Weekly Vineyard IPM Scouting Summary

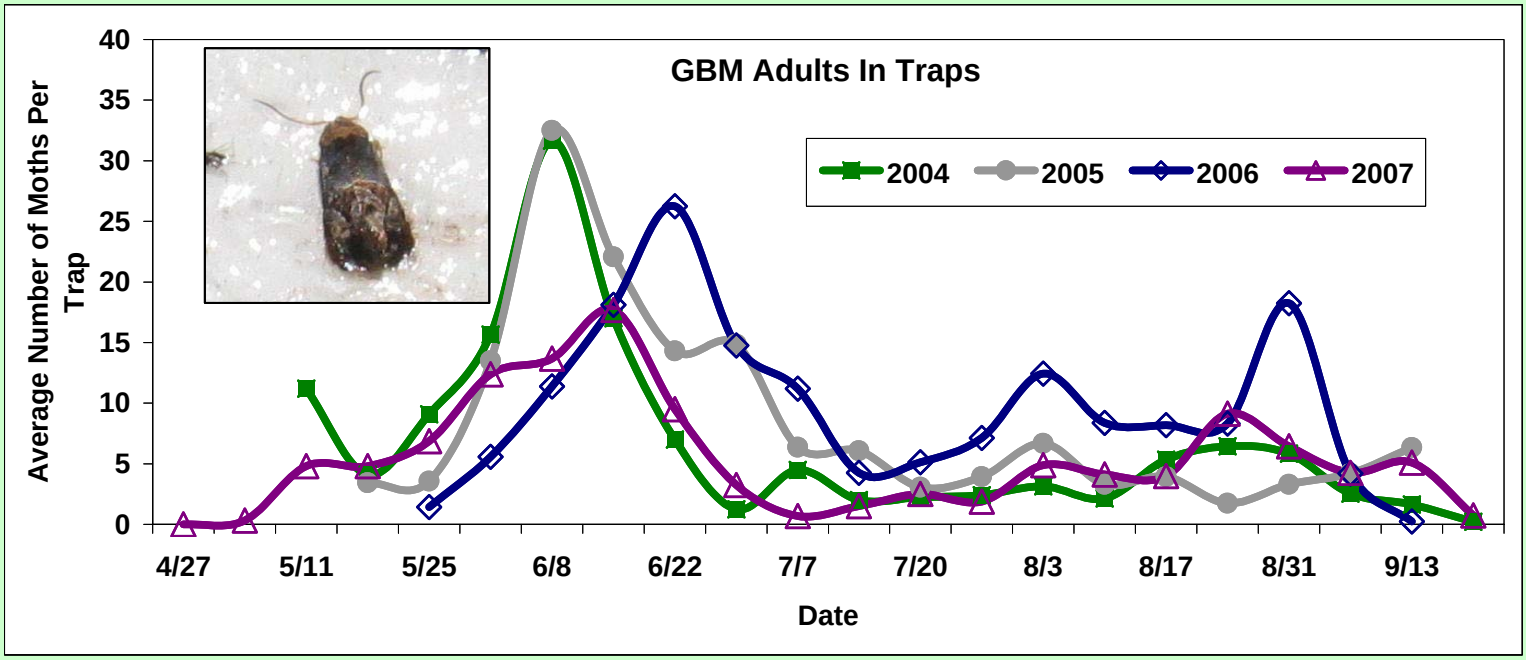
2007 Season Summary Report

Southwest Michigan

This is the scouting summary report of scouting that took place at four vineyards in southwest Michigan in 2007. In addition to the season summary, this report includes additional insecticide and fungicide information that could be useful to you in the upcoming growing season. Thanks to the many people who have helped make these weekly reports possible!

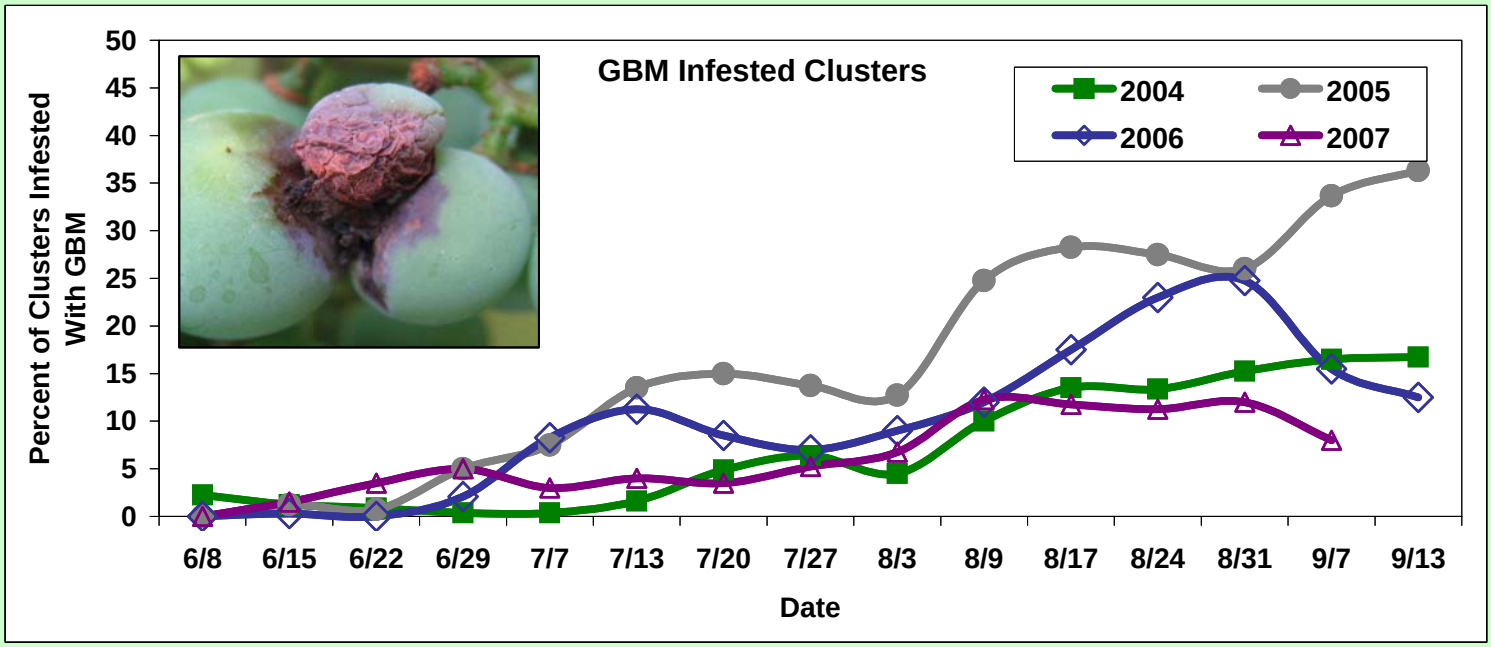
Steve Van Timmeren

Grape Berry Moth:

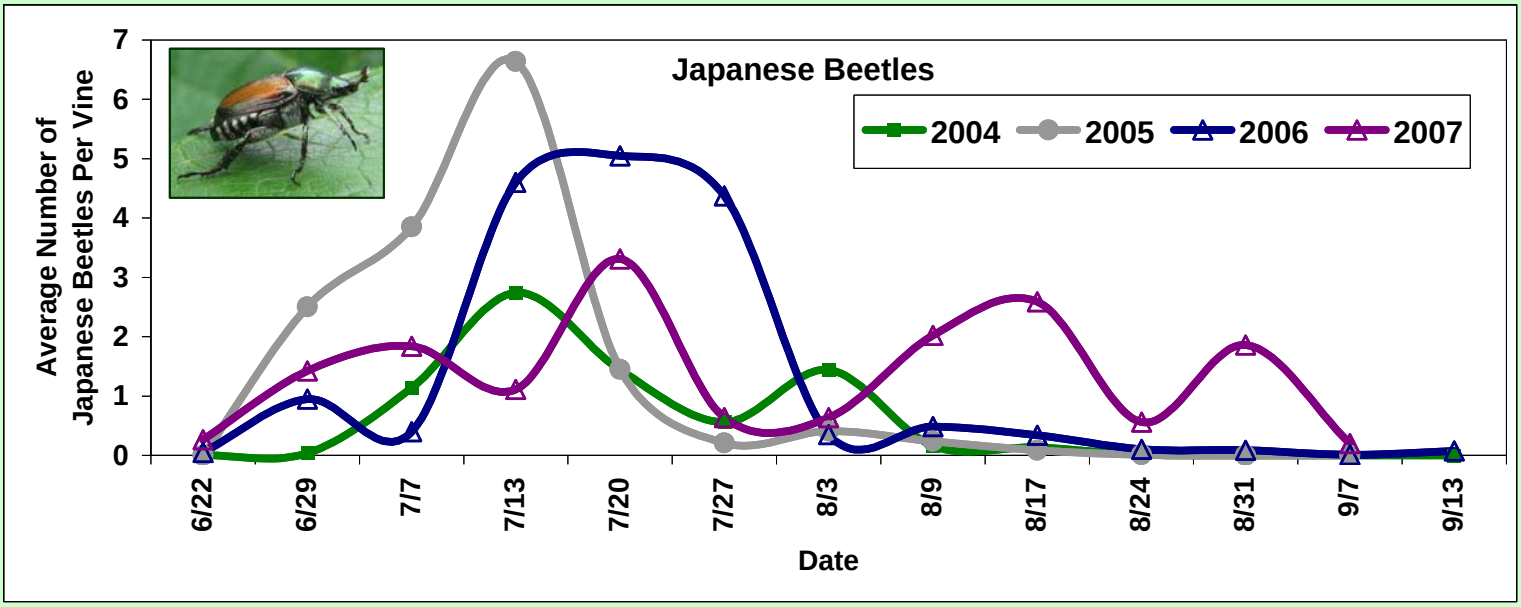


** Trapping of adult male GBM at the four sites scouted show an initial first generation peak just after bloom in each of the last four years. Trap catches during this first generation period were lower in 2007 than they were in the previous three years.

** The percent of clusters infested with GBM at the four sites was low through 2007 and ended up as the lowest year in the four years of scouting for this project. One thing to notice over the last four years is the wide variability in infestation levels later in the season. This emphasizes the importance of scouting throughout the season so you have a good idea of what to expect as you get to harvest and whether control measures will be needed.



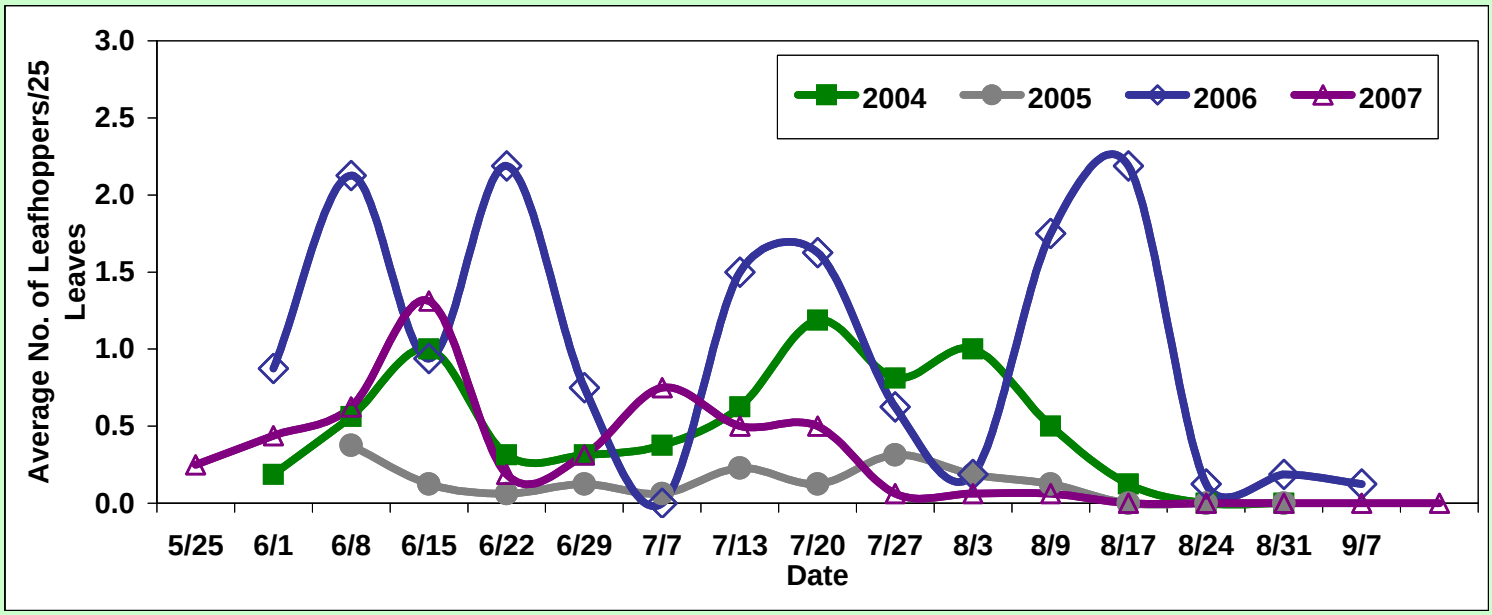
Japanese Beetle:



** The number of JB found during scouting in 2007 was lower than the last two years and similar to those found in 2004. More JB were present later in the season in 2007 than in the previous three years. This reflects the decision of growers to allow more JB to feed on grape leaves before spraying them. When JB emerge next year remember that most mature vines can handle at least some amount of JB feeding, so don't be afraid to wait a bit to apply insecticide sprays. You will want to keep a close eye on young vines and highly susceptible varieties, however, since JB can cause significant damage to them.

Leafhoppers:

** The number of potato leafhoppers and grape leafhoppers found during scouting in 2007 was lower than what was found in 2006, higher than 2005 levels, and about the same as 2004 levels. Populations increased steadily in June until decreasing rapidly due to post-bloom insecticide applications. Populations increased again somewhat in July but gradually declined to zero over the rest of the season.



Other Insects:

** Grape flea beetles and cutworms were around early in the 2007 season but weren't a problem at any of the four sites scouted for these reports. Most of the flea beetle damage was quite light and concentrated at the borders.

** There were just a few rose chafers at the sites scouted for this report with no sites having to spray for them this year. There were reports of some sites in southwest Michigan with rose chafer problems this year so it's always good to keep an eye out for them around bloom time as they can cause significant damage in a short amount of time.

NEW INSECTICIDES GIVE GRAPE GROWERS MORE OPTIONS FOR 2008

Rufus Isaacs and John Wise

In the past few years, the grape industry has received registration of many new insecticides. This is good news for grape growers who must maintain insects below economic injury levels in a time of increasing restrictions on conventional insecticides.

The Grape Entomology Program at Michigan State University evaluates insecticide performance in our Concord, Niagara, and hybrid vineyards at the Trevor Nichols Research Complex. Each year, we run these trials against grape berry moth, Japanese beetle, and in recent years potato leafhopper, testing the new products against each other and against a standard insecticide program. Our results have helped convince manufacturers and EPA to register some of the new insecticides listed below, and they help provide information on which to base our recommendations. These products vary in their performance across different types of insect pests, the residual control they provide, and their safety to biological control agents, and we have described their performance below to help growers integrate these products into their IPM programs.

Reasons to consider new insecticides as part of a grape IPM program include: 1) Some are more effective against key pests than current standard products; 2) Using new chemical classes can prevent insecticide resistance, 3) Reduced impact on biological control agents can reduce the risk of pest outbreaks, and 4) Greater safety to workers and the environment.

Winter is a great time to learn about new pest management tools, including insecticides, to prepare for the busy growing season ahead. Talk to other growers who might have tried some of these products, attend grape grower meetings organized by the Extension service in your area, and read the new Extension grape management guides for your region. You can also see the labels for these products at the www.cdms.net website.

1. Actara 25WG (Syngenta) is a neonicotinoid insecticide that is locally systemic, so it spreads in the foliage, protecting it against wash-off. It is active on leafhoppers, beetles, and other foliage feeders.

2. Admire Pro (Bayer CropScience) is labeled for leafhoppers, scale, mealybugs, and phylloxera. This is the same insecticide as Provado, in a different formulation for soil application. The label states that application can be made using a chemigation system or through soil application followed by irrigation. In our trials, this product provided 3 weeks of control of potato leafhopper when chemigated on vines grown on a drip system at the first sign of leafhoppers. However, performance was poor when we applied it as a band under irrigated or non-irrigated vines. This suggests that sufficient uptake of the insecticide is only possible on vines with roots trained to emitters. A later application, in late June, was also shown to reduce Japanese beetle feeding. This product has a 30 day PHI.

3. Assail 30SG (Cerexagri) is a neonicotinoid insecticide with activity on leafhoppers and other leaf-feeding insects. It also has performed very well in vineyard trials against rose chafer (equivalent to Sevin) and it provides vine protection against Japanese beetle feeding.

4. Avaunt 30WG (DuPont) was registered in mid-2007, and is a member of a new class of insecticides called the oxadiazines. This insecticide has shown good activity on grape berry moth in our small plot trials, providing a high level of control after bloom and in the mid-season, but lower control after veraison. It should also have broad activity on other pest types, including leafhoppers, making it useful for growers aiming to control multiple insect types.

5. Baythroid XL (Bayer CropSciences) has high activity on a broad range of insects. At the 3.2 oz rate, our trials have shown excellent activity against grape berry moth and Japanese beetle. This product is also very active on Asian ladybeetles, providing a week of control of this harvest-time pest at a 2.4 oz/acre rate. This has a 3 day PHI.

6. Brigade 2EC (FMC) is the same material as Capture 2EC (FMC), labeled from 3.2 to 6.4 oz per application, with a 6.4 oz limit. These products are pyrethroids with high activity on a broad range of insects. At a 3.2 oz rate, Brigade has excellent activity against grape berry moth with higher rates giving longer residual control. Control of beetles and leafhoppers is also expected to be high. This product was very active on Asian ladybeetles at a 2.4 oz/acre. This has a 30 day PHI.

INSECTICIDE UPDATE CONTINUED

7. Delegate 25WG (Dow AgroSciences) was registered in the past few months, and is a member of the spinosyn class of insecticides. It has activity on moth pests and is expected to be active on grape berry moth. However, we have not yet had a chance to test this in Michigan for insect control.

8. Intrepid 2F (Dow AgroSciences) is a selective insecticide with high activity on grape berry moth, and safety to natural enemies. Intrepid acts by disrupting the molting process in moths. Labeled at 4-8 oz/acre, there is a 16 oz seasonal limit. Eggs treated with this insecticide have low rates of hatching, and larvae that ingest residue die during molting. For these reasons, excellent coverage of clusters with spray is needed to achieve control. This product has long residual activity and is relatively resistant to wash-off.

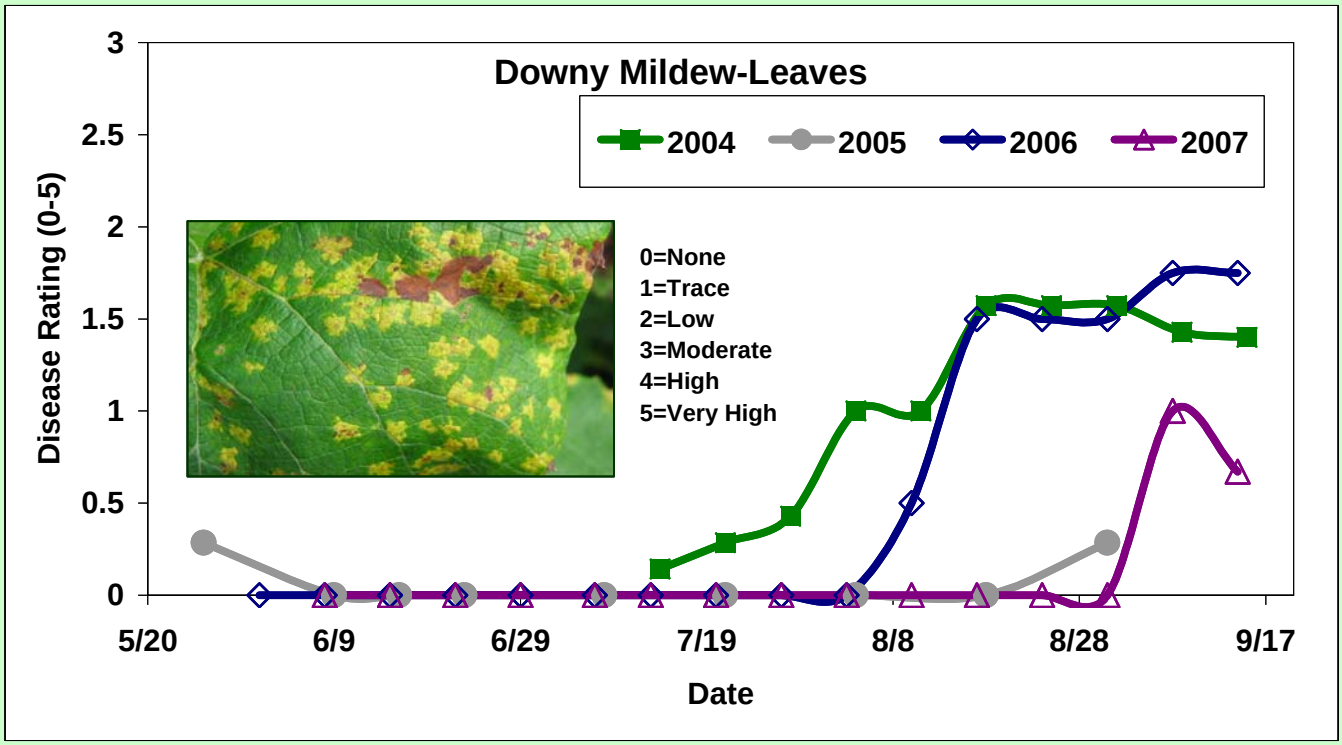
9. Mustang Max 0.8EC (FMC) was registered in 2007 on grapes. At a 4 oz rate this pyrethroid gave excellent control of grape berry moth, Japanese beetle and multicolored Asian ladybeetle. It has a 1 day PHI.

10. Venom 20SG (Valent) insecticide is in the same class as Admire Pro, and can be applied as a foliar or soil application. Foliar application provided excellent control of potato leafhopper in Traverse City vineyards during 2007, and it is active on Japanese beetle. Venom has also shown high activity against potato leafhopper when applied through chemigation, and activity against other soft-bodied insects such as mealybugs or other leafhoppers is expected. Our tests of Venom have also demonstrated reduced grape berry moth infestation when used against the first generation of this pest. Venom is not recommended for late-season control of berry moth, but it showed excellent activity against Asian ladybeetle infesting ripe grapes at 2 oz/acre in our 2007 trials, and has a 1 day PHI.

An important label change that may not have been noticed by all grape growers is the extension of the Re-Entry Interval for Imidan 70WP to 14 days in vineyards. The pre-harvest intervals have changed too: if more than 1.3 lbs is applied per acre, there is a 14 day PHI, compared with only 7 days if a lower rate is used. To get the maximum activity from this insecticide, it should be applied in water with pH 5.5. If you don't know the pH of your water supply, be sure to test it to find out if buffering is required.

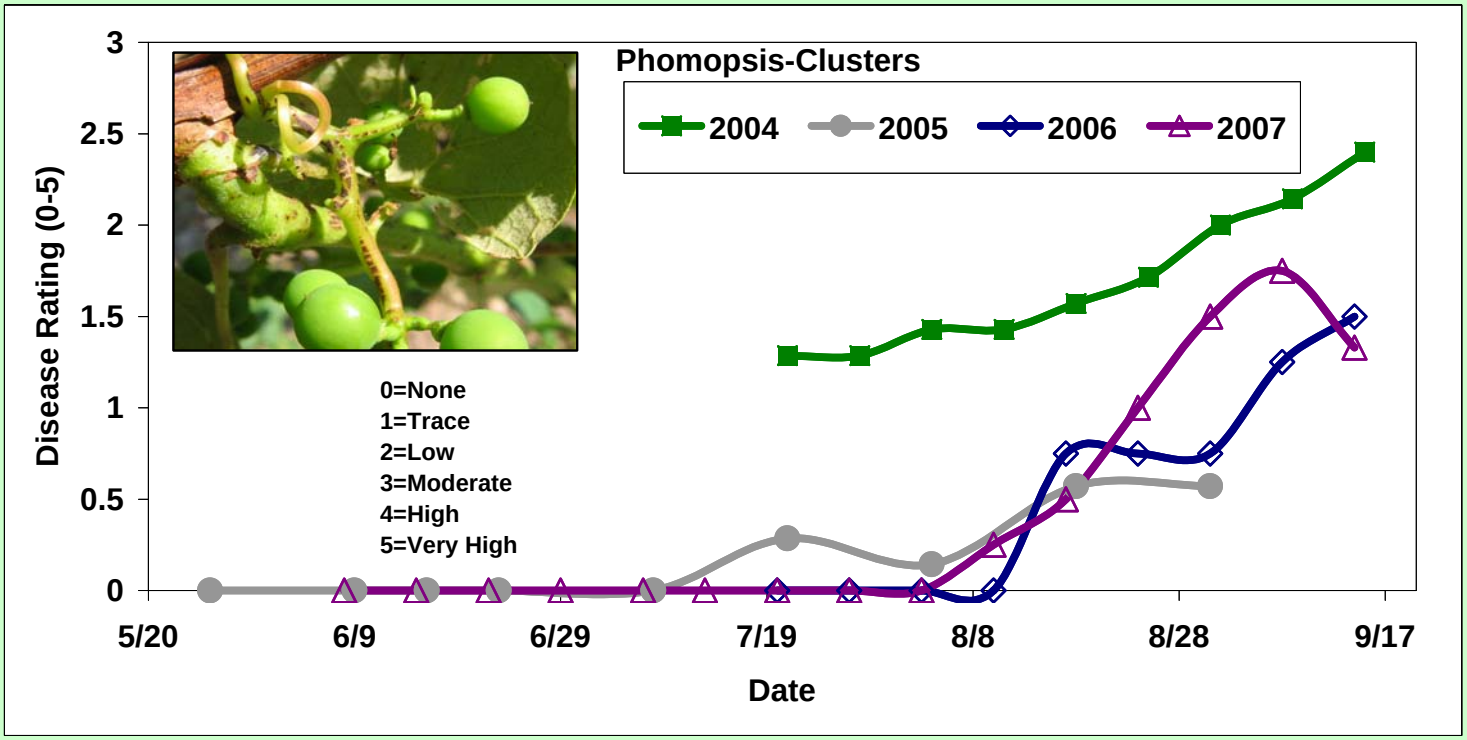
The insecticide testing program of the Grape Entomology Program at Michigan State University is supported by the Michigan grape industry through the Grape and Wine Industry Council and National Grape Cooperative, by the agrochemical industry, and by the IR-4 Project.

Downy Mildew:



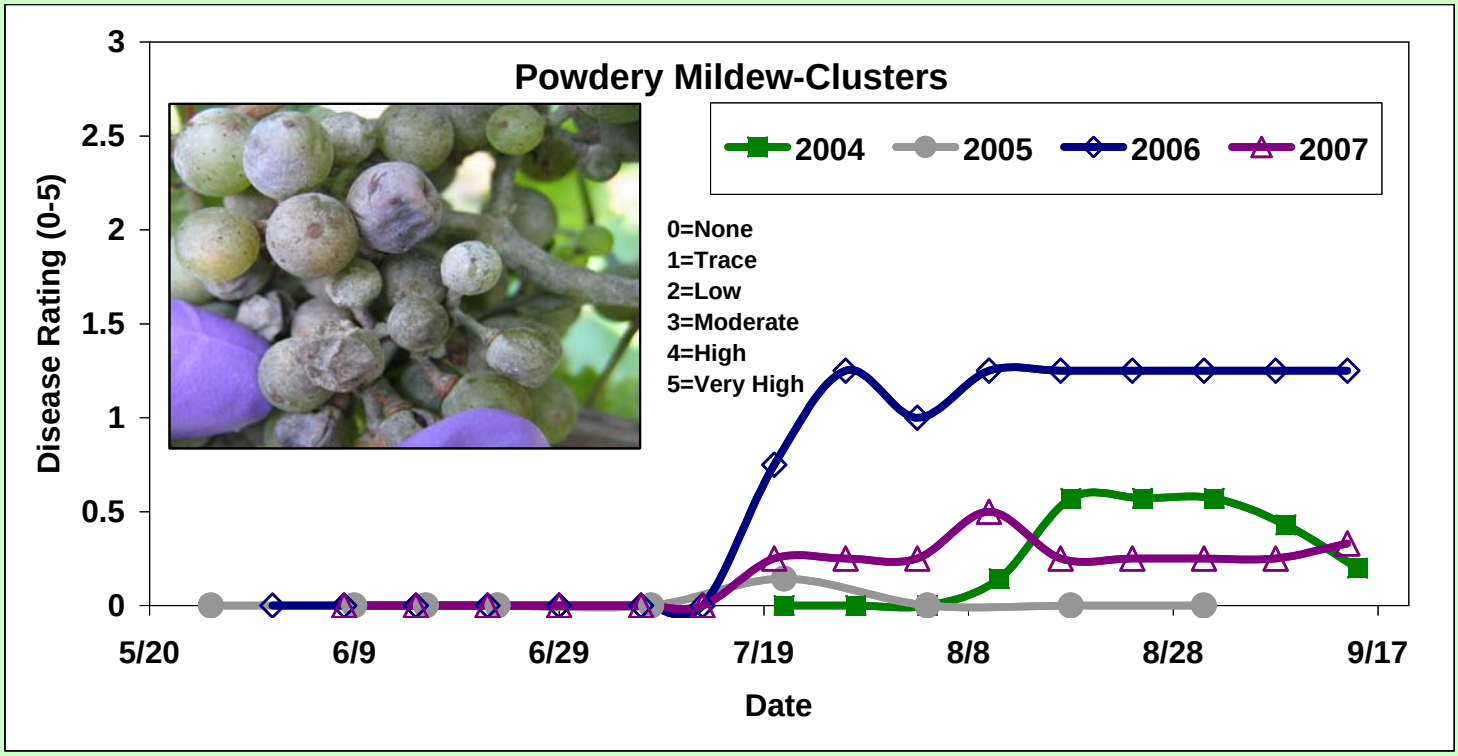
** Downy mildew was only present in trace amounts on average in 2007. Levels were lower than last year but not quite as low as 2005. The variability from one year to the next emphasizes the importance of scouting for downy mildew later in the season. In a year such as 2005 scouting would have indicated no fungicide sprays were necessary, while in a year such as 2006 you would have been able to detect infections and apply appropriate sprays to avoid major problems.

Phomopsis:



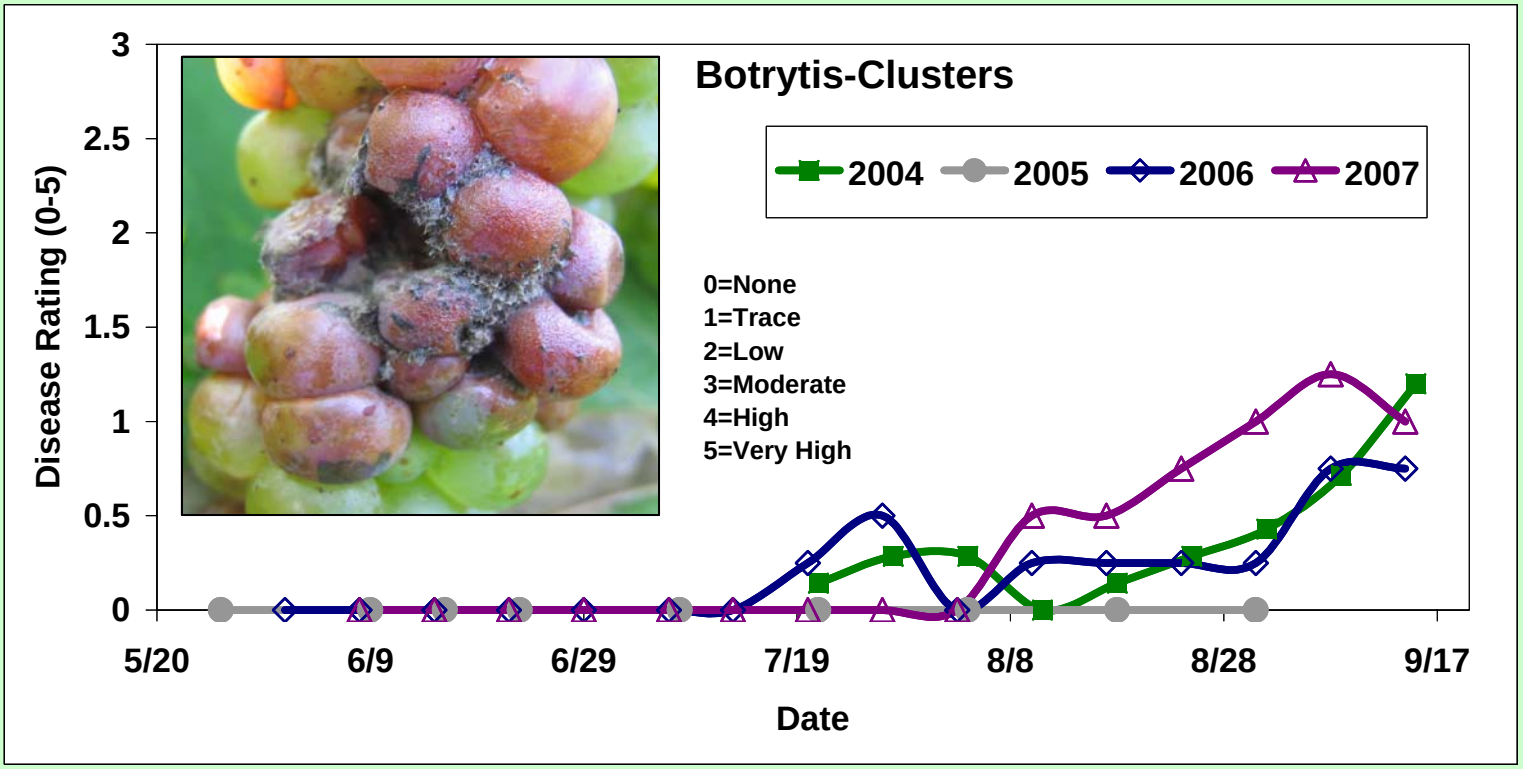
** Phomopsis infections on clusters have been at about the same level for the last couple of years. 2005 was the year with the lowest levels in the last four years, while 2004 had the highest. Since Phomopsis can vary variety to variety and block to block you're best bet is to keep track of which blocks have the highest levels of infection close to harvest and then make sure those blocks receive plenty of protectant sprays in the spring. You can also scout for Phomopsis leaf spots earlier in the season to get an idea of how much inocculum is actually in your vineyard.

Powdery Mildew



** Powdery mildew has only ever been a problem at the Allegan Chardonnay site in the four years that scouting has taken place. Powdery mildew levels in 2007 were similar to those seen in 2004. There was very little powdery mildew in 2005, while in 2006 there was a lot of it. The best way to deal with powdery mildew is to take preventative measures by applying sprays during the most vulnerable infection times (pre-bloom until 3-4 weeks after bloom).

Botrytis Bunch Rot:



** There were more Botrytis infections in 2007 than there have been in the last few years. Most of this was at the Berrien 1 Vignoles site where Botrytis infections formed on clusters that already had Phomopsis and sour rot. There was a small amount that showed up in the Concord vineyards as well, mostly on cracked berries and GBM-infested berries.

FUNGICIDE LABEL UPDATE FOR GRAPES, DECEMBER 2007.

1. Adament (tebuconazole and trifloxystrobin) is a mixture of a systemic (tebuconazole) and surface-systemic (trifloxystrobin) fungicide. It is a broad-spectrum fungicide that is labeled for control of multiple diseases on grapes, cherries, peaches, and nectarines. Adament is rainfast when dry, generally within 2 hours. Adament is effective against cherry leaf spot, brown rot, and powdery mildew on cherries, and powdery mildew in grapes. It has been moderately effective against Botrytis bunch rot. More research is needed to evaluate its efficacy against Phomopsis in grapes. Adament is best used as a protectant. Do not apply this product on 'Concord' grapes, as crop injury may result. Do not make more than two consecutive applications or a total of six (grapes) and four (stone fruit) applications per season.

2. Cuprofix MZ Disperse (mancozeb and copper sulfate) is a protectant fungicide/bactericide labeled for use against a wide range of diseases in apples, pears, grapes, and cranberries. This fungicide is more useful early in the season as the pre-harvest intervals are 77 days for apples and pears, 66 days for grapes, and 30 days for cranberries. Cuprofix MZ Disperss should not be applied in a spray solution with a pH of less than 6.5 as phytotoxicity may occur. It can also be reactive with metal surfaces. The maximum amount of product allowed per acre per season should consider all other EBDC fungicides applied. This product has not been evaluated for disease control in fruit crops in Michigan.

3. Fosphite (mono- and dipotassium salts of phosphorous acid 53%, equivalent to 3.9 lbs phosphorous acid per gallon) is a systemic fungicide for the control of downy mildew and Pythium and Phytophthora diseases of apples, pears, cherries, peaches, plums, nectarines, apricots, grapes, blueberries, strawberries, raspberries, and cranberries. Fosphite can be applied as a foliar spray or through the irrigation system. Do not tank mix with foliar fertilizers or apply within 20 days of a copper fungicide application. Do not apply to plants that are dormant or stressed by heat or drought. Do not apply when plants are expected to remain wet for more than 4 hours. Fosphite has not been specifically evaluated on fruit crops in Michigan, but similar products have been (e.g., ProPhyt or Phostrol). This product has not been evaluated for disease control in grapes in Michigan.

4. Fungi-Phite (mono- and dipotassium salts of phosphorous acid 45.5%, equivalent to 3.39 pounds of phosphorous acid per gallon) is a systemic fungicide for the control of downy mildew and Pythium and Phytophthora diseases of apples, pears, cherries, peaches, plums, nectarines, apricots, grapes, blueberries, strawberries, raspberries, and cranberries. The label also lists suppression of Septoria and anthracnose in berry crops; fire blight, blister spot, and blue and green mold in pome fruit; and bacterial diseases in stone fruit. Fungi-Phite can be applied as a foliar spray, root dip or through chemigation. Do not apply more than 4-6 times per crop cycle (check label). Do not apply within 20 days of a copper fungicide application or to plants that are dormant or stressed by heat or drought. Do not apply when plants are expected to remain wet for more than 4 hours. This product has not been specifically evaluated for disease control in grapes in Michigan but similar products have been (e.g., ProPhyt or Phostrol).

5. Gavel (mancozeb and zoxamide) is a broad-spectrum protectant fungicide with a supplemental label for control of downy mildew, bunch rot, and dead arm (this is an old term for a disease complex now known as Eutypa dieback and Phomopsis) in grapes. Addition of an agricultural surfactant will improve fungicide performance. Do not make more than 8 applications per acre per season. Consider Gavel and all other EBDC fungicides in observing the maximum seasonal use rate recommendations for mancozeb. Gavel was effective against downy mildew in fungicide efficacy trials in grapes in Michigan but its use is limited later in the season because of the 66-day pre-harvest interval.

6. Nova 40 WP/ Rally 40WSP (tebuconazole): Effective immediately, Dow AgroSciences will discontinue Nova 40WP and replace it with Rally 40WSP. It's the exact same formulation, and has the same EPA registration number, just a different name. Dow AgroSciences is consolidating labels and product. Rather than having two products, Nova 40WP and Rally 40WSP, we will have only one, Rally 40WSP. So for all of us on the East Coast, rather than having 4 - 5 oz packets per over pack there will be 5 - 4 oz packets in an over pack.

7. Orius (tebuconazole) is a systemic SI fungicide similar to Elite and is expected to have similar efficacy: see Elite. May be less expensive than Elite.

8. Purespray Green (petroleum oil) is a horticultural spray oil for insect and disease control in apples, pears, cherries, peaches, nectarines, apricots, plums, grapes, strawberries, blueberries, bushberries and caneberries. There is an organic version of this product, which does not list berry crops, so be sure to read the label prior to use. Most of the pests listed are insects; however, powdery mildew and rust are targets in blueberries, bushberries, and caneberries; and powdery mildew is listed under grapes and strawberries. Table grapes should not be sprayed within 60 days of harvest as the oil will remove the bloom on grapes. Avoid spraying in very cold or hot weather (under 32ºF and over 95ºF). Do not use in combination or immediately before or after spraying with copper, captan, bravo, folpet, sulfur. Check the label for other restrictions. This product has not been evaluated for disease control in grapes in Michigan.

FUNGICIDE LABEL UPDATE CONTINUED

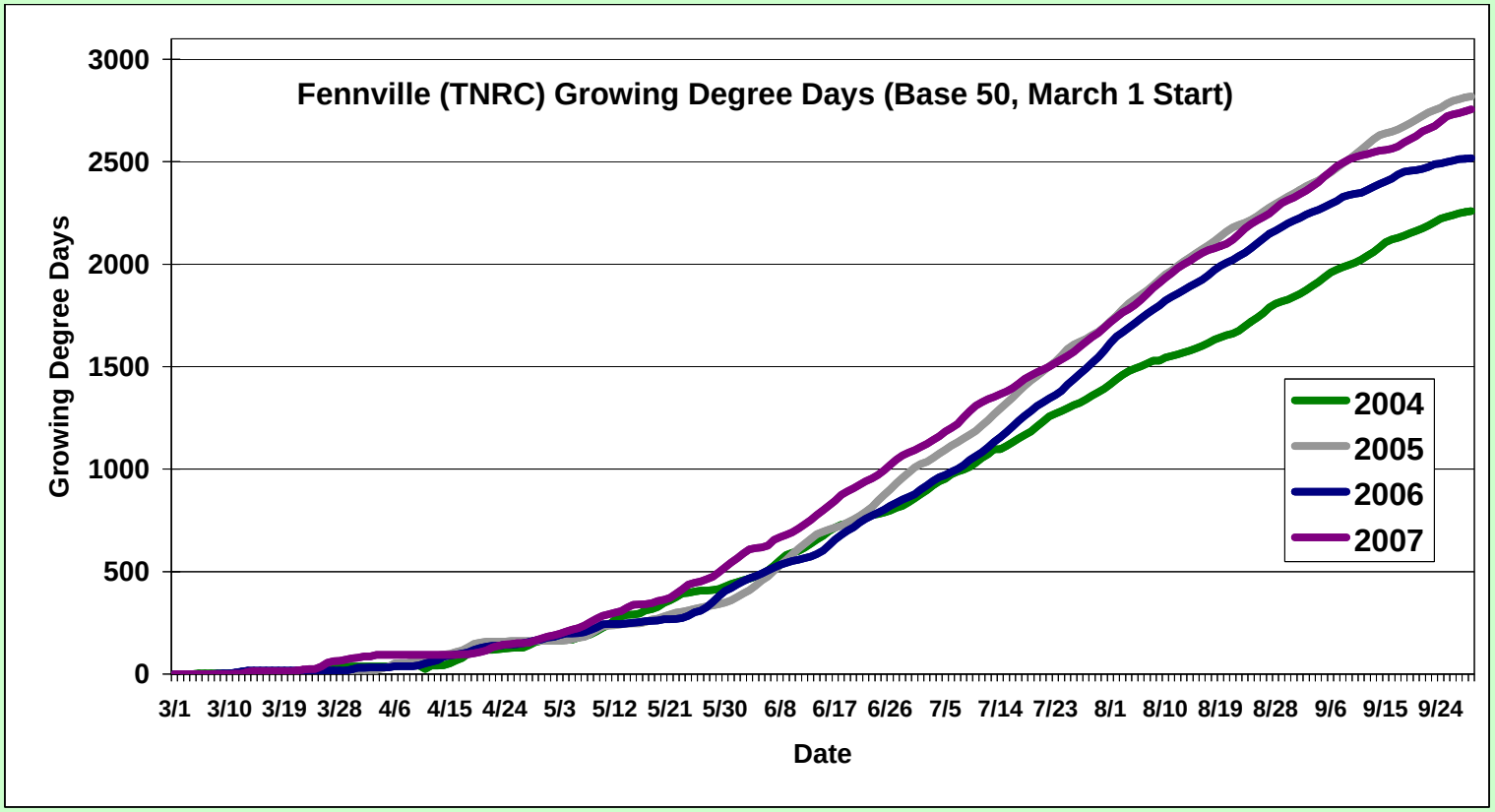
9. Saf-T-Side (petroleum oil) is a spray oil emulsion fungicide, insecticide and miticide labeled for use in grapes, blueberries, strawberries, raspberries, and blackberries. The label lists powdery mildew and Botrytis in grapes, and powdery mildew and rust in berry crops. All horticultural oils interfere with or slow plant transpiration during periods of evaporation. Do not apply during periods of drought or when plants exhibit moisture stress. Do not use in combination or immediately before or after spraying with captan, folpet, sulfur or NPK foliar fertilizer applications. This product has not been evaluated for disease control in grapes in Michigan.

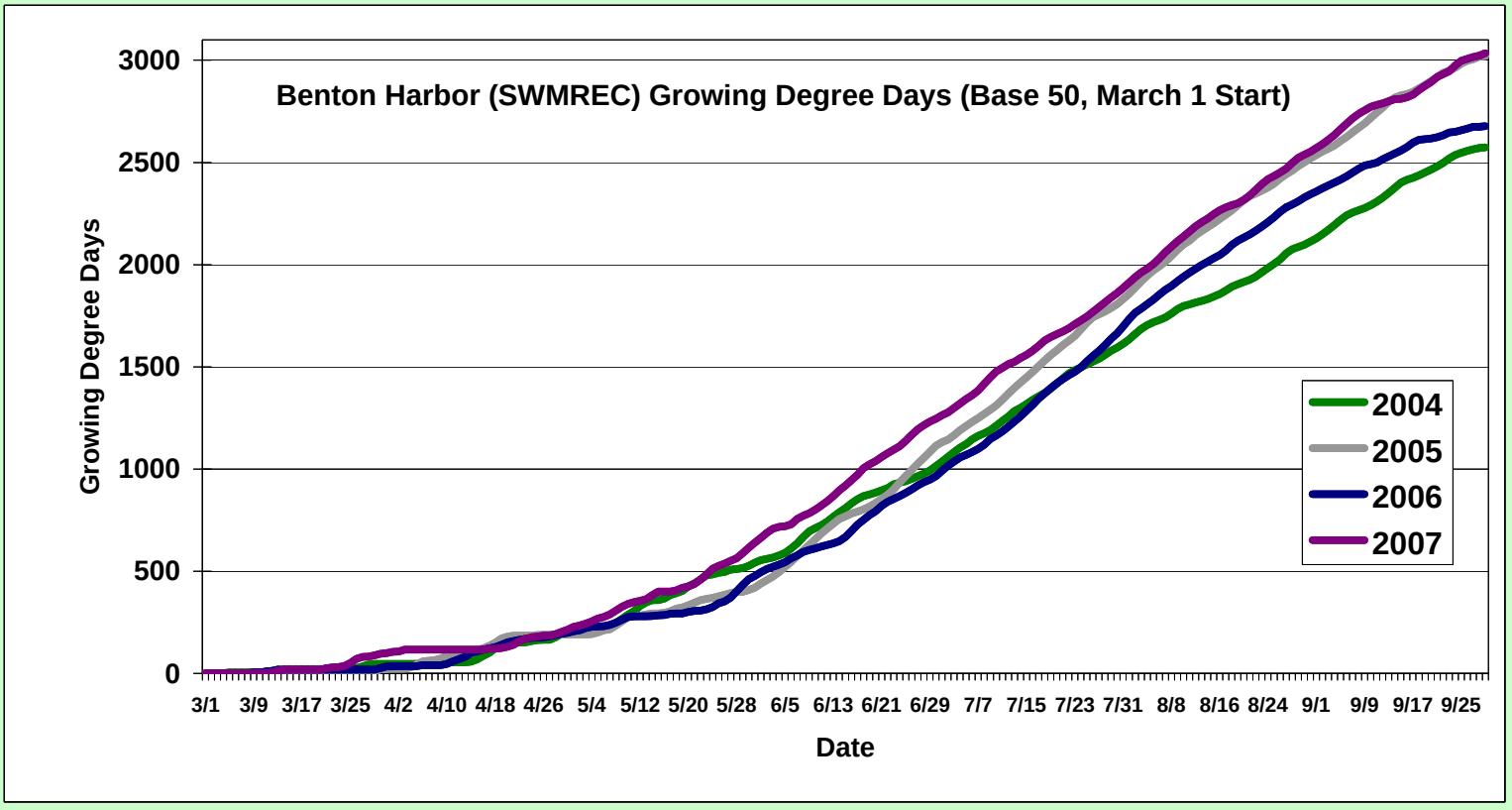
10. Sonata (Bacillus pumilis QST 2808) is a protectant biofungicide that is OMRI listed and therefore can be used in organic production. Sonata is labeled for use on grapes, blueberries, strawberries, raspberries, blackberries, gooseberries and currants. The label lists control of leaf rust and powdery mildew in berry crops, and powdery mildew in strawberries and grapes. 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. If disease pressure is high, alternate or tank mix this product with other effective fungicides. Further testing is needed on to determine its utility for disease control in small fruit crops in Michigan.

11. Sporan (rosemary oil, clove oil, thyme oil, wintergreen oil, lecithin, butyl lactate) is 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. Diseases listed on the label are: powdery mildew, downy mildew, black rot, Botrytis bunch rot, and Eutypa dieback in grapes; anthracnose fruit rot, downy mildew, gray mold, and powdery mildew in berry crops; fire blight, scab, powdery mildew, brown rot, anthracnose, rust, gray mold, cherry leaf spot, and black rot in pome and stone fruit. This product has not been evaluated for disease control in grapes in Michigan.

12. Trilogy (clarified hydrophobic extract of neem oil) is a plant extract that is OMRI-listed and can therefore be used in organic production. It functions 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. The label lists the following diseases: Alternaria, anthracnose, Botrytis, leaf spot, downy mildew, powdery mildew, molds, scabs, rusts, and shothole. This product has not been evaluated for disease control in grapes in Michigan.

Growing Degree Days





Effect of water pH on the stability of pesticides

Annemiek Schilder, Department of Plant Pathology

Most pesticides are sold in concentrated form and have to be dissolved or suspended in water before they can be applied to crops. This water can come from various sources, such as wells, ponds, rivers, or municipal water supplies. Water naturally varies in the amount of dissolved minerals, organic matter and pH, depending on its source. The pH is a measure of the acidity or alkalinity of water, which refers to the number of hydrogen (H^+) and hydroxyl (OH^-) ions in a solution. The scale for measuring pH runs from 0 to 14. The lower the pH, the more acidic is the solution, while a higher pH indicates that the solution is more alkaline. Water at pH 7 is neutral meaning that there are an equal number of hydrogen and hydroxyl ions in the solution. Many areas in Michigan have alkaline water with high mineral/iron content. In addition, the pH of water from natural sources can vary throughout the season.

The pH of water can negatively affect the stability of some pesticides. Under alkaline conditions, alkaline hydrolysis occurs which degrades the pesticide to non-toxic (inactive) forms. In general, insecticides (particularly organophosphates and carbamates) are more susceptible to alkaline hydrolysis than are fungicides, herbicides, or growth regulators. The end result is less active ingredient applied and poor pesticide performance. The degradation of a pesticide can be measured in terms of its half life. For example, if a product has a half life of 1 hour, its effectiveness is reduced to 50% in 1 hour, to 25% in the next hour, to 12.5% in the next hour, etc. Eventually, the pesticide becomes virtually ineffective. The effect of pH on pesticides varies from product to product and is also moderated by buffering solutions contained in the pesticide formulation. Tank-mixing multiple pesticides can modify the pH of the tank-mix.

The table on the next page shows the half life of a number of pesticide products as well as the optimum pH (where known). As you can see from the table, most pesticides are most stable when the spray solution at a pH of about 5. As many water sources are more alkaline than this it may be necessary to adjust the pH of the spray solution. There are important exceptions to the rule that spray solutions should be acidifed. For instance, in the case of copper-based fungicides, copper becomes more soluble at a lower pH and may become phytotoxic to crops. In addition, phosphorous acid and other acid-based fungicides already have a low pH and lowering it even more can cause them to injure crops. On the other hand, acidifying carbonate salt fungicides, such as Armicarb, may render them ineffective.

Check the pH of the water used for spraying pesticides frequently throughout the season. If you know that your water has a pH of 7.5 or greater, consider lowering the pH, especially if you are applying a pesticide that is sensitive to high pH. The fastest way to determine the pH level of water is to test it with a pH meter or test paper. Paper test strips are the least expensive; however, they can be unreliable and vary by as much as 2 pH points. A pH meter will provide the most reliable and consistent readings. Meters are available commercially for $50 to $400.
Adjust the water pH by using a commercially available acidifying/buffering agent before adding the pesticide. Buffering agents will stabilize a spray solution at a predetermined pH and keep it at that level. Read and closely follow the directions on the label of the buffering agent and make sure that the solution is stirred well before taking a pH measurement. While a pH of 5 may be optimal, a pH of 6 is usually satisfactory for many pesticides, especially if they will be sprayed out immediately after mixing. Some buffering agents such as pHase5 or PHT Indicate 5 will have a color indicator when the correct pH is achieved. Growers can add this product into the water until it reaches the color that indicates a given pH. For example, 5 = pink or red; 6 = orange; etc. When tank mixing multiple pesticides and/or foliar fertilizers, check the pH after the products have been thoroughly mixed and adjust the pH as needed. Not all pesticides react the same to the pH of the spray water solution and some products should not be used with buffering agents. Always read the label for any precautions with respect to pH and potential product incompatibility issues. Apply pesticides soon after mixing and avoid leaving pesticide tank mixes in the spray tank overnight.

*This article is based on the following online articles: “Pesticide wise” by the Government of British Columbia Ministry of Agriculture and Lands; “Effects of Water pH on the Stability of Pesticides” by F. Fishel, Department of Agronomy, University of Missouri; “Effects of pH on Pesticides and Growth Regulators” by T. Smith, Dept. Plant, Soil & Insect Sciences, University of Massachusetts; “Effect of water pH on the chemical stability of pesticides” by H. M. Deer and R. Beard, Utah State University Extension; and “The Wonderful World of Roses: Ph and Pesticides” by R. B. Martin, Jr, Pasadena, CA.

For more information on this project, contact Steve at (517) 242 1282
More information on Vineyard IPM is available online at: www.grapes.msu.edu
All photos: Steven Van Timmeren

Product	Optimum pH	Half Life / Time until 50% Hydrolysis**
Insecticides/Miticides		
Admire	7.5	Greater than 31 days at pH 5 - 9
Agri-Mek		Stable at pH 5 - 9
Ambush	7	Stable at pH 6 - 8
Apollo		pH 7 = 34 hrs; pH 9.2 = 4.8 hrs
Assail	5 - 6	Unstable at pH below 4 and above 7
Avaunt		Stable for 3 days at pH 5 – 10
Carzol	5	Not stable in alkaline water; use within 4 hrs of mixing.
Cymbush		pH 9 = 35 hrs
Cygon	5	pH 4 = 20 hrs; pH 6 = 12 hrs; pH 9 = 48 min
Decis		no data
Diazinon	7	pH 5 = 2 wks; pH 7 = 10 wks; pH 8 = 3 wks; pH 9 = 29 days
Dipel	6	Unstable at pH above 8
Dylox		pH 6 = 3.7 days; pH 7 = 6.5 hrs; pH 8 = 63 min
Endosulfan		70% loss after 7 days at pH 7.3 – 8
Foray	6	Unstable at pH above 8
Furadan		pH 6 = 8 days; pH 9 = 78 hrs
Guthion		pH 5 = 17 days; pH 7 = 10 days; pH 9 = 12 hrs
Imidan	5	pH 5 = 7 days; pH 7 < 12 hrs; pH 8 = 4 hrs
Kelthane	5.5	pH 5 = 20 days; pH 7 = 5 days; pH 9 = 1hr
Lagon	5	pH 4.5 = 20 hrs; pH 6 = 12 hrs; pH 9 = 48 min
Lannate		Stable at pH below 7
Lorsban/Dursban		pH 5 = 63 days; pH 7 = 35 days; pH 8 = 1.5 days
Malathion	5	pH 6 = 8 days; pH 7 = 3 days; pH 8 = 19 hrs; pH 9 = 5 hrs
Matador	6.5	Stable at pH 5 - 9
Mitac	5	pH 5 = 35 hrs; pH 7 = 15 hrs; pH 9 = 1.5 hrs
Morestan	4.5	pH 4.5 = 10 days; pH 7 = 80 hrs; pH 9 = 4hrs
Omite		Effectiveness reduced at pH above 7
Orthene		pH 5 = 55 days; pH 7 = 17 days; pH 9 = 3 days
Pounce	6	pH 5.7 to 7.7 is optimal
Pyramite		Stable at pH 4 – 9
Ripcord		pH 9 = 35 hrs; more stable pH below 7
Sevin XLR	7	pH 6 = 100 days; pH 7 = 24 days; pH 8 = 2.5 days; pH 9 = 1 day
Spinsosad	6	Stable at pH 5 – 7; pH 9 = 200 days
Thiodan	6.5	70% loss after 7 days at pH 7.3 to 8
Mavrik		pH 6 = 30 days; pH 9 = 1 - 2 days
Zolone	6	Stable at pH 5 – 7; pH 9 = 9 days
Fungicides		
Aliette	6	Stable at pH 4.0 to 8.0
Benlate		pH 5 = 80 hrs; pH 6 = 7 hrs; pH 7 = 1 hr; pH 9 = 45 min
Bravo	7	Stable over a wide range of pH values
Captan	5	pH 5 = 32 hrs; pH 7 = 8 hrs; pH 8 = 10 min
Dithane	6	pH 5 = 20 days; pH 7 = 17 hrs; pH 9 = 34 hrs
Nova		Not affected by pH
Ridomil		pH 5 – 9 = more than 4 weeks
Rovral		Chemical breakdown could take place at high pH
Orbit		Stable at pH 5 – 9
Herbicides		
Banvel		Stable at pH 5 - 6
Fusilade		pH 4.5 = 455 days; pH 7 = 147 days; pH 9 = 17 days
Ignite	5.5	
Gramoxone		Not stable at pH above 7
Laredo	5.5	
Poast	7	Stable at pH 4.0 to 10
Princep		pH 4.5 = 20 days; pH 5 = 96 days; pH 9 = 24 days
Prowl		Stable over a wide range of pH values
Roundup	5 - 6	
Touchdown	5 - 6	
Treflan		Very stable over a wide range of pH values
Weedar		Stable at pH 4.5 to 7
Wrangler	5 - 6	

**The half-life is the period of time it takes for one half of the amount of pesticide in the water to degrade. Other factors than the pH can affect the rate of hydrolysis, incl. temperature, solubility, concentration, type of agitation, humidity, and other pesticides and adjuvants in the mixture.

Weekly Vineyard IPM Scouting Summary

2007 Season Summary Report

Northwest Michigan

Weather Summary

Although this year seemed abnormally hot and dry. The difference between 2007 and the last two years was much warmer temperatures early in the season (June). **Figures 1 and 2** show growing degree days (base 50) from '05, '06, and '07, from the Old Mission and NW Research Station weather stations. In the month of June and early July, growing degree days accumulated much faster than either '05 or '06. In the month of June, twelve days had temperatures above 85 degrees F. However, by the end of the season, overall degree days from all years were similar. Rainfall totals for all weather stations in the northwest were below normal by at least three inches.

Table 1. Rainfall totals (inches) Jan. 1

Rainfall Totals (in.) Jan. 1 through Oct. 1			
	2005	2006	2007
Benzonia	20.0	22.6	15.2
East Leland	15.8	18.4	14.0
Elk Rapids	10.5	17.8	14.2
Northport	15.6	15.7	11.3
NW Station	14.5	16.9	13.2
Old Mission	15.4	17.5	12.6

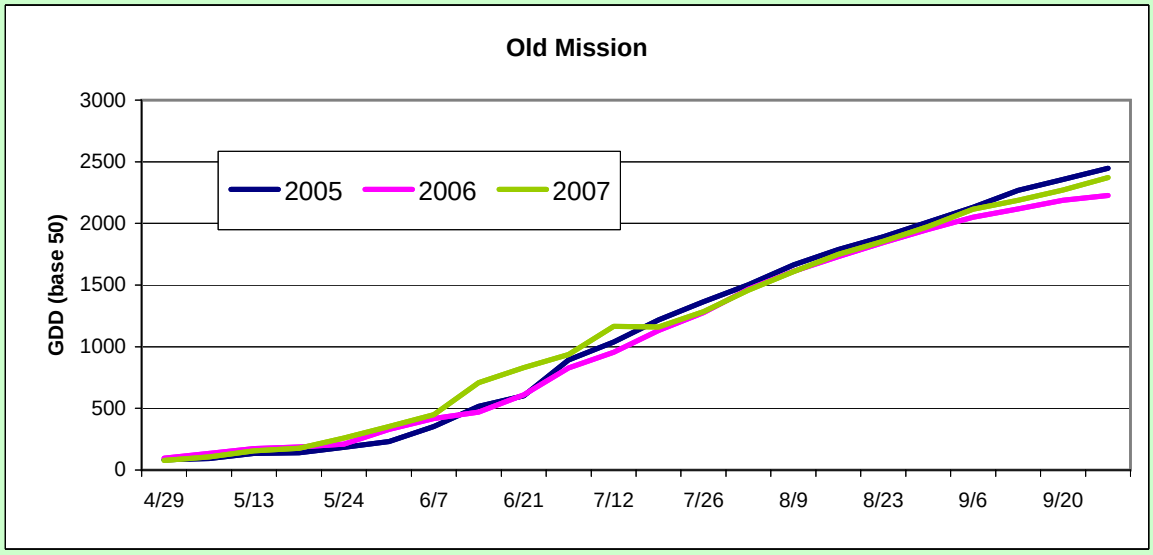


Figure 1. Growing degree day accumulations for '05, '06, and '07 on Old Mission penisula.

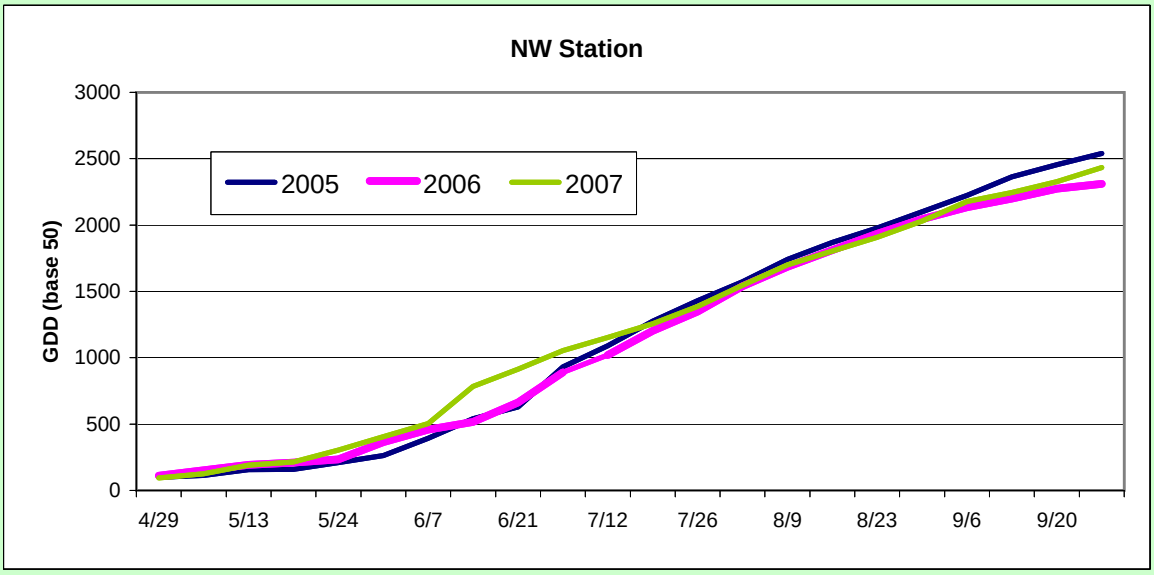


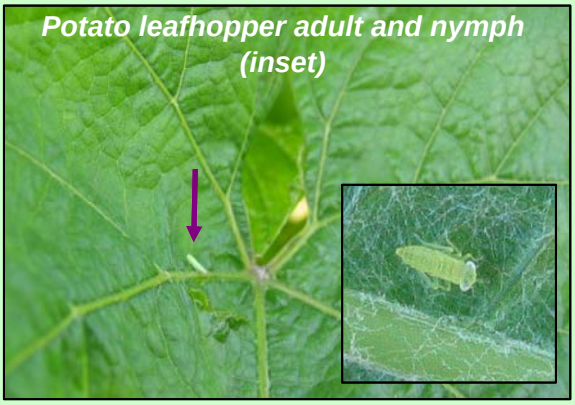
Figure 2. Growing degree day accumulations for '05, '06, and '07 at the NW MI Horticulture Research Station.

Potato Leafhopper

Potato leafhopper (PLH) is one of our major insect pests in winegrapes in NW Michigan. PLH 'migrate' northward on southern winds in the early spring. Because spring thunderstorms are unpredictable, we have no good method for predicting when PLH will arrive, but placing yellow sticky traps in the vineyard in early spring will provide an indication of their arrival. Traps should be placed on the highest wire. When foliage is present in the canopy, leaves should be removed around the trap area. PLH are attracted to these traps and the 'stuck' PLH will provide an early indication if the hoppers have arrived into the vineyard. This year they arrived in late May at approximately 6" shoot length.

Figure 3 shows the average number of PLH caught per trap at two vineryards. Each vineyard had a total of 4 traps; 2 on the border, and 2 in the interior. Overall, vineyard A's population peaked in mid-May and populations remained higher throughout the season. Vineyard B's population peaked in early to mid-June and populations dropped at the end of June and stayed low for the remainder of the season.

Checking yellow sticky traps



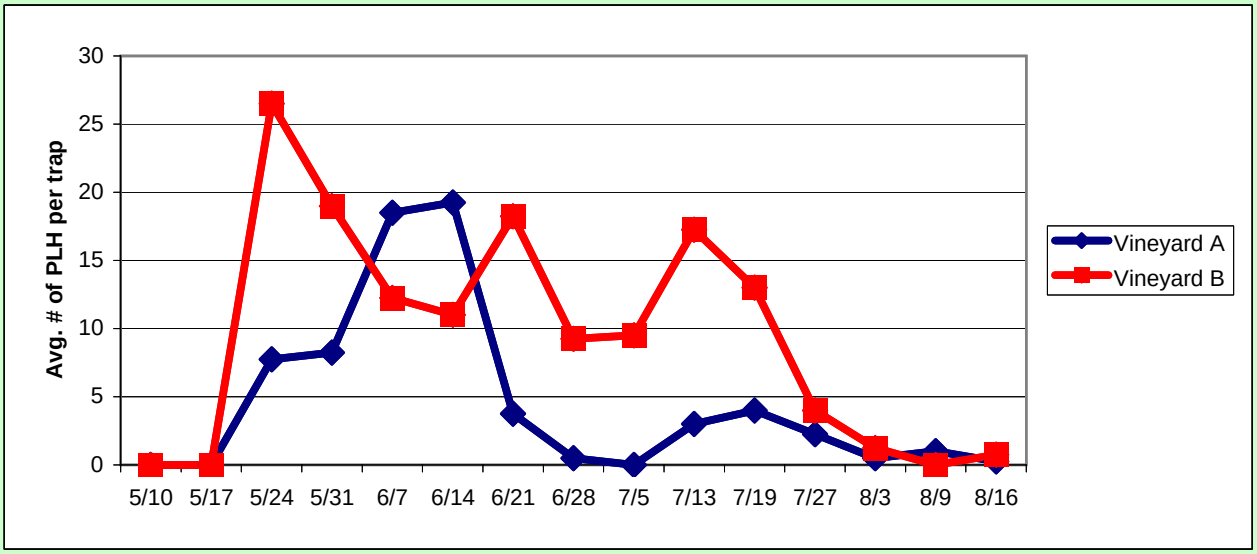


Figure 3. Average number of PLH caught per trap at two vineyard sites in NW Michigan.

Japanese Beetles:

We have observed Japanese beetles in northwest MI in many more areas this year than in 2006. The hot spot near Bodus Road in Leelanau County still remains just that - the place to be if you are a Japanese beetle. However, we have found them in the region in the following locations:

1) The M-204 corridor in Leelanau Co., in managed grapes
2) Zimmerman Road in G.T. Co, in managed grapes
3) The southern half of Antrim Co., in sweet cherry
4) The NMC campus in Traverse City, in wild grape
5) M-22 south of M-204 in Leelanau Co., in managed grapes and apples

We need to start thinking about potential control strategies for the coming years.

Japanese beetles

Grape Berry Moth

During the 2007 scouting season, we found grape berry moth (GBM) infestations in northwest vineyards. In the recent past, we have felt our area did not harbor this insect as a major vineyard pest as we have seen in other parts of the state. This pest is offically here, and the larvae are infesting clusters even if there are no adult moths in the pheromone traps! The table below shows the trap catch data for one vineyard for the early 2007 season, and no additional moths were caught in traps after June 7. Therefore, the traps do not seem to be a good indicator of GBM infestation in the northwest. Scouting for infestation is a must for all northwest vineyards.

Figure 4 shows the percent of Chardonnay clusters infested with GBM, which coincides with trap catch data in Table 2. The borders of this vineyard had considerable infestation that ranged from 25 - 50% infestation. However, the trap counts provided no indication that GBM moths were present in the vineyard. In addition to GBM, botyrtis infection set in those infested clusters.

Table 2. GBM trap catch data from one vineyard in NW Michigan.

Trap Location		10-May	17-May	24-May	31-May	7-Jun	14-Jun
1	*Border*	0	2	0	0	1	0
2	*Border*	0	1	0	0	0	0
3	*Interior*	0	0	0	0	1	0
4	*Interior*	0	0	0	0	0	0

GBM-infested Vignoles berry. Note the GBM entry hole.

Grape berry moth infested cluster

Adult grape berry moth

GBM infested cluster infected with botyrtis

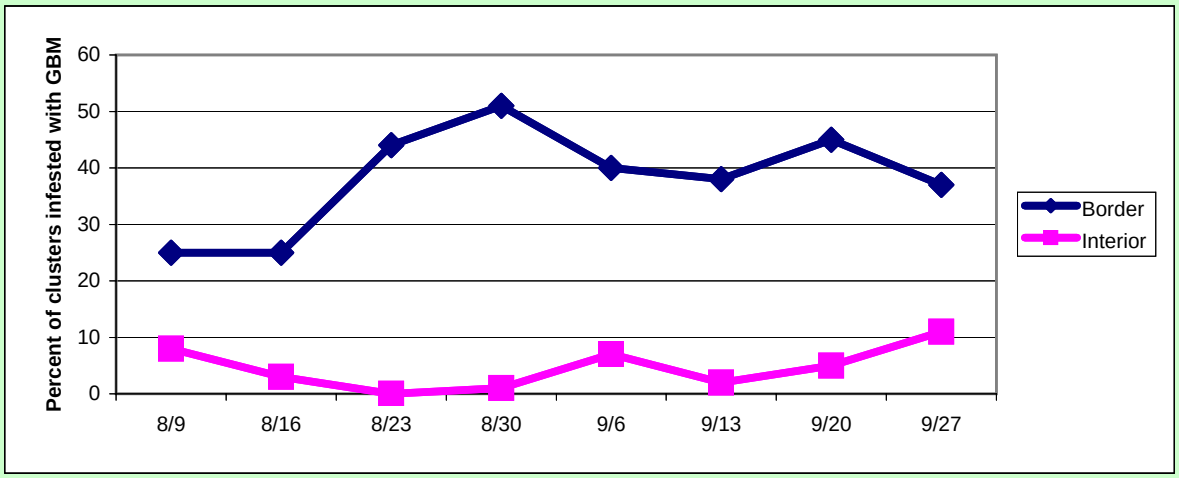


Figure 4. Percent of clusters infested with GBM at one vineyard in NW Michigan.

Fungal Diseases

Downy Mildew: Downy mildew is a disease of grapes that we occasionaly see in northwest Michigan. The fungus can result in yield losses by rotting inflorescences, clusters and shoots. Indirect losses can result from premature defoliation of vines due to foliar infections. This premature defoliation is a serious problem because it predisposes the vine to winter injury. Downy mildew was present in monitored vineyards and a higher level than orginally believed in NW Michigan.

Downy mildew on Chardonnay

Botrytis: This fungal pathogen was observed in fruit clusters in mid-August. This disease is most commonly found under cooler conditions (59 to 68ºF) and spreads more quickly under rainy conditions, which were not evident this season. This disease is also more common as the fruit ripens, when there is more sugar in the fruit. Botrytis is often more of a problem in varieties that have tight clusters. Overall, we observed botrytis mainly in grape clusters infested with grape berry moth.

Powdery Mildew: Based on 2006, we knew that PM would show up at some point in the season and sure enough, powdery mildew arrived in August in both Leelanau and Old Mission, however, levels were much lower than last season. Additionally, many infections were observed on fruit rather than leaves this season, which was likely due to fungicide coverage issues. This season, we were fortunate to have low levels of PM infection.

NEW INSECTICIDES GIVE GRAPE GROWERS MORE OPTIONS FOR 2008

Rufus Isaacs and John Wise

In the past few years, the grape industry has received registration of many new insecticides. This is good news for grape growers who must maintain insects below economic injury levels in a time of increasing restrictions on conventional insecticides.

The Grape Entomology Program at Michigan State University evaluates insecticide performance in our Concord, Niagara, and hybrid vineyards at the Trevor Nichols Research Complex. Each year, we run these trials against grape berry moth, Japanese beetle, and in recent years potato leafhopper, testing the new products against each other and against a standard insecticide program. Our results have helped convince manufacturers and EPA to register some of the new insecticides listed below, and they help provide information on which to base our recommendations. These products vary in their performance across different types of insect pests, the residual control they provide, and their safety to biological control agents, and we have described their performance below to help growers integrate these products into their IPM programs.

Reasons to consider new insecticides as part of a grape IPM program include: 1) Some are more effective against key pests than current standard products; 2) Using new chemical classes can prevent insecticide resistance, 3) Reduced impact on biological control agents can reduce the risk of pest outbreaks, and 4) Greater safety to workers and the environment.

Winter is a great time to learn about new pest management tools, including insecticides, to prepare for the busy growing season ahead. Talk to other growers who might have tried some of these products, attend grape grower meetings organized by the Extension service in your area, and read the new Extension grape management guides for your region. You can also see the labels for these products at the www.cdms.net website.

1. Actara 25WG (Syngenta) is a neonicotinoid insecticide that is locally systemic, so it spreads in the foliage, protecting it against wash-off. It is active on leafhoppers, beetles, and other foliage feeders.

2. Admire Pro (Bayer CropScience) is labeled for leafhoppers, scale, mealybugs, and phylloxera. This is the same insecticide as Provado, in a different formulation for soil application. The label states that application can be made using a chemigation system or through soil application followed by irrigation. In our trials, this product provided 3 weeks of control of potato leafhopper when chemigated on vines grown on a drip system at the first sign of leafhoppers. However, performance was poor when we applied it as a band under irrigated or non-irrigated vines. This suggests that sufficient uptake of the insecticide is only possible on vines with roots trained to emitters. A later application, in late June, was also shown to reduce Japanese beetle feeding. This product has a 30 day PHI.

3. Assail 30SG (Cerexagri) is a neonicotinoid insecticide with activity on leafhoppers and other leaf-feeding insects. It also has performed very well in vineyard trials against rose chafer (equivalent to Sevin) and it provides vine protection against Japanese beetle feeding.

4. Avaunt 30WG (DuPont) was registered in mid-2007, and is a member of a new class of insecticides called the oxadiazines. This insecticide has shown good activity on grape berry moth in our small plot trials, providing a high level of control after bloom and in the mid-season, but lower control after veraison. It should also have broad activity on other pest types, including leafhoppers, making it useful for growers aiming to control multiple insect types.

5. Baythroid XL (Bayer CropSciences) has high activity on a broad range of insects. At the 3.2 oz rate, our trials have shown excellent activity against grape berry moth and Japanese beetle. This product is also very active on Asian ladybeetles, providing a week of control of this harvest-time pest at a 2.4 oz/acre rate. This has a 3 day PHI.

6. Brigade 2EC (FMC) is the same material as Capture 2EC (FMC), labeled from 3.2 to 6.4 oz per application, with a 6.4 oz limit. These products are pyrethroids with high activity on a broad range of insects. At a 3.2 oz rate, Brigade has excellent activity against grape berry moth with higher rates giving longer residual control. Control of beetles and leafhoppers is also expected to be high. This product was very active on Asian ladybeetles at a 2.4 oz/acre. This has a 30 day PHI.

INSECTICIDE UPDATE CONTINUED

7. Delegate 25WG (Dow AgroSciences) was registered in the past few months, and is a member of the spinosyn class of insecticides. It has activity on moth pests and is expected to be active on grape berry moth. However, we have not yet had a chance to test this in Michigan for insect control.

8. Intrepid 2F (Dow AgroSciences) is a selective insecticide with high activity on grape berry moth, and safety to natural enemies. Intrepid acts by disrupting the molting process in moths. Labeled at 4-8 oz/acre, there is a 16 oz seasonal limit. Eggs treated with this insecticide have low rates of hatching, and larvae that ingest residue die during molting. For these reasons, excellent coverage of clusters with spray is needed to achieve control. This product has long residual activity and is relatively resistant to wash-off.

9. Mustang Max 0.8EC (FMC) was registered in 2007 on grapes. At a 4 oz rate this pyrethroid gave excellent control of grape berry moth, Japanese beetle and multicolored Asian ladybeetle. It has a 1 day PHI.

10. Venom 20SG (Valent) insecticide is in the same class as Admire Pro, and can be applied as a foliar or soil application. Foliar application provided excellent control of potato leafhopper in Traverse City vineyards during 2007, and it is active on Japanese beetle. Venom has also shown high activity against potato leafhopper when applied through chemigation, and activity against other soft-bodied insects such as mealybugs or other leafhoppers is expected. Our tests of Venom have also demonstrated reduced grape berry moth infestation when used against the first generation of this pest. Venom is not recommended for late-season control of berry moth, but it showed excellent activity against Asian ladybeetle infesting ripe grapes at 2 oz/acre in our 2007 trials, and has a 1 day PHI.

An important label change that may not have been noticed by all grape growers is the extension of the Re-Entry Interval for Imidan 70WP to 14 days in vineyards. The pre-harvest intervals have changed too: if more than 1.3 lbs is applied per acre, there is a 14 day PHI, compared with only 7 days if a lower rate is used. To get the maximum activity from this insecticide, it should be applied in water with pH 5.5. If you don't know the pH of your water supply, be sure to test it to find out if buffering is required.

The insecticide testing program of the Grape Entomology Program at Michigan State University is supported by the Michigan grape industry through the Grape and Wine Industry Council and National Grape Cooperative, by the agrochemical industry, and by the IR-4 Project.

FUNGICIDE LABEL UPDATE FOR GRAPES, DECEMBER 2007.

1. Adament (tebuconazole and trifloxystrobin) is a mixture of a systemic (tebuconazole) and surface-systemic (trifloxystrobin) fungicide. It is a broad-spectrum fungicide that is labeled for control of multiple diseases on grapes, cherries, peaches, and nectarines. Adament is rainfast when dry, generally within 2 hours. Adament is effective against cherry leaf spot, brown rot, and powdery mildew on cherries, and powdery mildew in grapes. It has been moderately effective against Botrytis bunch rot. More research is needed to evaluate its efficacy against Phomopsis in grapes. Adament is best used as a protectant. Do not apply this product on 'Concord' grapes, as crop injury may result. Do not make more than two consecutive applications or a total of six (grapes) and four (stone fruit) applications per season.

2. Cuprofix MZ Disperse (mancozeb and copper sulfate) is a protectant fungicide/bactericide labeled for use against a wide range of diseases in apples, pears, grapes, and cranberries. This fungicide is more useful early in the season as the pre-harvest intervals are 77 days for apples and pears, 66 days for grapes, and 30 days for cranberries. Cuprofix MZ Disperss should not be applied in a spray solution with a pH of less than 6.5 as phytotoxicity may occur. It can also be reactive with metal surfaces. The maximum amount of product allowed per acre per season should consider all other EBDC fungicides applied. This product has not been evaluated for disease control in fruit crops in Michigan.

3. Fosphite (mono- and dipotassium salts of phosphorous acid 53%, equivalent to 3.9 lbs phosphorous acid per gallon) is a systemic fungicide for the control of downy mildew and Pythium and Phytophthora diseases of apples, pears, cherries, peaches, plums, nectarines, apricots, grapes, blueberries, strawberries, raspberries, and cranberries. Fosphite can be applied as a foliar spray or through the irrigation system. Do not tank mix with foliar fertilizers or apply within 20 days of a copper fungicide application. Do not apply to plants that are dormant or stressed by heat or drought. Do not apply when plants are expected to remain wet for more than 4 hours. Fosphite has not been specifically evaluated on fruit crops in Michigan, but similar products have been (e.g., ProPhyt or Phostrol). This product has not been evaluated for disease control in grapes in Michigan.

4. Fungi-Phite (mono- and dipotassium salts of phosphorous acid 45.5%, equivalent to 3.39 pounds of phosphorous acid per gallon) is a systemic fungicide for the control of downy mildew and Pythium and Phytophthora diseases of apples, pears, cherries, peaches, plums, nectarines, apricots, grapes, blueberries, strawberries, raspberries, and cranberries. The label also lists suppression of Septoria and anthracnose in berry crops; fire blight, blister spot, and blue and green mold in pome fruit; and bacterial diseases in stone fruit. Fungi-Phite can be applied as a foliar spray, root dip or through chemigation. Do not apply more than 4-6 times per crop cycle (check label). Do not apply within 20 days of a copper fungicide application or to plants that are dormant or stressed by heat or drought. Do not apply when plants are expected to remain wet for more than 4 hours. This product has not been specifically evaluated for disease control in grapes in Michigan but similar products have been (e.g., ProPhyt or Phostrol).

5. Gavel (mancozeb and zoxamide) is a broad-spectrum protectant fungicide with a supplemental label for control of downy mildew, bunch rot, and dead arm (this is an old term for a disease complex now known as Eutypa dieback and Phomopsis) in grapes. Addition of an agricultural surfactant will improve fungicide performance. Do not make more than 8 applications per acre per season. Consider Gavel and all other EBDC fungicides in observing the maximum seasonal use rate recommendations for mancozeb. Gavel was effective against downy mildew in fungicide efficacy trials in grapes in Michigan but its use is limited later in the season because of the 66-day pre-harvest interval.

6. Nova 40 WP/ Rally 40WSP (tebuconazole): Effective immediately, Dow AgroSciences will discontinue Nova 40WP and replace it with Rally 40WSP. It's the exact same formulation, and has the same EPA registration number, just a different name. Dow AgroSciences is consolidating labels and product. Rather than having two products, Nova 40WP and Rally 40WSP, we will have only one, Rally 40WSP. So for all of us on the East Coast, rather than having 4 - 5 oz packets per over pack there will be 5 - 4 oz packets in an over pack.

7. Orius (tebuconazole) is a systemic SI fungicide similar to Elite and is expected to have similar efficacy: see Elite. May be less expensive than Elite.

8. Purespray Green (petroleum oil) is a horticultural spray oil for insect and disease control in apples, pears, cherries, peaches, nectarines, apricots, plums, grapes, strawberries, blueberries, bushberries and caneberries. There is an organic version of this product, which does not list berry crops, so be sure to read the label prior to use. Most of the pests listed are insects; however, powdery mildew and rust are targets in blueberries, bushberries, and caneberries; and powdery mildew is listed under grapes and strawberries. Table grapes should not be sprayed within 60 days of harvest as the oil will remove the bloom on grapes. Avoid spraying in very cold or hot weather (under 32ºF and over 95ºF). Do not use in combination or immediately before or after spraying with copper, captan, bravo, folpet, sulfur. Check the label for other restrictions. This product has not been evaluated for disease control in grapes in Michigan.

FUNGICIDE LABEL UPDATE CONTINUED

9. Saf-T-Side (petroleum oil) is a spray oil emulsion fungicide, insecticide and miticide labeled for use in grapes, blueberries, strawberries, raspberries, and blackberries. The label lists powdery mildew and Botrytis in grapes, and powdery mildew and rust in berry crops. All horticultural oils interfere with or slow plant transpiration during periods of evaporation. Do not apply during periods of drought or when plants exhibit moisture stress. Do not use in combination or immediately before or after spraying with captan, folpet, sulfur or NPK foliar fertilizer applications. This product has not been evaluated for disease control in grapes in Michigan.

10. Sonata (Bacillus pumilis QST 2808) is a protectant biofungicide that is OMRI listed and therefore can be used in organic production. 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, and powdery mildew in strawberries and grapes. 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. If disease pressure is high, alternate or tank mix this product with other effective fungicides. Further testing is needed on to determine its utility for disease control in small fruit crops in Michigan.

11. Sporan (rosemary oil, clove oil, thyme oil, wintergreen oil, lecithin, butyl lactate) is 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. Diseases listed on the label are: powdery mildew, downy mildew, black rot, Botrytis bunch rot, and Eutypa dieback in grapes; anthracnose fruit rot, downy mildew, gray mold, and powdery mildew in berry crops; fire blight, scab, powdery mildew, brown rot, anthracnose, rust, gray mold, cherry leaf spot, and black rot in pome and stone fruit. This product has not been evaluated for disease control in grapes in Michigan.

12. Trilogy (clarified hydrophobic extract of neem oil) is a plant extract that is OMRI-listed and can therefore be used in organic production. It functions 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. The label lists the following diseases: Alternaria, anthracnose, Botrytis, leaf spot, downy mildew, powdery mildew, molds, scabs, rusts, and shothole. This product has not been evaluated for disease control in grapes in Michigan.

Effect of water pH on the stability of pesticides

Annemiek Schilder, Department of Plant Pathology

Most pesticides are sold in concentrated form and have to be dissolved or suspended in water before they can be applied to crops. This water can come from various sources, such as wells, ponds, rivers, or municipal water supplies. Water naturally varies in the amount of dissolved minerals, organic matter and pH, depending on its source. The pH is a measure of the acidity or alkalinity of water, which refers to the number of hydrogen (H^+) and hydroxyl (OH^-) ions in a solution. The scale for measuring pH runs from 0 to 14. The lower the pH, the more acidic is the solution, while a higher pH indicates that the solution is more alkaline. Water at pH 7 is neutral meaning that there are an equal number of hydrogen and hydroxyl ions in the solution. Many areas in Michigan have alkaline water with high mineral/iron content. In addition, the pH of water from natural sources can vary throughout the season.

The pH of water can negatively affect the stability of some pesticides. Under alkaline conditions, alkaline hydrolysis occurs which degrades the pesticide to non-toxic (inactive) forms. In general, insecticides (particularly organophosphates and carbamates) are more susceptible to alkaline hydrolysis than are fungicides, herbicides, or growth regulators. The end result is less active ingredient applied and poor pesticide performance. The degradation of a pesticide can be measured in terms of its half life. For example, if a product has a half life of 1 hour, its effectiveness is reduced to 50% in 1 hour, to 25% in the next hour, to 12.5% in the next hour, etc. Eventually, the pesticide becomes virtually ineffective. The effect of pH on pesticides varies from product to product and is also moderated by buffering solutions contained in the pesticide formulation. Tank-mixing multiple pesticides can modify the pH of the tank-mix.

The table on the next page shows the half life of a number of pesticide products as well as the optimum pH (where known). As you can see from the table, most pesticides are most stable when the spray solution at a pH of about 5. As many water sources are more alkaline than this it may be necessary to adjust the pH of the spray solution. There are important exceptions to the rule that spray solutions should be acidifed. For instance, in the case of copper-based fungicides, copper becomes more soluble at a lower pH and may become phytotoxic to crops. In addition, phosphorous acid and other acid-based fungicides already have a low pH and lowering it even more can cause them to injure crops. On the other hand, acidifying carbonate salt fungicides, such as Armicarb, may render them ineffective.

Check the pH of the water used for spraying pesticides frequently throughout the season. If you know that your water has a pH of 7.5 or greater, consider lowering the pH, especially if you are applying a pesticide that is sensitive to high pH. The fastest way to determine the pH level of water is to test it with a pH meter or test paper. Paper test strips are the least expensive; however, they can be unreliable and vary by as much as 2 pH points. A pH meter will provide the most reliable and consistent readings. Meters are available commercially for $50 to $400.

Adjust the water pH by using a commercially available acidifying/buffering agent before adding the pesticide. Buffering agents will stabilize a spray solution at a predetermined pH and keep it at that level. Read and closely follow the directions on the label of the buffering agent and make sure that the solution is stirred well before taking a pH measurement. While a pH of 5 may be optimal, a pH of 6 is usually satisfactory for many pesticides, especially if they will be sprayed out immediately after mixing. Some buffering agents such as pHase5 or PHT Indicate 5 will have a color indicator when the correct pH is achieved. Growers can add this product into the water until it reaches the color that indicates a given pH. For example, 5 = pink or red; 6 = orange; etc. When tank mixing multiple pesticides and/or foliar fertilizers, check the pH after the products have been thoroughly mixed and adjust the pH as needed. Not all pesticides react the same to the pH of the spray water solution and some products should not be used with buffering agents. Always read the label for any precautions with respect to pH and potential product incompatibility issues. Apply pesticides soon after mixing and avoid leaving pesticide tank mixes in the spray tank overnight.

*This article is based on the following online articles: “Pesticide wise” by the Government of British Columbia Ministry of Agriculture and Lands; “Effects of Water pH on the Stability of Pesticides” by F. Fishel, Department of Agronomy, University of Missouri; “Effects of pH on Pesticides and Growth Regulators” by T. Smith, Dept. Plant, Soil & Insect Sciences, University of Massachusetts; “Effect of water pH on the chemical stability of pesticides” by H. M. Deer and R. Beard, Utah State University Extension; and “The Wonderful World of Roses: Ph and Pesticides” by R. B. Martin, Jr, Pasadena, CA.

MICHIGAN AGRICULTURAL EXPERIMENT STATION
Michigan State University

For more information on this project, contact Steve at (517) 242 1282
More information on Vineyard IPM is available online at: www.grapes.msu.edu
All photos: Karen Powers and Steven Van Timmeren

Product	Optimum pH	Half Life / Time until 50% Hydrolysis**
Insecticides/Miticides		
Admire	7.5	Greater than 31 days at pH 5 - 9
Agri-Mek		Stable at pH 5 - 9
Ambush	7	Stable at pH 6 - 8
Apollo		pH 7 = 34 hrs; pH 9.2 = 4.8 hrs
Assail	5 - 6	Unstable at pH below 4 and above 7
Avaunt		Stable for 3 days at pH 5 – 10
Carzol	5	Not stable in alkaline water; use within 4 hrs of mixing.
Cymbush		pH 9 = 35 hrs
Cygon	5	pH 4 = 20 hrs; pH 6 = 12 hrs; pH 9 = 48 min
Decis		no data
Diazinon	7	pH 5 = 2 wks; pH 7 = 10 wks; pH 8 = 3 wks; pH 9 = 29 days
Dipel	6	Unstable at pH above 8
Dylox		pH 6 = 3.7 days; pH 7 = 6.5 hrs; pH 8 = 63 min
Endosulfan		70% loss after 7 days at pH 7.3 – 8
Foray	6	Unstable at pH above 8
Furadan		pH 6 = 8 days; pH 9 = 78 hrs
Guthion		pH 5 = 17 days; pH 7 = 10 days; pH 9 = 12 hrs
Imidan	5	pH 5 = 7 days; pH 7 < 12 hrs; pH 8 = 4 hrs
Kelthane	5.5	pH 5 = 20 days; pH 7 = 5 days; pH 9 = 1hr
Lagon	5	pH 4.5 = 20 hrs; pH 6 = 12 hrs; pH 9 = 48 min
Lannate		Stable at pH below 7
Lorsban/Dursban		pH 5 = 63 days; pH 7 = 35 days; pH 8 = 1.5 days
Malathion	5	pH 6 = 8 days; pH 7 = 3 days; pH 8 = 19 hrs; pH 9 = 5 hrs
Matador	6.5	Stable at pH 5 - 9
Mitac	5	pH 5 = 35 hrs; pH 7 = 15 hrs; pH 9 = 1.5 hrs
Morestan	4.5	pH 4.5 = 10 days; pH 7 = 80 hrs; pH 9 = 4hrs
Omite		Effectiveness reduced at pH above 7
Orthene		pH 5 = 55 days; pH 7 = 17 days; pH 9 = 3 days
Pounce	6	pH 5.7 to 7.7 is optimal
Pyramite		Stable at pH 4 – 9
Ripcord		pH 9 = 35 hrs; more stable pH below 7
Sevin XLR	7	pH 6 = 100 days; pH 7 = 24 days; pH 8 = 2.5 days; pH 9 = 1 day
Spinsosad	6	Stable at pH 5 – 7; pH 9 = 200 days
Thiodan	6.5	70% loss after 7 days at pH 7.3 to 8
Mavrik		pH 6 = 30 days; pH 9 = 1 - 2 days
Zolone	6	Stable at pH 5 – 7; pH 9 = 9 days
Fungicides		
Aliette	6	Stable at pH 4.0 to 8.0
Benlate		pH 5 = 80 hrs; pH 6 = 7 hrs; pH 7 = 1 hr; pH 9 = 45 min
Bravo	7	Stable over a wide range of pH values
Captan	5	pH 5 = 32 hrs; pH 7 = 8 hrs; pH 8 = 10 min
Dithane	6	pH 5 = 20 days; pH 7 = 17 hrs; pH 9 = 34 hrs
Nova		Not affected by pH
Ridomil		pH 5 – 9 = more than 4 weeks
Rovral		Chemical breakdown could take place at high pH
Orbit		Stable at pH 5 – 9
Herbicides		
Banvel		Stable at pH 5 - 6
Fusilade		pH 4.5 = 455 days; pH 7 = 147 days; pH 9 = 17 days
Ignite	5.5	
Gramoxone		Not stable at pH above 7
Laredo	5.5	
Poast	7	Stable at pH 4.0 to 10
Princep		pH 4.5 = 20 days; pH 5 = 96 days; pH 9 = 24 days
Prowl		Stable over a wide range of pH values
Roundup	5 - 6	
Touchdown	5 - 6	
Treflan		Very stable over a wide range of pH values
Weedar		Stable at pH 4.5 to 7
Wrangler	5 - 6	

**The half-life is the period of time it takes for one half of the amount of pesticide in the water to degrade. Other factors than the pH can affect the rate of hydrolysis, incl. temperature, solubility, concentration, type of agitation, humidity, and other pesticides and adjuvants in the mixture.