

Organic pumpkin production

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INTRODUCTION

Pumpkins are a good choice for the grower who is considering organic vegetable production, as they may be included early in rotations or in a conversion plan. Other vegetables in this category include squash, gourds, cucumbers, rockmelons and watermelons.

Given favourable growing conditions, organic pumpkins will yield around 40 tonnes to the hectare, are relatively easy to store, handle and transport and,

if markets are not over-supplied, can provide a good return for producers. The organic market should be well researched as oversupply is a danger.

VARIETY SELECTION

Markets should be assessed prior to planting to determine consumer preference. Butternuts, Jarrahdale and Jap pumpkins are commonly grown. Organic markets may prefer some of the older varieties, while processors may be quite specific in their requirements. If over-supply occurs, you may have to sell your



An organic pumpkin crop at NSW Agriculture's organic demonstration site at Yanco. Pumpkins are a good choice to include in an organic rotation, early in the conversion phase.



A green manure crop of field peas, oats and faba bean ready for ploughing.

produce on the conventional market. With this in mind, you may wish to consider growing varieties such as Japanese hybrids that sell well in conventional markets.

Varieties will differ in their yielding ability, vigour and pest and disease resistance so it is advisable to investigate how the variety selected performs in your region. The growth characteristics of the variety will also determine cultural aspects such as planting distance.

DISCLAIMER

The information contained in this publication is based on knowledge and understanding at the time of writing (December 2003.) However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Agriculture or the user's independent adviser.

ALWAYS READ THE LABEL

Users of agricultural or veterinary chemical products *must always* read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this publication.

Production of pumpkins is usually from seed sown directly in the field. The National Standard for Organic and Bio-Dynamic Produce requires seed to be organically produced, unless suitable quantity and quality is unavailable, so a reputable supplier will need to be found. Records proving that an effort has been made to source organic seed must be provided to the organic certifier. If an open-pollinated variety is grown it will produce seed that will breed true to type (provided cross-pollination with other pumpkin or squash varieties does not occur) so, alternatively, you could raise and collect your own seed.

ROTATION DESIGN

Pumpkins prefer a high nutrition regime that would generally follow a green manure (legumes and grasses) or an intensive composting program.

Pumpkin's spreading growth habit and leaf size gives it a competitive advantage over weeds, and provides an opportunity as a 'cleaning' crop to precede a less competitive vegetable such as onions in the rotation. Potatoes are another excellent cleaning crop and if grown back-to-back with pumpkins in a rotation can provide a good preceding rotation for root crops, which are among the most difficult of vegetables to keep weed free.

To minimise the risk of disease carryover, pumpkins ideally should not be grown where another member of the cucurbit family e.g., watermelons, cucumber, zucchini, has been grown in the previous year.

Organic standards require that no annual crop of the same species, family, or similar characteristic be planted for more than 2 years out of 5 within the rotation. Furthermore, the standards require that a green manure, annual legume or pasture ley phase be grown at least one year in three, except where soil fertility and structural characteristics are entirely met by the importation of composted manures or other permitted varieties of organic matter.

GROUND PREPARATION AND PLANTING

Like other vegetables, good seedbed preparation is essential for pumpkin production. The seedbed should be weed free and reasonably clod free.

Pumpkins are generally grown on well-formed beds. Following green manure incorporation and scarifying, the field is hilled and, if compost is to be applied, it is deposited between a series of hills, which are later combined to form a bed. This places the compost directly below the planting row, allowing the pumpkin immediate access to the compost as it grows into it.

Alternatively, compost application could be split, with half applied and incorporated during primary tillage, thus facilitating decomposition of the green manure, and the remainder applied during bed forming or surface-applied following planting.

Seed is normally sown direct, when the risk of late frosts is well past and when soil temperatures have warmed (a minimum of 15°C). In inland New South Wales sowing begins in early October.

When planted in continuous rows the seeds are sown rather thickly, and when the pumpkin plants are at the 3 to 4 leaf stage, they are thinned to 0.8 – 1.3 metres apart within the row.

CROP NUTRITION

Achieving good yields of a quality product will depend on achieving a balance of soil elements, good organic matter and a biologically active soil.

Pumpkins will tolerate slightly acid conditions but prefer soils that are high in organic matter. Compost applications of around 10 tonnes / ha are commonly incorporated with green manure prior to cropping.

A soil test should be carried out following green manure incorporation and prior to planting to determine the crop requirements. Pumpkins are



Compost is an important addition to an organic soil management program. This compost was produced at the Yanco organic demonstration site.

relatively heavy nitrogen feeders and since N in compost is slowly available, an additional application of a commercial organic fertiliser may be required at planting.

Foliar applications or fertigation (applied through a micro-drip irrigation system) with approved organic products can be used to correct temporary nutritional deficiencies. A foliar application of fish emulsion, seaweed or garlic extract may also help to repel certain pests.

WEED MANAGEMENT

The most critical period for effective weed management is prior to crop establishment.

Pre-irrigation or rainfall will germinate weeds, after which a shallow cultivation or flaming will remove weeds prior to sowing.

Weeds need to be kept in check until the pumpkin vines have covered the beds. This can be achieved either by removing weeds by tillage with an implement such as the WeedFix® (see photo next page) hand weeding or mulching the entire bed. Mulching can provide additional benefits including moisture



The Weedfix® cultivator is an effective implement for controlling post-emergent weeds in crop rows. It is a cultivation machine consisting of a series of rotating tines that remove young weeds through a ‘stirring’ action on either side of the crop row. Crop guards, mounted adjacent to the tines, protect the crop from damage.

retention and can provide a ‘clean’ barrier between fruit and the bare soil, thus preventing staining of the underside of the pumpkin.

Hand weeding during early crop establishment is the usual method of intercrop (between plants within a row) weed management, since weeds are difficult to control with cultivating implements without damaging the crop. Thinning time provides an opportunity to remove weeds that have grown within the crop row.

PESTS AND DISEASES

Pests

Significant pests of pumpkin include the 28-spotted ladybird (*Epilachna* spp.) and the pumpkin beetle (*Aulacophora hilarus*). Both these pests have a migratory habit, often flying in to a crop in large numbers from weeds or other nearby crops. They are most likely to be a problem during establishment when plants are small (during this stage they may skeletonise a young plant) and during flowering when fruit set may be affected. Older plants can generally tolerate a larger pest load.

Crops attractive to pests should not be grown adjacent to the pumpkin crop and should be avoided prior to the pumpkin crop being planted. Removing host weeds also helps to reduce problems. Alternatively,

some plants may be more attractive to these pests and these may be strategically planted to act as a trap crop to draw the pests from the commercial crop.

Established organic producers often suggest that plants that are attacked by pests are suffering some form of stress. This could be moisture stress or a nutritional deficiency. Irrigation should be monitored to avoid moisture stress, while a leaf sap or tissue analysis can determine the nutritional status of the growing crop.

Some naturally derived pesticides are permitted for use in organic standards. However, this use should not be the primary form of control. Care should be taken when using these products as some may be toxic to non-target species and may also affect human health.

Diseases

Powdery mildew

The most common disease affecting pumpkins in inland areas is powdery mildew (*Oidium* sp.). Powdery mildew generally does not require moist conditions to establish and grow, and normally does well under warm conditions; thus they are more prevalent than many other leaf-infecting diseases in the dry summer conditions of inland NSW.

Powdery mildew first appears as white powdery spots



An oat crop that has been slashed to form a mulch over the pumpkin beds prior to sowing at Yanco.

that may form on both surfaces of leaves, on shoots and sometimes on flowers and fruit. These spots gradually spread over a large area of the leaves and stems. Leaves infected with powdery mildew may gradually turn completely yellow, die and fall off, exposing fruit to sunburn. Severely infected plants may have reduced yields, shortened production and fruit with little flavour.

Planting varieties that are least susceptible to powdery mildew is the primary method of control. Varieties differ in their susceptibility and seed companies should be able to provide you with a resistance rating for your chosen variety.

Old crops that are infected should be ploughed under as soon as possible following harvest. Crops should be rotated every 3 to 4 years and growers should avoid planting a new crop right next to an older, diseased crop.

Seed should only be saved from healthy fruit.

The web site <http://www.attra.ncat.org/attra-pub/PDF/powdmildew.pdf> provides organic control options for powdery mildew in cucurbits.

Downy mildew

In coastal districts downy mildew (*Pseudoperonospora cubensis*) is more common and is favoured by cool, wet

weather. Symptoms are yellow leaf spots that soon turn brown. Faint purple spore growth develops on the lower leaf surface and if the spots are numerous, the leaf shrivels and dies. Control is usually achieved organically with copper sprays (note that under the national organic standards this is restricted use).

Other problems

Failure of pumpkins to set fruit is usually as a result of inadequate pollination and / or excessive amounts of nitrogen in the soil. Bee hives can be hired for the season from bee keepers: 2 – 3 hives /ha is needed to ensure good pollination.

HARVESTING AND MARKETING

Following hand removal (cutting) of the vines, pumpkins may be field cured or cut from the vines and cured in well-aerated bins in storage. A light frost will kill off vines and facilitate harvest by exposing the fruit. There is some anecdotal evidence to suggest that allowing the vines to be frosted may also improve the flavour of the fruit. Heavy frost, on the other hand, may damage the pumpkin skin, especially thin types such as butternuts, leading to fruit breakdown.

A field elevator will assist in lifting fruit from the field and into field bins.

Bins should allow for adequate aeration and should be removed to the packing shed as soon as possible.

Packing and storage

Once cured, the pumpkins should be graded and packed according to market requirements. Wholesalers usually prefer fruit packed into bulk cardboard bins. Boxes or cartons should be labelled with your name, certification number, the certifier's logo, date packed, batch number (if selling in batches), variety and grade.

Pumpkins will store up to three months, depending on variety and storage conditions. Only sound fruit should be stored and these should be checked regularly and any rotting fruit removed. Butternuts should not be stored under cold conditions.

Marketing considerations

Storage will allow marketing over a period of time. This may help to avoid market oversupply. If other growers are supplying the market at the same time, it may be worthwhile coming to an agreement whereby supplies of produce into the market are alternated between growers. By doing this, all growers may receive better market prices.

Pumpkins are also processed into frozen, pureed for baby food and pie fillings, made into jams and used in dried products. Value-adding pumpkins could be done on-farm (facilities will need to be inspected by the certifier and will need to meet health standards) or by a certified processor. If supplying a processor, their requirements (such as variety, size and maturity at delivery) should be determined prior to planting.

The economics of organic pumpkin production will depend on costs of inputs (labour, fertiliser) the yield, quality, the type of market you target (fresh or processed) and supply and demand for your product.

CONTACTS AND FUTURE READING

Vegetable Agronomy

District Horticulturist
NSW Agriculture
Yanco Agricultural Institute
YANCO NSW 2703

Vegetable Entomology

Technical Specialist Vegetables, Yanco

Vegetable Pathology

Research Pathologist Vegetables, Yanco

Further reading

Organic Produce Export Committee (OPEC), now



Organic baby food is among the products made from organic pumpkins. Photo courtesy of www.GoodnessDirect.co.uk.

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See also the web site www.aqis.gov.au/organic

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