# Keys to Organic Strawberry Production

Strawberries have a broad pest profile which makes the production of this crop a significant challenge and risk. To be successful, the organic grower must have effective strategies in mind for dealing with the nutrient needs of strawberry crops; invasive weeds, and major diseases and insect pests including *Botrytis* fruit rot, red stele, powdery mildew, strawberry clipper weevil, root weevils, tarnished plant bug, two-spotted spider mite, cyclamen mite and slugs. Any one or combination of the above could cause major crop loss. Some strategies that organic growers might consider to increase their chances for successful production are outlined below.

**Nutrient Management:**

To optimize success in any production system, be it organic or conventional, the grower must build-up reservoirs of essential plant nutrients. Soil tests should be conducted to determine background levels in the soil and natural rock powders including limestone, gypsum, rock phosphate and Sul-Po-Mag may be used to elevate essential nutrients to desirable levels before planting.

Soil structure and microbial activity should also be elevated before planting strawberries and this can be done through an appropriate crop rotation with green manures, an application of livestock manures, and/or an application of composts. One excellent rotation to consider before planting strawberries would be:

1. Year 1 – winter rye with plowdown
2. Year 2 – sorghum-sudan grass or buckwheat green manure plowdown followed by oats in late summer
3. Year 3 – strawberries

An appropriate crop rotation is also a very useful part of the weed control strategy for strawberries. The successive cultivations and incorporation of green manures prior to weed seed formation reduces the weed seed bank prior to planting the strawberries.

Composts are an excellent way to build soil reservoirs of plant nutrients and also enhance soil microbial activity. Several organic composts are available and can effectively meet the nutrient needs of the strawberries for the duration of the planting.

**Weed Control:**

Whether organic or conventional, weed control tends to be the greatest bane of the strawberry producer. Mechanical means of weeding, coupled with hand weeding, tend to be effective in the planting year but become much less effective in subsequent years. For this reason, strawberries tend to be fruited only one year in organic “matted row” production systems.

A very desirable alternative to the traditional matted row system that provides much superior weed control, is the **plasticulture system** of production. In this system, black plastic is applied to raised beds ("hills") and the strawberries are planted through this plastic barrier at high density. Weeds are effectively suppressed by this plastic mulch in all but the area between the hills and the occasional escapee that germinates alongside a strawberry plant and emerges through the planting hole. Grass is usually planted between the hills and mowed as required. The uncut grass along the edge of the plastic can be sheared at the same time that runners are cut. However, it is the responsibility of the producer to ensure that the plasticulture system is permitted according to their certifying body's standards.

**Disease Control:**

To control many diseases, cultivar selection is critical. Many varieties have resistance to red stele and other diseases and should be selected if there is any history of these diseases at the site.

The most serious disease to contend with in organic strawberry production is *Botrytis* fruit rot. Most of the infections by this disease occur as a result of soil splashing from rain or overhead irrigation. The plastic mulch barrier of the plasticulture system minimizes this effect and the use of trickle irrigation, as an alternative to overhead, further reduces infections by this disease. The application of competitive beneficial fungi from **compost teas** to the plant surface may also help reduce infections of *Botrytis*. Finally, the fungal biological control agent *Trichoderma harzianum* is expected to be available in Canada in the near future.

Powdery mildew is another disease that can be a challenge in an organic production system. There is really only one course of action in treatment and prevention; you have to select varieties with good genetic variety. These varieties will have been bred to be resistant to powdery mildew.

**Insect and Slug Control:**

Soil insects including root weevils, wireworms, june bug larvae and nematodes are best controlled through appropriate rotations with non-host plants and of appropriate length between successive strawberry plantings. A minimum break from strawberries of 2-3 years is necessary for effective reduction of these pests if there is a history at the site.

An appropriate rotation is also important for managing strawberry bud clipper weevil but even then it is not advisable to fruit your strawberries beyond two seasons due to the expected increase of this pest and the significant crop loss it can cause. Floating row covers are allowed by most certifying bodies and may act as a barrier to clipper weevil invasion but once established this pest can survive and operate quite effectively under the cover.

Tarnished plant bug is a common insect pest that can be very difficult to manage in organic production systems. Many weeds are alternative hosts to tarnished plant bug and should be controlled throughout the growing season. Early varieties of strawberries can often be fruited before the plant bug population increases to damaging levels and should be preferred over later fruiting varieties for this reason. Also, attractive trap crops such as alfalfa can be grown next to the strawberries but these should not be mowed when the strawberries are in bloom as the pest will quickly migrate into the strawberries with devastating effects!

Other techniques for managing plant bug include the use of row covers as a barrier to invasion and the future availability of biological control agents including the pathogenic fungus *Beauvaria bassiana* and the parasitic wasp *Peristenus digoneutis.*

Depending on the certifying body, diatomaceous earth and/or ferric phosphate (Sluggo) may be allowable for slug control.

For two-spotted spider mite (TSSM), cyclamen mite and root weevil, biological controls are currently the best options for management. For TSSM, the predatory mites *Phytoseiulus persimilis* and *Amblyssius fallacis* are readily available and can be very effective. For cyclamen mite, the predatory midge *Feltiella acrisuga* has good potential for biological control; and, for the root weevil complex, research with the insect pathogenic nematode *Heterorhabditis bacteriophora* is very promising. All of these are commercially available.

**Conclusions:**

Organic production of strawberries is a high risk venture at this time due to the wide array of serious pests that can impact yields of this crop. However, the use of good soil building principles, suitable crop rotations, various plastic barriers and biological control agents make successful organic production of strawberries theoretically feasible at this time. The ongoing research in this area is encouraging but a successful demonstration of a sustainable organic system is still required along with an economic analysis of its commercial viability.

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