Integrated Cranberry Crop Management for Wisconsin

Cranberry

Crop Management Newsletter

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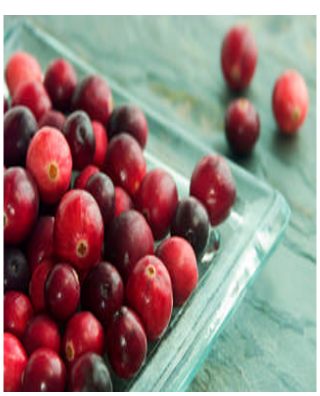

2011 Cranberry Fungicide Update

Patty McManus
UW-Extension Fruit Crops Specialist

In this article I review the strengths and limitations of the current fungicide arsenal. It is possible that I have overlooked some products and/or brand names, and exclusion of a product should not be viewed as a negative endorsement. On some fungicide labels you will see a listing for "Berry" which includes a long list ending with "and other berry crops." Surprisingly, this does not include cranberry, even as an "other" berry. Cranberry is in its own category on most labels, and unless you see it by name, the product is not registered on cranberry. Labels do change, so be sure to follow the instructions on the label of the product in your hands.

Abound. Active ingredient is azoxystrobin, which is in the strobilurin class of fungicides. Its relative low toxicity to mammals has earned it "reduced-risk" status by EPA. Nevertheless, it is toxic to certain aquatic organisms, and it therefore has a 14-day water-holding requirement. This rather onerous requirement could make it impractical for some growers to use Abound at all. I've been in touch with Syngenta about the possibility of getting this restriction changed, but according to them, it is not possible. Three sprays of Abound are permitted, starting at early bloom and then at a minimum of 7-day intervals. This product is primarily for control of fruit rot, which is caused by a complex of a dozen or so fungal species. Its performance in controlling fruit rot has been inconsistent, working well in some situations and not in others. Although we have never had intense disease pressure when we've tested it for cottonball control, it does have some efficacy. However, in our trials, it has not been as good as Indar or Orbit for controlling cottonball.

Bravo, Echo, Equus. Active ingredient is chlorothalonil, a broad-spectrum fungicide. In every fruit rot trial conducted in Wisconsin, and almost all of them conducted elsewhere, the chlorothalonil products have topped the competition. The different names and formulations appear to perform equally well. The cloud behind the silver lining, however, is toxicity to the cranberry plant. Applied during bloom, chlorothalonil sometimes reduces yields. Applied during bloom and especially if applied to pinhead-sized fruit, it causes red flecks and burns on fruit. These problems are worse if chlorothalonil is applied on hot days (temps reach 85 F or more) or in low spray volumes (less than 50 gallons/acre). In 2008 we put out several trials to compare the products for efficacy and toxicity. While the various chlorothalonils were equally effective, we saw NO phytoxicity in 2008! Interestingly, we did see phytotoxicity in 2009, despite the cool weather that followed application. Frank Caruso has conducted trials in Massachusetts where more fruit scarring occurred with Bravo WeatherStik than Bravo Ultrex in one year, and then the reverse was true the following year. He reports, however, that other field observations indicate that the Ultrex formulation is more phytotoxic. We intend to compare the two forms in 2011.

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WELCOME SHAWN STEFFAN

Research Entomologist, USDA-ARS

Shawn Steffan was recently hired by the USDA to develop an entomology research program in Wisconsin's cranberry bogs. His lab can be found on the UW-Madison campus, in the Department of Entomology. Having done his M.S. work at UW-Madison, Shawn is very happy to be back in Wisconsin, as is his wife, Kerry, who grew up in Door County. They recently moved to Madison from Washington State with their two children, Nadia and Elliot.

Shawn's experience in agricultural entomology can be tracked across many cropping systems, and over several states. Shawn grew up in California, did his undergraduate work at UC-Berkeley, then moved halfway across the country to study entomology under Dan Mahr at UW-Madison. After finishing his M.S. thesis in Wisconsin in 1997, he moved back to California to conduct biological control research in grapes, almonds, pistachios, and peach/nectarine orchards. His work focused on some of the original goals of IPM: integrating biological control with chemical control strategies, and deploying effective reduced-risk compounds. Shawn helped discover an invasive insect in California's pistachio orchards that was not only a new pest for California, but was also completely new to science. From 1997 to 2003, Shawn worked closely with growers and Extension personnel to make concrete improvements to horticultural production, spray timings, and pheromone mating disruption systems.

He then moved on to Logan, Utah, where he lead the IPM project at Utah State University. Shawn's work focused on the use of insect degree-day models to estimate pest development in apple and cherry orchards. Because insect developmental stages are important determinants of insecticide efficacy, knowledge of insect development in the field can make spray timings much more accurate and effective. While studying other ways to make IPM programs more effective, Shawn showed how "spray shadows" in the tree canopy create safe zones for pests.

After finishing his work on tree fruit IPM, Shawn moved his family to eastern Washington to pursue a doctoral degree in predator-prey interactions at Washington State University. His research revealed that predator-predator interference can have major impacts on how predator communities control prey populations. Furthermore, predator communities can effectively protect plants by non-lethal means—predators scare prey away from plants, and sometimes into the jaws of other predator species. He did his post-doctoral research on attractant compounds for natural enemies.

Shawn Steffan

This work allows for monitoring of natural enemy populations, and will pave the way for future applications like "herding" natural enemies into pest hotspots.

Since moving to Wisconsin this January, Shawn has met early and often with the cranberry industry. He has already begun an investigation of how and why flooding works as an insect control tactic in cranberries. He is looking at the submergence tolerance of various cranberry cultivars, and has arranged with nine growers around Wisconsin's cranberry growing regions to conduct replicated field trials of "bug floods." Shawn will be establishing colonies of cranberry fruitworm, tipworm, blackheaded fireworm, and *Sparganothis* fruitworm to screen cranberry varieties for their innate resistance to herbivory. Shawn will also be determining the temperature thresholds of these pests so that we'll have physiological development models for the major cranberry pests. Ultimately, this information will indicate where insects are in terms of development, based on recent weather. Along with his counterpart at the USDA, Juan Zalapa, he is also planning to look at the wild/feral cranberry populations around the state as source material for future breeding efforts.

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WELCOME JUAN ZALAPA

Research Geneticist, USDA-ARS

Department of Horticulture, UW-Madison

I joined the faculty of the Department of Horticulture at UW-Madison as a USDA-ARS Cranberry Geneticist last October, 2010. I have lived in Wisconsin for the last twelve years, and I have formed a family and become a proud Wisconsin Cheesehead. In Wisconsin, I learned that the cranberry (*Vaccinium macrocarpon*) is a Native American fruiting plant and is the state fruit. I also learned about the cranberry industry's history, culture, and economy. I am honored to have the opportunity to develop a breeding, genetics, and genomics program for cranberry to create an integrated effort towards the development of enhanced cranberry cultivars while promoting greater knowledge and outreach on this important, an iconic American crop.

I am originally from Brownsville, Texas, but grew up in Mexico until my teenage years. As a kid, I had a small garden and especially enjoyed planting fruit trees, although I never had enough space for my planned orchards. Due to my passion for plants, I decided to study agriculture. I graduated from Texas Tech University in 1998 with a bachelor's degree in Horticulture. My interest in the genetics of fruit crops lead me to Madison in 1999 to work in the Department of Horticulture in melon breeding and genetics where graduated in 2005 with a Ph.D. in Plant Breeding and Plant Genetics. From 2005 to 2008, I was a National Science Foundation minority postdoctoral fellow conducting population genetics research of North American elm species under Professor Johanne Brunet in a collaborative project with Dr. Ray Guries in the Department of Forest and Wildlife Ecology. After completing that project, I worked with Professors Mike Casler and Shawn Kaeppler in the Department of Agronomy on a project funded by the Great Lakes Bioenergy Research Center to develop switchgrass as biofuel.

In my current cranberry research, my goal is to develop genetic knowledge and genomic tools while improving the understanding of the current germplasm and improving breeding efficiency. I envision leading a coordinated national effort focusing on the establishment of an integrated cranberry breeding, genetics, and genomics project to develop enhanced cultivars for superior productivity, improved environmental adaptation, enhanced fruit quality traits, and increased disease and insect resistances.

I hope to meet all of you in person soon, but in the meantime please feel free to visit my office, call me, or email me at any time. Finally, I am very grateful to the Wisconsin cranberry industry for the opportunity to serve them and to Wisconsin that embraced me. "On, Wisconsin! ...Oh Wisconsin, land of my dreams."

"Forward"

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Juan Zalapa in the Cranberry Marsh

2011 Cranberry Fungicide Update *(continued from page 1)*

Copper-based fungicides. Several different formulations are registered on cranberry, but I don't know why. They have consistently been at the bottom of the pack (often not better than the untreated check) in fungicide trials for fruit rot and cottonball. Since copper has some bactericidal activity, some growers have used it the year following a bad outbreak of stem gall (sometimes erroneously called "canker"). The bacteria that cause stem gall, however, amass deep inside stems where copper can't reach them. It used to be that copper was cheap, but that is no longer the case. Perhaps its high price will bring an end to futile application of copper!

Evito. Active ingredient is fluoxastrobin. As a strobilurin fungicide, it is in the same general class as Abound. We tested Evito for fruit rot control in 2009 and 2010, with mixed results. For now we just don't know enough about its efficacy to make recommendations, so it will be included in 2011 trials.

Indar. Active ingredient is fenbuconazole, which is in the sterol demethylation inhibitor class of fungicides, same class as propiconazole (below). The best use of Indar in Wisconsin is for cottonball control. Indar has been equal to or just a shade better than Orbit for cottonball control in trials conducted 1996-2006. Like Orbit, pre-bloom applications are permitted to control the tip blight phase of cottonball. Indar is also labeled for control of fruit rot, but results have been generally poor in our trials. According to Rutgers pathologist Peter Oudemans, it is quite effective against early rot (*Phyllosticta vaccinii*) but not bitter rot (*Colletotrichum* spp.). At the sites where we have tested Indar in Wisconsin, early rot is NOT the major fruit rot pathogen, but *Colletotrichum* is present at high levels. That may be why it has not performed well in our trials.

Mancozeb. Mancozeb is marketed as Dithane, Penncozeb and some other names. A related fungicide is **maneb**. These are old, broad-spectrum fungicides. In our trials and in trials conducted in the eastern U.S., mancozeb has been very effective in controlling fruit rot. In our trials it lags just a bit behind Bravo, but it has been a much more consistent performer than Abound or Indar. The downside is that it can reduce fruit color if applied during bloom and/or fruit set stages, and that's when you need to apply it to control fruit rot. The price of mancozeb products has risen sharply in recent years, owing to factory shut downs and related shortages.

PropiMax and Tilt (=Orbit). Active ingredient is propiconazole, which is in the sterol inhibitor class of fungicides. After more than a decade of Section 18 registration, Orbit got a regular label in 2007 for cottonball control. When the patent on propiconazole expired, Dow AgroSciences released PropiMax. In recent years, the Syngenta product labeled for cranberries has been marketed either as Orbit or Tilt. Orbit and Tilt are identical, but cranberry MUST be on the label for whatever product you are using. We have not tested PropiMax, but I would expect it to perform as well as Orbit/Tilt. Propiconazole and fenbuconazole (Indar) are both excellent fungicides to control cottonball, but because they belong to the same chemical class, fungicide resistance is a concern. Indar and PropiMax/Orbit/Tilt each are permitted in four sprays per season, but you should not apply more than a TOTAL of four sprays of sterol inhibitor fungicides in a season. The best "bang for the buck" in controlling cottonball comes with spraying during bloom. So, unless you have serious cottonball problems (e.g., greater than 10% of fruit affected), you should probably forego the budbreak sprays and focus on protecting flowers. In over 10 years of testing both Orbit and Indar we have never seen a negative effect on yield or fruit quality. PropiMax, Tilt, and Orbit are NOT effective on fruit rots other than cottonball.

Phosphorous acid products. Aliette, which is an aluminum salt of phosphorous acid, was the first in this group. Now we have **Phostrol** and **Prophyt**. These are effective in controlling *Phytophthora*, but have not been tested on other cranberry pathogens. The active ingredients in phosphorous acid products are one or more phosphite salts (potassium phosphite, sodium phosphite, ammonium phosphite). From a practical standpoint, you can consider these products all the same. However, these fungicides do not contribute to P nutrition. Phosphorous acid releases the phosphite (also called phosphonate) ion, which is transported in the plant to the roots. While the phosphite ion is fungicidal to *Phytophthora*, it does not provide P for the plant. Phosphorous acid products do not release the phosphate ion, which is the form of P that plants use.

(Continued at Cranberry Fungicide Update page 5)

2011 Cranberry Fungicide Update *(continued from page 4)*

Ridomil. The active ingredient is mefanoxim, which is a slight modification of the old active ingredient, metalaxyl. Ridomil is effective on some species of *Phytophthora* but not the ones that predominate in Wisconsin, according to a survey we did in collaboration with Peter Oudemans of Rutgers University. Improving drainage is the first step in Phytophthora management, and often the problem goes away without fungicide input.

Serenade. The active ingredient in this biocontrol product is the bacterium *Bacillus subtilis*. Promising results from blueberry research inspired us to test Serenade on cranberry, especially for cottonball control. Unfortunately, it did not control cottonball as well as the standards, propiconazole and fenbuconazole, and in some cases, not better than the non-sprayed check. In separate tests, it did not control the fruit rot complex.

Additional information on fungicides and their uses can be found in several bulletins listed on the UW-Extension website at http://learningstore.uwex.edu/Berries-C84.aspx , the Pesticide Chart from Cranberry Institute, and in further articles in this newsletter.

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References to products in this publication are for your convenience and are not an endorsement of one product over similar products. You are responsible for using pesticides according to the manufacturer's current label directions. Follow directions exactly to protect the environment and people from pesticide exposure. Failure to do so violates the law.

Plant Disease Diagnostic Clinic

Patty McManus

Having an accurate diagnosis for sick plants is critical when trying to remedy the problem or prevent it from happening in the future. Most problems that arise on cranberries are probably due to cultural and environmental factors rather than living organisms. Nevertheless, to narrow down the possible causes, it is often helpful to search for pathogens. If you have samples that you want tested, send them to:

Plant Disease Diagnostic Clinic
Dept. Plant Pathology
1630 Linden Dr.
Madison, WI 53706.

Do NOT put my name on the package! If I am not around, then nobody will open the package and your samples will be ignored! The clinic charges a fee for its services, which is usually in the range of $20-25 per sample, depending on what tests are necessary. However, if you send in a bag of brown uprights from Bed A, Bed B, and Bed C, plus a bag of healthy uprights for comparison, and you want them sampled separately, that would be four samples ($80-100 total). You will be invoiced after the diagnoses are complete. If you have questions about how much you will be charged, it's a good idea to call the clinic prior to submitting samples. Phone 608-262-2863. Also, the more information you provide in an accompanying letter, the better. It's helpful to know cultivar, bed age, when the problem first showed up, and any other clues that you think would be helpful.

For more information on the clinic, including fee structures and instructions on how to prepare samples, see the PDDC web site:
www.plantpath.wisc.edu/pddc/

Your county UW-Extension office can also assist you in sending packages to the clinic.

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