Factsheet

Organic Leek Production

Leeks offer the potential of an extensive period of production, harvesting from August until May the following year if appropriate varieties and planting times have been used. Although harvesting costs are high and may involve much hand labour, leeks command a good price from both wholesale and retail markets and can provide high returns.

Soil type, fertility requirements and rotations

Leeks can grow on most soil types, although they particularly like well-drained soils that retain some moisture and have plenty of organic matter. In heavy soils care must be taken to avoid compaction.

They are not demanding and do well on the residual fertility of previous crops. In a rotation they can come after something more nutrient hungry. Some growers apply composted farmyard manure to encourage the production of larger leeks.

They are usually established from transplants and so can follow a short term green manure. However leeks should not follow a long-term grass ley due to risk of wireworm infestation.

Leeks belong to the allium family which should not be grown in the same place in more than one year out of four to avoid pest and disease problems. If white rot (Sclerotium cepivorum) is known to be present then alliums should be taken out of the rotation altogether for at least 20 years.

Young leek plants are not very competitive against weeds so it is wise to use a phase of the rotation that is likely to be relatively weed-free.

Seed variety choice

The varieties grown should meet the needs of your customer/s, so your intended market should be identified and arranged before selecting which varieties to grow. It is also very important to grow suitable varieties for each production period. Seed catalogues should contain the information needed to make these choices, and available organic varieties are listed online at www.organicXseeds.co.uk.

Factsheet

Production periods

Leeks fall into four distinct production periods which require different planting times and types of seed variety;

Type	Sow*	Plant out	Harvest	Main variety types
Early	**January/February** under protection to produce bare root or modular transplants	**Late April** - use a fleece to acclimatise the plants until they are growing steadily.	Late July/August	Swiss Giant or Autumn Mammoth
Autumn / Early Winter	a) **March** in outdoor seedbeds for bare root transplants or b) **March to May** in modules/blocks under protection	a) **June/July** b) **May/June**	Mid-September to December for early bulking varieties	Autumn Mammoth
Winter	As for autumn varieties	As for autumn varieties	December to March	Autumn Mammoth and Blauwgroene Winter
Spring	a) **March/April** in outdoor seedbeds or b) **May/June** in module/blocks	a) and b) **July/August** †	April/May the following year, before plants bolt.	Autumn Mammoth and Blauwgroene Winter (variety must be able to withstand the winter and stand without bolting)

**For direct-drilling use the date for outdoor seedbeds*
† ***N.B.*** *Plants should not be too advanced at onset of winter. They bulk up quickly the following spring with increasing day length and warmer temperatures*

Plant-raising

Leek crops are established either by direct drilling the seed, or by transplanting young plants which have been raised organically as bare-rooted transplants, or as plug plants in modules or blocks.

Direct Drilling

This is the cheapest but riskiest method. In non-organic production direct-drilling is used in conjunction with herbicide applications. Without the use of herbicides it is difficult to establish a viable crop due to competition from weeds. Leeks are slow germinators, especially in low soil temperatures, taking two to three weeks to emerge. The seedlings are slow to develop and so are easily out-competed by fast growing weeds. In an organic system flame weeding may be a solution (see below), alternatively the transplant method could be more suitable.

Direct drill seed 4-6.5cm apart, depending on desired size, and allow for 50% wastage.

Factsheet

Module or block transplants
Modules may be single- or multi-sown, blocks are normally multi-sown due to the relative cost of compost. Aim for two plants per block or module when multi-sowing, although three are acceptable. Generally leek seed has poor germination (with the exception of some newer varieties) so three seeds often only produce two good plants. However compensating for this by sowing more than three per block or module may result in smaller, and possibly intertwined and twisted, leeks. Therefore it is important to sow carefully and accurately.

'Peg' or bare root transplants
These transplants are raised in a seedbed at a high density drilling, such as 90-120 seeds/m. Early sowings from March onwards must be kept well weeded because of the the long germination time and slow early growth. Later sowings will germinate and grow faster in the warmer soils. The young plants are transplanted when at pencil thickness. Leaves can be trimmed to reduce transpiration at transplanting and to prevent the seedlings from bending over. With this system of transplant production root infections by fusarium are a risk.

Transplanting

There are several machines suitable for transplanting leek modules or blocks which should be planted as deeply as possible (and vertically to reduce the incidence of bent shanks). The tall Swiss Giant and Autumn Mammoth types will grow well if planted shallower. Bare root transplants can also be 'dibbed' mechanically. Holes should be deep, around 15cm, and the plants are dropped in with a little soil to cover the roots. Where machinery is not available all types can be transplanted by hand.

Autumn Mammoth and Swiss Giant types are also well suited to planting through a black plastic or paper mulch, though trickle or tape irrigation will then be necessary. Leeks could be transplanted this way after the harvest of an early crop such as broad beans, peas or early potatoes.

Spacing
Leeks are very sensitive to spacing; lower densities equal larger plants and vice versa. Therefore match the density within and between rows to the desired size for any particular market. Generally the spacing between rows is dictated by the weed control system (see below), so the final field density (and leek size) will be determined by the spacing within the row.

Where mechanical weeding is used 40cm row widths is typical. Soil compaction reduces growth so ensure adequate space for tractor wheels, particularly in wet conditions. Smaller, hand-weeded areas can have rows as close as 30cm apart.

Depending on the desired size of the final crop, within row spacing of multi-sown modules and blocks should be between 15 and 30 cm. Single-sown modules or bare rooted plants can be spaced at 8cm to produce small leeks for the pre-pack trade, or up to 15cm to produce a larger plant for the wholesale and retail trade. The weed suppression effect of a mulch means you can plant closer.

Factsheet

Irrigation

Irrigation is necessary for all leeks to aid establishment and during dry spells in the summer to prevent a check in growth. Whilst it is clearly important for summer and autumn maturing crops, it also applies to the spring-maturing plants. Though these plants should not be too advanced as they go into the winter, lack of water during the summer can result in poor yields at harvest time. Damage from cutworms and thrips can be reduced through regular irrigation during the summer.

Weed control

Flame weeding

Direct-drilled leeks require a thorough programme of weed control at the pre-emergence and seedling stage. When used correctly, flame-weeding can significantly reduce weeding costs. The process involves burning out weed seedlings before the slower-germinating leek seedlings emerge. It is most effective against weeds in the early cotyledon stage. Delaying sowing by a few days after the preparation of the seedbed may allow the weeds to emerge significantly ahead of the crop.

The leaves of leeks grow from the base of the plant which makes flame weeding possible (sometimes twice) up to the 'crook' stage of development. However the whole field should be inspected prior to each flaming as seedlings in different parts of the field may be at slightly different stages.

Tractor mounted flame weeders are available for field scale work, whilst hand-held burners with a backpack for the liquid propane canister can be used for smaller areas. Hoods over the burners will contain the heat and ensure that it is applied uniformly.

Mechanical weeding

Various mechanical implements are suitable for weeding between the rows. Brush weeders and traditional steerage hoes are effective, as well as the inter-row tined cultivators and the Lillystone rolling cultivator. All of these implements can be adapted to throw soil into the rows as well, which smothers the weeds there and creates a degree of ridging to encourage a longer shank and enhance blanching. On wider row spacing a potato ridger can be used to achieve the same effect.

In most situations hand weeding within the rows will also be necessary. Well-established leeks shouldn't be affected too badly by ground weeds as their upright stature allows them to compete effectively for light, however on-going competition from taller weeds should be minimised.

During all weeding procedures great care must be taken not to lodge soil in the base of the leaves.

Factsheet

Diseases

Rust

Rust is one of the most common leek diseases, caused by the fungus *Puccinia porri*. The spores are wind blown and require a wet leaf surface for germination and infection. Orange-red powdery pustules form on the leaf which can cause serious reductions in saleable yields and/or increase trimming costs. Rust is most common and severe from late July onwards in warm, humid conditions though earlier infections may occur, particularly in intensive leek growing areas.

Control options include isolating crops from other leek fields, removing infected debris from previous crops (as the spores can overwinter in the crop and/or debris), and using rust resistant varieties.

White tip

White tip is caused by the fungus *Phytopthora porri*. Initially water-soaked lesions appear on the leaves which then become white and papery at the tip by early autumn. The fungus survives in the soil on infected debris, so infected plants and debris should be removed. The fungus can persist for a long time so if possible avoid growing in areas known to be infected, or at least increase the rotation period between leek crops. There is no information on relative resistance of varieties.

White rot

White rot, caused by the fungus *Sclerotium cepivorum*, infects all allium crops starting at the base of the plant, which then yellows and dies. The resting bodies (sclerotia) of the fungus can survive in the soil for up to twenty years so, once infected, allow for very long breaks between susceptible crops and adhere to strict hygiene measures. Using compost can help suppress the disease[1]

Pests

Leek moth,

A small brown moth, common in southern areas of England in warm dry conditions. The young caterpillars of the leek moth eat into the leaves of the leek to feed leaving whitish brown patches. Older caterpillars tunnel into the stem of the leek which can make the leek rot from the inside. There are two generations of caterpillar each year, the first around May to June, and the second around August to October. The second generation of pupae and moth hibernate in plant debris. Remove caterpillars and cocoons and destroy badly infested plants. Covering plants with mesh will keep them off. Plants will sometime grow through the attack in the following spring but are often smaller as a result making the crop less profitable.

[1] AHDB project FV 219 - Composting of onion and other vegetable wastes

Factsheet

Thrips
During the summer and autumn thrips cause white to silvery blotches or streaks on leek foliage, which may become twisted and die away in severe cases. Thrips overwinter in the soil and lay their eggs in brassica and allium plants in late spring, which hatch within a few days. The nymphs feed on the leaves before pupating in the soil, and a further generation of adults emerge in about a week so damage levels can increase rapidly. Irrigation in dry periods reduces the damage and a wide rotation between susceptible crops reduces overall thrip populations.

Cutworms
Cutworms damage young plants by feeding on the stem just above and below the ground level. Plants become twisted with curled leaves, making them unmarketable. Cutworms are the caterpillar stage of several moth species and may be active from about mid-June onwards. They tend to be more serious on weedy land, which gives good cover for the moth stage, and also on light, well-drained soils. The moths and young larvae die in wet soil so irrigation of crops at risk usually prevents serious damage.

Wireworms
Wireworms are click beetle larvae. They are particularly common in crops following long-term grassland and they can persist for several years. They live in the soil and feed on roots and stems. Rolling the planting or seedbeds can reduce wireworm activity and fast growing, vigorous plants usually escape severe damage.

Rabbits
Rabbits can graze leek crops, particularly when they are young, physical barriers should be used to exclude them.

Nutrient disorders

Leeks are not a hungry crop though inadequate nutrition does lead to growth problems, so if in doubt do a soil test. Leeks do benefit from green manures and applications of composted farmyard manures, though this is principally for their texture and soil conditioning qualities.

Deficiency	Symptoms	Commonly occurs;
Nitrogen	Tip end die-back. Plants show loss of vigour and leaf colour	In light soils
Phosphorus	Dull colour and tip end die-back. Thin and stunted growth	In hardworking soils
Potassium	Older leaves die back from tip but there is no discolouration	In sandy soils, where cropping has created a heavy burden
Magnesium	Yellowing at base of leaf	On light soils but may develop due to poor drainage and compaction

Factsheet

Manganese	Pale green patches on plants developing yellow and green striping	On peat, and on organic soils that have been heavily limed
Boron	Blue green leaves develop, with older leaves yellowing and dying. Cracking and brittleness of lower leaves	In light soils and drought conditions

Harvesting and preparing for market

Harvesting and trimming leeks can be uncomfortable and expensive as it occurs in all weathers throughout autumn and winter. Care should be taken to avoid damage to the soil if using heavy machinery.

While leeks are often lifted by hand on smaller operations, a vibrating undercutter is ideal for larger scale operations. When conditions are favourable the leeks can be undercut and trimmed in the field or transported back to shelter for preparation. Alternatively they can be lifted with their roots before the bad weather hits to be stored and processed over the following fortnight. Stored leeks must be covered with an insulated sheet in freezing weather and stacked to avoid the shanks arching. Care should be taken to avoid soil getting down into the layers of leaves though if leeks are transported before trimming it is inevitable that the shank will become soiled and need washing.

In the UK it is traditional to trim the roots off and leave the hard pad or base plate at the bottom of the shank. If the cut is too high it damages the stem, leading to discolouration and skin curl. Leaves are cut to a few inches and a couple of outer skins removed to produce a clean leek. Alternatively wiping the leek with a damp cloth removes any soil stains which create a dull look when dry.

Continental leeks are often left with their leaves long and this can be popular amongst organic purchasers, though it is important that the leaf is disease-free. Dehydration occurs rapidly when the leaves are left on so they should be stored in a chilled environment.

Pressure washers with fine sprays can be used to wash leeks on a rotating wire frame or attached to roller tables. Machines exist to top, tail and spray-wash leeks, but they are expensive and not always efficient for smaller growers so often it is often done manually. It is an expensive operation, particularly if the leeks are small, so aim for a minimum size of 5 to 7 leeks per kilo to keep handling costs down. Cleaning leeks can be seen as a way of employing spare labour in the winter, but the crop needs to command a reasonable price to be profitable; if own labour is used then they can be particularly financially rewarding.

Leeks are usually packed in packs of 7lb, 10lb or 5kgs. Many UK growers use green and white nets to show off the crop colour, but they can have an abrasive

effect and may tear the leaves. Wooden and plastic returnable crates are more expensive but also more protective and easier to palletise.

As with any crop, it is wise to retain samples after dispatch to be able to monitor shelf life and adapt procedures where necessary. It may also be sound practice to regularly cut the samples open to determine whether frost damage or has occurred or bolting has started.

Pre-pack

Leeks for the pre-pack trade are unpopular with some growers due to the high wastage necessary to make the plants fit the specifications. It is difficult to grow small leeks at a high density in an organic system due to the need for mechanical and hand weeding. Consequently the organic grower tends to have fewer, larger leeks which are less suitable for tray pre-packs.

Pre-packed leeks are trimmed leaving a short 'beard' of root to enable a fresh cut into the base plate prior to packing. The leaf is cut to within 2-3cm of the desired length and all diseased material and some outer layers are stripped back to give a bright appearance. This allows for a further cut in the freshening up process prior to pre-packing.