Northern Michigan FruitNet 2015
Northwest Michigan Horticultural Research Center

Weekly Update

FruitNet Report 08/18/15

Calendar of Events

2015

8/27 **2015 Open House**
Northwest Michigan Horticulture Research Center

8/27 **Grand Traverse County Hazardous Waste Removal – Appointment Required**

Growth Stages at NWMHRC (Aug. 17, 2015, 10 a.m)

Apple: Red Delicious – 55 mm fruit
Gala – 51 mm fruit
Yellow Delicious – 48 mm fruit
Pear: Bartlett: 48 mm fruit
Sweet Cherry: Hedelfingen – Harvested
Napoleon – Harvested
Gold – Harvested
Tart Cherry: Harvested
Balaton: Harvested
Apricot: Harvested
Grapes: Riesling – Green fruit

Northwest Michigan Fruit Regional Report – August 18, 2015

Peach harvest is beginning, berry crop harvest is underway, and growers are protecting fruit from spotted wing drosophila as their populations continue to rise in the northwest.

Nikki Rothwell and Emily Pochubay

Weather Report

The weekend weather across the northwest was hot and muggy. Daytime temperatures approached 90 degrees F on Friday, Saturday, and Sunday. Humidity levels were also high and continue to be as we move into the workweek. The predicted temperatures for remainder of the week are in the 80s with

exception of Thursday, August 20, which is only predicting a high of 67 degrees F. The chance of rain for Tuesday and Wednesday (August 18 and 19) are 91% and 100% respectively, and so far on August 18th, the NWMHRC has yet to receive any measurable precipitation. Conditions are dry across the region, and rain would be welcomed in all orchards in northwest Michigan.

Crop Report

The majority of tart cherry harvest is finished although there may be a few growers to the far north that are winding up Balaton harvest. For the 7th week of tart cherry harvest, the CIAB is reporting northwest Michigan to have harvested 86.7 million pounds; the 2015 estimate for the region was 83 million pounds. We are still unclear how many pounds of tart cherries we lost to the recent storms, but more than likely the total amount harvested would have been higher than the current harvested pounds. Peach harvest is beginning in orchards that were not hurt by the harsh winter or the 20 May freeze event. Apples continue to size, and our apples at the NWMHRC that were hit by hail are beginning to drop from the trees.

Pest Report

It is not difficult to find **spotted wing drosophila** (SWD) in cherries that have been unsprayed this season or fruit that remain on the trees after harvest. We have also received reports of SWD infesting caneberries in the northwest region, and many berry growers are concerned with SWD at this time. We would like to remind all berry growers, and in particular, growers with U-pick operations to check pre-harvest intervals on insecticide labels when selecting materials for SWD control. Additionally, grower may want to do an occasional salt test to determine if their berries are indeed infested. Some raspberry and blackberry growers are considering rotating a pyrethroid insecticide (ex. Mustang Max, 1-day PHI on caneberries) with a spinosyn insecticide (ex. Delegate, 1 day PHI on caneberries) to keep fruit protected for as long as possible. Rotating insecticide classes will help to reduce the possibility of SWD developing resistance to these materials. Furthermore, growers who are planning to use pyrethroids should monitor regularly for spider mites as pyrethroid insecticides can contribute to mite flaring. For additional information regarding SWD management in berry crops, please visit http://www.ipm.msu.edu/invasive_species/spotted_wing_drosophila.

Apple maggot (AM) activity is ongoing and although trap catches at the research station were high last week (19 AM total), AM numbers decreased to a total of 2 AM on our traps. AM numbers in the region have on average also been low in the single digits (<2 AM per trap). **Codling moth** (CM) activity at the station is holding steady with an average of 4 CM per trap last week and 3 CM per trap this week. We are continuing to catch a few **obliquebanded leafroller**, but OBLR flight is winding down at this time.

No **brown marmorated stink bug (BMSB)** have been found in the northwest region at this time. However, apples at the station that were dinged up during the Aug 2nd storm have many dents that resemble feeding damage from sucking insects like BMSB. This damage is also difficult to distinguish from bitter pit on Honeycrisp apples; one indication of storm damage could be that the fruit are exhibiting bitter pit-like symptoms on the west side of tree rows.

Grapes
Duke Elsner

Storm damage update—

In many vineyards that I have visited during the past week I have seen that lightly injured berries have callused over the exposed flesh of the fruit, and severely injured berries have dried up quite rapidly. So far there has been little evidence of fungal infections on injured fruit. Hot

and dry weather following the fruit injury has been a big plus for limiting Botrytis infections, but the vines have been in drought and heat stress in many localities. The threat of Botrytis mold infections will continue, increasing if we get a period of wet weather. I think the severe weather conditions, especially the hail component, actually killed a large percentage of the big hornworm caterpillars in vineyards. They are hard to find in the damaged areas, but still present in vineyards that were not in the direct path of the storm.

Vineyards in general—

Powdery mildew has been favored by recent warm and humid conditions. Leaf, shoot and fruit infections can be found, especially in the interior of the canopy. Downy mildew has shown up on the foliage, tendrils and shoot tips of highly susceptible varieties. This may really take off as a problem if we get some rainy weather now.

Image 1: Powdery mildew on shoots

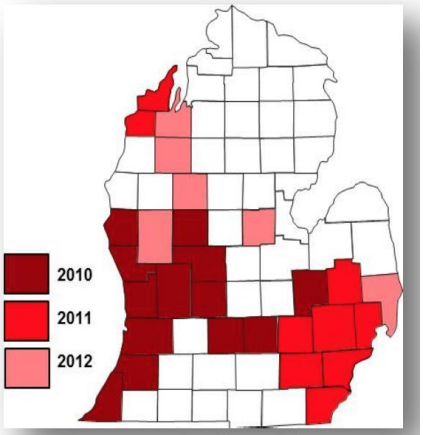
Image 2: Dried up Chambourcin fruit

Image 3: Powdery and downey mildew symptons on leaves.

Image 4: Downey mildew on underside of leaf

Spotted Wing Drosophila Management Recommendations for Michigan Raspberry and Blackberry Growers

The spotted wing Drosophila (SWD) is an invasive pest of berries, stone fruit, grapes, and some other fruit crops. It is native to Asia but was first detected in North America in California during 2008. Since then, it has spread to many of the primary fruit production regions of the United States. In Michigan, the first SWD were found in late 2010 (Figure 1). In 2011 the first captures were in early July, whereas in 2012 first captures were in late May. This season, first captures were in early June, with significant increase in catches during mid- to late-July.



Year when SWD was first detected, from monitoring in the main fruit counties of Michigan.

Across Michigan, SWD is now found throughout the fruit production regions, and it has been found in fields of blueberry, blackberry, raspberry, cherry, and grape, also in many wild habitats where the flies infest wild fruiting plants. It has also been detected in highway rest areas, cities, and wild areas so it seems well established in this region. Catches have also been reported in most fruit-producing states of the US.

For detailed fact sheets, identification guides, and weekly reports on this pest during the growing season, see the online resources at www.ipm.msu.edu/SWD.htm

Female SWD flies look similar to the small vinegar flies that typically infest fruits and some vegetables in late summer. However, unlike native vinegar flies the female SWD have a serrated ovipositor, or egg-laying device, to cut a slit into the skin of intact fruit to lay their eggs. This makes SWD a more significant pest. Soft skinned fruit such as raspberries, blackberries, and blueberries are at the greatest risk. These crops also ripen later in the summer when the population increases, further increasing the risk.

Female SWD flies can lay their eggs into intact fruit, starting when the fruit begin to color. Fruit are susceptible to SWD from this time until they are harvested. Eggs hatch inside the fruit, and the larvae feed, causing fruit to become leaky and collapse. If this pest is not controlled, fruit may be harvested with the white larvae inside, potentially leading to rejection and lost sales.

It is very important that Michigan caneberry growers incorporate control of SWD into their IPM programs to insure the impact of this pest is minimized. Effective management of SWD consists of these key components:

1. Monitor fields with traps and check them regularly.
2. Check trapped flies to determine presence and number of SWD.
3. If SWD are found and fruit are ripening or ripe, apply effective insecticides registered for caneberries to protect the fruit (see MSU Fruit Management Guide, MSU Extension publication E154).
4. Continue monitoring to evaluate your management program, and respond quickly if needed.
5. If possible, remove leftover fruit on the bush or in waste piles to reduce SWD food resources.
6. Stay informed. These recommendations are subject to change based upon new information. Find the latest information at our SWD website: www.ipm.msu.edu/SWD.htm

MONITORING

The most important step in managing SWD is to determine whether they are present in your fields, and when they become active. Monitoring for SWD from before fruit ripening until after the end of harvest will help identify the start and duration of fly activity. It is most important to monitor from fruit coloring until the crop is harvested, when the fruit are susceptible to SWD infestation.

Trap for capturing adult SWD flies.

These flies can be trapped using a simple monitoring trap consisting of a plastic 32oz cup with ten 3/16”-3/8” holes around the upper side of the cup, leaving a 3-4 inch section without holes to facilitate pouring out of the liquid attractant, or bait (photo). The holes can be drilled in sturdy containers or burned with a hot wire or soldering iron. The small holes allow access to vinegar flies, but keep out larger flies, moths, etc.

The traps are baited by adding 1.5-2 inch depth of a yeast-sugar mix, made by combining 1 Tablespoon of active dry yeast (we use Red Star brand) with 4 tablespoons of sugar and 12 oz of water. This ratio produces a solution that ferments and the flies are attracted to the odors. Comparing this mix to apple cider vinegar, we found that SWD were trapped earlier, more of the traps caught SWD, and SWD was trapped in greater numbers than with the apple

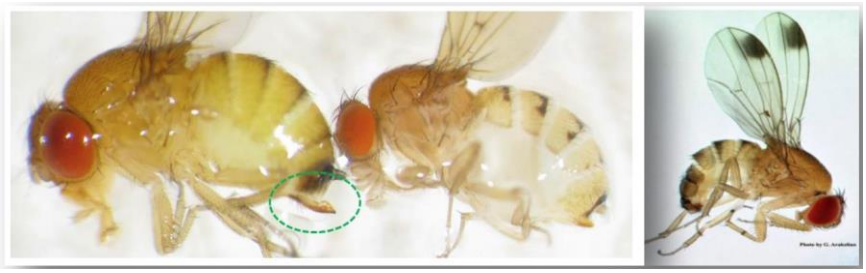
cider vinegar. Although these traps are harder and messier to service, the yeast bait is less expensive than the apple cider vinegar traps, and the benefits of earlier detection are obvious when needing to protect crops from infestation. Traps baited with yeast will collect many flies, so sorting through these traps will take more time. For growers in Michigan who want the best chance of catching SWD, we recommend a minimum of one yeast-baited trap for SWD every 5-10 acres.

Any traps for SWD should be hung in a shaded area of the canopy in the fruit zone, using a wire attached to the top of the trap. Make sure the trap is clear of vegetation with the holes exposed so that SWD can easily fly in. Traps should be checked for SWD flies once a week at a minimum, by looking on the yellow sticky trap and in the liquid. If you use a yeast-baited trap, checking only the sticky trap can be used as a way to reduce the amount of time needed to service the trap. However, checking the trap insert and liquid will provide the best ability to detect early fly activity. At each check, fresh bait should be swapped out and disposed of, away from the trap location. Spotted wing drosophila captures should be recorded each week in a log book.

IDENTIFICATION OF FLIES

Vinegar flies are small (2-3 mm) with rounded abdomens. Traps catch both male and female SWD flies and native species of vinegar flies. This means that SWD need to be distinguished from the others when checking the traps. Identification of SWD flies becomes easier with practice, especially when using a hand lens to examine the wings of trapped flies. Some native flies have dark patches on the wings, but will not have the distinctive dark dot that is present on the wings of SWD males.

Male SWD have a distinctive spot on each wing (right panel photo). In contrast, female SWD (left panel) do not have dots on the wing, so their ovipositor needs to be examined closely in search of its serrated characteristics. Use a 30X magnification hand lens or microscope to detect the distinctive saw- toothed ovipositor on female SWD. This is challenging to detect, so we recommend that people familiarize themselves with the distinctive features for identifying SWD. The photos here show a female SWD next to a female of another species. Note the ovipositor marked with a green oval. A photographic guide to identifying SWD and the potential look-alikes is provided at the MSU SWD website (www.ipm.msu.edu/swd.htm). If a trap catches flies matching these descriptions, but you are unsure of their identification, contact your local MSU Extension office or a trained scout or crop consultant for assistance.



L-R: a female SWD with the ovipositor highlighted; a ‘look-alike’ Drosophila fly; and a male SWD.

For flies suspected of being SWD that are trapped in counties where this insect has not yet been reported (Figure 1), we encourage growers, scouts, and consultants to place flies trapped on the sticky traps into another container (or pull those floating in the vinegar out of the liquid and place in a small vial) then send them for identification to: Howard Russell, SWD Monitoring, Diagnostic Services, 101 CIPS, Michigan State University, East Lansing, MI 48824-1311. Include the location and date of collection along with your contact information.

Further aid with identification can be gained from the online key provided by Oregon Department of Agriculture at

swd.hort.oregonstate.edu/files/webfm/editor/ID_D_suzukii_060210_sm.pdf

SAMPLING FRUIT FOR LARVAE

A first sign of SWD infestation in raspberries may be noticed as red patches left on the receptacle when the berries are picked. The fruit of raspberries and blackberries may also begin to collapse in patches where the larvae are feeding inside. Opening the berries may reveal the larvae within the fruit, but it is time consuming to check individual berries. For fruit suspected of being infested by SWD, larvae can be sampled using a fruit dunk flotation method. Either collect a standard sample of fruit, or only suspicious (oviposition scars and soft spots) fruits. If you are sampling in fields, place fruit in a plastic ziplock bag. Add a salt solution (4 cups water to every 1/4 cup salt). Leave the fruit in the mixture for an hour, then check it. Drosophila larvae will float in the liquid making them easier to see, plus they should be visible as small white larvae against the red colored liquid. Detection of small larvae may require the use of a hand lens, and this works well with a light behind the bag to shine through onto the larvae. If this is being done indoors, place suspect berries on a tray and pour the salt solution over the lightly crushed fruit. Observe the fruit after an hour to see if larvae are present. Note that this method doesn't allow for differentiating between SWD larvae and other similar species. The only way to be sure larvae in the fruit are SWD is to hold the fruit for two weeks and catch the flies that emerge for identification.

A practical way to do fruit extraction for detecting drosophila larvae is to mix a large jug of the salt solution to keep on hand, in a truck or back at the barn. Then take fruit samples into ziplock bags marked with the date and field. Once samples are taken, add the solution and leave for at least an hour. Then the samples can all be assessed at the same time.

CONTROL

Experience in 2011 and 2012 in Michigan indicates that use of effective insecticides that are well timed and have good coverage can keep this pest controlled through harvest. However, given the potential for rapid population increase by SWD, especially during fall red raspberry season, means that active management through monitoring of flies and fruit infestation is needed.

Registrations and recommendations change, so keep informed through our website, your local Extension educator, and the MSUExtension News for Agriculture.

There is no economic threshold for SWD, so we are currently recommending a conservative approach in which fly capture on your farm triggers protection of fields if berries are at a susceptible stage. If fruit are ripe or are ripening and SWD flies are trapped, growers should: 1) Continue monitoring to assess fly distribution; 2) Implement cultural controls where possible; 3) Protect fruit through to harvest using registered insecticides. Female SWD are able to lay eggs into berries from the time of first coloring through harvest. This period is the window of susceptibility to SWD. If drosophila larvae are found, the available management options and best strategies will depend on the scale of infestation, whether the field is certified organic or not, and the timing relative to harvest date.

Laboratory tests have shown little evidence of different varieties being more or less susceptible to infestation. But, because SWD populations tend to increase in the later part of the summer, we expect fall raspberries to experience much higher pressure from SWD than summer raspberries.

Cultural controls

Cultural controls can help reduce reproduction and survival of flies and should be included in the overall plan for SWD management. Cultural controls include scheduling timely harvests and removing over-ripe fruit from fields and then disposing of them properly, to minimize resources for SWD. In small fields this may be done by hand, and some farms have already implemented a plan where pickers have one bucket for marketable berries and the other for picking over- ripe berries to get them out of the fields. This may be impractical in large farms. Removing wild host plants that can harbor SWD such as wild grape, pokeberry, honeysuckle, nightshade, dogwood, spicebush, autumn olive, raspberry, blackberry, etc. near crop fields is another potential strategy, but the efficacy of this approach has not been tested in our region.

If infested berries are found either in the field or after packing, there are some strategies for killing SWD before they complete development and emerge to continue infesting fields. Recent research in Oregon has shown that bagging fruit inside clear or black plastic bags works well to prevent fly escape, and placing these in the sun will kill SWD. If there is a large pile of fruit, these can also be solarized in which 1-2 ml clear plastic sheeting is placed over the fruit in a sunny location and sealed well around the edge using soil. Burying infested fruit can reduce emergence but it is unlikely to be 100% effective unless the fruit is buried very deeply. A recent study in New Jersey indicates burial in over 30 cm depth of sand was required to prevent emergence.

Freezing berries is another way to kill SWD. Refrigerating them will stop further development, and may kill them after long periods of refrigeration. If possible, keeping berries cool during the supply chain from picking to market to customer will also minimize the chance that larvae will develop in berries. A sticker with “Keep me in the Fridge” is a simple way to encourage customers to put the fruit into colder conditions that will delay SWD development.

Chemical controls

Michigan raspberry and blackberry growers already use IPM programs to manage insect pests. Many of the insecticides already registered for this crop will provide some protection against SWD, including the pyrethroid, organophosphate, and spinosyn chemical classes. See below for a discussion of neonicotinoids – these are very effective for other pests, but they are not recommended for SWD control due to their slow activity on the adult flies.

It is important to realize that SWD females can start laying eggs one day after emergence. SWD will complete 5-6 generations under typical Michigan conditions and there will be continuous activity once the flies become active. These aspects of the pest biology mean that if SWD flies are active and fruit is ripe, spray intervals need to be tightened from a typical 2 week interval to a 7-10 day interval depending on the product being used. Sprayers should be calibrated to provide thorough coverage of fruit, especially in the center of the canopy where the flies like to hide in the shade. Applications that attempt to cover several rows at a time are unlikely to achieve good coverage of fruit on all the rows.

A number of registered conventional insecticides have shown to be effective against SWD in recent MSU trials. Insecticides with fast knockdown activity have performed well at protecting berries from SWD. These include Malathion (*see note below) which is an organophosphate insecticide; the pyrethroids Asana, Danitol, Mustang Max, and Brigade; and the spinosyns Delegate and Entrust (organic). Neonicotinoids such as Provado and Actara are considered weakly active on SWD flies and are not recommended for control. While there is some potential for post-infestation control of small eggs and larvae by the neonicotinoid insecticide Assail, this still has limited contact activity so we would presently only recommend Assail if there is also a need for aphid control. It will provide excellent aphid control, and has some activity on SWD.

Malathion 8F produced by Gowan Company has received a 24c Special Local Needs label for use in Michigan raspberries and blackberries allowing the use of up to 2 pints per acre rate against SWD. There is a seasonal limit of 4 sprays, and there is a retreatment interval restriction of 7 days. This has a 1 day PHI. Malathion products produced by other companies can be used only at the rates listed on their label. Our recent MSU research from blueberries indicates that the 2 pint rate of the 8F formulation provides 5-7 days of residual control against SWD.

Organic growers can use Entrust at 2 oz/acre to protect fruit in the pre-harvest period, and this can be rotated with Pyganic to stretch the period of coverage and to reduce the chance of resistance developing. It is important to note that Entrust provides ~5 days residual control and Pyganic provides ~2 days of control. Note also that the label for Entrust guides growers to only have two applications of Entrust before rotating to another chemical class.

The table below provides a list of insecticides registered for use in caneberries that have also shown high activity against SWD. Selection of insecticides for SWD control should take into account the other pests present, harvest date, re-entry restrictions, and potential impacts on existing IPM programs. Most of these insecticides are also active on other pest insects that will be in raspberry plantings. However, most are also damaging to natural enemies, and may also pose a risk to bees. It is therefore important to make spray applications when bees are not foraging, and to try and select insecticides with lower activity on predators. This is especially important in raspberry plantings where two-spotted spider mite (TSSM) can be a damaging pest. Our recent experience indicates that the pyrethroid class of insecticides is especially damaging to the predator mites that typically suppress TSSM. If TSSM populations build, a miticide may then be needed to bring the pest mite populations under control.

Always follow the specific label restrictions for raspberry/blackberry crops. The level of control achieved will depend on the SWD population, timeliness of application, coverage of fruit, and product effectiveness.

When selecting an insecticide for SWD control, consider the efficacy, chemical class, and PHI. If you are exporting fruit, also check carefully on the MRL restrictions for the destination country. See the label for restrictions on distance to surface water and safety to pollinators and other beneficial arthropods. Remember to rotate classes of insecticides to delay development of insecticide resistance. This is especially critical in organic production where there are only two classes of insecticide registered for use against SWD.

Organic production

Organic fruit growers should be aware that the insecticidal control tools available to them are less effective than conventional insecticides against SWD, and will require more timely application. However, experience in the west coast states and in Michigan indicate that SWD can be controlled in organic production through more intensive monitoring, timely application if flies are detected, and shorter intervals between sprays. Where possible to implement, the use of cultural controls will also be important to help reduce the overall population level.

Organic insecticide options are limited, and Entrust is the two most effective options for SWD control in organic production. Entrust has two formulations, the 80WP and the SC versions (see table below). These have different restrictions based on the different rates of active ingredient. There is a 9 oz/acre seasonal maximum for the 80WP and a 29 oz/acre limit for the SC formulation. There is a 2ee Entrust label for suppression of SWD with both of these insecticides formulations. We are recommending the high rate of Entrust to ensure the best residual control. Rotate Entrust with the organic pyrethrum insecticide Pyganic to achieve some resistance management. Pyganic 1.4EC is labeled at 16-64 oz/acre, and using the higher end of this rate range has provided short duration residual control in recent trials.

However, Pyganic or other non-Entrust organic insecticides should not be relied upon for effective control.

Resistance management

The potential for resistance development is a concern with SWD because of the potential for Drosophila flies to develop resistance, and because of the relatively high levels of insecticide use that is being used to combat this pest. One of the most effective approaches for reducing the likelihood of resistance to insecticides is to rotate among chemical classes. This can be done by using the chemical class as a factor in products from the list in the table below. Conventional growers should be rotating among the organophosphate, pyrethroid, and spinosyn insecticide classes by changing from one class to another through the season. Note that some labels specifically direct growers to rotate, so for example it is a legal requirement from the label language to rotate to another class after two applications of a spinosyn-containing insecticide such as Entrust or Delegate.

Resistance management is more challenging for organic growers who have only Entrust and Pyganic registered with efficacy against SWD. The Entrust label limits to a seasonal limit of 9 oz per acre of the 80WP formulation and 29 oz per acre of the SC formulation. This equates to 4 or 5 applications, depending on the rates used in the sprays. The requirement to rotate to a non-spinosyn insecticide will result in organic producers being able to protect fruit from SWD for 4-6 weeks depending on the interval used.

Mite management

Most caneberry growers in Michigan have recently enjoyed little need for mite management because of the abundance of predatory mites that keep pest mite populations in check. However, the increased level of pesticide use against SWD is starting to cause mite outbreaks that can compromise raspberry cane health and lead to reduced yield. This is especially likely inside high tunnels that tend to reduce the immigration of predatory mites.

Two spotted spider mite is the main pest mite encountered in Michigan caneberries, and this pest can quickly reach high abundance if the predator mites are removed. The mite can be monitored through the season using a hand lens on 10-leaf samples taken weekly. Look on the underside of the leaves for the small spherical translucent eggs and the stationary/slow-moving mites that have two dark spots in their bodies. The predatory mites are light colored and they do not have the dots, and tend to move quickly across the leaf surface. These mites will require a hand lens to see, as the mites are less than a millimeter diameter. A general rule of thumb is that if the predator to pest mite populations are 1:10 or higher, then the predators should keep spider mites in check. Treatment for two-spotted spider mite is considered unnecessary unless populations reach a threshold of one two spotted spider mite on 50% of the leaves. As mentioned above this is often not the case. However, if predator mites are not present the pest mite populations can far exceed this threshold. If that happens, growers will notice stippling damage on the leaves as the pest mite populations build. If it gets out of control, there can be severe leaf bronzing. Canes will typically recover from this damage eventually and put out new leaves, but the goal of mite management is preventing that situation from happening in the first place.

Caneberry growers have a number of miticides registered for use against two-spotted spider mites. These can be grouped into those products that have activity on the immature and adult mites (Acramite, Vendex, Kanemite, soaps) and those with activity primarily on eggs and immatures (Savey, Zeal). For growers producing fall red raspberries, it may be important to highlight that Savey and Vendex can be used when honey bees are active. The insecticidal soaps such as M-Pede, Safer, and other formulations are potassium salts of fatty acids, with activity on eggs, immatures, and adult mites. They have 0 day PHI

restrictions and 12 hour re-entry. Soap products require thorough coverage, including on the undersides of the leaves to be effective. Miticides for use in raspberry have 0-3 day preharvest intervals.

As with all uses of insecticide to control pest insects and mites, the label is the legal document that provides the official guidance on the appropriate use pattern. Refer to the label and any supplemental labels for the full restrictions on use in your crop. A good place to locate all the ost up-to-date information is through www.cdms.net. If new supplemental labels are developed allowing expanded uses for SWD control, those will be posted at this site.

FOLLOW FUTURE DEVELOPMENTS

Spotted wing drosophila is a new pest to North America and we have limited experience with it in Michigan. There is active research and monitoring underway to minimize its impact on fruit production. As new information is available, this will be posted online at www.ipm.msu.edu/SWD.htm and will be distributed to fruit growers via MSU Extension programs.

Insecticides for control of SWD in Michigan caneberries, their properties and restrictions

Trade name	Active ingredient	Rate	Class*	PHI days	REI hours	Minimum days btn. sprays	Annual limit	Days of activity**	Rain-fast?***	SWD activity	Natural enemy effects*****
Malathion 8F	malathion	2 pint	Organophos.	1	12	7	8 pints	5-7	+	E	M
Mustang 0.8EC	zeta-cypermethrin	4 oz	Pyrethroid	1	12	7	24 oz	7	++	E	T
Danitol 2.4EC	fenpropathrin	16 oz	Pyrethroid	3	24	14	32 oz	7	?	E	T
Asana XL*	esfenvalerate	4.8-9.6 oz	Pyrethroid	7	12	0	28.8 oz	7	?	E	T
Brigade 2EC	bifenthrin	3.2-6.4 oz	Pyrethroid	3	12	7	12.8 oz	7	?	E	T
Hero 2.13SC#	bifenthrin+zeta cyp.	4-10.3 oz	Pyrethroid	3	12	7	27.4 oz	7	?	E	T
Assail 30SG	acetamiprid	5.3 oz	Neonicotinoid	1	12	7	5 apps.	7	+	G	M
Delegate WG##	spinetoram	6 oz	Spinosyn	1	4	4	19.5 oz	7	+	E	M
Entrust 80WP##	spinosad	2 oz	Spinosyn	3	4	6	9 oz	3-5	?	G	M
Entrust SC##	spinosad	4-6 oz	Spinosyn	3	4	5	29 oz	3-5	?	G	M
Pyganic 1.4EC	pyrethrum	64 oz	Pyrethrin	0.5	12	0	-	1-2	?	F	M

Residual control provided by pyrethroid insecticides will be reduced during hot and sunny weather.

* Asana can be repellent to bees. Do not apply within 7 days of pollination activity.

** Estimated residual activity from MSU research.

*** Rainfastness ranking is based on a study with 0.8 inch rain on 1 day old residues. + = not rainfast, ++ = moderately rainfast. Recommend reapplication after rain events. Beware of the restrictions on minimum days between sprays for most products.

**** The maximum residue limit is provided for US and Canada. Check www.mrldatabase.com for MRLs in other countries.

***** M = moderately toxic, T = Toxic

Hero is a mixture of bifenthrin and zeta-cypermethrin (ingredients in Brigade and Mustang Max). Carefully check the rates used of these products so you do not exceed the total seasonal limit for both active ingredients.

Do not make more than two consecutive applications of spinosyn insecticides. Rotate to another chemical class.

NORTHWEST MICHIGAN HORTICULTURAL RESEARCH CENTER ANNUAL OPEN HOUSE

The Northwest Michigan Horticultural Research Center's (NWMHRC) annual open house is scheduled for Thursday, August 27, 2015. This year's event will include an equipment show, wine tasting and dinner, and the Leelanau Horticulture Society's annual meeting. In addition, Greenstone Farm Credit Crop

Insurance will be holding a discussion reviewing current fruit policies, as well as introducing the new Whole Farm Revenue Protection policy. This new policy is aimed toward specialty crop, and diverse growers. Dicussion will include a short powerpoint outling the basics, followed by a short Q and A.

The grounds to the exhibit area will open at 1:00 p.m., and equipment vendors will be on site. Free educational wagon tours of the NWMHRC featuring MSU specialists will take place from 3:00-4:45. The tour will include winegrape and tree fruit specialists that will speak on a variety of topics: disease management, vine health, insectary plant plots, cover crops, high density Montmorency plantings and the recent over-the-row harvest that was held at the NWMHRC. Growers are encouraged to meet with equipment vendors during the social hour from 4:45 – 6:00. Dinner and the Leelanau Horticultural Society's annual meeting will follow at 6:00.

As in past years, the equipment show, social hour, and dinner is sponsored by the Leelanau Horticultural Society and Parallel 45 with the educational portion sponsored by AgBioResearch, MSU Extension, and the NW Michigan Horticultural Research Foundation. To reserve or purchase a dinner ticket, please call (231) 946-1510 or email Jenn at goodr100@msu.edu by August 20, 2013. The dinner will be catered by *Ethnic Garden Catering* and will feature locally produced food; cost for dinner tickets is $10 per person.

For more information, contact the NW Michigan Horticultural Research Center at 231-946-1510. We hope to see many of you at this fun and educational event!

Grand Traverse County Household Hazardous Waste Collection - August 27th 1:00pm-6:45 pm and APPOINTMENTS ARE REQUIRED

GRAND TRAVERSE COUNTY RESOURCE RECOVERY DEPARTMENT (RecycleSmart) will conduct a Household Hazardous Waste (HHW) & Pesticide Collection on Thursday, August 27, 2015.

The online scheduling system is a convenient and the recommended tool to secure an appointment. An appointment is required and can be made at www.RecycleSmart.info or by calling the RecycleSmart Hotline at 941.5555.

This service is provided to Grand Traverse County residents at no cost, (up to 150 lbs., $1.30 lb. thereafter). Accepted material includes cleaning products, pesticides, mercury, moth balls, motor oil, pool chemicals, paint, stains, mercury containing thermometers, antifreeze, contaminated gasoline, CFL bulbs and more...

Latex Paint and Motor Oil is accepted.

For more information visit www.RecycleSmart.info are call the RecycleSmart Hotline at 941.5555

WEB SITES OF INTEREST:

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

This issue and past issues of the weekly FruitNet report are posted on our website:
http://agbioresearch.msu.edu/nwmihort/faxnet.htm

60 Hour Forecast:
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

Information on apples:
http://apples.msu.edu/

Information on grapes:
http://grapes.msu.edu

Fruit CAT Alert Reports has moved to MSU News
http://news.msue.msu.edu