



CRANBERRY WEB

The Newsletter of the BC Cranberry Marketing Commission

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We intend to provide information about Commission programs and activities and more importantly to provide relevant production information to growers.

Message From the Board

I am pleased to introduce the first edition of the Commission's Newsletter for Cranberry Growers. We intend to provide information about Commission programs and activities and more importantly to provide relevant production information to growers. This Newsletter is made possible by the good work of Dr Sheila Fitzpatrick and we thank her for her continuing strong contribution to the cranberry industry. Funding for the Newsletter is provided by your grower levies and from a generous grant from the Investment Agriculture Foundation of BC.

I believe the future for the cranberry industry is very positive. We have a great product and its utilization is strengthening and is now in balance with, or slightly exceeds, production. Offshore markets are strengthening and more opportunities exist particularly as we promote the health benefits of cranberries.

Part of the Commission's focus for the future will be to foster and support increased use of cranberries here in Canada and in foreign markets.

Working closely with the US Cranberry Marketing Committee we committed over \$20,000 in 2006 for cranberry promotion in Australia and we hope to expand on our foreign initiatives for 2007. We will also be initiating a new program for Canada to promote our product. All of these activities are supported financially by the Investment Agriculture Foundation of BC.

John Savage

On Behalf of the Board of the
BC Cranberry Marketing Commission

Strategic Plan Funding

The funding agreement between the Investment Agriculture Foundation of British Columbia and the Cranberry Commission has been completed. The Foundation will contribute \$575,000 over 5 years and the Commission committed \$700,000 during the same period to undertake the initiatives identified in the Strategic Plan. Research funding will receive over \$600,000 divided between production issues and consumer health benefits.

The BC Cranberry Growers Association will administer most of the research projects working closely with the Cranberry Institute on health related projects. There are also a number of initiatives to ensure BC cranberry growers have access to production information including the results of relevant research projects undertaken in other areas.

Foreign market development which represents a strong growth component for the cranberry industry will be supported by an additional \$150,000. These funds will be allocated to complement activities being undertaken by the Cranberry Marketing Committee. Additionally promotional initiatives are planned in Canada generally and British Columbia specifically to highlight our products and our industry.

Some programs will be undertaken to help strengthen the industry organizations including the Commission itself and the Association.

The funding provided by the Foundation is a welcome boost and will ensure the industry organizations are in position to add value to the cranberry industry.

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BCCMC Logo Unveiled

Logo reflects cranberries within the landscape of British Columbia.



Understanding Beneficial Nematodes

Dr. Sheila Fitzpatrick, Agriculture and Agri-Food Canada

This past summer I had a few growers ask questions about using nematodes for control of cranberry girdler. Here I summarize pertinent scientific research on beneficial nematodes and give specific information about their use in cranberries.

Beneficial nematodes are also known as entomopathogenic nematodes, which means they cause disease in insects.

“Beneficial nematodes ...
cause disease in insects.”

How do beneficial nematodes work?

Juvenile nematodes locate an insect, enter it and regurgitate bacteria they carry inside them. The bacteria kill the insect, usually within a few hours. Inside the dead insect, the juvenile nematodes (called IJs, for Infective Juveniles), develop into adults, mate and produce offspring, which feed on the bacteria. When the nematode offspring (new IJs) disperse from the insect cadaver to search for a new insect host, they carry bacteria with them.

Some species of beneficial nematodes do not rely entirely on their symbiotic bacteria to kill the insect host. In these species, the nematodes themselves contribute to killing the insect.

How do beneficial nematodes find and enter their host insect?

In the soil, infective juvenile nematodes either move about (cruise) in search of a host insect, or sit and wait (ambush). Some species are cruisers, some are ambushers, and some do both types of behaviour. Cruisers are more likely to find sedentary insects, whereas ambushers tend to find mobile insects.

Finding an insect host is a tough business for a nematode. Infective juvenile nematodes are tiny compared to their hosts. IJs move in films of water, but have no legs or fins to propel them. Most nematode species crawl by sinusoidal movement using the surface tension forces associated with the water film to propel them forward or backward. Movement is affected more by the surface tension of water than by gravity.

Nematodes rely on "chemosensation, thermosensation and mechanosensation" – chemical cues, temperature cues and touch or vibration – to detect insect hosts. The information an IJ receives from these cues tells it whether to crawl, stand, or jump. Cruisers tend to crawl toward hosts, whereas ambushers tend to stand, then jump. Standing means balancing on a bend in the tail, and is also called "nictating".

Some beneficial nematodes can identify and crawl toward chemical cues produced by insect-damaged roots. Scientists say these plants are sending chemical cues to "call for help".

Infective juveniles enter the interior of an insect host by penetrating its cuticle (outer body wall), by moving into its mouth or anus, or by entering one of the many spiracles (openings for breathing) along its sides. Insects have defenses that impede nematode entry.

Most beneficial nematodes sold for control of cranberry girdler belong to the species *Steinernema carpocapsae*. These and other *Steinernema* species are ambushers that reside near the soil surface. Sometimes a species of nematodes in the genus *Heterorhabditis* is also offered for sale. *Heterorhabditis* usually cruises in search of insects, and may work deeper in the soil. Cranberry girdler larvae feed near the surface of the soil on fine roots and runners in the trash layer. The larvae tend to feed without moving much, but might become quite mobile if threatened by nematodes or predators.

How long do beneficial nematodes last?

Generally, nematode populations can be expected to remain high enough to provide effective pest control for two to eight weeks after application.

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nematodes can identify
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Understanding Beneficial Nematodes (continued from page 2)

What's the best way to apply beneficial nematodes?

Beneficial nematodes can be applied with nearly all commercially available ground or aerial equipment, including pressurized sprayers, mist blowers and electrostatic sprayers. **HOWEVER**, some application components, pump pressures and temperatures can be detrimental to nematodes.

Openings in nozzles should be larger than 50 μm (micrometres) and pump pressure should be less than 2000 kPa (290 psi) for applications of *Steinernema carpocapsae* and *Heterorhabditis bacteriophora*. To apply *Heterorhabditis megidis*, pump pressure should be even lower: 1380 kPa (200 psi).

Hollow cone nozzles generate less hydrodynamic stress than flat fan nozzles and, at pressures greater than 60 psi, do less damage to nematodes. Below 60 psi, either type of nozzle is acceptable. Larger capacity nozzles are recommended for soil-applied treatments where a high volume of water is necessary to get nematodes beyond the soil surface.

If water is recirculated through the sprayer pump, the temperature of recirculated water can rise above 30°C. Nematodes exposed to high temperatures lose viability or die. Scientists recommend that water temperature in spray tanks remain below 30°C during nematode application. The label for Nematac C, the formulation used against cranberry girdler, recommends that water temperature not exceed 25°C.

In most field crops, beneficial nematodes should be applied to soil at rates of at least 2.5×10^9 IJs/ha, which equals 25 IJs/cm². (**Note that this rate equals 1 billion per acre, which is only one-third the rate recommended on the Nematac C label. The higher rate in cranberries probably allows for nematode loss on cranberry foliage and at the top of the trash layer.**) Irrigation prior to application will maintain soil moisture and promote establishment of nematodes in the soil sub-surface. Nematodes need water for survival and movement. During and after application, water is needed to wash nematodes from cranberry foliage and carry them into the trash and upper soil layers.

“Beneficial nematodes can be applied with nearly all commercially available ground or aerial equipment”

Are beneficial nematodes killed by flooding?

The experts say, "too much soil moisture may cause oxygen deprivation and restrict movement". It is likely that many nematodes are killed during flooding for control of cranberry girdler or for harvest.

Why don't we have better information about how to use beneficial nematodes?

Beneficial nematodes compete for market share with chemical insecticides. To compete effectively, nematode formulations need to provide predictable control of insect pests. "Because of the complex interplay of abiotic and biotic factors, achieving predictability is probably the greatest intellectual challenge facing biological control today". To assess the efficacy of nematodes so that rates, application techniques and timing can be improved, replicated field tests should be run for three or more years.

“Beneficial nematodes compete for market share with chemical insecticides”

What is the future of biological control using beneficial nematodes?

I came across an interesting possibility that may be very appropriate to future control of cranberry girdler. Instead of applying nematodes in an aqueous suspension, several scientists are figuring out how to apply insect cadavers infected with nematodes. This technique is showing promise in the lab and greenhouse. It might work well in cranberries, where girdler-damaged areas can be seen and targeted.



Commission Directors

John Savage
Chair

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Reference Information for the beneficial nematodes article

Most of the information in this article came from scientific papers presented at the Third International Symposium on Entomopathogenic Nematodes and Symbiotic Bacteria, held in Wooster, Ohio, in 2003. The papers were published in the scientific journal *Biological Control*, volume 38, in 2006.

Other pertinent information can be found at the following websites:

www.beckerunderwood.com Nematac C is the nematode formulation for cranberry girdler

<http://www.growercentral.com/index.cfm?siteAction=showFamilyDetails&familyID=155300&CFID=5640039&CFTOKEN=21312> Nematac C label

<http://www.rcrc.rutgers.edu/pubs/publication.asp?pid=FS029> Fact sheet with information on applying nematodes in cranberries

http://www.hort.wisc.edu/cran/mgt_articles/articles_pest_mgt/insects/profiles_insecticides/nematodes%20for%20cranberry%20pests.pdf#search=%22nematode%20cranberry%20girdler%22
different link to same fact sheet

<http://nematode.unl.edu/wormepns.htm>

<http://www.oardc.ohio-state.edu/nematodes/videoclips.htm> images and videos

<http://www.nysaes.cornell.edu/ent/biocontrol/pathogens/nematodes.html>

Websites From Other Growing Areas

The University of Massachusetts and the University of Wisconsin both have lots of good information on their websites. Both universities have newsletters on their sites.

Have a peek at these sites! Are they useful to you?

University of Massachusetts Cranberry Experiment Station:

Website: <http://www.umass.edu/cranberry/>

Sample newsletter: <http://www.umass.edu/cranberry/downloads/newsletters/dec05.pdf>

University of Wisconsin:

Website: <http://www.hort.wisc.edu/cran/>

See Publications Archive, Newsletters

Feedback From BC Growers

We would really like to know if this Cranberry Web newsletter is helpful to you. What would you like to see in the next issue? Would you like an electronic version of the newsletter as well as a paper version? Please pass along your thoughts and ideas to one of us:

Sheila Fitzpatrick

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