crushed bones, but not quite so quickly as steamed bone flour. It is, however, cheaper than the latter, and quite as good if put on early—in autumn, winter, or very early spring. Like kainit, it cannot be relied on if used in late spring, as dry weather may follow. To get the best results from chemical manures the soil must be moist. Basic

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slag is slower in action, and not much cheaper. Use it in autumn.

Nitrate of soda and sulphate of ammonia are both very quick in their action, and should not be used in autumn, but in spring. There is very little to choose between them, and the cheaper one may be bought.

It is not possible for all classes of gardeners to dig and manure their ground in autumn, but those who can do so may dig under the top spit or layer two barrow-loads of yard manure per square rod, and add to it 3 lb. of basic slag and 3 lb. of kainit per square rod; or 4 lb. of superphosphate and 2 lb. of sulphate of potash per square rod. This will give good results with nearly every vegetable.

If no yard manure is used, increase the quantities to 5 lb. of kainit and 5 lb. of basic slag; or 7 lb. of superphosphate and 3 lb. of sulphate of potash.

If autumn cultivation cannot be done, proceed directly the weather will permit in February or March. At that period the combination of yard manure, superphosphate, and sulphate of potash should be used, not kainit and basic slag; and instead of burying the chemical manure with the natural, it may be spread on the surface and forked in, or dusted in the drills at the rate of one handful per yard run. This should be done when the soil is moist, three weeks or more before sowing or planting, if possible.

As before, increase the quantity of chemicals if yard manure is not used.

Potatoes, Peas, Beans, Vegetable Marrows, Celery, Leeks, Onions, Cabbages, Cauliflowers, Winter Greens, Turnips, and other important vegetables will succeed with this treatment.

In the case of Beetroot, Carrots, and Parsnips it is best to avoid using manure the same year that they are sown; employ it for some other crop the previous year. Where, however, a start is being made with very poor soil, manure with superphosphate and sulphate of potash under the top spit.

Tomatoes need practically no manure, but wood ashes suit them.

We have not, it will be seen, found a use for nitrate of soda and sulphate of ammonia yet. These are best reserved for use on crops that are growing slowly in April, May, and June, such as Cabbages, Peas, Beans, Lettuces, Turnips, and Potatoes. Do not use more than 1 oz. per square yard or per yard run of row, and take care to keep the fertiliser off the leaves. Spread it evenly on the soil, and scratch it in with a rake or fork.

Liquid manure is valuable for crops that are well advanced in growth. It is good for Peas and Beans that are swelling

their pods, Celery, Leeks, and Lettuces. Be sparing with it on Onions, or it may cause leaf growth at the expense of large, firm bulbs.

Liquid manure may consist of: 1, drainings from yard manure diluted to the colour of weak tea; 2, liquid from sheep droppings placed in a bag and suspended in a tub of water for one night; 3, soot water made in the same way; 4, superphosphate at the rate of 1 oz. per gallon of water; 5, advertised special fertilisers at the strength recommended by the dealers. Two or more of these may be used alternately.

Mere sprinklings are not much good. One thorough soaking a week, after a shower, does more good than two or three dribbles in dry weather.

Liquid manure is also good for nearly all classes of fruit.

Step XXXVII.—How to Sow Seeds of Vegetables.

HAVING discussed the soil, we may proceed to our seeds.

The following are the principal vegetables raised from seeds in alphabetical order:

Beans	Cress	Radishes
Beetroot	Cucumbers	Savoys
Borecole	Leeks	Scarlet Runners
Broccoli	Lettuces	Spinach
Brussels Sprouts	Mustard	Tomatoes
Cabbages	Onions	Turnips
Carrots	Parsley	Vegetable Marrows
Cauliflowers	Parsnips	
Celery	Peas	

The list does not contain the most important vegetable of all, namely, the Potato, but this is usually propagated by tubers. So is the Jerusalem Artichoke.

Asparagus, Seakale, and Rhubarb may all be raised from seed without any trouble, but produce can be secured quicker by planting roots. The same remarks apply to those useful herbs Sage and Thyme.

Underground or Potato Onions and Shallots are generally grown from bulbs.

To take each of the vegetables named separately, and tell at length when to sow it, how deep to put the seed, how far apart to have the plants, and so on, would be a very long business. It will be more simple to put information on these heads into a table, and here it is:—

Whether to Sow for Transplanting, or in Rows where the Crop is to mature.

Quantity of Seeds or Sais.

Crop ready from Sowing or Planting, in weeks.

Final Distance Apart, in inches.

Depth, in inches.

Months to Sow or Plant.

Name.

A SOWING TABLE.

Name.	Months to Sow or Plant.	Depth, in inches.	Final Distance Apart, in inches.	Crop ready from Sowing or Planting, in weeks.	Quantity of Seeds or Sets.	Whether to Sow for Transplanting or in Rows where the Crop is to mature.
Artichokes (Jerusalem)	Mar., April	6	12 x 36	36	90 sets per square rod	in rows to mature
Asparagus (seeds)	Mar., April	1½	15 x 24	156	1 oz. to 50 feet	in rows for transplanting
Asparagus (crowns)	Mar., April	4	15 x 24	56	—	in rows to mature
Beans, Broad	Feb., Nov.	3	6 x 24	14	1 quart to 80 feet	in rows to mature
Beans, Dwarf French	April, May	3	6 x 24	12	1½ pints to 80 feet	in rows to mature
Beans, Runner	May, June	3	12 x 72	12	1 pint to 80 feet	in rows to mature
Beetroot	April, May	2	9 x 12	15-20	1 oz. to 50 feet	in rows to mature
Borecole	Mar., April	4	24 x 30	32	—	in rows for trans-
Broccoli	Mar., April, May	4	24 x 24	30-56	½ oz. yields upwards of 500 plants	planting
Brussels Sprouts	Feb., Mar.	4	24 x 30	24-32	—	in rows to mature
Cabbages	Mar., July, Aug.	4	12 x 15, 18 x 24	18-24	1 oz. to 80 feet	in rows for transplanting
Carrots	Mar., April, May	1	9 x 15	18-24	see Borecole, etc.	in boxes for transplanting
Cauliflowers	Mar., April	4	18 x 24, 24 x 30	15-20	a packet produces several hundred plants	in pots or boxes for trans-
Celery	Feb., Mar.	4	9 x 48	20-24	—	planting
Cress	Mar. to Aug.	1	—	2-3	1 oz. = 800 plants	in rows for trans-
Cucumbers	Jan., Mar.	1	24 x 24	9-18	—	planting
Leeks	Mar.	1	—	24-32	½ oz. = 500 plants	in rows for trans-
Lettuces	Mar. to July	1	12 x 4	10	—	planting
Mustard	Mar. to Aug.	4	6 x 12	2-3	1 oz. to 200 feet	in rows to mature
Onions	Mar., April, Aug.	1	—	16-18	1 oz. to 80 feet	in rows to mature
Parsley	Mar., June	4	6 x 9	12	1 quart to 120 feet	in rows to mature
Parsnips	Mar.	1	—	18-20	10 lb. per sq. rod	in rows to mature
Peas	Feb. to May	2	12 x 15	12-15	1 oz. to 100 feet	in rows to mature
Potatoes	Mar. to May	4-6	2 x 24, 3 x 36, 5 x 72	14-20	1 oz. to 100 feet	in patches to mature
Radishes	Feb. to May	1	12 x 24, 18 x 36	9-6	1 oz. = several hundred plants	in rows for transplanting
Rhubarb (seeds)	Mar.	1	36 x 36	156	—	in rows to mature
Rhubarb (crowns)	Mar.	4	36 x 36	52	see Borecole, etc.	in rows for transplanting
Savoy	Mar.	4	15 x 18	24	1 oz. = upwards of 100 plants	in rows to mature
Seakale (seeds)	Mar.	2	18 x 24	156	—	in rows to mature
Seakale (crowns)	Mar.	2	—	36-52	363 sets per sq. rod	in rows to mature
Shallots	Feb., Mar.	1	18 x 24	15-10	1 oz. to 80 feet	in boxes for transplanting
Spinach	Mar. to Aug.	1	9 x 12	10-14	½ oz. = 1,000 plants	in rows or broadcast
Tomatoes	Feb., Mar.	4	12 x 36	18-24	see Borecole, etc.	in boxes for transplanting
Turnips	Feb. to Sept.	1	9 x 12	8-10	—	in rows for transplanting
Vegetable Marrows	Feb., Mar.	1	15 square yards each	15-18	12	—

It may be well to refer briefly to a few of the columns.

When to Sow.—The best time to sow depends upon the weather. If it is wet, and the ground pasty, do not sow. If the soil is very dry, do not sow. To ascertain when the soil is right take up a handful of soil and squeeze it, then open your fingers. When the soil falls away, leaving a few particles sticking and a clammy feeling behind it, the right degree of moisture is present. The soil should neither stick like paste nor fall like stones. It will be seen from this that a calendar can only give the average time.

Depth to Sow.—The figures in Column 3 indicate the depth of soil which there should be over the seed, root, or tuber. In stiff, heavy soil the covering may be rather less than in light soil.

Distance apart.—This must vary with certain crops, notably Peas, according as they are short or tall varieties.

Time of Maturing.—The average is given; the exact period is governed by the weather.

The question may be asked: Why do we not sow all crops where they are to mature, and so save the trouble of transplanting? The answer is that sowing the Winter Greens (Borecole, Broccoli, Brussels Sprouts, and Savoys are the four vegetables called Winter Greens) and Lettuces in patches economises space. All of these things can be planted as late as June, and they can often be put on ground that has been cleared of an earlier crop, such as Peas, or between Potatoes. Sometimes, it is true, the results are not good, but that is almost always because the plants are allowed to get too thick in the patches and spoil each other. If thinned and set out a few inches apart in a nursery bed they remain sturdy, and then the plan answers well.

To summarise: (1) It is wise to look ahead in gardening, and have seeds ready before they are wanted, so that they may be put in directly a favourable opportunity arises.

(2) The principal vegetables grown from seed are Beans, Beetroot, Borecole, Broccoli, Brussels Sprouts, Cabbages, Carrots, Cauliflowers, Celery, Leeks, Onions, Parsnips, Peas, Savoys, Tomatoes, Turnips, and Vegetable Marrows.

(3) Salad vegetables, such as Cucumbers, Lettuces, Mustard and Cress, and Radishes, are also grown from seed.

(4) Potatoes and Jerusalem Artichokes are generally grown from tubers; Asparagus, Rhubarb, and Seakale from roots; Shallots from bulbs.

(5) Broad Beans, Borecole, Brussels Sprouts, Carrots, Onions, Parsnips, early Peas, Savoys, and Turnips may be sown at the end of March, also most of the salad vegetables.

(6) Of these, Beans, Carrots, Onions, Parsnips, and Peas are sown in rows where they are to grow.

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(7) Borecole, Broccoli, Brussels Sprouts, Lettuces, and Savoys are sown in patches and transplanted.

(8) Sowing these vegetables in a patch economises space, as they can be planted out eventually on ground from which an early crop has been lifted, or between rows of Potatoes.

(9) The great evil is overcrowding. This should be avoided by thinning and setting the plants out a few inches apart in a nursery bed.

(10) A table showing the months to sow, the depth, the distance apart, and other cultural matters, is a great aid to the gardener.

Step XXXVIII.—How to get an Early Dish of Potatoes.

In many districts there is commendable competition among amateur gardeners as to who shall dig the first dish of early Potatoes, and he is a happy man who manages to extract a few usable tubers from the soil in advance of his neighbours. Of course, the situation of a garden is often a determining factor, it being safe to risk planting in some positions a fortnight earlier than in others. A warm border with a slope to the south should always be chosen, where possible, and if there is a brick wall behind the border the owner may often dig his crop three weeks before less favoured rivals.

About the middle of January a start is made by placing the requisite number of seed tubers on end in a box. The large end of the tuber should be placed uppermost, and the box should stand in a light, somewhat moist, and frostproof place. Shoots will push from several of the eyes on each tuber in the course of a few weeks (Fig. 45, page 120), and as only two or at most three shoots will be wanted, all others must be rubbed out. The shoots which push from the large end of the tuber are invariably the strongest and best, and two of the sturdiest of these should be retained (Fig. 46, page 120). If other shoots show they should immediately be rubbed out, leaving only the two selected shoots to grow. By planting time these should be about $\frac{3}{4}$ inch long, and if properly tended such a set should yield a fair number of good sized tubers.

While the sets are sprouting, the site for their reception should be prepared. As warmth and only a medium amount of moisture are required, it is probable that the soil will need some addition. This may take the form of old and dry manure, leafmould, or old potting shed compost, *i.e.* that which has been shaken off the roots of pot plants. If this is

nicely mixed with the soil a dry and warm rooting medium will be obtained. If such materials are not plentiful, an effort should be made to get sufficient to provide a bed in the trenches for the tubers at planting time.

Planting may be done beneath the wall at the end of February, taking out a trench parallel with the wall, about 1 foot from it and 6 inches deep. Place a layer of the fine dry compost in the bottom of the trench, in this bed the sets shoots upwards, and cover with more fine material, filling in the trench with the garden soil. If more than one row of Potatoes is required, a second trench may be made and planted, but it should not be overlooked that the further



FIG. 45.—SEED POTATO AS IT SPROUTED IN A BOX.



FIG. 46.—SEED POTATO DISBUDDED AND READY FOR PLANTING.

the wall is left behind the less will be the warmth. The sets should be placed 1 foot apart, and 15 inches between the rows.

As frost will probably be in evidence at planting time, it will be well to place a layer of strawy manure along the rows to keep the ground from being frozen; this must, however, be removed before the young shoots can be damaged by contact with it. The appearance of the shoots should be carefully watched for, and a little soil drawn up around them from time to time as they progress. A few branches of evergreens, such as Yew or Spruce Fir, slanted against the wall, will keep the young shoots secure against frost. Later, when they are larger, the tops may be protected by hanging mats from the wall to rest on a few slanted stakes. In any case,

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the tops must be preserved, as if cut down by frost the crop will be delayed, although not likely to be ruined. Very little protection is, however, needed to keep frosts away from Potatoes that have the shelter of a south wall.

Earthing must proceed with growth, and is best done in two or three operations, as each layer of soil will help to protect the stems. If dry compost from the potting shed or other place can be obtained to use for earthing, so much the better, as then no check will be given to growth; this might easily happen were the cold, wet garden soil piled round the stems of Potatoes that had been protected.

The ordinary enemies of Potatoes rarely attack these early pioneers; Potato disease, wireworm, and leather jackets do not often give battle. The omnivorous slug, which gets on the warpath early in the season, may cause trouble when the shoots are young, and should be kept at bay by a dusting of soot and lime along each side of the rows. When growth is in full swing, frost is the only enemy to be feared.

Of varieties suitable for this early work there are many, but probably a good selection of Ashleaf will be found the most useful. Sharpe's Victor and Sharpe's Express are both excellent short topped early varieties, and Duke of York may be tried if a really handsome and well flavoured kidney is desired. Whatever sort is used should be well and properly sprouted, for therein is half the battle.

Step XXXIX.—How to Have Fine Asparagus.

Two ways are open to the man who would have fine Asparagus, the one to raise plants from seed, the other to plant roots. The former is the cheaper way in regard to initial cost, but the latter gives quicker results. If roots are employed, they should be purchased from a reputable firm, who may be trusted to give proper attention to packing, for Asparagus roots are very readily injured by exposure. For this same reason, planting should follow as quickly as possible on receipt.

Whichever plan is adopted, thorough preparation of the site is essential, preferably in the autumn previous to planting or sowing. Heavy land will require deeply digging, and lightening with road scrapings or old mortar rubbish. Sandy soil will need the addition of plenty of well-rotted manure, and should be trenched two or three spits deep. Here the beds may be formed on the level, but on a wet,

badly drained site they should be raised a little. It is quite unnecessary to dig in the vast quantities of manure that old practitioners used, as dung can always be employed as top-dressing, and is more beneficial in this form.

In seed sowing, a start should be made in April, drawing drills with a hoe about 2 inches deep and 1 foot apart. A little fine and fairly dry soil should be spread in the drills, and the seeds dropped in, in pairs, 1 foot or 15 inches apart. Cover the seeds by raking, and leave all level. When the seedlings are about 6 inches high, they should be reduced to one at each station. They are thin, puny-looking things, and it requires some courage to thin to a single plant, but one is quite different.

Summer treatment will consist of keeping down weeds by constant light hoeings, and giving water if drought is experienced. In very exposed places, it may be necessary to protect the young growth from injury by wind by placing a few sprayey boughs about the bed, or round the side most open to the wind. A layer of strawy manure placed on the bed in winter will be useful in protecting the young plants, and in enriching the soil. The produce will be fit for cutting in the fourth year after sowing; or a few precocious sticks may be taken in the third year.

If roots are planted, April should be the time selected for the operation, and roots not more than three years old are best; these should give sticks in the year after planting. A good ordinary distance to allow is 18 inches all ways, *i.e.* between the rows and between the plants, but in strong and especially suitable soil, 2 feet between the rows will not be too much. The roots should be planted about 4 inches below the surface, spreading them out well, and covering them with fine soil. The summer and winter culture need not differ from that advised for seedlings.

The routine culture of Asparagus consists of cutting down the stems when quite yellow, removing all weeds and stray seedlings, and putting on a dressing of thoroughly decayed farmyard manure. About April, the manure should be turned over, and broken up as much as possible with a fork and rake. Some growers apply salt at this season, and in light soils the practice is commendable; it is, however, rather injurious than otherwise with heavy land. Liquid manure is beneficial throughout the growing season, and nitrate of soda, $\frac{3}{4}$ oz. to the square yard, may be given in showery weather while cutting is going on. Cutting should cease at the middle of June.

Of varieties, Conner's Colossal is an established favourite, and Early White Argenteuil and Early Purple Argenteuil are extensively grown.

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Step XL.—How to Grow Cucumbers.

THERE can be no doubt that, as a general rule, it is better for an amateur gardener to purchase a Cucumber plant than to raise one from seed. He rarely requires more than one plant, which can be bought for 6d., whereas a packet of reliable seeds costs 1s. Again, the raising of a Cucumber plant demands greater heat and moisture than are good for the majority of greenhouse plants in spring, and where only one structure is available it is scarcely wise to subordinate the requirements of the many to the individual.

There is, however, no real difficulty in raising Cucumber plants from seed, and where the necessary heat and moisture are at command, seeds may be put in at any time. Small, well drained pots should be used, and one seed placed edgewise in the centre of each, covering it with about $\frac{1}{2}$ inch of soil. After watering in, the pots should be stood in the propagating case, or on the hot water pipes, until the young plant peeps through the soil, when a shady position in the body of the greenhouse may be given. Water should be given in abundance, and each plant should have a stake as soon as tendrils show.

This brings us to the same stage as though we purchased a plant, and the treatment of home raised and bought in plants will from this point be identical. One important point must not be overlooked, and that is to repot the young plants before any yellowing of the leaves takes place. Seeds are sown and plants purchased in $3\frac{1}{2}$ -inch pots, as a rule, and if the place for their reception is quite ready the plants may be put into their permanent quarters direct from these pots. If, however, there is likely to be any delay in planting, if only for a week or so, the Cucumbers should be shifted into 5- or 6-inch pots, according to the extent of the delay.

Cucumbers enjoy a good root run and plenty of rich food, therefore planting out in a border or frame gives better results than pot culture. Very good plants, to carry upwards of a dozen fine fruits, can, however, be grown in a 12-inch pot, and where planting out is impossible, and Cucumbers are a desideratum, the pot system may be adopted. The growths may be trained to wires or strings on the roof of the house, or twined round four long, stout stakes placed at the sides of the pot. Room should be left in the pot for top-dressings of rich material, and liquid manure should be freely given when the roots are working well.

Culture in a greenhouse presents no difficulty, and gives

the best results in the form of well shaped, deep green fruits. But the house must be almost entirely surrendered to the Cucumbers, only such plants as ferns, palms, Dracaenas, and stove plants generally finding themselves at home in the ideal Cucumber growing atmosphere. Tomatoes and Cucumbers in the same structure are almost an impossibility, but one that is often attempted by the enthusiastic novice. Planting can be done at any time in a greenhouse, provided that the plants are ready, and a night temperature of not less than 60° can be maintained.

Frame culture is, however, and deservedly, the most popular with the amateur gardener, and, if undertaken after the bedding plants have been removed from the frame, is free from worry, and involves little expense. Probably a hotbed will have been made up to assist the bedding plants, and this will provide an ideal root run for the Cucumbers. The sides of the frame should be scrubbed to remove any insect legacies left by the bedding plants, and on the now dormant hotbed about 1 bushel of good loam should be dumped, keeping this in a mound in the centre of the frame.

The frame should then be shut up closely to allow the soil to become slightly heated, and two days later the Cucumbers should be planted, allowing one to each light of the frame. Water should be given in sufficient quantity to soak the soil and to drench the whole inner surface of the frame; then the lights may be kept tightly closed for a few days to assist the plants in establishing themselves in their new home. Should the sun be very strong, a mat may be placed on the glass during the hottest part of the day, but no air should be given. Neither will any water be required, as the closed frame will prevent the escape of moisture.

When it can be seen that the plants are making growth, or in about a week, air may be given from about 10 o'clock in the morning until 2 o'clock in the afternoon, increasing the quantity as the sun gains power. When closing the frame, the plant, soil, and frame surfaces should be thoroughly moistened with tepid water, a full can being kept in the frame to provide this. As soon as roots begin to show through the soil, add more good loam, and continue this, from time to time, until the surface of the old bed is covered.

Before this occurs, pinching or stopping the shoots will have become necessary. The main shoot may be either stopped soon after planting, or allowed to almost reach the side of the frame, and then have its point removed. Whichever course is adopted, the result will be the production of side shoots, or laterals, on which the fruit is borne. Each of these laterals must in its turn be stopped at one leaf beyond the first fruit which shows. This will cause the fruit

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to swell rapidly, and also originate other growths or sub-laterals. As many of these shoots take an upward direction, pegs, either of wood or wire, should be employed to fasten them to the bed of soil, and thus keep them from contact with the glass, where their tips would probably be burnt by the sun.

As the frame fills with foliage, and when the vines have yielded a fair number of fruits, it is well to carefully go over the plants, and cut cleanly away all old growths that are carrying neither shoots nor fruits. If this is thoroughly done the frame will present a half empty appearance for a few days, but will soon fill up again with new, fruit bearing shoots. About this time liquid manure may be given with great advantage. The soil should first be well wetted with clear water, and then enough liquid manure should be given to ensure a thorough soaking. Once a week will be often enough to do this, and about 10 o'clock a.m. is the best time for carrying out the operation.

Step XLI.—How to Grow Outdoor Mushrooms.

MUSHROOM cultivation seems to the uninitiated to possess such an element of mystery that, as a rule, only the more venturesome among amateur gardeners essay it. And yet there is nothing to lose in Mushroom growing, even should no crop of succulent "buttons" result from the attempt. On the contrary, the garden stands to gain a welcome addition in the shape of a little extra sound loam, and some rich and well rotted manure. Therefore Mushroom culture on a small scale may well be recommended to all who are fond of this appetising fungus.

For the outdoor culture of Mushrooms, about midsummer is a capital time to start, as the crop will then be gathered before frost and cold winds make covering up and protecting the bed necessary. The first essential is good spawn, and above all fresh spawn; therefore business should be done with a firm that has a reputation for spawn, and a rapid output. Most of the failures in Mushroom growing may be traced to two causes: one, badly prepared or stale spawn; and two, unsuitable and unskilfully managed manure.

The manure invariably used is fresh horse droppings, and those from corn fed animals are preferable to those from horses fed on green food. Manure from horses undergoing

a course of physic should be studiously avoided, as the merest trifle seems to be sufficient to offend the susceptibilities of *Agaricus campestris*, as the Mushroom is scientifically called. The droppings are best collected daily, freed from straw, and deposited in a heap beneath an open shed. When sufficient has been collected, say enough to form a bed about 9 feet long, with a 4 feet wide base terminating in a point, the work of preparation should be begun.

Throw the manure into a high, square heap, and well tread it down: if very dry, sprinkle it with water when forming the heap. In a few days fermentation will set in, and to prevent the fierce heat thus involved from burning and drying up the manure, the whole should be shaken up and turned, placing the outsides to the insides. After about three such turnings, allowing an interval of three days between them, the manure should have lost its rank heat, and give out a sweet odour, somewhat suggestive of Mushrooms, when smelt. Old-fashioned gardeners test the fitness of the manure by squeezing a little in the hand. If it is pleasantly moist, but parts with no liquid when squeezed, it is fit for making into a bed.

The bed may be of any desired length, according to the space available, but the sides should slope like the roof of a house, from a base about 4 feet wide. The top of the ridge need not terminate in a sharp point, but may be 1 foot across, and rounded; this will facilitate watering. At the time of making up, it is a good plan to insert a couple of long sticks, such as besom handles, in the bed; these will be handy for indicating the moisture in the bed later on. The manure should be well compacted during the process of building the bed, and the whole finished off fairly smooth.

After making up, the temperature of the bed should rise for a few days, after which it should steadily decline. When a thermometer registers about 80°, spawning may take place, inserting pieces of spawn brick, about the size of hen's eggs, at 9-inch intervals over the surface of the bed. To insert the spawn, a hole should be made with the hand, the piece of spawn placed in, and well surrounded with manure. Some growers use a dibber to insert the spawn, but the practice is not commendable, as the spawn and manure should be brought into the closest possible contact. After spawning, the bed should be covered with clean straw, kept in position and free from wind shifting by laying over it a few boards or hurdles.

A week later, an examination of the bed should show tiny white, cotton-like threads running over the surface of the manure. These are the mycelial threads of the fungus, and show that everything is all right. If no white threads

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are apparent, a further wait of a few days may be made, and should no signs of mycelium then show, it will be wise to spawn the bed again, the inference being that the heat of the bed was too great at spawning time. If it is known that the heat was under 80° , and did not rise after spawning, the bed had better be broken up, and a new one formed.

When the spawn is shown by the white threads to be working, a layer of good loam, not unduly wet or dry, but what is known as nicely moist, must be spread all over the bed, patting it down with the back of a spade. To prevent the soil falling down, the spade may be dipped into a pail of water occasionally, and then gently rubbed, with a light, circular motion, all over the surface of the soil. This done, the covering of straw should be returned, and secured in place. This layer should be added to or lessened according to the fluctuations of temperature, a steady mean of 60° being desirable until gathering begins.

The inexperienced will wisely invest in a plunging thermometer, and with this take the temperature of the bed daily. Some six weeks after spawning the first signs of Mushrooms will probably appear, but no impatience need be felt if eight weeks elapse before the tiny buttons can be seen. Meanwhile water will be required in beds exposed to the full play of sun and air, but the need of this can best be ascertained by withdrawing one of the stakes inserted in the bed at making up time. Just after mid-day is a good time to water. Enough should be given to well soak the bed, and the covering of straw should be returned at once, to check cooling by evaporation. Chilled water only should be used, cold water often being sufficient in itself to ruin the prospects of a crop of Mushrooms.

In gathering the crop, the covering should be removed for only the shortest time possible, and each Mushroom should be pulled out cleanly by the root. A temperature of 55° should be maintained when the bed comes into bearing, and the occasional addition of a handful of salt to the water will be beneficial.

Step XLII.—Salads, and How to Grow Them.

SALADS are both health giving and appetising, and no garden, however small, should be without a selection, particularly in the summer months, when almost all may be grown in the open. With the advent of winter the demand for salads sensibly diminishes; but such as Mustard and Cress,

Chicory, and Endive are essentially winter salads, and in treating of a dozen of the most popular salad plants these will be included. The dozen selected plants are Beet, Celery, Chicory, Corn Salad, Cucumbers, Endive, Lettuce, Mustard and Cress, Onions, Radishes, Tomatoes, and Water-cress.

We will begin with Beet. A fairly light soil that has been well and deeply dug, but not recently manured, is the best for Beet; the globe shaped Beets are not so particular as the long ones about soil. Drills about $\frac{3}{4}$ inch deep and 15 inches apart should be drawn when the ground is fairly dry, towards the end of April. Thin sowing should be practised, and the plants ultimately thinned to 6 or 9 inches apart, according to the nature of the land. The Beets should be lifted before severe frost is experienced, and stored in a shed. The Egyptian or Turnip rooted Beet comes in earlier than the long rooted sorts, and is very useful for summer salads. Cheltenham Green Top and Dell's Crimson are two favourite long sorts, and Dobbie's Selected Globe is a good round sort.

Celery should be sown at the end of February for early supplies, and about the third week in March for late and maincrop purposes. A mild hotbed is the best place for the seed pan. Transplanting into boxes or a gently warmed frame should be done as soon as the plants are large enough to handle, and, after hardening off, the plants should be put out in trenches during the latter half of May. Trenches should be about 9 inches deep and 18 inches wide, and should contain a single row of plants, 9 inches apart.

Chicory is raised by sowing seeds in drills about 15 inches apart towards the end of April. A heavy, holding, well manured soil gives the best results, the plants being thinned to 9 inches or 1 foot apart. About the end of October the plants should be dug with a garden fork, and the roots packed fairly closely together in light soil in a box or dark shed. For early supplies a few roots may be placed in a warm Mushroom house, or in a darkened corner of a greenhouse. The tops are cut when 6 inches long, and the roots thrown away.

Corn Salad is little known among present day gardeners, but it is a useful little salad plant during summer, autumn, and early winter. Seed may be sown in March, on a warm border, the drills being 9 inches apart, and the plants being thinned to 6 inches asunder. Successional sowings may be made, as required, until September. The Broad-leaved Italian is the most profitable sort to grow, and stands cold weather well.

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bed, the best specimens being obtained from house grown plants. The end of February or beginning of March is the most suitable time to sow seeds. One seed should be placed in the centre of a 3-inch pot, and the seedling potted on until it forms a good plant in a 5-inch pot, when it should be planted out in a border or on a hotbed. Moisture in abundance is required at all times, both at the roots and in the atmosphere, and all growths should be pinched at two joints beyond the young fruit when the latter can be plainly seen. Lockie's Perfection is one of the best sorts. Ridge Cucumbers may be sown on a warm border outdoors at the end of April. If kept well watered they are very useful in the salad bowl. Stockwood is a prime favourite.

Endive does best on soil of a light, sandy nature that has been well enriched with manure. Seed sown in early June will give nice heads over a long period, and successional sowings in July and August will yield good winter salad. Drills about 1 inch deep should be used for sowing, transplanting the seedlings, when large enough to handle, 1 foot apart for the smaller varieties and 15 inches for the broad-leaved sort. The plants should be blanched by inverting flower pots over them as they stand in the ground; or they may be lifted in October and blanched in a cold frame by covering them with leaves. Green Curled and Imperial Green Batavian, broad leaved, are the two best sorts.

Lettuces may be raised under glass in January and February, choosing a small growing Cabbage sort, such as Veitch's Golden Ball. About the middle of March a sowing may be made on a warm outside border, either broadcast or in drills. The plants should be subsequently transplanted into rows 1 foot apart, with 6 or 8 inches between the plants. A succession should be kept up by fortnightly sowings, the last one, to stand the winter, being made at the end of August. Paris White is a good Cos Lettuce for general use, and the Bath or Brown Cos for autumn and winter. Of Cabbage varieties Continuity is a splendid flavoured, dark foliated sort, and All the Year Round is excellent for general purposes.

Mustard and Cress are raised by sowing seeds thickly on top of well drained boxes of soil under glass during the winter months. Cress should be sown four or five days before Mustard, to ensure the two coming in together. Sowings may be made outdoors as soon as genial spring weather obtains, choosing a sunny border for the first sowings, and a place beneath a north wall for subsequent ones. The seeds need not be covered with earth, but should be protected from birds with netting or Pea guards.

Onions are seldom specially grown for salads, the thin-

nings from the spring and autumn sown crops sufficing. The spring crop should be sown in March in well enriched, firm ground, keeping the rows about 1 foot apart. The autumn sowing should be made early in August.

Radishes give excellent salad if sown thickly under glass in January, the young plants being pulled just when the first rough leaf is visible. Enough may be allowed to remain to form edible roots. Wood's Frame and French Breakfast are good for this purpose. Outdoor sowing may commence early in March, and successional crops may be raised by fortnightly sowings until September. Broadcast sowing is generally favoured, the plants being thinned to 3 inches apart.

Tomatoes are best sown about the middle of March for a general crop; this sowing should give outdoor and indoor plants too. Outdoor plants should be put out at the end of May, against a warm fence, if possible. A rich soil is not needed in the early stages of Tomato growing, but when fruits are set, food and water in abundance should be given. Green fruits may be gathered, and ripened in a sunny window or a dark cupboard. Holmes' Supreme and Carters' Sunrise are two of the best Tomatoes known, either for outdoor or indoor culture.

Watercress is all too seldom an occupant of gardens, owing chiefly to the idea that it will only grow in water. If a damp, shady spot, such as beneath a north wall, is available, a sowing made in April will give good results, and may be followed by other sowings, as required. Water should be given freely during the whole of the growing period.

Step XLIII.—How to Grow Seakale and Rhubarb.

SEAKALE for forcing may be readily raised from seed, which should be sown in March or April, either in drills 1 foot apart, or in clumps 3 feet asunder all ways. The latter plan does away with the need of transplanting, as the seedlings in each clump only require to be reduced to three, at 6 inches apart all ways. But root cuttings are more generally favoured than seeds, and, moreover, save at least a year in the time that must elapse before edible produce is cut.

The cuttings employed are the thong like divisions of old roots, removed when the latter are lifted for forcing. These are tied into bundles, and lightly buried in soil until March, when they are planted with their crowns 2 inches below the

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surface, in deeply dug and well manured land. Each cutting should be cut squarely across the top, slantingly at the bottom, and should be trodden in firmly. About 2 feet should be allowed between the cuttings in all directions. If the cultivator possesses no old plants to yield cuttings, he should purchase the latter from a nursery at planting time.

As the cuttings occupy but little space in their early stages, it is possible to take a catch crop from between the rows. Onions, Radishes, Spinach, and Lettuces are suitable subjects for this, as they can be cleared before the Seakale leaves want the ground. It should always be remembered that the Seakale is the legitimate crop, and any other introduced should be subservient to it. Water in abundance will be needed should the season prove dry, and all flowering stems should be removed on sight. As autumn advances, the leaves will decay, when they should be removed, and preparations made for blanching or forcing. The former is easily carried out in the open ground, by heaping decayed leaves or ashes over the crowns after the turn of the year; the latter needs hot manure, or a warm greenhouse.

Rhubarb seed should be sown in a box, in a cold frame, about March or April. The seedlings should be kept in the frame, after pricking out into small pots, until they are large enough to plant outdoors. Except for raising new varieties, seed sowing is not to be recommended. Instead of sowing seeds, a few good roots of well known varieties, such as Daw's Champion for early and Victoria for late use, should be purchased and planted in autumn or early spring, the latter being the better time. The crowns should be buried 2 inches under the soil, and about 3 feet apart for the weaker growing varieties, and 4 feet apart for the stronger sorts. No sticks should be pulled the first summer, weeds should be kept down, and good soakings of water given to assist establishment, should the weather prove dry.

Both Seakale and Rhubarb can be readily forced during autumn and winter, in either case waiting until frost has caught hold of the leaves. Rhubarb is held to force more readily if the roots are dug up and left on the surface of the soil during a period of slight frost. A greenhouse with a night temperature of 45° will force both Seakale and Rhubarb, but a greater heat than 60° makes for weak and spindly growth. Both are best grown in the dark, though Rhubarb possesses a richer colour, but poorer flavour, when allowed light.

The roots should be surrounded with light soil, the quality of which need not be considered; even decayed leaves or thoroughly rotted manure may be used. Water should be given freely, and daily syringings with tepid water will

promote quick, succulent growth. With good management the earliest produce should be fit for use about seven weeks from the date that forcing was commenced; later batches will be ready in less time. When forced in a greenhouse, neither Seakale nor Rhubarb is worth planting out again, but should be thrown away.

For outdoor forcing, or forwarding the plants without removing them from their growing quarters, a quantity of dead leaves should be collected in the autumn, with about half the quantity of fresh, strawy manure. Early in the year the crowns of Seakale or Rhubarb should be covered with pots or boxes, the latter having, as have the pots, movable lids. Over these the leaves and manure, well mixed, should be heaped, and the whole left covered for a few weeks. If much heat is generated, it may be well to remove a portion of the covering, and also the lids of the pots or boxes, to allow steam to escape. On the other hand, a little addition of manure may be necessary, should the forcing materials be found to have parted with their heat. Care should be exercised not to expose the crowns suddenly after cutting the crop, as cold weather may easily cause damage, and crowns forced in the open ground are available for further crops.

Step XLIV.—How to get a Good Crop of Tomatoes.

Good crops of Tomatoes are obtained by two distinct cultural systems, the one, indoor culture, invariably giving excellent returns; the other, outdoor culture, being largely influenced by conditions over which the cultivator has no control, and therefore less dependable in the matter of results. The element of chance which enters into outdoor Tomato culture apparently has its attractions, for thousands of persons attempt it every year, so that a little consideration may well be given to it here, as well as to the less precarious indoor culture.

In growing Tomatoes under glass, by far the best results are obtained when a greenhouse can be entirely given up to them, as they are rather peculiar with regard to their atmospheric requirements. The amateur who essays to grow Tomatoes and the general run of greenhouse plants in the same house handicaps himself severely at the start, and unless he is prepared to sacrifice the tastes of his other plants somewhat, he had better leave Tomato growing severely

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alone. It may be taken as a truism that Tomatoes can never be grown to perfection in a close, moisture-laden atmosphere, and this should be realised and acted upon at the very beginning. Keep the foliage constantly dry and the roots constantly moist, and Tomato growing is one of the easiest things imaginable.

With this important fact kept ever before us we will commence to sow our seeds. Our greenhouse is just the ordinary sort, calculated to keep up a temperature in winter that never falls below 40°, and capable at seed-sowing time, the middle of March, of maintaining the heat of the house at between 55° and 60° during the night. Were it more liberally heated, we could have sown seeds sooner, but we shall still be in plenty of time, and, with ordinary good fortune, may hope to secure 10 lb. or 12 lb. of fruit per plant.

A 9-inch seed pan will enable us to raise some four dozen plants, out of which we may reasonably expect to select three dozen good, sturdy specimens for ultimately bearing fruit. We, therefore, place a large crock, concave side downwards, over the drainage hole, add a $\frac{1}{2}$ inch thick layer of finer crocks, and a covering, 1 inch thick, of the coarser parts of sifted compost. Fill up to within $\frac{1}{2}$ inch of the brim with fine soil, any that has been prepared for other seeds will do, and press in the Tomato seeds 1 inch apart all over the surface. Scatter on a $\frac{1}{4}$ inch of fine soil, make it firm with the bottom of another pan or flowerpot, water in, and stand in a warm corner of the greenhouse, covering with a pane of glass and sheet of brown paper if the position is a sunny one. The brown paper and glass are both removed as soon as the seedlings begin to break through the soil.

Growth is now rapid, and when the two smooth looking leaves which first appeared on each seedling are followed by a third, a leaf with crinkled surface and jagged edge, it is time to think about potting off. For this, we use 3-inch pots, allowing one to each seedling. Crocking need not be carried to excess, nor need any but an ordinary sandy compost be prepared; the chief points are to place each seedling in the centre of a pot with its lower leaves resting on the soil, and to make the latter quite firm. The pots are now stood closely together, kept well supplied with water, but not wetted overhead, until the roots begin to show through the sides of the soil, when a shift into 4 $\frac{1}{2}$ -inch pots becomes necessary. For this potting, use one crock only in the bottom of the pot, cover it with a little turfy loam, place in the plant, and fill up with a compost of fibrous loam 3 parts, and broken mortar rubble, road grit, or coarse sand 1 part. Make all very firm, water liberally, and treat as before, until pushing roots proclaim the need for another repotting.

This should be the final one, and 9-inch pots should be used. This time we dispense with crocks entirely, and cover the drainage hole with a handful of long, half decayed dung. The same compost may be used as for 4½-inch pots, with the addition, if the loam be not of tiptop quality, of 1 part of thoroughly dried and crumbled stable manure. Firm potting is again practised, but this time we leave the finished surface of the soil 2 inches below the brim of the pot. This is to accommodate a topdressing of sheep manure, or good new loam and Clay's Fertilizer, when the plants are carrying two trusses of fruit.

About this time side shoots begin to push from the axils of the leaves, and these we pinch out at sight. It is a good plan, however, to pinch the lower four or five side shoots back to one leaf, which will be found valuable when the original leaves decay. As flowers form, the plants should be lightly tapped daily when the sun is shining, in order to disperse the pollen and set the fruit. At this period we are more than usually careful with watering and ventilating, leaving a little air on all night, and increasing this gently in volume as soon as watering is finished. Care is also taken not to spill water about the house, as if by any means moisture condenses and settles in the eye of the flowers, the subsequent fruits will probably be affected by the well known black spot. Should this put in an appearance, affected fruits should be burned without delay.

Summer culture consists solely in pinching out side shoots, watering liberally, with tri-weekly applications of liquid manure when the plants are in full bearing, vaporising should white fly appear, and picking the fruit before it is fully ripe, and standing it on a shelf to finish. Holmes' Supreme is one of the best all round amateur's Tomatoes, but Up-to-date and Sunrise may also be tried if desired.

For outdoor culture, a few plants may be set aside from the indoor sowing. These we grow with and treat the same as the others until they require larger than 3-inch pots. Instead of giving them the 4½-inch size, as the indoor plants, we allow them each a 6-inch pot, proceeding in the same manner as before indicated. Watering and rubbing out side shoots are attended to as with the indoor plants, and by the middle of May strong specimens, some 18 inches high and bearing a truss of flowers, should be ready for transferring to a cold frame.

Here they may stay for a fortnight, or until the first week of June, when they may be planted a yard apart at the foot of a wall or closed fence; an open fence is a very undesirable position, owing to the constant draughts in its neighbourhood. Failing a wall or closed fence, the plants

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may be set out in a row in the sunniest part of the garden. Thus grown, they should be planted 18 inches apart, and 3 feet between the rows, each plant receiving a stout stake.

Watering, feeding, and hoeing are the chief items of summer culture, with the removal of side shoots, and a shaking of the plants after rain. About the middle of September the point of each plant should be pinched out, and any leaves removed that shade the fruit. Green fruits may be removed when fully grown and ripened in a dark cupboard, or on a sunny shelf in the greenhouse or window.

Step XLV.—How to Grow Herbs.

TIME was when every well regulated garden grew its quota of herbs; now they are rarely found save in the garden of the cottager, or that of the old-fashioned country mansion. Probably the ease with which dried herbs can be obtained in packets has had most to do with this decline of the herb in popular favour, but certain it is that our gardens are the poorer for the absence of such sweet, old-time favourites as Rue and Rosemary, Mint and Marjoram, Thyme and Tarragon, Sage and Savory, Balm and Basil, Chervil and Chamomile.

Herbs are not at all difficult to grow; some few of them may even grow themselves to such an extent as to be undesirable to the owner of a small patch. The majority like a loamy soil, inclining to be sandy rather than clayey; in fact some, such as Thyme, will grow in almost pure sand. They should be encouraged to grow strongly all the summer, and those that are dried and kept for use should be cut when in full flower, exposed to the sun for a few hours, and then suspended, head downwards, in paper bags, in a warm, dry room.

Propagation is effected by seeds, cuttings, and division of the old roots. Seeds are sown in spring, generally in the places where the plants are to grow. Cuttings are taken at the same time, or as soon as new growth is about 4 inches or 6 inches long. The illustration, Fig. 47, page 137, shows a Sage cutting, which is a young shoot springing from the old wood. It is trimmed, and ready for insertion in a semi-shady border of sandy soil. Division can be practised in autumn, or when growth is beginning to move in spring. Many herbs have a tendency to become bare in the centre; this is remedied by dividing the clumps every two years, throwing away the decayed central portions.

A few cultural details in connection with the chief herbs are appended, taking the most popular dozen kinds in alphabetical order.

Balm is one of the most fragrant of aromatic herbs. It is a perennial, a native of France and Switzerland, grows in any good garden soil, and should be divided each spring to keep up a stock of young plants. The scientific name is *Melissa officinalis*.

Basil is of two sorts, Bush and Sweet. The bush form is a native of the East Indies, and is raised from seed, sown in a pot towards the end of March. It is an annual, and rather tender. The Sweet Basil requires similar treatment to the above. It is a native of the East Indies, quite as tender as the preceding, but larger. Both flower about July, when they should be pulled up and dried in a light, airy shed, for winter use. Bush Basil is called by the botanist *Ocimum minimum*; Sweet Basil, *O. Basilicum*.

Chamomile may be either the double or single flowered form. Both like a sandy soil, are perennials, and may be propagated by stripping off side shoots with a few roots attached in April or May. Old growers always trod over Chamomile, when growing, to strengthen it. The flowers, used for Chamomile tea, are gathered in July, and dried in slight sunshine. The single flowered form, *Anthemis nobilis*, is better flavoured than the double *A. n. flore pleno*.

Chervil, or Sweet Cicely, is a pleasantly aromatic herb, in great favour with makers of salads. Seeds should be sown in May in sandy soil, thinning the seedlings to 6 inches apart. Successional sowings may be made in July and August. The leaves are the parts used. Botanically it is called *Chaerophyllum aromaticum*.

Fennel is one of the most graceful of our British foliage plants, its feathery form often adding great beauty to seaside cliffs. It is used for sauce and garnishing, and is excellent for mixing with cut flowers. Seeds are sown in autumn or spring, the plants being thinned to 18 inches apart. If the flower stalks are cut out, fine plants soon develop. It is a perennial, and scientifically known as *Foeniculum vulgare*, or *F. officinale*.

Marjoram is sometimes represented in gardens by the wilding form, *Origanum vulgare*, but there are two other sorts entitled to precedence over it. Of these, the Pot Marjoram, *O. Onites*, is a favourite, but frequently succumbs to a hard winter, unless planted in sandy soil. It should be divided in March, planting the divisions 9 inches apart. Summer Marjoram, *O. Majorana*, is a biennial, and is raised from seeds sown in April each year. It likes a sunny spot and sandy soil, and should have 6 inches of space all ways.

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Mint is such an indispensable adjunct of new Potatoes and Green Peas that room should be found for a few roots in every garden. It likes a moist situation, and rather holding soil. Cuttings strike easily when stock is short, or the old roots may be divided. It is never advisable to allow a Mint bed to remain longer than three years without breaking it up, or the destructive Mint rust may attack and destroy the plants. *Mentha viridis*, the Spearmint, is the best species for garden culture, *M. rotundifolia*, though frequently grown, being far inferior.

Parsley is another of the indispensables. To ensure a constant supply, a sowing should be made in February, followed by another early in June. The seeds generally take at least three weeks to germinate; the seedlings should have a space of 9 inches all ways. Plants from the June sowing will give a supply all the winter, if protected in severe weather.

Rosemary is raised from seeds or cuttings, or, rather, what country folk call slips. These are secured by abruptly pulling down side shoots near the base in such a manner that a heel of old wood is secured. These should be dibbled firmly into a moist and shady border in spring, placing them in permanent quarters in October. Seed is sown in spring, upon a sunny border. Rosemary succeeds best in a light, warm soil; its scientific name is *Rosmarinum officinalis*.

Sage is so popular that nearly everybody grows a bush. It is best propagated by cuttings, not slips (see Fig. 47), May being the month for taking these. A sunny border of light soil suits cuttings best, and a handlight facilitates rooting.



FIG. 47.—A CUTTING OF SAGE.

The plants should have the tops of the shoots pinched out occasionally, to induce a bushy habit. Old plants should be cut back annually in July. *Salvia officinalis* is the botanical name of the Sage.

Savory is represented by Summer and Winter Savory, the former being an annual and the latter a perennial. Both may be raised from seeds sown early in April, thinning the plants to 6 inches apart, and ultimately leaving the Winter Savory at 1 foot apart. The latter plants should also be pinched to induce bushy growth. Winter Savory may also be raised from cuttings, or divisions. *Satureja Hortensis* is the Summer, and *S. montana* the Winter, Savory.

Thyme may be of the ordinary, or the Lemon-scented species. Both are amenable to the same culture, may be raised from seeds, cuttings, or divisions, and succeed best in warm, sandy soil. Seeds may be sown or cuttings taken in April, the latter being made of the short shoots near the centre of the plant. Division makes the best beds in the shortest time. *Thymus vulgaris* is the common, *T. citriodorus* the Lemon-scented, Thyme.

Step XLVI.—How to Crop Ground.

It is difficult to teach the cropping of ground on paper in such a way as to assist everybody, because (a) gardens vary in size, (b) the individual requirements are different, (c) soil varies a great deal. Still, we will try.

We must first take into consideration the principle called "rotation cropping." It is based on the different root systems of plants, and their supposed habit of taking different manure ingredients from the soil. As an example, a Carrot has a tap root and a Pea a fibrous one. In theory, we must not put a crop of Peas or Carrots on the same ground two years running; we must have Peas one year and Carrots the next.

Now gardeners have been influenced a great deal in the matter of rotation cropping by farmers, but the cases are not identical. Farmers generally cultivate large areas of land split up into a great many separate fields, and it is quite easy for them to change the crops without overlapping. In gardening the amount of ground is often very small, and it is difficult to effect regular changes of crop without reducing the quantity of the most important ones.

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than balanced, however, by the better cultivation and the closer attention to individual plants that the gardener can give. When properly handled, the spade goes deeper than the plough. Besides, water and liquid manure may be given in the garden where they cannot in the field.

We will not condemn rotation cropping; we will practise it where we can; but we will not fear failure if we cannot practise it thoroughly. As a matter of fact, many of the most useful vegetables do well on the same ground year after year, always provided that the cultivation is good.

A simple plan of getting a change of ground is to classify our vegetables in three sections, and separate our plot into three parts.

Section No. 1 (tuberous rooted) would be Potatoes.

Section No. 2 (fibrous rooted) would be Peas and Beans, Celery, Cabbages, Cauliflowers, Onions, Winter Greens.

Section No. 3 (tap rooted) would be Beetroot, Carrots, Parsnips.

If we were dealing with a plot of 15 to 20 square rods, poles, or perches we could go to work as shown in Fig. 48, page 140, that is, give up one-half to Potatoes, and a quarter each to the other two sections. Fig. 49 shows how the ground would be cropped the second year. This plan gives a change in alternate years, and answers well if the soil is well tilled.

The serious difficulty in the way of a perfect system of rotation cropping in small gardens is that intercropping has to be practised, *e.g.* Winter Greens are planted between Potatoes. This upsets the rotation at once. As examples of cropping are instructive, some are given. These plans were actually cropped, and won prizes in strong competitions.

It is not to be supposed that any particular plot will suit every case, because the sizes and shapes of plots vary a great deal. It may, however, offer a useful suggestion.

The great thing is to arrange for the most important crops to have the most space. It is a mistake to reduce the Potatoes severely in order to introduce large quantities of minor crops. The principal crops should stand in the following order as regards space:—

1. Potatoes.
2. Winter Greens (Borecole, Broccoli, Brussels Sprouts, Savoys).
3. Peas and Beans.
4. Cabbages.
5. Onions.
6. Beetroot, Carrots, Parsnips, Vegetable Marrows.
7. Cauliflowers, Celery, Turnips.
8. Artichokes, Leeks, Shallots.
9. Pickling Cabbages, Cucumbers (often grown in a frame), Tomatoes (can often be accommodated against a wall or fence).

FIG. 48.—ROTATION CROPPING.

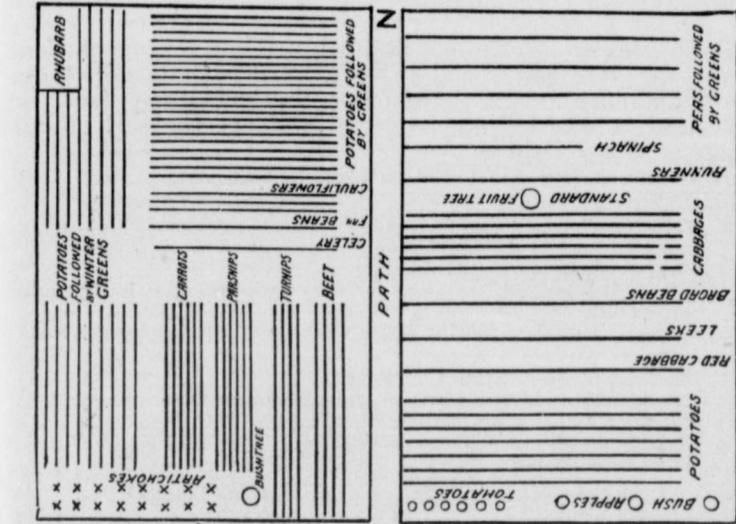


FIG. 48.—ROTATION CROPPING.

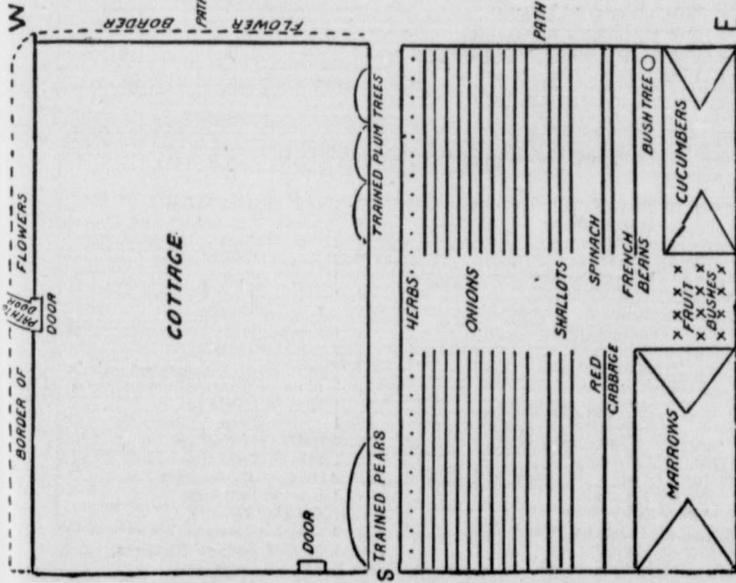


FIG. 50.—HOW A PRIZE COTTAGE GARDEN WAS CROPPED.

These are suggestions for general places. In some instances certain crops might be increased and others reduced for special purposes.

Of course, we want to get as much produce off our gardens as we can. We can afford to crop hard so long as we dig deeply, manure liberally, and hoe thoroughly—in fact, we shall find it almost impossible to exhaust the soil if our tillage is as it should be.

Here are a few ideas for intercropping :—

- A.—1. Make trenches for Celery in April.
 2. Plant Lettuces on the ridges at once.
 3. Plant the Celery in May or June.
 4. Use the Lettuces, and earth up the Celery with the ridges in September or October.
 5. Sow early Peas the following spring when the Celery has been cleared.

- B.—1. Plant short topped Potatoes in spring.
 2. Put Borecole and Sprouts between them in May or June.
 3. Lift the Potatoes in summer.
 4. Clear the Greens the following spring, and
 5. Make an Onion bed.

Note.—Do not put Greens between coarse growing late Potatoes.

- C.—1. Sow Onions in spring.
 2. Sow Cabbages in summer.
 3. Clear the Onions in September, and
 4. Plant the Cabbages in their place.

KEY TO PRIZE ALLOTMENT ON PAGE 143

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|---|-------------------------------------|
| 1. 1 row of Parsley. | 25. 1 row of Artichokes. |
| 2. 1 " Horseradish. | 26. 13 rows of Potatoes and Greens. |
| 3. 1 " Salsify. | 27. 1 row of Peas. |
| 4. 7 rows of Potatoes. | 28. 1 " Cauliflowers. |
| 5. 3 " Winter Greens. | 29. 1 " Greens. |
| 6. A bed of Asparagus. | 30. 1 " Scarlet Runners. |
| 7. 1 row of Lettuces. | 31. 3 rows of Turnips. |
| 8. 1 " Gooseberries. | 32. 1 row of Strawberries. |
| 9. A bed of Rhubarb. | 33. 2 rows of Carrots. |
| 10. " Seakale. | 34. Seed bed of Onions and salads |
| 11. 1 row of Raspberries. | 35. 7 rows of Potatoes and Greens. |
| 12. 1 " pickling Cabbages. | 36. 1 row of Cabbages. |
| 13. 1 " Tomatoes. | 37. 1 " Peas. |
| 14. 2 rows of Winter Greens. | 38. 2 rows of Parsnips. |
| 15. 1 row of Cabbages. | 39. 1 row of Cabbages. |
| 16. 11 rows of early Potatoes with Winter Greens between. | 40. A bed of Cucumbers. |
| 17. 1 row of Celery. | 41. 1 row of Lettuces. |
| 18. A bed of Vegetable Marrows. | 42. 7 rows of Onions. |
| 19. 1 row of Leeks. | 43. 4 " Carrots. |
| 20. 1 " French Beans. | 44. 1 row of Scarlet Runners. |
| 21. 1 " Cauliflowers. | 45. 1 row of Celery. |
| 22. 1 " Peas. | 46. 5 rows of Potatoes. |
| 23. 2 rows of Beetroot. | 47. 1 row of Chrysanthemums. |
| 24. 3 Turnips. | 48. A bed of Herbs. |

FIG. 51.

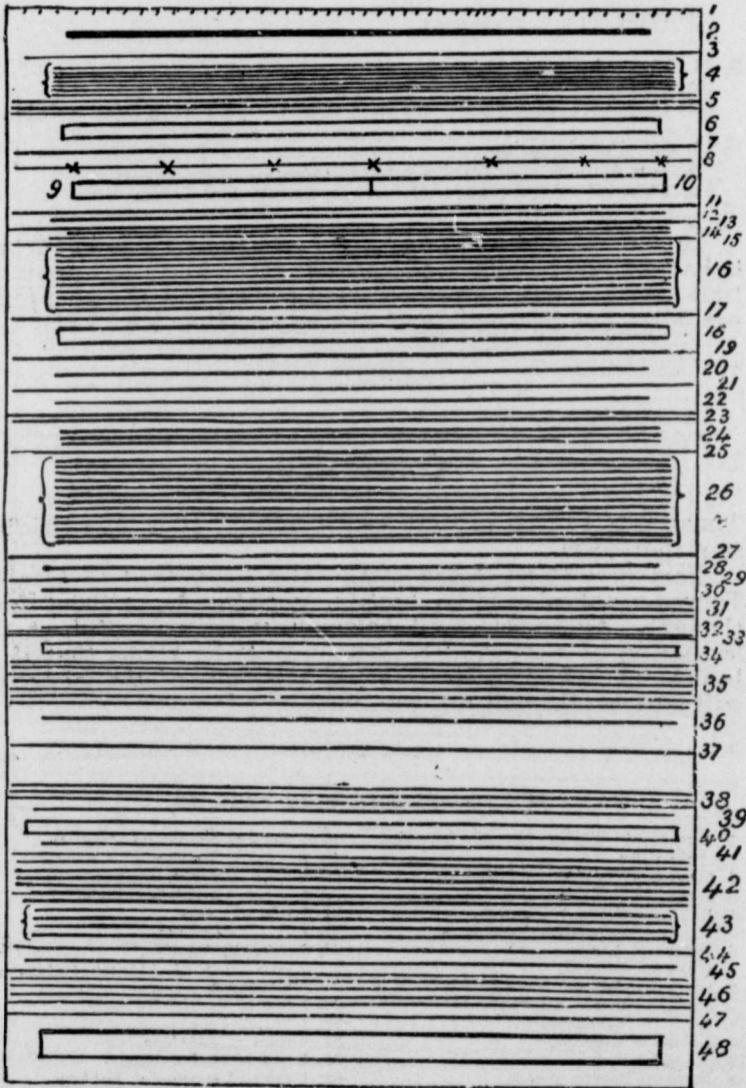


FIG. 51.—AN ALLOTMENT 69 YARDS LONG AND 5 YARDS WIDE, EQUAL TO ABOUT $11\frac{1}{2}$ SQUARE RODS, JUDGED ON AUGUST 9th.

(For Key, see opposite page.)

- D.—1. Clear off summer sown Cabbages in spring.
 2. Sow late Carrots and Beetroot.
 3. Plant out autumn Onions.
- E.—1. Plant Shallots in February.
 2. Transplant autumn sown Onions in February or March.
 3. Clear both crops off and sow with Rosette Colewort in June or July.
- F.—1. Sow Peas in spring.
 2. Sow Spinach and Turnips between them.
 3. Clear all off and plant with Savoys, Celery, and Leeks.

In successional cropping of this character it is important to have one crop ready to succeed the other when the appointed time comes. This can be effected by sowing at the proper periods. For particulars of sowing see Step XXXVII.

Conclusion.

THERE is a French proverb which says: "It is only the first step that costs."

Yes; first steps, being often false ones, lead to trouble. They are taken eagerly, hastily, impulsively, without forethought. An experienced batsman is very careful at the beginning of a game of cricket, because he knows that if he lashes out before he has learned the pace of the wicket he will mistime the ball and get out.

KEY TO ALLOTMENT ON PAGE 145.

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| 1. 9 rows of Winter Greens following Potatoes. | 20. 5 rows of Sprouting Broccoli. |
| 2. 8 rows of Potatoes and Greens. | 21. 4 " Turnips. |
| 3. 1 row of Seakale. | 22. 5 " Spring Onions. |
| 4. 1 " Globe Artichokes. | 23. 4 " Autumn Onions. |
| 5. 1 " Jerusalem Artichokes. | 24. 1 row of Cress. |
| 6. 2 rows of Leeks. | 25. 1 " Lettuce. |
| 7. 1 row of Lettuce. | 26. 3 rows of Potatoes. |
| 8. 1 " Celery. | 27. 3 seed rows of Autumn Onions and Cabbages. |
| 9. 1 " Scarlet Runners. | 28. 1 row of Scarlet Runners. |
| 10. 1 " Tomatoes. | 29. 1 " Peas. |
| 11. 4 rows of Turnips. | 30. 4 rows of Potatoes. |
| 12. 3 " Beet. | 31. 1 row of Red Cabbage. |
| 13. 1 row of French Beans. | 32. 4 rows of succession Cabbage. |
| 14. 2 rows of Spinach following Peas. | 33. 2 " Cauliflowers. |
| 15. 1 row of Celery and Lettuce on ridge. | 34. 3 rows of Broccoli. |
| 16. 1 row of seed Onions. | 35. 1 row of Brussels Sprouts. |
| 17. 4 rows of Parsnips. | 36. 2 rows of Curled Kale. |
| 18. 4 " Carrots. | 37. Parsley. |
| 19. 1 row of Salsify. | * Apple trees. |

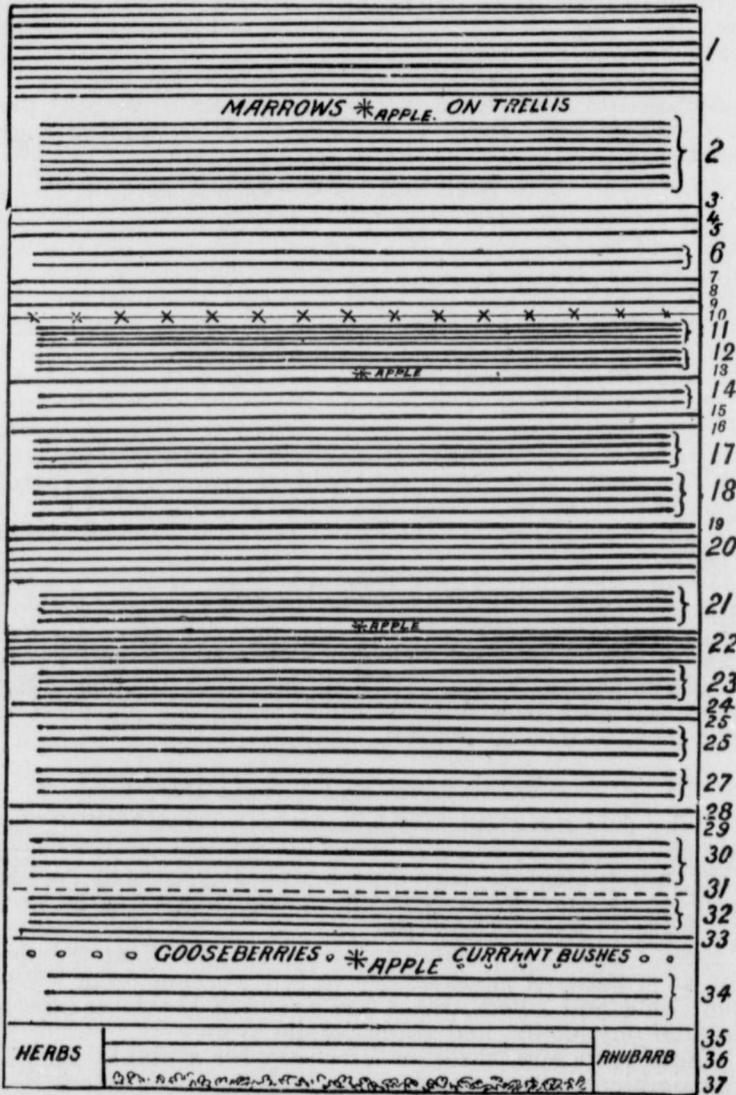


FIG. 52.—AN ALLOTMENT OF 16 SQUARE RODS, WITH FRUIT.

For Key, see opposite page.

Thousands of people find just as much pleasure in striking cuttings of plants as others do in hitting a ball, but in the one, as in the other, the greatest enjoyment comes when they have learned how to do it properly.

The first step at cricket is to learn the rules, the second to practise. It is the same in gardening. Rules without practice are no use. Practice without rules is working in the dark.

The Seed and its Germination.

It is not necessary to study a textbook on botany to learn a few of the principles of plant life. We can acquire some simple facts that will be a great help to us without that. Let us take a seed, and see what happens when it begins to grow. We will choose a fairly large one, which we can handle easily and see plainly—a Vegetable Marrow, for instance. If put into moist soil which is not too cold, the seed will germinate. It will open, and a green substance will appear. This is the future plant. A stem will be seen, with small white roots at one end of it, and tiny, smooth, green leaves at the other. The roots take hold of the soil and increase in size and number, the stem lengthens and thickens, and the leaves multiply, but instead of remaining smooth, become rough.

Now, what turned this Vegetable Marrow from a seed to a plant? The flattish, creamy white seed remained hard and dry while we kept it in a drawer, but soon after we put it into a pot it changed its state. It softened and opened. Warmth, moisture, and soil food caused the change. If we want seeds to grow quickly and strongly we must not put them into cold, dry soil.

What Roots and Leaves Do.

Why does the plant first form smooth leaves? Well, these are not really leaves at all. They are like the camel's hump—they are present to tide over a difficulty. Until its roots and leaves have got to work the young plant has no means of getting food. Now the smooth leaves (cotyledons or "lobes," as they are called) contain sugar, and keep the plantlet alive until its machinery is in full working order. When the roots and rough leaves are at work the lobes are not wanted any longer, and gradually die away.

Both roots and leaves are necessary for a plant. Employing simple language, we may say that the roots take in food, and the leaves take in air. As a matter of fact, leaves help to feed the plant, but their principal function is respiration. A plant with a bad root system will become unhealthy as certainly as a human being with a bad stomach. Equally,

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a plant will suffer as severely from diseased leaves as a man from diseased lungs. To have good plants we must have healthy roots and sound leaves.

Soil and Root Action.

People often put a plant in the soil without knowing what goes on there. This is not so bad if the plant grows well—but what if it does not? We are in the dark, and do not know what to do. We have an idea that the soil does not suit it, but we do not know why. It may be too wet or too dry, too poor or too fertile, too firm or too loose. Moisture and fertility are linked together, because the food of a plant is taken up by the roots in a liquid state. We learn from this not only that dry soil is bad for plants, but why it is bad. There is such a thing as soil being too wet. It may become like paste, for instance. When water lies in soil for a long time it becomes stagnant, and the soil sour. In that state plants will not thrive.

It may be asked: Do not the roots take up soil? No. It is true that particles of sand have been found in plants, but the broad fact is that the food taken up is liquid. We might call it plant soup, prepared by the soil cook. This busy being does not bustle about with a large white apron and a very red face; it is a tiny organism in the soil which we cannot see. If the soil is moist, well pulverised, and well manured, the soil cook is comfortable, multiplies fast, and, with all her brothers and sisters and aunts and cousins, gets through a tremendous amount of work. Soup is prepared by the copperful, and the plants are well fed.

Air in the Soil.

We have seen that sour soil is bad; how can we prevent it getting into that state? By admitting air. Soil without air is useless because the soil cooks cannot live in it, and without them the plants are not fed. If the upper layer (say the top 30 inches) of soil in a garden is very close on the top, and full of water below, it cannot contain much air. We must get the water away by drainage, and well break up the surface, before the soil will be right. The ingress of the air after that may be left to Nature. Air is always pressing on the soil and trying to get in. Give it a chance by crumbling the surface, and it will enter and fertilise the soil.

Plenty of Room Wanted.

Before we finish with these few general principles, let us glance at another point—the importance of giving the plants plenty of room. Plants that are crowded together

generally have few roots, weak stems, and flimsy leaves. In this state they cannot be healthy. It is not enough to say: "Well, if they were a bit crowded at first they have plenty of room now that they are put out." It is the crowding "at first"—that is, in the seedling stage—which causes the mischief. It is the children who are packed together and badly fed in the slums who die young or grow up sickly.

Much more might be said about the theory of gardening, but so much space has been used for practical matters that it must be left out. Let us sum up the salient points:—

1. A plant is a living organism springing from a seed.
2. It consists of roots, stem, and leaves.
3. Seeds germinate best in warm, moist soil.
4. The first leaves, or "lobes," are smooth.
5. The "lobes" feed the plant until its roots and leaves are in working order.
6. The roots take in food, and consequently a plant with a poor root system is not well fed.
7. The leaves take in air; a plant with unhealthy leaves does not get enough pure air to flourish.
8. The roots of plants take in food in a liquid state.
9. The food is prepared by small organisms that we call soil-cooks.
10. The soil-cooks cannot flourish in sour soil, and consequently plants in such soil do not get enough food to become strong.
11. The air which is always pressing on the soil must have free ingress, or the soil will not be fertile.
12. If sour soil is drained and well cultivated it becomes sweet and fertile through the admission of more air.
13. Plants must have plenty of room to grow from their earliest stages. If crowded when young they either die outright or grow up weakly.

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