

Organic Vegetables in Scotland An Introduction

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Demand for organic vegetables is increasing steadily but over 80% of UK supply is imported. Imported organic vegetables include types widely grown by conventional growers in Scotland. These vegetables may offer a starting point for large scale organic production. Purchasers of organic produce are often keen to support local growers through box schemes and farmers' markets. This can make organic vegetable production viable on a much smaller scale than conventional production.

Essential Requirements for Organic Vegetable Production

Land

Vegetables are much more exacting in their requirements for soil and site than most agricultural crops. Organic vegetable production will not be an option for many farms because soil and situation are unsuitable. So long as demand for organic vegetables greatly outstrips supply, there will be a sufficient price premium to allow production on less than ideal sites. If supply and demand move into balance organic vegetable production will be economic only on favoured sites.

Land suitable for conventional vegetable production will sometimes be unsuitable for organic vegetable crops. This particularly applies where conventional production depends on synthetic fungicides to control soil borne diseases such as cavity spot of carrots or foot and root rots of peas on heavy soils.

Equipment

Programmed production of quality vegetables often requires expensive and sophisticated equipment not found on most farms. Irrigation is essential effectively to programme crops such as calabrese, cauliflower and lettuce. Adequate water of suitable quality must be available. Microbiological standards of water must be considered for salad vegetables such as lettuce. Facilities are required to cool perishable crops such as lettuce and calabrese quickly after harvest.

Labour requirements for operations such as transplanting and harvesting can be dramatically reduced by mechanisation. Nine row transplanters give obvious labour savings over three row planters and harvesting rigs are much more efficient than harvesting into crates or sacks. Selection of an appropriate degree of mechanisation will depend on the individual business but economies of scale achievable by using large machines over large areas are considerable.

Labour

Vegetable crops are demanding of both manual and managerial labour. To achieve acceptable quality many vegetables have to be harvested within a time window of only one or two days. Sufficient labour, equipment, transport and a market outlet must be available when needed. Many perishable vegetable crops are harvested sequentially from, say, May to October extending the demanding harvest period over many months.

Labour difficulties of organic vegetable producers are compounded by the hand weeding requirements of many crops.

Sources of labour must be found before establishing vegetable crops. Casual labour may be available through local organisers. Foreign students are widely used in horticulture but supply is limited and controlled by Government. Some workers, may, however, find the idea of working on an organic holding attractive.

Markets

The fundamental advice to prospective growers of horticultural crops is always 'find a market before establishing the crop'. With demand outstripping supplies of most organic vegetables this is less likely to be a problem for organic growers but the advice remains pertinent. Many vegetable crops are highly perishable and if not marketed when mature will quickly go to waste.

In Scotland almost no organic vegetables are sold through traditional wholesale fruit and vegetable markets. This limits outlets available for produce not of supermarket quality. Small scale producers often market their crops direct to the public at the farm gate or through box schemes. A number of specialist companies pre-packing vegetables for supermarket and other outlets have been set up and some companies packing and marketing conventional vegetables are interested in organic supplies.

Depending on market outlet there will be legislative requirements particularly relating to health and food safety, weights and measures and EC Quality Standards for Horticultural Produce.

Vegetable Production in Scotland

Conventional vegetable growers in Scotland specialise in relatively few crops. Areas grown are shown in the table.

Scottish Vegetable Areas 1998

Crop	Area (ha)	%
Peas & Beans	4370	39
Culinary Swedes	1990	18
Carrots	1760	16
Calabrese	1360	12
Others	1740	15
Total	11,220	100

Peas and beans, swedes, carrots and calabrese together accounted for 85% of Scotland's vegetable area in 1998.

Scottish vegetable growing is also concentrated geographically. Nearly all Scottish vegetables are grown along the east coast from the Moray Firth to the Borders. Large scale production with economies of scale has become essential to produce conventional vegetables successfully and the great majority of production is undertaken by around a dozen companies.

Scotland has inherent natural advantages for growing peas and beans, swedes, carrots and calabrese. These advantages also apply to organic production and these crops seem a logical starting point for considering organic cropping on a large scale. Small scale producers for local markets may find a wider range of crops appropriate.

Peas

To date, growing processing crops such as peas organically has been relatively unattractive because of the lower prices paid than for fresh produce. Processors are now becoming more interested in organic crops and more willing to pay prices which make production worthwhile.

Peas are widely grown in Scotland because cool summer weather delays maturity and extends the optimum harvest period. They are nitrogen fixing with low nutritional requirements and even in conventional systems are usually grown without fertiliser applications. Heavier soils, which carry a risk of foot and root rot, should be avoided. In Scotland pea moth and pea midge are not troublesome and aphids are the major insect pest. The major obstacle to organic production is weed control, particularly weeds producing seeds or seed heads which may contaminate peas, such as deadly nightshade, thistle, poppy and mayweed. Considerable hand weeding may be necessary to minimise this problem. Weed control may also be effected by rotation, possibly cropping peas after a grass ley, and spring tine harrowing.

Vining machines for peas are very expensive. Peas should, therefore, be considered by existing producer groups rather than individual farmers. Organic production systems for this crop, particularly in relation to weed control, require further investigation.

Swedes

Production of culinary or shopping swede is applicable to more farms than the other vegetables. Swedes are grown on several upland farms, which would not consider other vegetables, with benefits of reduced pest incidence. Significant areas of swedes are grown further to the west of Scotland than other vegetables, particularly in Perthshire. Soil conditions, however, can make these areas unsuitable for lifting after Christmas. The value of swede as a fodder crop may also make them attractive to some farmers.

Swedes have a lower nitrogen requirement than most vegetables, which can be met by use of fertility building crops and/or permitted manures. Magres is the main cultivar in Scotland and its resistance to powdery mildew makes it suitable for organic production. Swedes are grown on beds (4 rows on 182cm bed centres) or ridges. Both systems allow inter-row weeding by steerage hoe or, more commonly, brush weeders. Land for swedes is usually stone separated and this creates a good working surface for mechanical weed control. Hand weeding within the rows may also be needed and this can be easier when ridges are used.



Weed growth in swedes before (right) and after (left) brush weeding

Provided a cultivar resistant to powdery mildew is chosen, disease problems are unlikely, although root blemishing diseases such as black crater (*Rhizoctonia solani*) and dry rot (*Phoma lingam/Leptosphaeria maculans*) damage a small number of crops each year.

The major problem for organic (and conventional) growers of culinary swede is control of second generation cabbage root fly. In Scotland this pest is almost ubiquitous and good control under organic management is only likely to be achieved by covering crops with fleece or fine mesh netting to exclude adult flies physically.

Slug control also presents difficulties to organic growers. Fields with low slug populations should be chosen particularly for late, overwintered crops which are at high risk.

Carrots

To date carrots have been the most popular crop for large scale organic vegetable growers in Scotland. Carrots are not demanding nutritionally. Carrot fly, which can be difficult and expensive to control organically, is absent from some parts of Scotland and although weed control can be expensive some lucrative returns have still been achieved.

Carrots require deep sand to sandy loam soil to give well shaped, straight roots and good skin finish. These soils also allow harvesting to take place throughout the winter. Very sandy links type soils are less suited for organic production because of nutritional difficulties. Land is usually stone separated before drilling.

Like swedes, carrots may be grown on beds or ridges. A wide range of plant populations is used to achieve roots of different size, and row arrangements require modification to suit. Intra-row spacings are much less than for swede and carrots are less weed competitive so more labour for hand weeding is required.



Organic carrots grown on a bed system

Stale seedbeds may be used prior to drilling followed by thermal or flame weeding just before emergence. Flame burners designed for potato haulm destruction have been used. It is helpful to monitor seed germination by sowing extra on the headland and marking it with a stick. Without a coloured seed dressing carrot seed is otherwise difficult to find. Accurate timing of flame weeding is essential. After emergence, weeds between rows can be removed by steerage hoeing or brush weeding but hand weeding will also be required. This is usually achieved using a weeding bed - a framework drawn over the crop on which operatives lie, reaching down to remove weeds.

Cavity spot is the main disease problem. Some cultivars, such as Nairobi, have useful resistance to this disease and soil can be tested to assess risk levels of individual fields. Adequate rotation is the main control measure.

Carrot fly is the dominant pest problem. Traditional carrot production areas in Scotland have damaging populations of carrot fly but other areas may still be carrot fly free and there precautions are not needed. Growing carrots repeatedly in areas where there are currently no carrot flies will eventually build populations to damaging levels. Carrot fly can be monitored using yellow sticky traps - if carrot flies are caught it may be possible to avoid severe crop damage by bringing forward lifting dates.

Late sowing can be used to avoid first generation carrot fly. A quickly bulking variety is then necessary. Some varieties such as Sytan possess limited but useful resistance to carrot fly. Fleece or fine mesh covers offer effective control of carrot fly.

Techniques used by conventional carrot growers to manipulate harvest date, such as polythene covers for early crops, or strawing down overwintered crops can also be applied by organic producers.

Calabrese

Calabrese is widely grown in Scotland because heads mature slowly in the cool summers allowing a higher proportion to be harvested than further south. Calabrese has a much greater nitrogen requirement than peas, swedes or carrots and should be placed in the rotation when soil nitrogen levels are at their highest, following fertility building crops. Permitted organic manures and composts may also be required.

Calabrese can be transplanted or direct drilled. In organic cultivation, transplanting is preferred because this reduces the period during which crops are susceptible to pests and to weed competition. Transplants grown to organic standards can be purchased from some propagators. Transplants may also be grown on farms where soil grown transplants may be easier than modular transplant systems.

Various spacings are used depending on head size required. Most crops, such as those for crown heads at, say, 60cm by 45cm are well suited to inter-row cultivation systems with hand weeding within rows as required.

Spear or head rot is the major disease of calabrese. This bacterial disease develops rapidly in humid conditions, particularly when temperatures are high. There are no organic controls (and only limited conventional controls).

A number of pests can cause severe losses in calabrese crops, mainly by contaminating heads. The bacterial insecticide *Bacillus thuringiensis* can be used to control caterpillars but cabbage aphid is very troublesome in hot seasons and cannot be controlled easily. Cabbage root fly control may also be problematic, depending on time of planting in relation to egg laying by the pest. Fleece or fine netting covers will offer effective pest control but will only be viable on a small scale.

Other Field Scale Vegetables

Other vegetables grown in Scotland on a field scale include lettuce, leek, cabbage, cauliflower and Brussels sprout. The shorter growing season in Scotland limits yields of many of these crops to below those achieved further south making Scottish production poorly competitive. For organic production, however, Scotland has significant counterbalancing advantages, particularly a lower incidence of 'difficult' pests such as cabbage aphid and cabbage root fly.

Field scale organic production of some of these crops may be feasible in Scotland but requires careful evaluation of the costs and returns at yields likely to be achieved. Market outlets chosen and price available will be critical.

Small Scale Vegetable Production

Small scale organic vegetable production may be undertaken to supply local markets by box schemes, roadside sales or farmers' markets. Requirements of these markets are very different to those of supermarkets and other volume customers. Box schemes and similar marketing systems require a variety of produce: availability of individual items during every week of the season is less critical. Direct sales to the public should also achieve higher prices than sales through intermediaries.

Higher prices achieved by direct sales support the range of crops demanded by customers and the higher costs of small scale producers. The range of crops grown and small area of each restrict possible mechanisation and different techniques, which would not be viable on a field scale, become appropriate. Examples include planting through paper or plastic mulches for weed control and greater use of fleeces or netting to exclude pests.

Opportunities for smaller scale production also occur where markets for a crop are small, or crops are unsuited to large mechanised production. Examples include speciality salads and herbs.

Vegetables in Scottish Organic Agriculture

Including vegetables in rotations has potential to increase profitability of organic farms in Scotland. Vegetables may be grown by the farmer himself or he may choose to follow common practice with conventional growers and rent ground to a specialist vegetable grower. Premium rents are currently being paid for land of organic status.

Farms with the majority of the rotation in vegetables are common in the Lincolnshire Fens and Holland but rare in Scotland. Most vegetables in Scotland are grown as part of an agricultural rotation. This practice is likely to be favoured by organic growers: crops such as carrot or swede can be included at a suitable point of the rotation but only form a small part of cropped area.

Vegetable production must only be undertaken where land is suitable and the whole system thought out beforehand. Problems should be predicted and, where possible, prevented. There are very few organic crop protection treatments available for most vegetables: as well as organic standards any treatment applied as a pesticide must also comply with The Food and Environment Protection Act 1985 and the Control of Pesticide Regulations 1986.

Organic production systems are likely to be much less standardised than conventional and more adapted to the circumstances of individual farms. Many aspects of organic cultivation interact such as plant spacing, variety and weed control. With swedes a cultivar with upright leaves such as Magres competes relatively poorly with weeds but easily allows inter-row cultivation whereas a cultivar with a spreading growth habit such as Helenor is more competitive with weeds but much more difficult to weed between the rows. Cultivar chosen then depends on the intended weed control practice and *vice-versa*.

Scotland has advantages for the production of many organic vegetables, such as reduced incidences of many pests and slow maturity of many crops in the cool summers. By choosing and exploiting crops, which utilise these advantages, organic farmers in Scotland can benefit from introducing vegetable production.

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