

CSANR ORGANIC CROPPING RESEARCH FOR THE NORTHWEST
Procedures for 2006 Reporting and 2007 Continuing Proposal

Researchers who have received funding for research projects from the CSANR federal special grant for Organic Cropping Research for the Northwest, must:

- 1) Submit a **progress report** for each funded project by Thursday, November 30.
- 2) Submit a **project continuing proposal** for each project where continued funding is requested, by Thursday, November 30

1. Research Progress Report - Required Format

The continuing proposal should be a maximum of 2 pages in length and should include the headings and information listed below. In addition to this information, you may choose to include as an attachment any additional information that you feel would provide a better understanding of or insights into the work you are proposing. Comments and suggestions are also welcome in the attachment. Please note that attached information is not required.

TITLE: Field efficacy trials of *Metarhizium anisopliae* alone and in combination with entomopathogenic nematodes against the larval stage of the Carrots Rust Fly *Psila rosa*

FUNDING CATEGORY (check all that apply):

Organic Seed Understory Management Wood Perennial Crops
 Weed Control Statistics / Economics
 Food quality Efficacy of materials

PRINCIPLE INVESTIGATORS:

Contact Person: D. P. Muehleisen

Phone: (253) 445-4597

Email: muehleisen@wsu.edu

COOPERATORS: Stefan Jaronski, USDA-ARS, Sidney, MT; Ekaterini Riga, WSU, Prosser, WA

FUNDING REQUESTED (show matching funds if applicable): \$15,500 AND IN KIND MATCH OF \$15,500

TOTAL PROJECT DURATION (indicate current project year and total project duration, e.g., Year 2 of 3):

DATE (period which report covers): 2006 growing season

KEYWORDS: Carrots Rust Fly; *Psila rosa*; *Metarhizium anisopliae*; entomopathogenic nematodes; *Steinernema feltiae*; *Heterorhabditis marilatus*; *Heterorhabditis bacteriophora*;

ABSTRACT (Maximum of 250 words in length, written in non-scientist/layperson language, briefly summarizes your work to date): We are working directly with organic growers to help them make management decisions to minimize damage cause by the Carrot Rust fly larvae, based on monitor for Carrot Rust Fly adult using yellow-orange visual sticky traps. In addition, we are testing selected entomopathogenic nematodes to determine their effectiveness against the soil dwelling larval stage of the carrot rust fly. All experiments were done on organic farms in Western Washington. Eleven farmer volunteered to monitor for the pest and were given a training in how to put traps out and identify the adult stage of the pest. Only one farm had

populations levels significant enough to justify any action to mitigate potential damage by the larval stage. At Terry's Berries, carrots were treated with three different nematode species to compare their effectiveness for protecting carrots from larval damage. At the time of writing this, the treated carrots are still in the field so no data is available for this year. Last years results demonstrated that the entomopathogenic nematode, *Steinernema feltiae*, gave significant protection against this pest. This year we tested *S. feltiae* and two other species as well, *Heterorhabditis marilatus*; *Heterorhabditis bacteriophora*. All three species were treated at a high (7.4×10^8 juveniles/acre) and low dose (2.2×10^8 juveniles/acre). In addition to the entomopathogenic nematodes, the fungal pathogen *Metarhizium anisopliae* has shown great promise as a tool to protect carrots from this pest. Due to EPA registration problems, this product was not used in these experiments this year.

OBJECTIVES: To develop alternative management methods against the carrot rust fly that can be used by organic growers

SUMMARY OF PROCEDURES: Originally, we had proposed to work with a minimum of 10 farmers throughout the Puget Sound area to establish a monitoring program. This creates a great opportunity to teach producers how to monitor for insect pests, a request I receive constantly from producers who are concerned about CRF. We did have one meeting with farmers at the WSU-Puyallup Research and Extension Center that five growers attended in person or via the telephone, to teach them how to set up traps and monitor for the CRF. Eleven growers did volunteer to participate. Traps were set on each farm by the participating farm and were instructed on identification of the CRF and how to maintain the traps. (This is an area that I will put more training in this year's proposal). Most of the participating farmers made the initial inspection of the traps and then mailed back to me for confirmation of the identification. None of the farmers were able to identify CRF adults at any time during the project. Five growers who had been consistently monitoring and showed active carrot rust fly populations were provided pelleted Mokum F1 OG variety carrot seeds to plant *ca.* 3000 square feet of carrots. Of those five growers only one grower, Terry's Berries had populations that reached economic injury levels. At Terry's Berries, 16 foot x 4 feet plots were set up. All treatments were replicated 4 times. Originally we proposed that we would replicate the treatment 6-9 times, but because of the lack of space created by the increase in the number of treatments when the experiment was altered. All application of treatments and sampling will be in the middle rows of each bed.

The Treatments were to be as follows:

1. Untreated Control
2. 2.2×10^8 juvenile/acre *Steinernema feltiae*
3. 7.4×10^8 juvenile/acre *Steinernema feltiae*
4. 2.2×10^8 juvenile/acre *Heterorhabditis marilatus*
5. 7.4×10^8 juvenile/acre *Heterorhabditis marilatus*
6. 2.2×10^8 juvenile/acre *Heterorhabditis bacteriophora*
7. 7.4×10^8 juvenile/acre *Heterorhabditis bacteriophora*

When the action level was reached, the treatments were applied as a sidedress with a backpack sprayer. Because timing of application is critical, plots were treated once a week for three weeks. All treatment applications followed by overhead irrigation long enough to soak the soil 1.0 inches below the surface (approximately 3 hours of irrigation), to ensure that both *Steinernema* below the surface. Treatments were done at dusk to minimize the detrimental effects of UV light on the nematodes. For the control plots and the plots treated with nematodes,

pharate pupae of *Galleria mellonella* wrapped in a fabric and buried ca. 1 inch deep within the rows to be treated. The pharate pupae were left in the field for *ca.* 24 hours, and shipped to Dr. E. Riga at WSU Prossor for quantification of nematode levels in the field.

The following data were collected: a.) Comparative yields (b.) Number and Percent CRF damage (c.) Adult population levels as determined by visual trapping (d.) Concentration of nematodes applied

PROGRESS TOWARDS OBJECTIVES (Comparison of actual results with the original goals):

OUTPUTS (Publications including newsletter articles, workshops and meetings, presentations, web sites or pages, field days):

Meeting: March 13, 2006 met with farmer at WSU Puyallup on how to monitor of CRF

Field day: July 10, 2006 on monitoring and alternative control of CRF at WSU Puyallup

Presentation: November 11, 2006 Alternative control of CRF, WA Tilth Conference, Vancouver, WA

Article: Muehleisen, D. P. and M. R. Ostrom. 2006. Monitoring for Carrot Rust Fly. Tilth Journal. 15(1):7-8.

Website: WSU Small Farms Team. (In Progress)

IMPACT (In what way has your work influenced organic agricultural practices, economics/marketing and environmental stewardship): I see a greater interest in monitoring, but I have yet to see anyone actually going out and monitor for CRF. This would be an important breakthrough if we could get row crop farmers to implement a proactive monitoring program for their farm plan. Also we are approaching the point where we can start to recommend entomopathogenic nematodes for management of CRF populations.

INSTITUTION: Washington State University

STATE: Washington

FUNDING SOURCE(S) (list matching funds if applicable):

FUNDING AMOUNT(S): \$15,500

ORGANIC RESEARCH LAND (indicate number of acres on all that apply):

Station	<input type="checkbox"/> non-organic	<input type="checkbox"/> transitional	<input type="checkbox"/> certified
On-farm	<input type="checkbox"/> non-organic	<input type="checkbox"/> transitional	<input checked="" type="checkbox"/> certified