

The selection of fresh vegetables now available in shops and supermarkets is probably greater than ever before. But there's a huge amount of satisfaction to be had from growing part of the food we eat. A well managed garden or allotment is an asset to any family and vegetable growing can rapidly develop into an absorbing hobby.

The quantities of vegetables to grow will naturally depend on circumstances. It can be as simple as growing a pot of parsley on your back doorstep or you can make it as big and fancy as you like. If there's only a small area available preference should be given to items where freshness is especially valuable such as lettuce, herbs, spinach, parsley, peas and beans. If there's more ground add brassicas, onions, carrots, beetroot, rhubarb and early potatoes to the mix. It will also add interest to try out some new or unfamiliar kinds each year.

Helpful Hints

- (1) Vegetables can be grown on most soils (light, medium or heavy) provided they are well drained. Choose an open though not exposed site, where plants can receive maximum sunlight.
- (2) Crops are grown on the flat, in drills (ridges) or on raised beds (also known as deep beds). Choose the system that suits you best. Or maybe a combination of all three.
- (3) Site perennial vegetables, such as asparagus, rhubarb, seakale, horse radish and other crops which remain in one place for a number of years to one side so that they do not interfere with the cultivation of annual crops.
- (4) Grow the early maturing crops together so that when they are harvested the ground may be planted with late crops. For example, early potatoes, scallions, lettuce, spinach and radish could be followed by savoy cabbage, winter cauliflower or late celery.
- (5) Vegetables are normally either sown directly where they are to mature (known as direct drilling) or else the seed is sown into a nursery bed or modules (multi-celled tray) and later on the young plants (transplants) are planted out into their final quarters. Carrots, parsnips, scallions, beetroot, swedes, spinach, radish, peas and beans are usually direct drilled, while most brassicas, lettuce, celery and courgettes are transplanted. Leeks, onions and sweetcorn are examples of crops that can either be drilled or planted.
- (6) A common mistake is to sow seed too thickly. As the seeds germinate and the young plants come through they should not crowd each other. When thinning out plants to their final distance this should be done when they are still quite small. The depth to which seed should be sown will vary depending on the size of the seed. See Table 2 in the Appendix for details.
- (7) Transplanted crops are usually sown under protection (plastic tunnel, glasshouse or garden frame) into a container of some sort. These containers could be a seed tray, small pot or a multi-celled tray called a module. Some of the brassicas and leeks can also be direct drilled into a seed bed outdoors and later on transplanted out as bare root plants.
- (8) A garden frame (or cold frame) is a marvellous addition to any vegetable garden. It's a simple box like structure with a plastic or glass top that allows you to warm the soil in early spring. If you don't possess a glasshouse you can use frames to propagate transplants or to grow early season crops.
- (9) As there are few effective insecticides available it's essential to physically protect your crops from pest attack using fleece, nets or barriers.
- (10) Keeping annual records outlining the crops grown, planting distances, varieties, dates of sowing, transplanting or harvesting etc. will add to the owner's store of information year on year.
- (11) Vegetable growing can get confusing due to the large number of different types of vegetable that are available and the many different ways of growing them. If you are a beginner you're better off to start small and grow something easy like cabbage, onion sets or beetroot. Look after them well and you'll get a harvest.

To find out the pH of your soil purchase a pH meter. But take note that you shouldn't guess the amount of lime to apply from a pH reading – send your sample to a laboratory to check the pH and buffering capacity of the soil. Buffering capacity is a measure of how much lime it takes to change soil pH.

Liming materials

- Ground limestone (CaCO_3 calcium carbonate)
- Dolomitic limestone ($\text{CaMg}(\text{CO}_3)_2$ calcium and magnesium carbonate)
- Granulated lime (CaCO_3 calcium carbonate)
- Burnt lime or Quicklime (CaO calcium oxide)
- Builders lime, slaked lime or hydrated lime (CaOH_2 calcium hydroxide)

The commonest liming material used is ground limestone rock. The particles vary in size from dust up to 3.35 mm and the reaction time varies as a consequence. If a soil sample indicates a magnesium reading of less than 50 mg/L then use of dolomitic limestone is advised as it's the most convenient way of applying that mineral. Granulated lime is very finely ground particles of calcium or magnesium carbonate formed into granules with the addition of a binder which 'cements' the powder that dissolves when applied to the soil and in the presence of moisture. It's a very convenient way for the farmer to apply lime, is quick acting, but is considerably more expensive than using ground limestone. The lime that was produced in the past from lime kilns was burnt lime and the modern version of it is a product called Gromax that's formulated as small chips, is quick acting and can be spread with a fertiliser spreader. If you add water to burnt lime (to 'slake') you come up with builders lime or slaked lime. This is a very quick acting form of lime but is caustic in nature, so handle with care.

Nitrogen is a key nutrient for growth and is available naturally in the soil. However we normally supplement soil nitrogen with fertiliser nitrogen and/or by adding organic matter. Vegetables vary in the amount of nitrogen they require. Some of the legumes such as peas and broad beans can fix their own nitrogen and don't require any. The following list groups vegetables into three categories of low, medium and high users of N:

Low: swede, French bean, runner bean, carrot

Medium: broccoli, beetroot, onion, courgette, parsnip, scallion, lettuce

High: leek, spinach, rhubarb, sweetcorn, cauliflower, cabbage, celery, sprouts

Phosphorus (P)

This element is important for root development, flowering, seed formation, straw strength in cereals, crop quality and disease resistance. It's also involved in cell division and is the carrier of energy within cells. It's rare to come across phosphorus deficiency in vegetables.

Potash (K)

Potassium is used in a wide range of plant processes and hence a lot of it is needed. It's essential for photosynthesis, starch formation, translocation of sugars and in the development of chlorophyll but the bulk of potassium is in the cell vacuole where it is involved with turgor and water control. It also tends to exert a balancing effect on excessive availability to the plant of nitrogen and phosphorus.

There are usually plentiful supplies of magnesium in soils and shortages of this element is unusual in most vegetable crops. It can come in on the prevailing winds enriched with magnesium from seawater spray (third most common element in the sea); the other source of available magnesium is in any area with underlying limestone geology. Another point to bear in mind is that regular additions of organic matter to the soil will add magnesium. Deficiency can occur on acid or sandy soils but sometimes you

get an induced deficiency if the root system comes under pressure from compaction, drought or heavy rainfall. The typical deficiency symptom is interveinal chlorosis; this occasionally occurs in broccoli crops close to harvest, but only rarely has any effect on yield. The other crop that regularly develops deficiency symptoms is tomatoes, especially if they are grown in some sort of bag or container.

One of the commonest deficiency symptoms in vegetables of any element, apart from nitrogen, is calcium. It's usually an induced deficiency rather than an actual shortage of calcium in the soil. Calcium is not a very mobile element within the plant and if the transpirational stream in the plant is interrupted, for example in drought conditions, a shortage of calcium can occur within the plant and deficiency symptoms appear in the weeks following. The symptoms are called a number of different names depending on the crop: brassicas and lettuce (tipburn), celery (blackheart), tomato (blossom end rot), potato (internal rust spot). The most effective way to counter calcium deficiency is make sure that your crops are well supplied with water by irrigating in dry spells.

Boron (B) Solubility of boron is pH dependent and high pH soils can exacerbate low boron levels in the soil due to lock-up of the available boron. Boron deficiency is also A Guide to Vegetable Growing 19 Black heart in celery. common on light free-draining soils. In mineral soils 1.0-2.0 mg/L (ppm) B is satisfactory. In peat soils 1.0 mg/L B is potentially deficient. Boron levels in soil can be maintained by 1-3 kg/ha of boron applied as Solubor (17.5% B) or by using one of the liquid based boron products. Boronated compounds containing 0.33% B applied at 15 bags/ha supply the equivalent of 2.5 kg/ha of boron.

Molybdenum (Mo) "Whiptail" in the brassica family is caused by a deficiency of molybdenum. It can be prevented by normal liming practices and by the application of a sodium molybdate (39% Mo) drench to the seed bed (10g/15 l per 10 m²). Field crops can be sprayed with 0.6 kg of sodium molybdate/ha if required. Mixing this treatment with other sprays is not recommended. Onions are also sensitive to Mo deficiency, particularly in peat soils, which can be controlled by treating seed with sodium molybdate, 8 g/kg

Manganese (Mn) Manganese is usually an induced deficiency. Deficiency occurs where pH and soil organic matter are high and where soils are excessively drained. Manganese deficiency can be expected in peaty soils where pH is greater than 6.0. On mineral soils it is most severe in sensitive crops at pH above 7.5. Can also be induced by drought. Manganese deficiency is controlled by foliar spray applications of 2.0 kg manganese sulphate (24.6% Mn)/1000 l water per ha

Zinc (Zn) Deficiency of zinc usually occurs on alkaline soils especially if heavy dressings of phosphorus fertiliser have been used. Cereals and maize are prone to zinc deficiency. Peat soils are deficient in most minor elements and peat grown plants often develop zinc deficiency. Zinc deficiency can be controlled if 11-23 kg/ha of zinc sulphate (35% Zn) is broadcast prior to sowing. Foliar application of 4.5 kg zinc sulphate/1000 l water per ha can be used, but for onions soil applications are usually more effective.

Copper (Cu) Copper is usually only a problem in peat soils and is especially deficient in the early stages of reclamation of peat soils. On such soils all crops should receive 20- 60 kg/ha as a base dressing suitably supplied as copper sulphate (25% Cu). Maintenance dressing of copper sulphate should be used during the rotation of crops susceptible to copper deficiency.

Organic matter Additions of organic matter – usually garden compost or farmyard manure – are beneficial for several reasons. It benefits soil structure, improves water holding capacity and adds in small amounts of major and minor elements. It is particularly beneficial for improving heavy and light soils. Compost, which is formed from the decay of plant material, is valuable for the humus and recycled nutrients it contains. All garden refuse, cut grass, kitchen waste, etc. should be collected into a heap and when rotted, dug into the soil. It is important to exclude from the heap the remains of any crop suffering from disease such as onions which have been attacked by white rot, or any brassicas which have suffered from club root. Farmyard manure is also a great source of organic matter when available. Spent mushroom compost, available in certain outlets, is pleasant to handle and compares more than favourably with farmyard manure and compost in nutrients. Organic matter should be dug in during the autumn or winter months at a rate of about 5-10 kg per m². It can also be applied prior to planting, as for example with potatoes. Organic matter is normally applied in rotation to the high nitrogen demanding crops: transplanted brassicas, celery, leeks, courgettes, potatoes and spinach. Final word of warning – don't be tempted to apply copious amounts of organic matter every year to the same ground – it is possible to overdo a good thing.

Fertilisers

Fertilisers are as valuable in the garden as on the farm if used intelligently to supplement moderate dressings of farmyard manure or compost. They supply to the crop the particular nutrient that it most requires. Fertilisers come in two forms – straights and compounds. Straight fertilisers contain just one element, such as nitrogen or potash. Compound fertilisers contain more than one element and usually consist of various mixtures of nitrogen, phosphorus and potash or N-P-K. The advantage of using compounds is that it's a handy way of applying all three major elements to a crop. The standard notation on a box or bag of fertiliser is to give a percentage figure for nitrogen, phosphorus and potash – or N : P : K – in that order. For example a bag of 7-6-17 contains 7% nitrogen, 6% phosphorus and 17% potash. Take note that UK sourced fertiliser always quote P as P₂O₅ and K as K₂O. In Ireland we use elemental P and K. To convert P₂O₅ and K₂O to P and K multiply by 0.44 and 0.83 respectively. Nitrogen in both countries is quoted in elemental N. One normally applies fertiliser just before sowing or planting a crop – sprinkle the fertiliser across the ground and lightly rake or fork in. One should apply only as much fertiliser as is required to grow the crop in accordance to the results of a soil sample and the following rates are only a guideline where that information is not available. Straights Superphosphate 8% P Apply 35-50g per m² of 8% P at time of sowing or transplanting. Sulphate of Potash 42% K Apply 30g per m² at sowing or transplanting. Sulphate of Ammonia 21% N, 24% S This is the commonest form of nitrogen available to the gardener and is also a useful source of sulphur. Works within about a week of application under warm, showery conditions. With constant use will tend to acidify the soil. Apply at 15-30 g/m². 22 Calcium Ammonium Nitrate (CAN) 27% N This is the most commonly used straight nitrogen in agriculture. Slightly faster acting than sulphate of ammonia. Apply at 15-30 g/m².

Compound Fertilisers There are various compound artificial manures on sale which incorporate the three main fertilisers i.e. nitrogen, phosphate and potash and sometimes other elements such as sulphur or boron. Granular compound fertilisers such as 10:10:20, 8:5:18+ B or 7:6:17 are ideal for the vegetable garden and do not have to be mixed. They are normally available at agricultural outlets. Apply at a rate of 50-90g per m², or preferably in accordance with the results of a soil test. There are other proprietary compounds on the amateur market suitable for vegetables and these should be used according to the manufacturer's instructions. Organic based fertilisers are also available in retail outlets.

Liquid Fertiliser

Many proprietary brands of liquid fertilisers are available which when diluted with water according to instructions are valuable for vegetables as a quick acting source of nutrients. However it is a much more expensive way of applying nutrients than using solid fertilisers. Commercial growers frequently apply these products to crops and at times are over used. To quote from a 1978 AFT Research Report on the findings of a three year trial that looked at testing nine different proprietary foliar feeds on a range of vegetable crops: "The overall picture which has emerged is one of little or no growth response. Indeed, only in carrots in 1977 was there a significant increase in yield and this was obtained with only two products. The results suggest that if soil fertility is high and adequate supplies of trace elements are available, the value of applying any of these products is extremely doubtful even under drought conditions such as occurred in 1976". However growers who are selling a green product such as *A Guide to Vegetable Growing* 23 This image shows nitrogen deficiency in parsley. It shows up in the older leaves as a pale green to yellow colour with the younger foliage showing a healthier darker green. broccoli or cabbage will use foliar sprays that contain Mg, Mn and S to green up their crop if it's off-colour for whatever reason as these three elements have a greening effect along with nitrogen.

Garden Compost

The word 'compost' can be a confusing one in horticulture. It can either mean a substrate, usually based on peat with added fertiliser, for raising young plants, or it's a natural process that turns waste vegetation into a dark crumbly material called compost. To clarify matters, it's probably best to call this latter material, garden compost. Garden compost is the end result of the decomposition of organic matter (OM) by an enormous mixed population of micro-organisms and soil animals in a moist, warm, aerobic (aerated) environment. The final product is humus or compost that is free of pathogens, weed free and stable; humus is a complex biological material that is resistant to further decay

There are two phases in the production of compost: the heat production phase and the maturation phase. Once the wastes are gathered into a heap, the moisture content brought to a suitable level and the mass aerated, the microbes multiply rapidly. The readily degradable constituents of the organic wastes – sugars, starches, fats, proteins and hemi-celluloses – go to make new microbes. The materials are oxidised to carbon dioxide and water in the energy liberating reaction. Part of this energy is used for microbe metabolism, the excess is given off as heat. After the initial spike in temperature the heap begins to cool down and after a number of weeks reaches ambient. The end product of the process, humus or compost, is made up of the more resistant parts of the organic wastes – cellulose and lignin, breakdown products, dead and some living micro-organisms – together with products from further complicated chemical reactions between these materials. Mother nature is very accommodating – if you just create a pile of organic garden waste it will eventually turn into compost. This is known as anaerobic composting – without air – and as a consequence doesn't heat up and takes a longer time to fully compost. This makes perfectly good compost but perhaps a better way is to keep the heap aerated while it's decomposing; oxygen encourages fungi and bacteria to quickly build-up which leads to the production of heat and the rapid break-down of the softer materials. And it's this heat, if held for a few days, that kills off weeds, seeds, pests and diseased plant material. With an anaerobic heap far less heat is generated, the process is slower and there is less chance of killing weed seeds and pathogens; plus release of pungent odours if the heap is turned or moved. However in practice most garden compost heaps go through a combination of aerobic and anaerobic phases. Temperature begins to build up very quickly in a freshly made heap, peaks at around 70°C after a few days and then cools back down. Temperatures in and around 60°C held for a few days are required to kill off weed seeds and pathogens. Once the heap has cooled down to ambient it enters a maturing phase. The initial ingredients of four week old compost that has been turned are unrecognisable and have turned into a dark raw sticky compost. This then needs to be left for several months to mature

into a compost that is a friable brown and pleasant to handle. It takes about 3 months to make compost during the warmer months but this can double in the colder months. The usual situation in a household is you have a regular supply of kitchen waste complemented by an irregular supply from the garden. For example you will have lots of grass during the spring and summer and lots of leaves in the autumn; and crop residues from the vegetable plot will vary during the year. Composting is a microbiological process. Organisms – mainly bacteria and fungi - use decaying matter as their food source. Bacteria and fungi are all around us, in the air and on plant materials, so there is no need to use activators. If these bugs are supplied with water, oxygen and nitrogen they will rapidly multiply. For aerobic decomposition you need a continuous supply of air. The best place for air entry to a compost heap is from underneath. The air then rises through the material, is warmed and exerts a chimney effect drawing more air after it. This can be achieved by placing a 10 cm deep layer of thick woody pruning's on the ground or by inserting a wire mesh cylinder in the base of the heap. A lot of the material that you add to a heap contains water. For example grass is about 83% water. But if adding straw it will probably need to be wetted first. Nutritional value of compost Garden compost contains a complete range of both major and minor nutrients and is a valuable food source for vegetables. The problem is that there can be big variations between different compost samples depending on the source materials and how it was made. Compost made entirely from green waste is less rich than one made from green waste with protein sources (e.g. scraps of meat); a covered heap will contain more nutrients than one that is left open to leaching by rainfall. The only accurate way to find out is to send off a sample for analysis which is not cheap. A laboratory will analyse for total N, P and K plus dry matter percentage. To compare different samples on a like for like basis we usually work out the results at 100% dry weight. The figures below are averaged from different garden compost samples that were sent off for analysis and are expressed in kg/dry tonne. The composting material was general mixed green waste with some meat waste. Most of the nitrogen is organically bound to the humus and is only about 10% available in the season of use whereas the phosphorus and potash are deemed 100% available.

Rotation The very first farmers back about 10,000 years ago would have discovered two things about rotation pretty quickly. Firstly, that breaking fresh ground gave them healthy crops; secondly, that if they kept cropping the same bit of ground with the same crops they became unhealthy due to a build up of pests and diseases. And so they would have begun to move – or rotate – their crops around in order to maintain good yields. The basic idea is that pests and diseases are usually specific to each family group of vegetables and that if you move the groups around you'll minimise the likelihood of an outbreak. But in a sense rotation is a bit of a nonsense for the small plot vegetable grower, as true rotation is something that only a farmer can carry out by moving his crops from field to field. Take carrot fly for instance. It's capable of flying up to a kilometre from its overwintering site and this year's carrot crop that's 2km away from last year's infected crop is unlikely to be attacked from that source. But the carrots in your allotment that are only a few metres away from the previous year's infected crop will get attacked. The other problem with small plots is that in the process of growing your vegetables you'll inadvertently move soil from plot to plot via boots, tools and wheelbarrow and in this way soil borne diseases like white rot and clubroot can be spread around. Hence it's not easy to rotate crops in a small area but the advice would be to practice it in as far as possible. Divide your crops into roughly six groups: brassicas (cabbage, swede, Brussels sprouts, cauliflower, broccoli, kale), legumes (pea, bean), alliums (onion, scallion, leek, garlic), carrot group (carrot, parsnip, parsley, celery), solanums (potato, tomato) and the last group is everything else. The idea is not to grow any one group in the same ground more than 1 year in 4 or 5. Notwithstanding the last piece of advice, an even simpler system is to divide your plot into three evenly sized areas and split up your vegetables into three groups: leafy crops (includes all the brassicas), peas and beans and root crops. Leafy crops are high nitrogen crops, roots are low nitrogen crops and peas and beans fix nitrogen and make it available to the following crop. Hence leafy crops

follow after the legumes and root crops are placed at the low point in the nitrogen cycle. The main problems that can stem from poor rotations include club root and white blister in brassicas, white rot and downy mildew in alliums and eelworm in potatoes – all of which are difficult to eradicate once they become established. Other reasons for rotating crops include evening out what nutrients are absorbed from the soil as crops differ in their requirements and improving soil structure. Varying the crops grown allow for different types of cultivation to take place and this can help to preserve good soil structure. For example the deep cultivations required for a potato crop are different to the more shallow cultivations required for an onion crop.

Asparagus

Asparagus is a perennial vegetable that's grown for its edible young shoots (spears) that appear in late spring. A well drained site is essential for this crop. As asparagus will remain in the same place for as long as 20 years the site should be carefully dug over as deeply as possible taking care to remove all perennial weeds such as scutch-grass, docks, etc. Plenty of farmyard manure or bulky organic material should be well mixed with the soil during digging. Asparagus is grown from seed or from one-year old crowns planted in March. Either way the plants must be allowed to establish for 2 years before taking your first harvest in year 3.

Sow seed in modules in January at 16-18°C under glass. Plant out in late May to early June in a staggered double row at a spacing of 45x30 cm, leaving 90 cm between rows. Plant in a 10 cm deep depression and as the plants grow gradually level off the bed by the end of the first season's growth. The easier alternative is to buy in 1 year old crowns and plant in March taking care to space out the roots in all directions and covering with soil to a depth of 10 cm. A light cut can be taken in the second year but the best advice is not to take the first harvest until the third year and don't cut beyond May 23. The harvest period in subsequent years can extend over a 6-8 week period from mid-April to mid-June. Cut the stems about 2.5 cm below ground level when the spears are 13-18 cm tall. When the foliage has turned yellow in the autumn cut it down to within 2.5 cm of soil level. Top-dressings of farmyard manure should be given each autumn and supplemented in spring with a dressing of artificial.

Varieties: Backlim F1, Gijnlim F1, Millenium F1

Diseases: rust, wilt

Pests: slugs

Beans, Broad

Broad or fava beans are a hardy leguminous crop that can be sown in the autumn or spring. There are three main types – Seville, Longpods and Winsors and can be further divided on the basis of seed colour – green or white. Seville (e.g. Aquadulce) are the hardiest suitable for overwintering. Longpods have eight seeds per pod while Winsors have four seeds in shorter, wider pods. A fourth type is the Dwarf or Fan-podded (e.g. The Sutton) which are bushy, short plants that mature quickly.

The very earliest crop can be sown in late October or November, weather permitting. The two varieties recommended for overwintering are Aquadulce and The Sutton. Most of the varieties grow about 1.3 m tall and require some sort of support but The Sutton is smaller at around 80 cm and is free standing. The spring sown crop is drilled any time from February to May. For succession sow the next batch when the first sowing reaches 8 cm in height. The seed should be sown in staggered double lines, 23 cm apart each way. If more than one double-row is to be grown allow 60-75 cm between them. Where you want to add organic matter to the soil, open a trench 30 cm deep and wide and add a layer of well-rotted manure or compost to the base and mix with the soil to leave a trench 5 cm deep. Sow your beans and cover over with the remaining soil.

Broad beans do not require staking unless they are a very tall variety. If this is the case support the crop by erecting posts at either end of the drill and tighten a double row of twine between them. They take around 3 to 4 months to crop and last for 4-6 weeks. Pick the pods when quite young – before the scar on the pod turns black; if left too long the beans will be tough to eat. If black bean aphids attack pinching out the tops of the plants will remove most of them. Otherwise spray them. At the end of the harvest cut the stems down at base level to leave the roots in the ground to allow the nitrogen containing root nodules to rot down for the next crop.

Varieties: Express, Imperial Green Longpod, Aquadulce, Jubilee Hysor, The Sutton

Pests: black bean aphid, pea and bean weevil, crows

Diseases: chocolate spot (Botrytis), rust

Beans, Dwarf, French or Kidney

This versatile vegetable can be harvested as immature green pods (green beans), left grow on to a half ripe stage where the pods can be shelled like peas (flageolet) or let mature completely to dried beans (haricot). There are two forms: bush and climbing.

NB: take note that beans at the flageolet stage (especially if they are a bit overmature) can be poisonous if eaten raw. Cooking renders them completely safe to consume.

French Beans are sensitive to cold temperatures and exposure, so choose a warm, sheltered spot for them. They require a minimum soil temperature of 10-12°C for germination. In early districts the first sowing may be made early in May and in late districts about the third week of that month. Further sowings can be made to the end of June. Open lines 5 cm deep and 45 cm apart. Place the seeds 5-10 cm apart in the drill. An early sowing may be made around mid-April in a glasshouse by single seeding 5 cm pots for transplanting out in May when the plants are about 8 cm tall. This early planting should be covered by fleece to protect against late frosts or cold wind. French beans take about 9-10 weeks from sowing to mature. Pick every two to three days to keep the plants productive and to maintain quality by preventing seed development. Outdoor crops can be harvested from July to October.

Commercial crops of French beans are always produced under glass using climbing varieties. Climbing varieties are more productive than bush varieties and especially so when grown under protection. For indoor production start off the plants in 5 cm pots and plant out after about 3 weeks when 8 cm high. Plant in double rows 60 cm apart, with 25-30 cm spacing between the plants in the row. Allow 1.5 m for the paths between the double rows.

Borlotti beans are a flageolet type that if left to mature on the plant will become a haricot bean. Most other varieties are green bean types. The stem should be allowed to grow along the wire for a metre before being stopped. It takes about 8 weeks for the first pods to be ready for harvest.

Bush varieties: The Prince, Nomad, Delinel

Climbing varieties: Cobra, Emerite

Pests: black bean aphid, slugs

Diseases: halo blight, root rot

Beans, Runner

More popular in the UK than Ireland – in the supermarkets in any case – this is another example of a half hardy vegetable which cannot be sown too early. The runner bean is not only a nutritious vegetable, but also an ornamental plant for growing against a fence or wall, or to form a screen for an unsightly corner. It is a climbing plant that will twist itself around a string or a pole.

Sow Harvest May - June and August - September

A minimum soil temperature of 11-12°C is required which will be achieved sometime in May. The seed is usually sown from mid-May to the end of June in double rows. Sturdy supports are required, such

as 2.5 m bamboo canes, one per plant, that are arranged in a tent like fashion secured at the top with a horizontal bar. The seeds are sown 5 cm deep, 20 cm apart, in rows 45 cm apart. Alternatively make a wigwam out of 6 or 7 poles with a plant per pole. One is usually sufficient. The alternative method of propagation is to single seed 8 cm pots under protection in late April to early May, harden off, and plant out in late May to early June. Twist the young shoots around the cane to encourage them to climb. When they reach the top of the support, pinch out the top of the plant to prevent it becoming top-heavy. From the flowering stage on make sure to water your plants in dry periods as this will help the flowers to set. The newer varieties, such as Moonlight (white flowered) and Firestorm (red flowered) have improved pod set. Regular picking of the crop will also encourage more pods to develop. Runner beans will crop from mid-July to mid-October.

Varieties: Scarlet Emperor, Moonlight, Firestorm, Red Rum, White Lady

Pests: black bean aphid

Diseases: halo blight, root rot

Beetroot

This is an easy crop to grow and will succeed on most soils. There are two types – long and the more popular round or globe shaped. What you get in the seed packet are 'clusters' or dried seed heads that may contain up to 3 seeds, unless you have purchased a monogerm variety that's been bred to produce one seed per cluster. Seed may be sown from April to the end of July to crop from July to March. For earlier sowing in March use one of the bolt resistant varieties such as Boltardy. Cover that sowing with fleece to get it to crop in early June. The drills should be 25 cm apart and the seed sown every 4cm about 2.5 cm deep. Start lifting the roots as they are needed when around 5 cm in diameter – this gives the remaining crop more space to develop. The crop is not fully frost hardy, so unless you are in a mild area, it is advisable to cover them with 15 cm of straw sometime in November. Alternatively cover with a double layer of fleece.

Varieties: Boltardy, Detroit 2, Burpee's Golden, Pablo F1, Red Ace F1

Pests: mangold fly (leaf miner), black bean aphid, beet flea beetle

Diseases: leaf spot (Ramularia), scab

Broccoli (calabrese)

This popular vegetable which hails from the Mediterranean only began to be grown in Ireland for the fresh market from about 1980. The name of this vegetable can cause confusion: it may also be called calabrese or green broccoli and is not to be confused with its near relation, sprouting broccoli.

Stemming from its southern origin it's one of the less hardy brassicas that we grow; we harvest it during the summer and autumn and import our winter and spring requirements from Spain.

The main harvest comes from a large centre head, but once that is removed you can get a second harvest from side shoot production depending on variety. The commercial grower will take just the main head going through the crop in two to three harvests but the gardener can utilise side shoots to extend the harvest period over several weeks.

The crop is normally sown in modules and planted out. Bare root transplants may induce buttoning (production of a small premature head). It could also be direct drilled and thinned out to the required spacing. The early sowing is made in February for planting out in late March. This early planting should be covered with fleece to lessen the chances of bolting and to give the plants a head start. Remove the fleece about 3 weeks before harvest or sooner if desired. Alternative sowing dates for early broccoli are the last week in September and overwintering the plants under glass or sowing in January under heat; but these early crops are only for mild areas and must be fleeced otherwise they'll bolt.

Crops planted from the second week of April onward do not require fleecing. Commercial growers will plant on a weekly basis through the season to ensure continuity. The late planting, by say August 7, can be chancy if the autumn is cold and frosts arrive early. A broccoli crop will normally mature in 60-90 days of planting depending on variety and date but up to 110 days for late crops. Broccoli is grown at a number of different spacings depending on the size of the centre head required but the overall yield doesn't vary from plant populations of 5 to 100 plants per m². For 500g heads use 60x40 cm (4/m²) for maincrop and 60x45 cm (3.7/m²) for early and late crops. For smaller heads try 45x30 cm (7.4/m²) or 30x15 cm (22.2/m²). For side shoot production use the wider spacings—suppressed at closer spacings.

Broccoli has quite a low demand for nitrogen in comparison to other leafy brassicas. The table below shows the results of a Teagasc trial applying increasing amounts of nitrogen to a crop of broccoli grown on a light and heavy soil. Broccoli can be a temperamental crop. During hot weather you may find some of the beads on heads that are close to harvest opening up and turning yellow; this can also happen after harvest. Certain varieties are more prone to this problem than others but is worst where the heads are slightly over mature so harvest on time. Depending on variety heads can also discolour if the weather turns sunny and may also discolour in very wet summers. Parthenon is the best variety to withstand a variety of weather conditions.

Varieties: Aquiles F1, Ironman F1, Steel F1, Parthenon F1, Green Magic F1

Pests: cabbage root fly, aphid, caterpillar, slugs, birds

Diseases: downy mildew, wet rot, white blister

Cabbage

Cabbage along with cauliflower is a crop that can be harvested all year round. Although consumption of cabbage has declined over the years it still is a major crop in Ireland. Cabbage has been selected and bred for centuries which helps to explain the confusingly large number of types and varieties and indeed the plethora of sowing and planting dates. The different types include: round headed (ballhead), pointed (York), Savoy (winter maturing), red cabbage, white cabbage (for coleslaw) and winter cabbage (Tundra type). York cabbage can be grown 12 months of the year but during the winter months it is harvested as 'greens', which is unhearted heads of cabbage. Duchy was the standard commercial York variety for June to November production but has been superseded by Dutchman, a variety very similar to Duchy. Both are good to eat. Savoy cabbage was traditionally a winter vegetable but summer varieties have also been developed. White cabbage, also known as Dutch cabbage or storage cabbage is mainly grown for coleslaw and is produced from summer through to winter. This type of cabbage is prone to frost and is brought into store in November, although some growers will take a chance and field harvest it over the winter. Round headed cabbage for general consumption have been developed for summer and autumn production – there are many varieties. However a new one called Sennen F1 has been developed for overwintering – it's planted in October and matures in May. Cabbage is planted at a variety of spacings depending on variety and size of head required. Suggested spacings are given in the Table entitled "A Guide to Brassicas". The narrower the spacing the smaller the head and visa-versa. For example, storage cabbage can be spaced at 50x50 cm to produce 1 kg heads.

Cabbage requires generous feeding, but the quantity and the kind of fertiliser varies with the season. A boronated compound like 8-5-18 +B is used for the base dressing as all the brassicas have a requirement for boron. Cabbage has quite a high requirement for nitrogen with summer and autumn crops receiving somewhere in the region of 70-80 g/m² of sulphate of ammonia. This is split between the base and top dressings with the top dressing applied about a month after transplanting. Autumn planted cabbages which have to withstand the rigours of winter are given little nitrogen but relatively high potash in the base dressing. Compound fertilisers such as 0:7:30 or 0:10:20 are suitable for

autumn planted crops. With the advent of fine weather in the spring nitrogen is given as light top-dressings. As soon as growth commences in spring give 40-50 g/m² of calcium ammonium nitrate (CAN) or sulphate of ammonia and repeat three weeks later. The main pests of cabbage are cabbage root fly, aphids and caterpillar. Pigeons can be a nuisance especially in early summer and also over the winter. The main diseases are leaf spots caused by either ring spot or Alternaria.

Pests: cabbage root fly, aphid, caterpillar, pigeons

Diseases: ring spot, Alternaria, white blister, downy mildew, Botrytis, clubroot

Cauliflower

It is possible to have cauliflowers in season during most of the year but take note that production in the January-February period is usually only possible in mild coastal locations. Careful selection of varieties and sowing and transplanting dates will go a long way towards successional cropping. Weather conditions will influence harvesting dates. A general rule of thumb is that plant spacing increases as the season progresses. This is because a larger plant size is required to produce a head of cauliflower in the depths of winter than an early crop in June. Early summer cauliflower for cutting during June and early July are sown either in cold frames in mid October or under glass in January. They are planted out in warm well-manured ground in March as soon as weather conditions allow, at a spacing of 60 x 45 cm. This crop is particularly susceptible to buttoning, which is where a small curd (edible white portion) forms prematurely caused by a check to growth. The crop must be kept growing to produce a big frame so make sure to water during dry spells.

Summer cauliflower for cutting from mid July to August can be sown in March- April for May planting. Autumn cauliflower is the easiest to grow and gives the biggest yield. Seed should be sown from late April to June for transplanting from June to about 20 July. The plants should be planted out at 60 cm square 5-7 weeks after sowing. It is a mistake to leave them too long in the seed-bed or modules as this may lead to buttoning. Winter cauliflower may be had in succession from December to May by planting a number of varieties. Development of the heads is greatly influenced by the prevailing weather – mild spells may cause rapid maturing while cold, wet weather with little sun will delay development. Hence, it may be difficult to accurately time the harvesting of this vegetable. Crops that mature in the January to February period can only be grown in the milder coastal areas of the country. Commercial crops of winter cauliflower traditionally follow early potatoes. Where winter cauliflower follows an early potato crop, 90g per m² of a compound vegetable fertiliser should be given. Nitrogen top-dressings in the early spring are necessary for the late maturing kinds (February-May).

Pests: cabbage root fly, aphid, caterpillar, pigeons

Diseases: ring spot, Alternaria, white blister, downy mildew, clubroot

Carrots

Carrots can be grown on a range of soils from heavy to light but the majority of the commercial crops are grown on light to medium soils. A sandy loam would be ideal. They can be produced outdoors from June to April with the earliest crops being produced using polythene covers and the very late crop from under black plastic and straw. The best place to store carrots for winter and spring use is in the ground where they are grown. However they are quite susceptible to frost so spread some soil over the tops in November or cover with a double layer of fleece. In the colder areas of the country cover the beds with 25-30 cm of loose straw. If commercial growers want to keep the crop to March and April they lay down a sheet of black plastic covered with straw in October-November – the straw keeps out the frost and the plastic keeps out the light to prevent re-growth in the spring. Apply slug pellets prior to strawing down to prevent damage to the roots. The use of leaves would be a suitable alternative to straw. There are several different types (root shapes) of carrots such as Amsterdam and Nantes and plant breeders have used them to produce hybrids, which is now the dominant type on

the supermarket shelf. Nairobi is the main variety grown commercially and will grow well on a wide range of soils. Its other advantage is that it will hold well once it becomes fully sized. The early crop is sown in February/March for June/July production. The main crop is normally sown from mid-April to May. A late sowing of an early variety can be made in June to give you a tender tasting crop in about 12 weeks. Seed may be sown in lines 15 cm apart on the flat at a depth of 1-2 cm. Stony soils produce misshapen roots. Commercial growers de-stone their soils to prevent this and to reduce damage when lifting. difficult to sow by hand but try to sow thinly so as to avoid thinning; otherwise, thin the resultant seedlings to 5-7 cm apart. One can get pelleted carrot seed which although more expensive is easier to sow evenly by hand.

Varieties

Early: Laguna F1, Mokum F1, Trevor F1

Maincrop: Nairobi F1, Ulyses F1, Kingston F1, Romance F1

Pests: carrot fly, aphid, slugs

Diseases: scab, Alternaria, cavity spot, Sclerotinia

Celery

There are three types of celery – green, self blanching (SB) and trench. The old-fashioned trench celery is no longer favoured having being replaced by the easier to grow selfblanching and green varieties. Virtually all of the commercial crop is now green celery. Trench celery was grown in rows to allow for earthing up but the self-blanching and green varieties are always grown on beds. In order to get self-blanching celery to blanch correctly it needs to be grown in a block at close spacing. Blanching is the development of a light colour by the process of excluding light. The main inputs in growing celery is nitrogen and water. A high level of fertility is necessary as you need to aim at maintaining continuous growth in order to grow succulent sticks of celery. A heavy dressing of farmyard manure or compost is recommended and supplemented with fertiliser. Celery needs to be propagated and grown on under glass or polythene before being planted out. The early crop has to be propagated under heat otherwise it will bolt. It's sown in February for planting out from around mid-April. The maincrop is sown in March – April and transplanted out in May – June; a late crop can be planted up to July 20 for harvest in November and December but this crop is a bit of a gamble as it can be damaged by early frosts. To reduce the risk of bolting with the earlier sowings maintain a day/night temperature of 17°C and venting at 21°C. In practice lower and higher min/max temperatures (10-25°C) can be tolerated without inducing a bolting reaction. The traditional way of raising celery is to sow the seed on top of moist compost and keep covered with polythene or glass until germinated in about 2 weeks. Grow on until large enough to handle (1 true leaf) and prick out into trays at 3 cm square spacing. They could also be pricked singly into modules. It takes 4-5 weeks from sowing to pricking off and a further 4-5 weeks from pricking off to planting out. Propagation temperature for celery is 15-20°C. Be wary of higher temperatures (25°C +) as germination percentage will slump. It may be necessary to use Styrofoam sheets to cover germinating seed during warm weather. Young celery seedlings are also liable to heat damage when under glass in sunny weather – shading material may have to be employed.

With advancements in seed technology all commercial celery is now propagated using quick-pills. A quick-pill is a pre-germinated coated seed that makes propagation of celery so much easier as it eliminates the pricking out stage. The pill is single-sown directly into a peat block or 216 module by machine or by hand. The pill is lightly covered by compost and grown on for around 10 weeks until it's fit for planting. Celery is normally planted on the flat in beds, typically four rows across a bed, 28-30 cm square in a diamond shape. A dressing of sulphate of ammonia at 30g per m² may be given pre-planting and topdress at about the 4 and 6 week stage with another 30g per m². Irrigate after planting and after topdressing to establish the plants and to wash the fertiliser in. Copious watering should

also be given during dry weather. Apply slug pellets along the rows just before the crop close in as slugs can move up into the developing celery head and consequently be difficult to remove. Ensure that pellets don't lodge in crown of the plant as they will still be there at harvest time. Blackheart can occasionally cause problems with celery. It's a blackening of the centre leaves at the base of the plant caused by a lack of calcium. It more usually is an induced deficiency brought on by a lack of moisture at the roots. To counter it ensure that the crop doesn't run short of water and irrigate well during dry spells. It would also be advisable to use calcium nitrate (15% N) as your topdressing material as it supplies calcium as well as nitrogen. If signs of blackheart appear, spray the plants with calcium nitrate at 10-20 kg/1000 L per ha so that the hearts get a thorough soaking. Repeat at 10-14 day intervals until near harvest. Celery is sensitive to boron deficiency which causes a disorder known as 'cat's claw'. Apply 2.2 kg/ha of boron or use a boronated compound such as 8-5-18 +B.

Varieties: Galaxy (SB), Loretta F1 (SB), Victoria F1 (green), Tango (green), Plato (green)

Pests: carrot fly, aphid, slugs, celery fly

Diseases: celery leaf spot (Septoria), Pythium root rot, pink rot

Disorder: black heart (calcium deficiency)

Garlic

Garlic, a member of the onion family, is grown from cloves, not from seed. These are planted in the autumn or spring and subsequently develop into bulbs that are formed underground. There are two types: hardneck and softneck. Hardnecks develop a stiff centre stalk from the flowering spike which is called a scape. Bulbs from this type are frequently purple or pink in colour with fatter but fewer cloves. The softnecks are usually white in colour and store well. We import most of our garlic from China and Spain, Plant by October – November or February – March. The best crops are grown on light to medium, free draining soils. On heavier soils grow the crop on a raised bed to improve drainage especially for the overwintered crops. You can use ordinary shop garlic but as there are many clones of garlic you may find you get better results with named varieties purchased in a garden outlet. In addition shop garlic is often treated with a growth regulator that will give poor sprouting when planted out. Garlic needs exposure to cold temperatures (0-2 °C for 1-2 months) to initiate bulbing – this can happen during storage or post planting. Garlic is a hardy vegetable that is either over-wintered or planted in early spring. Plant in October-mid December for June/July harvest or in February/March for July/August harvest. The bulb must be broken up into cloves for planting, discarding the very small and keeping those of 1 cm diameter and upwards. In general large cloves will produce the largest bulbs. Garlic is responsive to plant density with overall yield increasing at higher densities but with a decrease in individual bulb size. A density of around 20-30 per m² is about right for good sized bulbs. A spacing of 20 x 20 cm is equivalent to 25 per m². Plant the cloves with the basal plate facing downwards, 5-7 cm deep. Garlic is a moderate nitrogen demander – similar to bulb onions. Apply one-third of the nitrogen at planting, one-third when growth begins in the spring and the final third about a month later. If spring planted apply half at planting and the other half about 4-6 weeks later but not later than early May. The crop is also responsive to potash. The crop is sensitive to dry soil conditions and needs to be irrigated during dry spells. The most critical stage for irrigation is during bulbing – end of May to July. A lack of water will result in reduced yields and earlier maturity.

If any flower stems are produced, just snap them off to allow the plant concentrate all its energy into the developing bulbs. Harvest the crop when 10% of the tops have fallen over or when the foliage just starts to turn yellow. If you notice that some of the bulbs have split open you are harvesting too late. Carefully lift the bulbs, tie together in bunches of 10 and hang in light, airy, place to dry; or else lay them on wire mesh in a glasshouse. After about 4-5 weeks they should be sufficiently dry. Trim the roots and cut the tops to about 2 cm. Clean the bulbs by removing some of the outer skins without

exposing the cloves. The art of drying garlic is to achieve light, full cloves in the bulb with the leaves around the bulb and the stem completely dry but not brittle. Store in a cool dry place – can last up to ten or eleven months. For maximum storage store from 0-4°C and at a humidity of 60-70 % relative humidity.

Varieties: Arno, Cristo, Germidour, Purple Wight, Solent Wight

Pest and Diseases: as for onions but the main problem is rust

Kale

Kale is one of the hardiest and also one of the most nutritious of vegetables but 56g has never taken off in the popularity stakes. However the newer varieties are better flavoured than those of old. The leaves are the edible part and these can be harvested individually, or the complete head can be harvested in one go. Although it's produced commercially from June to April, it's still regarded as a traditional winter crop available from November through to March. To cover the June to April period five or six plantings will be required at approximately monthly intervals from March to the end of July for the late crop; this will entail sowing the crop in modules from January to June. Plant density for kale is in the order of 3.7-4.5 per m². So use a spacing of 60x45 cm for early and late crops and 60x37 cm for the main crop.

Varieties: Bornick F1, Firbor F1, Reflex F1

Pests: aphid, caterpillar

Diseases: ring spot, white blister, largely resistant to club root

Kohlrabi

This underrated brassica vegetable is far more popular on the continent than in these parts. It originated in northern Europe in the fifteenth century and its name comes from two German words: kohl meaning cabbage and rabi meaning turnip. The turnip-like globe of kohlrabi is actually the swollen base of the stem, not the root. There are green and purple versions. Kohlrabi can be either direct drilled or sown into modules and planted out. Sow from April to July in rows 30 cm apart with 20 cm in-row spacing. If sown too early there is a risk of bolting and if going earlier into March sow in modules under protection and plant out later. Sow every 3 weeks for succession. It's a quick growing crop – ready for harvest about 2 months after sowing during the summer months; so keep the crop moving along during dry spells by watering it. Harvest the crop when the bulb is between golf and tennis ball size.

Varieties: Domino, Congo, Superschmelz

Pests: cabbage root fly, caterpillar, aphid

Diseases: ring spot, Alternaria, white blister, club root

Lettuce

There are many different varieties of lettuce but there are two basic types: those that are leafy and those that form heads. Butterhead, iceberg and cos are examples of head forming lettuce. Lollo Rossa and oakleaf are just two representatives of leafy lettuces that exhibit a range of shapes and colours. Once mature, lettuce will not hold well; for succession make subsequent sowings when seedlings of the previous sowing have just emerged. Alternatively one can buy a packet of seed with a mixture of varieties with differing maturity dates. Lettuce is normally a transplanted crop but some of the leafy types can be direct drilled. It can be sown in a seed bed or tray and transplanted as bare-root plants but will establish better from modules. Take care when planting lettuce to ensure that the module is planted level or slightly proud of the surface of the soil – deep planting may induce basal rots in the young plant. Cos is a type of lettuce that produces upright oblong plants with a crisp inner heart. The

Little Gem variety is one of the earliest to mature in a more compact frame. Seed may be sown from March to mid July in drills 23 cm apart and thin out the seedlings to 23 cm apart.

Varieties: Little Gem, Little Gem Maureen, Pinokkio

Butterhead lettuce can be produced from June to October from sowings made from March to mid August. Space the crop at 30 cm square. Because lettuce is a perfectly circular crop, some savings in space can be made by planting in a triangular pattern – circles of 30 cm will fit into 30 cm rows and 27 cm in-row spacing.

Varieties: Cassandra, Roxy, Diana

Lettuce needs to be kept growing so water during dry spells and a rich, moisture retentive soil will help in this regard. Farmyard manure or compost may be used to enrich the soil and improve its moisture retaining capacity.

Pests: aphids, root aphid, slugs, caterpillars

Diseases: downy mildew, botrytis, bottom rot, ring spot, sclerotinia

Onion, Potato

The potato onion bulbs should be planted in well manured ground early in February. Plant in rows 30 cm apart and 23 cm between the plants in the rows. Cover the bulbs to rather more than half their depth. Early in August, as the bulbs are ripening, they should be pulled up and left on the surface to dry. When thoroughly dry, they should be stored in a cool dry place. Reserve a quantity of the smaller, well-ripened bulbs for planting in the following spring. Planting stock of this type of onion is not commonly available

Onion, Seed

We can grow onions perfectly well in Ireland but the problem for the commercial grower is to get a couple of dry, fine weeks in September to harvest the crop. Drilled onions need a long season to provide yield and good bulbing development for harvesting in early autumn. But the advantage of seed onions over sets is they will store for longer, can have less problems with disease and there's a greater choice of varieties. As an alternative to direct drilling, you can propagate your onions in modules under protection for planting out at a later stage. This method is well suited to the gardener who prefers to use seed to sets. Sow 5-6 seeds per cell between late January to mid-February and germinate on a warm bench if possible. Once germinated the modules can be grown-on in a glasshouse or polythene tunnel. Plant out in early to mid-April at a spacing of 30x30 cm. The individual plants look far too close together but you'll be surprised at how they are able to elbow each other out of the way as the season progresses. The number of seed/seedlings per cell has a major influence on the eventual size of onions produced. A seeding rate of 5 per cell will produce a lot of onions in the 60-80 mm size grade; if you up the rate to 8 or 9 per cell you will get a high proportion of 40-60 mm grade.

Varieties: Golden Bear F1, Hyton F1, Hygro F1, Hyfort F1, Vision F1, Red Baron

The easiest way to grow onions is by planting sets. These are small immature bulbs specially produced for planting. The advantage of sets over seed is they are quicker to establish and hence more accommodating in relation to time of planting, easier to weed and mature earlier. Plant in March to mid April but the season can extend from February to the end of April at a push. Ensure that late planted sets are watered if the weather is dry to make sure they get off to a rapid start. Spacing for sets is identical to spacing for seed onions so consult that section. However a common spacing is rows 23 cm apart with sets 10 cm along the row (43 per m²). Use a trowel to plant sets about 2.5 cm deep rather than just pushing them into the soil, as they may push up out of the ground when the roots start to grow. If you plant them just covered with soil it will stop birds from rooting them up. Sets can

also be planted in the autumn for an over-wintered crop maturing in July. Plant in the first week of October. Sets for the commercial market are sold in four size grades: 10-14 mm, 14-17 mm, 17-21 mm and 21-23 mm. The very smallest grade can lack vigour and the very largest grade can be more prone to bolting. The ideal size is 14-21 mm. Set onions normally mature in August. Onions from sets do not store as long as onions from seed. They will store satisfactorily until about January, after which time they start to sprout.

Varieties:

Spring: Stuttgarter Riesen, Sturon, Setton, Hercules F1, Centurion F1, Red Baron

Autumn: Shakespeare, Troy

A shallot is a small onion, that when planted grows to give a small cluster of bulbs at harvest time – they will multiply up about 8-10 fold. Shallots are quite hardy and can be planted in February or March 15 cm apart, in lines 30 cm apart. Plant with a trowel, leaving just the tips of the bulbs visible. When the leaves topple over and begin to die back sometime during July or August, the clumps should be pulled up and left on the surface to dry. When thoroughly dry, they can be broken up and stored in a cool dry place. All the bulbs should not be used in autumn or winter; a quantity of the smaller, well-ripened ones should be kept back for planting in the following spring. Shallots can also be raised from seed, with each giving rise to a single shallot. Sow in March or April in drills 10 cm apart with seeds spaced 4 cm apart in the drill; you require about 250 seeds per m²

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Varieties: Golden Gourmet, Matador F1

Parsnips

Parsnips are a root crop that will grow in a wide range of soils, more tolerant of heavy soils than carrots, and can be harvested from August through until March. Sowings are direct drilled from March to May. The March sowing can be covered with fleece for a mid July harvest. Prior to sowing the surface should be forked over to a depth of about 10 cm and raked free of stones and clods. The seed should be sown in drills 30 cm apart and 15 cm apart in the drill, sowing 2-3 seeds per station. This spacing equals a plant population of 22 per sq m giving you a medium sized root. For larger roots go up to 30x20 cm. They will take from 2 – 4 weeks to germinate depending on the weather. Thin to one plant per station. Parsnips are one of the hardiest of vegetables and can be left in the ground during the winter, digging them as required.

Varieties: Cobham Improved, Gladiator F1, Javelin F1, Countess F1.

Pests: carrot fly

Diseases: canker, various leaf spotting diseases

Peas

Peas are one of the most ancient and nutritious vegetables. There are three main types: shelled peas, mange tout and sugar snap. The traditional pea is the shelled type where you extract the peas and discard the pod; the more modern types are the mange tout and sugar snap where both peas and pod are eaten. The difference between the latter two lies in the development of the individual pea – the mange tout is underdeveloped in a flat pod, whilst the sugar snap has a developed pea in a thicker pod. The shelled peas can be divided into two types – round and wrinkled seeded – in the dried form. The round are hardier and used for early and late crops and wrinkled are less hardy and generally sweeter. Sow from March to June, every four weeks for succession if required, in flat bottomed drills 5 cm deep, 15 cm wide, spacing the seeds roughly every 5 cm apart. Allow 90 cm between the rows. Could also be sown on a bed at a density of 50 per m² (seeds sown about 14 cm apart). Extra early crops of peas may be had by sowing first early varieties in pots placed in frames, early in February and planting them out in April. Sowing peas in a flat bottomed trench. On poor soil, where it is necessary to apply manure at the time of sowing, a trench should be opened 30cm wide, and of the same depth,

in which a layer of well-rotted manure should be placed, dug in and mixed with the soil from the trench. No nitrogen is required as pea roots develop nodules on their roots that fix nitrogen from the soil air.

Generally peas require some sort of support for the leaf tendrils to hold on to and for ease of harvest but the newer varieties are shorter than the older and easier to support. This is particularly the case with the semileafless varieties. Traditionally tree branches (especially Elm) were cut in winter and used to stake the pea crop. Nowadays it's more likely that plastic pea netting or sheep fencing will be used. Whatever you choose it's important that the support be placed to the peas before the stems bend, i.e. before they have reached a height of 10cm. Having said all that peas can be grown without staking.

Varieties

Earlies: Early Onward, Meteor, Kelvedon Wonder

Maincrop: Hurst Green Shaft, Onward

Mangetout: Oregon Sugar Pod, Snow Wind, Edula

Sugar Snap: Sugar Ann, Sugar Bon, Cascadia

Pests: pea and bean weevil, pea aphid, thrips, birds

Diseases: powdery mildew, root rot, leaf and pod spot, downy mildew

Potatoes

Potatoes are a half hardy crop that originate from South America and first reached these shores around 1586. Being half hardy means that frost can cause problems. It can kill off newly emerged shoots from an early planted crop or damage tubers (potatoes) if the harvest is left too late. The crop is grown from tubers; you can use your own but it's probably best to buy fresh seed annually that is certified free of disease. Seed about the size of a hen's egg is ideal. These should be planted whole, but in the event of larger seed being used, they may be cut into two sets. The tubers can be directly planted into the soil but it's advantageous to sprout them first as they will emerge more quickly and mature earlier. Buy your certified seed in February or March and place them upright in a tray placed in a light, cool, frost free place. In a few weeks the tubers will have developed short (about 12 mm long), sturdy, dark green sprouts. Potatoes can be divided into 3 types in order of harvest: Early (June), Second Early (July-August) and Maincrop (September-October). Early potatoes are planted in March. If well sprouted potatoes planted at this time they should be ready for use during June and July. Main crops are planted in April to early May. Potatoes are traditionally grown in ridges or drills. Space the drills 70 cm apart for early and second early varieties and 75 cm for maincrop. Using a garden line to guide you, dig out a shallow trench with a shovel, and spread compost/manure (if you have it) and fertiliser along the base. Space the tubers out 25 cm apart in the row for earlies and 30 cm for maincrop. Open up a second drill parallel to the first and cover in the first trench with the soil from the second as you go along. Continue across the plot until you are finished to leave the ground roughly level.

The crop will require to be earthed up as it grows during the early part of the season. As mentioned, potatoes are prone to frost damage and if the shoots are showing and frost is forecast cover the exposed shoots with soil from between the rows. Ridge them up again when the emerged shoots are about 20 cm high covering them to about 10 cm. If necessary first loosen the soil between the rows with a hoe and then use a shovel to earth up. If you are growing on beds potatoes can be planted on the flat. Dig over the bed, rake it level and plant the tubers using a trowel. Space them 30x30 cm in a diamond pattern at a dept of 10-12 cm for earlies/second earlies and 15-16 cm for main crops. When planted on the flat there is no need to earth up. What makes for a good potato crop? A fertile soil with a full leaf canopy by the end of May; and the development of a deep extensive root system which is important for water uptake. And keep potato blight at bay. Slugs: if you find you crop riddled with holes along with hollowed out cavities the chances are that slugs are the culprit. The problem tends

to be field or plot specific – it's a problem in certain fields but not in others. Slug attack tends to worse in wet years on heavy soils and varieties vary in their susceptibility. Varieties like Kerr's Pink, Maris Piper and Rooster are vulnerable; Golden Wonder, Nicola and Pentland Dell are among the least susceptible varieties. Two slug species are implicated: the keeled slug and the garden slug. The problem with trying to counter the keeled slug is that it lives mostly underground and only comes to the surface to mate. Because of this applying slug pellets may be of limited use. Slugs will feed on tubers from late summer into the autumn; and essentially the longer you leave the tubers in the ground the greater the damage. For example in a trial they discovered that Maris Piper lifted on August 8th suffered 10% damage, lifted on October 3rd 30% damage and lifted in early November 45% were damaged. The following suggestions may help:

- Grow early or second early varieties as they are harvested early and hence less susceptible to slugs.
- Sprinkling a small amount of pellets along the open drill at planting time may have some effect on reducing damage later in the season.
- For main crops apply two applications of slug slug pellets in mid July and August. Alternatively use four half-rate applications.
- Consider the use of Nemaslug in early August; this is a species of eelworm that actively seeks out slugs and kills them. But it's not cheap and not 100% effective.
- Avoid growing pink skinned varieties.
- If you do notice slug damage towards the end of the season lift the crop promptly as the damage will only get worse the longer the crop is in the ground.
- Do not get unduly alarmed if you notice slug damage to the potato leaves as this may well be the grey field slug at work, a species that generally doesn't attack the tubers. Harvest the earlies and second earlies direct from the drill when they are big enough and as you require them. The main crop haulm will naturally die back in the autumn allowing the crop to be lifted in October. If you wish you can cut the haulm off 3 weeks prior to lifting. Store the crop in a dark, frost free shed.

Varieties:

Early: Home Guard, Duke of York, Coleen, Sharpe's Express

Second Early: British Queen, Orla, Maris Peer

Maincrop: Kerr's Pink, Rooster, Record, Pink Fir Apple, Cara, Setanta, Sante, Sarpo Mira, Sarpo Axona (the Sarpo varieties may not be to everyone's liking)

Pests: slugs, aphids, wireworm, eelworm

Diseases: potato blight, black leg, pink rot, soft rot, dry rot

Pumpkin and Squash

Members of the genus *Cucurbita* come in a confusing range of colours, shapes and sizes. And to add to the confusion the common names of pumpkin and squash can be attributed to several different species of *Cucurbita* (but mostly *C. pepo*). But to keep it simple pumpkins are a type of winter squash and the other type you'll see mentioned is summer squash. Summer squash is a quick growing type utilized when immature as a table vegetable, whilst winter squash matures in the autumn, develops a thick skin, and can be stored over the winter (hence the name) in a cool frost free shed. *Cucurbita* species also encompass marrow and courgette. Pumpkins are traditionally grown for Halloween for decorative purposes but pumpkins and squashes can be both edible and/or ornamental. They are vigorous annual plants that grow in a trailing and sprawling fashion, but some of the varieties have a more compact bush type of growth. The squash family require a rich well drained soil and preferably one that hasn't grown squash for 3-4 years. Squash is reasonably tolerant of soil acidity growing down to pH 5.5. The crop only requires moderate amounts of nitrogen – about 40-140 kg/ha – depending on initial soil fertility. With their origin mainly in Central America and Mexico they are all half hardy. Hence the crop is normally propagated under cover and planted out after the last frosts. Sow the seeds

singly into large modules, 5 cm blocks or 7-8 cm pots at a temperature of around 20°C in late April or early May. Provide frost protection if necessary during the propagation stage. Depending on location, plant out after 3-4 weeks from mid-May to early June. Plant two rows on a 1.4m bed, spacing the plants 85-90 cm apart, or from 1 x 1 m to 1.5 x 0.75 m on the flat. Weed control can be awkward with this crop as it grows everywhere so best bet is to plant through black plastic which will keep down the weeds and keeps in the moisture. Alternatively use a combination of a stale seed bed, inter-row cultivations and hand weeding. The only pests of note are slugs and then only at the planting out stage. However, disease is more problematic. The commonest is powdery mildew, which manifests itself as a white powdery coating on the leaves from midsummer onward. A late attack is of no great importance but an early one will slow plant growth and induce premature senescence. A tank mix of Microthiol Sulphur and SB Invigorator can be effective as can potassium bicarbonate at 5g per litre applied weekly. Pumpkins are susceptible to rots which can occur either pre- or post-harvest. It is not fully understood why they rot. There may be a connection with a powdery mildew attack; Phoma has also been implicated. Pumpkins are not very good at curing damage to their skin and this can allow entry of fungal and bacterial organisms that may initiate rot; so harvest and handle with care. Watch nitrogen levels in the soil – excessive amounts will increase the degree of rots. Harvesting usually takes place in September when the foliage has died back and the fruit has turned colour. Whenever possible the pumpkins and squashes should be allowed to fully ripen on the vine – the fruit will have a hollow ring when tapped – but harvest before the first frosts. The fruit are normally cut and windrowed in the field for a period to allow curing to take place, prior to collection into wooden bins and initial storage under glass or plastic. When removing pumpkins from the plant snap the stem at the knuckle to leave a handle 10-15 cm in length – if too short there's a greater likelihood of disease rotting organisms gaining entry. Curing allows the stem to seal and the skin to harden. In a poor summer the crop can be slow to turn colour and if a small bit of colour only is present curing can take place indoors in a well-ventilated glasshouse, tunnel or shed – ideal temperature is 25°C for about 2 weeks. The storage life of winter squash ranges from 2 to 6 months depending on the cultivar. Most cultivars of winter squash store longer than pumpkin cultivars.

Store at 7-13°C and at 60 to 75% relative humidity.

Pumpkin yield: 1-2 per plant; 1.5 is a good average.

Varieties:

Pumpkin: Baby Bear, Rocket F1, Paint Ball F1, Summer Ball F1, Mars F1

Winter Squash: Hunter F1, Harrier F1, Crown Prince F1, Turk's Turban

Summer Squash: Summer Mix F1

Pests: slugs, rats

Diseases: powdery mildew, rots, scab

Radish

Radish which comes in a number of different shapes and sizes is divided into two main types: summer and winter. Summer radishes are quick growing maturing in 4-8 weeks and are used in salads. Winter radish is ready in 8-10 weeks and is much larger than its summer cousin; it can be eaten raw in salads or cooked like turnip or swede. Sow summer radish from March to August and winter varieties from July to August. The summer crop can be thinly sown to aim for a final spacing of 15 x 3 cm. Allow more room for the winter crop – 15 x 15 cm. Summer radish can be harvested when quite small – about 2 cm in diameter. They can go woody quite quickly so only sow in small batches and every two weeks if succession is required. The summer crop needs to be grown quickly so make sure to keep it well watered in dry spells.

Varieties:

Summer types: Cherry Belle, French Breakfast, Sparkler, Rudi

Winter types: China Rose

Pests: flea beetle, slugs, cabbage root fly

Diseases: downy mildew, Rhizoctonia root rot

Rhubarb

This is an extremely useful early vegetable and a good plantation may remain in production for many years. Rhubarb requires a deeply worked free draining soil well manured and free of weeds. Farmyard manure is beneficial and should be applied in the autumn prior to planting or the ground may be fertile enough after a previously heavily manured crop such as potatoes; fertiliser requirements can be made up by subsequent topdressings. Planting material may be obtained by dividing up two to three year old stools into a number of portions, each portion or set as it is called, should have at least one bud and a fair portion of a root system. Plants raised from seed are likely to be variable and are best avoided. Plant anytime during the winter up to March if weather and soil conditions are suitable. Sets should be planted about 1 metre apart each way and sufficiently deep that the crowns are level with the surrounding soil. When growth starts a dressing of 30g sulphate of ammonia per m² should be given to help build up the root system. It's best not to pull the stems the first season after planting to allow for good establishment. When the leaves have died down in the autumn farmyard manure should be put around the crowns without covering them. The rhubarb harvest normally starts in February in mild areas in the south and in March further north in the country. During the pulling season an occasional application of liquid manure or sulphate of ammonia will help to promote a further flush of leaves. Take around a third to one half of the stems per stool at any one harvest leaving the rest to allow regrowth of new shoots. When pulling the sticks, put your hand down near the base of the stem and ease it out of the ground. Finish pulling in August or September to allow the plant to rebuild its reserves for the following year's crop. A simple method of forcing rhubarb for an early supply is to invert a tub over the crown at the end of January. It may happen that some of the stools occasionally throw up flowering shoots. These should be removed to stop the plant from expending its energy into flower and seed production. Most commonly seen in the season following a wet summer.

Varieties: Timperely Early, Victoria

Pests: slugs

Diseases: leaf spot (Ramularia), crown rot (Erwinia)

Spinach

This crop is grown in the same way as lettuce, but it does not transplant well. Small successive sowings are made in rich ground, at three week intervals throughout the spring and summer. The early sowings should be made in a warm position, but for the summer sowings a cool site should be chosen. Early thinning to 15 cm apart and watering with liquid manure, or dressing with nitrogen, tend to check bolting. A sowing should be made of a prickly seeded variety at the end of August for use in early spring.

Varieties: Fiorana F1, Medania

Pests: black bean aphid

Diseases: downy mildew

Sweetcorn

Sweetcorn developed thousands of years ago as a natural variant of maize which is a native of Central America, probably Mexico. It was brought to Europe by Columbus and subsequently spread worldwide to become one of the most important food crops for mankind. Sweetcorn differs only in a single gene from maize which slows down the conversion of sugar to starch. This produces kernels with a high sugar content and pleasant texture in contrast to the starchy grains of maize. It now only

exists in cultivation and as such could be called a man-made crop. This vegetable was transformed for the commercial grower by the development of supersweet varieties in the mid 1980's. These varieties possess sh2 genes which causes them to convert much less of their sugar to starch to produce kernels about 30% sweeter

A Guide to Vegetable Growing 151 Swedes growing under 1.3mm bionet. Most commercial swede crops are covered in nets to keep out cabbage root fly and also helps to reduce aphid and flea beetle attack than the standard ones (known as normal sugar), but more importantly hold their sweetness for longer. The old varieties, once ripened, quickly converted their sugars into starch and had to be used immediately. Another type you may come across in catalogues is the 'extra-tender sweet' variety which is a sweeter and less chewy version of the supersweets.

Sweetcorn is one of the half-hardy vegetables and is better suited to the warmer eastern and southern parts of the country. But the development of new varieties has rendered the crop less susceptible to the vagaries of an Irish summer. That said it will always do better in a warm summer and select a warm sheltered site if possible. It is doubtful whether commercial production of this crop would be financially viable except in the most favourable parts of the country.

Most of the varieties available are hybrids. The supersweet and extra-tender varieties can be grown together but must be separated from the normal sugar varieties plus the whites and multi-coloured types. All varieties must be isolated from forage maize by at least 75m as the starchy character of maize is dominant to the sweet character of sweetcorn.

If you're growing sweetcorn in one of the colder areas of the country you'd be advised to stick with using just the early varieties such as Earlibird or Northern Xtra Sweet.

Maize is grown commercially in Ireland for silage production and a lot of the crop is direct drilled through a strip of biodegradable clear plastic. The plastic increases the soil temperature by about 2-4°C which generates better growth especially for earlier sown crops. Maize requires a temperature of 10-12°C to germinate and doesn't thrive at air temperatures of less than 10°C. Sweetcorn is quite a nitrogen demanding crop. Up to 70 g/m² of sulphate of ammonia can be used split half at sowing or planting and the other half a month later.

Sweetcorn can be harvested from August through to October. The silks which hang from the developing cobs turn brown shortly after pollination and to a dry dark brown when the cob is close to harvest about 30 days later. The final test of ripeness is to push a fingernail into one of the grains – if the liquid runs clear it's unripe; if it's milky it's ready to harvest. You will normally harvest 2 cobs per plant. The top cob matures first followed by the one further down the plant. The supersweet varieties will last satisfactorily in a fridge up to a week.

Varieties

Normal sugar: Sundance F1

Supersweet: Northern Xtra Sweet F1, Earlibird F1, Mainstay F1, Seville F1

Extra-tender: Lark F1, Lapwing F1, Wagtail F1

Pests: aphid

Diseases: rust

Sweet Potato

Sweet potato, despite its name is not related to the potato but is a member of the bindweed family; and as its name suggests, it's a good deal sweeter than the ordinary potato. The sweet potato was probably domesticated in Mexico but possibly in South America, some 8,000 years ago. Much later, after Columbus discovered the New World in 1492, European sailors introduced the sweet potato to Africa and then Asia. Interestingly, the sweet potato was being grown in Oceania before Columbus, but the routes of introduction are still debated. As it's a semi-tropical plant it must be planted under protection, either glass or plastic. Grows best at 21-26°C.

Sweet potato is grown from slips or rooted cuttings (plug plants) which can be purchased. To produce your own slips get a tuber and stick it in peat in a warm glasshouse and it should have 10-15 cm sprouts in 4 or 5 weeks. Take a cutting and put it into a small pot covered with a plastic bag – burying it 2-3 nodes deep. Grow in a warm place for about 3 weeks until established. It will root from the cut stem area and also from the nodes. Plant on a shallow mound at 30x75 cm spacings under protection in late May to early June. Density is 4.5 per square meter. Takes 100 to 120 days to maturity. Pest and disease not generally problematic but keep an eye out for aphids. Slugs can graze the tubers and red spider mite can feature along with sclerotinia if either of these two are present in the glasshouse or polytunnel.

In early autumn when you notice the crop beginning to turn yellow and die back, harvest the tubers. You can leave them to get bigger but they need to be lifted before the first frosts.

Varieties: Evangelina (orange), Beauregarde (orange), Bonita (white)

Pests: aphid, slugs

Tomato

Tomatoes are a half hardy vegetable that give the best results when grown in a glasshouse or polythene tunnel. That said, if you have a sheltered warm spot in your garden or allotment, you can try growing them outdoors. There are two types – bush (or determinate) and cordon (or indeterminate). The bush varieties require little staking but don't yield as well as the more traditional cordon types which require both staking and side shooting. Bush types are possibly more suited for containers or pots and would recommend the cordon type for the vegetable garden. Outdoor tomatoes are raised under protection and planted out in June when all frosts are gone. You can propagate your own plants or more conveniently buy them in at planting time. Sow 1-2 seeds in a 8 cm pot sometime in April, about 8 weeks before your chosen planting date sometime in June.

You require a plant density of about 4 per m² so space them at 50x50 cm and put a 1.2 m stake beside each plant. As the plants grow they will have to be tied into the stake and the little side shoots that develop in the leaf axils need to be removed by snapping them off when they are about 3 cm long.

Tomatoes are heavy feeders so they would be a good crop to receive manure or compost and when watering apply a liquid feed as standard. Pinch out the growing point in August two leaves above the last flower truss – this is to get the plant to put all its energy into developing and ripening the fruit before the first frosts of autumn.

Varieties: Sungold (cherry), Sweet Apertif (cherry), Alicante (round),

Ailsa Craig (round), Ferline (beefsteak)

Pests: caterpillar, slugs

Diseases: potato blight

Disorder: blossom end rot (calcium deficiency)

Turnip

Turnips are a quick growing crop maturing in as little as 6 weeks from sowing. They come in a variety of shapes – flat, round or long – and in a variety of colours –purple, green or white. It's a versatile crop that can be harvested when small and eaten raw or left to grow in size and cooked; the tops can also be harvested like spring greens from a late summer sowing. A small sowing should be made about every three to four weeks from March to August in drills 30 cm apart and 2 cm deep. Sow thinly and gradually thin out to 15 cm apart. Start harvesting when they are golf ball sized for salads or grow on to tennis ball size for cooking.

The main problems will stem from attack by cabbage root fly, flea beetle and slugs. Your best bet is to cover the crop with fleece for the first two and a small amount of pellets to keep slugs at bay. As with any quick maturing crop water the crop during dry spells.

Varieties: Oasis, Purple Top Milan, Goldenball, Green Globe, Sweetbell F1

Pests: Flea beetle, cabbage root fly, slugs

Diseases: downy mildew

Herbs

There is a very wide selection of these useful flavouring plants and only the enthusiast grows all of them. Room should be made in every garden for few of the more commonly used kinds. Choose a warm, sunny site for your herb garden.

Thyme: Sow seed in April and thin or transplant to 15 cm apart. Will last for several years.

Mint: Plant in October or March in a cool, rich soil. Cut down the tops in autumn and cover with 5 cm of manure or compost.

Sage: Grow from seeds in April or cuttings in July or August. Plant 40 cm apart in a dry position. Each spring prune back the branches to ensure a supply of fresh growth.

Chives: Clumps may be bought from seedsmen and planted in early spring. Leaves are cut during summer as required.

Coriander: This annual plant is grown for both its leaves and seeds. Direct drill from March to July for harvesting from May to October. For May harvest sow under protection or in a garden frame. Sow every 3 weeks for succession. This crop is prone to bolting so keep well watered to prevent checks to growth. This plant hails from the Mediterranean and doesn't thrive outdoors in cool, wet summers.

Parsley: There are two types of this popular herb: curly and flat leaved. The flat version is the more flavoursome of the two. The seed should be sown in March/April, in lines 45 cm apart and thinned to 5 cm apart. A sowing may also be made in July for winter and spring use. Parsley can also be raised in modules and planted out. It's a biennial plant and several cuttings can be taken from a single sowing before the plants go to seed