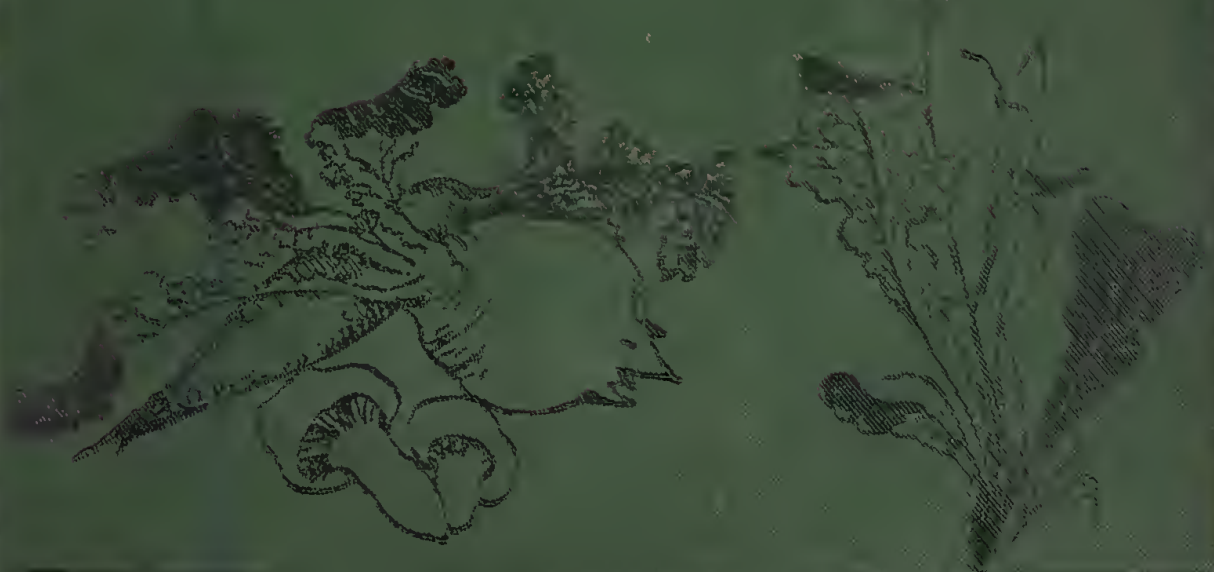
MARKET-GARDEN

HUSBANDRY



FARMING

FOR

PLEASURE AND PROFIT.

EIGHTH SECTION.

MARKET-GARDEN HUSBANDRY.

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Market-Garden Husbandry

For Farmers and General Cultivators.

BY

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CONTENTS.

CHAPTER I.

CHAPTER II.

CHAPTER III.

CHAPTER IV.

CHAPTER V.

CHAPTER VI.

CHAPTER VII.

CHAPTER VIII.

CHAPTER IX.

CHAPTER X.

CHAPTER XI.

MARKET GARDEN HUSBANDRY.

CHAPTER I.

Change of Farming Operations. CARROTS — Varieties — Soil — Cultivation—Manure—Raising the Crop and Storing. PARSNIPS.

OWING to a succession of bad seasons, and in face of the enormous food importations from abroad, the English farmer has had so many difficulties of late to contend with, under the usual system of husbandry that, in many instances, he has been unable to stand his ground, and hundreds of farms are now tenantless in various parts of the country.

Although there is, doubtless, ample occasion for serious apprehension on the part of many of the occupiers of land, yet the situation is not nearly so hopeless as it is often represented to be; and a change of practice, and resort to a more mixed system of husbandry, could often be profitably resorted to, to the great benefit of those concerned. This is by no means the first time that British husbandry has been under a cloud, for in 1797, when the Bank of England suspended cash payments, and an unlimited paper currency was issued, which offered unusual facilities

for the creation of trading capital, every article of consumption attained an artificial value; and the high price of grain in the years 1800 and 1801, and again from 1809 to 1813, caused the cultivation of wheat and other cereals to be followed to the fullest extent, valuable old pastures being broken up in all directions in order to grow grain.

There are old farmers now living, who can remember the reaction that took place after peace was proclaimed, for rents and tithes had been advanced in ratio to the general prosperity, and when a return to cash payments reduced the fictitious value of produce to the standard of a metallic currency, and the farmer had to pay in gold his engagements contracted under a paper currency, wide-spread ruin was the result, and the farming interest of the country was pretty generally prostrated, the times being worse for farmers than they are at present, according to the testimony of living witnesses; many families formerly in prosperous circumstances being broken up, and numbers of young men, originally intended for agricultural pursuits, had to turn their attention to commerce.

Change of Farming Operations.—A great many suggestions have been made respecting the advisability of a change of operations in the routine of ordinary farming practice, where wheat has hitherto been the chief product raised, which is now found not to pay the grower in the face of the large importation of corn from America and other places abroad, one of the most feasible of which is the raising of vegetables for the supply of our increasing population in towns; and in some instances the recommendation has been

acted upon to a limited extent, with disappointing results, it must be confessed, in many cases.

Market gardening, however, like everything else that is worth doing properly, is a business of itself, particularly liable to one great drawback—glut in the market; and the same fertilising showers which bring on to rapid perfection the succulent vegetables of one grower, perform the same friendly office for a hundred others; great quantities of vegetables are sent up to the markets simultaneously and "glut" is the result, causing the new growers in this line to be highly dissatisfied with the prices they have obtained for their produce which has been disposed of under such circumstances.

There are, however, several salient points in connection with successful market gardening that need to be taken into careful consideration by those who are desirous of turning their attention in this direction. One of the first is nearness to a town of considerable size, capable of taking the produce raised; or an adjacent railway station, and the opportunity of obtaining, or making, a thoroughly good supply of manure. It is well known that market gardeners in the neighbourhood of London owe the chief part of their success to the great facilities they enjoy in procuring large quantities of manure. Their carts leave overnight, or in the small hours of the morning, according to the distance they have to traverse, laden with vegetables, and they bring back manure which can be purchased very cheaply, for people in London are glad to have it removed from off their premises, where, on account of the confined space at command it is generally regarded as a serious nuisance. It is

usual for these to contract with stable-keepers, carriers, and others, to clear their litter away for a comparatively small sum, and load up their carts for the return journey with a large amount of fertilising material that enables them to take successive crops off their land without a moment's delay.

Now the manure ordinarily made upon a farm is relatively much smaller, and out of all proportion, when distributed upon the land, to the quantity thus at the command of the market gardener near London or any large provincial town where a similar condition of affairs prevails. But yet there are crops which can be successfully raised as field-crops, such as peas sold green, that could be grown in the ordinary manner like any other farm product. For green peas there is always a ready market for any quantity, and here early production is the great thing to aim at. The same may be said of early potatoes, and also cabbages. Carrots again is another crop that pays remarkably well upon suitable land for their growth; and the same may be repeated of parsnips, all of which require no special departure from the usual method of field cultivation that is followed.

All these kinds of crops can be grown upon the system of ordinary farm routine, upon land that does not possess a thick coating of *humus*, or garden soil, the result of a long course of application of manure, composed of vegetable, and animal excremental matters; but, at long distances from towns, where there is a difficulty in obtaining a plentiful supply of manure, it would not be difficult for the person about to commence market gardening to manufacture a large quantity of manure on his own premises, which he

could easily do by keeping, in the first place, a good stock of hardy pigs, such as the improved Berkshire breed. This race of animals is not over-choice in its feeding, and the bulk of the food required for them would be supplied by the outside leaves of cabbages, all the small and misshapen roots, potato tops, pea-haulm, and garden refuse of all kinds, supplemented by a small quantity of concentrated food of a better quality, the details of which will be referred to again in another part of the present work.

A cow or two might be very profitably kept in addition, upon the house-feeding, or soiling system, whose food could be entirely grown upon the land devoted to market gardening. The milk finds a ready sale in any neighbourhood, and should the project be attempted in any out-of-the-way place, where there is not a ready market, and the railway is depended upon for getting rid of the produce, and a milk-trade could not be very conveniently done, the milk could be churned into butter, and in this form, being very portable, is easily transferable a long distance without any large amount of cost or trouble. The details of these arrangements will, however, be found under the heading of "Stock-keeping for Market Gardeners."

CARROTS.

Carrots will be found a most useful crop to grow by farmers who are willing to alternate their usual practice with a little market-garden husbandry. They may be raised successfully upon poor soils, which would produce only a scanty crop of turnips, and, when resorted to in place of the latter, will give a

larger variety in the course of rotation. It is also useful in its effects upon the soil, for its long root, travelling to a great depth in the earth, loosens it, and does equivalent work to the subsoil plough, the fine extremities of the root extending downwards in some instances to a depth of 4 or 5 feet, and thus it has been observed that a better crop of wheat has been obtained after carrots than when following turnips, for the latter derive a good deal of their sustenance from the surface-soil, while the longer root obtains a great portion from the subsoil.

The carrot (*Daucus carota*) is not so likely to suffer from an uncongenial season as turnips, and is tolerably free from the attacks of insects or disease when a plant has been once established. This, however, is the great difficulty, for in any dry weather the obtaining of a good plant is somewhat precarious, and, in land that is infested with weeds, it is often difficult to clean. As carrot-seed does not retain its vitality long, very much depends upon the quality of the seed, which needs to be always new, and to make sure of always having the best, it will be found a good plan to grow one's own. If straight, long roots be chosen, which are the best of their kind, and planted in good rich soil, in a sunny and sheltered corner, the seed will produce a heavy crop of straight, clean roots, while seeds obtained indiscriminately will bring very often an inferior crop of forked and smaller-sized carrots, perhaps not more than half in amount of the others.

Varieties.—The two leading varieties of carrots in garden culture are the Early Horn, a light crop for spring and summer use, and the Altringham, for

autumn and winter sale. There is also an intermediate variety, the Long Red Horn, which is a useful sort for garden culture, but, as the early produce commands the highest prices, earliness is the chief feature in everything connected with market gardening. The White Belgian carrots, as well as Altringham, are grown by farmers as a field crop, and they have been found useful on thin soils on account of growing with a liberal portion of their roots above ground ; but on thin rocky soils they cannot be grown very successfully, as they become forked, and, penetrating the fissures, are very difficult to dig up. As food for horses, the White Belgian has been cultivated for many years as a farm crop, but it is unfitted for table use, being coarse in quality and inferior in flavour.

There therefore remain but three kinds to adopt for garden culture, *i.e.*, the Early Horn, the earliest, the Long Red Horn, or intermediate variety, and the Altringham, or Long Orange.

Soil.—Although very light sands and gravels will produce a heavier crop of carrots than turnips, the soil they like best is a deep sandy loam. Upon land of this description heavy crops are raised, which are both lifted and cultivated at a smaller rate of expense than when grown upon stiffer soils. In wet seasons, stiff soils are injured by the carting off of the crop, which is not stored in such good condition from the fact of portions of the soil adhering to the tubers. A perfect pulverisation of the land is one of the first essentials for successful carrot growing, and next, it must be quite free from weeds.

Cultivation.—On light sandy soils where mixed husbandry operations are carried on, turnips are found

a good forerunner, as the crop makes the land free from weeds. Where spade and fork husbandry is not attempted, if these are fed off the land in January or February, the land should be ploughed twice, and the subsoil ploughed to a depth of 14 or 16 inches; and if manure be required, nothing in the shape of new farmyard dung should be given, as the long straw both makes the carrots grow forked, and ordinary farmyard manure invariably contains seeds of weeds, and the crop is more likely to be attacked by grubs and insects.

When land requires manuring, well-rotted dung should be ploughed in three or four months before the seed is sown; and in some parts of Suffolk, carrots are made to follow upon a clean wheat or barley stubble in November or December, 15 tons per acre being ploughed in with a shallow furrow. This is succeeded, in February or March, by a deep ploughing and subsoiling, which loosens the soil to the depth of 14 inches, and is thus suffered to lie till the middle of April. Two or three heavy harrowings are then given to kill the weeds, the two-horse roll following to keep the land moist, and so cause the weeds that may be in the land to grow, when they can afterwards be effectually dealt with.

According to the method followed by these farmers, after the land has been harrowed two or three times and rolled, the seed is drilled in, in April or the beginning of May. As there is a difficulty of clearing off the weeds in land that is annually infested with them, this is the chief reason why upon ordinary rotation farming, it will be found best for carrots to follow turnips in preference to wheat.

As carrot seed germinates slowly, it may be hastened several days by mixing it with damp sand, and let it remain several days to "chip." Some persons put the seed in a bag, about nine days before it is sown, and steep it in water for forty-eight hours, and then spread it evenly on a floor, about 9 inches thick. In six or seven days it will begin to chip, and then it should be drilled in.

It is always usual before sowing carrot seed to rub it, so as to remove the hairs which cause it to adhere together, and mix it with a quantity of dry sand or ashes to ensure regularity. The common corn drill is the best for sowing carrot seed, 2 to 3 bushels of ashes being mixed with 4 to 6 pounds of seed, the seed being deposited as shallow as possible. A light rolling afterwards will be sufficient, and not a harrowing, the latter operation effacing the coulter marks, which will otherwise serve as a guide to the hoer. Where the horse hoe is used, a small quantity of oats, barley, or mustard seed, sown with the carrots, will be found a good guide to mark the position of the drills when weeds very much abound, and it is necessary to have an effective crusade against them.

Carrots were mostly sown broadcast at one time, at the rate of half-a-dozen pounds per acre ; but it costs less to hoe the crop when the seed has been drilled.

Manure.—If sown early, carrots are a long while vegetating, and the difficulty occurs, at times, of weeds abounding ; so that, although the crop may be sown from March till the middle of May, April is the best time for sowing—for, if deferred later, the tubers do not arrive at their full growth—and either wood or peat charcoal, by attracting moisture, hastens

growth. Soot and salt mixed together is a capital manure for carrots, 8 or 10 bushels of the latter being mixed with 20 to 30 bushels of soot, the soot also being an excellent application where the crop is likely to be subject to the depredations of insects which prey upon the roots. Guano has also been successfully used, artificials being generally applied broadcast before the seed is sown.

These remarks mainly apply to field culture as regards time, etc., but, in garden cultivation, if the weather will allow, Early Horn carrots may be sown upon a warm border as soon as the end of February or the beginning of March for a first crop (when a little risk must always be run), the Long Horn and Altringham following from the middle till the end of April.

The carrot is a vegetable that farmers may well turn their attention to as a market-garden crop, as it may be sold either for human consumption, commanding a remunerative price in the market, or it will store away and do for food for stock, there being little or no risk about it. If there be not an active demand for carrots one day, they may be in request at another. In average seasons they make their appearance in about three weeks after being sown, and no time should be lost in hoeing operations, when the rows can be distinguished. When closely drilled, from 1 foot to 15 inches asunder, the common Dutch hoe is a most effective implement upon a light soil, as it is thrust along swiftly by the hand, not costing more than 2s. per acre; and, a few days after this has been done, the carrots should be singled out with the hoe, so as to stand

from 8 inches to 1 foot apart, according to the quality of the land, the strongest plants of course being selected.

When planted in wide drills exceeding 18 inches, the horse hoe may be used with great advantage, especially in stiff loamy land.

When carrots are sown broadcast, the expense of hoeing and weeding is very considerable, the first hoeing being performed as soon as they can be distinguished from the weeds; narrow hoes are used —not exceeding 4 inches in width where the weeds are very abundant, it being necessary even to pull them by hand.

Raising the Crop and Storing.—The decaying of the tops shows when the crop is ready for lifting, but, as getting them to market early is a great point, the forward portions may be dug up and despatched to the salesman, dry weather being chosen for this operation. They are best taken from the ground with a light fork, with which the operator loosens the soil with one hand, applying the other to the tops of the carrots to assist in drawing them up. When the entire crop is removed, it is best to lay the carrots in long rows, and women and children may be afterwards employed to cut off the tops at a smaller expense than men's labour would have to be paid for, the rows being made wide enough for a horse and cart to move along without touching them.

Attention will have to be given to the mode of cutting off the tops. If to be sold as fresh vegetables, a portion will have to be left, so as to allow of their being tied up in a bundle, trade-fashion, which is done very often with a little straw twisted

in the tops. If for storing, it is best to remove the leaves close to the crown, for if they shoot, it will be detrimental to the root. The shoots may be removed when the heap is looked over in the spring, before much damage is done, while if the crown of the carrot be cut, it will sometimes rot, and its marketable appearance becomes injured, though French market gardeners generally make a practice of cutting off a thin slice of the top of each carrot to remove the central bud, so that the root may not become exhausted.

As carrots are apt to head when stored away in large quantities, they are best piled away inside a shed, top and tail alternately, with a little sand sprinkled between the rows, but not too thickly, or it will cause them to throw out a number of fine fibres. If in the open air, they will do in a sheltered position between stuffed hurdles, thatched on top, assuming they are left in hand unsold; but with moderate success, if the whole crop be not disposed of, it may be a good deal shaken down by early sales. If an early crop, the whole will be disposed of without any great difficulty, and fetch a very remunerative price. From 400 to 800 bushels per acre is the average range of a crop of carrots, and the haulm makes capital food for cows; the carrots themselves are also excellent provender for fattening stock in the spring of the year, when other roots are scarce, and are most useful for bringing horses into condition.

PARSNIPS.

The Parsnip (*Pastinaca sativa*) is cultivated much in the same way as the carrot, the ground needing

to be trenched with the spade, and all stones, roots, etc., removed from the soil in the course of the operation. It is very commonly supposed that the parsnip likes a stronger and more binding soil than the carrot, but this is a mistake, as it prefers a light, deep, rich soil, and if manure be used to the land preparatory to sowing the seed, it should be well decomposed and no long dung used. At the same time good parsnips have been grown in stiff soils that have been thoroughly drained, and have gone through a course of winter exposure which suits ordinary farm practice well enough, though but little uncropped ground is ever allowed to stand idle by the thorough market gardener.

Parsnips can often be made a very valuable crop, the yield being from 13 to 27 tons per acre in the Channel Islands, and the farmer here who grows parsnips for sale will in addition find it a most valuable root for fattening stock, being at all events equal, if not superior to the carrot, and quick in the fattening process, causing the meat to be juicy and of very superior flavour ; the animals eating parsnips eagerly, which may be accounted for by the fact, that they contain six per cent. more mucilage than carrots.

Parsnips are grown in the greatest perfection in the Channel Islands (Guernsey and Jersey), where cows are largely fed with them, and it is said that, when given in the winter time with a little hay, the butter, in colour and flavour, is as good as when the animals are feeding upon the pastures in summer time.

The Hollow Crowned variety is the best to resort

to for garden culture, and the seed can be sown somewhat earlier than the carrot—as early as February upon suitable soils which can be got ready in time —6lb. or 7lb. to the acre being usually employed, the rows being the same distance apart as the carrot; but whereas the latter may be drawn young and sold, the thinnings of the crop being valuable, half-grown parsnips are useless, so that in hoeing the plants out, the distance must be regulated to the one they are intended to stand in the rows, the singling being done as soon as the young plants have acquired three or four leaves. When this has been executed, they require no more attention than to keep them clear from weeds.

The crop does not get perfected till it has experienced the ripening effects of time, not being at its best till December or January, and as parsnips are easily stored away and kept in condition, they always meet with a good sale for use as a table vegetable in Lent, when they are much in request, and eaten with salt fish, besides the ordinary demand through the winter months.

Eleven or twelve tons per acre are considered a good crop in England, the Common, and the Hollow Crowned, being the only varieties worth cultivating, the Turnip-rooted being almost worthless; but the Hollow Crowned is both hardy of constitution and tender-pulped.

Seed should be used that is quite new, a good deal that is sold, not being purchased of first-rate seedsmen, being mixed with two-year-old seed. It should be steeped in water for two days before it is sown, and then spread somewhat thickly on a floor,

the same practice being followed at times, as with carrots, mixing it with a quantity of damp sand, which is kept at a temperate degree of heat till it "chips" or germinates. Sowing, as before mentioned, may be done as early as February; but if there be causes for delay, or land is not ready for the reception of the seed, the end of March or the beginning of April will be time enough, and parsnips may be grown on ridges, the same as turnips are, or upon the ordinary flat method.

CHAPTER II.

The Cultivation of Peas and Beans. PEAS—Sowing Varieties. BEANS —Varieties. FRENCH BEANS—Varieties.

CULTIVATION OF PEAS AND BEANS.—Peas and beans are each grown successfully upon soils of different characters and sometimes together; but peas can be profitably grown upon light dry soils of inferior quality, where beans would not answer, the former doing well upon chalky, sandy land, limestone, gravel, or oolitic soils that are not sufficiently deep or moist enough for beans.

PEAS.

If the soil intended for peas be not naturally of a calcareous nature, it needs to be well chalked, marled, or limed; without lime, it being impossible to grow good crops of peas. On soft black soils, and on strong clay land, peas and beans have been sometimes successfully grown together, the upright stems of the beans serving as stakes to support the peas which grow luxuriantly, and being thus supported do not smother the ground with their long trailing haulm, light, heat, and air being thus admitted to them, of which otherwise they would be deprived.

When sown in this way the proportion of seed used is 1 bushel of peas to 4 of beans. To farmers who may contemplate growing leguminous crops upon a scale larger than hitherto attempted, the benefit to the land will be found considerable.

The growing of peas in conjunction with other crops is no novelty, for many years ago the mode of cultivating peas along with turnips was described in the *Journal* of the English Agricultural Society, by Mr. Hannam, of Kirk Deighton, as follows: "The portion of the farm intended for common turnips being ploughed as usual in winter to a good depth, is stirred as much as possible before the 1st of April, or as soon after the pressure of the barley season as possible, and 3 cwt. of Peruvian guano mixed with an equal quantity of light mould, sown broadcast in the track made by the lines of the grubber, being covered in immediately by the harrow which precedes the pea drill. Four bushels of early frame peas are deposited in rows of twelve to the rod, in about 16½ inches apart, and as soon as high enough, are hand-hoed at 3s. 6d. per acre, then horse-hoed, then quickly hand-hoed again, and at the last slightly earthed as the horse hoe follows, by means of a band tied above the plate; the final horse-hoeing being timed just before the peas meet together. The turnip drill should now follow immediately, and if convenient for drilling, twelve furrows to the rod will take three or four furrows at a time; forked irons are attached to the drill, which, drawing a line on either side of each furrow, closes the earth upon the seed lightly, and while it is still moist. If the land be very clean, the first hand-hoeing of the peas may be omitted; indeed, unless

dispatch is made, there is little time for two hand-hoeings, as the peas soon shake hands across the furrow, and to attempt to hoe after they have done so, or have 'squatted,' will, of course, be an injury by the passage of the implement over the pea crop."

Peas are frequently sown broadcast, upon the system of field cultivation; but, whatever the nature of the land, this should never be done, however clean it may be. They should be sown in rows, in order to allow of the hoe being used to destroy the surface weeds which are sure to spring up among the young plants upon every kind of land. When the young plants make their appearance, the intervals between the rows should be carefully hand-hoed, and again be repeated before the plants meet at the top.

The system, as near as possible to garden operations, adapted for farm practice is to rib the land across before winter, harrow down in spring, and plough in wide "breaks." The furrow-presser follows the plough, and drops the seed from a machine attached into every second furrow, so as to cause the rows to stand 18 or 20 inches asunder. The seed is covered in by a double turn of the harrows, or, when two horses are employed to draw the furrow-presser, this may be effected by hooking on a harrow behind it. Before the seed springs up, but when it has germinated, which is ascertained by disturbing a row with the finger, the land should be twice harrowed, rolled, and again harrowed, to loosen the crust-like surface, and kill any weeds that may have sprung up. Then, when the plants make their appearance aboveground, the spaces between the rows should be stirred with a light drill-grubber or scarifier; at the same time the

rows themselves must not be overlooked, but be thoroughly cleaned by the hand, and this course be repeated before the plants get too far advanced, finishing off with a slight casting up to support the plants. It is considered better practice in good land to sow in double rows, 9 inches apart, with two furrows between, instead of sowing in single rows every second furrow, which can be easily done when the furrow-presser has two wheels. Four ploughs can be kept going by this method, either behind each other in the same land, or two and two in separate lands. When four ploughs are used, the presser follows behind, pressing the furrows, and missing two, letting the seed fall into channels made by the wheels, or it may go behind the two sets of ploughs, alternately working in different lands. By this method it will be perceived that the plants will come up in double rows, 9 inches asunder, leaving two unpressed and unsown furrows between each double row. In the case of the double rows, the peas will afford support to each other, when by adopting the plan of the single rows, the plants more easily fall over in heavy rains or high winds, and, in addition, the wide intervals between the rows are the means of admitting air besides affording the opportunity of using the horse hoe.

For field cultivation it is necessary, of course, to resort to the dwarf kinds that do not require sticking, and they are planted deeper (from 3 to 4 inches) than by the system of garden cultivation, when a depth of an inch or inch and half is thought sufficient. The Flemish market gardeners, who are very skilful in their business, and with whom the

English grower often has to compete in selling his vegetables, leave an interval of from 5 to 6 feet between two rows of peas, planting early potatoes between the intervals, the peas being sticked, by which a larger yield is obtained, and ground economised, for the haulm of the pea grows upwards in the air, instead of covering the ground, deriving, as is the case with all leguminous plants, no small amount of sustenance from the air itself.

Peas indeed are a very important crop with market gardeners, and, when produced early, can be made highly remunerative, the demand being certain and constant, large quantities being consumed (especially in the early part of the season) in the hotels and dining-rooms of London and the large provincial towns. According to the late Mr. Mechi (who upon one occasion was describing that he sold his peas in the green condition instead of harvesting them), hundreds of acres are cropped in Essex, picked green, and sent to market, and that in one season 1,500 tons went from Witham Station alone, as well as from Kelvedon and other stations up the line, the farmers wisely considering it the best course to raise those crops which sell the best. Mr. Mechi, in replying to a correspondent in a farming newspaper upon the occasion referred to, asks the pertinent question: "Has H. A. ever calculated how many scores of acres of green peas would be required to give the 4,000,000 of Londoners a single meal? According to my estimate the population of London consume daily the produce of 20,000 acres of land (taking as a basis the average acreable produce of the United Kingdom) in human food. How many acres of hemp and canary seed are consumed by the Londoners'

feathered pets, and how many tons of horseflesh for the cats and dogs?" The consuming power of the "maw" of London is indeed enormous, but of course there are a great many people who make it their business to supply its inexorable cravings.

Sowing.—When spade and fork husbandry is adopted and sticks can be used, to get early peas, they are often planted in November, and, as there is a certain amount of risk attending this practice, successive sowings should be resorted to, for, if a mild winter be followed by a sharp spring, a great part of the crop may be destroyed. Early sticking is therefore of great consequence where it can be done, as the sticks are a protection to the young crop, and they should be placed on each side of a row, so as to cross each other, by inclining them a little on one side each way. If snow falls before they are up, and they spring aboveground as soon as the thaw comes, they will generally do well afterwards. A liberal quantity of seed should be used in these early sowings, and, so that they may not be crowded, a drill should be drawn the entire width of the hoe, and the seed sprinkled over the whole breadth, instead of lying crowded in a narrow drill; and when the young plants are about 3 inches high a little earth should be drawn towards them, and the ground made clean and free from weeds. Successive sowings may be made during December, January, and February, March being the time for second and third varieties.

The pea is affected by cold in the spring, while autumn frosts blacken the leaves, and it has been thought likely that it was introduced into Britain from

the warmer parts of Europe, probably first brought thence from Egypt and Syria, the common pea (*Pisum sativum*) from historical evidence having been cultivated in Britain from a very early period, reference being made to it as an article of food in 1299; but the more delicate garden varieties do not appear to have been known in England till a much later period, as Fuller states they were brought from Holland in the reign of Elizabeth, being "fit dainties for ladies, they came so far and cost so dear."

Varieties.—The varieties of the garden pea may be divided into early and late, the dwarf kinds that can be grown without sticks of either variety, and those which require sticks, but the sub-varieties are almost endless. Of the early growing dwarf kinds, the Early Charlton, Early Frame, Early Warwick, Dwarf Spanish, and Bishop's Early Dwarf are old-established favourites—the Early Charlton being supposed by some to be the original stock from which most of our garden varieties have sprung—those that are sticked coming in a little earlier (by a day or two) than the unsticked ones. Of the dwarf varieties that can be grown without sticks, Bishop's Dwarf blossoms about May 30th and ripens July 25th, Early Spanish Dwarf blossoms about ten days later and ripens about July 30th, Late Spanish Dwarf blossoms about June 16th and ripens August 14th. The haulm of Bishop's Dwarf is about 2 feet long, but that of Early Spanish Dwarf only 1 foot; Groom's New Superb has straw 1½ to 2 feet in length, blossoms about June 15th and is ripe two months later—but peas are gathered, it must be borne in mind, at different stages of ripeness, some being plucked

before the pods are half filled. The Early Charlton, grown often as a field crop, has a haulm 4 feet in length, flowering June 3rd, and being ripe July 29th; the Blue Scimitar, another field variety, has a haulm 3 feet in length, flowering June 16th and ripening August 18th.

Of the early peas that require staking, there are Double-blossomed Early Frame, flowering May 31st and ripening July 25th, and Single-blossomed Early Frame, coming in at the same time, though these literally should be called one-blossomed and two-blossomed, producing in each case one blossom or two blossoms on each footstalk, double blossoms being for the most part barren, the straw of these kinds being about 3 feet long. Early Warwick has shorter straw (about 3 feet), blossoming and ripening about the same time, but not being so prolific. Early Golden Hotspur blossoms June 2nd and ripens July 27th, and is a good bearer. Laxton's Prolific, amongst the early and second early, is a useful variety for market gardeners. Continuing the list of peas that require sticking, Dwarf Prolific flowers about June 16th and ripens August 14th, with haulm 2 to 3 feet high. Dwarf Marrowfat has straw 3 to 4 feet in length, blooming about June 18th and ripening August 16th; the straw of the tall Marrowfat reaches 6 to 7 feet, blossoms June 16th and ripens August 15th, and, like the Dwarf Prolific and Dwarf Marrowfat, is a good bearer. The Early Green Marrowfat blossoms June 10th and ripens July 30th, the haulm being 4 feet long. The Late Green Marrowfat has longer straw, from 4 to 5 feet, blossoms June 16th and ripens August 15th, being moderately prolific. Wood-

ford's Green Marrow, or Nonpareil, is very prolific but a coarse variety, blossoms June 16th and ripens August 17th, the straw being 2 to 3 feet long. Knight's Wrinkled Marrow is prolific, with straw 3 feet high, blossoming June 26th and ripening August 15th; the straw of Knight's Tall Wrinkled Marrow runs up to 7 feet, and is prolific, blooming June 24th and ripening August 18th; Knight's Improved White Wrinkled Marrowfat is both very prolific and of superior quality, straw 6 feet long, flowering June 20th and ripening August 15th, being a better pea than Knight's Tall White Wrinkled Marrowfat, that has straw of 7 feet. Marquis of Hastings is a prolific variety with straw 4 to 5 feet, flowering June 26th and ripening August 16th; and the list could be continued to an almost interminable length, the kinds quoted being old-established favourites; but seedsmen are continually advertising new kinds, as Carters' First Crop, recommended as a first early variety, and pronounced by the Royal Horticultural Society to be the earliest pea in cultivation. Another by the same firm, Carters' Extra Early Premium, described as the most valuable extra early dwarf wrinkled pea in cultivation, being more robust and having larger pods than Little Gem, a dwarf and prolific sort recommended for forcing. Laxton's Alpha and Dillestone's Early are both strongly recommended, the latter having straw of 2 feet.

In sheltered situations late peas may often profitably be grown when the market, satiated with the early varieties, begins to get clear after a while, and green peas are somewhat scarce. Good prices

are often made thus by late peas, of which Veitch's Perfection is a well-known variety, said to be excelled by Carter's G. F. Wilson, having larger and better-filled pods, and being more prolific, the straw being 4 feet in length. King of the Marrows is described as the largest late pea in cultivation, the straw being 6 feet in length, Ne Plus Ultra being a good pea for a late crop, with haulm also of 6 feet.

Suttons' New Giant Emerald Marrow is a wrinkled pea, with pods and leaves of bright emerald green, the pods measuring 4 to 4½ inches in length. Suttons' Duke of Edinburgh, a productive variety 5 feet high, and Suttons' Bijou need to be mentioned, the latter an early dwarf wrinkled marrow, very prolific, with short straw about 1½ foot high.

Late-sown peas are subject to the attacks of mildew, but, if the drills be watered and manured, its appearance will be prevented: crops of Marrowfats have been gathered in October, and sometimes in favourable situations even in November.

It seldom answers to save peas for seed, except in the case of experiment in a new variety, as the haulms occupy the ground for so long a time, which might be more profitably employed.

The classes of peas may be divided into three kinds: the first early, such as Early Frame (double and single blossomed), Early Charlton, Early Warwick, Sangster's No. 1 (a good old variety), Early Conqueror, Carters' First Crop, Laxton's Alpha, Kentish Invicta, etc. Second crops: Early Emperor, Laxton's Quality, Thurston's Reliance, Fairbeard's Champion of England (a favourite), Carters' First Crop Blue, Bishop's Long-podded (a good productive variety of

dwarf habit, with straw only 1½ foot in length), Forty-fold (a capital pea, with haulm 4 feet), etc. The late, or autumnal peas comprise the Marrowfat varieties, some of which have been described as Carters' G. F. Wilson, Ne Plus Ultra, Imperial Wonder (a hardy pea), etc.

The very earliest peas sown at the end of October, which are ready for gathering about the end of May, if the spring be a forward one, are very precarious, and do not always pay the cultivator, though the produce commands high prices. The produce may be hastened on by pinching off the tops of the plants as soon as the first pods are formed, but this is of course done at the expense of the yield. Peas are raised by some gardeners under glasses, in the beginning of January, and then planted out in sheltered positions in February; but these, although interesting to private persons and amateurs, will scarcely answer the purpose of the market gardener.

Peas, as is commonly known, do not tiller from the root like cereals, and only have the power of pushing forth one stem, the buds on which produce fertile branches, so that it is a good plan to furnish support to the roots while under early cultivation, by earthing them up slightly.

Beans.

There are two broadly-marked varieties of beans: the field bean (*Faba vulgaris arvensis*), familiar to agriculturists; and the garden bean, equally familiar to gardeners (*Faba vulgaris hortensis*): but some of the early sorts, as Early Mazagan and the Common Long Pod, can alike be successfully cultivated in

either field or garden. When cultivated as a garden crop, Early Mazagan may be planted in October, November, and January, and, as few people care to have a succession of beans, while they are highly appreciated when they "first come in," the early kinds are of course by far the most valuable to the cultivator, besides being more delicate in flavour, the late beans not only being coarser and stronger, but more liable to the attacks of aphides, or plant-lice (*Aphis Fabæ*), sometimes termed "dolphins."

Beans, it may be here remarked, though naturally strong-growing plants, are subject to the attacks of a good many enemies. In cold wet seasons, the false wireworms, *Juil* and *Polydesmi*, bore into the seeds, and cause them to rot, which may be prevented by dropping soot into the holes as the beans are dibbled in. When the shoots appear aboveground, the curculios or weevils (*Sitona lineata* and *Otiorhynchus picipes*) nibble them off; and when the seed, thriving under favourable circumstances with respect to moisture, heat, and air, has caused the plant to proceed in its growth very rapidly, which it will do if the flower-buds and stalks escape being smothered by plant-lice, the humble bees (*Bombus terrestris* and *B. lucorum*) cause the pods to be imperfect by robbing the blossoms, while little beetles (*Bruchus granarius* and *B. flavimanus*) lay their eggs in the flowers, which when hatched attack the ripe seed.

By topping the beans, and burying or burning them, (for they must not be suffered to lie on the ground) the lice may be got under, and, if the topping be done when they are full in flower, and show enough blossoms to form a crop, the produce is hastened on

considerably by so doing. Topping is best performed by walking along every row, and breaking out the central bud of each plant by an adroit twist of the finger and the thumb. It might be supposed that this process would naturally diminish the crop a great deal; but this is not the case, for, if allowed to grow up very tall, many of the lower pods turn out to be abortive, as the larvæ and pupæ of the little beetles often accompany the seed. These may be killed by steeping it in brine, or immersing for a short time in hot water. Early Mazagan, when planted from October to January, is regarded a winter crop, and when sown in February and March is a spring one, its produce being early, abundant, and of good quality. The Common Long-pod is sown at the same time as the above, but the produce is later by a week or ten days (a very important matter in all market-garden operations), and, when grown under the system of garden culture, the seeds are heavier, and larger, than when grown in the field.

Varieties.—In addition to Early Mazagan and Long-pod, the Windsor, or Broad Windsor, is a superior kind that is very extensively cultivated, and it has the habit of ripening unequally, some pods being quite developed and full, while others are in different stages of filling: this variety is the heaviest-seeded of all the bean tribe, the proportions of the Windsor bean being: kernel, 84.4; husk, 15.6. The time of sowing generally extends from the middle of February to the end of May. The Harlington Broad Windsor bean is an Oxfordshire prize variety. Child's New Early Long-pod is earlier than the Long-pod and more prolific; Dutch

Long-pod carries large seeds—as big as the Broad Windsor—and is a good bearer, but comes in late. The Green Long-pod, Green Nonpareil, and Green Genoa retain their green colour when ripe, but are later than the common Long-pod, being generally sown in March, April, and May. The Sword, or Turkey Long-pod, is a productive variety which may be sown from January to the end of May. Johnson's Wonderful Long-pod is a good bearer, the pods being long, and containing from 6 to 8 seeds. Sangster's Imperial Long-pod is an excellent variety, and the White Blossom possesses the peculiarity of the seeds when ripe being nearly jet black in colour. The Green Windsor, like the Green Long-pod, retains the green colour of the seeds when ripe. The Token is a prolific variety, but is somewhat coarse in quality, the stem growing 5 feet high, occupying a middle position between the late and early varieties. Marshall's Dwarf Prolific is a good sort; and Seville was pronounced the best and earliest, at one time, of the long-pod beans at the Royal Horticultural Society's trials. The Dwarf Fan, or Cluster, is the shortest-stalked of all the different sorts, its ordinary height being a couple of feet and frequently less, and may be sown from October to May. It may be planted more closely than any of the others, the plan of "topping" not being followed with the variety of fan beans. The Red Blossom is a very handsome variety, presenting an extremely ornamental appearance when in full bloom, the flowers varying in colour from a pale hue to the deepest red. It is, however, not a saleable variety for the market gardener, the colour of the seeds being a rusty brown, and therefore not liked for culinary purposes.

All soils of an aluminous, or clayey nature when well drained, are adapted for beans; but though they grow in heavy clays, those which occupy a middle position between them, and light loams, are the most favourable, dryness, firmness, and depth of soil being the most necessary physical conditions, either a wet soil, or a shallow soil being unfavourable, its tapering root penetrating to the subsoil, from which it derives a great part of its sustenance; so that on thin dry soils the bean cannot obtain enough food to flourish, and the plants will be dwarfed; and on soils of this kind, beans had better not be attempted, for the crop will be too small to pay systematic cultivation.

Beans should be sown in rows 1½ inch deep, with a line and a dibber, one bean in each hole, standing 3 or 4 inches apart in the rows, which should be in pairs, 9 inches asunder. To grow them well, after the most perfect system of garden cultivation, there ought to be a space of about 4 feet between each pair of rows, the interval being cropped with low-growing plants, as onions, lettuces, or similar things, so that light and air may be admitted to the beans. Grown upon a large scale, however, this plan might be considered too minute, though it ought not to be, as every point should be considered in market-garden cultivation.

When the young plant is fairly above ground, it should be well hoed, and its growth will be found to be very rapid, shooting upwards, and forming leaves in quick succession, the greatest number of pods coming to maturity which most enjoy the influences of sun and air. The early garden beans, when sown

late in spring, so as not to receive any check from frost, can mature their seeds in little more than 4 months, while the field bean takes from 5½ to 6 months to attain maturity, and the winter variety as much as from 9 to 10 months: some of the latter standing late in the field may often be seen quite black from the plant-lice, with which they are covered; and the market gardener proper would be quite at sea with such a production, looking as he does for a quick succession of crops, caring very little for rotation, the want of which is appropriately made up by an abundant supply of proper manure.

The broad bean crop, therefore, is one that ought to be developed early, and got to market as soon as possible, for they do not continue to be in request with consumers like green peas, of which the public seem never to tire, but will take as the different kinds come round for consumption.

French Beans, Kidney Beans, or Haricots.—The Kidney Bean (*Phaseolus*) owes its name, it is said, to *phaselus*, a little boat, to which the pods form a certain resemblance, and they are usually divided into two classes: the runners, which climb on tall sticks, and come in late, but are grown largely in fields without sticking as well; and the dwarf-growing variety, which require no sticks, but bear a comparatively smaller crop, that comes in for use earlier in the season.

The Dwarf Kidney bean (*Phaseolus vulgaris*), erroneously called the French bean, a native of India, has been mentioned by writers as being in common cultivation in England about 1596, while the runner species (*Phaseolus multiflorus*) was brought to this country from South America in 1633, the scarlet

variety, the tallest-growing and most prolific, being mentioned as having been grown about that time by Tradescant, the renowned gardener of Lambeth, the gay blossoms being then much in request for the bouquets of ladies, and it is further stated that its use was confined to that of being merely an ornamental plant for nearly a hundred years, the pods, or legumes, not being used as an edible production till they were brought into use by Miller of Chealsea, some time in the eighteenth century. Besides the Scarlet Runner, there are the Scarlet and White, or Painted Lady, and the White Runner, with entirely white blossoms; there being, perhaps, on the whole, little difference in the amount of their respective produce, the Scarlet being accredited as the most prolific.

The general characteristics of the dwarf and runner varieties are the same, the leaves being ternate, and attached to long petioles, but the Scarlet Runners differ from the Dwarf variety in the circumstance that they cannot be strictly said to be an annual plant like the latter, inasmuch as if the roots be taken up, and preserved from the frost during the winter, either by being buried in sand, or hung up in a cellar, if planted at the end of the following May, they will produce stems as vigorous as those freshly sown, and flower earlier than those raised from seed; Mr. Cuthill recording an experiment which he made in this way, by which means the hand-planted roots came into bearing just one month before those sown in the usual way.

The great difficulty in the management of a bean crop, where a large quantity is grown, is upon the score of labour in picking, for both with Runners and

Dwarf, the green pods should be gathered as soon as they are ready, and sent to market, for if they are allowed to hang and develop their seeds, they check the production of the further crop of young beans, the strength of the plant being directed to the elaboration of the ripening grain.

Varieties.—There are a great many different varieties of the Dwarf kinds, of which the leading ones are Red-speckled Dwarf; Black-speckled Dwarf; Negro; Cream-coloured Dwarf; the Robin's Egg (a general favourite); the Dun Dwarf; the Early Prince Albert; Fulmer's Early; Wilmot's New Early Forcing; the Mohawk; Six Weeks, or Chinese Speckled Dwarf; Newington Wonder; Canterbury White; and many others. The varieties of the Runner are fewer, of which the Soissons and the Case-knife are two of the best.

Kidney beans succeed best in a light warm soil that has not been recently manured, and on this account are well adapted to follow spinach in those situations where the latter is grown. As the least frost kills them, they must not be sown before the middle of May, and even then in some seasons when the ground is cold and wet, the young crop often turns out defective, so that it is a safe plan to have some supplementary sowings a little afterwards, and it is always well to have a succession where it can be managed. The Dwarf should be planted by dibble and line in narrow beds which hold three rows, 9 inches apart, and standing the same distance in the rows. If too deep a hole be made with the dibble, the seeds may probably rot, so that care must be taken not to plant them too deeply.

In ordinary garden cultivation the Runners are sticked at the time the seed is sown, and a noticeable fact with regard to their tendrils is that, differently to other plants in their voluble habit of growth, they turn to the right, or in a direction contrary to the apparent diurnal course of the sun, and if perforce twisted the reverse way will undo their enforced training. In pointing out this commonly recognised habit of growth, Loudon says that this aberration from the common habit of plants has been accounted for by supposing that, the native climate of the Scarlet Runner will be found to lie south of the equator, and that the plant, although removed to the Northern Hemisphere, is still obedient to the course originally assigned to it, turning in a direction which in its native climate would be towards the sun.

When grown on ridges in field cultivation without sticks, they must not be too crowded, or the produce will be next to nothing, and at a certain stage of their growth the tops of the beans should be pinched off. On wet, or damp land, this method will not answer, for as there will be a crowded mass of tangled herbage, the legumes will get into a wet condition, and, being half smothered, what crop there may be will be difficult to find, in bad condition, and cannot be kept well in hand. Where there is plenty of space, and they are grown upon sticks, the crop is most abundant.

The Mont d'Or, or Golden Butter bean, is a climbing variety of Kidney bean with long lemon-coloured pods.

CHAPTER III.

ONIONS — Culture — Transplanting — Soil — Cultivation — Varieties — Onion-growing in the Bedfordshire market gardens — The Tree, or Bulb-bearing Onion — The Ground or Potato Onion — The Shallot. LEEKS — Cultivation — Varieties.

ONIONS.—The Onion (*Allium cepa*) has been cultivated and known at a very early period in English agricultural history, the plant being most likely introduced from central Europe, though probably taken there in the first place from still warmer regions, being of great antiquity in Africa, where modern travellers beyond the region of the Nile have observed gardens in which nothing was growing but onions, while the bulb was much esteemed in Egypt 2,000 years before the Christian era, being still held in great favour, and forming a principal article of food to the Egyptians; speaking of which, Hasselquist describes the flavour of the Egyptian onions to be very superior, being mild and pleasant to the palate, where in other countries they are strong and nauseous. "Here," says the writer, "the onions are soft and yielding, but in countries to the north they are hard, and their coats so compact, as to render them less easy of digestion."

Transplanting.—The long warm summers of the

south of Europe develop the bulb of the onion to a greater extent than the colder climate of England is capable of doing, and a plan for increasing the size of onions by transplanting them, was suggested by Worlidge in the beginning of the seventeenth century in his book 'Systema Horticulturæ,' but the method does not appear to have attracted much attention, or to have been followed to any extent, till modern horticulturists made the attempt with success.

The theory upon which the recommendation was founded is this: Plants which live longer than one year, generate sap or vegetable blood, which will perfect the leaves and roots in the succeeding spring, this sap in bulbous roots being reserved or deposited in the bulb; and Mr. Knight, it is said, was induced by these observations to come to the conclusion that two summers in England might equal the effect of one long fine summer in Spain or Portugal, and so resorted to this method of culture, which turned out successfully in greatly increasing the ordinary natural size of the bulb. He sowed onion seed very thickly in spring, in poor soil, in a shady situation; so that by autumn the growth of the bulb had not advanced beyond the size of a large pea. They were then taken from the ground and preserved during the winter, and were planted out again in spring in rich soil, at proper distances. By this method Mr. Knight succeeded in getting onions some of which exceeded 5 inches in diameter, the keeping properties being much improved by this process, on account of the bulbs being more matured.

Yet, in those countries where the onion is found in the greatest perfection, the practice of transplanting

prevails, the custom in Portugal being to sow the seed upon a moderate hot-bed in November or December, protected from the frost, where the plants are allowed to remain till April or May, when they are transplanted to a rich soil, and the warm sun of the Peninsula perfects them, till they attain a size very superior to that of our onions under the ordinary methods of cultivation practised in England.

Soil.—Onion culture is best promoted in light, dry, sandy soils that have been made very rich by the application of manures, such as ashes, soot, cinders, liquid manure, night-soil, blood, and bone-dust. Where these are to be obtained regularly, as may sometimes be the case with night-soil in particular districts, without resorting to expensive manure like bone-dust, onions may be grown successively for some years in the same ground, but under any circumstances, the land should be well dug in February or March, and be thoroughly manured.

Cultivation.—In bad seasons nothing is gained by very early sowing, yet as will have been seen, as it is necessary for the bulb to have as long a summer as possible in which to perfect its growth, no time should be lost, and a little risk must be run under such circumstances, so that in the beginning of March the beds should be formed in divisions (which may extend the length of a whole field) of a width to contain five rows of onions with a narrow alley between, for the convenience of thinning and weeding, the breadth of the bed depending upon the width of the rows, the large sorts requiring 1 foot, while a narrower space will answer for the smaller kinds. Shallow drills must then be drawn, not more than

half-an-inch deep, in which the seed is placed, and then covered over gently with the rake. Over the tops of the drills, cinders or lime rubbish sifted, is a useful application, to which a top-dressing of soot would be an additional advantage.

Hoeing should be carefully performed between the drills, and the drills themselves weeded by hand after a shower.

As spring onions are in great demand to be eaten raw, or used in salads, the superabundant plants are often drawn by hand from the drills and bunched up and sold, the best time for doing this being when they are quite young and not thicker than a good-sized quill, but care must be taken not to disturb the rest while doing this, leaving those in the ground to stand about 6 inches apart in the rows. If the thinning be too long delayed, the standing crop is likely to suffer, and when large Spanish onions are sought for, it is sometimes considered the better practice to cut out the plants with the hoe, and sacrifice the spring onions altogether. When the bulbs are well formed in September, those where the green leaves do not wither, should be gently turned back and pressed to the ground with a rake-handle, care being taken not to break them, so that the bulb may become perfected. When the crop is lifted, it is allowed to lie on the ground in the sun for several consecutive days, according to the weather, to get thoroughly dry.

Onions that are intended to stand the winter, should be sown in the same way in the middle, or towards the end of August, and in fine open weather, either in the last month of the year, or January or

February, according to the opportunities that present themselves, the drills should be thinned, so that the plants remain standing 6 inches from each other in the rows. Those which are removed should be lifted carefully, so that the roots are not injured, and these can be transplanted into prepared beds made ready for their reception, and planted in rows the same distance asunder with a line and dibble, care being taken not to bury the future bulb of the onion too deeply, and afterwards water them so as to settle the earth about their roots, and these will come pretty well as early and fine as those which have not been subjected to transplantation.

Varieties.—The White Spanish, or Portugal, is an excellent variety for main crops; the Tripoli is one of the largest onions grown, and an old stock variety to be sown in August and stand the winter, but is not a good keeper; nor is the Silver-skinned; but the Strasburg (a brown onion) is a capital keeper, well adapted for ordinary spring crops. There are many new varieties that are recommended, as Suttons' Improved Reading, being larger, thicker, and more solid than the old sort of Reading, which has acquired a good reputation; James' Longkeeping, an excellent variety for late spring use; Naseby Mammoth, an excellent keeping onion of symmetrical form and good flavour; White Globe, Brown Globe, Blood-red, and Brown Spanish, all being esteemed good old varieties; The Queen, a white-skinned variety which grows quickly, with good keeping properties; Large Early Red Italian, earlier than the Tripoli varieties, hardy, and a good keeper; Large Early White Italian, of the same kindred as the preceding, but differing in

colour; New Giant Lemon Rocca, advertised by Messrs. Sutton & Co. as a new and distinct variety, valuable alike for autumn or spring sowing; and Suttons' Giant Blood-red Rocca. For autumn sowing New Giant Rocca of Naples, New Giant White Tripoli, Early White Naples, Red Genoa, Giant Madeira, Neapolitan Marzajola, are all suitable; Covent Garden Pickling and Small Paris Silver-skin, the latter coming early, are suitable to be sold as pickling onions. There is a long list of names besides, but those enumerated are sufficient for any ordinary purpose to make selection from.

The main crops of onions are generally sown in March or April, much depending upon the weather, the second week in August being considered the best for the autumn varieties, such as Giant Rocca, Giant White Tripoli, and similar kinds to stand the winter.

Onion-growing in the Bedfordshire market gardens.—An excellent description of the method of onion culture as practised in the market gardens of Bedfordshire, was given by Mr. W. J. Arnold, of Bolton, in "The Agricultural Gazette" of September 27th, 1880. The writer states that "the greater part of the onions of the district are grown on land that has in the previous years been planted with cucumbers. The land is heavily manured with stable manure for cucumbers, with sometimes as much as 60 to 100 tons per acre. The cucumber does not draw the land to such an extent as many other crops, and a fair amount of the properties of the manure remains in the soil to feed the onion."

The cucumber enables the gardener to clean the

land of weeds preparatory to the sowing of the onion seed. It is of the utmost importance that cleanliness should be observed with this vegetable, and every means are tried to free the land from weeds the year previous to sowing.

The land is broken up as soon as the frosts have killed the cucumber vine, and is usually again manured. Bone manure is also used, and some gardeners top-dress with rotten stable manure when the seed is sown. The land is worked to a fine tilth, and the seed is sown usually, when the weather will permit, early in February. There is no general rule as to the manner of sowing, some drilling in rows from 5 to 6 inches apart, while others sow the seed broadcast. The garden portion is sown in the latter manner.

The quantity of seed used per acre is from 12lb. to 20 lb.. The weather in the early part of the spring usually destroys a large proportion of the young plant; and gardeners prefer having to thin when weeding than to run the risk of having a thin plant. The weeding commences as soon as the young shoots show themselves; and every dry day, however cold, is made the most of. In showery seasons, after every exertion has been made, the weeds will overpower the onions, and the crop, after all the labour and expense, has to be ploughed up. It has been a growing custom during the last ten years to sow some other crop, such as parsley, or parsnips, with onions; so that in case the onion fails, there is a hardier, though not so valuable a substitute left. The weeding is done by men who have been specially trained from early boyhood for the work. The

fingers, a knife-blade, and a small hoe about 3 inches wide in the blade, and 1 foot long in the handle, are the only implements used. The weeders, with knee-caps made of thick sacking, crawl on their hands and knees over their work, and, with a rapidity that is astonishing, free the young plants of the weeds that encumber them. The weeding has to be often repeated. Upon the second time of weeding, the thinning or setting out, as it is termed, is done. The work is done by the piece, and the price is from £5 to £6 per acre. The onion-weeder commences his work as soon as it is possible to distinguish the weeds from the onion, and his task is finished at Sandy Feast, the local holiday that has for years marked the time when this class of work is to be completed. The date of this feast is the third Monday in July. It often happens when seasons are unfavourable, the gardener will himself employ men to assist in the weeding, although he has already contracted with the weeders, as he finds it more profitable to do so than to lose by the crop being injured by weeds. Those who do not know the nature of onions would, upon seeing a gang of men crawling over and bruising with their knees and feet the tender plants, wonder that the crop was not entirely destroyed. But it is remarkable how quickly a bruise is effaced by a shower of rain and a warm day. The work of onion-weeding in the early part of the season is far from a pleasant one; the bitter winds chilling the limbs and numbing the hands, which must all this time be in contact with the earth. The men, however, stick to their work with commendable perseverance, knowing,

as they do, that one day's work at this period is worth a week's labour later on.

The onion plant has many enemies to contend against. Frost, if dry, does not injure it so much as cold wet weather, or cold winds. The grub is very destructive to it, and the mildew seriously affects it in wet seasons. Soot is extensively used as a manure, and nitrate of soda is very beneficial on sandy land. It often happens that a crop will appear to progress favourably until the beginning of May, when the plants will begin to turn yellow and die off, leaving sometimes not sufficient plants upon the land to mature, to pay the rent, leaving out altogether the cost of manure and weeding. It is probably the most expensive crop cultivated in this district, and, if we except cucumbers, the most hazardous. An acre of onions frequently costs from £40 to £50 by the time the crop is ready for the market, and often does not realise more than half the cost. There are seasons, however, when as much as £40 has been clear profit upon an acre; and the gardener, hoping that each season may turn out to be the lucky one, continues to cultivate onions, and putting the good seasons with the bad ones, does not, perhaps, in the long run, find the onion crops the least remunerative of garden products.

In a good season, a crop of 8 or even 10 tons would not be considered a very extraordinary one. The crop is pulled generally by hand as soon as the flag begins to wither, and then left on the ground to dry. When ready for storing, the bulbs are looked carefully over, and all that show any signs of un-

soundness are discarded. The smaller onions are either picked or sifted out for pickling, and the larger ones stored in lofts for the winter or spring market. The lofts are usually constructed over cart or other sheds, the bottoms and sides being latticed to enable the air to pass through and prevent heating, which frequently takes place when onions are stored on a close boarded floor. The lattice sides of the lofts are protected by shutters, which can be opened or closed at pleasure. Those growers who do not possess proper storage usually sell the crop as soon as ready for market, and some of the smaller growers tie the onions in bunches whilst green, and send into market for immediate consumption as early as possible. In crops where parsley or parsnips are sown with onions, the onions when ready have to be hand-pulled, and the pulling was at one time entirely so done. However, during the last few years many of the growers, where no other crop is planted with the onions, save a good deal of the expense that is increased by pulling up the bulbs by hand, by the use of an implement of local invention very much like an ordinary horse hoe, but set somewhat deeper; this, passing just below the roots, loosens the onions, and they are then gathered into rows by men and boys. When dry, they are stored as quickly as possible, as they will not keep when they are stored wet. The pulling of the onion crop usually takes place in the beginning of September, and costs from £1 to £2 per acre, according to the crop or soil. When once the crop is safely housed in good condition, it requires some attention; and upon any signs of heating, it is turned over, and the faulty onions cast out.

The prices realised by different growers are often widely different, as there is probably no vegetable that fluctuates so much in price as this. A frost in the winter will sometimes send up prices as much as £3 per ton in one week, and then they may fall again even more than this amount in the same period, without any apparent cause. The sorts usually cultivated are the White Globe, the White Spanish, the Brown Globe, and the Intermediate; perhaps, of these, the Brown Globe excels for winter use. It must not be supposed that all land will produce onions that will keep through the winter. Many growers have learnt by bitter and costly experience that the land they cultivate does not possess the necessary properties to ensure the keeping of the produce during the winter, and they therefore sell at such prices as can be obtained in the autumn.

There is with this crop, as with every other, the same difficulty in disposing of it to the best advantage. The grower cannot dispense with the services of the middleman, *i.e.*, the salesman; the prices the grower receives bear no proportion to that paid by the consumer. It may safely be taken that, of the cost of market-garden produce to the consumer, at least 30 per cent. goes into the pockets of the men that stand between the grower and the consumer, and in some cases vegetables are retailed out 200, 300, and even 400 per cent. more than the producer receives. This matter is one in which, in the present struggle, the market gardener more than ever takes an interest, anxiously looking for some other means of reaching the consumer than through the organised ring through which his produce now reaches them. At present the gardener

is unable to do without the salesman; but this is an evil that must in time work its own cure, and the days of the system that now obtains may safely be said to be numbered, as it is impossible for the gardener, in the face of adverse seasons, to submit to the impositions he has too patiently borne in the past.

The Tree, or Bulb-bearing Onion (*Allium cepa var. viviparum*) is an object more of curiosity than use, growing with a strong stem about 2 feet in height, on the top of which flowers are produced after the manner of the ordinary variety, a crop of bulbs being obtained from the top of the stalk, which drop off when they become ripe, and fall to the ground, when they push out roots and again vegetate; but these are not suited to the purpose of the market gardener.

The Ground, or Potato Onion is another singular variety, which multiplies a number of bulbs from the parent root like potatoes underground, being earthed up like potatoes, and planted at midwinter, the crop maturing at midsummer; the size and number of the new bulbs depending very much upon the size of those planted, the increase being proportionately large or small.

The plant is said to be a native of Egypt, brought thence by the British army in the early part of the present century; but it is one more worthy the notice of the private grower than the market gardener, the principal features in connection with it being that, through its means a supply of onions may be kept up all the year round, and that it makes good the deficiencies that may occur in the spring-sown

onions that have failed from some cause or other—as uncongenial weather, the attacks of insects, etc.

When they are cultivated, the ground should be made rich towards the end of December, and beds formed 4 feet wide with a path between, in which four rows can be grown, the seed-bulbs being merely pressed down into the soft earth (from which all stones, etc., have been removed), only at a depth sufficient to keep them upright. The earth should then be gently drawn over the bulbs from each side till their crowns are fairly covered. In spring, when they have rooted, and the crown has made shoots of 3 or 4 inches in length, the earth which was drawn over the roots should be carefully removed with the hoe, leaving half of the bulbs exposed to the air, and thus standing on the level ground. By the middle of June the flagging of the leaves will indicate that the condition of ripeness is approaching, and when the original bulb has divided into a large cluster, the central portion will be ripe some days before those next the ground, which may be removed, by which those that are left will obtain more air and sunshine, and benefit accordingly.

The Shallot (*Allium ascalonium*).—This plant grows much in the same way as the potato onion in the multiplication of its roots. It is a native of warm climates, being often found in Syria growing wild, especially near Ascalon, whence its name is taken, some writers assigning its introduction into England to the Crusaders. Turner, in his "Signes of Herbes" published in 1548, speaks of it as a well-known plant. They may be sometimes profitably and usefully grown by the market gardener, especially

in the form of a border to beds where one may be required. The seed-bulbs must be planted close to the surface, and not buried too deep in the earth, the common fault often committed in planting.

The shallot does not in all situations produce perfect seed, or seed at all, but in fine summers and favourable situations, it bears seed abundantly that ripens well. In planting, the clusters of roots should be carefully divided, so as to injure them as little as possible.

Leeks.

The Leek (*Allium porrum*) has been cultivated from an early date in England, Tusser mentioning it in his "Five Hundred Points of Good Husbandry," while it was the favourite badge of the Welsh long before that time, Shakespeare alluding to this at the time of the battle of Cressy, the instance of Pistol eating the leek being a humorous incident portrayed by the great dramatist. It has been for many ages under cultivation, Biblical commentators including the leek amongst the Egyptian luxuries for which the Israelites pined in the wilderness.

The leek is cultivated to a great extent in France, entering largely into the composition of soup, which is universally consumed in that country. The demand in England is much greater in some districts than others, and it possesses the advantage of thriving in colder, wetter, and in more ungenial climates than is suited to the onion, doing well on cold damp soils. It is also at its best at a time of year when fresh vegetables are somewhat scarce, from the middle of March to the middle of May, when it is very

welcome to the cook, and therefore should find a ready sale in districts that are not commonly favourable to vegetable growing.

Cultivation.—Leeks, unlike onions, require to be deeply planted, so as to obtain a long blanched stem. The seed should be sown in the end of February in rich light soil that has been well manured, thrown broadcast and moderately thick upon a prepared seed-bed, to be transplanted afterwards. The earlier the sowing and transplanting are performed, the finer will be the produce; late-planted leeks being inferior in size to those raised earlier. Under favourable conditions, they will be ready for planting out early in June, and the young plants ought not to be smaller than a thick goose-quill. They should be removed carefully from the seed-bed without breaking the roots, and transplanted in beds 4 feet wide, which will allow four rows being planted therein standing 1 foot apart in the rows. A few inches should be cut off the tops of the leaves, to prevent them from being top-heavy, the leeks standing 6 inches from each other in the rows. A perpendicular hole, 6 to 8 inches deep, should be made with a dibble, the depth of the hole being in accordance with the strength of the plant, one of which should be inserted in each hole, into which a little earth is pushed with the end of the dibble, only just enough to cover the fibres of the root, leaving the plant to stand thus loosely in the hole. When the entire bed is planted out, it should receive a good watering, and this be continued daily till the plants are established, dry weather being the greatest enemy to newly transplanted leeks. The beds should be well hoed in dry weather whenever

weeds make their appearance. They will be fine and strong under good cultivation towards the end of the year, but if allowed to stand, they will have greatly increased in size by the time March comes round.

Leeks are sometimes earthed up like celery, halfway to the tops, which increases the length of the portion blanched, and the crop is a good one to follow some early removed crop, as winter-planted lettuce, Early York cabbage, etc. When fine specimens are aimed at, a greater distance is allowed for the plants to stand: some allow a space of 1½ feet between each.

Varieties.—The London, or Broad Flag, and the Musselburgh, are good old-established varieties, newer kinds being the Monstrous Carentan, Ayton Castle Giant, and Henry's Prize. It should be added that, in warm weather liberal dressings with liquid manure are highly favourable to the growth of leeks.

CHAPTER IV.

POTATOES—Varieties—Cultivation—Potato-growing in Bedfordshire—Autumn planting—Mr. Howard's experiments—Mr. Charles Rintoul's evidence—The Potato Disease—The Potato Murrain destructive—A Palliative—Sorts—Treatment and Instructions.

POTATOES.—The introduction of the potato (*Solanum tuberosam*) into Ireland by Sir Walter Raleigh upon his return from Virginia, who had obtained a patent from Queen Elizabeth "for discovering and planting new countries not possessed by Christians," is too commonly well known to need further allusion to the subject here, beyond the fact that it was not cultivated to any extent till nearly a hundred years after, being regarded as a great delicacy in the reign of James I., and although forming one of the articles provided for the consumption of the queen's kitchen, the quantity used was extremely small, costing at the rate of 2s. per lb. Evelyn speaks disparagingly of them in his "Kalendarium Plantarum," the first gardener's calendar ever published in Britain, in which he gives the following directions: "Plant potatoes in your worst ground; take them up in November for winter spending, there will enough remain for a stock, though ever so exactly gathered." The production of salad plants was a much more important matter

in Evelyn's estimation, and in his "Acetarius," he remarks that the apple, or green fruit of the potato, makes an excellent salad. Ray, the celebrated botanist, who commenced the publication of his "Historia Plantarum" in 1686 merely remarks of the potato, that it is dressed in the same manner as Spanish batatas, or sweet potato; while Lisle, who wrote upon husbandry from the year 1694 to 1722, is totally silent about this now valuable tuber, though it is described in Mortimer's "Garden Kalendar" for 1708, with directions for its planting in February, the description given being that "the root is very near the nature of the Jerusalem artichoke, although not so good and wholesome, *but that it may prove good for swine!*" Potatoes appear also to have extorted a half unwilling notice from Bradley, who wrote about 1719 upon horticultural subjects. He says: "Potatoes are of less note than the horseradish, scorzonera, beet, and skirret; but as they are not without their admirers, I will not pass them by in silence."

Varieties.—The varieties of the potato are very numerous, there being some old standard varieties such as Ashleaf Kidney (perhaps the best potato grown in this country, but only a light cropper), York Regents, Early Shaws, Dalmahoy, and similar well-known sorts; but of late years those kinds that are the least liable to disease have been freely taken up, of which the Champion has made itself a leading name. Several standard American varieties are now largely grown, as Alpha (the earliest), Early Rose, Late Rose, etc. Carters' Disease-resisting Scotch Champion has been pronounced a very first-class potato; Suttons' New Disease-resisting, Suttons'

Reading Hero, etc. Of the Kidney varieties there are Suttons' Improved Early Ashleaf, Carters' Champion Forcing, Myatt's Improved Ashleaf, Early Rose, Early Hammersmith (which is said to be of stronger growth than the Early Ashleaf), Veitch's Ashleaf, Early Racehorse (for forcing), Rivers' Royal Ashleaf, Myatt's Prolific Ashleaf, etc. Amongst the second early varieties are included Snowflake, Beauty of Hebron, Covent Garden Perfection, Suttons' Field Ashleaf, Oxfordshire Kidney, and International; and amongst the late Kidney varieties Late Rose, Suttons' Hundredfold Fluke, Suttons' Magnum Bonum, Gloucestershire Kidney, Fluke, etc. Of the standard round varieties, there are Early Handsworth, Early Coldstream, Early Shaw, and Dalmahoy (before-mentioned), Flour-ball, Fortyfold, Walker's Regent, Red Regent, White Rock (a heavy cropper but inferior in quality), Carters' Redskin Flour-ball, Suttons' Redskin Flour-ball (which is a late sort), as also Turner's Schoolmaster, Scotch Champion, Grampian, Late Fortyfold, Paterson's Victoria, Walker's Improved Regent.

The Early Shaw has long been cultivated by market gardeners as an early potato, while Suttons' Fillbasket, Surprise, and Early Oxford are recommended for the same reason. The second early round varieties comprise White Don, Rector of Woodstock, Early Fortyfold, Gryffe Castle, etc., etc.

Standard American varieties include Carters' Bread-fruit, Ruby, Extra Early Vermont, Brownell's Beauty, Early Goodrich (a very productive potato), Bresee's Peerless, and Climax (a heavy cropper).

Cultivation.—Planting potatoes with the spade,

which is the usual method followed in market-garden cultivation, is equally well adapted for the field where the necessary amount of labour is to be obtained. After the land has been thoroughly well dug, a trench is opened against a line of appropriate depth, in which the seed is deposited, which is afterwards covered in with the earth taken out in forming the succeeding row. When the plough is used, the ordinary method most in use is to raise drills by the single or double mould plough, which is very appropriate upon all well-drained, deep, alluvial soils, as the plough can raise a sufficient quantity of earth in first forming the drills to furnish cover for seed and manure in the succeeding operation of splitting them.

The "lazy bed" system is applicable to wet soils that have not been drained, the earth being thrown up on the top of the beds that are formed from a deep trench, which acts as a drain to carry off the surface-water; but few cultivators would attempt market-garden cultivation upon undrained land.

Potatoes like an abundant supply of vegetable refuse in the form of manure, which is the secret of them succeeding so well upon old rich leas that are first broken up and planted with potatoes. When this is done, the ground should be dug over two spits deep, a spade depth of the surface being placed in the bottom, and then about 8 inches of the subsoil thrown upon the top, so as to completely cover the turf. The field is then left exposed to the frosts of winter, and in early spring can be ploughed, harrowed, and worked down, and the seed planted in raised

drills without manure, when a heavy crop will be the result. Of course the kind of potatoes suitable for field cultivation must be selected, and not any fancy garden varieties; and nothing will equal the spade when it can be resorted to in cultivation. Some very pertinent remarks upon planting seed potatoes will be found recorded in the practice of the cultivators whose experiments will be referred to later on in this work; but experience has shown that large sets properly cut answer better than small seed potatoes, which many growers make a point of planting. Large whole potatoes bring the most vigorous plant, but there is a danger from too great exuberance of haulm. Numerous experiments have been recorded of trials made of seed cut and uncut, of various sizes: and the upper, or nose end of a cut potato produces a stronger and better plant than sets cut from the bottom end of the tuber. When the haulms of potatoes are too luxuriant, there is a danger of their being broken, and the crop not perfected in consequence.

As the practical experience of individuals in different districts is of great value in throwing light upon a subject which must often be looked at under varying conditions, the description given of potato-growing in the market gardens of Bedfordshire, by Mr. W. T. Arnold in the "Agricultural Gazette," will be found interesting.

"Of all crops cultivated by the market gardener the potato stands first in importance, yet probably no vegetable is less studied than this. Whilst any new variety of any other kind of produce that may show itself superior to the ordinary sort is carefully

watched and saved for seed, the growers of potatoes usually wait until some of the raisers of new sorts have introduced a new variety into the market some years before they will adopt it. (In this Mr. Arnold is somewhat mistaken, as we will presently show in the evidence of Mr. Charles Rintoul before the Select Committee on the Potato Crop). In no part of the country, so far as we are aware, is there one gardener that ever endeavours to raise potatoes from seed, and the introduction of new kinds is usually left to gentlemen who do not grow for profit. Sir J. Montague Burgoyne, Bart., of Sutton Park, has rendered good service to the district in this respect. He usually endeavours to secure for trial any sorts that are likely to prove superior to the existing kinds; and after growing a quantity of 'seed,' if the variety proves to be a good one, he distributes it amongst the neighbouring gardeners. He introduced Paterson's Victoria, a potato that in its day had no superior in either weight or quality, and later on the Magnum Bonum, which is considered by many to surpass the Champion.

"The period of the introduction of the potato into this district cannot be clearly traced, but it was grown here in the year 1711 for sale, and probably earlier. It is somewhat remarkable, that of all the vegetables in cultivation, the potato is not only the only one that has not benefited by the advanced knowledge of the gardener, but that it has very much deteriorated. Fifty years ago it was no uncommon thing to find potatoes 12 inches in length; and we have heard of a bushel of potatoes being tied up with a cord like a bundle of sticks, and carried home on a man's back.

Now it is unusual to find a tuber more than 6 inches in length. The weight on land that was not in anything like the state of cultivation that it is in the present day, was much greater. It is stated on high authority that the life of a potato is only from twenty to thirty years; and this rule would apply to probably every kind, with two exceptions, and these exceptions are the Shaw and the Ashleaf Kidney. These varieties have been grown in unbroken succession for more than fifty years, and are still reckoned amongst the best of the early sorts. The next in point of age is the Jersey Blue, once a famous cropper; this, however, is fast dying out, and will soon become extinct.

"The inquiry into the causes of the potato disease may lead the scientific gardener to provide a specific against this dreaded enemy, by producing fresh kinds, but at present there is no variety that will take the place of the Shaws or the Ashleaf Kidney, of which Myatt's Prolific appears a variety. These are not seed-producing, as they bear no apple. It is worthy of note that the kinds of potatoes that bear no seed are longer-lived than those that can be reproduced from seed. This, from a somewhat extended observation, appears to be a fact, and should influence producers in their selection of new varieties.

"The potato is grown upon all kinds of soil, and under all varieties of circumstances. In this district it forms the staple produce of the market gardener, and is of the first importance. The early kinds are planted in February and March, in rows from 18 inches to 2 feet apart. It is usual with the greater portion of the gardeners, after the potatoes have been

moulded up in May, to set Scarlet Runner beans between the rows, or to drill carrots or some root crop; but by far the greater quantity of beans are so grown. By the time the beans have begun to run, the potatoes are ready for digging, and by this system the two crops may be grown simultaneously. The quantity of seed potatoes usually planted per acre is from 12 to 15 cwt., and the cost of planting from 8s. to 12s. The hoeing and moulding up will not cost less than 16s. to £1. There is very little regard paid to the rotation of crops, as the gardener considers it necessary to replace in the land, in the shape of manure, all that he takes out of it in produce. Most of the land is heavily manured with stable manure, and the crop is often twice dressed with soot and artificial manure. Every attention is paid to cleanliness, as no gardener can grow weeds in any quantity with a profit. The first produce is ready for market about the middle of June, and the price is usually good for the first fortnight. This season (1880) no potatoes were dug in the district until June 27th. The prices realised during the first week were: Kidneys £11, Shaws £9, and Early Rose £7 per ton. The quantity per acre at that time would not be more than from 3 to 4 tons. The earliest part of this district is Potten, where potatoes are ready a few days before they are fit for market in other places. Gamlingay is next, and Sandy follows. This order may, however, in some seasons, owing to a variety of causes, be entirely reversed. During the first month of the season probably 3000 tons would be sent by rail from the three stations mentioned, and

of this quantity the greater portion would be for the Birmingham market.

"The potato salesmen have agents in every place, and supply growers with the hampers for the delivery of the potatoes. These agents are kept well advised as to the state of the market, and the vegetable season is a busy one at the local telegraph offices, as the telegrams are numerous and frequent. It is sometimes wondered at, that whilst the salesman can keep an agent in every place of any importance, and in some places more than one, the producers cannot keep one agent to look after their interest, and to advise them as to prices and prospects. As it is, the grower is entirely in the hands of the salesmen, and must perforce submit to whatever prices the salesmen return. It does not much matter to what market the produce is consigned, the conditions are the same. It is alleged that it is impossible for a new man to do business in any other manner than it is being done, as, in case a stranger should begin business and purchase potatoes of the grower, he would not be able to sell them at a profit. The salesmen would at once undersell him, and be able to do so without loss, as they would be dealing with other people's property; and so perfect is their machinery, that no large quantity of potatoes reach the market without its being well known under what circumstances they have been sent. How far these allegations are correct we are unable to form a just estimate, but there remains one fact patent to all—that the market gardener does not reap the just proportion of the profit of his labour, for whilst he has not improved

his position for some years, the salesmen have been growing rich.

"The backward kinds of potato are not often dug in time to permit of a second crop being obtained, and it is usual to sow the land with turnips, or mustard seed, for ploughing-in in the spring. Nothing seems to benefit the succeeding crop so much as a green crop of any description being used as a compost, the land of this district being chemically deficient of potash. There are few kinds in cultivation, Champions and Americans being the only sorts that are grown to any extent. Of the former variety there is a large breadth, and although there are some signs of disease at present it does not appear serious. This potato, from its gigantic, tree-like top, requires a greater space, and is seldom planted nearer than 2 feet 6 inches from row to row. When the haulm reaches a height of 2 feet some growers cut off the leading stems. There are signs of disease this season in this variety, and probably in another year it will have become as susceptible as any others. The Magnum Bonum is not largely grown, although one of the finest potatoes in cultivation. We examined a crop being grown by Sir J. M. Burgoyne, at Sutton. His system is to plant the tubers in rows, 3 feet apart, and 18 inches from potato to potato. By this plan he obtains a greater weight than where the crop is planted closer, and a far better quality.

"The advantage of steam cultivation is to be plainly seen upon this estate. Side by side is a piece of Magnum Bonums, one part of the land was ploughed by horses in the ordinary manner, and the other steam-cultivated. The land that was ploughed was

also manured, but the portion that was cultivated was not manured; on the latter portion the potatoes look stronger and healthier, and, judging from appearances, will yield far more weight than those on the ploughed land. The soil is a rank red sand. The land upon which the potato is to be planted is usually ploughed to a depth of 6 inches in sandy land, and to a greater depth on heavier soil. The ploughing is sometimes repeated three times. After the potato is planted, and just before the shoot is ready to break through, the surface of the soil is loosened by being harrowed with light harrows, and after the potato is well through, the harrowing is repeated. The hoeing then follows. The moulding up is done with a plough, specially constructed, with two flat shares in the shape of Λ. Frequently the early sorts are damaged by frosts in April and May, and very few gardeners are able to raise potatoes for the earliest market. The prices are generally influenced by the supply from other districts. The Jersey, French, and Cornish potatoes are earlier as a rule than the Bedfordshire; but if they are not cleared before this district sends their produce into market, prices are almost certain to suffer.

"The late potatoes are stored in pits, usually on the land where they are grown, and sold as the markets are favourable, or to meet the necessities of the gardener. The weight per acre this season has been more than one-third higher than any season for the last ten years, and, notwithstanding low prices, gardening has been fairly remunerative.

"Although the district is well adapted for the production of all kinds of vegetables it is in no way

to be compared in point of productiveness to many districts. The yield, especially of potatoes, is not so great, nor the tubers so large, but the quality for the table is unsurpassed.

"A subject of the utmost importance to growers has cropped up this season, and during the first few weeks caused great consternation amongst growers. The railway companies, without previous notice, raised the rate of carriage of new potatoes from 12s. 6d. to £1 per ton, or an increase of 7s. 6d. per ton. This extraordinary impost, which represented frequently more than the profit of the growers, gave great dissatisfaction, and a meeting of the leading gardeners, under the presidency of Sir T. M. Burgoyne, was held at Potten. The meeting was largely attended, and it was resolved to memorialise the directors on the subject. In six hours the memorial was signed by gardeners representing 8,000 acres of market gardens, and was duly presented to the railway officials by Sir T. M. Burgoyne in person, when, in face of the strong remonstrances that were made, the directors ordered a return to the old rates."

That the potato becomes exhausted, as it were, and deteriorated in course of time—in fact, weakened, and so falling an easy prey to disease, seems to be very apparent, and, according to a theory not by any means recent, this deterioration is brought about by spring-planting instead of by autumn-planting. But there are several ways of obtaining healthy seed by a certain course of treatment, one being to dig up potatoes intended for seed early, while they are growing, and strong and vigorous. These should be laid in the sun and dried, and, being somewhat

immature, under this process they will shrivel up and not possess a very inviting appearance, but they will contain the germs of reproduction unimpaired within them. Formerly careful gardeners used always to make a point of laying out their seed-potatoes in the sunshine to "green" them, in some place where they were sheltered from the wet, the "greening" process, as experience showed, giving them greater vigour. In all probability—speaking roughly, and without tracing the cause scientifically, and without reference to specific causes and effects—the sun's rays would doubtless exercise a beneficial action upon the tubers, and destroy, or dry up certain spores of unhealthy growth, which without such treatment would afterwards become developed.

Autumn Planting.—The advantages arising from planting potatoes in October or early in November has lately been confirmed by an excellent authority—Mr. James Howard, M.P., whose notice was attracted by a letter addressed to the Editor of the *Times*, which appeared in that journal on August 30th, 1879, the writer having followed the practice for thirty years. The letter in question is as follows:

> Two letters in the *Times* of to-day on potato cropping seem to show that the writers do not know that, generally speaking, the best time to plant potatoes is late in October or early in November. The reason for it is not far to seek. Potatoes, if stored in a cellar until spring, shoot forth long roots or filaments—called by different names in different counties—and thus expend their vegetative powers before they are planted, and are thus far more liable to disease. They are, in fact, sickly potatoes; and matters are not much mended by storing seed potatoes in a garret, for there they shrivel, and thus lose much of their strength and growth; whereas if planted in the autumn

they are kept alike from the outward air and from growth, and thus come out of the ground in the spring much stronger and better plants than those that are put in in the early spring. I have done so myself for the last thirty years, and thus speak from experience. It was new to the farmers in my neighbourhood, among whom I introduced the practice, who all declare they never will give it up, as it yields a better, and safer crop. All one has to do is to plant the potatoes 2 inches deeper than in the spring. A farmer who planted his crop last autumn after this fashion told me that "not one potato missed," and the winter was both hard and long enough to try potatoes and most other things.

TO THE EDITOR OF THE "TIMES."

Mr. Howard's Experiment.—This letter having caught the eye of Mr. Howard that gentleman determined to put the system in practice, and the results of his experiment are recorded in a letter to the editor of the *Times* dated September 30th, 1880, as follows:

In the *Times* of August 30th, 1879, a letter appeared, signed a "A Country Parson," in which the planting of potatoes in October, or early in November, was advocated. The reason assigned for the practice seemed to possess such force, that I determined to give the plan a trial. The writer, moreover, stated that he had successfully practised the method for thirty years, and that the results had been such as to induce his neighbours to follow the example.

Before proceeding to give the result of my own experience, I will recapitulate the argument of "A Country Parson." "Potatoes," he wrote, "if stored in a cellar until spring, shoot forth long roots or filaments, called by different names in different counties, and thus expend their vegetative power before they are planted, and are thus far more liable to disease. They are, in fact, sickly potatoes, and matters are not much mended by storing seed-potatoes in a garret, for there they shrivel and thus lose much of their strength and growth; whereas, if planted in the autumn, they are kept alike from the outward air and growth, and thus

come out of the ground in the spring much stronger and better plants than those that are put in in the early spring."

In the first week of November last, upon a piece of strong land—"boulder clay"—I planted Rivers' Royal Ashleaf Kidney, dibbling in the seed from 8 to 9 inches deep. In the third week of March I planted two adjoining plots in the ordinary way with the same variety. The plants on these plots showed above-ground about the time expected, but the November-planted portion showed no signs of life, and I began to fear that the unusually intense frosts of the winter had had the fatal effect predicted by my gardener. However, within three weeks the plants gave unmistakable signs of life, showing very bold above-ground. They grew most vigorously, quickly passing the spring-planted portion. The tops were far more luxuriant, and the roots were ripe and were gathered three weeks before any sign of disease appeared. The spring portions were attacked with disease just before they were ripe, as was a small portion of the November-planted which had been left in the ground in order to see whether the disease would attack them or not. I would here remark that the disease did not extend to adjoining portions planted with the "Champions," which were raised last week, nineteen-twentieths being sound.

The November-planted crop was raised while I was in London attending to my Parliamentary duties, and unfortunately was not weighed, as I had intended, my gardener remarking: "There was no need to weigh them. Anybody could see that the yield was nearly double." Upon a small part of the plot, however, this was not the case. Stable manure had been liberally applied to this portion just before planting (originally intended for spring planting), and the result was that grubs attacked the seed, and destroyed at least one-third. Notwithstanding this check, the crop was greater than the spring-planted portions. The objection on the part of the best potato-growers to the application of farm-yard or stable manure immediately before planting, is, doubtless, the result of experience. On the other hand, a little soot put in with the seed has a most beneficial effect.

Last week I was commending the plan of autumn-planting to the holder of some allotment ground in an adjoining parish, who, to my surprise, informed me that the letter of "A Country

Parson" came under his notice, and that he was thereby induced to plant some Magnum Bonums in November. His experience, I found, exactly coincided with my own.

My garden experiment having proved so satisfactory, I intend to adopt the practice upon the wider area of the farm. A field is now being steam-ploughed, which I propose to plant at the end of October or early in November.

In the evidence given before the Select Committee of the House of Commons upon the potato-crop by Professor Carruthers, F.R.S., Botanist to the Royal Agricultural Society of England, and the British Museum, I find, in answer to a question upon the policy of "deep planting in November," he expressed a fear as to the result, remarking that the potato is extremely liable to frost, and the too early germination of the potato may be detrimental from the injury done to the crop by spring frosts. Exactly so. But as November-planted roots remain under ground two or three weeks after those planted in the spring, their liability to be cut down by frost is considerably diminished. It is evident that Professor Carruthers is unacquainted with the fact of the later germination.

I know that farmers who grow their 150 and 200 acres a year will say that, what with wheat-seeding and so much other work to attend to after harvest, it is impossible to get any large breadth of potatoes planted in the autumn, and I admit the difficulty; but if the system should be found to pay, the difficulties will speedily be overcome.

(Signed) JAMES HOWARD.

Clapham Park, Bedfordshire,
September 27th.

Considering the method has been so successfully adopted for many years in one district, it seems remarkable that it has not become more generally known than it appears to be, and followed more extensively. Many observant gardeners know from experience that the stray potatoes they dig up in the spring, after the crop has been taken up from the ground in the usual manner, make the

healthiest and strongest seed, and many have been in the habit of putting them carefully aside, to be used as seed potatoes. The circumstance has also been pointed out before, that in instances in Ireland, where the potato crop has been so badly diseased as not to be considered worth lifting, and the field remained untouched till ploughing operations commenced in the spring, quite a fine crop of sound tubers was turned up by the plough, the diseased ones having entirely disappeared, becoming decayed and amalgamating with the soil, while the small healthy ones developed into sound condition.

It has been remarked that farmers, with a great press of autumn business, are unable to give the time for thus planting in October or November; and are apt to say that, with a large amount of work in hand that must be done at special times, they cannot give the pains and attention demanded by a course of market-gardening process; but if one will pay while the other does not, the least paying ought to give way for that which will, and the established routine be sacrificed, if the old methods and old forms of production do not answer the purpose of the cultivator.

To those who aim at market gardening the plan would not be at all objectionable; for, at the season of the year recommended, the ground would be clear of many crops, and the labour of spring planting would be transferred to even a more leisure period, for, in the spring, market-gardening operations will engross every minute of available time. A great point is gained, however, from a knowledge of these facts.

Mr. Charles Rintoul's Evidence.—Some very salient points in reference to the potato crop were given in

the evidence of Mr. Charles Rintoul before the select committee on the potato crop. He farms about 700 acres of land, having one farm in West Lothian and another in East Lothian, raising annually, on the average, 150 acres of potatoes, the soil west of Edinburgh being very free land, that in East Lothian consisting of a mixture of clay and loam. "At the Cramond Farm," said Mr. Rintoul, "I grow early potatoes for the Edinburgh market, and in East Lothian for the London market. The soil is thoroughly drained, every furrow. It would not pay to grow potatoes if the land was either wet or not sufficiently drained. We begin with potatoes, then wheat, turnips, barley, grass, oats. It is first alternately a white and green crop, and, if we do not sow down, we have two white crops, that is to say, barley after the wheat; six or seven years elapse between two potato crops on the same soil. We begin to prepare the land immediately after harvest, by ploughing a deep furrow, and in spring it requires to be stirred, and we begin to plant as early as the weather will permit—about the beginning of March on the average. For the early potatoes we give 40 tons of horse and cow manure per acre, and about 10 cwt. of a mixture of nitrogenous and phosphatic manures, super-phosphatic, guano, and dissolved bones. I estimate the cost of our manure, for an acre of these early potatoes at Cramond, at about £36 all over. The horse and cow manure costs us 10s. a ton, that is £20, and the extraneous manure about 7s. 6d. per cwt., making a total of £25 15s. an acre for manures. I apply about 20 tons of manure and 5 cwt. of portables at the North Berwick Farm—£7 an acre less than

at Cramond Farm. The heavy manure we apply at Cramond is not calculated to produce the disease in an early crop, because we hope to have the potatoes ripe and in the market before the season at which the disease usually appears. The total cost of the early crop at Cramond I have calculated, on an average, at about £36, including everything—horse-work, labour, and working expenses. We begin to take up this early potato crop, on the average of seasons, about July 1st—from 4 to 5 tons per acre about that time. The whole of the early potatoes will be lifted by the middle or end of August, and at the end of August we have from 8 to 10 tons per acre. I prefer putting all the manure in the drills, everything at the root of the potato. I want to stimulate them as much as I possibly can, in order to get them early into the market; and I work them as much as ever I can with horse and manual labour till they come up; I have never done working them until they close in the drills. The Cramond Farm is low, and surrounded with woods, whereas the other is open; and I think that, for early produce, you must have shelter, and for late you must have an open country. I begin to plant at North Berwick by the middle of March. The ground is too cold earlier, and it is not necessary that they should be planted any earlier to produce a crop at the season that I take them off; and if planted earlier there would be considerable risk of their being frosted. I have them planted by the middle of April, if I can manage it. I expect them to be ripe, and ready for storing, by October 1st, and the average crop on the North Berwick Farm is about 8 tons. The potatoes, after they are lifted out

of the land, are kept in pits about 3½ feet wide, covered with wheat-straw. You leave them a little time open at the top—perhaps three weeks or a month—by putting straw over the whole of the potatoes; then covering up about three-quarters of the pits, towards the top, with a certain quantity of earth, and leaving the top part of the heap with no earth on the straw, but with orifices to allow any heated air to escape from the potatoes. The kinds of potatoes I grow at the Cramond Farm, for early potatoes, are Dalmahoys and early Dons. The Dalmahoy was introduced the season after the disease carried all the potatoes away—1847, I think—and it rapidly became popular after that, and was planted throughout Midlothian about the year 1850. There was a small quantity of potatoes bought in Edinburgh from a seedsman, under the name of "American Earlies," and that was the name it went under before it got the name of "Dalmahoy." The name was changed to Dalmahoy because it was taken to the Dalmahoy Estate. The character of the Dalmahoy variety is not changed in any respect since the year 1850, further than that it is not so prime. It requires selection now to keep it correct.

"It would not suit our business—planting for early lifting—unless thoroughly selected. I grow my own early seed, but I buy a great many of my late seeds. I send the Dalmahoy to late districts, and then select it there. I must have my seeds from later districts in the country every second year. Every one would be better, but the second year it must be done. This variety requires heavy forcing by manure, and light mouldy land. After they have passed the hoeing

process, I go over the field and observe the tops of them. I select my seed even before they are beginning to come into flower. Some do not come in flower at all. Early potatoes do not; they only, at the most, produce a small knot. They never reach blossom. Those stems which appear to be different from the Dalmahoy I take out. Those that I am going to put down for my early lifting I select at the digging time as well. When they are digging them up, we know them from their shape and their ripeness. If there is a potato that is not early enough we throw it out. The other variety I depend principally upon, for an early potato, is the Early Don. I introduced that potato myself. I got it off the Dalmahoy, a twin potato. There were two growing together, and I broke them apart and planted them separately, and they produced different varieties from the same potato. There is a purple streak on them. The Old Don has entirely disappeared. That was a streaked potato, and that is the reason I gave it the name of the Don. The Don was a late potato, very famous in Scotland before the disease broke out; but the disease cleared it away. On the North Berwick Farm, Regents are our principal crop. Regents have been popular in the country. Two or three years after the disease cleared the potatoes away, it came into use. Taking everything into account, I do not know any difference in the character, or quality, or constitution of any potato now, as compared with what it was five-and-twenty years ago, except that it is more susceptible to disease now than it was five-and-twenty years ago. The Champion potato is well suited for a wet, late season,

or for a country such as Ireland. I think it would be very well suited for that sort of climate, but not for our best districts in Scotland. The only thing that recommends it to me is, that it is a safe cropper against disease. In a dry season it is not so large a cropper as the Regents. It grows better in a damp season than in a dry one, and I think it would be a more productive potato than any other we have at present, in a wet season. They are excellent eating. I have experimented since 1848 in endeavouring to procure new varieties of potatoes. I have grown potatoes from the seed almost every year since 1848. I select from the best sorts, such as the Victoria, and from some of those American new varieties that have been coming in. I have been cultivating some of them of late, and they produce earlier potatoes than other classes. After the first year I select the tubers which seem the most likely to give a good quality of potato—a good appearance, and a good crop. If I select for the second time those that are wholly red, and those that are wholly white, even then I will not get them exactly the same until I can cut them, and then the produce will be the same. It requires about three years to develop the potato to a sufficient size to cut into sets, and four years to develop the potato to its best. The cutting of the potato in sets, in my opinion, improves its quality, both with regard to making a more productive crop and also a finer class of stuff. In my experience, the finest quality of potato always goes first with the disease. I think there is something with regard to there being more starch in them, and floury matter, and I think the disease is

more fatal to a potato of that class, and therefore they go first. I think that growing from seed is the most likely way of overcoming disease. It is a long and tedious process, with very slight results, the labour and trouble being great of making continual experiments. I think that great good might be done by the local agricultural societies, or, in the case of Scotland, by the Highland Society offering inducements, either premiums or prizes, for the growing of new varieties of potatoes. I think a good many farmers would try to raise new varieties if there was some encouragement held out by local societies, and especially by the Highland Society in Scotland. The Champions and the Victoria resist the disease better than any other popular potato that is grown, such as Regents or Dalmahoys. I have had the Regents all cut down, and the Champions almost untouched, growing right alongside in the same field, with the same treatment, the same land, and everything. A good variety of potato will resist the disease a good many years. The Victoria is getting very much subject to disease now. At first it was as strong a disease-resisting potato as the Champion is, but now it takes the disease too. It is a bad thing to choose the small potatoes always for seed; you get into coarser stuff always if you do not grow it from cuts every alternate year; they would not go back in one or two years, but if you continue growing from small potatoes you will get into a bad stock. The Government could encourage the growth of fresh varieties from the seed if they were to pay some person for carrying out experiments in different parts of the kingdom. I do not know whether offering

prizes would be so good as having stations here and there under Government officers, or under societies such as the Highland Society. The Highland Society has done nothing in that way hitherto. I agree with the last witness as to stimulating manures being bad for potatoes—*i.e.* over-stimulation by portables; but I do not think that the manuring with horse and cow manure is prejudicial, provided that it is not put too near the potatoes, if it is put on the stubble. Last year was the worst I have ever seen or known for the last thirty years anywhere. The disease appeared about the beginning of July. On the whole, the Victoria, I think, is the sort that has resisted the disease most, and produces the best quality of potato at the same time, that I know of."

For a long time the nature of the potato disease has been merely a matter of conjecture, it being commonly known that certain climatic conditions developed it in some seasons more than others, this especially happening when a good deal of rain falls at the time when the crop is approaching maturity; but recently more definite information has been enunciated upon this subject.

The Potato Disease.—Of late years the great drawback to potato cultivation has been its liability to disease, which is always the worst in seasons of more than usual humidity. Mr. Worthington G. Smith, F.L.S., F.R.S., gives the following evidence relative to the potato disease, which was appended to a report of the Select Committee of the House of Commons on the potato crop: The nature of the fungus first in order of the potato disease, *Peronospora infestans*, a fungus which invariably accompanies the

murrain, has probably been described to the present committee; first, by Mr. Dyer, of Kew, and next, by Mr. Carruthers, of the British Museum: so that it is unnecessary for me to refer to it again in detail. A fact unaccountably lost sight of by many botanists is, that there is a second fungus parasite upon the potato plant, second in order with the *Peronospora*, and almost equally virulent with it. This second fungus is named *Fusisporium solani*. It commonly grows in company with the first open potatoes. Like the first, too, it disorganises by contact, and it is almost, if not quite, as powerful in causing the utter destruction of the potato crop as the *Peronospora* itself. Both these fungi go to rest in an egg condition; the eggs, or "resting spores," as they have been termed, of *Peronospora*, are capable of remaining in a hybernating state in the ground for a period of from one to three years before they show any signs of renewed life; whilst the resting spores of the *Fusisporium* seldom hybernate for a period longer than from three months to one year. It is a very easy matter to destroy the fruiting branches of both fungi whilst in a growing state, but the resting spores are able to resist climatic extremes of moisture, dryness, frost, and heat. The resting spores of both these fungi continue to hybernate whilst climatic conditions remain unfavourable to their active growth, but on the advent of a favourable amount of humidity and warmth they start into renewed life, and in the first instance grow on any material at hand, provided it is not caustic or corrosive. Microscopic fungi are commonly prepared for prolonged examination in glycerine, and nothing is more common than to see the spores of the potato

fungus (and the spores belonging to many other fungi) growing in glycerine. The sudden onslaught then of the potato murrain, each successive autumn, is caused by the advent of sufficient warmth and humidity to suit the germination of the resting spores. The resting spores are eggs of both the *Peronospora* and the *Fusisporium*; they rest on and in the ground everywhere, especially in damp places, and amongst decaying vegetable refuse. When these eggs at length burst, they generally protrude threads which carry seeds of spores, and these seeds are set free in uncountable millions. These seeds sail through the air, and such as fall upon potato-plants rapidly gain an entrance to the interior tissues of the host, and cause its corrosion and destruction. No doubt living resting spores, together with fungus spawn, are often planted with potatoes, and when this is the case, the disease commences with the tuber and works upwards, whilst, in the former case, *i.e.* when the germination of the resting spores takes place upon the neighbouring ground, the leaves are the first part attacked from the air, and the disease works downwards to the tuber. Diseased potatoes, when planted, often produce perfectly sound crops, for it by no means follows as a rule that, because a potato is merely discoloured and "diseased," as potato growers say, it must invariably carry within itself healthy hybernating spawn, or hybernating spores, or seeds of the murrain capable of reproducing the disease. When potatoes once have the murrain decidedly upon them, cure is perfectly hopeless. The potato plant is permeated by a poison hostile to, and potent against its life, and no treatment can possibly renew the corroded and

putrescent tissues of the potato plant. The position of the potato, in a case like this, is equally hopeless with that of a human subject under the last stage of blood poisoning, or consumption. The above being my opinion of the hopelessness of cure, I will concisely confine my remarks to the answering of two more questions, viz.—1st. Why does the potato plant fall such an easy prey to murrain? 2nd. Is it possible to prevent, or palliate, the destructive virulence of each annual assault of the fungus?

The Potato Murrain Destructive.—Why does the potato-plant fall such an easy prey to the murrain? My answer to this is, that, although there are many well-known instances of bad attacks of the murrain falling upon well-cultivated crops, yet, as a rule (and taking an average of the general mode of culture throughout the country), potatoes are badly stored, badly planted, badly cared for, and, moreover, carelessly and ignorantly thrown out of health. It must not be forgotten that the potato is not a hardy plant with us. It leads a somewhat unnatural life, under adverse conditions, and it requires nursing. When potatoes are stored, they require, as conditions of the first importance, both dryness and coolness, whilst, as a rule, potato-growers subject their potatoes to moisture and over-heating. Stored potatoes are commonly piled in heaps during the entire winter, and in these death-heaps the potatoes get bruised, heated, and thrown completely out of condition. Stored potatoes are commonly in a hotbed of disease. The potato-tuber, thus fermented and damaged, is now commonly cut into pieces, and the pieces, whilst still wet, are too frequently placed in the furrows of the

ground in actual contact with rank dung and refuse, this material being saturated with spores and vermin of all sorts. The potato has by this time more or less lost its constitution, and the position in which it is planted too often adds to its troubles; for when potatoes are grown in marshy places and on flat alluvial plains, they require a different mode of culture from the same plants as grown in dry calcareous earth. As a rule, too, potato-growers crowd their plants too much together, and the potatoes are in as bad a plight for contracting disease as human beings and other animals are when constantly kept in overcrowded ill-ventilated places.

The potato murrain is not exclusively confined to the potato-plant, for it attacks with equal virulence (especially has this been the case in recent years) the tomato. This latter plant, like the potato, requires special care in cultivation; and where this care is not forthcoming, the whole crop is utterly lost. The murrain also attacks various wild plants in this country (principally members of the family to which the potato belongs); but these plants being healthy, hardy, and natural to the soil and climate, throw off the murrain with ease, and rarely succumb. Records of facts of this class could be multiplied to an almost indefinite extent; hardy native and uncared-for subjects escape, whilst introduced subjects fall. For instance, there is a well-known disease of house-leeks, named *Eudophyllum sempervivi*. This is one of the rarest possible occurrence on the hardy common house-leek of our roofs and gardens; but when the disease once gets amongst exotic species of *sempervivum*, it completely destroys

every plant. It is the same with the hollyhock disease, *Puccinea malvacearum*. The old hardy single hollyhocks of cottage-gardens throw off the disease with ease, whilst the tender highly-cultivated garden varieties are utterly destroyed. Peaches, when grown on walls and exposed places, fall a prey to a disease named *Ascomyces deformans*, a disease almost unknown amongst peaches when carefully grown in fruit-houses. Late-fruiting garden peas are often completely destroyed by a fungus named *Erysiphe martii*, but this fungus has very slight effect upon the hardy wild-peas.

The following observations belong to a similar class of facts. A racehorse may be as healthy as a waggon-horse, and may be able to live as long a life; and a well-tended spaniel as healthy as a Scottish shepherd-dog; but one must be cared for in a different style from the other, if life and health are to be equally satisfactory in both. I conclude, thereby, that the potato-plant would not fall such an easy prey to the murrain if it received greater care in its general storage, planting, and cultivation. It now too often falls a prey to the infectious murrain, in the same way as the unclean and improperly fed human beings of populous districts fall before certain diseases, whilst clean, well-fed, and healthy individuals escape. Healthy, or apparently healthy, potato-plants may occasionally succumb to the murrain, in the same way as a doctor may occasionally die from fever, communicated by a patient.

A Palliative.—The second and last question: Is it possible to prevent the destructive virulence of each annual assault of the fungus? is far more difficult of satisfactory answer. I, however, most

certainly consider a good reduction of the amount of disease to be quite possible. The attacks cannot be mitigated by care, but a strong attempt might be made towards the prevention of the murrain. With a correct knowledge of the nature and cause, nearly every known disease can be prevented or palliated, especially when there is a specific poison in the case, as with the potato disease. As for stamping out the murrain, or isolating cultured experiments to an island in the sea, a short distance from the shore, any such attempt would be utterly futile. Spores are present everywhere, and can no doubt be carried through the air across a sea, or ocean, as readily as over a hedge. Spores everywhere sail with the wind, and at the same speed. Nothing is better known than the descent of spores, pollen, and other minute organisms, on to ships in mid-ocean. If potatoes were taken into an island in the middle of the South Pacific, or transported upwards, miles into the air, or submerged for years in a river, they would yet be liable to contamination from the *Peronospora*, for the spores of the fungus are everywhere. The resting spores have been kept alive for three years simply in pure water, and they germinated after that time. In fact, the only way to satisfactorily see the ordinary spores germinate, is in water. I have for many years been in the habit of constantly using the microscope, and I have found the spores of the potato fungus on the most diverse objects, and from the most diverse positions; showing that the spores must have been blown for long distances in every direction. Now, suppose the statement to be correct (which it is not), that the spores of the potato fungus are not

carried far by the wind, are there no other means of dissemination at hand than disturbed air? Suppose a fox or hare runs through a field of infected plants, and then goes off to non-infected districts, he will carry tens of thousands of spores in his coat. Suppose a bird alights amongst infected potatoes; when that bird flies off he will carry tens of thousands of spores in his wings, and discharge them into the air as he sails over the country or the seas. The innumerable beetles, flies, moths, butterflies, and grubs, found amongst potato-plants, commonly swarm with spores. When a farmer goes into his infected fields he inhales the spores into his lungs, and when he eats his fruit from the walls of his kitchen-garden he takes the spores into his stomach.

From the above it will be clearly seen that any idea whatever, founded on stamping out, can only be a wild dream. Prevention is the only means worthy of a moment's consideration. In my opinion a careful selection of tubers is first required.

Many varieties of potato are known to be less liable to disease than others, and these varieties might be authoritatively recommended for cultivation, especially in those districts where the conditions for the spread of the potato disease are favourable, as in the low terraces and plains belonging to rivers, and in humid districts. The fact that some varieties of potato are highly susceptible to disease will not admit of doubt, and such varieties should be confined for culture to greenhouses, and calcareous or other suitable soils.

We have facts of a similar class in the human family: for instance, some persons are constitutionally

highly subject to zymotic diseases, as typhoid and diphtheria; other persons cannot go near a hayfield without contracting hay-fever. In opposition to being highly subject to special diseases, certain other individuals, both animals and plants, are equally able to throw them off. In a paper read by me before the Scientific Committee of the Royal Horticultural Society, I detailed some experiments in which I inoculated, by actual grafting, the tubers of diseased potatoes with those of sound ones; in some instances a thick slice of a highly-diseased potato was spliced into the substance of a sound one; the constitution of the host-potato was, however, in some instances so robust, that the host grew well, and with no effects of disease in its aftergrowth. I have also carried out similar experiments with the fungus of the hollyhock disease, and other plant diseases, and always with like results, viz. that infection was something simply impossible with sturdy plants.

These facts also find a parallel in the human family, in the application of vaccine from the cow. In some individuals vaccination is entirely without effect, as regards the production of cowpox.

Sorts—Treatment—Instructions.—It may therefore be regarded as a certain fact, that robust early-ripening varieties of potatoes might be selected for general cultivation with advantage. In the next place, it might be recommended that all potato tubers should be preserved through the winter in a perfectly dry place, and dusted with some caustic material. Thirdly, the cut tubers should never be placed in the furrows till the cut surfaces of the potato have healed; and never, under any circumstances, should they be placed

directly on the farmyard manure, or overcrowded, as they commonly are, in the furrows. Fourthly, especial cultural directions might be printed for the proper growth of potatoes on peaty, sandy, loamy, calcareous, and other soils. Lastly, all potato refuse should be completely burnt every autumn, and never, under any circumstance whatever, be ploughed in. If directions like these were scrupulously attended to, my belief is that the potato-plant would, in a few years, be able to throw off attacks of the disease as easily as now does the wild-plant of our hedges, the common bittersweet, *Solanum dulcamara.* A piece of ground (the number of acres to be afterwards decided upon) might be selected as an experimental garden, and a responsible direction appointed. This piece of ground should be situated on an elevated exposed plateau on a thirsty, calcareous soil. Many such positions are to be seen in Bedfordshire and elsewhere, where the chalk comes to the surface. The gardens at Kew and Chiswick are entirely unsuited to the purpose. All farmyard manure should be discarded, and chemical manures only used. Varieties of the potato known as early ripeners, and potatoes with the strongest constitution only, should be grown. Late ripening in a potato is a fatal defect in the hardiest plant, for all experience shows that sooner or later a late ripener is certain to succumb before the murrain. These early and hardy potatoes should be continually crossed and recrossed, so that by constant selection and improvement, this production of hardy new varieties might be secured in succession. Such new forms as these, grown in a favourable geological position, and under the best

cultural conditions, could hardly fail to be the precursors of hardy new races. On the experimental garden, a store-shed should be built, capable of preserving the potatoes in perfect dryness during the winter, and the seed-tubers should be preserved in a slightly caustic material. All apple-growers know that, unless they keep their apples perfectly dry during the winter, every fruit will be destroyed by a fungus named *Oidium fructigenium.* Now, stored potatoes are equally valuable with apples, and they demand and deserve equal care. In a garden such as here described, many sturdy varieties would, without doubt, soon be produced; these varieties would have a considerable market value, and an experiment of the nature indicated could probably be made to pay its own expenses.

Rules may be useful; but the great and difficult question is, how can such rules be made everywhere known in Great Britain? How can all potato-growers be made to understand and appreciate the probable benefit belonging to a careful adherence to a certain strict code of regulations? Not one potato-grower in a hundred knows anything about the exact nature of the potato murrain, the majority of farmers do not know whether the disease is an insect, a fungus, or a gas; whether it is caused by a fog, a rain, or a thunderstorm; what it is, whence it comes, or where it goes, they have no idea. It is a small minority of potato-growers who buy agricultural, horticultural, and farming newspapers. A comparatively few only are members of our great agricultural societies, and potato-growers may be said, as a rule, to know little or nothing more of the potato and the murrain than

that they every year see and propagate both. My suggestion then might be as follows: In the first place, a notice might be printed and sent to all the post-offices and police-stations in the kingdom, the notices to be exhibited in some public manner, so that they might be seen by all persons. The notice might be to the effect that, a strong attempt was about to be made towards the mitigation of the potato murrain, and that any person who had a certain number of acres of potatoes under cultivation, and who wished to possibly secure himself against the usual annual loss, might obtain information of the means proposed to be taken at the nearest post-office or police-station. On applying at the office or station, each applicant might be furnished with a paper, to be filled up with a statement of the number of acres under cultivation; the usual mode of culture, storing, etc., the variety usually grown, with other particulars as to soil, etc., which it is unnecessary for me here to write out in detail. This paper should be posted on to some society, office, persons or person, in London or elsewhere, for consideration. Suitable replies should then be ready for posting back to the applicants, and, in some instances, personal advice or inspection of a district and its surroundings might be given if desirable; but always on condition that the recipient of such advice, printed or personal, not only promised to act upon the advice given, but also agreed to fill up another printed form of results, for comparison with the results received from other sources at the end of the season. The results and experiences thus obtained from different quarters of Great Britain as

to the varieties of potatoes grown, the modes of storing, general culture, average losses, and other particulars, should then be carefully tabulated by the society, person or persons, above mentioned. These persons should be well acquainted with potatoes in their different varieties, their constitution and culture, and well acquainted with the exact nature of the murrain by which potatoes now are so badly affected. Results thus obtained would probably form a good foundation for a complete knowledge of the exact requirements of the potato-plant under the different climatic and geological conditions peculiar to Great Britain. I am not much in favour of subjects of this class being relegated to societies and academies. It too often happens that bodies of this class effectually smother a subject with a maximum of words and a minimum of work. Provided a competent person could be found, I am in favour of the appointment of one absolute responsible ruler and master—a person who should be allowed to take the entire subject of the potato murrain in hand for a series of years on his own responsibility. If such a person could be found, any number of suggestions or facts might be submitted for consideration or tabulation ; but, provided the responsible leader of the investigation had the requisite knowledge and experience, he should be allowed to work out his own ideas in his own manner. I have now sketched out, as I see them, the broad outlines of the practical side of this great and important subject. I have purposely refrained from entering into cultural, chemical, climatic, and geological details, and statis-

tical details of all sorts, and have purposely adverted to no potato or potato-raiser by name. The salient outlines of the subject are first wanted; and if these outlines, as now indicated by me, are accepted, all the details with which such outlines must at length be filled will be forthcoming.

CHAPTER V.

Cabbage: Varieties—Brussels sprouts—Cauliflower: Varieties: Cultivation—Broccoli: Cultivation: Shelter contrivances: Varieties: First, Second, Third, and Fourth Divisions—Kale: Cultivation: Varieties—Kohl-Rabi—Couve Tronchuda, or Portugal cabbage.

The Cabbage (*Brassica oleracea*).—Cabbage can be made a most paying crop, adapted alike as it is for a market-garden vegetable or as food for stock, and can be raised upon heavy land that is not adapted for turnips. The yield is often immense, cabbages being now grown that weigh half-a-hundred weight apiece. The field cabbage, Drumhead cabbage, or cattle cabbage, though attaining these enormous weights when well grown, is not coarse, as would commonly be supposed to be the case, and therefore quite unfit for a table vegetable, but is delicate and sweet.

There are a great many varieties of cabbage, but all of them being gross feeders, liking a large quantity of rank manure, the crop is a valuable one for preceding those which do not succeed upon land to which it has been recently applied.

To have early spring cabbage, for which there is always a brisk demand, beds should be thoroughly

prepared, and the seed sown in them in September, the whole of the cabbage tribe being subject to transplantation.

Varieties.—For spring use the Fulham, or London Market, or the Battersea, as it is sometimes called, is an excellent variety; for when good seed has been obtained it is pretty sure to give good heads in the spring, and very few will "bolt," or run to seed. The Early York has long been a favourite with market-gardeners, for, although not a large variety, it is considered a very good one, and is sent by them to Covent Garden and other markets in large quantities at the commencement of June. The Early Dwarf York, Bullock's Heart, and some others belong to the same family, and come in sooner than the Early Battersea. The Sugarloaf, of which there are several sub-varieties, is a good-looking cabbage, from a saleable point of view, but is of somewhat inferior quality.

In the London markets, and also in the neighbourhood of large provincial towns, coleworts, or cabbage-plants half grown, before they have formed their hearts, find a ready sale, being sold tied up in bundles. They are a profitable crop in those districts where they sell, as they are on the ground only for a short time. But when a main crop is to stand for summer cabbage, and coleworts are taken from them, this is effected by planting them out twice as thickly as when the whole crop is to stand for hearting, and draw every other row, and every other plant in the standing rows, by which means the coleworts figure as an extra crop gained, and for early use perhaps no variety of cabbage will excel the Early York. Cole-

worts are extensively used as a winter vegetable bunched up as greens.

There are several well-known sorts of cabbage constantly cultivated especially fitted for garden culture, as Atkin's Matchless, a dwarf variety that comes early; Early Brompton; Wheeler's Imperial, which is also early, of good size and quality. Early Nonpareil is also early and of excellent quality, as well as Preston's Victoria, which is both large and early. Carters' Miniature Drumhead is a small early round cabbage, quite distinct from cattle cabbage; Vanack, and Early Jersey Wakefield, an American variety, besides a host of others.

Red cabbage, which is a good deal eaten on the Continent in the form of fricassee, especially during Lent, but more or less all the year round, is only used in England as pickling cabbage. Red cabbages are mostly produced by sowing the seed in the middle of August, so as to stand the winter and come in for use about the following August, at which time they are less watery and in better condition than at any other time for this special application.

Savoys are mostly cultivated as a winter crop, there being two principal varieties, the Large Green and the Dwarf Green. The seed of these should be sown in April or May, and the plants set out not later than June; savoys not usually being sown in the autumn, like many other kinds of cabbage, as they have the entire summer to grow in, and are never used till the winter months set in. There is a common impression prevailing that frost improves the flavour of savoy cabbage; but this is, of course, quite a mistaken idea, as the frost-bitten leaves readily make manifest.

Brussels sprouts are a very marketable commodity, and they possess the advantage of being portable, and can be packed in a small space, there being no waste, or outside leaves, to deal with. They are very easily cultivated, being treated much in the same way as savoys, but sown even earlier, so as to get the whole summer's growth, and planted at once into the rows where they are intended to stand. It is very necessary to procure the very best seed, which is imported from Belgium; much of the seed that is sold being of very inferior quality, a disappointing crop is the result. The stems run up from two to three feet high, being surmounted with a small cabbage on the top, somewhat resembling a savoy cabbage in appearance, and these should always be kept distinct from the sprouts when sent to market. As the summer proceeds on its course, the side leaves drop from the stalks, and at the bottom, or root of the foot-stalk of each, springs out the sprout, in the shape of a miniature cabbage of itself, which is plucked off the stems, and packed in half-bushel or bushel baskets. The growth of these may be assisted by stripping off the side leaves, but this must not be done too soon, or the plant will suffer.

Savoys planted out in July and August will furnish small cabbages, and at the best middle-sized ones, but these are often found to come in useful during the course of the winter, and in spring when other greens are somewhat scarce; but any quite late plants will not form a heart, but run up for seed as the spring advances.

Peculiar soil or situation will often cause one description of cabbage to succeed better than another,

but Early York should be sown twice a year, that is to say, in early spring and towards the end of July. Where the land consists of stiff loam, a proper seed-bed should be made, and light soil mixed with it, leaf-mould or wood-ashes being good for the purpose. A sound seed-bed in good heat will furnish strong plants, which only grow weakly and slowly in cold and ungenial soils, often falling a prey to damp frosts and insects during the winter months. For winter cabbage it is almost impossible to make the soil too rich, and plenty of strong farmyard manure may be used. If the ground is dug two spits deep, and the manure well incorporated with it, upon heavy land this will be found invaluable treatment, and a first-rate precursor for a crop that does not like freshly-applied manure, to follow the cabbage.

A good seed-bed formed, the seed should be sown in drills, six inches apart, and not too thickly, so as to allow the young plants room enough to get strong before they are removed for final planting out, young cabbage plants often being made to grow in far too crowded a condition for their well-being.

It is best to purchase cabbage seed, as a rule, so as to get it true, rather than raise it oneself—the opposite to the advice usually given when pure unmixed seed is sought to be obtained from recognised and good specimens which it is desired to propagate to a further extent; but the reason for this is, that cruciferous vegetables are apt to become bastardised, the pollen being wafted by the wind from one species to another, or inoculated by insects; so that to get true seed it is necessary for the plants to be grown in great numbers together, and be isolated from others,

where danger is not to be apprehended of a likelihood of their being crossed.

Nor should the price of good seed ever be grudged; for a common practice prevails amongst unprincipled persons who offer cheap seed of cauliflower or broccoli (which is very expensive), of mixing it with common cabbage seed that can be bought at a tenth part of the price, resembling it in appearance, which is killed by heating; and there remains only the small quantity of genuine seed of the true description, which of course has been allowed to retain its vitality, to come up. And if there is but a quarter of the quantity of true seed in an adulterated parcel (which is often questionable), compared with genuine at twice its price, the latter in reality costs only just half the amount of the adulterated seed. So that it is always better to deal with a high-class seedsman whose goods may be relied upon, no matter how high his rate of charges may appear, unless there is actual experience to the contrary, that these high charges are altogether unwarranted. Gilbert's new Cabbage Broccoli has been pronounced an acquisition in the way of cabbage, and it can be used as a broccoli in the spring.

It is worthy of remark, with respect to the old-fashioned savoy cabbage, that it was distinguished beyond all other varieties by its deeply-corrugated leaves, and used to be of only moderate size, but of late the savoy has been developed into a larger and smoother-leaved variety, partaking of the nature of a Drumhead cabbage, a larger and hardier species being the result, which does not come up to the standard of the original savoy, though increased bulk of individual specimens has been the result.

Sir Anthony Ashley is said to have first introduced the cultivation of cabbages into England, a cabbage being represented at his feet upon his sculptured monument at Wimborne St. Giles, Dorsetshire; but it was for long an article of import from Holland, as is proved by Ben Jonson, who wrote fifty years after its introduction by Sir Anthony Ashley, who, upon an occasion, says: "He hath news from the Low Countries in cabbages."

Messrs. Sutton, of Reading, advertise their cabbage, Sutton's Imperial, as being an early and profitable cabbage, as by judicious sowing it can be made available for autumn, winter, and spring use, good heads also being able to be cut from the stems during summer.

Cauliflower (*Brassica botrytis*).—Cauliflower is often confounded with broccoli by the uninitiated, but they are a distinct variety, cauliflower being easily injured by even slight frosts, while broccoli stands our ordinary winters very well. The Walcheren cauliflower, or broccoli, for it is indifferently styled by either term, is a variety between the two; but while there are a great many kinds of broccoli, there are but two (if two) of cauliflower, viz. the early and late.

Varieties.—Carters' Defiance Extra Early is a small kind, producing heads of the size of a cricket-ball; Sutton's King of the Cauliflowers is of dwarf compact growth, described as standing the drought of summer well, and being suitable for producing a succession through autumn and winter; Early London White, and Walcheren, come in for early use; while there are Lenormand's Paris Market, Veitch's Autumn Giant, Stadtholder, Carters' Dwarf Mammoth, Early

Short-legged, Late German, Early Dwarf Mammoth, etc.

Cultivation.—Cauliflowers pay well to grow in those situations for which they are adapted, if the heads can be got to market early in the season, a good kind, with this object in view, being the Early London. Seed should be sown in gentle heat in February and March, and in the open ground in April, May, and June; the sowing should not be too thick, and the seedlings should be planted out as soon as they have made three or four leaves, on a rich bed, to strengthen them before they are finally planted out. And, as a long season is necessary to perfect the growth of the cauliflower, the young plants need to be in a sheltered position, and liberal use of liquid manure and gross fertilisers are useful applications in assisting their growth. Slugs and snails attack the young cauliflowers, and as they choose those leaves which are flagging in preference to the fresh, those who will take the trouble may capture these vermin early every morning by placing a few leaves that have been cut close to the plants, which will attract them. To have a constant supply of cauliflower, seedlings should be transplanted at intervals of ten days or a fortnight, when they are likely to be wanted. A second sowing of seed in the middle of May will bring in crops fit to cut between September and November.

Broccoli (*Brassica cymosa*).—Broccoli have to stand a longer time in the ground than cauliflower, as they come into use in the spring, autumnal broccoli not being required when cauliflower is grown; the latter being preferred for their fine white heads, which make a daintier dish of vegetables.

Cultivation.—The great difficulty in the management of a crop of broccoli, is to prevent their coming on all at once, and hence it is advisable to have frequent sowings and transplantations, where it will answer the purpose of the cultivator to devote the necessary time and pains to the operation. At first the seed should be sown in gentle heat under glass in February, after which time sowings can be made in succession during March, April, May, and July, in the open ground; those intended for spring use as a main crop can, however, be sown in May, and be transplanted in July and August. If they are planted twice as thickly as they are intended finally to stand, by removing every other plant, and planting them elsewhere, the check they receive by this operation may probably cause them to come in later; but a better plan is to grow various kinds, the probability being that the different sorts will arrive at perfection at different periods. A space of about four feet square should be allotted to each broccoli-plant. When the heads are forming, it is a good plan to turn a few leaves over them as a protection from the hail-storms in early spring and the scorching sun at other times.

Climate has a great deal to do with the successful growing of broccoli. In the south and south-east counties of England the crop stands the winter well, the saline influence of the sea air in many places appearing to modify that cutting frost which is so destructive to particular forms of vegetable life in certain situations, when sometimes unusually hard frosts will kill nearly every plant.

Shelter Contrivances.—There are certain con-

trivances that might with advantage be often resorted to by market-gardeners, that, however, never are made use of, for protecting crops from injury from frost and biting winds. Without wishing harm to one's neighbours, it follows that, if any given crop is mostly destroyed in a district by frost, and from superior skill one grower manages to save his from material injury, a great gain can be made. For crops likely to be thus injured might often be protected and saved, by means of hurdles thatched with straw being placed at intervals amongst the crop, and round the edges where it is exposed to the north and east winds. Hurdles can always be readily removed from place to place, and this shelter would be found invaluable in many exposed districts, where crops are left very much to their fate by their owners.

Some growers have resorted to the method of trenching, or laying broccoli so low in September that the centre of the stem at the top of each plant is level with the ground, and the earth drawn round each plant before snow was expected to fall, the result being that the plants were strong and vigorous in the spring, and produced fine heads; but there is more trouble about arrangements of this nature than many growers are willing to bestow, while that of the thatched hurdles could be quickly managed at but a trifling expenditure of labour.

Varieties.—It is indispensable to buy broccoli and cauliflower seeds of first-rate seedsmen, in order to obtain true varieties, and these have been very carefully classed by the best dealers, to bring in the crop as follows:

First Division, for cutting from September to

December: Walcheren; Early Purple Cape; Veitch's Self-Protecting Improved Purple Cape; Early White Cape; Sutton's Superb Early White; Grange's Autumn.

Second Division, for cutting in December, January, and February: Snow's Winter White; Penzance Early, commonly grown in Cornwall, from whence large quantities are sent up to the London markets; Osborn's Winter White; Backhouse's Winter; Sutton's Favourite Early Dwarf; Sutton's Improved White Sprouting; Sutton's Improved Purple Sprouting; and Adams's Early White.

Third Division, from February to April: Carters' Mammoth Spring White; Dancer's Late Pink Cape; Covent Garden; Leamington; Carters' Improved Early Purple Sprouting; Dalmeny Park; Frogmore Protecting; Knight's Protecting; Winter Perfection; Elletson's Gigantic; Duke of Portland; Sutton's Perfection; Cooling's Matchless; Hampton Court; Sutton's Reading Giant; Basket's Late White.

Fourth Division, for cutting from April to July: Cattell's Eclipse, a hardy late variety; Carters' Summer, recommended as being a capital fill-gap that exists between broccoli and cauliflower; Late Queen; Carters' Champion, to precede Carters' Summer; Sutton's Protecting Late White, a favourite old variety; Brimstone Colour, a hardy kind, with small heads; Chappel's Large Cream; Dilcock's Bride; Richmond; and Late White. There is a long list of names besides, but those given embrace the newest varieties, Sutton's Late Queen being recommended as distinct from other varieties, dwarf and

compact in growth, and rarely affected by frost, being of a creamy white colour.

Kale, Borecole (*Brassica oleracea:* var. *Sabellica*).—Unlike the close-hearted cabbage, which must be regarded as a modern importation, kale is mentioned amongst the earliest English records, the Saxons being familiar with its culture, the Saxon name for the month of February, which is Sprout-kale, being evidently derived from the season when the shoots from the old stalks first come into use. Its chief recommendation is, that it is suitable for cold and exposed districts, and is well adapted for late seasons, a certain part of Scotland being peculiarly styled "the Land of Kale," which applies more particularly to the parts about Aberdeen, which, although often lauded as a delicacy, is really only a very inferior vegetable production, compared with hearted cabbage:

> There's cauld kale in Aberdeen,
> An' castocks in Stra'bogie.

Cultivation.—Kale is grown in the same way as other kinds of cabbage, doing best upon a richly-manured deep soil. The seed should be sown in March, and the seedlings planted out as soon as they are strong enough for removal. The rows should be placed three feet asunder, and the plants stand in the rows two feet and a half from each other. The redeeming point about this somewhat coarse vegetable is, that its growth may be assured through the hardest winter, and supply greens far on into spring. In a rich soil they grow vigorously, and attain a large size—the

larger the size the coarser the quality, the stunted kinds being the better eating.

Varieties.—Where the soil is somewhat fine, Extra Green Curled and Cottager's are the best kinds to plant, there being a good many different kinds altogether. Jersey Tree Kale often attains a height of ten feet, or even more, and is useful for cattle; but the dwarf kinds are those most suited for the use of the cook, as the Acme; New Heading or Hearting; Improved Variegated; and Carters' Improved Garnishing, are ornamental kinds. Green Curled Extra Fine Dwarf Scotch is a useful kind; the Abergeldie, or Prince of Wales' Plume, being a fine dwarf curled sort of good quality; and Sutton's Extra Curled Scotch; Buckman's Hardy Winter Green is considered one of the hardiest, capable of standing the severest winters; Frisby's Crested, an ornamental variety; Imperial Hearting; Sutton's New Dwarf Purple Curled; Dalmeny Sprout, a hybrid between a cabbage and Brussels sprout; as is also Albert Sprout, producing a quantity of "buttons" on the stems with a savoy-like head; Ragged Jack, etc.

Kohl-Rabi, or Turnip-rooted Cabbage, is not worth the attention of the market-gardener; the Earliest Green, Earliest Purple, and Early White Vienna being the kinds usually selected when grown, which is seldom the case, though the vegetable is a favourite one in Germany, but will not answer to cultivate for the English market nearly so well as Brussels sprouts and the finer kinds of cabbage.

Couve Tronchuda, or Portugal Cabbage.—Much the same as the above may be said of this variety, though the top forms a fine cabbage, of capital flavour. The

mid-ribs of the largest leaves are sometimes cooked in the manner of sea-kale. The seed should be sown in February, March, and April, the first sowings upon gentle heat. The plants should be put out the same way as ordinary cabbage, in rich soil, and be supplied with abundance of water, if the summer is a dry one. It is, however, a variety more fitted for cultivation in private kitchen-gardens.

CHAPTER VI.

Lettuce: Varieties: Cultivation—Endive: Varieties—Spinach: Varieties—Division of the Seasons—Market-garden Herb plants: Parsley, Sage, Thyme, Mint.

Lettuce (*Lactuca sativa*).—Lettuce is an important crop to the market-gardener, which is of easy cultivation, and is one of those things for which there is always a regular sale. There are a good many varieties of one sort and another, about twenty being enumerated, of which there are three or four leading kinds that are mostly cultivated.

The lettuce was known as a hardy annual in English gardens in 1562, having, it is said, been introduced from Flanders about 1520. The Cos lettuce, as its name implies, is a native of the island of Cos, and we are no doubt indebted for its introduction, in some of the varieties, to the Greek islands. In the privy-purse expenses of Henry VIII. in 1530 a payment is recorded to have been made to the gardener at York Place for bringing "lettuze" to Hampton Court; and Turner, in 1652, speaks of lettuce as being familiarly cultivated at that period.

There is a narcotic principle in the juice of the lettuce, which of late years has been utilised for

medicinal purposes, and has found a place in the Pharmacopœia under the name of *Lactucarium*, which possesses in a lesser degree the narcotic principle of opium, though without producing such deleterious effects, and is therefore resorted to in those cases where the use of the latter would be attended with danger.

As market-gardeners seldom turn their attention to any of those horticultural manufactures, so to speak, that might often be carried out to advantage, a brief account of the method of harvesting the lettuce-juice in the form of a pharmaceutical preparation, which is saleable, may be of interest.

When the flower-stems have reached a good size and height, and before the flowers of the plant have begun to open out, a portion of the top is cut off transversely, which is done when the plants have been excited into action by the direct rays of the sun, which causes the milky juice to exude from the wound, and fixes it there at once, without allowing it to flow down, when it will form a kind of scale about the size of a fourpenny piece or sixpence. This after a time gets dry, and can be removed, when another small piece is cut off the top of the stem, and the same operation is gone through again, and another scale formed, and so on till the juice of the plant is exhausted, and these are collected and sold to the drug dealers. It may as well be mentioned also here, that it has been found profitable to grow poppies, and sell the heads, when ripe and full of seeds, to the wholesale druggists.

This narcotic principle has long been known under its ordinary aspect; and the strength and quality

of the juice as an opiate, in the form of its modern preparation, necessarily greatly depends upon the variety of the plant, and the soil upon which it has been produced. In the case of the wild lettuce (*Lactuca virosa*), which is strong-scented, the narcotic juice is so plentiful and acrid as almost to bring it within the class of vegetable poisons—the name of *Lactuca* being derived from the milky juice which these plants contain.

Varieties.—The two broad divisions of lettuce, which are cultivated in gardens, are the Cabbage lettuce and the upright, or Cos lettuce.

Of Cabbage lettuce, the Hardy Hammersmith, Brown Dutch, White Dutch, Malta or Drumhead, Neapolitan, Asiatic, Grand Admiral, Gem, Commodore Nutt, Stanstead Park, are all well-known varieties; while the New American Green-fringed is of ornamental appearance, of a delicate shade of green, the inner part of the leaves being white, and the edges fringed. The Hanson is recommended for its rapid growth in hot weather, and non-liability to run to seed, which is also said to distinguish Perpignan; some of the best lettuces coming from Paris; while the New American Gathering, or Curled, is a distinct kind, intermediate between the Cabbage and Cos, but more inclining to the former, being fit for use from spring to autumn.

The Cos varieties are, however, considered the most useful and profitable for the purpose of the market-gardener. The White-seeded Bath Cos, the Monster Brown Cos, the Black-seeded Bath Cos, Imperial Bath, London White, Egyptian Green Cos, Moor Park Cos, Paris Green Cos, and Florence Cos

are all established sorts; while Carters' Giant White Cos is recommended as being slow to seed, and requiring no tying; Sutton's Superb White, attaining a large size, not readily running to seed, and being level in character; All Heart, reaching a large size, specimens having been grown of weights ranging from 6 lb. to 9 lb.; Buckland Green, a green Cos lettuce that does not require tying; Sutton's Champion Brown, the hearts of which grow to a large size; Carters' Giant Brown Winter Cos, a useful variety for early consumption; and Kingsholm Cos, of the Paris Cos type, which is said to withstand the summer heat for a long time after many others have run to seed, the great drawback to lettuce cultivation.

Cultivation.—The seed should be sown in pans in gentle heat in February, and the plants pricked out for an early crop in a warm position that has been richly manured; but there is an amount of risk to be incurred in early growing, which, however, is well worth running to a certain extent, on account of the extra price gained by early produce. Seed should be again sown in March, and continued till the end of July. Room is not always to be had, or the best lettuces are those which stand all through the winter and attain their full size in May and June, the seed of which should be sown in August and September. In mild winters they will often stand through them, in sheltered positions, almost untouched; while, when the outer leaves are sometimes destroyed, the vitality of the plant will be kept intact, and it will make rapid progress in growth upon the return of genial weather.

Like most other plants, the lettuce thrives best upon a rich soil, and likes plenty of water; but, if

the kind is judiciously chosen, lettuces may be grown upon poor soils, and where it is not possible to water them, though they naturally thrive best with water. The spring-sown lettuces in February may be planted out in the open air in March; but the more advanced the season becomes, the less will they stand transplanting without injury, on account of their prevailing tendency to run to seed. They succeed best sown in drills, the seed placed thinly in the drills, and the superabundant plants cut out with the hoe as soon as they get two or three leaves, so as to stand a foot apart each way. The smaller kinds, as Tom Thumb and Commodore Nutt, will do in a space of eight inches, but these are more suited for private families than adapted for the purpose of the market-gardener. Waterings should be given in long-continued drought, and a light friable soil is better suited for the growth of lettuce than a clayey or stiff one.

Late lettuce may occasionally be grown with advantage; but, as a rule, it does not pay to cultivate them after midsummer, as their quality deteriorates towards the close of the early season, and they are particularly subject to the attacks of vermin, as slugs, snails, and various insects.

Endive.—When lettuces are scarce in autumn and winter, endive takes their place. The seed should be sown in May and June, in drills nine inches to a foot apart, the plants standing six inches in the rows for the autumn supply, upon richly-manured ground, and water should be given in dry weather. A sowing should also be made in July and August, to keep up a succession.

Varieties.—There are several varieties, as New

Round-leaved Batavian, of close and compact habit, forming a good heart. French Mossy Curled, compact and ornamental; Sutton's Extra Fine Green Curled, which, it is said, will stand for a long time before running to seed, if planted in the shade. Lancinated Louviers; Green Batavian; Italian, adapted for summer use, not readily running to seed; Digswell Prize; Imperial Batavian, a plain-leaved variety, though the curled is usually preferred, as Green Curled Winter, Fine Green Curled, White Curled, etc.

Spinach (*Spinacea oleracea*).—Spinach in England occupies a secondary place as a universal vegetable, not being so highly appreciated here as upon the Continent; still, large quantities may be sold at times, and it will answer the purpose to grow a crop occasionally, for it likes plenty of manure; and as it only occupies the ground for a short time, it is a capital thing to go before summer crops, like kidney beans, the manipulation of the crop getting the land into good condition for the reception of summer crops of vegetables.

Spain is supposed to be the first European country in which spinach was grown, some of the old botanists terming it *Olus Hispanicum*; Ruellius styles it *Atriplex Hispaniensis*, stating that the Moors, who established themselves in Spain, called it *hispanach*, or *Spanish plant*, in which a resemblance to the word spinach will be traced. Beckmann states that, under the name of *spinargium* or *spinachium*, it is included in the list of vegetables consumed by the monks on fast-days, its enumeration occurring as early as 1351; while Turner the herbalist, in 1568, describes its cultivation and preparation for the table

in the same manner as followed at the present time; it may therefore be regarded as one of the oldest English vegetables. The relish for spinach appears to be an acquired taste, some persons being extremely fond of it; and without doubt it is a most wholesome vegetable.

It is an annual, with an inveterate tendency to run to seed in dry weather, which is its greatest drawback; and therefore, if there is a choice in the matter, and water is accessible, as a pond, or any water-supply on the land, it should be planted near to it (if on a small scale), and repeated waterings given in dry weather.

The autumn-sown spinach is the best, which stands the winter, and is ready for market in the spring, and successive sowings may be made in October, January, February, March, and April. After April, and until the following August, there is not much chance of a crop, unless in a dripping season. The best kinds to sow in the autumn are the Smooth-seeded, the Round-leaved, the Oblong Triangular-leaved, which has prickly seeds, and is sometimes called Prickly spinach, and the Flanders, or Large-leaved, the latter being considered the best, and for all practical purposes most to be relied on for winter cultivation.

At the end of August, four-foot beds should be formed, after the land has been richly manured, and the seed sown in shallow drills nine inches to a foot apart, merely raking a slight covering of earth over the seed. As the Flanders spinach may be used when only about one-third grown, it may be taken by cutting the tap-roots with a sharp knife, so that the seed may be sown somewhat thicker than need be

when the entire crop is intended to stand; but in thinning out the plants care must be taken not to disturb those which remain.

As remarked before, as it occupies the land but a short time, spinach may often be resorted to as an odd crop where the ground is clear of longer-standing vegetables.

In dry weather, when, despite any care, the crop shows unmistakable signs of going to seed, and it is thought worth while to allow it to develop itself, as the male and female flowers grow on different plants, which are dicœcious, care must be taken to allow a proper proportion of each to remain, and the male plants should be pulled up when the seed capsules are set, so as to allow a larger space in which the female plants may perfect theirs. On this account many gardeners prefer to purchase their seed, and not to save it.

Varieties.—The Round, or Summer, is considered the best kind for summer use, the Prickly, or Winter, being hardier than the Round; the New Thick-leaved Round is a Continental variety, superior to the ordinary Round; New Zealand and Perpetual spinach; Orache, or Mountain spinach, a productive variety; and Lee's Giant Orache, are all good sorts; and Broad Flanders is also a useful variety.

The Round-seeded may be sown at intervals from February to the end of April. The Perpetual spinach, or Spinach Beet, is somewhat coarse, but if sown in March or April, or even later, will supply leaves for many months. The New Zealand is not, strictly speaking, spinach, being destitute of the peculiar flavour that distinguishes spinach proper, yet is sold

and classed with spinach by the dealer. Orache, again, is merely allied to spinach, but has the same flavour; the great advantage in its favour being that, when heat and drought have caused the true spinach to run to seed, and has spoiled it for table use, excepting Perpetual and New Zealand, its leaves will supply cuttings when the other is absent from the market.

Division of the Seasons.—As allusions are constantly being made to the different seasons—spring, summer, autumn, and winter—it may be as well to say, perhaps, that, according to the common acceptation of the matter, the beginning of each is as follows: Spring is ushered in with the vernal equinox, March 20th; summer, with the summer solstice, June 21st; autumn commences with the autumnal equinox, September 22nd; and winter with the winter solstice, December 21st.

Market-garden Herb-plants. — There is a long list of culinary herbs grown, but out of a great number, there are but four that are worth the notice of the market-gardener, viz. parsley, sage, thyme, and mint.

Parsley (*Apium petroselinum*).—Although it is commonly recognised as quite a subsidiary article of production, the consumption of parsley is enormous, both for the purpose of garnishing dishes, as well as entering largely into stuffings for meat, and used with melted butter; and it is therefore one of the plants that are not beneath the notice of the market-gardener, as a merchantable article.

Parsley was well known to the Greeks, and is said to have received its name of *petroselinum* from

Dioscorides. The Plain-leaved parsley was the kind originally cultivated in this country, but it has given place to the Curled-leaved and Hamburg varieties; the roots of the latter being sometimes used as a substitute for carrots and parsnips.

Sutton's Giant Curled is a handsome and distinct variety, growing to a large size, and is therefore well adapted for market-garden production; Imperial Curled, being a curled dwarfed variety; Fern-leaved is also a dwarf variety; Champion Moss Curled is very close and finely curled; Myatt's Garnishing and Scotch Curled are good standing sorts; and Covent Garden Garnishing is a useful sort for general purposes. Hardy Winter Matchless, and Fine Double Curled are also useful kinds, and the Large-rooted Hamburg is a good kind for cultivating for the sake of the roots, if wanted.

Being a biennial, to insure a constant supply, three sowings should be made in the year—in February, June, and September. Some cultivators sow only twice a year—in March and June respectively. The land should be deeply dug and well manured. Parsley seed is a long time in germinating, taking from thirty-five to forty days. The beds or borders should be cut over in autumn, to prevent their running to seed, and insure a new growth before winter. If there are frame-lights to spare, it will answer the purpose to transplant as many roots as may be wanted, or can be accommodated in December, to guard against possible failure from frost.

Parsley is said to be a good remedy for the gravel in man, and also an effectual cure for the rot in

sheep, attempts being made many years back to promote its cultivation with this object in view, under the auspices of the Society for the Encouragement of the Arts, etc.; but the nature of the liver-rot, or flukes, in sheep is now better understood than at the time referred to, Mortimer mentioning that the cultivation of parsley as a remedy for rot in sheep was a good deal practised in Buckinghamshire.

Sage (*Salvia officinalis*).—Sage, although a native of the warmer parts of Europe, has for a great length of time been cultivated in Britain, where it enters largely into use in the kitchen for making stuffing for pork, ducks, geese, etc., Gerarde speaking of it in 1597 as a well-known plant in English gardens. It is very hardy, but although regarded as a perennial, it does not last more than three or four years without degenerating; but new plantations are easily formed by taking cuttings of the young shoots and planting them in the latter end of spring—such herbs conveniently occupying little odd corners that are not adapted for larger and more important crops. The Narrow-leaved sage, or Sage of Virtue, as it has been called, has for some centuries enjoyed a kind of reputation, and in addition, there is the Common Green sage, Red sage, Variegated sage—in red, green, and white, which are of ornamental character, as well as the Gold-striped sage.

Thyme (*Thymus*).—Two kinds of thyme are natives of Britain, *Thymus serpyllum* and *Thymus acinas*, the cultivated variety (*Thymus vulgaris*) being a native of Spain and other countries of southern Europe; the distinction between wild and cultivated

thyme being drawn in that charming creation of Shakespeare's fancy, "The Midsummer Night's Dream," in the song—

I know a bank whereon the *wild* thyme grows—

the cultivated thyme having been introduced long previous to the middle of the sixteenth century, although the exact date is unknown.

It attains a large size in Spain, where the climate appears to be especially favourable to the growth of all the sweet herbs. De Labarde says, that at Marvella, midway between Malaga and Gibraltar, he met with sage, thyme, marjoram, lavender, myrtle, and rosemary bushes, more than six feet high, embalming the air on all sides.

Thyme is easily propagated by division of the roots, but may also be raised from seed, or by cuttings. A considerable quantity finds a ready sale in the market.

Mint (*Mentha*).—There are several kinds of mint. Spearmint (*M. viridis*), having lanceolate leaves, finely serrated, for which there is a considerable demand, to be boiled with green peas in the season. It will spread very rapidly from a few roots placed in a damp corner.

Peppermint (*M. piperita*) is chiefly used for obtaining oil of peppermint by distillation, being very often cultivated with this object in view, in low-lying, rich, marshy lands, the roots being transplanted every three years.

Pennyroyal Mint (*M. pulegium*) is a trailing plant, with small, smooth, oval leaves, its odour being less pungent than that of the others, but often used for

the same purposes. As mint can be grown without trouble, on land that is not suitable for other plants, it should not be lost sight of by the market-gardener.

CHAPTER VII.

Turnips: Cultivation: Varieties: Diseases—Beet: Cultivation—Radishes.

Turnip-growing.—The turnip is indigenous to Britain, it being thought probable that its garden cultivation was introduced by the Romans; though as a field crop its growth is of comparatively recent date, its culture in this form being justly considered as one of the most important events in the annals of English husbandry, from the opportunity it has afforded to the agriculturist of raising food for stock upon light and poor soils unfitted for other root crops, as the sandy plains of Norfolk. Turnip-husbandry appears to be the most successful in the north of England and Scotland, turnips thriving especially in the western parts of Scotland where the climate is humid, and in close proximity to the sea.

Of the ordinary garden turnip, of which it concerns us most to speak, in contradistinction to the field varieties that are cultivated for the feeding of stock by farmers, several writers make mention towards the close of the sixteenth century, Gerarde in the year 1597 remarking that: "The small turnip grown by a village near London, called Hackney, in a sandie ground, and

brought to the Cross in Cheapside by the women of that village to be solde, are the best that I ever tasted." Of the Roman writers, both Columella and Pliny treat upon its cultivation, the latter relating that some single roots weighed as much as forty pounds, which modern writers have considered must have been an exaggeration by this naturalist, unless the temperature of Italy has undergone a change, for warm climates are not so favourable for the growth of the turnip as a cool, moist region. It has been thought possible that, although known in Britain from the time of the Romans, its cultivation may have collapsed until revived by the Flemings, who settled in England in the sixteenth century, when they were grown partially, but not universally.

The turnip (*Brassica rapa*) prefers a light rich soil, but draws its nourishment to a great extent from the atmosphere, through the medium of its broad-spreading leaves, the grand point being to hurry on the development of the young plant, which is done by stimulating manure during the early stages of its growth. Its penetrating roots draw up no small amount of sustenance from the subsoil, being known in some instances to reach four feet in length, though succeeding often in a shallow surface-soil. The great scourge to the turnip-crop is the turnip fly, flea, or beetle (*Allica nemorum*), which attacks the cotyledons or seed-leaves, early crops being often destroyed by them, especially in dry springs. The main object therefore becomes to hurry on the crop, so as to develop the rough leaf as quickly as possible, when they are out of danger—as soon as they have made three or four leaves—from this especial enemy.

Some writers have recommended thick sowing, so as to have plants enough both for the fly and a standing crop; but by dusting the leaves with quicklime, as soon as they appear above ground, early in the morning when the dew is upon them, cultivators have always preserved their crop. Jethro Tull used to circumvent the enemy by sowing his swede turnips at three different depths all in the same line—first at a depth of one and a half inch, secondly at one inch, and lastly at half an inch. If the fly demolished the first crop, the second took its place, and if these in turn succumbed to the enemy, the third and deepest planted arose to occupy the ranks of the others; but sprinkling with lime-dust will generally be found efficacious, if it is done promptly, and not delayed till the fly makes its appearance. A more simple method than that pursued by Tull, so as to insure four different epochs of vegetation, is to mix old seed with an equal quantity of new, and divide the mixture into two equal parts, and steep one moiety for twenty-four hours in water, by which four different times of vegetation are obtained, and by this means so many extra chances of escaping the fly.

Cultivation.—Turnips may be obtained in succession almost throughout the year, by sowing seed every month in spring and summer. They may stand thicker in the ground under the system of garden cultivation than in the field, both on account of the culinary varieties being smaller in size than the others, and because they may be thinned out as soon as a bulb sufficiently large for sale is formed.

If sowing is done too early, there is a danger of their running up to seed at once; but a little must be

risked this way, a good deal depending upon whether the spring is showery or dry, the end of March being quite soon enough to begin, speculative sowings being made—if it is thought worth while to do so, and if there is vacant ground—towards the middle of August. In early sowing the drills should be well watered with liquid manure, so as to stimulate the growth of the plants; large crops of turnips are sometimes grown by the application of a few hundredweights of guano, or superphosphate of lime; the inference being that, in the growth of the turnip, the ammoniacal manure taken up by the roots, stimulates them at the same time to appropriate the phosphate of lime from the soil, while by giving the latter substance as a manure, it becomes absorbed, and enables the plant to abstract ammonia from the atmosphere.

If the last sown turnips, at the end of August or beginning of September, which may be tried as a speculative crop, have not time to bulb, in the event of winter setting in early, if the room can be spared, and they are allowed to stand, they will bring in turnip-tops, for which there is always a sale in the spring.

For cultivation on a large scale, the best turnip soils are considered to be those which consist of black and hazel-coloured loam, found above the different varieties of trap, basalt, limestone, and the red, green, and yellow sand. An inferior class of soils is found on the same formations, besides many others, consisting of loose black or brown earth of a sandy description; the inferior turnip-soils being included in those of a thin, rubbly, or stony nature, that are frequently found on the granite and trap formations, as well as the

flinty soils of the upper chalk; the whole of which often possessing widely different characteristics, yet having a sufficient uniformity to stamp them as being turnip soils. Upon clay soils, although successful ventures have occasionally been made, it seldom answers to grow turnips, it always being hazardous, and sometimes even an injurious course of cultivation.

On soils composed mostly of chalk, oolitic limestone, or hungry sands, common enough in the midland and southern counties of England, which are so loose as not to be able to retain moisture for any great length of time, owing to the porosity of the subsoil, as the principal aim is to prevent the drought from entering the land, a different course of cultivation is followed to that pursued on heavier soils. The land is cleaned in autumn, manured and ploughed as soon after as possible, and allowed to remain untouched till spring (under the usual course of field cultivation), when it is lightly scarified, to keep down weeds, and when the proper time arrives it is sown on the flat, in narrow drills from fifteen to twenty-two inches broad, according to the nature of the herbage of the variety planted. When light manures are used, they are drilled under the seed, by a machine which performs both operations at once. Sometimes the same results are obtained by using pulverised manures, either of guano or dissolved bones, by means of the water-drill, which contains a small tank, wherein the manure is mixed with water, both being delivered together by spouts into the ruts made by the coulters, the seed being deposited (by the same machine) upon the moist manure. By this plan of operations the seed quickly springs up strongly, and soon pushes into

rough leaf—the grand object to be aimed at in turnip-growing—and it is upon such poor soils as these that turnip-husbandry has proved itself to be such a valuable addition to English agriculture—in dry seasons those who have used the liquid-manure drill having obtained a crop, when others have not succeeded in getting a plant, the turnips so raised having got into rough leaf, and after being singled by the hoe in due time, have stood well, and resisted the adverse influence of dry weather.

Upon soft, rich, black soils the best extra manures are considered to be dissolved bones, bone dust, bone powder, or some of the inferior sorts of guano, which stimulate the growth of a sounder crop of bulbs, where manures of a highly azotised nature are used, being likely to produce an overgrowth of leaf to the prejudice of the bulb, the use of inferior guano on this account being preferable to the best Peruvian.

Varieties.—For garden cultivation, the Early Stone or White Stone, and the Yellow Malta are good kinds, as are also the American Stone, or Purple American, which latter has a purple tinge on the upper portion that is exposed to the air, though it is quite white within; but this variety is tender, and apt to rot in wet seasons that are mostly favourable to the growth of turnips generally, and does not stand the winter. The Early Dutch is also a good variety; Carters' Nimble Six Weeks being a fast-growing, handsome, good-flavoured turnip. The American Strapleaf is a quick-growing sort, having a straplike leaf. The Jersey Navet is a distinct variety, of oblong form, having a long tapering root which grows entirely under the ground, and is very hardy.

For field cultivation, there are seven classes of white turnips that are standard varieties. Common White Globe, Snowball, White Stone Pomeranian, Autumn or Six Weeks Turnip, White Norfolk or White Round, and White Tankard. At least five-and-twenty varieties of garden turnips could be named, each kind having some sort of specialty or other.

Diseases.—A principal feature in turnip-growing is to have large firm bulbs, with healthy, but not over-luxuriant, foliage; as when too large an amount of manure has been used, the leaves may be seen of a rank deep-green, and are watery, and of a large size; and when this is the case the bulb is likely to be attacked by *Botrytis parasitica*, which somewhat resembles the potato mould, the roots upon which it is produced being very likely to decay, and so totally unfit for storing.

Another destructive disease is that called fingers-and-toes, which the use of lime and bones is beneficial in preventing. Beside the turnip-fly, already mentioned, a great number of insects attack the turnip throughout the whole course of its cultivation. At the first set-off, ants run away with a good many of the seeds, and when these are mixed with something objectionable, which is the case at times when something strong in the form of liquid manure is drilled in with the seed, or soot, their inroads are prevented; for which steeping them in sulphur-water has been recommended, this of course being thrown off with the tunic or outer coat of the seed, when the depredations of its worst enemy, the fly, commence, the cotyledons or seed-leaves being very attractive to the

allied species called *Altica consobrina, obscurella,* and *concinna,* and also a weevil named *Ceutorrhynchus contractus.* As the turnip proceeds in its growth, the nigger caterpillars, the offspring of *Athalia spinarum,* prey upon the foliage, which is also much relished by the caterpillars of the white butterfly, *Pontia brassica, napi,* and *rapæ,* the white diamond-back moth, and various slugs and snails, "too numerous to mention," commit their depredations; whilst wire-worms from the click-beetles, snake-millepedes, centipedes, and scolopendræ attack the bulbs; these in turn being preyed upon by partridges, pheasants, rooks, starlings, gulls (when near the sea-coast), lapwings, and other small birds, which at certain times live almost entirely upon these vermin. Where ducks and poultry can be turned in amongst turnips they can be made the means of doing much good, and a little poultry stock would often be found useful by the market-gardener to perform the friendly office of destroying these pests for him. Lime-dust and tobacco-water are also useful applications, while hand-picking should not be neglected. A bushed hurdle or bunch of green furze drawn over the rows would wound or kill large quantities of the black caterpillar or nigger; but careful cultivation is a considerable safeguard against the attacks of all sorts of vermin, which often cause a crop of turnips to fall a sacrifice to their inroads.

Beet (*Beta*).—Beet is a vegetable that is extensively consumed in some districts. It was for a long time used merely as an ornamental addition to dishes of salad, but it is coming gradually into use for boiling, or baking in a slow oven, sliced when cold, and eaten with vinegar as a dish by itself. *B. maritima,*

or the Sea beet, is a tough-rooted perennial, common on some parts of the sea-coast, growing in the form of a dark-green bush, with narrow, shining, rather fleshy leaves; and the Chard beet is cultivated by the French, but is little used in England. To the common beet belong all the fleshy-rooted varieties of beet of the different kinds known as mangold wurzel, red beet, yellow beet, sugar beet, etc., which differ in size, form, and colour of their roots; the best kind of garden beet being that known as Castelnandary, named from the place where it is chiefly raised, in the district of La Gironde, in the south-west of France. Its roots are small, deep crimson colour, inversely conical, and almost wholly formed underground, the leaves being of a deep-purple colour. The Yellow Castelnandary and the White Silesian are of the same variety, but larger in size, and are grown largely upon the Continent in the sugar-producing districts, for the manufactory of beet-root sugar.

It is not known when beet was first cultivated in England, but Tradescant the Younger, in 1656, was raising it at Lambeth, and it is supposed that it was known in Britain at the time of the Romans, for Pliny gives an accurate description of it in his writings, and we are indebted to the Romans for so many of our plants. It is, however, a native of the Mediterranean, where severe frosts, as we get them, are unknown, and therefore, being impatient of cold, they need to be lifted at the beginning of winter, and packed in dry sand, or stored carefully away, the leaves being first removed; but these must not be cut too close, nor the tapering root removed, for otherwise the root will bleed, and its rich red colour become diminished in

volume, which will be a drawback to its appearance when served up at table.

Cultivation.—The seed should be sown in the month of May in shallow drills a foot apart, and should be thinned with the hoe when they come up, so as to stand about nine inches from each other in the row. Beet likes a deep, rich, friable soil, and as the seeds lie a long time in the ground without germinating in dry weather, it is best to steep them in water for forty-eight hours before sowing them, so as to soften the hard shell which encrusts them. The best varieties are those which grow completely underground, and do not need any earthing up, it being said that the absence of light is favourable to the development of the saccharine qualities of the root, and on this account any that may protrude from the ground are best earthed up. In the larger varieties, in the case of mangold wurzel, like the Long Red, a third of the root may often be seen growing exposed and naked out of the ground.

Some gardeners sow beet in beds and then transplant the young plants; but if this is done, great care must be taken not to bend back the weak end of the roots when they are inserted into the holes prepared for their reception.

Egyptian Dark-red Turnip-rooted beet is recommended for shallow soils, and is useful for summer use, coming to maturity early, and valuable for salads. The Blood-red Hamburg is long and tapering, of red colour, and on this account also useful for salads.

Radishes (*Raphanus sativus*).—Radishes are always largely in request in early spring, and large quantities are grown by the market-gardeners in the neigh-

bourhood of London, many of whom make the best use of the space they have at command by planting them on the ground occupied by their earliest potatoes, being covered over with mats at night, and their growth hurried on as quickly as possible, and drawn from the ground as soon as the potatoes make their appearance above it; the great secret in radish-growing being to raise them quickly, and with this end in view they should never suffer from want of water.

The radish is said to be a native of China, but there is no direct testimony as to their introduction into Britain, where they have been known for a considerable period, for Bullein speaks somewhat disparagingly of them in 1562, remarking that: "Of radish roots there be no small store growing about the famous City of London; they be more plentifull than profytable, and more noysome than nourishinge to manne's nature," which appears to the lover of radishes to be somewhat of a prejudiced description of this succulent vegetable.

There are several varieties both of long and turnip radishes, the spring, or early, being most in request; the Early Scarlet Short-top being a favourite with nearly all growers; the Yellow Turnip and Round Brown being autumn kinds, and the varieties of Spanish, as Oblong Brown, White Spanish, and Black Spanish, being winter kinds, are very little used in this country, though eaten to a great extent on the Continent, the Long Red and the White and Scarlet Turnip varieties being alone saleable to any extent in early spring.

The first sowings of radishes are made upon a

mild day in January, followed by a February sowing, and then afterwards as frequently as they are likely to be wanted, the seed being merely raked in, in well-prepared ground, which is covered over with long manure, that is kept there during frost and inclement weather, but drawn aside upon fine sunny days, to be replaced at evening. Many market-gardeners dig in plenty of fresh manure, which, heating beneath the radishes before decomposition finally sets in, keeps the ground in good forward condition, and when the radishes come off, the growth of which it has stimulated, it is in good order for a succession crop of some sort or other.

To secure early Crops.—Every market-gardener is aware of the necessity of having early crops, and of being "early in the field" with his produce; for sometimes as much as double or half as much again will be paid for vegetables that are one week earlier than the ordinary first supplies; for the simple reason that there is none in the market of any consequence to compete with them; and salesmen can often thus get fancy prices, which is a very satisfactory result to the grower, for only an interval of one week will make an extraordinary difference in the market, as supplies will come pouring in from all quarters. Besides the ordinary methods to insure earliness—such as the beneficial one to be derived from situation, as a south aspect and sunny position; and mechanical ones, as pinching off the tops of beans, and similar contrivances, which we need not definitely refer to at length, as they are commonly understood—there are two salient points which are greatly overlooked in England that conduce to early production, from which

a good lesson may be learned from Continental practice, derived from wide planting and the use of liquid manure.

The wide Planting of Crops.—It is only of late years that a knowledge of agricultural chemistry has enabled the most advanced agriculturists to turn to profitable account the facts which it discloses, amongst which is the very important one, that plants derive a very large share of their nutriment, or support, from the atmosphere, more especially leguminous plants, as peas and beans, the principal constituent of peas containing considerable quantities of sulphur, in a peculiar state of organic combination with carbon, hydrogen, and nitrogen; and hence the vigour and luxuriance with which such plants grow when plenty of space is assigned to them, and they can obtain the full influence of the air and sunshine.

The Flemish market-gardeners—who send over to England large quantities of early produce, which pays them well to do, on account of the good prices realised, which would be out of the question with late produce—leave a space of five or six feet between their peas, and down the middle they plant early potatoes, sticking the peas early in the season, which are the means of affording a great amount of protection or shelter to both crops. These grow rapidly; and mechanical means are resorted to for getting the produce as quickly on as possible, so that the coveted week or so beforehand is to be obtained before the bulk of growers are ready with their produce.

Some of the French gardeners follow a somewhat similar plan with peas, which they sow in beds a metre (thirty-nine inches) wide, with an alley between,

of eighteen inches in width. Four rows of peas are dibbled in, in tufts six inches apart in the row, into each dibble-hole there being put half-a-dozen seed-peas. After the beds have been well hoed in the spring, the sticks are inserted so as to form a kind of bower as it were, or separate thicket of peas, off which the pods are carefully cut with scissors, instead of being roughly pulled off, as English peas are generally treated, with the finger and thumb, by which process a great number of plants are regularly destroyed. The slovenly picking of immature pods is a matter of great complaint amongst market-gardeners; but pods would be often better and more uniformly filled, upon unstuck pea-haulm, if more space to grow in were allowed at first.

Liquid Manure as a stimulating Application.—The Flemish market-gardeners, who are amongst the most skilful in the world, largely resort to the use of liquid manure, which hurries on the early growth of crops; for the earth immediately absorbs the liquid, which soon reaches the roots of the plants, and causes a rapid vegetation, much sooner than produced from the effects of solid manure. Now, English market-gardeners, as a rule, bury new manure in large quantities, of which they obtain a considerable supply, and the Flemish plan of using liquid manure might often be resorted to with great advantage.

It must, however, be borne in mind that liquid manure is scorching in its nature, and its application to growing crops is not desirable unless with water; for, on account of its being improperly used in unskilful hands, injury rather than benefit has been done to many crops, and its use therefore condemned.

A good deal of the sandy land in Flanders owes its entire fertility to liquid manure, which is relied upon above all others, being considered applicable to most crops, and to all varieties of soil; though, on heavy land, the solid manure undoubtedly exercises the most beneficial influence in ameliorating the tenacity of the soil, which that eminent agriculturist Baron de Thaër admitted, when describing the Flemish method of procuring a sufficient supply of liquid manure, which is worthy of imitation here.

By some farmers in Flanders water is regularly thrown over the manure-heaps, and the oozings are made to drain into pits that are constructed for the purpose, and permitted to ferment before it is applied to the land, when it is largely diluted with water. Large cisterns are also formed, into which are thrown quantities of rape-cake; the manure so made being very efficacious, tanks being constructed under stables, and every care being taken to secure a supply of this, to them, indispensable manure.

We have a good many early potatoes sent over here from Flanders, the potato crop being regarded there as one of the utmost importance. As before described, some are planted between peas, and the earliest variety is that known as the White Midsummer Day potato, which gets ripe in June; for though it cannot be included amongst the best varieties, on account of its earliness it pays well to grow. Manure is generally laid in drills, upon which the sets are planted, and as soon as the haulm attains a height of four inches, the weeds are carefully pulled out. When the plants reach eight inches high they are watered with liquid manure, and afterwards earthed up, which

at the same time destroys the weeds. The sets are planted in the beginning of March, and a couple of feet are allowed between the rows, which, considering the variety is a small and early one, would be equivalent to four feet of a larger kind.

Towards the middle of March they plant a second sort called Early Red, which are fit for taking up in July. A third kind, *Zaailingen*, or seedlings, are planted in May, and do not ripen till September. It is, of course, the earlier kinds that the English market-gardener has to dread competition in.

The straw of the washed-out manure-heaps is used as manure for the potatoes, which are well known for their avidity for vegetable manures, and in this form is less objectionable than when sets are placed in close contact with rank manure, a practice largely followed by some potato-growers, which, as remarked in another place, is considered by some as one of the causes tending to disease in the tuber.

CHAPTER VIII.

Rhubarb: Cultivation—The Cucumber: Varieties: Cultivation—Vegetable-marrows: Cultivation—The Tomato.

Rhubarb (*Rheum*).—Rhubarb is very easily cultivated, and is of considerable importance as a market-garden production; and, though it takes up a good deal of room, the produce under good management is very considerable. There are several species, as the true rhubarb, known in medicine as *Rheum palmatum*, imported from the Levant; but as the foot-stalks of the radical leaves—the part used for culinary purposes—are smaller than those of the other kinds, it is not generally cultivated in this country, and our climate is not of that nature to perfect the root so as to cause it to be fit for medicinal use.

Mr. Myatt, of Deptford, was the first person to cultivate rhubarb upon a large scale in England, it being recorded that, in the first place, he sent his two sons to the Borough Market with five bunches, out of which number they could only succeed in selling three; but, persevering with it, rhubarb became gradually in request, and year by year he increased his annual production, till it has now become an article of prime necessity for the kitchen before

gooseberries and other early fruits come into season. The first roots were obtained by Mr. Myatt from Mr. Oldacre, the gardener to Sir John Banks, who procured them from Russia, and were a finer and earlier sort than those which had been previously cultivated in this country. Dr. John Hope, in 1758, was the first to introduce it into England, it being a native of some parts of Tartary, where the physical peculiarities of the soil are adapted for the perfection of the root.

The Hybrid rhubarb (*Rheum hybridum*), a native of the more northern parts of Asia, was first cultivated in England by Dr. Fothergill in 1776, but did not come into culinary use till many years afterwards, the "Gardeners' Magazine" for February, 1829, giving a notice of a very large plant of this species, the earliest account of rhubarb being given by Tusser as early as 1573, of the kind known as Monk rhubarb (*Rheum rhaponticum*), the stalks of the Hybrid being more succulent and larger than the Monk rhubarb, and was therefore preferred in general cultivation. The varieties known as Buck's rhubarb and the Elford used to be preferred by gardeners, to be replaced in turn by Myatt's Zinnæus and Mitchell's Royal Albert, which are considered early and good-flavoured varieties, and upon which the modern estimation of rhubarb may be said to have been founded, the Elford, Hybrid, and Victoria still being cultivated more or less. In addition to the kinds named there are also Baldry's Scarlet Defiance, Salt's Emperor, and Johnson's St. Martin, the latter being considered both an early and prolific variety, deep-pink in colour, and of good flavour.

Cultivation.—Rhubarb roots should be planted in rows four feet apart, standing the same distance from each other in the rows. The ground should be previously deeply trenched and richly manured, some cultivators making a deep hole where each root is to stand, and nearly filling it with rank manure, upon which sufficient earth is placed in which to plant the root, with its crown exactly level with the surface of the land, the operation being performed any time in autumn. Upon the approach of winter the roots should be covered with long stable litter, which will blanch the young growth, which gradually lifts up the covering as it proceeds, and is thus preserved from frost. The produce will not be so early during the first spring as subsequently, and the ground should never be dug amongst, but kept clear of weeds, and well mulched each season.

A method has been adopted of late years of growing rhubarb permanently in deep trenches, with rough wooden coverings to form a kind of shed over them so as to force on an early produce, for rhubarb meets with a quick and ready sale in the first part of the season, and realises good prices.

Those who like to make the experiment, and are curious in obtaining new kinds, may sow rhubarb-seeds in spring, and the plants will be ready for setting out in autumn, and will come up strong enough to be made use of in the succeeding spring; but the flowering stems should be removed, except in those instances where plants may be wanted for seed.

The Cucumber (*Cucumis sativa*).—The cucumber has been known in England from a very early period, Gough describing it as being common at the time of

Edward III., but it became from some cause or other neglected and overlooked till the reign of Henry VIII., though it was not universally cultivated till the middle of the seventeenth century.

In the East, as we learn from Holy Writ, cucumbers were known from the very earliest times, for Isaiah, in making allusion to the desolation of Judah, says: "The daughter of Zion is left as a cottage in a vineyard, as a lodge in a garden of cucumbers;" and the Israelites, who longed after the fleshpots of Egypt, complained to Moses in the wilderness, and said: "We remember the flesh which we did eat in Egypt freely, the cucumbers and the melons."

Cultivation.—Popularly regarded as a native of the East Indies, its source of origin will give a plain hint that the cucumber likes plenty of sun and warm moisture, and those who have frames should sow the seeds in heat in March, growing the plants near the light, and plant them out when strong enough on a well-prepared hot-bed, one plant to a light. The chief attention they require is watering and the giving of air, when they will soon come into bearing. A good plant should be obtained before it is pinched and stopped, which some cultivators resort to at too early a stage of the plant's growth, from the mistaken idea of obtaining extra strength; for strong fruit cannot be obtained till plenty of healthy vigorous leaves are formed, through means of which the enduring vitality of the plant is established. When stopping is needed, the points of the side-shoots should be pinched out, leaving one leaf in advance of the fruit, all of which, however, should not be suffered to remain, but the weak and sickly specimens removed, for many of these will not mature.

Varieties.—There are a great number of different kinds of frame-cucumbers, as Carters' Model; the Paragon; Carters' Champion; Cuthbert's Perfection; Hamilton's Goliah; Berkshire Champion; Long Gun; Tender and True; Munro's Duke of Edinburgh; Sutton's Duke of Connaught—a handsome level cucumber from twenty-two to twenty-six inches long, covered with bloom, being of superior flavour and very productive—Sutton's Improved Telegraph, a fine cucumber with a small neck and prolific; Sutton's Marquis of Lorne, a long variety, remarkable for absence of seed, and a prize-taker; the London Market, being a good sort for market-gardeners; Dean's Early Prolific; Berkshire Challenge; Cuthill's Black Spine, an old favourite variety, of which Mr. Cuthill said he never found a variety at once so early and so productive; Carters' New Frame-Cucumber "Model," which is described as combining the general characteristics of Tender and True with the prolific habit and strong constitution of the Telegraph variety.

Of Ridge cucumbers for open-air growing, the new kinds embrace Sutton's King of the Ridge, a straight-growing cucumber of twelve to sixteen inches in length—most of the Ridge cucumbers assuming a somewhat curled or curved shape—with a smooth skin, which ranks higher in marketable value than those covered with tubucular excrescences, and is hardy, productive, and vigorous; Carters' Best of All, a useful hardy cucumber, from sixteen to twenty inches in length, containing but few seeds, and growing straight; Stockwood, an abundant bearer; Sutton's Early Fortyfold, of small oval shape, and somewhat prickly; and Wood's

Improved. Carters' Miniature Cluster is a hardy and prolific variety, suitable for producing short Gherkin cucumbers for pickling.

The seeds of Ridge cucumbers should be sown under glass in gentle heat in May, and transplanted upon a richly-prepared bed or ridge, when sufficiently strong, or under hand-lights when they are intended to stand, which can be dispensed with as the summer advances. Unlike most other seeds, those of the cucumber preserve their vitality for many years, and the old seed is said to produce more fruitful plants, though of less luxuriant growth, than the new; and it is considered the best practice not to grow the seed where the plants are to stand, but to sow in pans, or upon manure upon a hard surface in loose soil, the conditions of which are against the formation of a tap-root, but in favour of fibrous and bunchy roots, from whose assistance the future plant will derive a greater share of nourishment, and be better adapted for transplantation.

Ridges can easily be formed with fermenting dung, covered over with a good coating of light soil, but no stopping should be practised, and only the Ridge kinds grown, the Frame varieties being too tender for outdoor cultivation. Entire fields of cucumbers may be seen growing in some parts of Hertfordshire, where neither dung nor glass is resorted to, the produce being sent to London for pickling, and in the market-garden district of Sandy, in Bedfordshire, ten thousand bushels of pickling cucumbers have been sent away in one week.

There is no article of vegetable production perhaps that fluctuates so widely in value as the cucumber.

When they first come in they command fancy prices, a pound a-dozen being given for them ; but at the end of the season, in August and September, when glut sets in, they have frequently been sold at the rate of a penny per dozen.

Vegetable-marrows.—The vegetable-marrow (*Cucurbita citrullus*) is the only species of the gourd tribe that meets with any extensive sale, pumpkins and gourds taking their place more with ornamental or curious vegetable productions than with edible products, though pumpkins in old times were used to economise fruit, and were made up into pies, and consumed to some extent by the poorer classes, though they are now entirely neglected by them as an article of diet.

It is not very certain from whence we derived the vegetable-marrow, but it has been surmised that the first seeds were brought to England, probably from Persia, where it is known under the name of *Cicader*, by one of our ships trading to the East Indies. Coming from a warmer climate than our own, the vegetable-marrow likes a sunny position and a rich soil, being frequently grown on manure-heaps by those who can afford to let such heaps lie idle ; and they take up a good deal of room, and will cover a large space of ground, with their luxuriant vines, which should never be stopped, but allowed to grow at will. On this account they could often be grown with advantage on barren or waste places, if a barrow-load of manure was put into a deep hole, and sufficient rich earth placed over it in which to insert a few plants, which could be trained in opposite directions on space that is not of any great value. There are

many slopes and cuttings where roads have been made, of an inferior quality of soil, that might be rendered productive by the growth of vegetable-marrows, the inconvenient amount of space they require being of no consequence in such situations, where scarcely anything else would grow to any advantage.

Cultivation.—The seeds should be sown in separate pots, or two or three together in a larger pot, some time in March, and placed in a frame or hotbed, and then planted out with the ball of earth undisturbed from the pot, in the situations where they are intended to stand, at the beginning of June or end of May. Where there is plenty of space the produce will be larger and of better quality than when grown in more confined quarters, and may be conveniently resorted to in those instances where the ground is clear at the beginning of June, destined to be occupied by a crop planted in the autumn. Plenty of water should be given in dry hot weather, and liquid manure is of great assistance to their growth. If planted in holes made rich, in barren places, as suggested, where there is plenty of space for their luxuriant vines to stretch themselves out, some earth should be thrown over the principal stems, when they have grown to a considerable extent. Roots will form at the joints so buried, and the plants derive extra nourishment and strength from the treatment.

Vegetable-marrows may be grown on ridges formed with good fermenting manure, covered over with a coating of light soil, in the same way that Ridge cucumbers are grown.

Tomato, or Love Apple (*Solanum lycopersicum*).—

There appears to be a growing demand for tomatoes, which on this account are worthy of the attention of the market-gardener who has the opportunity of growing them to advantage; a favourable situation being necessary as regards climate, it being a native of South America, though thriving well in southern European countries. In Italy, large fields of them are grown and sent in waggon-loads to market, the shortness of our English summer being the great drawback, which, unless in favourable situations and under careful management, will not ripen the fruit.

Cultivation.—The plants are raised in the same way as followed with cucumbers, from seed in a hotbed, which are pricked out in pots, and gradually hardened by exposure to the air and sun, and planted out at the end of May at the foot of a wall with a south aspect. Where fruit-trees grow which do not cover the lower part of the walls, tomatoes might be planted with advantage, or, in warm situations, a temporary trellis of wire fencing fastened to iron rods would enable a good many to be grown, which should face the south or south-east. In a case like this, thatched hurdles would come in useful, and might be placed at the back of the wire fencing to keep off the cold winds and form a temporary wall, and, by the resort to such expedients, the intelligent market-gardener would often be enabled to grow crops that would never be attempted by many. So that the fruit may be properly formed and ripened, it will be found a safe plan to throw the whole strength of the plant into the formation of the first bunches of blossoms into

fruit, and stopping the leading shoots a joint or two above a cluster of fruit, and not attempt the development of too many on one plant, all unnecessary laterals being taken away.

If the fruit is obliged to be gathered when not quite ripe, and green, if afterwards exposed to the sun it will generally ripen and assume its proper red colour, though the flavour will be somewhat inferior to those which have been ripened in the open air. The application of liquid manure will at all times be found beneficial to tomato-plants, except when there is a sufficiency of well-formed fruit upon them, when they should be starved, which will assist the ripening process.

CHAPTER IX.

Asparagus : Cultivation—Celery : Varieties : Cultivation—Sea-kale : Cultivation—Horse-radish—Water-cress—Garden-cress—Mustard.

Asparagus (*A. officinalis*).—Asparagus has long been cultivated in England as a favourite vegetable, selling for a good deal of money in the early part of the season, put up into bundles of quarter-hundreds, half-hundreds, or hundreds, according to requirements. It grows naturally on the seashores of Britain, and was highly esteemed by the ancient Greeks and Romans, mention being made of it in the writings of Cato, Columella, and Pliny; the latter describing a kind which grew near Ravenna that was so large in size that three shoots weighed a pound.

There are several varieties, as the Giant asparagus, the White, the Common Green, the Large Purple or Dutch, and the Ulm; the two main divisions usually cultivated consisting of red and green. The red is the larger, being handsomer in appearance than the green, and growing fuller and closer than the latter, and is therefore held in the best esteem by market-gardeners on account of its more saleable look, but it is not of such good flavour as the green.

The great drawback to its cultivation upon a large

scale is, that it takes three years to establish an asparagus-bed; and many cultivators do not like to wait so long before they get a return for their pains and outlay; yet it is cultivated upon a large scale by the market-gardeners around London, several of whom have as many as sixty and eighty acres under asparagus—Battersea, Mortlake, and Deptford being the chief districts in which it is raised.

Cultivation.—The natural soil of asparagus is poor and light; but as it needs to be grown quickly, it likes best a deep, rich, sandy soil, and should have abundance of liquid manure given to it; and it appears to thrive best when water is found not far from the surface of the soil by digging, the presence of brackish water, and even occasional floodings, not being injurious to it.

Beds are usually formed by planting one or two year old plants in rows nine inches asunder, the plants standing the same distance from each other in the rows, and this method shortens the time when a cutting may be made, but not to the extent that is commonly supposed, for the growth of the plant is stopped by their removal; and if the seed is sown in the place where the plants are permanently to remain, the after-progress of the bed will be far more satisfactory, and yield very nearly as soon as the transplanted seedling; and it has been computed, that five square poles of ground planted with sixteen hundred plants will yield from six to eight score heads daily during the season.

Seedlings should be planted in March and April, though the operation may be performed up to the beginning of June, and they should be put into the

ground at once, and exposed as little as possible to the air, and be tenderly handled, as the fibres of the roots are very brittle, and when broken are some time before they shoot again.

Some gardeners, in forming an asparagus-bed, raise it up very high, many beds being seen a couple of feet above the level of the soil; but it is considered a better plan to empty the earth from the site of the intended beds to the depth of three inches and then trench the bottom, afterwards returning the soil to its place with the addition of sea-sand and well-rotted manure thoroughly blended with it. The plants should then be carefully inserted into a drill drawn with the hoe, taking care to spread the roots out right and left, and cover them with mould by hand.

When seed is sown, the bed is formed in the same manner, in drills nine inches asunder, and when the plants spring up the rows must be thinned carefully, so that those which remain are not injured in the process, and they stand the same distance apart in the rows, *i.e.* nine inches.

Nothing else but asparagus should ever be grown upon the beds, which should always be kept perfectly clean and free from weeds, and the plants should not be touched for two years at least, the stalks being allowed to run up in freedom, and the asparagus branches should never be cut during summer, for the sake of their handsome foliage, but be allowed to stand until they get sere in autumn, and in cutting the asparagus during its first growth, one or two shoots should be allowed to remain to each stool when the bed is finally established, to flower and run up to seed, or otherwise the root will perish, good

management being very essential with asparagus, which under proper culture will furnish annual crops from the same plants for twelve or fourteen years, or even a lifetime, when the seeds fall, and are coated over with soil or manure, in the ordinary course of management; a good coating of stable-manure being spread over the beds as soon as the withered stems are cut in autumn, to remain upon them all through the winter, the rain washing the fertilising parts of the manure down to the roots, or stools, and the manure raked off in February.

In cutting the heads, a small cutting being made for the first time in the third year, the blade of the knife should be pressed down close to the stalk, and cut with a firm pressure, so as to sever only the particular head in view, care being taken not to wound the stool, or other shoots may be destroyed at the same time, and the produce of the bed considerably lessened. Two or three inches below the surface is a sufficient length to cut the shoots, though they may be often seen tied up in bundles in the greengrocers' windows much longer, with scarcely any of the portion which grows above ground, which, to be a good sample, should be from two to four inches, as the white stalk part is perfectly useless. The shoot of the asparagus proceeds only from the extremity, and vegetatesfrom the centre, and not from the surface, pushing upwards in one mass. Of recent kinds, Conover's American Colossal, a large robust variety, of pea-green colour, and the Large Early Batavian, or Fine Reading Giant, are well spoken of, while the Giant Paris is extensively cultivated for the Paris and other Continental markets, French cooks, es-

pecially, chopping asparagus into short lengths, which they use to garnish dishes.

Celery (*Apium graveolens*).—There is always a steady demand for celery, which is a tolerably good crop to cultivate from a remunerative point of view, the earliest and latest productions fetching the best price in the market; the earliest on account of its novelty in the first part of the season, and the latest because it becomes somewhat scarce, and better prices are obtained than when the market is glutted with a full supply.

An open space should always be selected for growing celery—one that is fully exposed, and away from the shade of either fences or trees, which is very injurious, as it draws the young plants up weakly, and causes them to become hollow, and rot off early in the autumn. As celery likes moisture, the trenches, which should range north and south, ought to be as wide at the surface as the nature of the land will allow, so as to obtain all the rain that is possible, for trenches may even be flooded once or twice a-week in dry weather with advantage. The common wild celery may often be found growing near ditches and salt marshes near to the sea, which points out that the plant likes both moisture and salt, and it has been found a good plan to apply salt to the sides of the trenches. In the process of blanching also, when it is earthed up, salt may be used with advantage as well, for it keeps the earth moist and kills slugs and other vermin.

Varieties.—There are many varieties of celery, two good kinds being the Manchester, or Solid Red, and the Solid White, the best white being considered

to be the Incomparable Dwarf when true seed is obtained, and the Leicester Red is a compact hardy variety, which keeps well in the winter.

Cultivation.—The seed must be sown at the end of February to get early celery, which is best done in boxes or large flower-pots, the earth being made very fine, the small seeds being merely sprinkled over the surface and gently pressed down with a flat trowel, or similar implement, and the boxes or pots should be placed in a hotbed, vinery, or other warm place, to start the seeds. Water should be given from time to time, and as soon as the plants make their appearance they should be set out in the sunshine, whenever there is any, for an hour or two every mild day, to give them strength, and prevent them from being drawn up weak and thin.

At the end of March, in warm and sunny situations, celery may be planted out in the open air, being protected by a handlight; but as they are very small plants, an immense number can be raised in boxes or pots. Before they are finally planted out they will need an intermediate planting when big enough to prick out, and for this purpose a warm and sheltered position should be chosen, and a layer of good rotten dung, about three inches thick, spread upon a perfectly hard surface, the dung being beaten firmly down. A slight coating of soil—half-an-inch will be found sufficient—should be spread over the manure, and the plants pricked out, standing about three inches apart. By this means the plants will make roots quickly and spread out, the hard bottom preventing them making tap-roots; for the more numerous the fibres, the stronger will be the future

celery-plant, and they are also less liable to run to seed prematurely. By adopting this method, when the time comes round for them to be planted out permanently, they may be cut out with a mass of matted fibres, and will scarcely flag at all in their new position if well watered. They will have become strong enough to remove in June, when the earth should be taken from a deeply-dug site, about six inches deep, to form the future trench, which is commonly made too deep in the opinion of some of the best gardeners. Some dig the trenches eighteen inches deep, if the soil will admit of it, and fourteen inches wide for early celery, the trenches being three feet asunder from the middle of each row. If the soil is poor, a foot depth of manure should be placed in the bottom, and on this three or four inches of soil should be laid for planting in. The surface soil is best used for this purpose, and if dry, it should be watered.

It is considered a bad plan to earth-up celery too soon or too often, as it weakens the stems and checks their growth, this operation being best performed when the plants have become hardened and strong. The market-gardeners in the neighbourhood of London earth-up their celery about three times altogether, using the spade, and earthing-up by hand. By allowing the plants to grow sturdy before they are earthed-up, the stems are both stronger and of finer and crisper quality when eaten, than if earthed-up often a little at a time. In the blanching process, care must be taken to keep the centre leaves close and compact together, free from soil, for if any falls in the centre, the heads are almost sure to become deformed and lose their

marketable value. Early celery may be blanched in three weeks' time, so that it is unnecessary to be too anxious about the earthing-up.

For late crops, the rows may be five feet apart, the plants standing six or eight inches asunder in the rows. The plants must be placed in the trenches some time in July, and they should be so made as to preclude the danger of the earth caving in upon the plants, which will check their growth; and, if the intervals between the trenches are wide enough, the earthing-up can always be managed without any difficulty, and this should not be completed till the celery has attained its full size, for the main crop may remain unearthed until the beginning of November, when frosty nights may be expected.

By earthing-up gradually, longer plants may be obtained, but they lose correspondingly in stoutness, and one good operation of this sort is quite enough, for a late main crop, three weeks before it is wanted. The job should be performed by two persons on a fine dry day, one, with a spade, taking the side where the excavated earth lies that has been taken from the trench, while the assistant takes his position on the other, grasping each head of celery with both hands, to keep the leaves together and prevent any mould from entering the heart, the soil being carefully put into the trench till it is filled up level with the ground. The earth is then shovelled up against the celery-plants from the spaces between the trenches, till only the foliage of the leaves remains uncovered. If this is done simultaneously by two men on opposite sides, the pressure against the plants will be equal, and, if need be, one can always hold the celery-head together.

The ridges thus made should be neatly smoothed with the back of the spade, and the higher the plants are earthed the more secure they will be against frost, and the more mature the outer leaves, the less likely will they be to decay.

It is usual to plant celery after peas, which is a very good practice, as the ground is clear, and ready for the reception of the crop.

Sea-kale (*Crambe maritima*).—In its natural state, sea-kale is a hardy perennial, found upon various parts of the coasts of Great Britain, in March and April; on the western coast, persons having been in the habit from time immemorial of watching for the young shoots as they pushed forth from the sand or gravel, and using them as greens; and that it was regarded as a merchantable commodity more than a century ago is proved by Jones, who states that he saw bundles of it in Chichester market in the year 1753, while it is recorded by Maher that more than two centuries ago sea-kale was sent from England to the Continent by Lobel and Turner. The young spring shoots are the parts used, which are blanched by earthing-up under the system pursued in garden cultivation; and by forcing, sea-kale may be had from November to May. With regard to appropriate soil, as in its natural state it is found in deep sand, partially blended with alluvial substances from the sea, these component parts may with advantage be well imitated in its course of cultivation.

Cultivation.—By the ordinary method pursued, plants from one to two years old are planted either in March or November, in straight rows five feet apart, the plants standing in the rows a foot and a half

asunder, in a rich, light, well-drained soil, that has previously been thoroughly trenched; or the seeds may be sown in the positions the plants are intended to occupy, sowing the seed being best done in the spring, and setting out plants in the autumn. By planting, a larger cutting is got in the following spring. If seed is sown, enough should be used to insure four times the number of plants that are wanted to stand eventually, the extra plants which are taken away being kept in reserve, and planted elsewhere, to be used in making good any deficiencies that may occur.

At the close of the year, some time in December, when the foot-stalks of the leaves have unmistakably separated themselves from the crown of the plants, sea-sand or wood-ashes should be piled over each plant; but if these are not to be obtained, any light earth that is free from manure must be substituted. Some growers are in the habit of piling dry leaves over them, which is a bad practice, as a rule, for there is often green matter of one sort or another, if only in small quantity, amongst the leaves, and this causes a slight fermentation, which, although it will answer the purpose of stimulating the growth of the shoots, and may present, indeed, a fair appearance to the eye, will give them a disagreeable flavour that will cause them to become uneatable; though dry leaves may be occasionally used for blanching sea-kale indoors under cover, in pots or pits, as a layer of covering.

There is very little trouble in cultivating sea-kale after this fashion, as it may be carried on in any situation, or upon any kind of soil, and if earthed-up before the frosts come, it lies dormant, and on the

return of spring throws out its delicate shoots, which combine the flavour of asparagus and cauliflower.

Some roots may be forced by covering them with a large flowerpot, with the hole stopped up; but earthen sea-kale pots are regularly sold by the dealers in coarse earthenware, with a close-fitting lid at the top, for the purpose of being lifted off, that the progress being made by the shoots may be inspected.

The cutting may be timed under the forcing process, by covering the pots, six weeks before the sea-kale is wanted, with long stable litter that is just about to begin to ferment, so that they stand in a hotbed as it were, covered over with the earthen pots, the heat adapting itself to the plants gradually, about fifty-five degrees being the right temperature; for if the heat is too great, the shoots may be drawn too fine, and consequently not be a handsome sample, and the forced sea-kale possesses as good a flavour as that which has been grown naturally, unlike other vegetables, as asparagus, rhubarb, etc., which are but sickly and watery imitations of the healthy plants in point of flavour.

Sea-kale may be forced by being placed in any dark place, as a cellar or dark enclosure in a hot-house, and may afterwards be planted out permanently without having received any injury from the treatment to which it has been subjected.

When it is necessary to form a new bed of sea-kale, from the fact of its being considered that the plants have stood too long in the same place, this may easily be effected by dividing the roots of the old stools and forming a bed or beds elsewhere, which should be done immediately after a cutting.

In the process of cutting, a somewhat different plan is followed to that pursued with other blanched plants of forced growth. The shoots should be cut with a sharp knife below, instead of above the point from whence they spring, taking away with it a very small portion of the stool of the plant, which will receive no injury thereby, the plant being very difficult to kill, unlike some others, which would be destroyed by wounding the crown of the stool. As the shoots are very brittle however, a good deal of care must be used in the operation of cutting, or the best specimens may become spoiled by rough handling. The flavour of the sea-kale grown in this way is superior to that raised under pots, on account of its contact with the earth from which it obtains succulence, while those grown under pots are to an extent dried by the influence of a certain amount of air, which penetrates the pots and reaches them. The cost of the pots is also saved by growing sea-kale in beds, the only drawback being that it comes in pretty well all at once; but this may be obviated to a certain extent by forming beds in different situations and exposures as regards warmth, when the times of production may be made to vary within a period extending at all events to ten days. If there is a wall to spare with a south aspect, a row of sea-kale may be established and earthed-up from the border against the wall over the plants, which will afford an early cutting. Fruit-growers who have walls and make no use of the lower portions, will find it answer their purpose to grow sea-kale in this manner, which, being naturally grown, will produce shoots of exquisite flavour. It should be remarked that, although sea-kale is a

maritime plant and likes sea-sand and sea-weed, it does not answer to apply crude salt in inland situations, a treatment which would naturally suggest itself to many, for if it will not do the plant permanent harm, it will at all events check its growth very materially, and defeat the principal object in view, that of stimulating the growth of the shoots.

There is a steady demand for table luxuries, no matter how bad the times may be, and doubtless it would well answer the purpose of many cultivators to raise sea-kale upon a more extensive scale than obtains at present.

Horse-radish (*Cochlearia armorica*).—The French, who are capital cultivators of all kinds of vegetables, and who seem to overlook nothing, as a rule, altogether neglect the cultivation of horse-radish, except where there are colonies of English, who want it to eat with their roast beef. It is a perennial plant, that may often be seen growing wild in marshy districts by the side of ditches, and naturally prefers a deep damp soil; but it is often difficult to extirpate, and stray roots have often given a good deal of trouble in neglected gardens before now. Where regularly cultivated it is best to have three distinct beds, making use of one each year. In forming a horse-radish bed, the earth should be emptied out of the intended site to the depth of a foot, in March, and the bottom well broken up with a fork. Pieces of horse-radish should be laid along the bottom at regular intervals. The crowns can be used, or any part of the root, about an inch and a half long. The earth is then replaced in the bed, which may be used for any small vegetables that come off by the time

the radish-shoots make their appearance, and at the end of the second summer there will be large sticks ready. Two other modes of cultivation are respectively recommended by Knight and Judd. Both trench the soil to a considerable distance, the former laying manure at the bottom of the trench, giving the plant the task of striking downwards in search of the nutriment arising from it; while Judd recommends holes to be made quite to the bottom of the trenched soil, and in each to drop a horse-radish set, filling up the hole with wood ashes, rotten tan, sand, etc., through which the set will protrude by the hole to the surface.

Horse-radish likes an open situation, but its general fate is to be assigned to out-of-the-way corners. At the back of a pond, where no other kind of garden produce would be thought of growing, horse-radish will do very well, a moist soil developing the bitter and alkaline flavour of the root.

Water-cress (*Nasturtium officinale*).—Water-cresses may be cultivated and grown with greater ease than the pains necessary to be taken to find them growing in their natural state in little streams and rivulets, which may be often seen upon a country roadside with a sloping declination. There is a large demand for them in the London and other markets, and an abundant succession of young tops may be gathered throughout the spring, summer, and autumn.

The water-cress was made the subject of regular cultivation in England by Bradbury, in the year 1808, and it is said to have been first cultivated in Europe at Erfurth, about the middle of the sixteenth century. A good deal is grown in the neighbourhood of London,

a short distance from town, upon some of the railway lines—from whence it is quickly despatched in a fresh condition to the metropolis—as well as in Hertfordshire and other parts. A great quantity is produced at Springhead, a village near Gravesend.

A clayey soil is selected for the formation of water-cress beds where it is to be found, but if not, a lining of clay will give firmness and adherence to a somewhat loose site, beds rather less than a foot deep being constructed, having a slight declination from one end to the other. Dams about six inches high are made at intervals across the bed, their number being regulated by its length and degree of inclination, so that when the dams are full the water may rise at least three inches above the plants in each compartment. At the bottom of these beds the cress is planted in rows about six inches asunder. The water may be introduced to these beds by a stream no larger than will fill a pipe of one inch bore, which, upon a clayey soil that would not absorb it, would be sufficient to irrigate beds amounting in the aggregate to the eighth part of an acre. By this method of management the water will circulate throughout, and if the plants are not allowed to flower, will permit of continued cropping during the three-quarters of the year referred to, the plant being a creeping amphibious perennial, throwing out rootlets at the joints of the stems, the leaves, which have a slight tinge of purple, being rather heart-shaped and pinnate. Where the stream is somewhat rapid, they may be seen, under the hands of the cultivator, weighted down with stones in certain places ; for otherwise the young shoots do not easily take root, and a considerable

portion of the plant rises above the water, which has the effect of altering the shape of the leaves, and they become larger and narrower, the leaves which grow near the ground being handsomer and broader.

Although a little observation will show the distinction, water-cress grown above water somewhat resembles in appearance the joint flowering water-parsnip (*Sium nodiflorum*), which is poisonous, and is often found growing in a natural state amongst water-cresses. The leaves of the latter are, however, smooth and entire at the edges, while those of the water-parsnip are serrated; but similar consequences have sometimes ensued, when these two plants have been confounded, as those which occur from mistaking for an edible mushroom the deleterious fungi which sometimes so closely resemble them in appearance.

In a warm climate, as India, the value of a vegetable like water-cress may be easily imagined, and it is cultivated under sheds erected for the purpose in Hindostan.

Garden-cress (*Lepidum sativum*).—Garden-cress is supposed to have been introduced into Britain from Persia and the island of Cyprus, about the year 1548, and though a hardy annual, is not, as commonly supposed, indigenous to this country. A constant supply may be obtained during the greater part of the year, by sowing as much as is likely to be wanted every week, as it germinates very easily and rapidly, and is used alone at times, but mostly in conjunction with mustard, when the leaves are young and tender, being cut while still in the seed-leaf, or very soon afterwards, and is sown in shallow drills. It is most

tender when grown under hand-glasses, being apt to get tough when grown in the open air.

Mustard (*Sinapis alba*).—Mustard is grown in the same way as cress, and, as remarked before, is usually used with it in the form of small salading, but, as it grows quicker than the cress, it must be sown a few days afterwards. It germinates so easily that, when a salad has been wanted on board-ship, or for the curiosity of the thing elsewhere, a plate of salad has been procured by spreading the seeds over moist flannel, stretched over a vessel of water.

CHAPTER X.

Mushroom-growing: Mushrooms under cover: Gathering: Mushroom-houses warmed by heat: Growing mushrooms on manure-ridges: Mushroom-growing in the open air—The Morel—The Truffle.

Mushroom-growing.—In some European countries various fungi are commonly eaten in the same way as mushrooms in England, the Orange mushroom being regularly brought to market in Italy, while in China it is said enormous quantities are now imported of what would here be regarded as poisonous fungi of a most dangerous description. In France, on the other hand, where there is a constant and large demand for mushrooms, they will eat none but the cultivated kinds, French consumers being afraid to eat those which grow naturally in the fields, fearing to expose themselves to the danger of taking something that would prove decidedly unwholesome; and thus large crops of excellent mushrooms, which grow wild in the fields and meadows, are allowed to be wasted. Mushroom-growing is therefore carried on very extensively in France, a good many being exported in addition to the large demand at home; old quarries, catacombs, cellars, and any subterranean convenience being utilised for this purpose, by people who make a business of it.

The *Agaricus muscarius*, or fly-blown mushroom, a native of Britain, is generally considered highly poisonous, having a large cup of a high pink or crimson colour, which is sometimes six inches in diameter, supported on a tall stalk; but it is used in the north-eastern parts of Asia to promote intoxication in the same way that opium is, being the favourite drug *moncho-more* of the Russians, Kamtschatdales, and Koreans, and is doubtless employed for the same purpose by the Chinese, the supplying to whom of poisonous fungi (which is a new trade recently sprung up) has excited a good deal of surprise, and also grave doubts as to the morality of such a proceeding.

The way of preparing these fungi is to collect them in the hottest month, and hang them up by a string in the air; but those which dry themselves on the ground are said to preserve the narcotic property in a stronger degree. It is said also that if they were chewed they would disorder the stomach, and are therefore taken in the form of a bolus, after being rolled up, one large or two small ones producing intoxication, which will last for a day, the effects being very exciting to the nervous system of some individuals.

There are two kinds of mushrooms only which are considered edible in England, *Agaricus campestris*, the ordinary mushroom, and *Agaricus pratensis*, or meadow mushroom, which has a stem like the common kind, the upper surface being pale brown and the gills yellowish, which grows on a moister soil than the ordinary mushroom, and these are considered very unsafe to resort to, as they very much resemble the *Agaricus virosus*, the most poisonous of all the tribe, and grow in similar situations. The poisonous fungi

are, however, broader in the gills in relative size, and are very dark-coloured, having also a collar in the stem, of which the *pratensis* is destitute, and the fleshy part of the cup is thinner. It is doubtless from the mistakes made in gathering these for the edible fungi that cases of poisoning have often ensued, though some persons cannot eat the edible mushrooms that are served up at table without injurious effects, as was the case with Cobbett, who says in his "English Gardener," after speaking of the cultivation of mushrooms: "I cannot conclude without observing that some of these funguses are deemed extremely unwholesome; some people even think them poisonous, and that the mushroom is only the *least noxious.* I once eat about three spoonfuls at table at Mr. Timothy Brown's, at Peckham, which had been cooked, I suppose, in the usual way, but I had not long eaten them before my whole body, face, hands and all, was covered with red spots or pimples, and to such a degree, and coming on so fast, that the doctor who attended the family was sent for. He thought nothing of it, gave me a little draught of some sort, and the pimples went away; but I attributed it then to the mushrooms. The next year I had mushrooms in my own garden at Botley, and I determined to try the experiment whether they would have the same effect again; but, not liking to run any risk, I took only a teaspoonful, or rather a French coffee-spoonful, which is larger than a common tea-spoon. They had just the same effect, both as to sensation and outward appearance! From that day to this I have never touched mushrooms, for I conclude that there must be something poisonous in that which will so quickly produce the effects that

I have described on a healthy and hale body like mine; and, therefore, I do not advise anyone to cultivate these things."

Some persons trust to the smell to distinguish the edible from the poisonous kinds, but this is by no means to be relied on, for although those which smell disagreeably and nauseous may be safely rejected, there are others which are not wholesome that resemble very much the odour of those which are eatable.

The *Agaricus campestris* is the only variety that is cultivated in Britain, and it may be distinguished from the poisonous kinds by certain marks or signs, which are familiar to the experienced; the stem being short, solid, and white, with a prominent ring a little below the cup, the remains of the covering which shrouded the gills in the early stage of its growth. The cup, when first formed, is white and regularly convex, but a little turned in at the edge; as the growth proceeds it becomes flattened, scaly, and of a brown colour, the flesh being firm, white, and solid. The gills are loose, and, without touching it, reach to the stem on all sides, being of a pinky colour when young, but changing to a dark hue when the cup alters its rotund form. As the upper surface changes colour, this circumstance causes it to be distinguished at this stage from the dark-gilled toad-stool, which it otherwise a good deal resembles, but which, however, has a longer and more slender stalk; nevertheless, it has deceived a good many.

The edible mushroom varies very much in size and is from two to nine inches in diameter, the mushroom-spawn from which it is artificially raised

consisting of a white, fibrous, threadlike substance, which appears capable of existing anywhere in places suited for its development; mushrooms often springing up spontaneously in many unexpected and out-of-the-way places, the spawn having the property of lying dormant for years, and springing up into mushrooms under conditions favourable to its growth.

There are several ways of growing mushrooms, which may be obtained all the year round by forming beds in a cellar, dark shed, or any place that may be at command.

Mushrooms under Cover.—A cellar or empty building having been fixed upon, a stout bench formed of rough planks should be fixed against the wall, about four feet in width (which is as wide as a man can conveniently reach over to gather the mushrooms), a couple of feet or so from the floor. About four inches of stable manure should be first spread on the boards and beaten down firmly with the back of the spade. After an interval of a few days this should be repeated, and continued till a body of beaten manure is formed from fifteen inches to a foot and a half in thickness. The heat of the manure is the nice point to regulate, for if too hot the spawn which has to be planted in it will become destroyed, the right heat being about that of fresh milk from the cow, and the heat should be on the decline rather than not, the danger of overheating having to be guarded against. By thrusting some sticks into the manure and allowing them to remain there for some time, the exact heat of the bed may be ascertained when they are withdrawn. The right heat having been arrived at, the spawn, which is sold in the shape of flat bricks by

the nurserymen, should be broken into pieces about the size of a hen's egg, and be placed in the bed about a foot or a little more from each other (some plant closer), about two inches below the surface, and the whole should be again beaten down; for mushroom-beds cannot well be made too hard, as they will force their way upwards, and even dislodge paving-stones, a case being on record of some men who were at work on a building who noticed that a large stone, which formed part of a pavement, had been raised considerably from its proper position, and upon removing the pavement to discover the cause, found it was due to mushrooms that were growing beneath it! The spawn will spread its thread throughout the bed, though its progress is very uncertain, sometimes lying dormant for weeks. When it may safely be concluded that all danger from heating in too great a degree is past, the bed should be covered over with two-and-a half to three inches of fine soil, and beaten down hard. The harder and firmer the surface, the better the chance of the mushrooms doing well.

In regulating the heat of the bed too much watering is likely to destroy it, while it must not be too dry; a certain amount of moisture being necessary for the successful growth of mushrooms. The earth should be covered lightly with hay, which is better than straw for the purpose, or the latter in the absence of the former, the sticks being left in the bed in order to test the heat from time to time. If the covering makes the bed too hot it should be removed, the regulation of the heat being a very essential point, which the covering is an active agent in doing, though some dispense

with it altogether. In six weeks' time or so, if all is well, a number of small white spots will make their appearance all over the surface of the bed, which will gradually get developed into full-sized mushrooms, and the bed will continue productive for a month or six weeks. A gentle watering now and then with tepid water hastens the growth of the crop, but too much water is objectionable. It is a safe plan, on the other hand, when the heat of the bed is on the decline, if there are doubts of its having been too hot when the spawn was placed in it, or at any time subsequently, to sow the spawn a second time, to make sure.

Gathering.—When the time comes for gathering the mushrooms, each should be cut carefully with a sharp knife, so as not to touch or injure the stool or root, as they sprout up in groups upon a fertile bed, and especially if the first button is pulled up roughly the root will become injured and give no more mushrooms, and even when in full bearing, roughly gathering the produce will seriously check production. Two or more ranges of planks can be made to support mushroom-beds like shelves one above another, so that sufficient space is left to allow for their proper inspection and manipulation.

Mushroom-houses warmed by Heat.—Mushrooms are also grown in long narrow houses, about a dozen feet wide and thirty feet long, having a door and two or three small windows, which are kept closed with shutters. A fireplace is arranged at one end outside, with a flue passing down the middle beneath the flooring, and returning again to the fireplace; round the sides of this narrow room three tiers of shelves

being placed, which are generally about three feet in width, with an upright plank about a foot in depth, nailed upright to the edge to keep the manure and earth in their proper position, which is treated in much the same way as has been described, the beds on the shelves being slanted upwards towards the wall. Some pursue the plan of mixing about a quarter of the quantity of fresh mould with the horse manure, with but very little long litter in it, beating it down till it is quite firm, which is easier done by this method. Cobbett, who describes these houses as a method introduced from Germany, recommends that the scrapings of a horse-track of a mill-house of any sort be mixed with the compost. Road-scrapings are, on this account, desirable to use; land which has been dressed with road scrapings in the ordinary method of field cultivation, without any contemplation of such results, having sometimes brought forth large crops of mushrooms, that have grown amongst potatoes and carrots, there having been special causes favourable to their development and growth which have been quite unknown to those chiefly interested, due probably to atmospheric causes resulting in a prevalent warm dampness that has stimulated their production.

Growing Mushrooms on Manure-ridges.—Market-gardeners in the neighbourhood of London, who have an abundant supply of manure, grow mushrooms upon their unemployed manure, often in such spaces as a yard devoted to its reception amongst out-houses, in any odd corner of land where the manure can be thrown down, that is not immediately wanted during summer. The manure is arranged in long ridges

slanting downwards from an apex like the roof of a house, so that no rain can rest upon it. The heat must be regulated in the way described, standing thus for about a week, taking care that the whole sloping surface on both sides is even and firm, and will stand well without risk of dislodgment, being covered with mats, or long straw, to keep it from getting either too moist or too dry. When the heat is found to be correct, a layer of fresh, fine mould should be spread over the slanting surfaces, about an inch in thickness, and beaten down with the back of the spade. Into this coating of earth the pieces of mushroom-spawn must be stuck at distances of a foot or less, after which another inch of mould must be spread on the top, and again be beaten down hard. Straw, or matting, must be kept on the ridges to protect them from the sunshine or too much rain, but can be taken off to receive the benefit of light showers in summer-time, if immediately replaced, or if the season should be very dry, as is often the case in a droughty summer; sprinklings with a fine rose watering-pot of tepid water are desirable.

Although market-gardeners generally have some crop or other coming off the ground which needs to have fresh manure dug in, yet there are seasons when, the ground being rather thickly cropped, there happens to be an accumulation of manure, and at these times mushrooms may be grown to great advantage. Some growers, who make a point of following out this method, place in the ground two upright posts, at a distance from each other that will make a heap of any desired length, which supports a transverse beam. To this beam are hinged boards, overlapping each

other to form shutters, which are speedily lifted up and down, and thus the labour of spreading litter or mats when occasion demands is done away with, and they can become acquainted with the aspect of the surface at any moment without trouble, and thus those who follow their occupation in the most thorough manner utilise the manure which they have no opportunity of otherwise immediately using, and secure to themselves an extra crop for their pains.

Mushroom-growing in the open Air.—There is a good deal of chance in the result of mushroom-growing in the open air, but as it may be tried at times without the risk of any loss, the trial may be worth the making. This may be done in connection with growing cabbage or cauliflower plants that will be removed from the bed, and planted out as soon as they are sufficiently large for the purpose. The bed must be richly manured in spring, and after the cabbage seed is sown, lumps of mushroom-spawn should be inserted at short intervals, and over the whole surface of the bed carrot-seed should be somewhat liberally sprinkled. The object of this is to furnish a shade for the bed, which the carrot-leaves will confer, and keep it moist, and if they stand too thickly the carrots may be drawn when young. Sometimes a crop of mushrooms will be obtained in this way, but at others nothing will come of it, and the chance must be taken, a certain condition of the atmosphere having much to do with the matter, sometimes it having been the case, when such a bed has been made, and nothing came of it after a certain time, and the experiment was well-nigh forgotten, that

a thick crop of mushrooms has sprung up afterwards quite unexpectedly.

It has been narrated that the owners of a patch of potatoes situated in a field in Derbyshire, upon proceeding to dig up their crop, found, to their great surprise, that there was a very large quantity of mushrooms growing amongst the potatoes. The spot from whence the mushrooms were taken had been dressed with road scrapings and a quantity of moss that had been taken from off the roof of an old building, which probably contained the seeds of the fungi. Upon one occasion immense quantities were gathered in the neighbourhood of Preston, in Lancashire, the profusion being so great that they were sold at from threepence to fourpence per peck, cartloads of them being purchased for the Manchester markets and sent thither.

The Morel (*Phallus esculentus*).—The morel is a native of Britain, often found in the greatest perfection in those woods where charcoal fires have been made, growing usually in moist pastures and damp woods. It is waxlike and friable when newly grown (but when gathered and kept dry will keep for several months), its form being spheroid, hollow within, standing on a smooth white stalk, the whole being about four inches in height, and is used in the same way as truffles for culinary purposes. As the morel is not, however, an object of culture, it needs but cursory mention, though it has at times been raised from seed.

The Truffle (*Tuber cibarium*).—Truffles are found growing in the woods of both Scotland and England, but not in such abundance as in Italy and many

other parts of the Continent, where they are highly esteemed, and grow of much larger size. Those found in Great Britain seldom exceed three or four ounces in weight, but it is said that in Italy they are frequently found to weigh from eight to fourteen pounds. As there are no indications to point out where they are growing, dogs are trained to discover them by scent, and when the sagacious animal has done this, he scratches the ground and barks, when the truffle-gatherer digs them up from beneath the surface, where they grow in clusters some inches beneath it, mostly in soil which is composed of a mixture of clay and sand. The truffle is without any visible root, of a dark colour nearly approaching to black, spherical in form, and covered over with pyramidal tubercles. They are found in the downs of Wiltshire, Hampshire, and Kent, but, like the morel, are not artificially cultivated.

CHAPTER XI.

Stock-keeping for market-gardeners—Mr. Caird's view of our present agricultural circumstances—Flower-growing: Growing lavender: Enormous consumption in London of natural flowers.

Stock-keeping for Market-gardeners.—Many persons lately have sought to discourage farmers from attempting to grow vegetables by quoting the market prices at a time of the year when there is a glut, and prices consequently very low. But it only follows as a matter of course that bulky, perishable green stuffs must be sold at unremunerative prices at those seasons, for they cannot be moved about from place to place, and need to be cleared off at some price or other, and must be expected to fall occasionally to an unremunerative level. The business of producing vegetables will at times be somewhat precarious, and it requires judgment, forethought, and skill; but with these, and ever keeping in view the principle of either late or early production, it can be made both satisfactory and remunerative.

But there is another plan of disposing of a surplus of vegetables that is hardly ever resorted to by the market-gardener, which is so plainly of an advan-

tageous nature, that it must be a matter of surprise that it has not been resorted to more frequently than is done—which consists in keeping a certain number of live stock to eat up the refuse and surplus vegetables.

There is an immense amount of waste in most market-gardens, consisting of the outside leaves of cabbages, potato-haulms, the haulm of green-peas, the tops of carrots, parsnips, and other vegetables, besides the small and ill-formed roots that it is difficult to dispose of in a profitable manner, which might be given to pigs and cows.

The tops and refuse portions of vegetable production are indeed dug into the land again, and so supply some of the same elements that have been taken out of it, and cannot, in the estimation of the gardener, be regarded as waste, nor is it so under this aspect; but this refuse might be much more profitably employed in the feeding of stock, which would doubly return to the soil the elements of reproduction in the large amount of manure they would supply.

Stock-keeping upon a scale as large as could be conveniently managed would be of special advantage to those who have to contend with a difficulty in obtaining sufficient manure, the haulage of which is expensive. Cows could be kept upon the soiling or house-feeding system, in the same way as followed by the London dairymen; the chief point to be kept in view being the obtaining of prime healthy animals that yield a good supply of milk, and continuously carrying on a system of selection, changing from time to time the least profitable animals; and the constant variety of food the cows would obtain, where market-

gardening is carried on upon an extensive scale, would be of great advantage to them. A certain amount of concentrated food would have to be purchased in addition to the roots and green stuff given, but this would bear no serious proportion to the great bulk of their provender, which would be grown upon the spot. If a trade in milk would not be desirable, butter could be made, which is a portable article always in demand, and there would be a certain amount of refuse from the dairy that could be profitably employed in feeding pigs.

A hardy breed of pigs, such as the Black Berkshire, could be kept at a very small cost. These could be maintained at a very trifling expense till the time came round when they are to be fattened off. They would get partially fat upon carrots, parsnips, and potatoes. In cases where there is any quantity of diseased potatoes, it would be found a good plan to construct a small kiln, consisting of a thick plate of iron, beneath which is a fire-hole, which could be built up for a trifle, and bake those affected by disease. The operation of baking dries up the moist objectionable portions of the tuber, and the pigs will eat them, when so cooked, as readily as they would do corn, and thrive amazingly upon them. A hardy breed that is not choice in its food, and will endure changes of weather, such as the Improved Berkshire, would be found to do very well upon very inferior victuals, and nothing comes amiss to them, for they will eat almost anything.

As store-pigs they could be kept upon the refuse of the garden without the cost of a penny, and at twelve months old could be fattened off with a single

sack of barley-meal, eked out by an economical mixture of steamed or boiled potatoes beforehand, the change of food being made gradually, such as mixing the potatoes with bran, or pollard, or barley-meal and pollard, finishing off with barley-meal alone. There are unprofitable breeds of pigs that would take twice or three times the amount of good food to make them fat, that would answer with the Improved Berkshire, and these, of course, would have to be avoided, much depending upon the score of profit upon the breed of pigs selected. Pigs of a hardy kind, that have been brought up from the first upon rough fare, fatten very quickly when put upon better food, and soon get into a condition for killing.

The most profitable form of dealing with pigs, however, will be found in that of keeping a few breeding sows, which should be selected with an eye to the best breeding points, as long body, straight back, rather fine head, and tapering neck, good depth fore and aft, having twelve well-shaped teats. A covering of long soft hair indicates both quality and constitution.

If good animals are selected, as the period of gestation lasts sixteen weeks, with good management two litters a-year may be counted upon, the average number farrowed being eight, out of which six may be counted upon being reared, a good breeding sow thus producing twelve pigs a-year, which will vary in value according to the market price of pigs, from fifteen shillings to twenty shillings each, at eight weeks old, when they are weaned, and can be taken from their mother. Each sow will thus bring in a good profit, for the provision will cost next to

nothing, except when she has farrowed, and needs a certain amount of good food to get on her young in condition, which are fed through the mother in this way.

Mr. Caird's View of our present Agricultural Circumstances.—At the first ordinary meeting of the session, 1880-81, of the Statistical Society, Mr. James Caird, C.B., the president, delivered the inaugural address, in which he made allusion to our present agricultural circumstances (making a brief reference to the condition of Ireland) to the following effect: "I do not feel it necessary to refer to the special circumstances of Ireland or the measures required there in regard to the tenure of land. A very competent commission is engaged in sifting the whole subject of the relations between landlord and tenant in that country, the result of which will doubtless enable the Legislature to deal with it in a spirit of mutual justice and conciliation. Those of us who can remember the condition of Ireland between 1846 and 1850 will note a remarkable distinction between that period and this. In the counties where the famine was worst, I found, in 1849, that even the finest quality of land was deserted in many cases by the tenants, owing to the pressure of rates. The difficulty was then to retain the old tenants on the land; their anxiety now is to keep possession of it. Apart from the obvious motive which they have been encouraged to entertain, of becoming the owners of their farms on easy terms, the returns of the Irish farmers during the last ten years have been much more favourable than those of the sister countries. They have rapidly diminished their dependence on

wheat, the average of which has decreased more than one-third. They have been placing their reliance more on the rearing of cattle and the produce of the dairy, for both of which the prices have been good. The small farms, requiring little expenditure for hired labour, have enabled them to escape the growing labour-bills of the large farms of this country.

"For similar reasons the West of England, and most parts of Scotland, have not suffered with anything like the severity of the more purely corn districts of England, whose dependence is chiefly upon wheat, and where the system of large farms is necessarily accompanied by increasing labour-bills. In seven out of ten years the seasons have been wet and chilly, and this has pressed with special severity on the crops which thrive best with abundance of heat and sunlight. But there are few parishes from the Humber to the Solent in which farms have not been surrendered to their owners, and some in which farms are absolutely tenantless. The local bankers, for their own protection, have been compelled to withhold credit, and tenants with diminished capital and restricted credit have found it necessary to retire from large holdings, and either take smaller farms or quit the business. A local journal in one of the southern counties, in September last, contained upwards of one hundred advertisements of auction sales of farming stock within its own district, embracing fifty-five thousand acres of land given up by the tenants, some of which had been relet at a great reduction of rent, but most remained on the owners' hands. In every county one meets with instances of considerable estates with six or eight farms thrown on

the landlords' hands, and certain localities can be named where, within a mile or two of thriving towns, there are hundreds of clay-land farms entirely deserted, and on which there has not been a furrow turned for two years. It is in such circumstances no longer a question of reduction of rent, or of outlay on improvements. The tenants have left the neighbourhood, employment of labour has ceased, and the landlords and their agents, even if they had the means, can have little hope of gaining a profit where a hard-working farmer has failed. The entire area of corn in Ireland is not more than half of that of the eleven principal corn counties of England upon which this heavy loss has fallen, and if measured in money, the loss of capital in Ireland occasioned by the seasons would bear no comparison with that of England.

"Circumstances have thus forced upon us changes which can no longer be postponed. These, by legislative measures, which will tend to break up embarrassed estates, will gradually place the land in the possession of owners who can act upon it with freedom. There will then be a large increase of landowners cultivating their own land, and especially will this be so if the same facilities for purchasing it as have been offered to the farmers in Ireland are, in justice to them, also offered to the farmers of England and Scotland. We shall find landowners selling a portion of their property in order to become themselves the cultivators of the rest with the capital thus acquired, and the smaller landowners, to whom they sell, vieing with them in the improvement of their new farms, neither being hampered with the restrictions

on cultivation generally imposed between landlord and tenant. Room, too, will be found for peasant proprietors, where the agricultural labourer may, in favourable localities, get a freehold on the land of his own country.

"I should have little fear of a prosperous result to well-applied industry on this principle, if due care is taken that no government loans for such an object be granted except where the climate is favourable, and the land of good natural quality. On such holdings there is ample room for good business in eggs and poultry, early and late vegetables and fruits, and milk and butter—upon all of which the profit will be in proportion to the skill and labour employed in their production. The system would not only give free play to skilled labour, but would also elicit the action of the higher qualities with which man is endowed, and which are too apt to lie dormant when he works under a mechanical routine. In reviewing the statements that are met with, it would appear obvious that a great change is being effected in the agricultural condition of this country and its people. The narrow bounds of these islands are being rapidly enlarged. By the aid of the improvements made in the adaptation of steam and steel to locomotion, the Atlantic and the great lakes and rivers of the fertile plains of America are becoming at once the cheapest lines of transport for the teeming riches of the West, and also the fittest links for connecting the mutual interests of the English-speaking race. Of all Western people ours is already the most numerous; and when we contemplate the further spread of the English language over North America and Australia, and the habits of

order, instinct of self-government, and love of liberty, which are the inborn characteristics of the Anglo-saxon race, and the voluntary action with which this beneficent conquest of nature is being conducted, we may well feel confidence in the future. Holding, by natural position and firm adherence to free trade, the post of intermediary between the Old World and the New, we shall be the first to reap the benefits of the rapidly-extending commerce which this fuller development of so much of the earth's resources is bringing to our shores."

The picture here given of the condition of agriculture is true enough, though considerable differences of opinion may prevail as to the political aspect of affairs, and the unswerving maintenance of free trade in every branch of production, which, however necessary in many instances, it is contended by some, should undergo considerable revision; for free trade has entirely destroyed the manufactured-silk trade of this country, a production which might be ranked with luxuries and not necessaries, so that if a duty of ten per cent. were put upon manufactured silk goods, the prosperity of what are termed the silk towns of England, as Macclesfield, Coventry, Derby, Leek, and Congleton, which have long been in a distressed condition, would arise as if by magic, and trade in this branch flourish, without detriment to the consumer, who would get a substantial English-made article in place of a meretricious foreign one, the same, it is contended, applying to foreign clocks and watches, and possibly many other things; the tariff requiring much more careful revision than has been given to it than a sweeping rule of thumb which has hitherto

been applied. The subject, however, is not one requiring attention in this place, beyond a cursory remark that it is necessary for readers to form their own conclusions relative to the matters referred to outside of the region of the subject in hand, and to apply those pertinent facts relating to husbandry to their own peculiar circumstances.

Flower-growing.—Farmers who are unsuccessful in their ordinary vocation have had the advice tendered to them of turning their attention to growing flowers, in most instances greatly to their disgust, for many of course are entirely ignorant of floriculture, and if they could succeed in raising the flowers, would be entirely at a loss how to dispose of them; and to a man accustomed to grow large quantities of wheat, in the habit of ploughing and manuring his ground, threshing out his produce and sending it to market, and having all the appliances at hand for carrying on the business to which he has been accustomed for a long series of years, such advice savours a good deal of the ridiculous, and is generally treated with scorn.

Yet it is not such absurd advice as on its face would appear at first sight to many, for there are flowers that are not of a perishable description—such as lavender—that have been cultivated for many years in large fields containing several acres, in the counties of Surrey and Hertford, there being usually some six hundred to eight hundred acres of land always under lavender, a great deal having been grown at one time at Mitcham, near London, the air being perfumed for a considerable distance by its fragrance.

Special aptitude is necessary for the successful management of such a branch as this on the part of the grower; and nearness to London, or at all events the neighbourhood of some very large town, is another essential point. There are, however, many nurserymen who make a very good living by rearing thousands of bedding-out plants. These are often sold by auction at so much per dozen, at the proper season, when they are greatly in request, by a regular auctioneer employed for the purpose; and the sale of these in many instances often pays the rent and expenses of the land and premises for the year.

Growing Lavender.—As lavender is not such a perishable article of floriculture, and may often be made a profitable item of growth upon somewhat doubtful land, a few particulars relative to its cultivation may be considered desirable. Lavender likes a light sandy soil; but as rank manure is very injurious to it, in preparing an area for its reception, it is generally usual to manure the land heavily, and plant a crop of potatoes beforehand, and as soon as these are off, spade-trench the land, in order to get it in readiness for the lavender slips. This is not, however, always done, for much of it has been simply worked by the plough.

November is considered the proper time to plant lavender, though it is occasionally set in March, for where the soil is warm and light, the slips set in November make fresh roots before Christmas. A new plantation is made out of an old one, the plants being lifted up by the men who pull or slip them, the longer the slips are split down the better, and if with roots to them, better still; for if even strong slips are

broken off high up and short off, that plant would be pretty certain to die before summer. The plants are inserted at a depth of about six inches, having about three inches of the top part or head above ground, standing about two feet apart in every way; but single slips are not inserted, three or four being put into each hole.

A plantation (if it may be so termed) lasts about five years. The first year it yields only a few blossoms, and nothing is done all through the summer beyond hoeing, to keep the land clear of weeds. The second year an acre of lavender brings in about twenty pounds, the expenses being generally about three pounds ten shillings per acre, this being the calculation of the crop grown in Mitcham, near London, where the land was ploughed, and not spade-trenched. Plough-trenching would doubtless answer the purpose, if it were begun by throwing out a trench two spades deep, into which two furrows deep could be ploughed.

The stalks and blossoms are cut at the time when the lower blooms are beginning to change their colour to a darkish brown, fresh-cut blooms being needed for the purpose of distillation; for if left too long, the odour of the flowers would suffer by evaporation, and the least troublesome way of disposing of the produce is to sell it to the distillers of spirits of lavender, which is a regular item of commerce.

Enormous Consumption in London of natural Flowers.—Of the large consumption of flowers during the London season *The Pall Mall Gazette*, in speaking of the one ending in 1880, drew the attention of its readers to one of its remarkable features, which consisted in a lavish display of flowers. "Flowers were

to be seen everywhere in enormous quantities—in drawing-rooms, in corridors, in boudoirs, in banqueting-halls, and on the robes of the dames of fashion as well. One hundred thousand pounds, it is said, will not anything like cover the season's flower bill of 'fashionable' London." (This was for cut flowers.) "This taste for flowers," says the writer, "has been growing for some years, and last season (1880) it probably culminated. Never before, at anyrate, has there been seen in the course of a few months such profusion of gay blossoms for household decoration and personal adornment; and it is no wonder that persons who have read in their newspapers about the rose alcoves of the Marchioness of This, or of the violet boudoirs of Lady That, are beginning to ask where all the flowers come from. There are few, however, who can answer the question. The gardens of foreign lands have been spoliated—Holland has contributed its camellias, and France has yielded up its roses; from Italy and Africa, from Spain and Portugal, have been imported the lovely bouquets carried by our fashionable ladies. Even at home, within a radius of some ten or twelve miles of Mayfair and Belgravia, we grow in our own suburban gardens and hothouses numbers of these perishable commodities. It has been calculated, in a rough-and-ready way, that if all the flowers which are sold in London in the course of twelve months could be seen growing at once, they would cover an area equal in extent to all the parks of London twice over. The London flower trade assumes a great variety of shapes, from the 'buttonholes' and more gorgeous bouquets for use at weddings and balls, to the coster-

mongers' barrow-loads of growing flowers in pots. The chief 'flower factories,' as they may be called, and the rose and violet farms, are all within an hour's ride of town. There are farms whose specialty it is to provide roses for the million, and nothing but roses—Tea roses, White roses, Fairy roses, Blue roses, and Yellow roses; in short, roses of every size and colour, every species and variety.

"Not a single day of the year is lost in a rose manufactory. From January to the last of December the growth goes on with undeviating regularity. Roses which in their season cost half-a-crown each, are in due time succeeded by countless thousands of beautiful blossoms from the same beds, which may be purchased for a penny apiece. For the 'queen of flowers' there is a never-ceasing demand, so much so that it is found profitable to bring over loads of these blossoms from France and other countries. The chief art of the London florist is exercised in providing a vast display of blooms at the time they are most in demand; in the winter season and during the early weeks of spring prices are high, and all the year round the figure obtained must be a highly remunerative one, probably not less than sixpence a blossom on the average; and on some days as many as two thousand flowers will be forwarded to the bouquet-makers from one florist. A visit to the houses of glass in which our florists carry on their business will be well worth the time expended. Much cunning is displayed in rose culture, and the wealth of blossoms that can be grown in a glass house three hundred feet long and forty feet broad will seem marvellous to the uninitiated. It must not,

however, be taken for granted that our florists are free from anxiety. Market-gardeners of every description, fruit and vegetable growers as well as florists, are haunted night and day by various cares. An unexpected, and consequently unprovided-for night's frost, will play havoc amid their pots; while at all times a fierce fight has to be fought with myriads of insect enemies. In the case of roses there is the green-fly to contend with, as well as the fear of mildew, so that unceasing attention is absolutely necessary. Although house-reared Tea roses and other varieties constitute a florist's most profitable business, he will not neglect other sorts. Thus around the metropolis many acres of land are devoted to the culture of the deep-red-coloured Moss rose.

"As an example of the general economy of London market-gardening, and the economy of space which is requisite in such dearly-rented ground as the florists are compelled to occupy, it may be mentioned that, thousands of rose-bushes are planted in orchards, and grow vigorously enough under the shadows of the fruit-trees. The rental of flower-gardening ground near London varies from about six pounds to fourteen pounds per acre, and many a florist has made a fortune out of a few acres.

"Violet farming is another profitable floral industry. The violet is grown in the open air, and early flowers fetch a fancy price, bunches in the early springtime bringing from threepence to sevenpence, the final bouquets of the season being sold at a similar figure. In some years as many as ten thousand bunches of

violets have been gathered from about two acres of ground; these, at a return of sixpence each, represent a considerable sum of money; and as in some seasons one shilling each is willingly given for a bunch, the violet-grower makes a good thing of it. Of course the sum expended in rent, labour, and manure is considerable, for the flowers have not only to be grown, but also to be pulled and bunched. The grower of violets has also to contend with various gluts; in some seasons the crops of the flowers are positively so enormous that it would be in vain to present them in the market. When the season is one of medium produce, the profits reach their height, as in such years the price seldom falls below threepence a bunch, while in years of plenty a dozen bunches may be purchased for ninepence.

"In the counties of Surrey and Hertford there are usually some six or eight hundred acres of land under lavender. The lavender is used in two ways. It is sold in small bunches to dainty housewives, who delight to place it in their wardrobes and linen-chests; and it is distilled into lavender-water, of which it has been calculated that as much as twenty-eight thousand gallons are annually produced in England. Bulbs which come early into bloom are sold by hundreds of thousands. In two London establishments of moderate area, two hundred and fifty thousand hyacinths are turned out for sale every year; and as for tulips and crocuses they are planted and reared in yet more enormous quantities. Tuberoses, because of their exquisite perfume, are in great demand; and as for show pelargoniums, from fifty thousand to one hundred

thousand will be sent to market from one establishment in the course of a year. The lily of the valley is a favourite early plant, which, as well as being sold in sprigs for buttonholes, is extensively disposed of in pots, a good potful early in the season being valued at half-a-guinea. As many as six thousand clumps of this favourite flower have been grown in one establishment. For bavardias and gardenias there is an incessant demand. One grower of the former was able in the course of one season to dispose of twenty thousand plants. Fuchsias, myrtles, hydrangeas, and a dozen other flowers find a ready market, either in blooms or in pots. Mignonette is a favourite pot-flower; it is no uncommon sight to see fifteen thousand pots coming into bloom in a single establishment. The mere blossoms of a large number of plants are gathered, the want of stems proving no object to their being utilised, whether in bouquets, by means of fine wires, or as trimmings for dresses."

When violets have to be sold at ninepence for a dozen bunches, which must not unfrequently be the case, as they are often retailed in the streets of London at a penny a bunch, the cry of "Sweet violets, a penny a bunch!" not by any means being an unfamiliar one, it is clear that they will not pay the grower to pluck and bunch them up for market, and an acre of cabbages would pay much better; but these violets may be grown at the foot of a hedge most successfully, where nothing else would grow, perhaps, and these might often be made a source of profit in those seasons when they happen to be in profitable demand. There are miles of hawthorn, or "quick" hedges, which

surround the market-gardens in the suburbs of London; for example, such a district as Hounslow, where violets could there be advantageously grown; and in some few instances they are thus cultivated; but the fruit-growers do not seem to "go in" for flowers to any great extent.

THE END.

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