

# Michigan Blueberry I.P.M. Update



April 22, 2008

Volume 2, No. 1

## **Blueberry IPM Kick-off Meeting this Wednesday!**

April 23<sup>rd</sup>, NOON to 3PM, Lunch served  
Trevor Nichols Research Complex, Fennville, MI  
*SEE PAGE 10 FOR DETAILS*

## Contents

- Welcome back!
- New Small Fruit Education Coordinator
- Crop Stages
- Degree Days and weather Notes
- Disease update
- Insect update
- Pest of the Week – Mummy Berry
- New herbicides registered for blueberry
- Insecticide label update
- Fungicide label update
- Meetings and Announcements
- In Next Week's issue...

## **IPM UPDATES FOR 2008 – Something old, something new**

Welcome to the MSU Blueberry Team's IPM Updates for 2008. If you are a subscriber from 2007, welcome back! If this is the first edition you have read, we hope you will value this service. The newsletter is free to anyone who wants to receive it, delivered using email and our website at [www.blueberries.msu.edu](http://www.blueberries.msu.edu). If you provide us with your email address, we can send a reminder each week when a new IPM Update is posted.

At the start of this second year of these weekly updates, we wanted to say thanks to the Michigan blueberry industry for their support of this project. Your encouragement has kept these updates alive for 2008 and we are making some adjustments to the reports to respond to the feedback we received during the winter. We could not provide this service without the financial support provided by Project GREEN and by the North Central IPM Program of the USDA. These sources of funding allow us to visit the sites to gather pest information and they support preparing the information to supply this newsletter.

There is a personnel change for 2008 - Paul

Jenkins, MSU's new Small Fruit Education Coordinator (see below), will be sending out the newsletter each week. Members of the Blueberry Entomology and Plant Pathology programs at MSU will still be scouting two fields in Van Buren and two fields in Ottawa counties each week, and Paul will coordinate that information with relevant fact sheets and pest updates.

We are also planning to hold more blueberry IPM meetings this year - see inside for details. We hope you'll be able to attend one or more of these during the year.

Best wishes for a productive season,  
The MSU Blueberry Team

## **NEW SMALL FRUIT EDUCATION COORDINATOR**

Paul Jenkins joins MSU as the new Small Fruit Education Coordinator. He has responsibilities for coordinating extension and applied research efforts to address the pest and production priorities of Michigan's small fruit industries. His focus will be to support small fruit commodity organizations, MSU extension educators, and MSU researchers in the development, production, and delivery of outreach programs. He will also facilitate collaborations between MSU researchers, county/district extension educators, industry partners, growers, and related clientele.



A native of Grand Rapids, Paul has been at MSU since 2001. Prior to his new position, he was a graduate research assistant for Rufus Isaacs (Entomology) and has spent time as a research technician for John Wise (Trevor Nichols Research Complex/ Entomology) and Christine Vandervoort (Pesticide Analytical Laboratory/Plant Pathology). His research maintained a focus on both blueberries and grapes, making him well suited for this position and a welcomed asset to the MSU team.

Paul can be contacted at 517-432-7751 or by email at [jenki132@msu.edu](mailto:jenki132@msu.edu).

## CROP STAGES

In Van Buren County, Jersey in Covert and Blueray and Bluecrop in Grand Junction are at bud break. In Ottawa County, Blueray are at bud break in Holland and Rubel and Bluecrop are at early bud break in West Olive. Injury can occur at temperatures below 20°F. See critical temperatures at: <http://web1.msue.msu.edu/vanburen/fruitfreeze.pdf>.



Blueray at bud break in Holland (left) and Bluecrop at bud break in Grand Junction (right).

### DEGREE DAYS AND WEATHER NOTES

Complete weather summaries and forecasts available at [enviroweather.msu.edu](http://enviroweather.msu.edu)

GDD (from March 1)	Base 42	Base 50
	Van Buren County	
4-15-08	125	44
4-21-08	235	112
Projected for 4-28-08	333	163
	Ottawa County	
4-15-08	90	26
4-21-08	190	84
Projected for 4-28-08	291	137

## WEATHER

**Mark Longstroth**

**SW Michigan District Fruit Educator, MSU Extension**

Warm temperatures with highs in the 70s and lows near 50 have increased plant growth. Some rain fell in Berrien County and the southwest portion of the region. With the warmer weather, our GDD accumulation has moved much closer to average. We are still behind recent years, but are no longer unusually cool. Continued warm weather should place us in the middle of the average spread of temperatures. The warm weather makes freezes seem unlikely, but we are only about half way through the spring freeze season. There is now a wide range in bud stage development. Freeze injury would occur at temperatures from freezing to the low 20s. Soils are beginning to dry out. The forecast is for continued warm and dry conditions with rain showers Thursday.

## DISEASE UPDATE

Timothy Miles and Annemiek Schilder  
Department of Plant Pathology, Michigan State University

### Mummy Berry

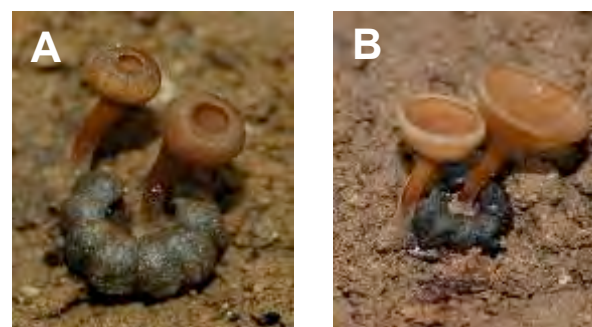
Mummy berry is caused by the fungus *Monilinia vaccinii-corymbosi* and is characterized by blighting of young shoots (shoot strikes) and, to a lesser extent, flower clusters (flower strikes). Fruit infection will lead to the shriveling and mummification of berries, hence the name mummy berry. Most mummified berries fall to the ground before harvest, but some make it into the harvested lugs. There is a zero tolerance for mummified berries in processed fruit.

At the beginning of the season, infections begin by the release of ascospores from apothecia that develop on last year's mummified berries. The optimum temperature for formation of apothecia and infection is 50 to 57°F (10 to 14°C). Also, at least 12 hours of wetness is required for infection. Young succulent shoots are particularly susceptible to infection by mummy berry ascospores.

Blueberry fields in four locations (two in Van Buren County and two in Ottawa County) were scouted over the past two weeks for signs of mummy berry (mummified berries and apothecia) on the ground below bushes. Some of the fields have been very wet and had standing water. This week in all scouted fields, the number of apothecia had increased compared to the previous week, most likely due to higher temperatures. The number of mummies on the ground varied among scouted plots with the wetter sites having more mummies and apothecia. The percentage of germinated mummies was as high as 24% (Figure 1). Most apothecia were 1-2 mm in diameter, although a few were as large as 5 mm in diameter. Apothecia start to release ascospores when they are 2 mm in diameter, but peak spore release occurs when they are 5-10 mm in diameter. Warmer soil temperatures lead to more rapid growth and expansion of apothecial cups but the apothecia will not last as long. Growers should scout for mummy berry and consider preventive fungicide treatments if leaf buds are at green tip and apothecia are found.



**Figure 1.** Germinating mummies with "mushrooms" or "trumpets" (apothecia) in Grand Junction on 4-18-08.



**Figure 2.** Mummified berries were collected on April 10, 2008 and incubated in a growth chamber at 59F (15°C). A) Five days after collection (apothecial cup diameter 2-3 mm). B) Nine days after collection with apothecia (5-7mm diameter) actively shooting spores.

<b>Van Buren County</b>					
Farm	Date	Number of mummies on the ground per bush*	% Germinated mummies	Average of apothecia on the ground per bush*	Average number of mummy berry shoot strikes**
<b>Covert</b>	4-11	1.9	0.0%	0.0	0.0
	4-18	2.2	8.3%	0.4	0.0
	4-25	-	-	-	-
<b>Grand Junction</b>	4-11	15.4	6.0%	1.5	0.0
	4-18	26.4	24.0%	9.1	0.0
	4-25	-	-	-	-
<b>Ottawa County</b>					
<b>Holland</b>	4-11	2.7	5.0%	0.3	0.0
	4-18	3.0	14.9%	0.5	0.0
	4-25	-	-	-	-
<b>West Olive</b>	4-11	6.0	2.0%	0.1	0.0
	4-18	7.3	15.9%	2.4	0.0
	4-25	-	-	-	-

\*Based on 10 bushes per field (5 bushes spaced over 2 rows). \*\*Bushes not advanced enough to rate for shoot strikes.

## INSECT UPDATE

Keith Mason and Rufus Isaacs

Department of Entomology, Michigan State University

Insect activity has been low at all four farms, but with the forecasted warm weather we could see some leafroller, climbing cutworm or spanworm feeding. The flower feeding beetle *Hoplia trifasciatus* was observed at the West Olive farm, but no feeding damage was seen. For more information on this pest, please see the May 15, 2007 IPM Update at: <http://www.isaacslab.ent.msu.edu/blueberryscout/blueberryscoutarchive.htm>

As of 4-21-08 no cherry fruitworm or cranberry fruitworm have been caught. We do not expect the flight for either of these pests to begin in the next week. Growers and scouts should set traps for these moths in the next couple of weeks and the traps should be checked weekly until harvest.

We have started to catch a moth in cherry fruitworm traps that is not cherry fruitworm. This "contaminant" moth is *Pseudexentra vaccinii* and is commonly caught in cherry fruitworm traps. Although it reportedly may feed on blueberry, we have never found it to be a pest of any economic consequence in Michigan. The contaminant moth is ~1/2 inch long which is much larger than cherry fruitworm which is ~1/4 inch long. Cherry fruitworm also have an iridescent banding pattern while the contaminant moth has darker markings on a light gray body. See the photos at right to help with identification.



Cherry fruit worm (left) and the contaminant found in cherry fruitworm traps, *Pseudexentra vaccinii* (right).

### Pest Monitoring Note:

As the warm weather promotes bud development, scout fields for bud damage by spanworm, cutworms and other spring larvae. The damage is usually more obvious than the insect larvae, and it may be seen as complete bud removal or ragged feeding on the buds. A working threshold for control at this point in the season is 2% of the buds removed. Count 10 buds on 10 bushes spread through the field to pick up any hot-spots. More information on these and other pests is online at <http://blueberries.msu.edu/insects.html>.

<b>Van Buren County</b>						
Farm	Date	CBFW moths per trap	CFW moths per trap	BBA % infested shoots	BBM adults per trap	JB per 20 bushes
<b>Covert</b>	4-7	Set	Set			
	4-14	0	0			
	4-21	0	0			
<b>Grand Junction</b>	4-7	Set	Set			
	4-14	0	0			
	4-21	0	0			
<b>Ottawa County</b>						
<b>Holland</b>	4-7	Set	Set			
	4-14	0	0			
	4-21	0	0			
<b>West Olive</b>	4-7	Set	Set			
	4-14	0	0			
	4-21	0	0			

## PEST OF THE WEEK – MUMMY BERRY

Annemiek Schilder

Department of Plant Pathology, Michigan State University

It's mummy berry season again. The mummy berry fungus enjoyed the snow cover this winter, which provided sufficient moisture for mummies to germinate. However, the rate of germination is lower than last year, with a maximum of 6 percent mummies germinated at this time. The extended cold weather seems to have delayed their development. In addition, some sites are very wet and many mummies may actually be submerged. It is not known how well they can survive waterlogging, but wet soils in general are conducive to disease. At this time, some mummies are showing small finger-like extensions (apothecial initials) and some have small trumpet-like mushrooms (apothecia) ranging from having pin-prick size openings to about 1-2 mm in diameter. At 2 mm (1/12 inch) in diameter, they can start to release ascospores. However, the most spores are released when apothecia are 5-10 mm in diameter (1/4 to 2/5 inch). If there is no leaf tissue on the bushes, it does not matter since infection cannot take place without green tissue being visible. The mummies typically germinate over several weeks to a month, depending on temperature and soil moisture, so there may be more waves of germinating mummies ahead.

### What to look for

Blueberry growers should be monitoring for mummies with trumpet-shaped mushrooms (see pictures). The number of germinated mummies (specifically the number of visible apothecia) is a better predictor of disease than simply the number of mummies under a bush, since germination is prerequisite for ascospore release and disease development. Mummy berry occurs primarily at wetter sites and in poorly drained areas; therefore scouting should target those sites. Dry, sandy sites may not have any mummies at all. The mummy berry fungus shoots ascospores out of the apothecial cup as soon as the cup diameter is about 2 mm (1/12 inch) wide. Ascospore release continues until the cup collapses. Longevity of the mushrooms is affected by temperature close to the ground, e.g., at 70°F, the mushrooms may live for less than a week, whereas at 50°F, they can last two to three weeks, and at 40°F up to four weeks. At higher temperatures, the mushrooms expand more quickly (they can almost become dime-sized) and release more spores per day than at lower temperatures. A severe freeze may damage the cups, but research shows that they can partially recover their ability to shoot ascospores after exposure to temperatures of 22°F and above. The ascospores are windborne and can travel fairly long distances (supposedly up to a mile). So even if you don't have any mummy berry in your field, there is a chance that ascospores can drift in from other fields or nearby woods with wild or escaped blueberries.



Mummified berries with immature (left) and mature apothecia in early spring.

### Stages of infection

There are two stages of infection. First the developing shoots are infected by the ascospores released from the mummy berry apothecia. Shoot strike symptoms appear approximately two weeks after infection. Shoots are susceptible from bud break until they are about 2 inches in length. Sometimes flower clusters may also become blighted; these are called flower strikes. Both shoot and flower strikes are characterized by drooping/wilting symptoms and a layer of gray spores (conidia) on the surface. These conidia are spread by insects (primarily bees), wind and rain. Bees are attracted to the shoot and flower strikes due to their UV light pattern (a nifty trick of the pathogen) and pick up the conidia on their legs and bodies. Bees then inadvertently deliver the conidia to the flowers where infection takes place.

The conidia infect the flower stigma followed by colonization of the developing fruit, which eventually mummifies and drops to the ground. Flowers are susceptible for about four days after they open. The more shoot strikes there are and the better the weather for pollination, the greater the risk of flower and fruit infection. Cultivars such as Berkeley, Bluetta, Blueray, Earliblue, Jersey, Nelson, Patriot and Weymouth are susceptible whereas Bluecrop, Duke and Elliott are moderately resistant to the disease. Some cultivars are more susceptible to shoot strikes and less susceptible to fruit infection, whereas others are just the opposite.



Early shoot strike

Late shoot strike

Spores visible

Some cultivars are more susceptible to shoot strikes and less susceptible to fruit infection, whereas others are just the opposite.

## Control

While there are multiple fungicides registered for mummy berry control, Indar consistently has outperformed other fungicides for both the primary and secondary phases of the disease in Michigan. Indar is a sterol inhibitor fungicide and therefore prone to resistance development in target fungi. It is recommended to limit the number of sprays of Indar to a maximum of two or three per season (five are allowed per the label). Orbit (propiconazole) and PropiMax (propiconazole), which are in the same chemical class as Indar, now both have a supplemental label for blueberries. Indar, Orbit and PropiMax all have a 30-day PHI. In small plot trials in Michigan, we found that Orbit was similar to Indar in the control of shoot strikes, but did not perform as well as Indar for control of fruit infection. PropiMax has not been tested in Michigan, but is expected to behave similarly to Orbit.

For fungicide resistance management, it is important to alternate SI's with fungicides in different modes of action, such as Bravo (fair to moderate efficacy), Captevate (moderate to good efficacy) Topsin M + Captan or Ziram (moderate efficacy), and Serenade (moderate to good efficacy). Systemic fungicides such as Indar and Topsin will likely provide better coverage of the flower parts (the stigma specifically). Cabrio and Abound have shown poor to fair efficacy in past trials in Michigan. While Pristine did not perform particularly well for control of mummy berry shoot strikes in small-plot trials in Michigan, it provided good control of fruit infection. We suspect that the activity of Pristine is better at higher temperatures; it therefore may be a good option during bloom as it also controls anthracnose, Botrytis and Phomopsis twig blight and canker.

## NEW HERBICIDES REGISTERED FOR BLUEBERRY

**Bernard Zandstra and Eric Hanson**

**Department of Horticulture, Michigan State University**

Supplemental labels have been issued for Callisto (mesotrione, Syngenta Crop Protection) and Chateau (flumioxazin, Valent Biosciences) for use on blueberry. The supplemental labels are part of the Section 3 federal labels and do not have expiration dates.

Callisto provides preemergent and postemergent control of several broadleaf weeds that are troublesome in blueberries, including several pigweed species, chickweeds, horsenettle, lambsquarters, marestail, eastern black nightshade, ragweed, and smartweed. Callisto has limited effect on grasses. Callisto is absorbed by weeds through the roots and leaves. Apply Callisto before bloom at up to 6 fl. oz. per acre. This amount may be split into two 3 oz. applications at least 14 days apart. Apply as a directed spray to soil beneath the bushes.

The addition of crop oil concentrate (COC) will improve postemergent activity, but combinations with postemergent herbicides such as Gramoxone or Rely are suggested for very weedy areas. Callisto with COC may injure blueberry leaves and young stems. Callisto can be used on young, non-bearing and bearing bushes. Avoid plant contact as much as possible.

Chateau is primarily a preemergent, soil-active herbicide. Chateau has some postemergent activity when it is applied with a non-ionic surfactant or COC, but it is more effective as a burndown in combination with postemergent herbicides such as Aim, Rely, Gramoxone, or Roundup. Troublesome blueberry weeds controlled by Chateau include chickweeds, dandelion, common groundsel, lambsquarters, eastern black nightshade, several pigweeds, ragweed and most annual grasses. Application rates are 6 to 12 oz product per treated acre. Do not apply Chateau after bud break through final harvest. Do not mow treated areas between bud break and final harvest, because dust created by mowing may settle on blueberry leaves and cause injury. Do apply to bushes established less than two years. Rain or irrigation is needed to activate Chateau.

One last change is a new formulation of an old herbicide. Casoron CS is a micro-encapsulated liquid formulation. The older granular product, Casoron 4G, is hard to uniformly apply beneath blueberries. Casoron CS can be applied to bushes that have been in the ground at least six months, and should not be used on light sandy soils. Casoron CS works best when applied in the late fall or early spring. Susceptible weeds include many annual grasses and broadleaves and some troublesome perennials, such as wild aster, horsetail, red sorrel, yellow woodsorrel and bindweeds.

Callisto, Chateau and Casoron have weed control spectrums somewhat different from the commonly used preemergent herbicides such as Princep, Karmex and Sinbar. They also have different modes of action, so it may be helpful to rotate these products over time to broaden the weed control spectrum and discourage development of herbicide resistant weed populations in blueberries.

## **INSECTICIDE LABEL UPDATE**

**Rufus Isaacs**

**Department of Entomology, Michigan State University**

Guthion WP (azinphosmethyl) is still registered for use during 2008. This year, the EPA's phaseout restrictions start to affect how much, and how this insecticide can be applied. The important changes for 2008 include a reduction in the total allowed per acre from 3 to 2.5 pounds. The maximum single application rate remains at 1.5 pounds. There is a 7 day REI and 7 day PHI, except for in U-pick fields. In this special situation, the REI is 30-42 days, depending on the rate used. The buffer zone to bodies of water is 60 ft for ground application and 150 ft for aerial application. The buffer to occupied dwellings or recreational areas is 60 ft.

Intrepid 2F (methoxyfenozide) has received a supplemental label for use in blueberry and other bush berry crops. This is an insect growth regulator and is a more active version of Confirm. If you have used Confirm in recent years for control of fruitworms, you should expect better performance from this product. It is safe for bees, allowing application during bloom and it provides good residual control of moth larvae with high worker safety and a good environmental profile. Intrepid is registered for control of many of the most economically-important blueberry moth pests including cherry fruitworm, cranberry fruitworm, obliquebanded leafroller, and gypsy moth. Tussock moth is not on the label, but this product will be very effective for that pest if applied with good coverage when the larvae are still small. While the label indicates 16 ounces per acre for most of these pests, this is a very high rate and I expect a high level of control at 12 ounces per acre. As with Confirm, this insecticide must be applied with excellent coverage to be effective: the larvae must eat the residue, or it needs to be in contact with the eggs to work. For example, the label states a minimum of 30 gallons of water should be used from ground equipment and 10 gallons if applying by air. Intrepid has a 7 day PHI.

Assail 30SG (acetamiprid) is registered for use in blueberries for control of aphids and leafhoppers at 2-5-5.3 ounces per acre. It is in the same chemical class as Provado, the neonicotinoids, but it has a wider range of pest activity that includes moth pests. A higher range (4.5 - 5.3 ounces per acre) is registered for use against

cranberry and cherry fruitworms, Japanese beetle, blueberry maggot, and some other insect pests. We have seen good to excellent control of these pests in small plot trials conducted at the Trevor Nichols station, and we are looking forward to gaining more experience at commercial farms this season. Assail 30SG has a 1 day PHI. It is also labelled for use on strawberries, other bush berries and cane berries, and can be applied by ground or air.

Delegate WG (spinetoram) is a new insecticide from the same chemical class as SpinTor (the spinosyns) and is highly effective against lepidopteran pests. It is labeled at 3-6 oz per acre for armyworm, cranberry fruitworm, leafroller, and spanworm control in blueberries, with a 3 day PHI.

Danitol 2.4 EC (fenpropathrin) is a new pyrethroid insecticide labeled for cranberry fruitworm, plum curculio, blueberry maggot, and Japanese beetle. It has a 3 day PHI, and in our on-farm trials at Michigan blueberry farms during 2007 this product provided good beetle control for a week when applied using aerial or by ground application.

Labelled late in 2007, Mustang Max (zeta-cypermethrin) is a pyrethroid insecticide registered for leafroller control. Activity on other insects is expected, but we have very little experience with this insecticide in blueberry. It has a 1 day PHI.

## **FUNGICIDE LABEL UPDATE**

**Annemiek Schilder**

**Department of Plant Pathology, Michigan State University**

There have been several new fungicides that have been labeled for blueberries and some changes to existing labels. This article provides an update on these changes.

**Indar** (fenbuconazole) is a systemic fungicide that received a full registration for use in blueberries in 2007 and also has a supplemental label for disease control in cranberries. Indar was already labeled for use in stone fruit. It is available in two formulations: Indar 75WSP (water soluble packets) and Indar 2F (flowable). They have the same active ingredient and are for all practical purposes the same. Indar has repeatedly shown good efficacy against mummy berry and Phomopsis canker and twig blight in blueberries. The application rate for Indar 75WSP is 2 oz per acre; a maximum of 4 applications (8 oz) may be made per season. The application rate for Indar 2F is 6 fl oz per acre; a maximum of 4 applications (24 fl oz) may be made per season. Apply Indar in a minimum water volume of 10 gal/acre, if applied aerially, and 20 gal/acre if applied by ground. The pre-harvest interval is 30 days. Since Indar is the least systemic of the sterol inhibitor fungicides, a non-polymer containing spray adjuvant may be added to spray solutions according to the manufacturers use instructions to improve disease control by aiding penetration of Indar into the plant tissue.

**Orbit** (propiconazole) is a systemic sterol inhibitor fungicide labeled for use in blueberries, strawberries, raspberries, blackberries, currants, gooseberries, and cranberries. It is also labeled for stonefruit. It has protectant and curative activity. Orbit is a broad-spectrum material that is effective against mummy berry, rusts, powdery mildew, and Septoria leaf spot. We have found that Orbit is as effective as Indar against the shoot infection phase of mummy berry, but not as effective against the fruit infection phase. The PHI of Orbit is 30 days.

**PropiMax** (propiconazole) is a systemic sterol inhibitor fungicide with the same active ingredient as Orbit that recently received a supplemental label for blueberries. It was already labeled for stone fruit and several other crops. PropiMax is expected to have similar efficacy as Orbit. The PropiMax label lists the following target diseases: mummy berry, rusts, powdery mildew, and Septoria leaf spot. PropiMax has a 30-day PHI.

**Topsin M** (thiophanate methyl) is a systemic fungicide that has been used as a Benlate (benomyl replacement) for the past 5 years. However, we are still awaiting approval of the Section 18 (emergency



exemption) request for 2008 and will notify growers as soon as we are notified of the decision. Growers who want to use this product in blueberries should be in possession of a copy of the Section 18 label at the time of use. Target diseases on the label for blueberries are Phomopsis twig blight and canker, Fusicoccum canker, mummy berry, anthracnose fruit rot, and Botrytis blossom blight. The recommended rate is 1 lb of product per acre applied by ground or aerial application. The product may not be applied through any type of irrigation system. No more than 3 sprays (3 lbs product) may be applied per acre per year. A worker re-entry interval (REI) of 12 hours must be observed. The pre-harvest interval (PHI) is 7 days. Applications may be started at green tip and repeated at 7-10 day intervals. However, use of this fungicide will be most appropriate in the period from pink bud through early fruit development, as the Phomopsis, anthracnose, and mummy berry pathogens are all active at that time. Topsin M should be used in combination with non-benzimidazole fungicides, such as Ziram or Captan, to reduce the risk of resistance development.

Other new(er) products that are available but have not yet been evaluated for disease control efficacy on blueberries in Michigan are:

- 1) **Actinovate AG** (*Streptomyces lydicus* WYEC108) is a protectant biofungicide that can be used as a soil drench, in-furrow or foliar application. It is labeled for all raw agricultural commodities, including apples, pears, cherries, peaches, plums, nectarines, apricots, grapes, blueberries, strawberries, raspberries, blackberries, gooseberries and currants. The label lists suppression/control of *Pythium*, *Rhizoctonia*, *Phytophthora*, *Verticillium*, and *Fusarium* as well as powdery and downy mildew, *Botrytis*, *Monilinia*, and *Alternaria*. Actinovate is OMRI (Organic Materials Review Institute) listed which means it can be used in organic production and has a 0-day pre-harvest interval. Actinovate provided good control of mummy berry in small plot trials in Georgia in 2007 and will be evaluated in Michigan this year.
- 2) **Sonata** (*Bacillus pumilis* QST 2808), a protectant biofungicide that is OMRI listed and therefore can be used in organic production. Sonata is a cousin to Serenade (*Bacillus subtilis*) produced by the same company (AgraQuest). Sonata is labeled for use on grapes, blueberries, strawberries, raspberries, blackberries, gooseberries and currants. The label lists control of leaf rust and powdery mildew in berry crops. Sonata has a 0-day pre-harvest interval and a 4-hour re-entry interval. Sonata has been moderately effective against powdery mildew, downy mildew, and Phomopsis in grape trials in Michigan. Adding a non-phytotoxic spray adjuvant, such as Biotune, can improve coverage and control.
- 3) **Sporan** (rosemary oil, clove oil, thyme oil, wintergreen oil, lecithin, butyl lactate) which is marketed as a broad-spectrum protectant fungicide for use in apples, pears, cherries, peaches, nectarines, apricots, plums, grapes, blueberries, strawberries, raspberries, blackberries, and cranberries. Sporan is OMRI listed so it can be used in organic production. Sporan has no re-entry interval and a 0-day pre-harvest interval.
- 4) **Trilogy** (clarified hydrophobic extract of neem oil) is another OMRI listed product and marketed as a contact/protectant fungicide, miticide, and insecticide. Trilogy is labeled for use on apples, pears, cherries, peaches, nectarines, plums, apricots, grapes, blueberries, strawberries, raspberries, blackberries, gooseberries, currants, and cranberries.

Since none of these products has been tested for disease control in blueberries yet, we cannot confirm the claims on their labels and do not make recommendations for their use. However, we thought it important for you to know what these products are in case you run across them.

## MEETINGS AND ANNOUNCEMENTS

### **April 23 – Blueberry IPM Kick-off Meeting**

12:00-3:00PM at Trevor Nichols Research Complex, Fennville, MI  
*Lunch provided!*

Please join the MSU Blueberry Team for our first IPM meeting of the season. Many topics will be covered, including early-season insect, disease, and weed control, pesticide label updates, and frost protection.

### **2008 Blueberry IPM Twilight Meeting Schedule:**

*All meetings held from 6-8PM*

May 14: Cornerstone Ag, Van Buren County

May 28: Carini Farms, Ottawa County

June 11: Cornerstone Ag, Van Buren County

June 24: Carini Farms, Ottawa County

These meetings are hosted by MSU to update growers on insect, disease, and weed control as the season progresses. They are completely free, with a light dinner served at 6PM. For more information, contact Paul Jenkins (517-432-7751, [jenki132@msu.edu](mailto:jenki132@msu.edu)).

## IN NEXT WEEK'S ISSUE...

Fungicide label update  
Cutworm and spanworm  
Frost protection

### **MSU BLUEBERRY TEAM**

Eric Hanson, Horticulture  
Annemiek Schilder, Plant Pathology  
Rufus Isaacs, Entomology  
John Wise, Trevor Nichols Research Complex  
Matt Grieshop, Organic Pest Management  
Paul Jenkins, Small Fruit Education Coordinator  
Mark Longstroth, Van Buren County Extension  
Carlos Garcia, Ottawa County Extension  
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