

## **Getting the best from organic fruit and vegetables: Growing for quality**

This is the first of a series of factsheets to help horticultural businesses improve the quality of their produce, and focuses on the growing crop. Subsequent publications deal with post harvest management and retail/ presentation.

### **Organic farming and food quality**

The debate over whether organic food of higher quality than conventional produce is long-running. Historically it has been informed by a series of conflicting reports which has led to a great deal of confusion. The recent completion of the Quality Low input Food (QLIF) project which included reviews of existing evidence and original research has brought some much needed clarity to the issue. The project found that in many instances organic food is of better quality – although this was not the case for all products all the time – and was able to attribute many of the benefits to specific management practices.

### **Growing quality crops**

Improving crop quality benefits everyone. Growers get better prices and fewer crop rejections; wholesalers and retailers can build good reputations and secure customer loyalty; and the consumer gets a quality product that reinforces a positive image of organic food. However, it is not always easy to produce top quality crops. Some factors are beyond the immediate control of growers – climate, growing conditions and infrastructure, for instance - but there are many things that we *can* do to drive up standards:

### **Healthy soil**

The organic systems are founded on the premise that healthy soil supports healthy plants which feed healthy animals and people. Organic approaches to soil fertility can lead to higher levels of 'healthy' phytochemicals such as antioxidants and vitamins, and lower levels of undesirable compounds such as heavy metals and glycoalkaloids which are found in potatoes and are toxic at higher concentrations<sup>1</sup>. Improvement in taste and shelf-life can be attributed to slower delivery of nutrients to the plant characteristic of organic systems and a better match between nutrient supply and crop demand at key stages of plant growth.

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You can enhance the role your soil plays in crop quality by:

- **Promoting soil life.** Biological activity is essential for making the nutrients locked up in the soil organic matter (SOM) available to the crop. Maintaining/ increasing SOM through balanced rotations and use of composts and manures is a crucial. This increases the supply of food for soil organisms, which increases their number which in turn makes more of the nutrients stored in the soil available to the crop. Good news all round! Maintaining a good soil structure (see below) is just as important because it allows air to circulate and ensures moisture levels are optimal for soil life.
- **Building and maintaining soil fertility.** This is essential for vigorous crop growth and plant health generally. A good rotation that balances fertility building and exploitative crops is at the heart of organic production systems. Deep rooting plants such as chicory can mine P and K from the deep within the soil profile, and help improve soil structure. As discussed above manures and composts are important sources of supplementary nutrients.
- **Developing a good structure.** In addition to supplying nutrients and feeding soil organisms, SOM has an important role in soil structure and can be regarded as the 'glue' that holds it all together. Cultivation can improve structure but be careful; if you have heavy or fragile soils allow sufficient time between cultivations for recovery. Never cultivate in wet conditions, however pressing the need might be in the short term; a single cultivation or a heavy handed harvest in wet conditions can undo years of careful work. Where soil has become compacted cutting slits in the surface with a soil aerator can help, and where iron or plough/ rotovator pans have developed sub-soiling will improve structure significantly.
- **Getting the pH right:** An optimal soil pH increases the availability of nutrients significantly. However, each nutrient has a slightly different pH at which availability is highest (e.g. 5.5 for P, 6.0 for K and 7.0 for calcium) so a pH of between 6 and 7 is considered a happy medium at which all the main nutrients are in sufficient supply for healthy plant growth.

### **Ecological pest, disease and weed management**

Organic approaches to pest, disease and weed management can have benefits for crop quality. The most obvious are associated with the absence/ very low levels of pesticide residues and the prohibition of genetically modified crops. Recent research has also identified some more subtle effects, for example increased levels of vitamins in organic lettuce<sup>1</sup>. However insect-proof netting actually caused a reduction in certain antioxidants compared to crops protected by pesticides<sup>1</sup>, and in these instances growers need to balance priorities carefully.

Pest management practices that promote quality include:

- **Promoting healthy soils:** Plants grown in healthy soil are better able tolerate pest and disease problems. A biologically active soil suppresses many soil borne diseases.

- **Encouraging beneficial organisms** (predators, parasites and pathogens of insect pests and diseases). By not using pesticides you are already making a huge contribution to protecting beneficial organisms. You can increase their numbers further by providing habitats such as beetle bank, log piles and rough field margins/ hedgerows. You can augment populations by buying in and releasing beneficals into the system, but because of the cost, this is most common in high value protected crops.
- **Rotating crops** – This avoids the build up of pests and diseases in the soil. Alternating weed susceptible and weed suppressing crops reduces the weed seed bank over time.
- **Using cultural controls and physical methods.** Cultural controls are related to way in which the crop is grown. The most common include adjusting sowing dates, stale seed beds, intercropping and using resistant varieties. Physical methods include mechanical weeding, flame weeding, mulching, traps and hot water treatments for seed.

### Choosing the right variety

The market is probably the main consideration when choosing varieties. Supermarkets are quite prescriptive and tend towards F1 varieties because they deliver uniformity of size, shape and appearance. Growers selling direct are able to use a wider range of varieties and can focus on other characteristics such as flavour and they typically require smaller volumes of crop to mature over a longer period. You can steer your customers towards varieties that are particularly suited to your production system. Research in Switzerland found that taste descriptions at the point of sale helped get customers interested in, and become more accepting of, new varieties<sup>3</sup>.

### Water

Getting the moisture levels right is critical to producing quality crops. Drought at one extreme and water logging at the other puts stress on the plants which become more susceptible to pest and disease attack and other factors.

- **Monitor moisture levels** closely, and irrigate to avoid drought conditions. This is particularly important for lettuce which becomes very bitter if water stressed.
- **Maintain SOM**, which acts like a sponge retaining soil moisture- another good reason for keeping your SOM levels up.
- **Promote good soil structure** to achieve optimum drainage.
- **Use drought tolerant varieties**, which are available for some crops.

### Summary

Growing for quality is rooted in good crop husbandry. Get the soil structure and fertility right and much of the rest will follow. Organic approaches to pest and disease can bring rewards in terms of quality and work closely with your customers to find varieties that suit both of you.

## Further reading

### General

Cooper, J; Niggli, U; Leifert, C (2007) 'Handbook of organic food safety and quality' *Woodhead Publishing Ltd*, pp521

Little, T Frost, D (2008) 'A farmer's guide to organic fruit and vegetable production' *Organic Centre Wales* [http://www.organiccentrewales.org.uk/uploads/hortguide\\_eng.pdf](http://www.organiccentrewales.org.uk/uploads/hortguide_eng.pdf)

### Soil Fertility

Hitchings, R (2009): 'Compost: Effects on nutrients, soil health and crop production' *Institute of Organic Training and Advice* [http://www.organicadvice.org.uk/tech\\_leaflets/compost\\_final.pdf](http://www.organicadvice.org.uk/tech_leaflets/compost_final.pdf)

Little, T: 'Phosphorus and potassium in organic systems: Getting the best from your soils' *Organic Centre Wales* <http://www.organiccentrewales.org.uk/uploads/pandkfactsheeteng.pdf>

Watson, C; Stockdale, E; Philipps, L (2009) 'Soil analysis and management' *Institute of Organic Training and Advice* [http://www.organicadvice.org.uk/tech\\_leaflets/soils\\_final.pdf](http://www.organicadvice.org.uk/tech_leaflets/soils_final.pdf)

### Pest management

Davies, G; Sumption, P; Rosenfeld, A (2010) 'Pest and Disease Management for Organic Farmers, Growers and Smallholders' *Crowood Press* pp 416

Frost, D (2003) 'Improving knowledge of pest and weed control in organic crop production in Wales' *Organic Centre Wales* [http://orgprints.org/10834/1/pest\\_and\\_weed\\_control.pdf](http://orgprints.org/10834/1/pest_and_weed_control.pdf)

### Crop varieties

NIAB (2007) 'Organic Vegetable Handbook' NIAB pp108

### References

1. Leifert, C (2009): 'Determining the effect of organic and low-input production methods on food quality and safety' *QLIF project leaflet (Sub project 2)*
2. Rosa, E.A.S; Bennett, R.N; Aires, A 'Levels of potential health impacts of nutritionally relevant phytochemicals in conventional and organic food production systems' In: Cooper, J; Niggli, U; Leifert, C (2007) 'Handbook of organic food safety and quality' *Woodhead Publishing Ltd*, pp521
3. Weibel, F; Leder, A (2007) 'Experiences with the Swiss (Organic) Method: How to Introduce New Apple Varieties Into Retail Market' *The Compact Fruit Tree*, 40 (2).