

## **PEST MANAGEMENT: WHAT CAN WE LEARN FROM ORGANIC FARMERS?**

Western Canada Turfgrass Association 41<sup>th</sup> Annual Conference  
February 23, 2004, Victoria, B.C.

By Mario Lanthier  
CropHealth Advising & Research, Kelowna, B.C.

The number of tree fruit orchards that were “certified organic” went up dramatically between 1998 and 2002, with a four-fold increase in the number of certified apple orchards. So reported researchers with the Washington State University in a study published in 2002. Studies in Canada indicate a similar trend, and the percentage of shoppers buying organic is also going up.

If organic farmers were to become landscape managers, what tricks would they bring with them?

### **THE TRANSITION TO ORGANIC**

Linda Edwards is an organic tree fruit grower in Cawston, in South-Central B.C. For two years, she was the president of the Certified Organic Associations of British Columbia. In her book “Organic Tree Fruit Management”, she talks of the transition from “conventional” to “organic”.

#### *1) Pest management is different.*

Many insect problems decline after predators and parasites become more important. However, weed control will require major changes, including new equipment and more labour work.

#### *2) Fertilisation is different.*

There is no more quick fix with nitrogen, phosphorus and potassium. Fertilisation is done with composts and green manures, and working with local soil and weather conditions.

#### *3) Marketing is different.*

The contacts with buyers and customers become more direct and more frequent, with a better understanding of market conditions. The product must be certified by an independent agency.

Adapted from Edwards L. 1998. *Organic Tree Fruit Management*. Certified Organic Associations of British Columbia, Keremeos, B.C. Available at <http://www.certifiedorganic.bc.ca/Booksand/index.html>.

### **I. INSECT PEST MANAGEMENT**

Organic farmers rely on two major tools for their insect management programs.

*Beneficial insects:* predators and parasites become more numerous when broad-spectrum pesticides are not used and play a large role in the control of aphids and spider mites. Landscapers can use flowers to attract beneficials such as syrphid flies and parasitic wasps.

*Natural source pesticides:* organic farmers have a prescribed list of pesticides they can use on their farm. These pesticides are registered in Canada, are usually from a natural source or have a low ecological impact, and must be approved by a certifying agency.

## ATTRACTING BENEFICIAL INSECTS

Native beneficial insects can be attracted to landscapes by plants that provide them with pollen and nectar. Plants that are known to attract beneficial insects include:

- *Alyssum*
- *Aster*
- Candytuft (*Iberis*)
- *Coreopsis*
- Lavenders (*Lavendula*)
- Marigolds (*Tagetes*)
- *Potentilla*
- *Rudbeckia*
- Shasta daisy (*Chrysanthemum m.*)
- Yarrow (*Achillea*)

Adapted from Gilkeson L.A., R.W. Adams. 2000. *Integrated Pest Management Manual for Landscape Pests in British Columbia*. B.C. Ministry of Environment, Lands and Parks. Available at <http://wlapwww.gov.bc.ca/epd/epdpa/eripm/landtoc.htm>.

## II. DISEASE MANAGEMENT

Two important procedures of organic farming would be of interest to landscapers and gardeners.

*Sanitation:* if there is a problem, take it out. Strict sanitation is an important aspect of “natural” disease management. If a branch is diseased, cut it out. If a plant is highly susceptible to a local disease, replace it with another cultivar that is less susceptible.

*Microbial products:* many products now entering the market are made of naturally-occurring soil microbes. They offer an exciting new way to prevent plant diseases. For example, mycorrhizal formulations can help the plants become more tolerant of environmental stresses such as drought, cold, or low soil fertility. Other products, such as Mycostop and Rootshield, are currently registered for greenhouse production for the prevention of damping off and root rot.

## PESTICIDES FOR ORGANIC FARMING

In British Columbia, organic farmers refer to the standards described in the “Organic Agricultural Products Certification Regulation”. This official publication of the provincial government can be viewed at <http://www.certifiedorganic.bc.ca/Standards/section8e.htm>.

*Allowed pesticides:* these products can be used without restrictions. They include acetic acid, *Bacillus thuringiensis*, boric acid, fatty acid soap, and insecticidal soap.

*Regulated pesticides:* these products are for short-term needs and other methods should be sought for the future. They include diatomaceous earth, dormant oil, ferric phosphate, fixed copper, lime sulphur, and sulphur.

*Prohibited pesticides:* these products cannot be used under any circumstances and include all synthetic products. All products not listed as “allowed” or “regulated” are prohibited.

### III. WEED CONTROL

Can we live without Round-up? Many cities and school districts now face that question after being told to cut down their pesticide use in public areas. As they will attest, it is almost impossible to find a replacement that is just as effective and inexpensive.

#### Acetic acid

Acetic acid is a weak acid found in household vinegar. A number of products are registered in Canada as post-emergent herbicides (applied after the weeds are already growing).

Contact with acetic acid will dissolve the cell membrane, leading to desiccation of tissues and death of the top portion of the plant. The roots are not affected. Best results are obtained with 10% or 20% concentration, with addition of soap at 1% concentration to help distribution on the leaf surface. Application to plants in full sun is more effective than application on a cloudy day.

Household vinegar is 5% concentration. Commercial products at 10% or 20% concentration will cause skin burn, and spray equipment must be thoroughly cleaned after application.

*Average percent control of lawn weeds sprayed once with different products*

| Treatment       | After<br>24 hours | After<br>2 weeks | After<br>9 weeks |
|-----------------|-------------------|------------------|------------------|
| Glyphosate      | 53 %              | 98 %             | 97 %             |
| Acetic acid 5%  | 93 %              | 75 %             | 33 %             |
| Acetic acid 20% | 98 %              | 96 %             | 76 %             |

*Adapted from Chinery D. 2002. Using Acetic Acid (Vinegar) as a Broad-Spectrum Herbicide. Cited in HortIdeas. 19(11): 121-122.*

#### Infra-red radiation

Commercial machines manufactured in Switzerland are available from specialized suppliers. These hand-portable devices are equipped with a propane cylinder lasting 2 to 4 hours. They are appropriate for weed control in sidewalks, driveways, shrub beds, and near buildings.

The heat is transferred to ceramic tiles generating very high temperatures. When moved slowly over the weed, the protein compounds coagulate, preventing further photosynthesis and leading to plant death. Time of application is short, about 1.5 second over the weed, but larger weeds require a second application.

#### **“NATURAL” WEED CONTROL**

A program of “natural” weed control must take into account two important processes of nature.

*Vegetation succession:* bare soil tends to be colonized by broad-leaf plants. As they die, they are followed by grasses, then in time by woody shrubs and trees. A bare patch of soil in a lawn is an invitation for nature to grow a broadleaf weed such as dandelion or chickweed.

*Weeds as soil indicators:* plants tend to grow where conditions favour them. In many situations, correcting the condition may be sufficient to eliminate the weed. In lawns, black medic indicates a dry soil with low fertility, and prostrate knotweed indicates a compacted soil with thin grass.

## **Hot water steam**

Commercial equipment is now available for this technique. Water is heated to boiling temperatures under low pressure, and pumped to an application system for delivery on the weeds. The application of steam melts the waxy coating of plant foliage, resulting in loss of plant moisture and severe dehydration.

Recent research indicates weed control that is comparable to glyphosate. Best results are obtained when the treated plants are young, or drought stressed before application. The procedure is safe for use in shrub beds and near trees as the temperature is reported to decrease rapidly below the soil surface and will not impact the plant roots.

On the negative side, the initial purchase is expensive, the equipment travels slowly, and the water reservoir requires frequent refilling.

## **Corn gluten meal**

This product is now available as a “least-toxic” pre-emergent herbicide. A domestic formulation (for sale at garden centers) was officially registered as a herbicide in Canada in September 2003.

Corn gluten meal is a by-product of the wet milling process of corn for starch. Research in the United States has demonstrated this product will prevent germination of many weeds commonly found in turf areas, mostly by inhibiting root formation.

Applied on an established lawn, three to five weeks before seed germination in early spring or late summer, at 9.7 kg of product per 100 m<sup>2</sup>, on moist soil allowed to dry, the result is 60 to 80% reduction in dandelion and crabgrass when compared to untreated areas. If the material is applied after the weed has rooted, the nitrogen component will promote more weed growth.

## **IV. A “NATURAL” LANDSCAPE PROGRAM**

The horticulture industry has made great strides in environmentally-friendly pest management programs. By understanding and manipulating natural processes, landscape managers can offer maintenance programs that answer the public request for less pesticide use.

These can be called “natural programs” rather than “organic”, to avoid issues with the legislated requirements of “organic” standards in food production. At all times, a “natural” program should have a strong component of healthy soil to promote healthy plants.

## **V. FOR MORE INFORMATION**

- Granatstein D. and E. Kirby. 2002. *Current Trends in Organic Tree Fruit Production*. CSANR Report No. 4. Washington State University. At <http://organic.tfrec.wsu.edu/OrganicIFP/OrganicFruitProduction/Index.html>.
- Olkowski W., S. Daar, H. Olkowski. 1991. *Common-Sense Pest Control*. The Tauton Press, Inc. Newtown, CT. Available at <http://www.birc.org/>. An excellent publication to review “natural” weed control concepts.
- Buczynski L. 2003. *The Vinegar Brouhaha*. The IPM Practitioner, 25(9-10): 7-8. More information is available from a U.S. Agricultural Research Service, at the website <http://www.barc.usda.gov/anri/sasl/vinegar.html>.
- Hannsson D. and J.E. Mattsson. 2002. *Influence of development stage and time of assessment on hot water weed control*. Weed Research 42(4): 307-316. A second part of this study is published in Weed Research 43(4): 245-251.
- Bingaman B.R., N.E. Christians. 1995. *Greenhouse Screening of Corn Gluten Meal as a Natural Control Product for Broadleaf and Grass Weeds*. Hortscience, 30(6): 1256-1259. The Canadian registration can be viewed as Regulatory note REG2003-09 at the website <http://www.hc-sc.gc.ca/pmra-arla/english/pdf/reg/reg2003-09-e.pdf>.