

Organic potatoes: Cultivating quality – step by step

A new technical guide on potato production, from FiBL in Switzerland, focusing on achieving quality end-product, has been translated into English. The adaptation of the publication into an English version has been enabled by the Organic Knowledge Network Arable (OK-NET) project and coordinated by ORC. The guide provides a fresh perspective on potato growing and challenges some widespread practices in UK production. **Phil Sumption and Dominic Amos** of ORC discuss the guide's recommendations and the implications.

Position in rotation

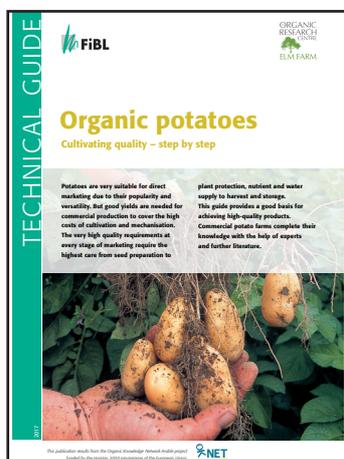
There is some useful guidance on managing potatoes within a rotation. Due to the high nutritional requirements of potatoes, particularly for nutrients to be available shortly after emergence, the recommendation is for preceding crops that support the looseness and structure of the soil and leave a high amount of easily degradable organic material. Suitable preceding crops include a one-year grass/clover ley, one-year fodder and grain legumes (field beans/peas with a cover crop, field vegetables/roots, cereals with legume cover crops). Longer grass/clover leys may promote wireworm, scab, dry core and slugs and the breakdown of the residue is slower than a one-year ley.

If early tillage is needed to prepare for potato planting, cover crops that are killed by frost in winter should be cultivated. The succeeding crop should be one that utilises the available nitrogen in the autumn such as winter cereals, brassicas or green manure such as rye. Minimal tillage will preserve the soil structure and allow frosting of remaining tubers, to avoid volunteers (provided the winter is hard enough).

Nutrient supply

The importance of getting the nutrient supply right is emphasised for quality production. Examples are:

- To prevent *Rhizoctonia* (Black scurf), use only well-rotted manure and apply it in the autumn on the preceding or catch crop. Composted plant material applied in the planting furrows can also reduce *Rhizoctonia* infestation.
- A good supply of potassium and magnesium increases the quality, prevents damage and internal bruises and improves shelf life. Excessive fertilising with manure leads to a decrease of starch and dry matter in the tubers.
- Too much nitrogen can create large, dense foliage which delays tuber formation and decreases growth rates. Early infestations of potato blight could result in losses in yield/revenue.
- Liming before or during the cultivation of potatoes increases the risk of scab infection.
- A high nitrogen supply in late summer can have a negative effect on dry matter and nitrogen content, and hence on flavour. It can also increase susceptibility to damage, and to discolouration, as well as reducing storability.



Potatoes at Wakelyns - June 2014

Fred Bonestroo – Close Farm, Tetbury

At the heart of my late blight limitation strategy is the selection of resistant varieties. I grow six main varieties that all offer reliability and security. I grow four of the most blight-resistant potato varieties available: Allouette, Cara, Carolus, and Toluca. I also grow Agria because of its all-round use and great yield even though it's not very blight resistant but is manageable. I grew Rudolph for the first time this year which looks to be a nice potato, but I will try something different next year. Agrico run field days with trial plots of blight resistant varieties that allow me to select what to grow. Each year I try out new varieties and will give out free samples of these to the box schemes to help introduce them to the consumer.

Measures combined for late blight control:

- Number one is selecting resistant varieties, either from Bioselect or from the Sarvari Trust.
- I try to plant as early as possible as I can't extend the growing season at the other end due to the risk from blight. I do chit very early potatoes but as a small grower don't have the time, facilities or labour to chit the maincrop.
- I use wider in-row spacing (approx. 41cm) to decrease the competition between crop rows and also get more air circulating around the foliage.
- I've stopped cropping the headlands as this is often compacted and the area where the crops struggle and are least healthy.
- I don't apply too much farmyard manure as there is usually enough fertility from the ley, but if I do use it, I make sure it's well composted. I don't believe in pushing the crop too hard. I've found that growth cracks and scab can occur when too much farmyard manure is added, and I prefer a slightly lower yield that stores well and tastes better.
- Once the blight infection has come into the crop, I burn off the foliage of infected plants to prevent the disease spreading to other plants and to the tubers.



Soil and seedbed preparation and planting

Chitting potato tubers before planting is recommended, as it shortens the time to harvest by 10 to 14 days, reducing the risk of late blight infection. Chitting accelerates emergence and thus reduces the likelihood of the sensitive sprouts being infected with *Rhizoctonia* or *Erwinia* (Blackleg). The costs of £500 to £600 per ha are reclaimed through higher yields and yield security, the guide says. Chitted tubers should be planted only with the appropriate technology (rolling-floor planter, belt planters) to prevent breaking off sprouts. Tillage or planting during wet soil conditions leads to clods, deformed tubers and damage during harvest. Cold, wet soils can promote *Rhizoctonia* infection. To improve warming of soils, shallow ridges should be made from the start.

Crop husbandry and weed control

The goal is to create a large, stable, centrally positioned ridge, to open up surface crusts for better aeration and to control weed growth until crop covering. Hoeing damages the delicate root hairs at the side of the ridge, and can also lead to damage on the leaves. Roots and leaves can thus become ways for diseases to enter the plant. A balance is needed between types and number of passes for weed control and avoiding damaging the plants. It will vary by soil type, but alternating harrowing and ridging is recommended, up to a crop height of 10cm (plants bigger than fist size should not be covered).

Protection of leaves from pests and diseases

An integrated systems approach should be taken for leaf and tuber blight. It should integrate the use of:

- i. Resistant varieties
- ii. Available agronomic control strategies (e.g. chitting, making large ridges without cracks, spatial separation of early and late crops, avoiding excess nitrogen and heavy weed infestations)
- iii. Alternative treatments (e.g. organically-based fungicides, plant 'strengtheners' and bio-control agents which can replace synthetic and copper-based fungicides) and
- iv. Optimisation of blight control treatments utilising existing blight forecasting systems with the aim of maximising synergistic interactions between (i), (ii) and (iii).

The development of this systems approach took place in the EU project Blight-MOP. More recently the Co-Free project investigated the potential for innovative methods, tools and concepts for the replacement of copper in European organic and low-input production systems (See ORC Bulletin No.121). Potato Cyst Nematode (PCN) control also requires an integrated approach including choosing resistant or tolerant varieties, removing volunteer potatoes and working within sustainable rotations. Soil sampling should be done regularly to identify and monitor the threat and biofumigant crops such as mustard can be chopped and incorporated into the soil to help kill PCN eggs.

Irrigation

The importance of soil moisture at key times is emphasised in the guide. Sufficient moisture at the time of tuber formation (initiation) prevents common scab infection (*Streptomyces scabies*). Sufficient moisture during tuber

development reduces secondary growth and growth tears, and leads to uniform cooking quality. Soil that is too wet at tuber initiation can promote powdery scab (*Spongospora subterranea*) infection through lenticels and occasionally through eyes or wounds. For yield the critical period is from three weeks after flowering until maturation.

Haulm removal

Uneven soil conditions and foliar blight of various degrees within a crop often lead to uneven maturation of the tubers. Well-timed haulm removal promotes even maturation as well as early setting of skin and early harvest maturity. Early haulm removal promotes an early harvest and reduces the risk of wireworm and *Rhizoctonia* infestation. Removing haulms on time can reduce the risk of tuber blight in the case of leaf blight. However, late haulm destruction can lead to higher starch contents, better baking properties and an improved flavour. The use of haulm removers that are adapted to the ridge prevents damage on ridges and tubers (green tubers).

Harvest

Before harvesting, the state of maturity, skin stability and tuber quality should be determined. The basic requirement for harvesting (except for early potatoes for certain markets) is set skin. An early harvest reduces the risk of damage from wireworms, slugs, *Rhizoctonia* and silver scurf. Well-matured (set skin) tubers are less sensitive to damage and storage rot. Careful harvesting at temperatures that are not too low, or too high, helps to prevent damage.

Storage

Dry the potatoes off before storage to prevent rot. To avoid susceptibility to damage, warm the potatoes up to at least 10 °C before grading, washing or packing. To avoid spreading diseases, only use clean boxes and expose them to the sun or disinfect them. Clean off fine dust during grading to reduce the spread of silver scurf. Plant tonics such as spearmint oil, citronella, cloves and rapeseed oil are used in Continental Europe to inhibit sprouting of potatoes in storage. Maybe, there's a whole new market for mint-infused potatoes?

Conclusions

The guide contains useful sections on recognising pest and disease damage to tubers and other defects, and how best to prevent them. There is also information on the economics of potato production, marketing and grading. The guide places important emphasis on quality factors throughout, both for cosmetic appearance and cooking ability and taste. Quality defects are more common in organic potatoes compared to non-organic potatoes. The guide should be a helpful tool for organic growers to redress the balance.




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