



# CRANBERRY CROP MANAGEMENT JOURNAL

DIVISION OF EXTENSION

Volume 34 • Issue 2

UNIVERSITY OF WISCONSIN-MADISON

May 19, 2020

## Tank Mixing 101

*By Leslie Holland and Christelle Guédot*

The following information is a brief summary of a presentation given by Jason Deveau (“Spray Guy”) on May 5, 2021 for the Cold Climate Grape Webinar Series. The concepts and practices discussed apply to all fruit crop growers.

### ***Terminology***

Suspension - heterogeneous mixture of a fluid and solid particles

Carrier - primary material used to allow a pesticide to be dispersed effectively

Adjuvant - substance added to a pesticide or pesticide spray mixture to enhance performance

Agitation - stirring or shaking

### ***What is tank mixing?***

Tank mixing is the practice of combining multiple crop protection products into a single tank to make a single spray application. Tank mixing allows for the treatment of various pests with a single pass.

### ***Why do we tank mix?***

- Efficiency - Passing through the field once instead of several times - saves time and money! Additionally, you can avoid possible crop damage by reducing the number of times you pass through with equipment that could be damaging to the crop. Fewer passes in the field also reduces compaction of soils.
- Resistance management - multiple modes of action to prevent and reduce fungicide resistance issues.
- Improved performance - adjuvants such as stickers/spreaders can improve spray quality and reduce drift.

### ***Why might we avoid tank mixing?***

- Chemical or biological incompatibilities - chemicals can act synergistically or antagonistically in a tank mix. The symptoms of reactions may never be apparent or occur immediately upon mixing.
  - Synergism of chemicals can increase potency which can harm the plants.
  - Antagonism of chemicals can reduce potency and interfere with how the product works.
- Physical incompatibilities can result in reduced productivity of your spray operation if you have to empty the tank due to chemistries not mixing ex. liquid chemistries can solidify and clog plumbing, and dry products can fail to suspend in the tank mix (water) and clog screens and nozzles.

### ***What can cause issues with suspensions in tank mixing?***

- Not agitating the tank frequently enough

- Using spray equipment with low carrier volume
- Mixing when carrier temperature is low

### ***Mixing order matters!***

- If your carrier is water the tank should be  $\frac{1}{2}$  full of water before adding the first product; if your carrier is a fertilizer the tank volume should be  $\frac{3}{4}$  full of water before adding the first product
- Check the quality of your carrier water by establishing a baseline for:
  - pH
  - Total hardness
  - Bicarbonate
  - Salinity or Total Dissolved Salts
- W.A.L.E.S. - this acronym represents different categories of products you would typically include in a tank mix; see a more detailed overview of the different products within each category in Jason's presentation
  - Wettable powders
  - Agitate
  - Liquid flowables
  - Emulsifiable concentrates
  - Surfactants
- Compatibility agents and anti-foamers should be added before pesticides; adjuvants should be added based on label direction or based on their formulation

### ***How to avoid tank mixing issues?***

- The more products you tank mix, the greater the chance for incompatibility.
- Decide what you are planning to tank mix before you tank mix; do not make these important decisions while you are loading up your sprayer.
- Contact the manufacturer of the products you are using, extension educators and specialists.
- Consult the pesticide label! PDF versions of pesticide labels are available at Agrian and CDMS
  - TIP: Use the PDF version of the pesticide label to search (CTRL+F on a PC or Command+F on a Mac) for potential tank mixing related issues using the following key words:
    - Do Not Mix
    - Mix
    - Hours
    - Agitation
    - Fertilizers

### ***Tips and Tricks:***

- Mixing takes time! Especially when you have a cold carrier or using dry products. Do not rush or you may risk product(s) not being fully suspended in the carrier.
- What if you do not know if certain chemistries are compatible? Try the jar test which can indicate physical incompatibilities of products. You can also purchase a Compatibility Test Kit (ex. Precision Laboratories Compatibility Test Kit).

### ***Other considerations***

As product registration may change from year to year, it is important to check if the pesticide you intend to use is registered with the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP). As you know, state registration is mandatory for the use of products in Wisconsin and compliance is essential to avoid potential legal issues. To comply, you can always use the DATCP pesticide database that has the current registration status for each product registered in Wisconsin, sites products can be applied to, pests targeted, and more. This website is searchable by product name or by active ingredient which makes it very convenient to check a specific product.

# Who Is Pollinating the Cranberries? Find Out With WiBee: The Wisconsin Wild Bee App

By Colleen Satyshur

This is the big kickoff year for WiBee Wisconsin Wild Bee App project. Thank you to all the cranberry growers and crop scouts that participated last year! We're hoping for another good year of cranberry pollinator counts!



The WiBee project started with growers asking if they had enough pollination on their farm from wild bees alone. Since bloom for many crops is short, and conditions are different from farm to farm around the state, the Gratton lab at UW-Madison developed a free smart phone app, called WiBee, that's easy to use so that growers or crop scouts or anyone out during bloom can do quick 5 minute surveys and send it in to the data pool. This can be a really powerful set-up if a lot of people can participate, because it can be so much more representative than if just one group of people tried to collect all the data, and the results can be more specific to an orchard or farm. I'm trying to contact farms/orchards to invite them to do a few short surveys, if they have time. The more surveys we receive, the more reliable conclusions we get on wild bee pollination.

Participation starts with 4 steps:

- 1) Download the app (easiest to do inside with wifi and email access nearby). Once it's downloaded surveys can be done without cell reception.
- 2) Learn the 6 pollinator groups (Honey, Bumble, Large Dark, Small Dark, Green, and Non Bee). There are pages also available on the app. Here's a 1 page printable PDF that has all the info in one place and can be taken in the field. Once people know "non-bees" and "honey bees" the rest are pretty self-explanatory.
- 3) Take Bee Quiz in the app (app requires this one time quiz prior to first survey).
- 4) Learn survey protocol (3x3ft area, count flower visits for 5 minutes. For best statistics on our end, repeat 3xday on 3 days for one spot/plant species). Here's the 1 Page printable PDF. The "take another survey" button at the end of a survey preloads your previous location etc. and is a quick way to get 3 surveys done in a day. We are able to offer a \$50 honorarium for growers/scouts/others that complete 9 surveys, 3 per day for 3 days.

Then survey away!

Tip- for people who downloaded the app last year-check for updates. Go to the App store, search WiBee and look for an "update" button next to the name like this:

Many people's phones update automatically, so they will just see "open" next to the name or something like that. There's more info on the website: <https://pollinators.wisc.edu/wibee/> and questions can be sent to [pollinators@wisc.edu](mailto:pollinators@wisc.edu)

People can track bees on their property and can go into more depth into the bees and the data if they want (we love talking about bees!). But we tried to make the survey process straightforward and quick for participants. Thanks and looking forward to seeing cranberry surveys this year!

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# Newly-Registered Insecticide: Danitol

*By Christelle Guédot*

Danitol is not a new insecticide but it is new to the cranberry industry. It was registered in 2020 on cranberry and is the first pyrethroid registered on cranberry. It is registered for use in Wisconsin on several crops including pome fruit, stone fruit, grape, bushberries, and low-growing berries, including cranberry. It is marketed by Valent® under the formulation 2.4 EC (2.4 lbs of active ingredient per gallon as an Emulsifiable Concentrate). Danitol is in the class of the pyrethroids (IRAC group 3), which have a mode of action that targets the sodium channels in the neurons. Pyrethroids cause a prolonged depolarization of the neuron from a prolonged influx of sodium into the neurons, leading to repetitive nerve activity that can result in hyperexcitation, paralysis, and death. The active ingredient in Danitol is fenpropathrin. Danitol is an insecticide with foliar activity that is fast acting by contact or ingestion of treated plant surfaces. Affected insects will rapidly stop feeding, become paralyzed, and eventually die.

- Available as 2.4 EC (2.4 lbs of AI per gallon, Emulsifiable Concentrate)
- Restricted-entry interval (REI): 24hrs
- Pre-harvest interval (PHI): 2 days
- No more than 2 applications per year
- Do not exceed a total of 0.8 lb AI (42.7 fl. oz.) per acre per year
- Rate of use per acre: 10.7 - 21.3 fl. oz.
- Minimum interval between applications is 14 days

Danitol has broad spectrum activity on many insect species and under the low growing berries (13-07G) which includes cranberry, Danitol is registered to control a long list of insects. Despite this long list, the only insects listed that are pests in Wisconsin cranberry are leafhoppers. In our trials, Danitol was shown to be very effective on leafhopper nymphs and adults and more trials will be conducted to assess its efficacy on blunt-nosed leafhopper more specifically.

Danitol may be applied by ground equipment, chemigation, and air and buffer zones from aquatic habitat are specifically stated in the label and vary based on the mode of application. For more information on mixing and spraying, and all other considerations, please see the product label.

Danitol is highly toxic to bees exposed to direct treatment or residues on blooming plants. Do not apply Danitol when bees are foraging and until flowering is complete. Danitol is extremely toxic to fish and aquatic organisms and must not be applied directly to water. Danitol is also toxic to wildlife.

Please check with your handlers before using a new product as handlers may not allow certain products for domestic and/or foreign markets. Also handlers may extend PHIs from the one stated in the label to reduce residues so please always check with your handlers. As always, make sure to read the label before using any pesticide. You can find the label of Danitol at the following link: <http://www.cdms.net/ldat/ld520001.pdf>

Happy growing season!

# DIY Nematode Ranching

By *Brandon Gominho and Shawn Steffan*

On May 6, Brandon Gominho and Shawn Steffan delivered a nematode ranching workshop, hosted at Pergande Cranberry. The methods developed in the Steffan lab have improved greatly since 2020, both in efficiency, and in reduced odor! For those who are curious about the process, we wanted to share the propagation protocol used. We “ranch” in two stages after receiving a new culture: first small scale in petri dishes, then increasing production to large scale in paint trays.



## General information

1. The nematodes are soil dwelling organisms so they don't like light or sitting in water for too long.
2. We found they prefer temperatures around the 70s. They will survive at temperatures as low as high 40s, but their numbers will be low and they'll be moving slowly.
3. We use mealworms for propagation, but they can be propagated on numerous host types. They generally like beetle and butterfly/moth larvae.
4. Since they don't like sitting in water, we recommend using them the day you collect them. Whether for application or plate/tray creation, they will perform better if you use them day of. They can survive in water kept at room temp or in the fridge for a day, but their numbers will fall pretty quickly after.
5. If you have the 2 species we provide, *Oscheious onirici* (Oo) and *Heterorhabditis georgiana* (Hg), then keep them separated and do not cross contaminate. They can be applied together, but they do not grow well together. They both follow the same procedure and timeline outlined below.

## Nematode Small-Scale Propagation Protocol (Petri Dish)

### Materials needed

1. Petri dishes
2. Cotton rounds
3. Frozen, dead Mealworms (5-8)
4. 5-10mL of Nematode solution (can be weak [as low as 10 nematodes] or strong [as high as 1 million nematodes])
5. Water

### Starting Plates

1. Get out petri dish and place 1 cotton round on the base of the petri dish
2. Load mealworms on the cotton round
3. Place second cotton round on top of mealworms (creating a mealworm sandwich)
4. Apply nematode solution on top of cotton rounds. Only add enough nematode solution to soak the cotton and leave a small pool around the cotton. The nematode solution shouldn't take up the entire base of the petri dish.
5. Let sit for 2-4 days to allow nematodes to enter mealworms

## Cleaning Plates

1. After incubating for 2-4 days, rinse the cotton rounds with water. You don't need to drown the mealworm sandwich. Just add enough water to cover the base of the petri dish
2. Gently swirl the water around the petri dish to help work the nematodes out of the cotton and into the water.
3. Gently pour off the water into a collection container.
4. Repeat steps rinsing steps 2-3 times
5. Use the water from the collection container (nematode solution) to make more plates or dump into sink or apply as a small spot treatment
6. When finished rinsing, leave only a small amount of water in the petri dish until the next cleaning. The water shouldn't cover the base of the petri dish. The water is only to keep the cotton moist.
7. Clean plates every 2 days

## Timeline of Plates (estimates)

1. Initial infection period: 2-4 days after start
2. Ramp up period: 2 weeks after start
3. Maximum production: 2-6 weeks after start
4. Plate Fallout: 6-8 weeks after start
5. Total plate lifespan: 8 weeks

## Nematode Large-Scale Propagation Protocol (Paint Tray)

### Materials Needed

1. 2 Burlap rectangles (cut into 20.5" x 12" rectangles)
2. Frozen, dead Mealworms (1000 large mealworms-2000 small mealworms)
3. Paint tray
4. Lid
5. 500-600mL of Nematode solution (Has to be strong [ $>100,000$  nematodes])
6. Turkey Baster
7. Water
8. 1 Liter containers
9. 1mL syringe
10. Sedgewick Cell (for counting)
11. Counter
12. Microscope

### Starting Trays

1. Fold burlap rectangles in half (so it ends up being a double layer around 10.25"x12"). Soak burlap in water for 5-10 minutes
2. Place 1 burlap sheet on paint tray.
3. Load burlap sheet with mealworms. Be sure to keep the mealworms on the top half of the paint tray away from the basin. The mealworms need to be away from the water.
4. Place the second burlap sheet on top of the mealworms, making a burlap sandwich (similar to the petri dish setup). Press down on the edges to keep the mealworms inside the burlap pocket (like a calzone)
5. Apply the nematode solution to the burlap calzone. Be sure to focus on the section with the mealworms in it.
6. Use the turkey baster to suck up the solution that pools in the basin and reapply it to the burlap (like you're basting a turkey)
7. Put lid on and let incubate for 4 days.

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## Cleaning Trays

1. After the 4-day incubation period, its time to start cleaning the tray. The basin water will be pretty gross because of the number of mealworms. There may even be a thin film of bacterial growth. That's fine because the mealworms are not in the water. Pour out the water in the basin
2. Take about 400-600mL of water and pour it over the burlap. This will help get the nematodes out to the burlap and into solution.
3. Use the baster to reapply the basin water to the burlap. This will ensure all mealworms are infected and it helps push nematodes out of the burlap.
4. Pour out the basin water into a collection container
5. Repeat rinsing steps about 4-5 times
6. If using for application:
  - Collect 1 liter of nematode solution.
  - Using the syringe, suck up 1 mL of nematode solution
  - Put 0.1mL of nematode solution into the Sedgewick cell
  - Count the number of nematodes in cell
  - Take the total number and multiply it by 10,000 to get the number of nematodes per liter you collected
  - Collect how every many liters you need from 1 or more trays and combine them into a big bucket for application
7. If not using for application, use the nematode solution to make more trays or plates or dump nematode solution down the sink
8. When finished rinsing, leave only a small amount of water in the basin.
9. Clean trays every 2 days

## Timeline of Trays

1. Initial infection period: 4 days after start
2. Ramp up period: 0-4 weeks after start
3. Maximum production: 4-12 weeks after start
4. Plate Fallout: Unknown (we never tested the full lifespan of a tray)
5. Total plate lifespan: at least 12 weeks (we never tested the full lifespan of a tray)

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# Update from the Wisconsin Cranberry Research Station

*By Wade Brockman*

Things are really growing fast and moving along at the Wisconsin Cranberry Research Station. The new beds just got their third application of herbicide, and are putting on a lot of growth. Research is going well too: Jyostna Devi Mura, Amaya Atucha, Jed Colquhoun, and Allison Jonjak all have research under way, with more to come over the course of the season.

# Grower Updates

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## Flying Dollar Cranberry

*By Seth Rice*

“Agriculture is the most healthful, most useful and most noble employment of man.” -George Washington

I hope everybody enjoyed that little cold spell as much as we did. Watching frost can really take a toll on a person, especially when you keep having back-to-back nights like we just did. Hopefully, everybody got their early herbicides on if not we still got a small window yet. We did not have any plans to plant this year or renovate but if we did now would be a perfect time to do so. I see some of the neighbors are taking advantage of that with this nice weather on the horizon.

Soon our favorite IPM crews will be out scouting and keeping us in the loop on what is happening on the marsh. We have been told to be on the look out for false blossom and blunt nose leaf hopper this year especially and the devastating effects it has on our industry.

Also, now that we have our soil samples back, we can start to make more long-term plans and overall health of the marsh. I wish everybody a safe and happy spring!

## Cranberry Lake

*By Karl Pippenger*

The extended cold snap prevented some herbicide applications due to long frost nights. Growers are completing herbicide applications the week of 5/14, should finish by early next week. Ben Lear have lost 75% of winter color, Stevens about 50%. All varieties have bud swell/elongation beginning along the edges, bed centers are mainly at white bud. Beds planted in 2020 have red shoots emerging. No insects swept. Crop potential appears to be above average at this point.

