

Crop Advisory Team

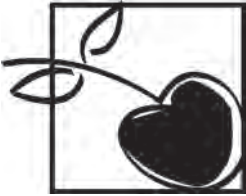
Alert



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Fruit Crop Advisory Team Alert

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Final issue for 2008

This is the last issue for the 2008 season of the *Fruit CAT Alert* newsletter. Included in this issue is an index of articles to help guide readers through the topics covered this year. Educators and specialists have worked hard to inform readers about current issues and crop production throughout the last few months.

Now we would like to hear from you! Please send us suggestions on topics that you would like us to cover in 2009. Take our survey at <http://www.ipm.msu.edu/cat08fruit/f09-16-08.htm> to let us know how you are benefitting from the newsletter and to give us feedback on improvements for the print publication and web site.

Please send your comments via catalert@msu.edu or mail them to the address on the back of this newsletter. Indicate whether you are referring to our fruit, vegetable, field or landscape edition. **IPM**

Thank you. -Joy Landis, editor, Andrea Buchholz, asst. editor, Victoria Morris, associate editor

Insect and mite pest management: End of season wrap-up

David Epstein, MSU IPM Program, Larry Gut, Entomology, John Wise, Entomology, Nikki Rothwell, NWMHRS

Codling moth

Another cool spring season in 2008 provided us with a good lesson in how variable codling moth catches can be from one farm to another, and from one block to another on the same farm. This is not surprising considering that the extent of early season codling moth activity in an orchard is typically associated with how well the pest was controlled in the previous season. The lowest levels of codling moth pressure were consistently recorded in orchards that have been using pheromone-based mating disruption for several years.

Some new materials were available for codling moth control for the first time in 2008 and many opted to incorporate these new products in their codling moth management programs. Delegate (spinetoram) is a new compound in the same insecticide class as SpinTor (spinosad). Spinetoram, however, is much more lethal to codling moth larvae. Altacor (rynaxypyr) is a new compound, and the first product developed in a newly emerging class of insecticides. Our on-farm trials this year confirmed the results of TNRC

small-plot trials, with both Delegate and Altacor providing excellent first and second generation codling moth control. They also provided excellent leafroller control. Taking the lead from our Washington colleagues, we also evaluated an early ovicide followed by a delayed larvicide program using Rimon as the ovicide and either Delegate or Altacor as the larvicide. All programs proved highly effective in controlling first generation codling moth.

Hail damage on the Ridge was extensive and many growers opted to forgo or minimize their summer insect pest control programs. We have been conducting fruit injury counts, and have been quite encouraged by the low incidence of codling moth fruit infestation. For the past few years, many of these orchards have been relying on mating disruption and the newer insecticide chemistries to manage codling moth. It appears that these programs have substantially reduced codling moth populations.

Secondary pests

Some secondary pests of concern have raised their pest profiles in the past two seasons, and now warrant attention from

growers and pest managers to prevent unwanted injury. Obliquebanded leafroller is finding it ways into both stone fruit crops and growers would be well advised to set out traps to monitor for this pest.

San Jose scale are now occurring in sweet cherry, as well as on its traditional hosts, apple, peach, pear and plum, where populations have been reported in high numbers on some farms in 2008. Growers who have noted increasing San Jose scale populations should be ready to monitor crawler populations in late May of 2009. An oil application during pre-bloom is highly effective at targeting adults. Insecticides applied mid-June and mid-August target crawlers before they mate (See the May 6, 2008 *Fruit CAT Alert* for discussion on spray options).

Late summer mite populations increased in many fruit orchards in 2008. European red mite eggs on spur

shoots and limb crotches serve as the starting point for next year's spring mite population. We recommend that orchards that had high European red mite populations in 2008 be marked for pre-bloom scouting next spring in order to get a jump on optimal control tactics for the season. We also recommend that orchards with high twospotted spider mite populations in August be marked for scouting next May or June—earlier than would be warranted under typical conditions (See the September 2, 2008 *Fruit CAT Alert* for discussion on spray options).

Wooly apple aphids are also raising their profile on many Michigan apple farms. Reports of severe wooly aphid infestations emerging in late August to early September stretch from southwest Michigan to areas north of Detroit. Several compounds target control of aerial populations. Trials from the Western United States show that a new

material, Movento, applied around petal fall, targets control of root populations. A couple of trials with Movento were run in Michigan in 2008, and results will be analyzed later this fall. Growers should note where they had Wooly apple aphid populations in 2008 to assess control options for 2009.

Borers

In response to rumblings about the possible loss of chlorpyrifos and endosulfan down the road, we initiated a survey of wood boring pest activity in cherry and peach orchards. One of the more surprising results was the discovery that American plum borer is abundant in many of cherry orchards surveyed. Greater and lesser peachtree borer were also quite widespread. The good news for these two pests is that mating disruption showed considerable promise for controlling both species in our 2008 on-farm trials. **IPM**

Overview of tree fruit diseases during the 2008 growing season

George Sundin, Plant Pathology

The disease triangle concept in plant pathology reminds us that plant disease only occurs if there is a combination of a susceptible plant host, virulent pathogen, and conducive weather conditions. Alteration of any component of the triangle can lead to a reduction or lack of disease. Thus, the use of a resistant plant host or chemical control of the pathogen will alter the triangle and lower or eliminate the amount of disease observed. Weather conditions provide the most difficulty when assessing the prospects for disease occurrence in any season. Conducive weather is always difficult because even the best managed programs can still be defeated by rapidly growing pathogens. The situation with American brown rot in Northwest Michigan illustrates this concept. Problems can still occur under relatively dry conditions, as we observed with apple scab particularly on the Ridge and in eastern Michigan. We also face a continuous battle with the development of fungicide and bactericide resistance and the spread of resistance in pathogen populations. In this article, I will review what we've observed and learned in 2008. Before that, I want to acknowledge

the excellent MSU Extension folks in the state (Mira Danilovic, Amy Irish-Brown, Erin Lizotte, Mark Longstroth, Nikki Rothwell, Phil Schwallier, Bill Shane, Bob Tritten) that work long and hard to stay on top of things in the tree fruit world. I am indebted to these dedicated professionals, rely on them for information, and enjoy the many "fruitful" discussions we have.

Apple scab

Weather conditions on the Ridge were dry and not conducive to apple scab this spring with only four infection periods recorded. However, extensive scab infection occurred this year with serious infections in some locations. What happens to the scab fungus under these dry conditions? When it is dry, the scab fungus remains in the leaf litter waiting for the rain. When the first rain comes, there is the potential for a tremendous spore release. Couple this release with greater leaf area available as the spring progresses and the possibility for problems increases. When conditions are dry, the tendency is to extend spray intervals because the threat of scab infection is not there. However, unless orchards were fully covered,

no alternate row spraying, prior to the next rain event, the potential existed for a significant amount of foliage with not enough fungicide residue available for control. If applications were put on immediately after the first infection period and disease still occurred, coverage or improper spray calibration is the most important issue. Any factor that results in reduced coverage, including spraying under windy conditions, or poor calibration resulting in lower-rate fungicide applications, leaves a sub-optimal level of fungicide available to protect susceptible apple tissue. A grower may escape serious problems if the numbers of apple scab ascospores flying around are relatively low. If, however, the numbers were higher this spring because of the prolonged dry conditions, there would be plenty of spores to overwhelm partially-protected tissue.

This situation may become exacerbated if an anilinopyrimidine (AP – Scala, Vanguard) or strobilurin (Flint, Sovran) is used alone and not tank-mixed with an EBDC or Captan protectant. If a systemic material was put on a few days ahead of an infection period, there is a possibility that new

growth was left unprotected and exposed to an abnormally large spore release. Under conditions of light rain, EBDC's and Captan are redistributed to new growth and other unprotected areas that may have been missed due to coverage issues. This redistribution is an under-appreciated bonus for scab control. Redistribution of systemic fungicides to new growth is poor and becomes a problem the longer the interval between application and an infection period.

In our fungicide experiments conducted on 'McIntosh' trees in East Lansing, Michigan our spray dates (Table 1) indicate that the pink spray was two days ahead of a light infection period and the bloom spray was two and five days ahead of two infection periods. Fruit and foliage infection on non-sprayed control trees in these experiments averaged 70 percent and 47 percent, respectively, when rated on June 11. Treatments yielding the best results (fruit infection of 0.5 percent or below) included those incorporating a full rate of EBDC (Dithane75DF or Manzate 75WG at 6 lbs/A) or systemic material tank-mixed with a half rate of EBDC in the April 21, April 30, and May 9 spray applications. With systemic materials applied alone, only a treatment using a strobilurin alone on April 21 and 30, followed by a full rate of Dithane on May 9 was effective (0.3 percent fruit infection). In contrast, a treatment using an AP alone on 21 and 30 April followed by a full rate of Dithane on May 9 resulted in 11.5 percent fruit infection.

A final, more sinister possibility to our 2008 scab problems is a new development of or increase in fungicide resistance. While we know that resistance to SI fungicides and dodine is a continuing problem in Michigan orchards, we do not have information yet on the occurrence of resistance or shifts in sensitivity of the scab fungus to AP's or strobilurins. In 2008, we obtained samples from 17 orchards on the Ridge and in eastern Michigan; these scab isolates will be tested for resistance to SI's, dodine, anilinopyrimidines, and strobilurins with results known in the next few months.

Regardless of the outcome of this survey, a lesson learned is the importance of tank-mixing systemic fungicides, if they are used, with an EBDC or Captan. Not only is such

Table 1. Spray dates, apple growth stages, and apple scab infection periods for 2008 fungicide trials at East Lansing, Michigan.

Spray Date	Growth Stage	Infection Period Date
April 21	Half inch green tip	
April 30	Pink	
		May 2 (light infection)
May 9	Full bloom	
		May 11 (light infection)
		May 14 (moderate infection)
May 16	Early petal fall	
May 23	Late petal fall	

a strategy important for resistance management, this strategy also increases control from redistribution of the protectants.

American brown rot

Brown rot typically occurs sporadically in sweet and tart cherry orchards and is heavily influenced by weather. The prolonged wet weather occurring in Northwest Michigan in June this year was optimal for development and spread of the brown rot fungus. This organism envelopes fruit within one to two days under these conditions and quickly sporulates to spread further. Injured fruit from wind damage may have served as ready targets for initial infections. Unfertilized, retained sweet cherries and poor spraying weather leading to coverage issues also likely contributed to our problems this year (see the NWMHRS pest report summary in this issue). Once initial infection occurs, spread can be rapid under warm, wet conditions.

When brown rot infection is severe, spore inoculum is prevalent and can easily blow in from other orchards. Protection of ripening fruit through thorough fungicide coverage is essential. In sweet cherry trees with dense fruit clusters, it is probable that fungicide coverage was a problem. The problem is that the American brown rot fungus, as with all other major tree fruit pathogens, is unforgiving. With the quantity of spores flying around, the likelihood of a spore reaching and germinating on an unprotected fruit is probably 100 percent during optimal weather conditions such as we experienced in 2008. A few infected fruit are enough for the fungus to quickly produce more spores for

subsequent infection.

We currently do not have any evidence that we are experiencing problems with the efficacy of sterol-inhibitor fungicides for American brown rot control. Indar remains the best option for control. Erin Lizotte from the NWMHRS performed an extensive survey of Michigan sweet cherry, tart cherry, and peach orchards in 2006. Although she had evidence that the brown rot population had differing levels of susceptibility to SI fungicides, none of the isolates showed a significant decrease in susceptibility. We confirmed that in a field trial conducted in 2008, Indar was highly effective in controlling brown rot. Erin has repeated her orchard survey in 2008, and we are anticipating results available this fall.

Fire blight

Fire blight is always important in at least one region of Michigan every year. This year, blight was probably the worst in Northwest Michigan. We are eight years removed from the severe 2000 epidemic in Southwest Michigan. We will probably experience conducive weather conditions for a blight epidemic (warm, wet bloom period) again soon and growers must always prepare for this possibility.

Streptomycin resistance continues to be a major problem for fire blight control. In areas with resistance, alternatives for blossom blight control include oxytetracycline (Mycoshield or the generic compound FlameOut) and the biological controls Serenade MAX, and bacterial antagonists BlightBan and Bloomtime. None of these materials are as effective as streptomycin and while these materials may control blossom

blight, they do not kill the pathogen like streptomycin does. Thus, inoculum remains in the tree which can lead to shoot blight infections.

In orchards with existing streptomycin resistance problems, the use of Apogee is critical. Apogee is a growth inhibitor that reduces shoot growth. This reduced growth is accompanied by increased shoot blight control as the fire blight pathogen tends to infect only actively-growing shoots. Apogee use is critical because this shoot blight control is effective against both streptomycin-susceptible and streptomycin-resistant strains of the fire blight pathogen. Do not use Apogee on 'Empire' and 'Winesap' as fruit cracking may occur.

The Michigan Department of Agriculture has applied to the EPA for a section 18 emergency exemption

for the use of Kasumin in 2009 for blossom blight control. Kasumin is an alternative antibiotic that is effective against streptomycin-resistant strains of the fire blight pathogen. We will keep tabs on the progress of this application during the winter.

Summary

When environmental conditions favor disease, disease will occur. Even when conditions are unfavorable, we must remember that inoculum may still be around. For example, in years with cold temperatures during apple bloom where we might escape blossom blight infection, the fire blight pathogen will eventually ooze out of cankers providing inoculum for subsequent shoot blight. Each infection event enables the pathogen to increase population size meaning that further

control attempts must then deal with increased inoculum. Proper protection of susceptible tissue is the key.

From the disease triangle, it is clear that the best disease control comes from host resistance. However, although there are some resistant apple scab varieties available, we lack resistance to our major diseases. The reality is, especially with fire blight, many of our varieties are so susceptible, that they tilt the triangle heavily in favor of the pathogen. For example, if a much smaller population size is required to cause blight on a highly-susceptible variety, it makes it much more difficult if not impossible to adequately control. This also reinforces the need for active and efficient disease management and resistance management of existing bactericides and fungicides for long-term protection. **IPM**

FIFRA 2(ee) recommendation for lower rate of Scholar postharvest fungicide on apples and pears

George Sundin, Plant Pathology

Syngenta has sent out an update regarding the use of Scholar fungicide for the postharvest control of blue mold and gray mold on apples and pears. A recommendation is made under the authority of FIFRA Section 2(ee) recommending the use of Scholar at a lower rate when used as a postharvest drench or dip for blue and gray mold control.

For a high volume (dilute) application, mix five oz. Scholar in 25-100 gallons of appropriate water, wax/oil emulsion, or aqueous dilution of a wax/oil emulsion for the crop being treated. Use T-jet, flooders, or similar application system.

For Dip application, mix five oz. Scholar in 100 gallons of appropriate water, wax/oil emulsion, or aqueous

dilution of a wax/oil emulsion. Dip for a minimum of 30 seconds and allow fruit to drain.

Any user must have the 2ee recommendation in his or her possession at the time of application. A copy of the 2ee user directions is available here. (www.ipm.msu.edu/cat08fruit/pdf/9-16Scholar.pdf) **IPM**

Watch for MSU Tree Fruit IPM School - 2009

Erin Lizotte, IPM/IFP District Educator

As in past years, the 2009 Tree Fruit IPM School will be a two and a half day event to be held February 16, 17, and 18 at the W.K. Kellogg Biological Station in Hickory Corners, Michigan. It will include updates on pathogens and pests from MSU faculty and researchers. We

are also hoping to bring in an out-of-state speaker to get an outside perspective on the challenges facing Michigan fruit growers. We are looking forward to another successful program that delivers information you can't find anywhere else. We hope to see you there!

To have your name added to the list to receive registration materials when available, please contact Jackie Baase at the Northwest Michigan Horticultural Research Station. Phone: (231) 946-1510. Email: baase@msu.edu. **IPM**

Small fruit news

2008 small fruit insect summary

Rufus Isaacs, Keith Mason and Steve Van Timmeren, Entomology

Insects have continued to give grape, blueberry, strawberry, and raspberry growers some challenges in 2008.

Spring rains and windy conditions made control of some early season insects difficult, especially if timing

of application was critical. Some vineyards had frost damage that led to low cropload and so some vineyards

have had a minimal pest management program this year. This season was slower than 2007, but more like an average year in terms of weather and crop development, although there was a long dry spell in mid-summer that held back populations of some pests. Overall, 2008 has seemed like an average year for insect pests in Michigan's small fruit crops.

Blueberry

This year the Guthion phaseout started to restrict the use of this key insecticide, and so blueberry growers have been testing alternatives for fruitworm control including Intrepid during bloom and Imidan, Asana, and Sevin applied after bloom. The insect growth regulator Intrepid was registered early in 2008, and this was used widely during bloom in place of Confirm. All indications from our research and from talking with growers during the season are that the 12 oz rate of Intrepid was very effective against cranberry fruitworm, and we expect this product to replace Confirm. Growers who used this product during bloom had superior control of fruitworms compared with those that did not. The alternatives to Guthion mentioned above that were used after bloom also worked well for cranberry fruitworm if applications were timed correctly. We have also conducted trials at grower cooperator farms with Assail and Delegate, two new insecticides registered for blueberry. A program with Intrepid in bloom followed by Assail and then Delegate after bloom was as effective at controlling cranberry fruitworm as a standard Confirm followed by two Guthion sprays.

The Achilles heel of fruitworm control programs in 2008 seemed to be accurate timing. Some fields did not get protected in time for various reasons, and the result was seen a few weeks later as fruitworm infestation became visible. Reports of cherry fruitworm infestation were more common this summer, and this is a pest where the early activity of this insect is catching growers by surprise. Understanding the monitoring and early activity of cherry fruitworm is part of an ongoing research project at MSU and we will focus on reporting about our results on fruitworm management this winter at grower meetings. Another big challenge

to good insect management this spring was Mother Nature. A few 80°F days coupled with windy and rainy conditions made fields in bloom quickly move through petal fall, leaving fruit exposed to cranberry fruitworm egg-laying, but not suitable weather for growers to apply protective sprays. Depending on the stage of development of the varieties, this caused some fields to experience higher fruitworm infestation this season.

Blueberry maggot activity was variable across blueberry fields this year as usual, but we did see a long and high level of activity at some of the non-managed farms that we trap flies at. In particular, traps at the Trevor Nichols Station in Fennville trapped very high numbers and continued catching flies much later than usual. A potential explanation is that the dry 2007 summer caused flies to stay in the ground for an additional season (blueberry maggot has the flexibility to do this), leading to a higher and longer emergence this year. Growers following a good IPM program that are monitoring and responding to fly activity should have been able to achieve high control of this pest.

As usual, Japanese beetle activity started in early July and continued through into September. Growers have learned the host spots on their farms over recent years and know what products work the best to prevent this beetle from being present at harvest time. We have also seen more fields using the combined system of bare ground in summer, to remove egg-laying sites for beetles, followed by a winter rye cover crop. Seeding this after harvest gives it time to grow through the fall and provide soil stability in winter and spring before mowing and tilling again the next year.

A new pest that has been growing in abundance over the past few years is Putnam scale. This insect creates a small brown scale, one to two millimeters in diameter, over itself for protection and moves onto leaves, stems and fruit in mid-late summer. A few processing sheds and fields visited during August had infestations with one or more scales on berries, and reports of this insect over the past few years have come from across the main production region in west Michigan. For photos of this pest, see the MSU blueberry website www.blueberries.msu.edu/scales.htm.

This is a pest that growers and consultants should be monitoring for, and if fields have been infested in 2008, a spring application of oil to suffocate the overwintering scales should be planned for early 2009. Coupled with an active pruning program, this can go a long way to minimizing the activity of scales in blueberry.

Grape

The season started off with frost damage hitting some vineyards during the flea beetle and cutworm activity period. This cold weather cut back populations of these pests and also took away their food in some sites. By the time secondary buds pushed, the danger from these pests was largely over. We also observed grape cane gallmaker and banded grape bug (see a photo at www.grapes.msu.edu/bandedbug.htm) early in the year, but levels of these pests were below economic thresholds.

Potato leafhopper moved into Michigan this spring on the rain fronts, but most of the pressure dropped off quickly, with little reinfestation. Consultants reported scouting vineyards and seeing such low numbers that insecticides weren't warranted, while for others a single treatment prevented this pest for the season.

Grape berry moth populations started lower this year in the first generation, perhaps because of the low survival in late 2007. Despite the slow start, populations have caught up through the season and this is now close to the average level of infestation we have monitored over the past five years. Vineyards in the Traverse City area are reporting more infestation from this insect, and this insect will require attention next year in some sites to prevent the berry splitting and associated diseases that can use the holes to enter berries. We have been testing Grape berry moth control programs on-farm this season and have seen good activity from eight oz/acre of Intrepid applied to high risk vineyards in mid-July to cover the long period of egg-laying by this pest. Additional studies testing two new products from DuPont, Altacor and Avaunt, applied for berry moth control have looked as good as the conventional program, though pre-harvest samples remain to be taken in these Concord vineyards.

Japanese beetle pressure in vineyards was not as high in some previous years, though some growers needed to protect their vines with insecticides to prevent leaf damage. This was especially true in some winegrape vineyards with susceptible varieties or small vineyards with low leaf area. Berry moth sprays were also timed to catch Japanese beetles and we heard variable opinions on levels of this pest from “not too bad” to “much worse this year.” Populations of this pest are usually very variable, and the level you experience will depend on where your vineyard is located, how good the local landscape is for supporting Japanese beetle (was there moist grassy land nearby last year?)

and the weather conditions this year. In the northwest growing region, Japanese beetles have been seen in very low numbers, but it is clear that these beetles are getting established in this region.

Over the past few weeks, a few reports have come in of mite bronzing on labrusca vines and high grape leafhopper infestations in some vineyards around Lawton. This emphasizes the need to remain vigilant in scouting vineyards and planning an IPM program for your 2009 season that can prevent these problems next season.

Strawberry

Potato leafhopper populations were

moderate, but still caused leaf curling symptoms on fields, especially young ones, that did not get protected. During harvest, sap beetle populations were high in some sites, with reports this summer of growers being forced to close U-pick farms. Cyclamen mite was found this year too, emphasizing the need to purchase plants from reputable nurseries that minimize the chance of you bringing this pest into your farm.

Finally, a big thank you to all the growers who provided research sites for our on-farm projects and also opened their farms for extension meetings this summer. See you in 2009! **IPM**

EPA registration of Maneb fungicide cancelled

Annemiek Schilder, Plant Pathology

United Phosphorus, Inc. (UPI) has submitted a request to the EPA to voluntarily cancel all Maneb (75 percent manganese ethylenebisdithiocarbamate registrations). Maneb belongs to the EBDC fungicide group. Due to a variety of regulatory reasons, UPI will

not be supporting the re-registration of Maneb. UPI plans to produce Maneb until the end of 2008.

The fruit crops that will be affected are grapes, apples, and cranberries. In grapes, Maneb is labeled for control of black rot, bunch rot, downy mildew and Phomopsis. In cranberries, it is labeled

for control of fruit rot, and in apples for control of *Fabraea* leaf spot, fly speck, rusts, scab and sooty blotch. In general, most Maneb uses can be replaced with the fungicides Dithane, Penncozeb, or Mancozeb (zinc ion plus manganese ethylenebisdithiocarbamate). **IPM**

Overview of small fruit diseases during the 2008 growing season

Annemiek Schilder, Plant Pathology

The 2008 season was challenging for small fruit growers, as frequent precipitation and fluctuating temperatures promoted many fungal diseases, especially those that rely on rain for spore dispersal and infection. At the same time, the inclement weather did not allow growers to apply fungicide sprays at the optimal time and also led to washing off of fungicides that were applied. Together, these factors made for a less than optimal season for fruit growers.

Blueberries

Snow cover over the winter provided an ideal habitat for overwintering mummy berries, with sufficient moisture for mummies to germinate in the spring. After a cold period in April which delayed germination and apothecium development, conditions turned more favorable. The weather was conducive to the development of shoot strikes,

which were first noticed in early May. Conditions during bloom were good for dissemination of spores to the flowers by bees due to an extended bloom period. Fruit infections were also severe, particularly in sites with a history of mummy berry and in unsprayed or insufficiently sprayed areas. In a fungicide efficacy trial, we saw extremes of 115 shoot strikes and 579 mummified berries per bush in unsprayed plots – a record. Some growers may have been taken by surprise by the level of mummy berry infection as levels have been relatively low over the past five years. Mummified berries were even noticed in clamshells with Michigan blueberries sold in supermarkets this summer.

Anthraxnose fruit rot incidence was moderate this year, it appears that the cold spring and early summer limited sporulation and infection. *Alternaria*, *Botrytis*, and *Phomopsis* were also found affecting fruit in post-harvest rot tests.

The cold wet weather and freeze events also led to bacterial twig blight infections (bacterial canker) caused by *Pseudomonas syringae*. It was characterized by dark brown to black twigs, which at first sight looked like *Phomopsis* twig blight. In some fields, the dark-blighted twigs were more common in lower lying areas and occurred despite a tight fungicide program. However, no fungi were isolated from these twigs and bacteria streamed out of the vascular bundles after incubating the twigs in moist chambers. This was the first time that we have seen this disease in Michigan. Cold, wet conditions and frost injury promote infection. While *Phomopsis* cankers were apparent on last year's canes (due to heavy rains in August of 2007), we did not see a lot of cane death or twig blight this season.

Virus and virus-like symptoms were more obvious in some bushes this

year, which is typical in cool years. However, some odd symptoms were also noticed, like unthrifty bushes with purple blossoms in the spring and leaf reddening and necrosis later in the season. While it initially was thought that herbicide damage could have played a role in the development of leaf curling and necrosis, the patterns of affected bushes indicated a possible virus problem. The symptoms were also widespread in a many fields. Various ELISA tests were done on plant samples but were negative except for blueberry shoestring virus. Investigations are ongoing as to the cause of this baffling symptom.

Another rare blueberry disease in Michigan was seen in 2008, namely red leaf, which is caused by the fungus *Exobasidium vaccinii* and reduces growth and productivity. This fungus systemically invades plants and causes the leaves to turn fully or partially red. It is a very striking disease. Infected plants continue to produce infected canes every year.

Grapes

Due to the cool, wet spring and rainy summer, black rot and downy mildew were particularly prevalent on leaves and clusters in unsprayed or insufficiently sprayed vineyards this year. Black rot, Phomopsis, and downy mildew all need rain/wetness for spore dispersal and infection, so this season was particularly conducive to disease development as a whole. In most commercial vineyards, however, growers managed to control black rot and downy mildew well, despite the frequently difficult conditions for spray applications.

Downy mildew on fruit clusters and leaves of grapes showed up early. Regular rain events in late spring and summer encouraged infection. In the 'Chancellor' research vineyard at TNRC in Fennville, 100 percent cluster infection occurred in the unsprayed control. Downy mildew also got an earlier start in many 'Niagara' vineyards than in recent years. Most growers did apply fungicides for downy mildew. Some growers that had missed the opportunity to apply Ridomil because of the long PHI used ProPhyt or Phostrol for control.

Despite the rain, Phomopsis disease pressure was not as high as expected, possibly due to the cold weather in

late spring and early summer, which can suppress sporulation and infection. However, cane, leaf, rachis, and fruit infections are still plenty common in susceptible cultivars, like Vignoles and Niagara. In vineyards where black rot was common, it may have outcompeted Phomopsis.

Powdery mildew showed up relatively late in most vineyards, but became severe in some wine grapes due to warm dry conditions prevailing in late summer. Cases of berry infection were reported in 'Concord' vineyards and most likely occurred due to ascospore infection from overwintering inoculum after rain events right after bloom. This is the time when the berries are most susceptible. There was potential for severe powdery mildew due to early rains which would have promoted ascospore release. However, too much rain and cool weather may have slowed down powdery mildew in the early part of the summer. Once it has gained a foothold, powdery mildew prefers warm, dry weather, and frequent rains that may actually lower disease incidence by washing powdery mildew spores off the leaves and causing bursting of spores in water droplets. Leaf, rachis, and berry infections were noted in wine grapes in unsprayed areas. On the other hand, growers were more acutely aware of the problem and sprayed more diligently as well. Powdery mildew on 'Concord' leaves was less severe than in prior years and late enough to be of little consequence.

This has been a moderately favorable year for Botrytis bunch rot and sour rot so far. Dry weather in August has generally helped keep these diseases at bay. However, recent heavy rains may turn that situation around. Frequent rains promote bunch rots. Any wounds created by insects or cracking of berries in tight bunches can encourage Botrytis development. Tight-clustered cultivars also provide a moist environment for infection and sporulation, which further spreads the disease. Botrytis bunch rot can be distinguished from sour bunch rot by the presence of grayish brown spore masses at the stem end or along wounds in the berries, and the absence of the vinegary odor

associated with sour bunch rot. In addition, sour rot often has fruit flies colonizing rotting clusters.

A relatively rare disease of grapes in Michigan, anthracnose, caused by the fungus *Elsinoe ampelina*, was again observed at several sites this year. The fungus primarily attacks table grapes, but can also infect 'Niagara', 'Concord', and 'Vidal' and 'Frontenac' wine grapes. Symptoms on the canes somewhat resemble those of Phomopsis, but lesions are typically more sunken with raised edges. On leaves, the center of older lesions drops out, giving the leaves a puckered and "shot hole" appearance. Lesions on green berries are reddish brown or grayish with darker margins, and do not expand much upon ripening. This disease is favored by cool, rainy springs.

Strawberries and brambles

Cool wet conditions favored foliar diseases of strawberries like common leaf spot, Phomopsis, and angular leaf spot, as well as leather rot on fruit of strawberries. Angular leaf spot caused blackening of calyxes in some strawberry fields. Leaf spot, spur blight, and anthracnose cane spot were commonly seen on raspberries. Fire blight also occurred on raspberry in some locations, killing back shoot tips and sometimes fruit clusters on raspberries. Botrytis gray mold on the fruit was also common, both on strawberries and raspberries. It was mainly a postharvest problem on raspberries.

Oddly shaped strawberries (button berries) were probably caused by tarnished plant bug if they occurred later in the season (on everbearing strawberries), although freeze injury of flowers may have to blame in June-bearing strawberries. Some fields suffered from frost injury where frost protection was not feasible.

White drupelets, usually indicative of sun scald were also noticed, particularly in tunnel-grown raspberries. Due to the warm weather, mites were a problem in tunnels. Fungal diseases are not very common in tunnels since there is rarely free water on plant surfaces to allow for infection. However, it is possible to get some Botrytis infection of fruit if the relative humidity is very high (greater than 95 percent) for multiple days in a row - *Botrytis conidia* can germinate under those conditions,

although they prefer a film of water. Leaf distortion, crinkling and plant

stunting resembling virus symptoms were caused by potato leaf hopper.

Apple maturity reports for 2008 are **IPM**



I - Southwest

Mark Longstroth
Bill Shane

available by email or by going to www.maes.msu.edu/swmrec. Look under publications for fruit newsletters. If you are interested in receiving the reports by email contact Bill Shane at shane@msu.edu.

2008 weather

The winter of 2007 - 2008 began snowy, but lows were seldom much below 20°F. Several mid-winter thaws melted the early snow in January. A cold snap occurred in late January with lows around zero. February was cold and snowy. Temperatures were close to zero several times in the last three weeks of February. This caused some damage to fruit buds. Significant winter injury was reported in peaches, apples and sweet cherries in the central counties of the state, but not in the counties located near the lakeshore. Winter snows recharged soil moisture. 2008 was the second coldest spring in the last 14 years. Growing degree day accumulations began slowly and early bud development lagged behind the average of the last ten years. Snow on March 20 and 21, the first full day of spring, dumped six to 14 inches of snow in the region. All the snow and ice had melted off the lakes and ponds by the end of March.

Early April brought mild temperatures with highs near 60°F and lows in the 40s allowed plants to get off to a good start. The first damaging freezes occurred on April 15, when most crops were in early bud development causing little damage. This freeze was followed by warm weather with

highs in the 70s and lows around 50°F allowing rapid bud growth. A freeze on Wednesday, April 30, with lows in the 20°F to 29°F range, caused wide spread damage, but the severity of damage varied from extensive to very little. This freeze was radiation freeze similar to freezes in 2002, 2004 and 2006, so sites with good air drainage suffered less damage. Apples, grapes and sweet cherries were the hardest hit. Later freezes that were important to the north did not impact southwest Michigan fruit except blueberries.

Weather during the growing season was not unusual. Soil moisture levels were good into June, but by then spotty rain resulted in drought conditions for July and August. Heavy rains returned in September with eight to 10 inches of rain on September 12 - 14.

Tree fruit

Common direct pests such as codling moth and Oriental fruit moth were generally well controlled. Many growers used spray programs including newer reduced risk materials rather than OPs. San Jose scale continues to increase in importance as a pest. We saw this pest in more orchards this year. Japanese beetles have declined in importance. For most growers Japanese beetles did not require multiple sprays in addition to the normal spray program.

Apricots were scarce in 2008 due to frost losses from the April 30 freeze, which occurred when the fruit was in the shuck. Some growers with good sites had a good crop. Bacterial spot was the major problem in 2008.

In **peaches**, winter damage was light in the major peach producing area. Significant winter injury was reported in peaches, apples and cherries in the central growing area of the state, but not in the counties located on the lakeshore. Peaches were damaged by the April 30 freeze. Damage is generally light at good sites in the major production area of Berrien County. Early non-showy types were hit hardest. Unopened flowers were not damaged. Most varieties retained a good crop. Rusty spot (powdery mildew) and bacterial spot were common. Oriental fruit moth generally was controlled. Brown rot was

a problem in areas that received rain just before harvest.

Sweet cherries also suffered a little winter damage, which appeared as hollow flower buds that had no flowers. At the time of the April 30 freeze, sweet cherries were in the shuck. Damage varied from heavy to light. Better sites and later varieties suffered less damage. Bacterial canker was a problem after bloom. Both leaf and fruit symptoms were common in 2008. Alternaria fruit rots were a problem for some at harvest.

Tart cherries were at full bloom during the April 30 freeze, but damage was generally light. Bacterial canker was a problem. Cherry leaf spot was not a significant factor before harvest. Yields were generally good and leaves were retained well into August in most orchards.

In **plums**, there were no major problems. Japanese plums were reduced by the freeze. European plums were also light.

Apples are in early bloom during the April 30 freeze. Damage to apples was severe in some sites. Early and late varieties were damaged and the damage seems very variety specific. Pollination weather was very variable with very warm conditions alternating with cold and rainy conditions. There was a very heavy June drop in apples that significantly reduced the crop. This drop occurred in both spray thinned and non-thinned varieties and blocks. Cool conditions and rain events during bloom may have reduced pollination and led to the large June drop. .

There were no major pest problems. Codling moth was controlled with newer materials. There were only two flights in 2008. Apple maggot, obliquebanded leafroller, white apple leafhopper, spotted tentiform leafminer and European red mites were generally controlled. Woolly apple and green apple aphids were common and San Jose scale was a problem and many growers tried to time sprays for the late season crawlers.

Pears did not suffer greatly for the freeze and yields and quality were good.

Small fruit

Blueberries were not greatly

damaged by early spring frost/freeze events. Initial fruit set was excellent and it looked to be a banner year. Drought conditions during berry swell caused soft and small fruit for mid-season varieties. Anthracnose ripe rot was the main fruit rot problem. Leaf spots were a problem in some areas after harvest. Drought stress also revealed mineral nutrition problems such as iron and potash. Japanese beetles and blueberry maggot were generally controlled.

Some of the wood in juice grape vineyards looks weak from the large crop last year. Damage from the April 30 freeze to juice grapes was severe in some areas. Some French hybrids were advanced enough to be hurt, but vinifera grapes suffered little damage. Insect and disease control was good for

vineyards where there was a good crop. In vineyards that suffered significant losses to the spring freeze, early season sprays were reduced and black rot was a problem. Powdery mildew and, downy mildew were not generally a problem. Downy mildew and phomopsis did show up late in the season. Due to the cool year, harvest was delayed with Niagara harvest, scheduled for September 15, delayed a week by heavy rains on September 12 - 14. Quality for wine grapes was excellent. Botrytis fruit rot was relatively minor in wine grapes.

Strawberry fruit size and quality were excellent. Some growers were surprised by the early ripening and closed early because they lost their early pickings. Others took advantage of the cool conditions and enjoyed a three-

week season. Leather rot and sap beetles were a problem in some fields. Root weevils and potato leafhoppers stunted growth after renovation. Verticillium wilt and black root rot were problems that appeared later.

Raspberry and blackberry plants showed winter damage in many areas. Yields were average, but fruit quality was down for non-irrigated fields. Pests like raspberry sawfly and raspberry girdler were minor but most growers did need to treat for Japanese beetles. Fall raspberry harvest was delayed by cool weather and the mid-September rains ruined early fruit underway. **IPM**

2 – Southeast

Bob Tritten

Recent weather news

The weekend rain event was highly unusual as hurricane Ike pushed moisture through the region. Most of the Enviro-weather stations reported receiving between three and a half and five and a half inches of rain across east Michigan for the three-day (Friday, Saturday, Sunday) period. However I have had several reports from fruit farms across the region of receiving seven inches of rain. There are many farms where rain gauges overflowed, and so it is a bit of a mystery in terms of the exact totals. Wet weather brought a screeching halt to harvest of our fruit crops, and even some rain on Monday continued to slow things. Wet soils made it difficult to navigate orchards, and therefore it may be a few days before apple harvest continues. The impact of this much rainfall on the apple crop is very difficult to determine, as we don't have many experiences over time that were similar to this recent rain event. One thing for apple growers to be aware of is that the plus side of the rain event will be that apples will size dramatically over the next two weeks. The down side is that fruit picked this week and early next week will be very prone to bruising, and especially picker bruising.

Weather season in review

Recall that we had a relatively mild

Southeast Michigan growing degree day totals for March 1 to September 15

Location	GDD42	GDD45	GDD50
Commerce (Oakland)	3521	3058	2333
Emmett (St. Clair)	3415	2970	2262
Flint (Genesee)	3454	3005	2289
Lapeer (Lapeer)	3440	2984	2278
Petersburg (Monroe)	3619	3148	2425
Romeo (Macomb)	3594	3129	2398

winter with good soil moisture coming into the spring. Our 2008 season started out to be fairly normal in terms of degree day totals, and much behind the two last seasons, which were very early. Then in late April we had a stretch of extraordinarily warm weather, which pushed our season to six days ahead of normal. Throughout the rest of the season, our degree day totals gradually dropped back to more of a normal range. In fact, over the last couple weeks our degree day accumulations dropped back to be four days behind normal. Soil moisture for the season was excellent in early spring, and most growers had fairly regular soil moisture through the end of May. Many growers started to see soils dry toward the end of May and continue all the way into early August. In fact, a few farms continued to have severe drought conditions which impacted fruit size and quality.

We had two major spring frost and freeze events which affected our fruit crops in the region. The first was

widespread and occurred on the evening of April 29 and the morning of April 30. Most weather stations had temperatures below 28°F, and the duration of the cold was a bit unusual in that it was cold for three to seven hours. That cold event took a significant amount of our sweet cherries, and about a third, to a half of our tart cherries at most farms. There was also peach damage at some farms as a result of this event. A second frost/freeze event affected growers north and west of Flint, and occurred on May 28. Temperatures on that day were reported in the range of 23°F to 27°F. Unfortunately fruit farms in this part of the state lost most of their apple crop with this frost/freeze event.

Though these frost and freeze events were very difficult this year, most apple growers needed to do a fair amount of hand thinning, as traditional thinning measures didn't work well. Hail was reported at many fruit farms across the region in June and July; however the extent of the injury was not nearly as

bad as it has been in previous seasons, and definitely not as bad as it was in other parts of the state.

Tree fruit

Apple harvest is moving along at a normal pace this year. As I look over the entire east region, I would say that we have a pretty good crop of apples despite the two spring frost and freeze events. Growers are currently finishing up 'McIntosh' harvest, and are working away at 'Honeycrisp,' 'Gala' were harvested ahead of 'Mac's' this year. Growers are looking down the road at 'Jonathan' and 'Empire' harvest.

Major pest problems for the season included early high populations of potato leafhopper and later in the season woolly apple aphid. Codling moth had two distinct generations this year with well defined first and second generation trap catch numbers, and even with the typical "a" and "b" peaks in each of those generations. Codling moth mating disruption blocks this year seemed to have some leak through with first generation trap catches, and some farms sustained damage to fruit. I am not certain what the future will bring with mating disruption, but there are many growers who are looking at it at this time to see why we had some damage break through.

Oriental fruit moth numbers in apples were about normal this year. Apple maggot had a very heavy trap catch in early to mid-July, and then numbers were much lower than normal for most of the rest of the season. There were some farms that had a little bit of a bump in numbers in early August. Many fruit farms this year experienced Japanese beetles for the first time ever. In farms where Japanese beetles have been present before, we had extremely high numbers for several weeks. As indicated earlier, potato leafhopper populations blew into the state on storms around June 10, and they continued to be a problem, particularly in new plantings. Woolly apple aphid populations were low this summer, but several farms have been seen building numbers throughout the fall.

European red mite populations were generally under threshold throughout the season at most farms; however hot spots in mid-August where soil moisture was short quickly turned into situations where miticides were needed. Many

growers applied an oil application as well as summer applications targeted at San Jose scale, as it was a serious pest in 2006 and 2007. Most farms seem as if they have had good success with bringing San Jose scale populations under control.

Apple scab was a serious issue at many farms across the region this year. Some of my best growers experienced apple scab infections at rates much higher than normal. It is still a bit of a "head scratcher" as to why scab was so prevalent this year. In reviewing spray records and comparing them to weather station data; it is difficult for me to determine exactly when scab got a foothold. In fact, we have collected apple scab infected leaves early this summer to be tested for fungicide resistance. There will be more details throughout the winter meeting season on the results of this testing. Several growers also experienced sheet scab. Black rot was an issue later in the season at many farms across the region. A few farms have serious black rot problems in 2007, and many more experienced it in 2008. I am not certain if this is an up and coming disease or not, but for the last two seasons this has been an issue. Fireblight was not a serious issue at most farms across the region. The exception were apple growers in the Thumb who had late fireblight infestations, there are still reports in the last two weeks of recent fireblight strikes.

Pears were harvested about ten days ago across the region, with the exception of winter storage pears. They had typical populations of pear psylla this year, and a few blocks had some light amounts of fireblight. There were no other major pest problems for the year.

Peach harvest is now complete across the region. The 2008 crop of peaches was phenomenal for growers who had a crop. Other growers had nothing. Once harvest got into full swing in early to mid-August many blocks of peaches picked out extremely well. We had great demand for peaches at most farm markets. X-disease was seen more prevalently across the region than I had experienced in the last 15 years.

Sweet and tart **cherry** crops were both reduced from the April 29 and 30 frost and freeze event. Most farms had about a 20 percent to 30 percent of a

sweet cherry crop and about 50 percent of a tart cherry crop. The exception to this crop size was the Romeo area where they had a good crop of both sweet and tart cherries.

Plum harvest is wrapping up across the region. We started out with a great crop of plums in spring, but due to fruit drop, our crop diminished greatly. Brown rot was also a bit of an issue.

Small fruit

Strawberries continue to look good this year with good runner development. A drought following renovation time was a bit of an issue at many farms across the region, and most growers applied more water through their irrigation systems than normal to compensate for dry soils. Potato leafhopper was an issue at many strawberry farms this year, and twospotted spider mites populations were high at a few farms. Most farms had a long harvest season, so they ended up having a good crop of strawberries.

Raspberry harvest is continuing for fall red raspberries. Over the last two days I have had numerous reports of gray mold or botrytis blight in raspberries. Growers need to apply some of the higher rated products for botrytis control in raspberries for this time of year. Consult E-154 for more details. Japanese beetles were a serious issue at many raspberry farms this year. The summer raspberry crop was a disappointment at many farms across the region, with some delayed winter injury as well as drought stress that reduced crop by one half to two thirds.

Blueberry harvest is complete across the region, and has been so for several weeks now. For the most part, we had a good crop of blueberries this year with great demand from consumers. Our blueberry crop escaped the spring frost and freeze damage. Berry size was an issue at several farms across the region, particularly on second through fourth or fifth picking. **IPM**

3 – Grand Rapids Area

Phil Schwallier
 Amy Irish Brown
 Carlos Garcia-Salazar

Weather

As far as degree days go, normal accumulations were pretty much the standard for most of the growing season. We jumped slightly ahead of normal averages, only to fall back. Towards the end of the season, we are just about right at normal degree accumulations for the general Grand Rapids area. Unfortunately, degree day totals were the only thing normal about the 2008 growing season for tree fruits.

Crop report

The growing season started out somewhat slowly compared to the past couple of years. In 2007, there was first green showing around March 30, but in 2008, that didn't occur until April 16, which is just a few days behind normal averages. On April 30, just as many early varieties were entering the open cluster to pink stages, there were overnight low temperatures between 22°F and 25°F, depending on location. This killed many king blooms in apples, but it was generally thought that most apples came through okay. **Sweet cherries** were really hurt by this cold weather and that diminished a crop that

was already light due to winter injury to flower buds. **Peaches** were a little lighter than normal for crop set. The **apple** crop was thought to be set pretty well until June drop occurred. The drop was very severe and much more than anyone expected with some varieties being nearly blank and others with three-quarters or so of a crop. 'Red Delicious' and 'Empire' were the most severely affected.

Then, as if to add insult to injury, we had hail storms that damaged 75 percent of the tree fruit acreage in the Grand Rapids area. The first was in early June with very isolated damage; the second was in early July and resulted in much more damage to fruit. Damage was variable from site to site, but many growers are saying they have never seen or heard of such wide-spread hail in this area before. While 75 percent of the acreage has some hail damage, it's not all so severe to be a total loss. As we move into harvest, growers are trying to figure out the best way to accomplish harvest. Surprisingly, early harvested varieties such as 'Macs' and 'Galas' are looking and tasting excellent despite the earlier damage.

Precipitation has been adequate, but it did stay dry for much of August. In early September, rainfall has been more than adequate as we've had over 10 inches of rain over a 10-day period.

Apple scab season was fair to

moderate, with less infection periods than most years. Spore maturity was very early with some of the highest spore rod numbers between tight cluster and early bloom. For most of the general area, there were only four apple scab infections for the entire primary scab season. With such few infections, one would expect little scab to show up, but unfortunately that was not the case in many blocks. Primary apple scab lesions started to show up in late May and throughout June even in blocks with spray programs that appeared to be really sound. No clear explanations have been identified yet, and research continues to try to find the answer.

Fire blight was generally not as bad as it could have been given the several hail and high wind situations that plagued the Ridge in 2008. There is some trauma blight, and very little blossom blight.

In general, insects did not cause any major issues this season. Codling moth is still a major apple pest, and most growers have reigned in their numbers in the past couple of growing seasons to a point that is much more manageable. Plum curculio was active earlier than usual, but very little damage to tree fruits was found. Mites would just start to build and then a rain storm would move through and reduce their numbers. The use of summer miticides was therefore reduced. **IPM**

5 – Northwest

Nikki Rothwell, Duke Elsner,
 Erin Lizotte, Rob Serrine

Growing degree day accumulations at NWMHRS

GDD42	3264
GDD50	2120

Weather

The overall weather for northwest Michigan was more typical this season than in the past few years. We started the season cool and wet with a challenging pollination period for all fruit crops. We were also hit with a few late season spring frosts, which were particularly damaging to southerly areas of the region. The rainfall stopped in mid-season, and the area entered a droughty phase which rivaled last year in lack of

precipitation. As fall approached, we received more much needed rainfall for sizing the apple harvest. As of September 15, we have accumulated 3,264 GDD base 42 and 2,120 GDD base 50. Since April 1, we have had 19.6 inches of rainfall.

Crop report

Despite pollination, weather issues, and disease pressure in northwest Michigan, most crops faired well. However, we must include a caveat in that crop quality and yield varied across the region. **Strawberry** harvest was a bit variable this season, where some growers had an excellent crop, but areas hit with late season frost faired much worse. **Sweet cherry** yields were similar to last year, but American brown rot was particularly problematic across the region—this disease greatly impacted the quality of fruit. Estimated tart cherry

yields for the region were much lower than expected; the USDA estimated the tart cherry crop to be 75 million pounds, and the actual harvest came in at 95.8 million pounds.

Peaches were of particularly good quality this year although some farms without irrigation struggled with size if the trees had not been adequately thinned. **Apple** harvest has really just begun here in the north, and again, southerly areas of the region were hit hardest by frosts. We have much lower yields in those areas, and frost damage is evident on fruit still on the trees. As we move further north, apple quality is looking excellent, particularly with the recent rains to size fruit.

NWMHRS, Pest Report Summary for 2008

Apples: Fire blight was a challenge this season. Almost the entire bloom

2009 Average trap catch summary for the NW Michigan Horticultural Research Station

	Date	21-Apr	28-Apr	5-May	12-May	19-May	27-May	2-Jun	9-Jun	16-Jun	23-Jun	30-Jun	7-Jul	14-Jul	21-Jul	28-Jul	4-Aug	11-Aug	18-Aug	25-Aug	2-Sep
Apple	Codling Moth			0.0	0.0	0.0	0.0	2.0	11.5	30.0	18.0	34.0	26.5	26.5	26.0	7.0	4.5	5.0	7.5	2.0	5.5
	Spotted Tentiform leafminer	0.0	4.5	1.0	41.0	91.5	62.5	39.0	11.5	1.5	2.0	9.5	34.0	117.5	182.5	233.0	27.5	40.0	64.5	93.0	176.0
	Apple Maggot										Trap set	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5
	Oblique-banded leafroller								0.0	0.0	2.0		18.5	4.5	0.5	7.5	0.5	0.0	3.5	19.5	35.0
	Oriental Fruit Moth	0.0	0.0	3.5	0.0	0.0	3.5	8.0	16.5	20.5	7.5	5.5	5.0	1.5	6.0	9.5	9.0	21.0	4.5	16.0	8.0
Cherry	American Plum Borer	0.0	0.0	0.0	0.7	0.0	10.0	14.3	11.3	6.0	2.7	1.0	0.3	4.0	8.3	10.0	6.0	8.0	1.3	4.7	2.0
	Oblique-banded leafroller								0.0	0.3	9.0	27.0	27.3	21.3	23.0	25.7	7.0	0.0	7.3	30.0	57.7
	Lesser Peach Tree Borer			0.0	0.0	0.0	1.0	8.3	16.3	7.3	7.3	14.5	10.7	7.0	14.3	5.7	8.0	5.0	3.0	2.0	0.7
	Greater Peach Tree Borer								0.3	0.3	2.0	1.3	3.0	5.3	13.0	17.7	20.3	31.0	34.7	14.0	6.0
	Cherry Fruit Fly Avg.								0.0	0.0	0.0	0.2	1.5	4.2	16.2	34.5	10.7	16.8	14.2	5.8	7.7
	Cherry Fruit Fly Total								0.0	0.0	0.0	1.0	9.0	25.0	97.0	207.0	64.0	101.0	85.0	35.0	46.0
Grape	Grape Root Borer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Grape Berry Moth	0.0	0.0	0.0	0.0	0.0	1.5	0.5	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	0.0

period fell under weather conditions that pushed the epiphytic infection potential over 100, a situation exacerbated by high winds and ample rain. Additionally, the region saw a large amount of tag bloom and hail/wind damage, prolonging the fire/trauma blight season well into June. Apple scab was present in substantial levels region-wide with six infection periods, totaling 13 days were predicted in June alone.

European red mites were a problem in some area apple orchards, particularly in the spring. Plum curculio was controllable in apple blocks this year with little or no damage to managed blocks here are the station. Codling moth biofixed on June 5 and we continued to catch moths through last week (see trap catch summary below). It was difficult to differentiate between generations this year as trap catches were relatively consistent throughout the season. Spotted tentiform leafminer emerged in late April and we continue to catch them to date, with peak flights occurring on May 19, July 21, and September 2. Oblique-banded leafroller were first caught on June 23 in the

station apple blocks and trap catches have been variable throughout the season.

Cherries: Heavy rains this spring set the stage for an intense level of disease throughout the region this year. Cherry leaf spot infections were frequent during the early season, with the NWMHRS weather station predicting cherry leaf spot infection periods for 20 out of 30 days in June. These conditions were intensified by high winds that prevented fungicide application. Overall the weather in July was less conducive to cherry leaf spot infection, and in August the weather station recorded only 0.89-inches of rain.

American brown rot was sighted early this season with our first observation during the last week in June on green tart cherries. American brown rot reached epidemic levels in some area sweet cherry orchards this year, in some cases growers were forced to abandon blocks due to high infection levels. Perhaps due to cooler weather, we observed significant retention of unfertilized sweet cherries this season. These cherries failed to

drop in early June and, when combined with poor spraying weather, could have contributed to the high levels of American brown rot this season.

Bacterial canker was also widespread this season, particularly in areas that were hard hit by the freeze after Memorial Day weekend. Alternaria was also a problem in some area orchards, a disease more commonly observed in overripe fruit.

American plum borers were first caught in May, and continue to be caught at present (see trap catch summary graph). Lesser peach tree borers have been emerging since late May, with adult trap catches peaking in mid-to-late June and continuing through last week. Greater peach tree borer emergence began the second week of June and peaked mid-to-late August, with this week marking the first with no catch. Plum curculio began emerging in early May and we continued to see ovipositioning scars into late June. Obliquebanded leafroller adult emergence began around June 16 and first and second generation emergence peaked in July and late

August, respectively. We caught our first cherry fruit fly on June 30, well ahead of the region average, and the population peaked on July 28.

Grapes: Grape growers in the region were hit hard by the freeze early in the season, but things have remained relatively quiet this season. Downy mildew was observed for the first time at the beginning of July, but quickly subsided. Powdery mildew

was spotted in late July; surprisingly it showed up on clusters before leaves this year. Vineyards that received dormant fungicide applications or were kept covered early in the season remain clean. We also saw sunscald on exposed bunches in late July. A rare case of phomopsis cane and leaf spot was also observed in one area vineyard.

In early June grape phylloxera and leafhoppers were observed in area

vineyards (see trap catch summary graph). Despite spring storms, potato leafhopper populations remained unusually low this season. One June 20, grape plume moths and rose chafers were observed for the first time. Japanese beetles arrived in late July, and before the recent rain two-spotted spider mite populations were flaring. **IPM**

Weather news

Jeff Andresen, Agricultural Meteorology, Geography

Tropical visitors

What a difference a week makes. During the latter half of the 2008 growing season, the majority of Michigan and the eastern Midwest region have experienced much drier than normal weather, with less than half of normal precipitation mid-July through early September. Enter the Atlantic hurricane season. Relatively weak upper air winds and warm sea surface temperatures across the subtropical Atlantic basin have led to a very active season thus far, with 10 named storms. While hurricanes, generically referred to as “tropical cyclones” and their remnants typically move poleward from tropical and subtropical origins at some point in their lifetime, it is somewhat unusual for them to impact Michigan and the Great Lakes region as the storms must make landfall in an area potentially upwind of region and then upper air winds have to be just right to advect or transport the remnants here before the system completely dissipates. After making landfall, the storms weaken as they lose the major source or their energy (water vapor from a warm ocean), and if they move poleward and persist long enough, they may transform into their mid- and upper latitude sibling, the extra-tropical cyclone, the type of low pressure area that brings us the majority of our precipitation year-round.

This year, we have really beaten the odds, as three separate tropical-origin systems have impacted the state. The first was Hurricane Gustav, or more precisely, its remnants, which initially made landfall in Louisiana and moved through Michigan September 3 – 4. This system brought over four inches



Figure 1. Radar-estimated precipitation totals (inches) across the Continental United States from August 16 though September 15 (figure courtesy of NOAA National Weather Service).

of rain to western sections of the Lower Peninsula. Because the rain with this system fell in a steady, moderate intensity over a several hour period, in contrast with a heavy thunderstorm event in which the rain falls at sometimes torrential rates over short periods and runs off, the vast majority of the precipitation soaked into the soil profile.

This past weekend, Michigan was “visited” twice by tropical systems. The first was the remnants of Tropical Storm Lowell, which made landfall in northwestern Mexico last week. The remnant moisture from this system was caught up in strong southwesterly low-level winds and transported into the Midwest. An extratropical upper air disturbance and cool front at the surface moved into the region last Friday, providing strong lift for the residual moisture. The result was a widespread area of heavy rain from Illinois and

Indiana into southern Lower Michigan overnight Friday into Saturday. More than six inches of rain fell in the Chicago area, setting a new all-time record for precipitation in a 24-hour period.

Finally, Hurricane Ike made landfall in the Galveston, Texas area early Saturday morning. The southwesterly flow that brought the remnants of Lowell into the Midwest were still in place across the region Saturday, and Ike’s remnants moved quickly north and eastward into the Great Lakes region by early Sunday morning, Galveston is about 1200 miles away from Michigan and it moved here in approximately 30 hours, which is an average rate of about 40 mph, with another round of heavy rain. Relatively strong winds (15-25 miles/hour with higher gusts) were still present with the system as it moved through southern Lower Michigan.

The spatial pattern of rainfall

during the last 30 days illustrates well the movement of the tropical systems into the Great Lakes (see Figure 1). More than ten inches of rain fell at some locations across the southwestern Lower Peninsula, leading to flooding and water-logged soils and some new rainfall records. Normal rainfall for this period generally ranges from three to four inches. Unfortunately, the recent rainfall generally missed some northern sections of the state, and drought conditions continue there. Finally, it is interesting to note that the wettest month climatologically over most of Michigan tends to be a summer month (e.g. June). However, September also shows up as the wettest month at some locations. After this past weekend, we at the State Climatologist's Office are very curious about the role of tropical moisture in our climate and how frequently it is a factor in Michigan (maybe more than we had suspected previously). A study is under way...

Looking ahead

In contrast to the turbulent weather of the past week, high pressure across the Great Lakes region should lead to a mostly fair and dry work week. Temperatures will fall back to normal or slightly below normal levels during

the next couple days, with highs Wednesday, September 17 from the 60s north to the low and mid-70s south and lows generally in the 40s north to low 50s south through the early weekend. Given clear calm conditions, dry soils, and low humidities, some scattered light frost will be possible in interior sections of Upper and northern Lower Michigan overnight Wednesday into Thursday morning. Temperatures will slowly warm into the weekend, with highs back into the 70s and lows from the upper 50s to mid-50s in most sections of the state by Saturday. A weak cool frontal boundary is expected to move through the state by late Saturday, but given little moisture ahead of the front, any rainfall with the system should be light and isolated, with most locations remaining dry.

In the medium range time frame, upper air troughing is forecast across central sections of North America, with a return of generally warmer than normal weather forecast. The National Weather Service **6 - 10 day outlook**, covering September 21 – 25, calls for above normal mean temperatures and below normal precipitation statewide. Some changes are forecast for the **8 - 14 day** period, covering September 23 - 29, with near mean temperatures

and precipitation totals expected. Given a wide variation amongst the forecast tools, forecaster confidence is considered lower than normal.

Longer lead outlooks from NOAA's Climate Prediction Center (CPC) for the next few months in Michigan remain generally vague. The NOAA 30-day outlook for the month of September calls for cooler than normal mean temperatures across large areas of the Midwest and Great Plains regions. The outlook also calls for above normal precipitation totals across much of the southeast United States due to an active tropical storm season in the Northwest Atlantic Basin. For Michigan, the official outlook still places all of the state in the "equal odds" scenario of below, near, and above normal mean temperatures and precipitation totals. The NOAA outlook for September through November continues to call for increased odds of above normal temperatures state- and regionwide, but no forecast direction for precipitation (i.e. the equal odds scenario).

Caption for Figure 1. Radar-estimated precipitation totals (inches) across the Continental United States from August 16 through September 15 (figure courtesy of NOAA National Weather Service). **IPM**

Michigan State University Cooperative Agricultural Weather Service
Cumulative Precipitation Summary For 09/15/2008

STATION	DIST	PRECIPITATION TOTALS SINCE				04/01/08 (since Apr. 1)	Dev. Norm.
		09/09/2008 (last week)	09/02/2008 (last 2 weeks)	08/19/2008 (last 4 weeks)	Actual		
+							
MARQUETTE	WU	2.44	2.90	3.06	-0.59	16.98	-1.31
CORNELL	EU	1.15	1.92	2.30	-1.04	14.96	-1.60
SSMARIE	EU	1.22	2.31	3.25	-0.09	15.53	-1.17
BENZONIA	NWL	0.99	1.98	2.12	-0.99	18.27	2.16
BEULAH	NWL	1.14	2.49	2.83	-0.28	19.88	3.77
BINGHAM	NWL	1.23	2.31	2.89	-0.22	14.80	-1.31
NORTHPORT	NWL	0.00	1.20	1.57	-1.54	12.69	-3.42
OLDMSSION	NWL	1.24	2.49	2.99	-0.12	13.26	-2.85
ALPENA	NEL	0.97	3.37	3.62	0.57	17.64	1.54
ROGERCITY	NEL	1.27	3.25	4.37	1.32	20.31	4.21
FREMONT	WCL	1.88	4.57	5.04	1.82	17.68	1.27
HART	WCL	1.08	3.10	3.92	0.70	18.99	2.58
LUDINGTON	WCL	1.81	3.40	3.55	0.33	20.84	4.43
LUDINGTON	WCL	1.81	3.40	3.55	0.33	20.84	4.43
ENTRICAN	CL	2.29	4.98	6.10	3.01	17.31	0.11
BADAXE	ECL	3.08	3.96	5.28	2.84	22.67	7.39
SAGINAW	ECL	2.79	4.22	4.99	2.55	18.59	3.31
BHARBOR	SWL	6.84	10.23	10.66	7.91	22.47	4.86
FENNVILLE	SWL	5.85	9.73	9.93	7.18	27.37	9.76
GLENDORA	SWL	5.61	8.93	9.46	6.71	24.21	6.60
GRANDJUNC	SWL	7.12	10.66	11.44	8.69	24.49	6.88
HOLLAND	SWL	4.96	7.91	7.95	5.20	25.98	8.37
KENTCITY	SWL	5.61	8.93	9.46	6.71	25.49	7.88
SPARTA	SWL	6.04	10.28	10.58	7.83	25.94	8.33
WATERVLIET	SWL	5.61	8.93	9.46	6.71	24.21	6.60
BELDING	SCL	5.26	5.80	6.60	3.97	17.12	-0.29
COLDWATER	SCL	6.86	7.82	8.51	5.88	20.83	3.42
ELANSING	SCL	5.40	7.31	7.81	5.18	19.05	1.64
DETROIT	SEL	4.13	5.86	5.99	3.57	16.51	-0.19
FLINT	SEL	4.90	7.69	8.47	6.05	20.29	3.59
MILFORD	SEL	4.27	6.25	7.04	4.62	21.75	5.05
ROMEO	SEL	4.13	6.69	7.21	4.79	19.41	2.71
SALINE	SEL	3.38	4.43	4.46	2.04	15.74	-0.96
TOLEDO	SEL	3.01	3.62	3.84	1.42	19.58	2.88

STATION OR DISTRICT	ACTUAL AND PREDICTED DEGREE-DAY ACCUMULATIONS SINCE MARCH 1 2008 (*)				BY 09/20	BY 09/25
	AS OF 2007	BY 09/20	AS OF 2007	BY 09/25		
+						
WEST UP NORMS**	3069	2795	2864	2918	1759	1823
MARQUETTE	3069	2544	2598	2660	1971	1554
+						
EAST UP NORMS	3265	2556	2625	2680	1537	1586
CORNELL	3265	2825	2887	2958	2107	1800
SSMARIE	3020	2659	2717	2784	1910	1617
+						
N. W. LP NORMS	3087	3170	3239	3299	1995	2044
BEULAH	3577	3261	3325	3412	2366	2139
BINGHAM	3617	3240	3303	3390	2437	2111
NORTHPORT	3212	2902	2959	3036	2073	1819
OLDMSSION	3425	3113	3174	3257	2264	2042
+						
N. E. LP NORMS	3020	3099	3165	3165	1929	1975
ALPENA	3342	3042	3102	3182	2198	1963
ROGERCITY	3384	2985	3044	3122	2248	1909
+						
W. CENT. LP NORMS	3358	3450	3526	3526	2212	2269
FREMONT	3778	3371	3442	3536	2538	2199
HART	3583	3231	3299	3389	2370	2080
LUDINGTON	3356	3061	3125	3211	2158	1927
+						
CENT. LP NORMS	3445	3535	3612	3612	2287	2342
ENTRICAN	3704	3350	3417	3508	2482	2179
+						
E. CENT. LP NORMS	3478	3573	3656	3656	2317	2375
BADAXE	3662	3417	3490	3592	2474	2249
SAGINAW	3930	3597	3674	3781	2676	2444
+						
S. W. LP NORMS	3790	3897	3990	3990	2573	2642
BHARBOR	4122	3659	3733	3844	2828	2454
FENNVILLE	3849	3446	3516	3620	2581	2306
GLENDORA	4144	3671	3745	3856	2841	2458
GRANDJUNC	4152	3769	3845	3959	2865	2552
HOLLAND	4198	3874	3952	4070	2900	2643
KENTCITY	3910	3643	3717	3827	2663	2447
SPARTA	3792	3399	3468	3571	2539	2213
WATERVLIET	4144	3671	3745	3856	2841	2458
+						
S. CENT. LP NORMS	3707	3810	3899	3899	2510	2577
BELDING	3786	3418	3489	3590	2554	2239
COLDWATER	3905	3689	3765	3874	2639	2470
ELANSING	3830	3607	3682	3788	2567	2415
+						
S. E. LP NORMS	3728	3833	3925	3925	2522	2589
DETROIT	4345	4111	4196	4317	3027	2838
FLINT	3993	3762	3839	3951	2725	2545
MILFORD	3823	3475	3546	3649	2566	2294
ROMEO	3880	3604	3678	3785	2642	2402
SALINE	3948	3738	3815	3926	2676	2526
TOLEDO	4342	4043	4126	4246	3018	2795

* Since weather data for some agricultural stations are not available prior to April 1st, GDD values for those stations during February and March are estimated with closest available station data.
** District normals were calculated as the mean of daily GDD totals at several stations within each district for the period 1951-1980.



Crop Advisory Team Alerts

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