

**Landscape Alert**

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**Forest tent caterpillars and gypsy moths feeding on trees**

Dave Smitley, Entomology

**Forest tent caterpillar outbreak is in full swing**

Blocks of state and national forest are being completely stripped by forest tent caterpillar in the northern Lower and Upper Peninsulas. The caterpillar can be also found in the southern Lower Peninsula as well, but heavy defoliation is more unusual. Oak and aspen forests and woodlots are being hit the hardest, but many other hardwood species are also being stripped, especially when mixed in with oak or aspen.

The caterpillars are about done feeding for the year in southern Michigan and are wandering about and pupating. For more information on forest tent caterpillar, see: <http://www.na.fs.fed.us/spfo/pubs/fidls/ftc/tentcat.htm>

**Gypsy moth defoliation becoming noticeable in some places**

Gypsy moth caterpillars are now a half-inch long or larger in southern Michigan and feeding damage is becoming apparent in infested woodlots.

Oaks, poplars and birch are their favorite forest trees, but gypsy moth may feed on quite a few other hardwood species as well. The outbreaks are localized and scattered throughout the state, so you could see some gypsy moth damage just about anywhere.

The fungal pathogen, *Entomophaga maimaiga*, was very active last year, and is expected to take a heavy toll on gypsy moth caterpillars again this year, reducing the severity and length of outbreaks. Outbreaks can last one to three years.

**Caterpillars defoliating linden trees in some Clinton County woodlots**

In addition to forest tent caterpillar and gypsy moth, we are seeing some cankerworms or loopers, smooth-skinned caterpillars that ‘inch’ or ‘loop’ when they walk. These caterpillars are defoliating linden (basswood or *Tilia*) trees in Clinton County.

**Will forest tent caterpillar or gypsy moth defoliation kill my tree?**

Not usually. If less than half of the leaf canopy is consumed, it will have a minimal impact on tree health. More than 50 percent defoliation can be stressful, and more than 80 percent

Amount of spring defoliation	Impact on shade trees
Less than 30	None
30-50%	Minor stress, a little branch dieback may be visible the following spring.
50-75%	Stressful and likely to cause some branch dieback the following spring. Most trees will return to a healthy state in time.
75-100%	Very stressful, 5-10% of the defoliated trees may die. Survivors may be weakened and branch dieback will be obvious the next spring.
100% two years in a row	May cause extensive tree mortality, especially under droughty conditions.

usually results in the tree pushing out a new set of leaves in July, a very stressful event, because much of the trees starch reserves are consumed in the process. The impact of defoliation also depends on tree health and site conditions, but you can use the table on the first page of this newsletter as a general guide.

Defoliation in late summer or early fall is not as harmful and rarely causes dieback or tree mortality. Also, if shade trees in your yard are defoliated in late June or early July, water the trees when the soil is dry to help them push-out a new set of leaves. **IPM**  
Right, young gypsy moth larvae, 1/2-inch long.

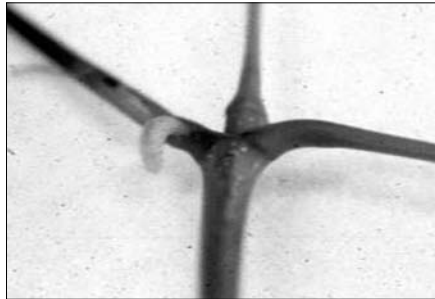


## Maple leaves are falling, what's wrong?

Dave Smitley, Entomology

*Note: This was posted to the Landscape Alert web site on June 5, 2009.*

Nothing is wrong. Early June is when maple petiole borer larvae finish feeding in the petioles of maple leaves, causing the blackened, restricted petiole (leaf stems) to break and the leaf to fall. The stems usually break at a darkened area near the leaf blade. Usually infestations are limited to *sugar maples* and only about 25 percent to 30 percent or less of the leaves fall to the ground. While spectacular, the leaf drop has little effect on tree health. Sometimes spring storms also cause



Maple petiole borer larva emerging from petiole.

some maple leaves to drop. The best way to tell why the leaf dropped is to look at where the leaves came from. If you can still see a small petiole stub attached to the tree, it was most



Maple petiole borer causing restriction of petiole near base of leaf. (Purdue University)

likely due to maple petiole borer. However, if the petiole broke cleanly at the base where it is attached to the tree, it was probably due to wind damage. **IPM**

## Honeylocust plant bug

Dave Smitley, Entomology

*Note: This was posted to the Landscape Alert web site on June 5, 2009.*

I haven't seen much injury to honeylocust trees so far this year, but the next two weeks is when most of the feeding damage occurs. One foliar spray of a pyrethroid, Sevin, Orthene or a nicotinoid insecticide will stop the feeding damage. But remember, the damage will be over by July 1, and the trees will push out new leaves. **IPM**



Honeylocust plant bug injury to honeylocust.  
(Pennsylvania State University)



Honeylocust plant bug adult.  
(Pennsylvania State University)

## West Michigan Summer Nursery Discussion meetings

Thomas Dudek, MSU Extension Horticulture and Marketing Educator

The month of June is here, and it's time to start our **summer nursery meetings** schedule for 2009. This year we've **changed the location and time** for our grower discussions. Please note where we will be meeting:

Conference Room F  
Ottawa County Fillmore Complex  
Administration Building  
12220 Fillmore Street  
West Olive, MI 49460

Enter the building from the north side, take the elevator up one floor and Conference Room F will be in front of you. **The meetings will start promptly at 11:00 AM and be done by 12:15 PM.** Lunch is on your own afterwards. This adjustment was made because we now have a nice meeting room that will allow for better slide presentations, hands-on identification, and an improved learning atmosphere.

We hope you still will find value in joining fellow nursery growers for our round table discussions and sharing which helps the nursery industry grow and prosper in West Michigan. **Feel free to bring plant samples for the discussions. IPM**

### 2009 Summer Nursery Discussion Schedule

**Thursday, June 11 Dr. David Smitley, MSU Dept. of Entomology**

- Update on new insecticides for the nursery industry.
- Review of insects bugging nursery crops.

**Thursday, June 18 Dr. Bert Cregg, MSU Dept. of Horticulture**

- Update on water management and nutrient management.
- Ash alternatives...What looks good from the MSU plantings.

**Thursday, June 24** Speaker to be Determined

**Thursday, July 9 Dr. Jan Bryne, MSU Diagnostic Services**

- Improving your diagnostic skills on nursery crop diseases.
- A look at root and foliar diseases.

**Thursday, July 16 Mr. Jeff Zimmer, MDA, Grand Rapids, MI**

- Update on regulatory issues that area nursery growers need to be aware of.
- The latest information on new pests, pesticide issues and regulations.

**Thursday, July 30** Speaker to be Determined

**Thursday, August 6 Dr. Tom Fernandez, MSU Dept. of Horticulture**

- Update on new research for container production of nursery plants.
- New information from msu and other university researchers.

**Thursday, August 20** Speaker to be Determined

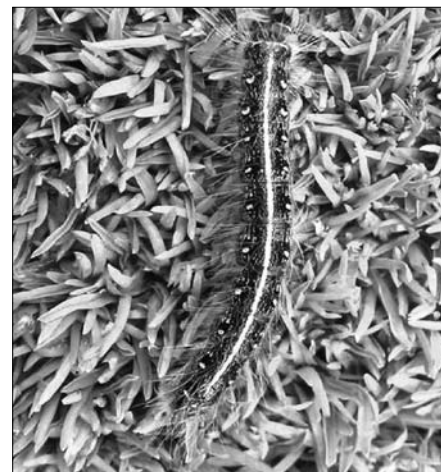
## Wandering caterpillars can be a nuisance for golf

Dave Smitley, Entomology

*Note: This was posted to the Landscape Alert web site on June 5, 2009.*

I never thought I would be writing about eastern tent caterpillars and forest tent caterpillars in the turf section, but if you look at the attached picture on a golf course green from near Traverse City, you can see why. Thousands of eastern tent and forest tent caterpillars have defoliated trees surrounding fairways

and have started to wander – right across fairways, tees and greens. Golf course superintendents have tried spraying Scimitar, Talstar and Sevin with limited success. The caterpillars are dying, but they are dying on the greens, which doesn't really help. The best strategy for the next week or so before the caterpillars pupate seems to be to spray the tees, greens, surrounding collars, and surrounding rough between the trees and the fairways with one of the above insecticides every other day, so the caterpillars will die before reaching the greens and tees. **IPM**



Wandering eastern tent caterpillar.

## Why are my roses changing color?

Jennie Stanger, MSU Extension – Monroe County

### Question from a *Landscape Alert* reader

“Several friends and I are confused and bewildered by our gardens this year. I have a rose bush that’s well established and has always been pink. It’s a J & P rose although the tag has long since disappeared. This year the rose is blooming with flowers that are yellowish-peach – more like a Peace rose than the vibrant pink it has always been. My mother and one of her neighbors had irises that bloomed different colors this year than last - Mom’s was a dark rust color last year, and this year it’s maroon!”

### Answer

It is not unusual for roses to “change color.” A minor change occurs when cooler weather intensifies pink-to-red shades, or age and hot weather fade them. Knock Out ‘Blushing’ rose flowers, for example, are medium pink in cool springs like this and in fall, but a washed-out, nearly-white in summer. The ‘Rainbow’ and ‘Sunny’ Knockout rose marketing capitalizes on the fading of pastel pink and yellow petals as they age, emphasizing that at any one time there are deeply colored buds, pastel

newly opened flowers, and pale to off-white older blossoms. The contrast is greatest, and those plants are most attractive in cool weather. Some of our Master Gardener volunteers have complained they are quite disappointed in the “washed-out” summer appearance of those varieties.

The second type of color change is due to the fact many roses are grafted, so the branches are one variety and the lower root system is a hardier rose. If those lower roots sprout branches, they may appear different in leaf size, shape and flower color. They are more likely to have such sprouts when planted shallow, or if the top branches are all killed by cold temperatures. Around Monroe, there are many identical roses near homes that bloom abundantly at the same time in June; two-inch, dark red flowers with prominent yellow centers. Rosarian Nancy Lindley told me they are most likely the variety ‘Dr. Huey,’ which is often used for the hardy rootstock, and those roses all probably started out with branches and blossoms of a different variety such as a less hardy tea rose.

The third change happens when one branch actually has a mutation affecting blossom color. Many of

our colors started as a single odd branch, called a sport, such as the branch of pale pink roses on a Red Knock Out rose that became a new variety, Knock Out ‘Blushing’ rose when many buds from the branch were grafted onto other rootstocks. One Knock Out ‘Blushing’ rose in our demonstration gardens either reverted (mutated back), or it was grafted onto the red version, because we have a red-flowering branch near the base.

### Irises and color change

Irises are far less susceptible to the color changes described above in roses. The MSU Extension educators on our conference call this morning agreed it is far more likely that a different variety won the competition for space for some reason. One colored variety may have been killed out in one or two seasons by severe borer attack, allowing a seedling or stray rhizome of another variety to proliferate. The successful plants may be blooming for the first time even if they have been multiplying in the spot for a couple of years or more. Few gardeners keep track of which iris variety was planted where and when, nor are they careful to deadhead and remove seedlings. So reports of color change are not uncommon. **IPM**

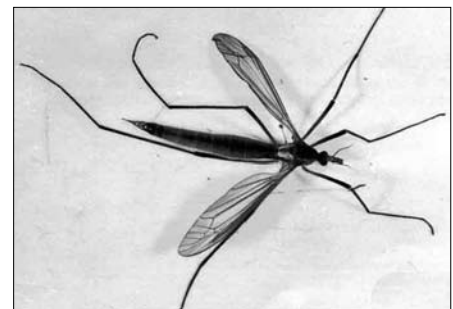
## European crane flies discovered in Waterford

Howard Russell, MSU Diagnostic Services

A few weeks back a homeowner in Waterford (Oakland County) sent in some insect larvae that were crawling about his driveway in large numbers. I recognized the larvae as crane fly larvae (Tipulidae) and suspected they were European crane flies, *Tipula paludosa*.

I sent them off to Jim Zabloutney, USDA/APHIS/PPQ, at the Detroit Metro Airport for confirmation. Jim informed me this week that

USDA had confirmed my initial identification. Adult European crane flies have been found in Michigan during recent surveys but this is the first time the larvae have been found. The homeowner reported that his lawn has several dead areas and that his house and garage were covered with large mosquito-like insects during the fall of 2008. The European crane fly can be a serious pest of turf that threatens grass



**European crane fly adult.**

Photograph by Canadian Forest Service Archive, Canadian Forest Service, Courtesy of forestryimages.org

pastures, lawns, golf courses and sod farms. The larvae are also known to attack a wide range of vegetables

and small fruit crops.

The European crane fly was identified in North America in 1955 in Nova Scotia. It was first found on the west coast in 1965 in British Columbia. Adults were collected in light traps in Washington in 1966. In the east, the fly was first identified in Ontario in 1998 and then in New York in 2004.

The larvae, known as leatherjackets, feed on underground plant parts during the day and will emerge to feed on stems and grass blades on damp warm nights. This feeding can cause patches of grass to die when numbers of leatherjackets reach around 50-80 per square foot. Damage to golf greens has been reported when birds peck out the larvae during the spring.

European crane fly adults emerge during late summer and early fall, typically shortly after sunset. The adults do not waste anytime milling about. They finish mating by midnight, and lay most of their eggs by dawn of the following morning. Eggs hatch in 11 to 15 days. The larvae are said to feed ravenously and usually complete the first two instars in less than two months. The larvae overwinter as third instars and begin to feed again as soon as temperatures warm in the spring. They stop feeding in mid-May

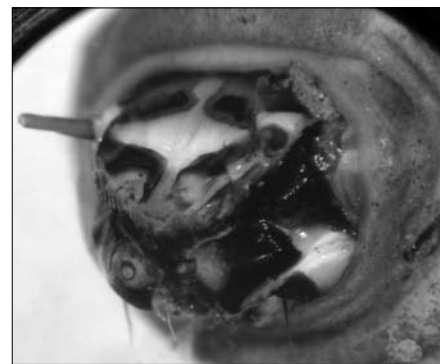


Two European crane fly larvae.

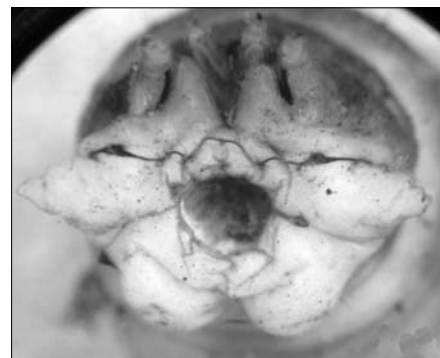
and then remain inactive until they pupate towards the end of August. Adults appear shortly afterwards to begin the cycle anew. There is one generation per year.

The larvae are legless worms that taper slightly at both ends. They are light gray to greenish grey with irregular black spots. Their sclerotized head capsule is quite different from that of a caterpillar or sawfly larva. They have large fleshy lobes that surround two dark spiracular plates on their posterior ends.

**Fun Fact:** Tipulidae is the largest family of flies (Order Diptera) with 1,517 species in the US and Canada. Most larvae are aquatic or semi-aquatic. There are only four species of tipulids that are considered pests.



The head capsule of a European crane fly larva.



The posterior end of a European crane fly larva. Note the fleshy lobes that are characteristic of this species

See another nice photo of an adult European crane fly at: [http://www.naturspektrum.de/spezies/tipula\\_paludosa\\_d.php](http://www.naturspektrum.de/spezies/tipula_paludosa_d.php)

IPM

## Agricultural labor statistics for spring 2009

Vera Bitsch, Agricultural, Food, and Resource Economics

During this past April, the total number of hired workers was estimated at 903,000 individuals; that's down by 2 percent from a year ago. In the reference week, 680,000 individuals were hired directly by farm operators. The average number of hours worked stood at 40.1, down 2 percent compared to last year's 40.8 hours.

Again, hired worker wage rates were up from a year ago in most regions. The largest increases in wage rates occurred in the Pacific,

Northeast II, Appalachian I (North Carolina and Virginia), Mountain I (Idaho, Montana, and Wyoming), and Southern Plains regions. The average wage rate was \$10.84 per hour, up from \$10.57 during last year's reference week. Field workers received \$9.99, compared to \$9.65 a year ago. Livestock workers made \$10.25, compared to \$10.24 a year ago. These wage rates do not include the value of benefits.

Michigan, Minnesota, and Wisconsin make up the Lake region.

For the three states, the number of hours worked stood at 39.5 hours during the survey week, compared to 39 hours last year. The total number of workers, excluding agricultural service workers, is estimated at 56,000 individuals, compared to 52,000 during last year's reference week. The average wage rate for all hired workers, including supervisors and other workers was \$11.55 per hour, which ranks among the top five out of the 18 regions, including Hawaii with \$13.36. The Cornbelt I (Illinois, Indiana, and Ohio) and II (Iowa, Missouri) regions paid higher wages, \$11.70 and \$11.80, respectively. A year ago the average

wage in the Lake region was \$11.25 per hour. In this year's reference week, field workers earned \$10.92, livestock workers earned \$10.38 per hour, compared to \$10.57 and \$10.78, respectively, last year. Comparing this year's wages to the previous two years shows continuing wage increases for the Lake region.

In addition to analyzing wage rates by type of worker, NASS provides wage data by type of farm for ten regions with slightly different results. These data combine field workers and livestock workers, but exclude the other, typically higher paid, subgroups. The average hourly wage rates in 48 states, excluding Alaska and Hawaii, during this

April's reference week were \$10.07 overall, \$10.54 for field crop farms, \$9.90 for other crop farms (greenhouse and nursery crops, vegetables and fruits), and \$10.25 for livestock and poultry farms. Last year those rates were \$9.87, \$9.84, \$9.66, and \$10.20, respectively. Thus wage rates show further notable increases in the 48 states.

During the April reference week, the hourly wage rates in the Lake region were \$10.88 for all farms, \$12.17 for field crop farms, \$10.71 for other crop farms, and \$10.81 for livestock and poultry farms – excluding supervisors and other workers. Overall, the Lake region was paying the highest wages of all

ten regions (excluding Alaska and Hawaii) during the survey week, tying the Cornbelt (Iowa, Illinois, Indiana, Missouri, and Ohio) region. Wages were highest for field crop farms and for other crop farms in the Lake region. Wages were third highest for livestock and poultry farms in the Lake region.

To read Dr. Bitsch's complete newsletter go to her website at <http://www.msu.edu/user/bitsch>. Under "News" click on "Agricultural Labor Issues in Michigan" for a list of available newsletters. For more details, the NASS release is available at <http://www.nass.usda.gov/>. On the right, under "NASS Publications," "Title," search for "Farm Labor." **IPM**

## Weather news

[Jeff Andresen](#)

Agricultural Meteorology  
Geography

Forecast guidance during the past several days has been very consistent in suggesting an extended period of mostly dry weather during the upcoming week, with gradually warming temperatures. A weak upper air disturbance will move through the region overnight Friday into Saturday (June 12-13), setting off a few widely scattered showers, mainly in western sections of the state. Similarly, a second disturbance will move across the state Sunday with a few scattered showers possible mainly across northern sections of the state. Any rain that falls during the weekend should remain less than 0.10", with most areas remaining dry.

High pressure is expected to move into the region by Monday, with fair, dry conditions expected through much of the first half of next week. Highs temperatures Saturday ranging from the mid-upper 60's north to the mid 70's south will gradually increase to the low 70's north to upper 70's or low 80's south by Tuesday. Lows Saturday morning from the mid 40's to low and mid 50's will increase to the 50's to low 60's by early next week.

Further ahead, look for a gradual return of moisture and humidity by the middle and latter half of next week. Scattered showers and thunderstorms will be possible once again by late Wednesday or Thursday. At this point, best chances for significant rainfall will be next Friday or Saturday.

In the medium range forecast, the recent upper air flow pattern across North America is expected to gradually become more southwesterly resulting in warmer temperatures. Both NOAA CPC **6-10 day and 8-14 day outlooks** (covering June 17-21 and June 19-25) call for mean temperatures to moderate to near normal levels statewide. Precipitation totals during the 6-10 day time frame are forecast to range from below normal levels across Upper Michigan to near normal over Lower Michigan. Near normal precipitation totals are forecast statewide during the 8-14 day period. **IPM**

Michigan State University Cooperative Agricultural Weather Service  
Cumulative Precipitation Summary For 05/21/2009

STATION	DIST	PRECIPITATION TOTALS SINCE				Actual	Dev. Norm.	Actual	Dev. Norm.
		05/15/2009 (last week)	05/08/2009 (last 2 weeks)	04/24/2009 (last 4 weeks)	04/01/09 (since Apr.1)				
HOUGHTON	WU	0.42	0.66	2.49	0.20	3.42	-1.03		
IRONWOOD	WU	0.30	0.76	2.60	-0.09	4.04	-0.41		
MARQUETTE	WU	0.30	0.76	2.60	-0.09	4.04	-0.41		
STEPHENSON	WU	0.14	0.83	2.65	-0.04	4.09	-0.36		
CHATHAM	EU	0.43	1.11	2.88	0.27	4.32	-0.17		
SSMARIE	EU	0.86	1.95	2.44	-0.17	3.26	-1.23		
BEULAH	NWL	0.15	0.98	2.83	0.38	3.99	-0.43		
LAKECITY	NWL	0.20	1.70	3.89	1.44	5.03	0.61		
PELLSTON	NWL	0.21	0.77	1.52	-0.93	2.27	-2.15		
ALPENA	NEL	0.12	1.03	2.21	-0.34	4.25	-0.20		
HTNLAKE	NEL	0.18	1.45	4.12	1.57	5.74	1.29		
ROGERCITY	NEL	0.12	1.08	2.81	0.26	4.65	0.20		
VANDERBILT	NEL	0.12	0.99	2.79	0.24	4.63	0.18		
FREMONT	WCL	0.00	1.41	4.48	1.74	5.94	0.99		
LUDINGTON	WCL	0.00	1.62	3.54	0.80	5.20	0.25		
LUDINGTON	WCL	0.00	1.62	3.54	0.80	5.20	0.25		
MUSKEGON	WCL	0.00	0.62	4.18	1.44	5.42	0.47		
BTGRAPIDS	CL	0.04	1.23	3.95	1.04	5.46	0.47		
SAGINAW	ECL	0.14	1.01	4.88	2.24	6.90	2.54		
STANDISH	ECL	0.22	1.17	3.79	1.15	5.56	1.20		
GRAPIDS	SWL	0.02	1.21	4.87	1.80	6.70	1.24		
GULLLAKE	SWL	0.36	0.89	3.02	-0.05	5.39	-0.07		
HOLLAND	SWL	0.11	1.50	5.75	2.68	8.44	2.98		
SOUTHBEND	SWL	0.36	1.50	2.83	-0.24	5.14	-0.32		
WESTOLIVE	SWL	0.00	0.94	5.81	2.74	7.55	2.09		
ALBION	SCL	0.91	2.10	3.58	0.66	6.79	1.61		
COLDWATER	SCL	1.72	2.81	3.25	0.33	7.19	2.01		
LANSING	SCL	0.38	1.90	5.16	2.24	8.45	3.27		
DETROIT	SEL	0.41	1.73	3.19	0.36	6.93	1.77		
FLINT	SEL	0.44	1.30	4.01	1.18	6.75	1.59		
MILFORD	SEL	1.29	1.75	4.04	1.21	7.87	2.71		
MTCLEMENS	SEL	0.00	0.00	0.00	-2.83	0.00	-5.16		
ROMEO	SEL	0.15	0.73	2.11	-0.76	2.91	-2.25		
TIPTON	SEL	1.03	1.83	2.75	-0.08	6.38	1.22		
TOLEDO	SEL	0.31	1.21	2.73	-0.10	6.49	1.33		

Report generated at 08:42, 05/22/09

ACTUAL AND PREDICTED DEGREE-DAY  
ACCUMULATIONS SINCE MARCH 1 2009 (\*)

STATION OR DISTRICT	BASE 42 BE DEGREE-DAYS				BASE 50 BE DEGREE-DAYS			
	AS OF 05/21 2008	BY 05/26 2009	BY 05/31 2008	BY 05/26 2009	AS OF 05/21 2008	BY 05/26 2009	BY 05/26 2009	BY 05/31 2009
WEST UP NORMS**								
HOUGHTON	349	421	494	171	213	253		
IRONWOOD	175	253	351	50	114	129	160	
MARQUETTE	247	384	435	89	185	210	259	
STEPHENSON	201	285	323	69	127	144	178	
STEPHENSON	336	376	426	521	142	176	200	246
EAST UP NORMS								
CHATHAM	258	320	381	102	134	164		
SSMARIE	205	277	321	394	79	118	137	169
SSMARIE	277	285	330	405	97	111	129	159
N.W. LP NORMS								
BEULAH	467	474	531	638	222	222	249	301
LAKECITY	402	437	490	588	192	211	237	290
PELLSTON	377	360	403	485	175	174	195	239
N.E. LP NORMS								
ALPENA	394	471	548	190	234	280		
HTNLAKE	401	403	455	544	181	198	223	270
ROGERCITY	445	469	529	633	212	223	251	304
VANDERBILT	358	411	464	554	150	202	227	275
VANDERBILT	376	406	458	548	178	203	228	276
W. CENT. LP NORMS								
FREMONT	506	592	683	257	311	367		
LUDINGTON	513	533	608	713	253	248	292	350
MUSKEGON	448	475	542	636	206	212	250	299
MUSKEGON	522	591	674	791	244	280	330	395
CENT. LP NORMS								
BIGRAPIDS	539	628	722	278	332	391		
BIGRAPIDS	497	519	594	703	255	258	303	366
E. CENT. LP NORMS								
SAGINAW	534	621	715	273	326	385		
STANDISH	559	584	670	801	280	284	333	408
STANDISH	431	458	526	628	202	219	257	315
S.W. LP NORMS								
GRAPIDS	619	689	771	900	319	353	403	483
GULLLAKE	795	786	880	1027	450	413	471	565
HOLLAND	591	671	751	876	303	338	386	462
SOUTHBEND	676	766	857	1001	351	404	461	553
WESTOLIVE	530	599	670	782	254	293	334	401
S. CENT. LP NORMS								
ALBION	622	717	819	332	390	455		
COLDWATER	612	647	727	847	313	325	373	445
LANSING	578	686	771	898	279	350	402	479
LANSING	610	653	733	855	311	321	368	440
S.E. LP NORMS								
DETROIT	601	693	795	312	374	434		
FLINT	701	764	851	990	355	384	434	518
MILFORD	532	585	652	758	260	282	319	380
MTCLEMENS	582	657	732	851	289	324	366	437
ROMEO	546	596	664	772	252	289	327	390
TIPTON	601	657	732	851	295	333	376	449
TOLEDO	660	771	859	999	333	398	450	537

\* 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 08:42, 05/22/09



## **Crop Advisory Team Alerts**

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

### **The *Landscape Alert* is brought to you by: MSU Extension Campus Specialists**

#### **Entomology**

Dr. Deborah McCullough  
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#### **Plant Pathology**

Dr. Dennis Fulbright  
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#### **Forestry**

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#### **Crop & Soil Sciences**

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#### **Horticulture**

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