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Fruit Crop Advisory Team Alert

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Last issue for 2010

This is the final issue for the 2010 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.

We will continue to publish timely articles at the *Fruit CAT Alert* web site: <http://ipmnews.msu.edu/fruit>. Interested in staying informed via email notification? Send an email to catalert@msu.edu with your full name and note that you wish to subscribe to the fruit edition.

We love to hear feedback from our readers. Do you have a comment or suggestion? Please send it to catalert@msu.edu or mail it to the address on the back of this newsletter. Indicate whether you are referring to our fruit, vegetable, field crop or landscape edition.

This is our last issue with assistant editor Andrea Gooch. We wish her well at her new job in Kalamazoo and will miss her excellent skills here at the MSU IPM Program.

Thank you. - Joy Landis, editor and Andrea Gooch, asst. editor

Cherry green ring mottle virus confirmed in tart cherry in Northwest Michigan

George Sundin, Plant Pathology; Nikki Rothwell and Erin Lizotte, NWMHRS

We have received confirmation of our diagnosis of green ring mottle virus (GRMV) in tart cherry samples obtained from northwest Michigan this past July. Symptoms of green ring mottle virus infection are usually expressed in late June to mid-July. The main symptom of the infection is bright yellow leaves with circular green blotches (see photo from previous [July 27 Fruit CAT Alert article](#)). These infected leaves can be easily removed from trees during shaking at harvest, or will defoliate naturally. In 2010, defoliation approached 40-50 percent of the leaves on each affected tree. Green ring mottle virus symptoms appeared sporadically this year (one to a few infected trees per block). Sometimes fruit is affected by green ring mottle, and will look indented with streaks of dead tissue to the pit. We did not observe any fruit symptoms in 2010.

The first year that symptoms of virus infection are expressed in trees is typically the worst ("symptom burst" effect). In subsequent years, virus disease symptoms are

usually reduced and reach a more moderate level. There is no cure for virus infection, and trees with green ring mottle virus symptoms in 2010 will continue to harbor the virus. However, we do not know what environmental conditions led to the outbreak observed this year. Thus, we do not know if green ring mottle virus-infected trees will appear symptomatic in 2011.

Natural spread of green ring mottle virus is very slow, and appears to occur tree-to-tree via root grafts. The virus is also spread by grafting at the nursery stage. Indeed, with virus indexing, we should not be seeing this disease in virus-free nursery stock. We currently do not know the source of the green ring mottle virus infections observed this year, or if the virus could possibly be vectored by an insect. We will be on the lookout for green ring mottle virus symptoms in 2011 and, if they appear, we will be assessing orchard blocks for evidence of spread of the virus and examining mechanism(s) of spread. **IPM**

Reduction of overwintering inoculum in orchards with apple scab

George Sundin, Plant Pathology and Amy Irish-Brown, MSU Extension Educator

Apple scab infection was prevalent this year, mostly due to three issues: (1) heavy inoculum carryover from 2009, which was a bad scab year; (2) large number of scab infection periods in 2010; and (3) the inherent difficulties in controlling scab when we are reliant on a protectant fungicide program.

Orchards with existing apple scab infections on leaves will again carry over significant inoculum into next season. Same as last year, much of this inoculum will likely be resistant to strobilurin fungicides. Even though strobilurins have not or should not have been used for scab control in 2010, we have evidence that the strobilurin resistance phenotype is pretty stable in the scab population year-to-year even in the absence of strobilurin use in orchards. Thus, any methods that would be useful in reducing this inoculum load are important to give consideration to.

The apple scab fungus overwinters in fallen leaves. During the following spring, the fungus undergoes a sexual cycle and produces a fruiting body called the pseudothecium that contains the ascospores. These ascospores are the spores that represent the primary inoculum. Development of these spores is timed with the development of the tree, and the spores can begin to be released around green tip.

Inoculum-reduction methods serve

to reduce the primary ascospore load by eliminating some of the apple scab-infected leaves. Any reduction of scab-infected leaves directly correlates with a reduction in primary inoculum. Now, it is impossible to completely eliminate this inoculum, but spore-reduction strategies have been effective in reducing spore loads by 50-80 percent.

The two main methods for spore reduction are:

1. Application of urea to fallen leaves in fall or spring.
2. Shredding of leaf litter with a flail mower.

A five percent solution of urea (spray urea or greenhouse grade) (40 lb urea in 100 gallons of water) is used to increase the breakdown of leaves. Urea will stimulate indigenous microbial breakdown of leaves; urea can also soften leaves, which are then more easily ingested by earthworms. These native organisms will work better as the temperatures rises; thus, urea applied in November may not be as effective if followed relatively quickly by freezing temperatures and snow cover. An application in spring can be highly effective in spore reduction and the urea may also directly inhibit ascospore formation. Another possibility is the direct application of urea to leaves on trees; this method usually is less effective because if the

leaves do not drop within seven days after application, the nitrogen present will be taken up into the tree and not be available for leaf degradation. Finally, urea sprayed on the ground beneath the tree canopy will also add to the nitrogen fertilization of trees and subsequent N fertilization rates should be adjusted accordingly.

Shredding leaf litter in the spring increases microbial breakdown of leaves by providing more pieces that can be invaded and consumed. In addition, mowing tends to re-orient most of the leaf pieces on the orchard floor. When the scab fungus is developing pseudothecia, the structures are all oriented in a vertical direction with the opening facing up. The spores are forcibly ejected out of the top of the pseudothecium. If a leaf piece containing a pseudothecium is inverted, the spores are ejected into the soil and not into the air. Thus, re-orientation also decreases inoculum load by preventing the fungus from effectively discharging spores. A few other points: 1) the mower must be set low enough to reach leaves low to the floor; 2) the mower must be offset to reach leaves beneath the trees; 3) if the mowing is done later in the spring, the re-orientation of leaves is also effective. Prior to spring, the pseudothecia structures have not developed yet. **IPM**

A late-season flight of grape berry moth

Rufus Isaacs, Entomology

This article was originally published to the Fruit CAT Alert website on September 9, 2010.

Monitoring traps for grape berry moth checked in the past few weeks across southwest Michigan have indicated an upswing in activity from grape berry moth at high pressure sites, with associated egg laying on berries. This pest pressure seems mainly in traditional hot spots, but growers are advised to check their vineyards (especially on wooded borders) to look and see whether they are getting new infestations developing at the vineyard edges. With the cooler nights and windy

days this week, the suitability of the weather for berry moth mating and reproduction is not ideal. But, this pest has apparently been able to provide some late-season pest pressure by trying to fit in another generation.

If vineyards are being harvested this week or next they are unlikely to benefit from attempts to control berry moth, because larvae are either already inside berries, or the eggs laid in the next week will grow slowly under these cool temperatures, making them less likely to be detected. For those hot spots where additional activity is being seen in vineyards that are being harvested later

in September or early October, growers will need to decide whether additional expense is worthwhile at this point in the season. This decision will obviously need to take into account the level of infestation, expenses to date in the vineyard, and the level of crop present.

Why are we seeing this late season berry moth activity? With the very warm 2010 season, we have accumulated sufficient degree days for a fourth generation of this pest, exceeding the 2,430 growing degree days from wild grape bloom that is required to start another generation. This is much more than usual, and the insects are

responding to this heat. For comparison with last season, we had accumulated 2,660 grape berry moth degree days in Berrien Springs yesterday, September 8, whereas only about 2,100 had been accumulated at this time last year. In a typical season, as the days get shorter in August grape berry moth enters a

resting state or “diapauses” so that larvae develop to pupae and then stop at the pupal stage to make it through the winter. With this season’s hot summer, they apparently could detect the signal from the environment that it might be worth trying another generation, and so the heat counterbalanced the usual

effect of the shorter days. This resulted in a significant portion of the larvae developing through to adult moths that are now flying, mating and looking for egg-laying sites on clusters. As a result, we are now seeing some higher late-season activity from berry moth. **IPM**

Fruit and vegetable pollinator survey – let your opinion count

Rufus Isaacs, Entomology

We are working with a diverse group of researchers and farm educators to develop a strategic research and education proposal to the USDA Specialty Crops Research Initiative grant program. The focus of the proposal is

on understanding the role of native bee pollinators in specialty crops and how to improve habitat and farm management to increase pollination by bees. To help us develop the most relevant research for agricultural producers – and to

help us assess the current level of awareness among those producers – we are conducting a brief survey. If you have time and are interested in crop pollination, please follow this link: <http://bit.ly/pollinatorsurvey> **IPM**

Specialty crop and Minor-use pesticide prioritization in the 2010 IR-4 Food Use Workshop

Satoru Miyazaki, John Wise, and Bernard Zandstra

Since 1963, the IR-4 Project (Interregional Research Project No.4) has been the major resource for providing pest management tools with growers of specialty crops (or formerly known as minor crops) and sometimes, minor uses on major crops by developing registration data to support new EPA tolerances and labeled product uses. Due to the current review of crop protection chemicals under the Food Quality Protection Act and the high cost to industry of product registration, specialty crops are at risk of having few available pest management products or being lost for pest management. To alleviate this problem IR-4, primarily funded by USDA-NIFA, facilitates pesticide registration for specialty crops by conducting field residue trials, and occasionally, efficacy trials. Specialty crop research needs are prioritized each year during a national workshop since resources are limited. The primary objective of this workshop was to have the participants identify the most important research projects for the 2011 IR-4 research program.

Research priorities for the year-2011 field residue program for fruits, vegetables, field crops and herbs grown in the United States and Canada were assigned at the Food Use Workshop held September 14-15 in Summerlin,

Nevada. The workshop was attended by Drs. Bernard Zandstra, Mary Hausbeck, Satoru Miyazaki, and John Wise of Michigan State University, along with other specialty crop/use researchers, extension specialists, representatives of

commodity and industry groups across the country, and personnel from EPA, USDA, IR-4 plus the AAFC (Canadian counterpart of minor use program), and PMRA (Canadian counterpart of U.S. EPA) personnel.

Priority A's for fruits

Commodity	Group	Chemical	Pest problem
Cherry	12	Emamectin benzoate	Obliquebanded leafroller
Cherry	12	Spinosad	Spotted wing drosophila, leafrollers, other lep insects, western flower thrips
Peach	12	Metrafenone	Powdery mildew
Plum	12	Spinosad	Spotted wing drosophila, leafrollers, western flower thrips
Caneberry	13-07A	Pendimethalin	Broadleaf & grass weeds
Blueberry	13-07B	Byi 02960	Blueberry maggot, aphids
Blueberry (high bush)	13-07B	Pendimethalin	Annual weeds
Currant	13-07B	Simazine	Weeds
Grape	13-07F	Mesotrione	Annual broadleaves, yellow nutsedge
Cranberry	13-07GH	Rimsulfuron (mana)	Asters, narrow-leaved goldenrod, buttercup, yellow loosestrife, yellow nutsedge

More than 160 people attended the two-day meeting for each discipline session. Participants were provided with a complete list of all pesticides “nominated” with desired priority (i.e.; A or B rating) by regions for consideration prior to the meeting. This “nomination” process, introduced four years ago, greatly streamlined project selections and allowed the participants to spend more time reviewing only the worthy projects. As a group they ranked

products based on need, performance, safety, availability of alternatives, and compatibility with the IPM program. Only a limited number of projects could be assigned “A” (entomology [16], weed science [16], plant pathology [18]). An “A” priority guarantees IR-4 to begin the field residue program immediately the following season, with expectations that a complete data package be submitted to the EPA within 30 months. Ten fruit projects important for Michigan were

assigned A priorities. (See the attached table). Any “B” priority projects must be upgraded to A priority either by an Priority Upgrade Proposal (PUP) or by regional upgrade. The following new candidate priority “A” projects listed are preliminary until affirmed at the IR-4 national planning meeting on October 26– 27, 2010. A complete listing can be found on the IR-4 web-site (<http://www.ir4.rutgers.edu>). **IPM**

Challenges of growing fruits and vegetables in plastic tunnels

Hannah Stevens, Extension educator

In cold climates such as Michigan, gardeners and growers have had success with lengthening the growing season in spring and fall by using row covers, low tunnels and various types of greenhouses. More recently, a trend towards buying local has lead some producers to explore on-farm winter storage as well as the production of fresh greens that survive and thrive in these structures during the winter. High-tunnel production can lengthen the growing season and provide producers with a means to enter the market earlier with high value crops. This has the potential to expand the availability of healthy locally grown crops. In addition, in several states, including Michigan, there are incentive dollars available to growers who would like to try high tunnel production systems.

Pest problems and their management in greenhouses and high tunnels are different than field grown fruits and vegetables, and an understanding of those differences is needed to capitalize on early and late season markets. Soil, water and nutrient management are also unique to these systems and markets for these crops need to be developed and well understood. [MSU Extension](#) would like to invite interested growers to a

webinar series sponsored by the [Great Lakes Vegetable Working Group](#), the [University of Illinois Extension](#), and a Sustainable Agriculture Research and Education Professional Development grant. These programs include five 1-2 hour webinars produced on November 1, 3, 8, 16, and 18. You can view the webinars at home via your computer or at the suggested places set up throughout the state.

Webinar One (November 1, 6:30-8:30 PM) will provide an overview of season extension methods and economics and weed, insect and disease control.

Webinar Two (November 3, 6:30-8:30 PM) will address production systems for tomatoes and related crops, cultural, organic and other pest control methods as well as grafting techniques.

Webinar Three (November 8, 6:30-8:30 PM) will include an overview of winter crop production systems including a discussion of economics, sanitation, plastic management, production sequences, crop selection, sanitation for a simple hoophouse, greenhouse, in-ground, in container, row covers, and low tunnels. Pest management and storage will also be discussed

Webinar Four is titled “Management of Nutrients, Water, Soil, and Other

Production Considerations in High Tunnels” and will be broadcast November 16 at a different time than the previous three webinars. This will be a brown-bag lunch webinar airing from 1:00-2:00 PM. The first 50 participants or organizations to include webinar four as part of their registration, will receive a free copy of the “High Tunnel Production Manual” published by Penn State.

Webinar Five is titled “Interpreting NRCS High Tunnel Project Guidelines.” This will also be a brown-bag lunch webinar on November 18 from 1:00-2:00 PM and will clarify the support available through the EQIP program.

Pre-registration for this webinar series is mandatory and can be found at http://www.surveymonkey.com/s/season_ext. The cost for the series is \$30 whether you attend one or all five webinars. Each webinar will be recorded and available on several state IPM or vegetable oriented websites for viewing soon after its original airdate. For people who do not have a broadband connection, we are identifying several places throughout each state to host the webinar series.

For more information, please check out: <http://bit.ly/plastictunnels> **IPM**



I – Southwest

Mark Longstroth,
Bill Shane and
Diane Brown-
Rytlewski

2010 weather summary

The 2010 growing season will be remembered as coming early. The winter of 2009-2010 was a mild Michigan winter. January seemed milder than normal because of a warm spell when temperatures were generally above freezing and most winter snow melted. The coldest days of the winter were at

the beginning and end of January when low temperatures briefly fell close to zero. The snow and cold returned in February. Snow storms deposited several feet of snow and the highs seldom rose above freezing, for the entire month.

Spring and the month of March began on the same day in Southwest Michigan, with highs in the 50s and lows above

freezing. Bud swell was underway by mid-March. March's warm weather continued into early April with highs near 80°F. Intense hail and wind storms on April 6 caused significant damage in northern Cass, southern Kalamazoo and southwestern Van Buren counties. Warm temperatures in April caused rapid development. Sweet cherry bloom was almost three weeks ahead of normal.

The first significant freeze occurred on April 19, during tart cherry and apple bloom. Grapes, apples and tart cherries in low sites suffered significant injury. The April 19 freeze was followed by cool weather and another freeze on April 28. The final serious freezes took place on May 9 and May 10. These freezes caused some damage in blueberries and strawberries.

April and May were fairly wet and flooding was a problem in poorly drained fields early in the season. June, July and August were relatively dry and hot with highs generally in the 80s and lows near 60°F. The last weekend of August was hot with highs in the 90s. By the end of August drought stress symptoms were common in tree fruit and blueberries. The variability in rainfall between the different sites was very pronounced. Some sites received more than an inch and others only about a quarter inch of rain. The fruit harvests were early, due to hot weather in early April, high degree day accumulation and light crops in many locations. The 2010 season was 10 to 14 days ahead of normal. 2007 was a comparable year in heat accumulation.

Tree fruit

Because of a warm March and several very warm weeks in early April, bloom was about two weeks early. Growers scrambled to get bees into their orchards and finish up pruning. Once bloom began, temperatures were more seasonable, so that generally bloom for most fruits was stretched out over time. Japanese beetles were generally scarce. [Oriental fruit moth](#) was a serious pest in the late season. Apple flea weevil, a pest many years ago, resurfaced this year to cause severe losses in some organic apple orchards.

The **apricot** crop was light. Apricots were in full bloom on about April 8. The normal full bloom date is April 17. Apricots suffered some damage from the freezes, so that fruit thinning was not a

Southwest Michigan GDD totals March 1 through September 19				Grapes start April 1
Location	GDD 42	GDD 45	GDD 50	GDD 50
SWMREC	4266	3738	2909	2874
Fennville	4046	3524	2711	2683

major issue. The crop was average and fruit size and quality were good.

The **peach** crop was fair in southwest Michigan. Peaches suffered some damage from winter cold. This was apparent as flower buds fell off the trees when growth began in the spring. At the time of the April 19 freeze, the bloom of large, flowered, showy-type peaches was ending and non-showy types were at full bloom. Bacterial spot was a significant problem in orchards exposed to wind-blown soil. Oriental fruit moth pressure was significant this season. Many growers reported late infestations in their orchards.

Sweet cherries in good sites suffered little loss from freezes. [Bacterial canker](#) and [cherry leaf spot](#) were common and rains as the fruit ripened also caused significant losses.

Tart cherries were at full bloom on April 19. Most of the blooms opened on April 13 when temperatures were about 80°F for two days in a row. Several freezes caused extensive damage by killing or scaring the fruit. The tart cherry crop was generally light and graded poorly. [Bacterial canker](#) and [cherry leaf spot](#) were common and many orchards were defoliated early. This will reduce the winter hardiness of the trees this winter since they will have reduced carbohydrate reserves.

In **plums**, Oriental plums suffered severely from the April 19 freeze, and the crop was light. European plums also suffered damage. The initial fruit set was light, and the crop was small. Black knot was common indicating that controls were poor in previous years.

In **apples**, many varieties were at king bloom by April 19. The normal full bloom date for apples is May 8, so we were almost two weeks early. The April 19 freeze caused considerable damage in many orchards. Cold conditions during bloom or perhaps the freezes on May 9 and May 10 resulted in light apple crops throughout the area. Many orchards were abandoned due to the light crop. Fire blight problems were primarily associated with trees having overwintering fire blight cankers.

Newly planted orchards were generally unscathed by fire blight this year. The zone of streptomycin resistant fire blight bacteria moved slightly west in central Berrien County and east in southern Van Buren County. Wet conditions in the spring made it a good year for apple scab and many orchards had significant infestations and early defoliation.

Warm temperatures in the 30 days after bloom resulted in apples maturing nearly two weeks ahead of the long term normal. Apple ripening is a week to two weeks ahead of the long term average. Gala harvested ahead of McIntosh in this hot year.

In **pears**, the crop was generally light. Frost damage to fruit shortly after bloom was the primary problem on pears this year.

Small fruit

Blueberry bloom began about May 1. Bloom was generally heavy. Some growers [used sprinklers](#) and frost fans to [protect blueberry flower buds](#) during the later freezes. Little damage was reported. [Mummyberry](#) was not a significant disease this year because the early part of the season when shoot infection would have taken place was relatively dry. Phomopsis cane canker was a major problem this year. Flooding in the fields was a significant problem and then July was hot and dry. Growth was generally poor in the late season in unirrigated fields. Yields were generally at or below average. Bluecrop had a heavy crop year following the light crop in 2009. Jersey yields were down.

Grapes were hard hit by spring freezes. Grape buds were opening and flower clusters were visible in the shoot tips on April 19 when a freeze severely damaged many areas with lows to 26 F. Damage from the April 28 freeze affected the same areas as the April 19 freeze concentrating in low areas where cold air collected. Shoots that escaped damage were killed by the second freeze. In southern Berrien and most of Van Buren counties, freeze lines were visible where shoots growing above areas of freeze damage were clearly visible. Southern Berrien

and most of Van Buren counties had extensive damage to Concord and Niagara vineyards. Grapes growing in higher sites were not severely affected. Many growers stopped spraying their vineyards early in the season due to lack of crop. Because of the wet weather early in the season, phomopsis was a significant problem in many vineyards. The warm season allowed grape berry moths to build to very high levels late

in the year. High populations of grape berry moths caused problems in 2004 as well when the crop was reduced by a freeze early in the season. Downy mildew was a common problem. Harvest of juice grapes should be finished by the end of the month due to the small crop and warm season.

Strawberry suffered from spring freeze damage. Most growers used sprinklers to protect against the freezes.

The harvest season was early and many growers had problems effectively marketing their fruit. Growth after renovation was generally poor due to the dry conditions.

Raspberry and **blackberry** harvests were good and the main problem was maintaining quality due to the dry conditions in nonirrigated fields. **IPM**

2 – Southeast

Bob Tritten

Weather

Warm weather over the last two weeks has continued the trend of our season and degree day totals being two weeks ahead of normal. Many farms have received between 1.0 and 1.5 inches of precipitation over the last two weeks. However, a number of farms have received less than 0.5 inch from four or five wetting events. That means that soil moisture supplies remain much below normal. Some of this rainfall came quickly in the form of thundershowers, and therefore a fair amount of the precipitation was also lost to runoff. Overall, our soils remain dry to very dry across the region. This has impacted fruit crops in a variety of ways, most notably with our apple crop where soils have been dry over an extended period of time causing fruit size to be reduced.

Our season started out very early with a fair amount of warmth early in the season. Throughout the spring our season was running about a week ahead of normal, then in early summer and mid-summer that slowly crept forward even more to a point where we ended our season two weeks ahead of normal. We also had a season that was filled with extreme variables in terms of soil moisture supplies. For the most part, the southern tier of counties received excessive amounts of rainfall in May and early June. Counties to the north, however, tended to be drier throughout that time. In the month of July and August, many areas of the region had extreme drought conditions. Many fruit growers were irrigating on a regular basis beginning in June and running through July and August.

Our spring season was fought with a

Location	GDD42	GDD45	GDD50
Commerce (Oakland)	4036	3523	2720
Emmett (St Clair)	3990	3481	2690
Flint (Genesee)	4012	3501	2709
Lapeer (Lapeer)	3990	3483	2696
Petersburg (Monroe)	4219	3697	2883
Romeo (Macomb)	4085	3570	2766

number of frost/freeze events. The worst of these events occurred on Mother’s Day night, May 9, and continued into that next morning May 10. Temperatures got cold early and stayed cold for a good number of hours. What was different about this freeze event was the fact that it got cold so early in the evening, and that it stayed cold for five to six hours at most of our [Enviro-weather](#) reporting stations. The temperatures recorded at many farms were in the range of 24°F to 26°F. Many of our tree fruits were in full bloom at that time. The tree fruit crops that were most notably affected included apples, pears, sweet and tart cherries and plums. Peaches seemed to escape this frost/freeze event. The best way to describe the net effect of these frost events for tree fruit crops was the extreme variable across the region. While a few growers escaped that frost/freeze event relatively unscathed, others lost 90 percent-plus of their crops due to this cold event. More details to follow in the individual crops section.

Tree fruit

Apple harvest is progressing very nicely throughout the region. Many apple growers are picking Jonagold and Jonathon. Our Gala harvest started about ten days ahead of normal, and that trend continued through Honeycrisp and McIntosh. I would expect that Golden Delicious harvest will begin towards the end of this week. Red Delicious and Northern Spy are ten days to two

weeks away from being mature. The order of maturity or harvest is different this year than it has been in past years. Most notable was that Gala ripened well ahead of McIntosh this season. Honeycrisp harvest was shorter than normal with most growers picking three times instead of a typical four to five. Fruit size was diminished in several varieties; most notably at some farms was Gala. Although I need to say that in certain parts of the region it was odd that Gala seemed to size very well despite the dry soil conditions.

The apple crop was extremely variable this year. A few orchards had 90 percent of a normal crop (not last year’s extremely heavy crop). Most orchards are picking out shorter than what they had expected. If I had to estimate the size of the apple crop at this time (we are nearly one-third of the way through harvest), most growers are feeling like they are picking out around 40 to 50 percent of a normal apple crop. Unfortunately, we have had also a good number of growers that have decided not to spray certain blocks of fruit or their entire crop due to lack of crop. The other thing that is odd about the crop this season has been that we have had orchards that are less than 15 to 20 miles apart that have varied greatly in terms of their crop load. I think a lot of this was caused by the variability of cold temperatures on the Mother’s Day frost/freeze event.

Overall, our apple pest populations

were much reduced for the entire season. We generally had lower levels of apple maggots, most likely due to the dry soil conditions. Codling moth was the exception to the general overall low pest pressure that we saw this year. Codling moth had two strong generations this year with a high amount of flight. There was an exceptional amount of damage from codling moth this season. Oriental fruit moth was also the exception at many farms, being very high numbers of both first and second generation, and that also rolled into the third generation populations being extremely high. There currently are some small larvae being found in some orchards, most of these are codling moth, however, some are oriental fruit moth. I do not think a late season application of an insecticide is needed. The only pest that has been a problem at a few orchards over the last two weeks has been abundant numbers of white apple leafhopper adults. These are often troublesome for the harvest crews. Growers may need to apply control measures to reduce populations in order to help make harvesting bearable. We had manageable numbers of European red mites this year. There were some blocks that had some hot spots, but generally the predators kept their numbers under control. We had excellent numbers of predators throughout the entire season this year.

Our wetter than normal spring at many orchards brought a fair amount of apple scab this year, particularly in the southern part of the district. Many growers applied a record number of fungicides to control apple scab. Complicating apple scab control strategies this year was the number of orchards where fungicide resistance was a problem over the last four years or so. Most growers needed to change their spray program in order to accommodate this resistance issue. Fireblight was not as serious as most seasons at most farms across the region. There are a few orchards that had fireblight later in the season, however, and just a small handful that had an extreme amount of fireblight on susceptible varieties, most notably was Jonathon. Black rot continues to be an ever increasing disease problem in most of our apple plantings. While our growers have applied more fungicides this year to control black rot, it seems as if the problem has been getting worse in the

last three to four seasons. Varieties that have black rot this year included Gala, Honeycrisp, and it appears now that Empire, Northern Spy and Idareds are also most infected.

Pears were impacted dramatically by the Mother's Day frost/freezing event. Where growers did have a pear crop, fruit finish is very poor this year due to frost and freezing scarring. We also had a fair amount of crop loss at many farms. Most farms reported about a third of a pear crop this season. Pear psylla was the most notable pest problem on pears this year, some growers did not seem like they ever had good control of pear psylla throughout the entire season.

Peaches were the exception to the overall poor tree fruit crop this year. Most peach growers reported a good crop of peaches. This was particularly true on better sites, such as in the Romeo area. On poorer sites there were some farms that lost a good number of their peaches due to frost/freezing events. Peach leaf curl continues to be an issue at several farms this fall. This is a disease that most growers have been seeing more of in the last few years. Remember that peach leaf curl control sprays need to be applied after foliage has dropped at fall, or very early next spring before growth begins. Another challenge that many peach growers had this year was their early harvest; low consumer demand for peaches was a problem for early peach varieties.

Sweet and tart cherries were also impacted dramatically by the frost/freezing event of Mother's Day night. Most growers had about 25 to 40 percent of a normal cherry crop. Cherry fruit fly populations were high across the region this year in many blocks. This pest also showed up in traps earlier than what we had seen in the last five years or so. Many growers applied a post harvest application of insecticide to help reduce the populations for next season. Brown rot was an issue with several farms throughout the region during harvest. Since harvest at many farms lost nearly all of their foliage due to extreme amounts of cherry leaf spot infected leaves. This was particularly true in tart cherries. I hope that these cherries are able to survive the winter.

Small fruit

Strawberries have been looking much better since we received some

rainfall over the last two weeks or so. Newly planted fields have filled out the rows quite nicely, and renovated patches seemed like they have come back fairly well. There has been a fair amount of potato leafhopper damage in newly planted strawberries this year, with some farms having excessive leaf curling. The drought also had an impact on strawberries not rebounding well after renovation. Weed pressure has been high at many farms across the region this year. This is particularly true at farms that did not irrigate well after renovation.

Most strawberry growers were disappointed with their yield and sales this season. Most of this was due to the early season and the extreme heat midway through harvest.

Raspberry harvest continues for fall red raspberries and blackberries. Fruit size was diminished for several pickings where soils have been dry over the last month or so. This is turning around fairly quickly now that we have seen some rainfall. I have seen an unusual disease the last three weeks, late leaf rust disease, in fall red raspberries. This is a disease that causes leaves to yellow and drop prematurely. Infected leaves have yellow spots on the upper leaf surface and light yellow spores on the bottom sides of the leaves. This disease also has infected the raspberry itself, making it unsalable. The disease is variety specific with some being resistant and others being fairly susceptible.

Summer red raspberries were a disappointment at many farms across the region. Many growers had delayed winter injury where canes became to collapse at the midpoint of harvest. This was also impacted by some extreme levels of anthracnose, which infected canes last summer. I have talked to summer red raspberry growers that claim that they picked only 20 to 40 percent of their normal crop this season.

Blueberry harvest wrapped up at most farms two weeks ago or so. Until the third week or so of August, most farms had a nice crop of blueberries with good quantity and good fruit size. Blueberries were one of those crops that appeared to be unaffected by the Mother's Day frost/freezing event. We saw lower than normal amounts of blueberry maggot this year, again most likely due to dry soils.

Grapes are nearing harvest for

Niagara and several of the wine grape varieties. Grape berry moth was not as much a problem at most farms as

it has been the last two years or so. Downy mildew was a serious disease problem at many farms this year. Also

there were many grape blocks that were impacted by Mother Day's frost/freeze event. **IPM**

3 – Grand Rapids Area

Amy Irish Brown

Phil Schwallier

Carlos Garcia-Salazar

Weather and crop summary – Amy Irish Brown and Phil Schwallier

2010 was certainly a rollercoaster year when it came to the weather. We had one of the earliest green tip dates in 40 years on March 23, which started the season off about two weeks ahead of normal. Degree day accumulations went from two weeks ahead to about seven days behind and then back ahead of the average again. As of mid-September, degree days are now totally about two weeks ahead of normal averages. The early spring spurred tree growth and several cold snaps reduced most tree fruit crops to about half. There was quite a bit of variability in crop set that mostly depended on the site and crop stage at the time of the cold weather snap in early May. There are some orchard sites with no fruit at all and other blocks, not that far away, with 60 to 70 percent of a crop. Growers with wind machines reported a definite increase in their crop set because of these machines and a few more have been installed in the area because of it.

Disease problems

Depending on the site, there were 16 to 19 wetting periods during primary scab season, 9 to 11 of these were apple scab infections. There were between 6 and 10.5 inches of rainfall recorded at the four different weather stations in the general Grand Rapids area. All this wet weather led to some problems keeping primary scab out of apple blocks. Apple scab was certainly better controlled in 2010 than in 2009, but some growers were still disappointed to see it after all the spraying they did to try to prevent it. With the loss of strobilurins and SI's to help with any back action against scab, it was difficult to stay ahead of all the rains this year with only protectants.

Fire blight was less of an issue this year than usual, but there were a few days during bloom when the blossom blight risk was high and preventative

sprays were needed. The use of Apogee for shoot growth control has significantly reduced the amount of fire blight we've had in the last two years. There was a section 18 for Kasumin use this year and those that used it reported favorable results.

Powdery mildew seemed to be more prevalent in susceptible apple varieties in 2010. The weather was hot and humid very early in the season, which got mildew established early and made it difficult to stop.

Brown rot in sweet cherry was very prevalent and somewhat of an issue in other stone fruits. In sweet cherry, there was a lot of cracked fruit due to a light crop and several rain events. Add high temperatures and humidity to this and you get lots of brown rot. It was difficult to stay ahead of this disease in sweet cherry.

Insect pests

After some record-breaking early biofix dates and then cooler than normal weather before the heat and humidity moved in for much of the summer, the tree fruit insects in general were pretty normal in their development. There were some higher than expected codling moth numbers in 2010. After 2009's record cold summer and very low codling moth numbers, some were surprised to have the trap numbers right back to 2008 numbers or even a bit higher. Despite the higher numbers, there is very little fruit damage from codling moth overall. There was some concern about a possible third generation of codling moth this year, but the trap numbers did not reflect this occurring.

Obliquebanded leafroller numbers were slightly higher in 2010 than we've seen for the past five years. Growers are encouraged to do more extensive monitoring with traps in 2011 for obliquebanded leafrollers.

One head-scratcher for 2010 was European red mites. In 2009 (a cold year), European red mite numbers were unexpectedly very high with bronzing in some blocks as early as June. With all the hot weather in 2010, it was expected that European red mite numbers would

again be very high. Not so – even in the same blocks with the very high numbers in 2009. There have been many theories as to why, but the most probable reason is the presence of beneficials in 2010 that just weren't there in 2009.

Potato leafhoppers were very prevalent this year, and there was plenty of hopper burn in the area. While the leaves are cupped and curled, it did not seem to slow down shoot growth as much as expected. A light crop load, plentiful rains and high sunshine levels seemed to overcome the stunting that we would normally expect with such high levels of potato leaf hoppers.

Apple maturity

Today, on September 21, growers are in the busiest time of harvest – something that normally is said for the first two weeks of October. Like many other tree fruit crops, apple harvest is two weeks ahead of normal dates and moving along very quickly. Our apple maturity testing is showing a broad range of maturity even on the same tree. Physiological disorders are more pronounced in 2010 due to the lighter crop load. There are some blocks and varieties with frost marked apples, but given the rough start to the season, there are many blocks with very high quality apples being harvested. Growers report picking out shorter than expected, yet they feel the estimated crop numbers are about right.

2010 end of season blueberry report – Carlos Garcia-Salazar

In 2010, there were many issues related to weather conditions that affected blueberry productivity. One of the most serious issues was weather conditions during the bloom period. Low temperature affected the length and uniformity of the bloom period, which created pollination problems. This resulted in uneven fruit size and problems at harvest time. Another problem was spring frost damage. Although many growers were able to escape severe damage in early varieties by frost protecting their crop, some others were not so fortunate. There were reports of yield loss in fields where the

frost protection system was not properly activated or was not turned on. Losses in those fields varied widely. We conducted a field evaluation right after the last frost event and found that unprotected fields or fields where the frost protection failed had fruit set losses that reached 20-30 percent. In most cases, this was confirmed at harvest time.

Pollination and productivity of some Jersey fields was also affected. In most cases, this was the result of low pollination. Fields under good pollination conditions yielded on average 5 to 6 thousand pounds per acre reported 30 to 40 percent yield reductions. At harvest time, hot weather conditions in July and August combined with excessive rain also affected the fruit quality. There were multiple complaints related to soft and leaky berries. There were instances in which fruit harvested for fresh packing had to be diverted for processing. This resulted in heavy economical losses for growers and packers/shippers alike.

Despite all these issues, statewide blueberry production was a little bit higher than in 2009. Industry preliminary estimates indicate that the size of the blueberry crop in 2010 will be of approximately 203 million pounds.

Post harvest issues

There are several issues related to post harvest management of blueberry fields that need attention. At this time, two things need to be considering in preparing your fields for next year’s season. The first one is disease control.

Phomopsis twig blight and canker is present in many fields and is becoming a continuous problem for many growers. Also, mummy berry shoot strike is a recurrent problem. Growers need to be aware that the beginning of the infection for both diseases occurs at the end of the previous season. Every year after the fruit has been harvested blueberry bushes tend to reinitiate vegetative growth. Once the competition between fruit and vegetative growth is removed, the bush directs all nutrients to develop new buds and to produce new shoots. Unfortunately, not all the new growth is mature enough by the time the first killing frost occurs in October or November. The frost injury provides the inoculum a port of entry into the plant that remains dormant in damaged shoots until next spring. At bud break, the pathogen resumes development and a new disease starts again. To break this cycle, protecting the new growth at the end of the harvest is critical. One or two fungicide applications after harvest before the bushes enter dormancy have proven to be very effective to reduce the incidence of mummy berry and *Phomopsis* the following season. For fungicides and recommended doses, consult the *Michigan Fruit Management Guide* (E-154) or call your local Extension educator.

The second issue is bud mite sampling. Sampling your fields for the presence of bud mites may help you to eliminate one source of concern if you had fields with low productivity that

could be attributed to spring frost or pollination problems. If you had bud mites in the past, it is possible that the problem is still there. At this time, bud mites can be controlled easily because flower buds are still open and the insecticide penetrates with no problem. We offer our diagnostic services to help those growers interested in determining if they have a problem with bud mites. Like in the past, this service is free of charge.

Growers interested in this diagnostic service need to bring their shoot samples to the [MSU Trevor Nichols Research Complex](#) (TNRC) in Fennville, Michigan. Sample preparation should be done as follow:

- 1) Take 10 shoot samples 5-inches long and put them in a plastic bag.
- 2) Place the plastic bag in a cooler to maintain the sample is fresh.
- 3) Label each sample with your name, farm name and address, phone number and email (if available).
- 4) Samples should be left at TNRC with an attention note for “Carlos Garcia.”
- 5) Do not bring dry shoot samples.

Once the samples are examined, the results will be sent to you via email or by phone.

If you have question about these issues, do not hesitate to contact me. Please call Carlos García, 616-260-0671 or email to garias4@msu.edu with all your questions. **IPM**

5 – Northwest

Nikki Rothwell, Duke Elsner, Erin Lizotte and Rob Serrine

Weather

Like most regions of the state, northwest Michigan had an extremely warm, sunny summer. However, we had ample rainfall for the season and did not experience our more typical dry spells mid-season. Overall, we accumulated 3,848 GDD base 42 and 2,542 GDD base 50, and these accumulations were much higher than our 20-year average, which was 3,437 GDD base 42 and 2,241 base 50. With the heat this season, we were at least two weeks ahead of a typical season, and we had

the earliest bloom since 1945. In April, we had three days into the 80’s and had already accumulated 484 GDD base 42 and 234 GDD base 50; we had 2.6 inches of rainfall that month. In May, we continued with the warming trend with high 70’s and 80’s, and three days that reached into the 90’s. Rainfall was similar to April with 2.52 inches of rain. In June, 66 percent of our days were in the 70’s and 80’s, and we had ample rainfall this month with 5.6 inches of rain. July and August again followed the early season heat with 77 percent of days in the 80’s or above in July. In these two months, we had 1.86 inches of rainfall in July and 3.65 inches in August. September has started off cooler, windier, and rainy – temperatures

have been in the 50’s and 60’s, and we have had approximately 3 inches of rain.

The big weather events came early with the warm up with some substantial frost and frost damage. We had multiple typical inversion frosts and one wind freeze. All fruit crops were damaged, but the damage was variable between blocks and between trees within the same block.

Fruit crops

As mentioned above, the spring frosts results in loss of yields in many crops throughout the region. However, the damage was not easy to quantify likely due to the inversion frost and wind freeze event. For instance, some sites that were located on the tops of

the hills (high sites) had just as much damage, if not more, than some of the lower, more frost prone sites. Proximity to water was crucial, particularly on the east side of the northwest region (Antrim County). Southern areas tended to fair slightly better than more northerly sites, but overall yields were down across the board.

Sweet cherry crops were damaged, and most growers sustained about 40-50 percent damage, and fruit that remained had some frost scars. However, sweet cherries were valuable this season, likely due to the reduced crop. Some growers tried to harvest brine sweet cherries with stems and were successful. Cannery that made it through the frost had some issues with cracking due to the rainfall in June. We harvested sweet cherries much earlier than in most years.

The **tart cherry** story was unique this year as the northwest region of the state was unregulated because of substantial loss to the crop. Other than 2002 when the whole Michigan tart cherry crop was lost, northwest Michigan has not been unregulated since the Federal Marketing Order has been put into place. Quality of tart cherries was also reduced by the heat of the season.

Apples were also hit by the frosts of the spring and earlier blooming varieties were harder hit than later varieties. There are frost scars appearing on fruit as harvest is now underway, and color was a concern for growers with the hot season. Apples are starting to color up nicely in the past week or so, and the size of fruit is good this year. With the ample rainfall, apple trees have tremendous growth as do cherry trees.

Lastly, **winegrapes** are the highlight of this summer's warm temperatures. Despite some of the frosty situations in the spring, most vineyards fared well. Even vineyards that were hit with frost had somewhat of a thinning effect and left growers with enough fruit to produce quality clusters. The brix on the grapes is climbing as we move into the fall, and some early varieties have been or will be harvested in the coming week. The wines made from the 2010 season will likely be excellent because of the warm temperatures.

Pest report summary for 2010

Apples. Fire blight was less of a challenge this season with cool conditions during much of bloom,

which occurred during the first part of May. In fact, here at the station the fire blight model never predicted epiphytic infection potentials (EIPs) over 100, indicative of a potential infection period. Around the region, bloom time and weather did fluctuate enough to warrant a streptomycin application in some orchards, although these applications were typically in high pressure sites with susceptible varieties and borderline EIP values. Apple scab season began early with green tissue appearing in early April just in time to coincide with a moderate scab infection period. The season had a total of 7 infection periods (2 light, 4 moderate, and 1 heavy) occurring during primary scab, which ended in early to early June. Symptoms of scab did not become visible until late June in most area orchards.

Codling moth (CM) biofix (sustained catch) on May 20 with steady trap catches for first generation extending until the end of June. Second generation flight did not appear until late July at the NWMHRS, although area growers reported a less distinct pattern between first and second generation flight. Spotted tentiform leafminer (STLM) emerged in late April, and we continued to catch them through August, with peak flights on May 4 and August 29 with average trap counts of over 400. Overall, STLM are down compared to last year when peak flight reached 1,150 per trap in 2009. Obliquebanded leafroller (OBLR) were first caught on June 7 in the station apple blocks with variable trap catches throughout the season and a high trap catch of 17 moths on 12 July. OBLR are continuing to be trapped as of August 23. Apple maggot was detected in many orchards this season with variable trap catches, we only caught one on July 20 in the trap block by the NWMHRS. European red and plum nursery mites were also reported in significant levels, particularly toward the end of this season.

Cherries. We observed what has been confirmed as green ring mottle virus (GRMV) in some orchards, while in others we observed the expression of cherry yellows virus. The GRMV diagnosis was confirmed by laboratory testing at Washington State University. Refer to the *Fruit CAT Alert* article "[Appearance of a virus disease of tart cherry in northwest Michigan](#)" for more information

about GRMV. With significant leaf loss from virus early and intense leaf drop from cherry leaf spot infections, growers are concerned about winter hardiness. Cherry leaf spot (CLS) infections were frequent this year, with the NWMHRS weather station predicting 24 CLS infection periods (13 low, 5 moderate, and 6 high) from 30 April-1 September. Untreated tarts were completely defoliated by mid-August at the NWMHRS. Cherry leaf spot is present at significant levels, and defoliation is significant in sites where infection was able to establish itself early on. Generally, a single well-timed chlorothalonil (Bravo) application slows the progression of leaf spot infection. Post-harvest applications also help delay defoliation to maintain adequate winter hardiness and to minimize poor fruit quality in the following year. However, due to the early harvest, growers needed to protect trees from infection for a longer period of time after harvest this year. Minimally, the goal is to keep 50 percent leaf retention through September to reduce the risk of winter injury, this level of defoliation does not necessarily prevent adverse effects on fruit quality etc.

Considering the amount of fruit cracking, frost scaring, and wind whip that occurred in cherries this season, American brown rot (ABR) was well managed in most blocks. It looked like problems might occur as infections began showing up just prior to harvest, but the weather cooperated and most growers were able to get the fruit off of the tree before problems occurred. Here at the NWMHRS, we recorded 50 percent infection in untreated Ulsters by late July. Low ABR incidence was a welcome change from last year when much of the region suffered from epidemic levels of this disease. Bacterial canker was present this season, although not particularly intense despite cool conditions in early spring.

American plum borer were first caught in late April, with peak flight occurring in mid-August. Lesser peach tree borer has been emerging since May 17 (almost three weeks earlier than last year), with adult trap catches peaking between May 24 and July 12. Greater peach tree borer emergence began June 14 and continued through

2010 Northwest Michigan Horticulture Research Station insect trap counts averages

	Date	12-Apr	19-Apr	26-Apr	4-May	10-May	17-	24-May	1-Jun	7-Jun	14-Jun	21-Jun	27-Jun	5-Jul	12-Jul	20-Jul	26-Jul	9-Aug	23-Aug
Apple	Codling moth					Trap set	0	19	8	7	2	6	3	0	0	1	0	1	4
	Spotted tentiform leafminer	Trap set	0	140	600	137	225	55	21	0	0	14	225		150	130	19	465	360
	Apple maggot											Trap set	0	0	0	1	0	0	0
	Oblique-banded leafroller						Trap set	0	0	2	5	14.0	9		17	2	2	0	4
	Oriental fruit moth	Trap set	0	0	3	3	0	64	38	0	3	0.0	1		3	0	2	2	2
Cherry	American plum borer	Trap set	0	3	12	2	9	17	0	0	1	0.0	6	*	27	22	13	4	Trap down
	Oblique-banded leafroller						Trap set	0	12	27	43	45.0	48	*	52	10	6	26	Trap down
	Lesser peachtree borer				Trap set	0	2	29	27	13	3	15.0	11	*	30	3	4	1	Trap down
	Greater peachtree borer						Trap set	0	0	0	3	2.0	8	*	32	11	5	1	Trap down
	Cherry fruit fly							Trap set	0	0	0	3.0	21	*	52	28	14	0	Trap down
Grape	Grape root borer					Trap set	0	0	0	0	0	0.0	0	*	0	0	0	*	0
	Grape berry moth					Trap set	0	0	0	0	0	0.0	0	*	0	0	0	*	0

* Unable to check traps due to pesticide application.

August 9, with peak flight recorded July 12. Plum curculio activity was underway in mid-May this season with the majority of egg-laying occurring before mid-June. On June 21, fourth instar (mature) larvae began dropping from the fruit to soil. Adult plum curculio activity was observed well after harvest. Oblique-banded leafroller (OBLR) adult emergence began on June 1 with steady emergence season-long and peak flight occurring in early July. We saw a significant number of OBLR larvae in cherry tanks this year, many of which were larger, mature larvae that were difficult to control with preharvest insecticides. The use of organophosphate and pyrethroids appears to be ineffective against OBLR. We caught our first cherry fruit fly (CFF) on June 21, and the population peaked shortly after on July 12 with the end of flight recorded on July 26. Some area orchards recorded exceptionally high levels of cherry fruit fly, and some growers applied post-season insecticide applications to bring down the populations. High levels of two-spotted spider and European red mites have also been reported and observed in area cherry orchards, it is important to keep in mind that thresholds for mites increase as the season goes on and growers should quantify the population to determine if management is warranted. Lecanium scale was also an issue on young cherry trees this season. The rule of thumb is that vigorous and healthy

trees and plants can tolerate some scale infestation, but if high populations of Lecanium scale are found, control programs should be considered. Natural enemies usually regulate scale populations and prevent outbreaks of these pests, but growers with high populations this season utilized chemical control options. Lastly, sap beetle (adults and larvae) was an issue at cherry harvest, particularly in isolated areas of intensive fruit production.

Grapes. Surprisingly, downy mildew was more prevalent this season, powdery mildew was also a concern this year but neither disease has caused significant issues in well-covered vineyards. Botrytis has been a sporadic issue particularly in vineyards affected by grape berry moth. Grape berry moth numbers were significant in some of our scouted vineyards, with traps continuing to fail in catching adults but larvae being highly visible in clusters. The early season saw major infestations of forest tent caterpillar. It appears that the caterpillars crawled or were blown in from neighboring woodlots but didn't appear to do any significant damage to the newly emerging leaves and shoots at most sites. Management for this pest was not recommended or commonly reported. Forest tent caterpillar follow a boom-bust cycle of population density and the 2009-10 seasons have seen extremely high populations around northwest Michigan. Forest tent caterpillars are a native species with

indigenous natural enemies, diseases, and resource limitations that are expected to naturally control populations in the coming seasons. Overall, potato leafhopper numbers were lower than anticipated with the many early season rains, with many area growers reporting no need for management. Lecanium scale nymphs were spotted blowing into vineyards from surrounding windbreaks—likely a result of the extremely high populations in non-crop tree species. Rose chafer arrived in late June and some vineyards experienced intense pressure and warranted control. Japanese beetle (JB) arrived in low numbers in late July and all throughout August, but we heard no reports of control measures against JB. *Phylloxera*, snailcase bagworms, grape plume moth, and fall webworm were also observed in low numbers this season. **IPM**

12 ----- Fruit Crop Advisory Team Alert - September 21, 2010

ACTUAL AND PREDICTED DEGREE-DAY ACCUMULATIONS SINCE MARCH 1 2010 (*)

STATION OR DISTRICT	BASE 42 BE DEGREE-DAYS				BASE 50 BE DEGREE-DAYS			
	AS OF 2009	09/20 2010	BY 09/25	BY 09/30	AS OF 2009	09/20 2010	BY 09/25	BY 09/30
+-----+-----+								
WEST UP NORMS**		2864	2918	2968		1797	1823	1846
MARQUETTE	2510	3172	3210	3264	1472	1981	1998	2021
+-----+-----+								
EAST UP NORMS		2625	2680	2728		1571	1596	1616
CORNELL	2721	3440	3489	3545	1651	2202	2223	2244
SSMARIE	2599	3387	3435	3491	1509	2107	2127	2147
+-----+-----+								
N. W. LP NORMS		3170	3239	3299		2044	2082	2113
BEULAH	3095	3836	3900	3973	1908	2530	2566	2600
BINGHAM	3094	3824	3888	3961	1926	2528	2564	2598
NORTHPORT	2767	3504	3563	3629	1652	2246	2278	2308
OLDMISSION	2940	3697	3759	3829	1793	2426	2461	2493
+-----+-----+								
N. E. LP NORMS		3099	3165	3223		1975	2010	2039
ALPENA	2875	3564	3623	3689	1759	2322	2354	2385
ROGERCITY	2873	3428	3485	3548	1738	2203	2233	2263
+-----+-----+								
W. CENT. LP NORMS		3450	3526	3594		2269	2312	2349
FREMONT	3328	4026	4102	4182	2092	2694	2740	2779
HART	3175	3888	3961	4039	1966	2578	2622	2659
LUDINGTON	2969	3725	3795	3869	1788	2445	2487	2522
+-----+-----+								
CENT. LP NORMS		3535	3612	3679		2342	2386	2424
ENTRICAN	3259	3940	4015	4093	2033	2638	2684	2723
+-----+-----+								
E. CENT. LP NORMS		3573	3656	3729		2375	2424	2465
BADAXE	3172	3954	4032	4119	1988	2671	2720	2764
SAGINAW	3497	4274	4359	4452	2237	2945	2999	3047
+-----+-----+								
S. W. LP NORMS		3897	3990	4074		2642	2698	2748
BHARBOR	3730	4363	4456	4558	2425	2995	3056	3111
FENVILLE	3471	4166	4255	4352	2208	2810	2868	2919
GLENDORA	3711	4389	4483	4585	2415	3008	3070	3124
GRANDJUNC	3818	4506	4602	4707	2516	3131	3195	3252
HOLLAND	3895	4520	4617	4722	2587	3133	3197	3254
KENTCITY	3699	4117	4205	4301	2409	2793	2850	2901
SPARTA	3362	4013	4099	4192	2103	2677	2732	2780
WATERLIET	3711	4389	4483	4585	2415	3008	3070	3124
+-----+-----+								
S. CENT. LP NORMS		3810	3899	3977		2577	2631	2677
BELDING	3346	4002	4085	4173	2104	2689	2742	2788
COLDWATER	3777	4393	4484	4581	2481	3024	3084	3135
ELANSING	3599	4129	4215	4306	2312	2790	2845	2892
+-----+-----+								
S. E. LP NORMS		3833	3925	4006		2589	2646	2693
DETROIT	4042	4711	4807	4913	2689	3309	3372	3428
FLINT	3508	4332	4420	4518	2241	2991	3048	3098
MILFORD	3392	4196	4282	4376	2137	2872	2926	2975
ROME0	3518	4225	4311	4406	2256	2888	2943	2992
SALINE	3623	4207	4293	4387	2349	2871	2925	2974
TOLEDO	4043	4692	4788	4893	2695	3299	3362	3417

* 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.

Report generated at 10:02, 09/21/10

Michigan State University Cooperative Agricultural Weather Service
 Cumulative Precipitation Summary For 09/20/2010

PRECIPITATION TOTALS SINCE

STATION	DIST	09/14/2010	09/07/2010		08/24/2010		04/01/10	
		(last week)	(last 2 weeks)	Dev. Norm.	(last 4 weeks)	Dev. Norm.	(since Apr. 1)	Dev. Norm.
MARQUETTE	WU	1.60	2.24	0.53	3.57	0.07	22.22	3.43
CORNELL	EU	1.19	2.38	0.67	3.96	0.66	20.38	2.67
SSMARI E	EU	0.90	2.30	0.59	5.35	2.05	18.26	0.55
BENZONIA	NWL	0.43	0.89	-0.74	2.61	-0.57	15.37	-1.31
BEULAH	NWL	0.66	1.16	-0.47	2.86	-0.32	18.08	1.40
BI NGHAM	NWL	0.88	1.53	-0.10	3.00	-0.18	18.78	2.10
NORTHPORT	NWL	0.06	0.13	-1.50	0.26	-2.92	7.24	-9.44
OLDMISSION	NWL	0.84	1.45	-0.18	2.79	-0.39	18.56	1.88
ALPENA	NEL	0.63	1.20	-0.36	1.57	-1.53	18.65	1.98
ROGERCI TY	NEL	0.69	1.31	-0.25	1.79	-1.31	22.26	5.59
FREMONT	WCL	1.23	1.73	0.26	4.17	1.11	15.46	-1.45
HART	WCL	0.30	0.91	-0.56	2.82	-0.24	19.46	2.55
LUDINGTON	WCL	0.19	0.68	-0.79	2.30	-0.76	18.14	1.23
LUDINGTON	WCL	0.19	0.68	-0.79	2.30	-0.76	18.14	1.23
ENTRI CAN	CL	0.58	0.97	-0.42	1.83	-1.12	14.90	-2.84
BADAXE	ECL	0.91	1.26	-0.05	2.84	0.33	20.15	4.28
SAGI NAW	ECL	0.57	0.93	-0.38	1.70	-0.81	16.47	0.60
BHARBOR	SWL	0.85	1.15	-0.36	1.94	-0.87	15.77	-2.45
FENVILLE	SWL	2.97	3.33	1.82	3.88	1.07	27.86	9.64
GLENDORA	SWL	0.98	1.40	-0.11	2.42	-0.39	21.60	3.38
GRANDJUNC	SWL	1.59	1.95	0.44	2.70	-0.11	26.19	7.97
HOLLAND	SWL	1.15	1.61	0.10	3.39	0.58	33.20	14.98
KENTCI TY	SWL	0.73	1.22	-0.29	2.37	-0.44	16.49	-1.73
SPARTA	SWL	0.85	1.53	0.02	3.40	0.59	23.32	5.10
WATERVLIET	SWL	0.98	1.40	-0.11	2.42	-0.39	21.60	3.38
BELDING	SCL	0.62	1.30	0.01	2.12	-0.45	18.77	0.76
COLDWATER	SCL	0.03	0.13	-1.16	1.32	-1.25	18.12	0.11
ELANSING	SCL	1.60	2.09	0.80	3.33	0.76	19.33	1.32
DETROIT	SEL	1.49	1.88	0.63	2.04	-0.32	21.23	3.95
FLI NT	SEL	1.02	1.49	0.24	2.65	0.29	16.09	-1.19
MILFORD	SEL	1.53	1.82	0.57	2.19	-0.17	22.09	4.81
ROMEO	SEL	0.97	1.43	0.18	1.61	-0.75	15.04	-2.24
SALINE	SEL	0.95	1.17	-0.08	1.52	-0.84	24.00	6.72
TOLEDO	SEL	0.54	0.88	-0.37	1.26	-1.10	22.39	5.11

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Crop Advisory Team Alerts

Integrated Pest Management Program
Michigan State University
B 18 Food Safety & Toxicology Building
East Lansing, Michigan 48824 -1302

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