

February 2023
VEPART Research Update

In this research brief we will be sharing results from the following research projects:

- Cultural and biological control tactics for the management of **wireworms** in root crops
- Development of above and below ground strategies using entomopathogenic fungi and RNAi technologies for the **control of root crop pests**
- Evaluation of **swede midge** tolerance and resistance among four popular kale.
- Vermont Pest Scouting and Monitoring Program

PARTICIPATORY ACTION RESEARCH

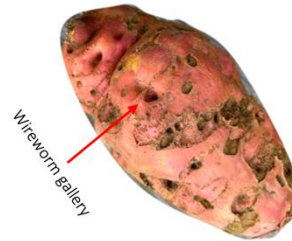
Over the past 7 years, our research team has had the great opportunity to work with a host of growers, gardeners, and researchers throughout Northeast. Our research framework, technically referred to as participatory action research (PAR), is the heart of our work. The three components of this research paradigm: participation, research, and action, each play a critical role in the success of our projects.

- First, **participation** relates to the collaborative process of working with farmers and other community members in the development and execution of each and every research idea.
- Second, we set out to conduct **relevant research** based upon the experience and needs shared by growers through a participatory process.
- Finally, **action** refers to the concrete steps that we take to leverage our research results to affect change in the communities we serve.

We would also like to acknowledge that without the participation and support of growers and other farm community members, our work has no value.

WIREWORM RESEARCH UPDATE

The objective of our wireworm project is to assess potential organic strategies to wireworm pressure.



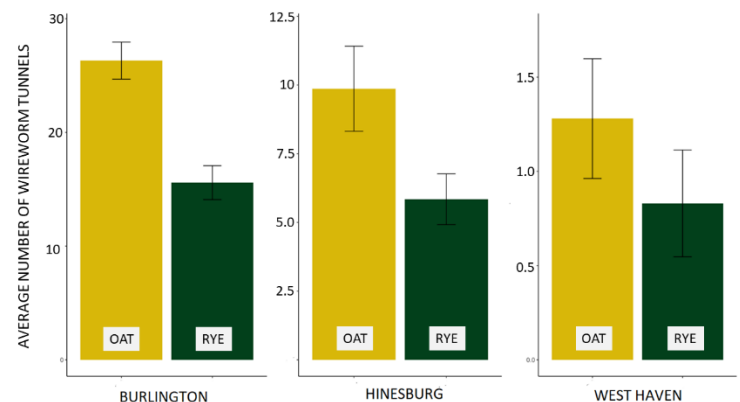
Sweet potato exhibiting wireworm feeding tunnels

Specifically, we looked to:

- Assess different cover crops (rye and oats) to determine how they attract or repel wireworms.
- Evaluate the performance of several biorational soil drenches for wireworm management entomopathogenic fungi for biological control of wireworms

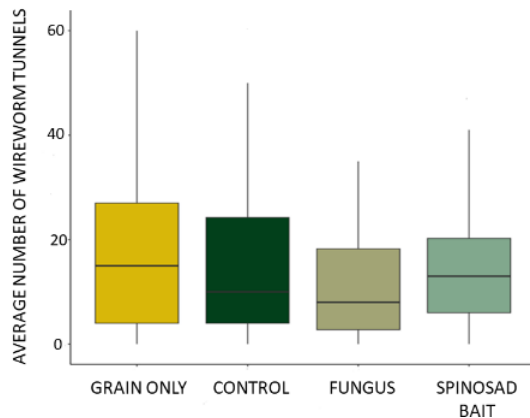
Cover crop assessment

During field season 2022 we planted two of the most commonly used cover crops to assess their effect of wireworm pressure: Oat and winter rye. The trials were replicated on five farms in the northwest region of Vermont. However, only three of the trials exhibited high enough levels of wireworm pressure to evaluate the cover crops. (Burlington, Hinesburg, and West Haven). Unlike summer 2021 when our experiments showed mixed results, summer 2022 results showed that, even if not significant at two of the farms, the severity of damage was lower in rye cover crop compared to oats at the three farms.



Biopesticide trial

We examined the effect of an insect fungi pathogen that has shown promising results in lowering wireworm damage (mainly Canada) tested several different biorational soil amendments and evaluated their effect on wireworm pressure (measured as the number of wireworm feeding galleries) in sweet potato plantings.



The treatments and their primary biological control agent were the following (from left to right in the figure):

1. Grain control (sterilized grain)
2. Control (no amendment)
3. Fungus = *Metarhizium* (entomopathogenic fungus with grain)
4. Seduce = Spinosad (insect bait)

Our results from 2022 showed a decreasing trend in the number of wireworm tunnels in the pathogenic fungi treatment.

Fungal applications and seduce soil amendments failed to significantly reduce wireworm damage, when compared to untreated control. However, the *Metarhizium* fungi did exhibit a decreasing trend, significantly different from seduce.

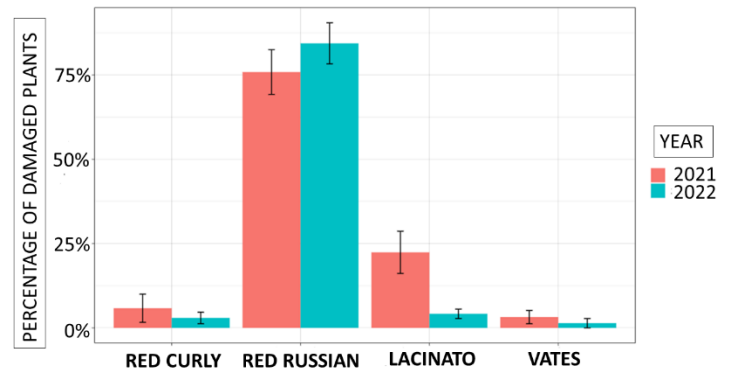
Finally, the **grain controls (sterilized millet) significantly increased the severity of wireworm damage when compared to the untreated control.** The increase in wireworm pressure from millet grain is important, especially for those growers that rotate different grains into their crop schedule. Some of those grains may act as attractants for wireworms.

We will be repeating all of the wireworm trials this upcoming season (summer 2023) and will look to add other sites that have a history of high wireworm pressure.

KALE VARIETAL TRIAL

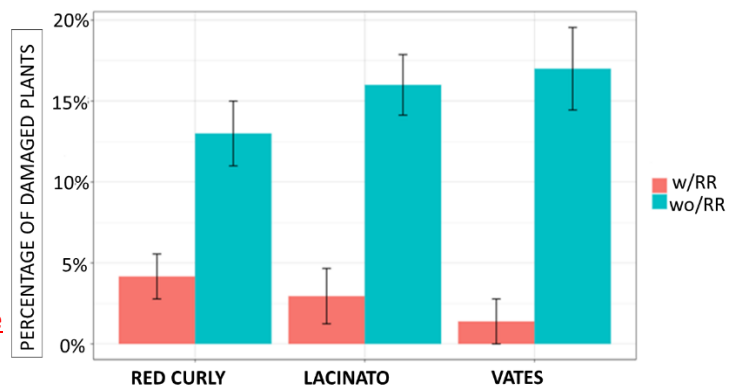
In 2021, our research team performed a kale varietal field trial comparing swede midge pressure among four of the most popular kale varieties grown in the region: Red Curly, Red Russian, Vates, and Lacinato. That field trial revealed that swede midge exhibits a strong preference for Red Russian kale over all other varieties.

This past season (2022), we repeated the same varietal trial and added a secondary trial where removed the Red Russian kale variety to gauge the potential of Red Russian as a trap crop.



Results were consistent across both years in the full varietal trials, with **Red Russian kale displaying significantly higher incidence (>75%) of swede midge damage when compared to all other varieties.**

Provided the swede midge's strong preference for Red Russian kale, we decided to perform a secondary field trial where we removed Red Russian kale from the mix. If swede midge pressure in the other "less preferred" varieties increased in absence of Red Russian kale, we may have a potential trap crop!



Comparisons between the full trial, with Red Russian (w/RR), and the secondary trial, without Red Russian (wo/RR), are encouraging. **The presence of Red Russian kale did significantly reduce swede midge pressure in the other kale varieties (10-15%).** However, it is important to note that swede midge pressure in the other kale varieties was inherently low in both trials (maximum 16%). So trap cropping in these varieties, using Red Russian as a trap, may not be necessary or advisable.

For the upcoming season we will be exploring the utility of Red Russian kale in other brassica crops (e.g. broccoli, Brussels sprouts, etc.) Stay tuned!

2022 VERMONT PEST SCOUTING AND MONITORING PROGRAM

This past season we again ran the [pest and disease scouting program](#) as a service to all of the VVBGA members and other regional farming/gardening communities. With support from [Cedar Circle Farm](#) and their on-farm scouting program, we were able to get additional weekly scouting data to better serve those growers in the Connecticut River Valley. Given the positive feedback throughout the season, we are planning to continue the program this upcoming season with the intention to add yet another on-farm monitoring site somewhere in the southern part of the state. If any farms in that region are able and willing to contribute, please reach out! We've also been in preliminary conversations with UVM's Master Gardener Program to potentially leverage their community of gardeners.

THANK YOU AND STAY IN TOUCH

As always, we thank you for any and all feedback that you may have regarding our collective work.

For more information regarding any of our research and/or monitoring efforts or participating in any of our future research, check out our website: go.uvm.edu/pests

Feel free to reach out to our research team at any time!

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- Cultural and biological control tactics for the management of wireworms in root crops [LNE19-379]
- Development of Above and Below Ground Strategies Using Entomopathogenic Fungi and RNAi Technologies for the Control of Root Crop Pests [LNE22-450R]

New England Vegetable & Berry Growers Association

- Evaluation of swede midge tolerance and resistance among four popular kale varieties

Vermont Vegetable and Berry Grower's Association

- Vermont Pest Scouting and Monitoring Program