Crop Advisory Team

Alert

MICHIGAN STATE UNIVERSITY EXTENSION

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Landscape Alert

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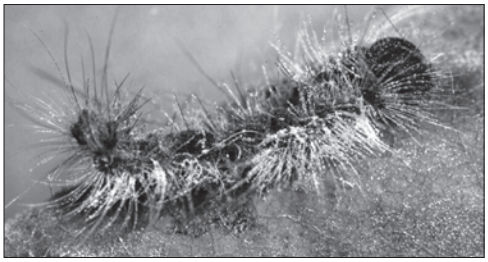
Entomophaga responsible for dead gypsy moth caterpillars

Dave Smitley, Entomology

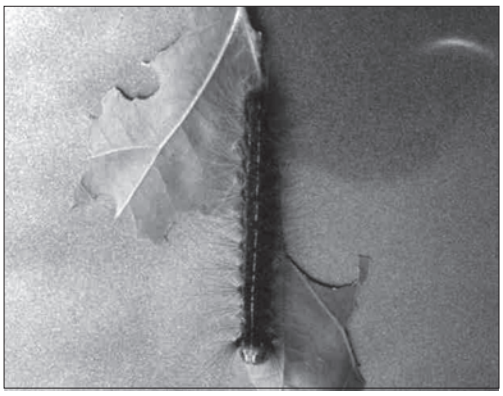
During our last conference call several extension agents said they were seeing lots of gypsy moth caterpillars dying on the trunks of trees, due to *Entomophaga maimaiga*. *Entomophaga* is a fungus that infects caterpillars, causing a disease, and turning them into a mushroom in about a week. Fortunately, *Entomophaga* is very host-specific and only infects gypsy moth and not any other animals.

Young caterpillar (less than a 0.5 inch-long) die on the leaves, and in moist weather, sporulate to infect other caterpillars (see photo). Large caterpillars (less than 0.75 inch-long) die on the tree trunks facing head down, the bodies becoming shriveled and rubbery in a few days. Eventually the dark-brown to black mushrooms, still in the shape of a shriveled caterpillar, fall to the ground around the base of the trees. In each mushroom are thousands of spores that will infect gypsy moth caterpillars next spring. When young caterpillars become infected next spring, they will die quickly, turn into mushrooms and sporulate immediately during wet weather, infecting other caterpillars. That's how the fungus can spread quickly through a forest, infecting most of the gypsy moth caterpillars. The fungus in large caterpillar-mushrooms that are present now will not sporulate until next May when the next batch of gypsy moth larvae is active.



Entomophaga-infected gypsy moth cadaver sporulating.

Black soft larva that melts, caused by gypsy moth NPV, a virus.



Late instar gypsy moth larva.

Gypsy moth larvae dying facing head-down due to Entomophaga.

The wet spring and early summer that we have had so far this year has allowed *Entomophaga* to spread quickly. Over the next two weeks watch the trunks of oak, birch, poplar or other infested trees on your property. You may soon find many dead caterpillars (mushrooms). If *Entomophaga* is active in your area, there will be fewer adults that emerge and fewer egg masses. Where *Entomophaga* is active, gypsy moth population will naturally decline, so you may not see nearly as many caterpillars next year or the year after. **IPM**

Scouting for disease: Daylily leaf streak

Jan Byrne, Diagnostic Services

Pathogen: *Collecephalus hemerocalli*.

Hosts: *Hemerocallis*.

Symptoms: Elongated brown lesions, which are lengthwise on the foliage, surrounded by a chlorotic halo. Lesions that affect the midrib of a leaf cause the leaf to senesce from the lesion to the leaf tip. Tissue in the center of the leaf becomes necrotic, creating a dead streak down the middle of the infected leaf. Flower production may be decreased.

Spread: Diseased plant material can introduce the pathogen into a production area. *C. hemerocalli* produces wind-borne spores on infected leaves. Sclerotia, an overwintering structure, are produced on dead or dying foliage.

Management: Cultivars vary in their susceptibility. Remove dead foliage from the preceding year. Poorly managed plants in overcrowded growing situations are more likely to become diseased. The disease is more severe early in the growing season. Temperatures above 90°F limit disease development.

Editor's note: This and more disease identification information is available in the filed guide A Pocket Guide for IPM Scouting in Herbaceous Perennials To order call 517-353-6740. **IPM**

The disease was named for these streak symptoms along the leaf's midrib.

D. Brown-Rytlewski, MSU

Initial symptoms are tan leaf spots surrounded by chlorotic halos.

D. Brown-Rytlewski, MSU

Severely infected leaf.

Crabgrass progressing in turf

Kevin Frank, Crop and Soil Sciences

The recent hot and humid weather not only had the air conditioners humming but also had the crabgrass spurting upward. The small crabgrass plants that I noticed a week ago now look like they're on steroids after a week of temperatures near 90°F. If you're going to try and control the crabgrass with postemergence herbicides, it's best to get going before the plants really mature.

Probably the most common postemergence crabgrass killer in the homeowner market contains the active ingredient MSMA, usually sold as a product that has the phrase "crabgrass killer" somewhere in the title. If you are going to use products that contain MSMA beware that at high temperatures (greater than 80º F) these products have the potential to burn the turf.

The forecast next week indicates highs are supposed to be back around 80°F and not 90°F so there should be an opportunity to use these products without too much concern for burning the turf. Another active ingredient that is now more widely available in homeowner products and is very effective for postemergence control of crabgrass is quinclorac. Remember that sometimes green is better than brown even if it is a weed, especially when considering that it is challenging to establish new turf from seed during the summer to fill in the voids. Remember that when using **any pesticide read and follow all label directions**. **IPM**

Treat home lawns for chinch bugs, European chafer and Japanese beetle now

Dave Smitley, Entomology

With the frequent rain this spring, we may not have as many problems as usual with chinch bugs. Still, it is worthwhile to check for chinch bugs now. Examine dry, sunny parts of your lawn that are looking thin and maybe even a little

brown in places. When it is warm and your lawn is dry, check these spots for chinch bugs by getting down on your hands and knees and pull back the debris on the surface of your lawn between grass stems. Watch for small (0.125-long) black bugs scurrying for cover. If you can count more than 20 chinch bugs in two minutes of searching, you have enough to cause some turf damage. The damage from chinch bugs is greatest in July and early August.

Right now is a good time to treat for both chinch bugs and grubs, because one application of the same insecticides (imidacloprid, clothianidin, or thiamethoxam) works very well for both pests. Because they are systemic insecticides, taken up by the roots and moved throughout the plant, they can be applied with a fertilizer spreader.

If your turf was damaged by grubs last fall or early this spring, now is the best time to apply imidacloprid, clothianidin, or thiomethoxam to prevent grub injury to turfgrass this fall and next spring. New damage from grubs won't appear again until this September or October. Golf course superintendents and professional turf managers can use Merit, Meridian, Arena, Aloft, Allectus, or Mach II.

For homeowners, look for GrubEx, Season-Long Grub Control, Grub & Lawn Insect Control, or Grub Stop Once & Done. These products contain the same active ingredients listed above for chinch bugs. Granular insecticides are recommended for low maintenance turf where irrigation is not feasible. Applications of sprayable insecticides should be followed by 0.25 to 0.5 inch of irrigation. **IPM**

Eriophyid mites on conifers

Jill O'Donnell, Christmas Tree ICM educator

Immature and adult eriophyid mites suck on the sap in the needle. This feeding can discolor and distort foliage of many conifer species. Currently, we have found these mites on Fraser fir, spruce, concolor fir and hemlock, but they can also cause damage to Scotch and white pine.

When many mites are present, their damage gives the needle a dusty, bronze to rust-colored appearance. Similar damage can occur from winter injury, nutrient deficiency, drought or herbicide damage. To tell if the damage is caused by these mites, you will need to look at the needles with a hand lens and even then you may over look them if you don't know what your looking for. Eriophyid mites are very tiny, and have a carrot-shaped body with only four legs on one end. They can be clear, tan, cream or orange-colored.

To scout for these insects, zig-zag through your fields randomly checking trees for mites and looking for trees with bronzing or distorted foliage. Look at both the new and previous years' growth. Often growers ask at what levels they should consider spraying. To determine if you need to treat your field, North Carolina State University recommends for hemlock west mite to keep track of the percentage of shoots that have mites, as well as the greatest number of mites on an individual needle, adding the number on both the upper and lower surface of the needle.

Treatment threshold

To determine if a pesticide is necessary, **both** of the following criteria must be met:

1. *At least 80 percent of the shoots have mites on them*. In most cases, it is not necessary to treat until the majority of the trees have at least a few mites on them. This percent incidence is determined by dividing the number of shoots with at least a single mite somewhere on the shoot by the total number of shoots examined.

2. *There are at least eight mites on a single needle on one shoot*. Only one needle on one shoot has to meet this criterion to reach treatment threshold if 80 percent incidence has been reached. Count mites both on the front side and back side of the needles to reach this sum.

Hemlock rust mite.

Keep scouting weekly until you see mite numbers begin to decrease. This mite likes cool and dry weather and numbers can increase quickly if the conditions are right. With this past week's hot weather, mite numbers should begin to fall off.

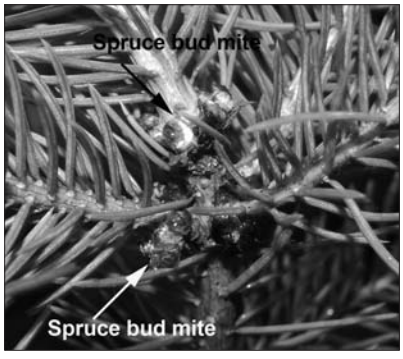
Products that are used to control spider mites may not control eriophyid mites that are biologically different. Successfully treating for eriophyid mites requires using a miticide effective against eriophyid mites, such as Avid (abamectin), Sevin (carbaryl) or Envidor (spirodiclofen). Remember to continue to scout trees even after treating trees to determine if mites were killed. Also, you will want to scout trees in the fall when cool temperatures return. **IPM**

Spruce bud scale easy to overlook

Jill O'Donnell, Christmas Tree ICM educator

Spruce bud scale *(Physokermes piceae)* is usually found mainly on Norway spruce, but it will attack other spruces. This past week, I found a pretty heavy population in a field of Colorado blue spruce. Spruce bud scale may often go unnoticed since their size and color can cause them to be mistaken for buds. They are round, reddish-brown in color and are often clustered in-groups of three to eight at the base of new shoots. Lower branches are more often attacked than higher branches. Severe infestations can produce sufficient honeydew to allow sooty mold to grow.

In addition, severe infestations



can cause lower branches to die, especially on trees that are already weak or stressed. There is only one generation per growing season. Young females overwinter on the under side of the needles. In the spring, females move onto the twigs to complete their development. In June or early July (700 to 1,150 GDD base 50), eggs hatch and tiny crawlers move around on the twigs and branches eventually settle down to feed. As with other scale, insects apply treatments when crawlers are active.

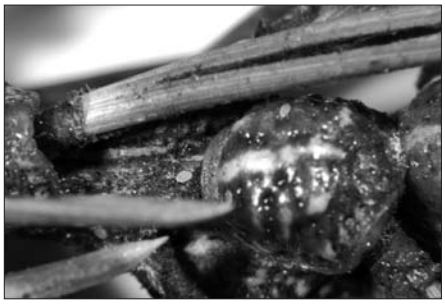
To quote Shakespeare "a rose by any other name is still a rose" this applies to pine tortoise scale. **IPM**

Striped pine or tortoise scale?

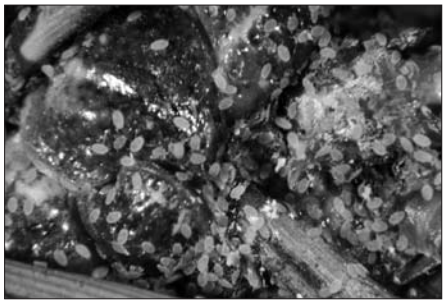
Jill O'Donnell, Christmas Tree ICM educator

Pine tortoise scale (*Toumeyella parvicornis)* adult female scales are reddish-brown whereas stripe pine scale (*Toumeyella pini)* is similar in appearance, but has distinctive white stripes. For many years, both of these soft scales on Scotch pine were called tortoise scale, but a scale expert finally made separation of the two species possible in the mid-1990's.

In Pennsylvania, they found most of the scale in Christmas tree farms are actually striped pine scale. After looking at scales this past week, I suspect this is true for Michigan as well. What does this mean…probably nothing to a grower since the biology and control of the two species are quite similar with a single generation each year. Also, there doesn't appear to be much difference in timing of crawler emergence, which is now in many locations in the lower peninsula. Crawlers are tan to pink and resemble sawdust as they move over the bark.



Striped pine scale upclose.



Striped pine scale crawlers.

These scales produce lots of honeydew, which is attractive to ants, bees and wasps. This honeydew also supports growth of sooty mold, and heavily infested trees appear to be black. **IPM**

Aphids: Little green cows of the bug world

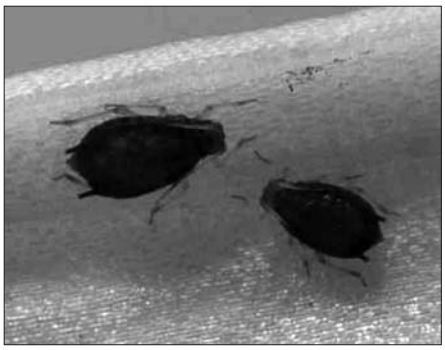
Dave Smitley, Entomology

In our last conference call, our MSU Extension educators reported lots of phone calls about aphids on flowers and in the garden. Although aphids don't usually cause much damage, large numbers may cause some distortion of the leaves, yellowing or slow plant growth. Usually aphids are kept under control by a host of natural enemies: ladybird beetles, lacewing larvae and small parasitic wasps that deposit their eggs inside the aphids.

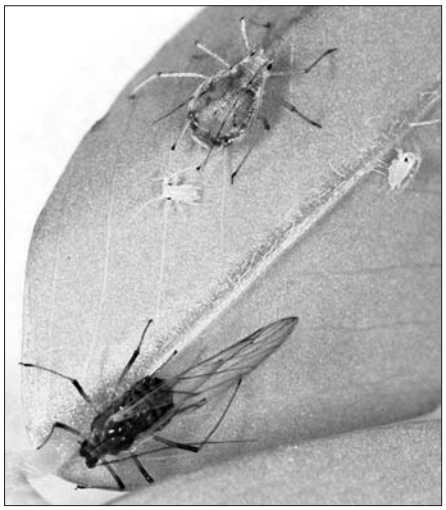
However, there are two situations that may lead to an abundance of aphids. First, if an insecticide was used about four to six weeks earlier, it may have eliminated most of the natural enemies. Because aphids reproduce rapidly (one generation in less than seven days in warm weather), populations may grow fast after the natural enemies are gone. Secondly, the aphids may be protected by ants. Many species of ants will tend aphids to collect the honeydew droplets (sweet nectar-like excretions) excreted by the aphids. If ants are tending the aphids, they will ward off potential predators to protect their "cows."

If aphids are causing plant injury, you may want to spray infested plants with a solution of 1 percent insecticidal soap. Spray with as much intensity as you can without injuring plants, to dislodge the aphids. Avoid exceeding the label rate for insecticidal soaps because the soap can injure plant leaves, especially flowers.

Finally, and as a last option, you can spray a pyrethroid insecticide (resmethrin, permethrin, cyfluthrin, and others). This will kill the aphids and predators. But watch plants sprayed with a pyrethroid insecticide later this summer. They may be back in four to six weeks. **IPM**



Aphids on a lily leaf (less than 1/16 inch-long).



Adult aphid in winged-form and in the more typical wingless form (1/8 inch-long) and two young aphids.

Mound ants

Howard Russell, Diagnostic Services

Species: *Formica exsectoides Forel*
Distribution: Nova Scotia to Georgia from the Atlantic Coast to the western side of the Appalachian Mountains.

Hosts: Soil dweller, attacks any plant or tree near the nest.

Damage: This ant attempts to kill any vegetation that may grow on the mound or shade the area. The ants do this by biting the plant and depositing formic acid into the wound. This readily kills small plants, but trees may require numerous "stings" over the entire trunk before death results. Attacked plants will be near mounds and the bark will be covered with resin-filled blisters.

Description and life cycle: The Allegheny mound ant, as its name implies, builds above ground nests in undisturbed, open areas. The above ground portion, the mound, acts as a solar collector for incubating ant eggs and larvae. This colonial insect has many queens to lay eggs as opposed to other ants that may have only one. A 19-inch high mound may contain 250,000 individuals. The ants feed on other insects for protein and aphid honeydew for sugar. The ants may be reddish-orange, black or both colors. Colonies are started by a single, mated queen. New colonies take several years to develop enough to make an above ground nest. Larger colonies may also subdivide, like honeybees, resulting in many mounds being located in a given area.

Control hints: Large, numerous mounds are difficult to control. This ant will move to a new spot if severely disturbed and new colonies will become established from surrounding forests.

Option 1: Eliminate food. Since this ant relies on other insects for food, control of aphids, scales and needle feeding insects will reduce mound ant activity.

Option 2: Disturb mounds. Physical destruction of the mounds will usually just irritate the ants, and they will reconstruct the mound. However, continual disturbance, such as plowing two to three times a year, will usually cause a colony to relocate elsewhere.

Option 3: Mound treatments. General chemical sprays to the mounds are usually not effective. Dusts must be applied to the mounds and around the parameter, at least one foot out so that the ants will track through the insecticide. Colonies may burrow underground and establish a new colony

More on mound ants

Allegany mound ants, *Formica exsectoides*, build large conspicuous nests in open fields and in open areas in woodlots and forests. Their large mounds are constructed of soil brought up from excavated galleries below the nest. Large colonies may include over 250,000 workers and over a 1,000 egg laying queens. The mound acts as an incubator for mound ant larvae and pupae. The ants kill nearby vegetation including small trees and shrubs to keep shade off of the mound. They do this by chewing a small hole in the bark and injecting formic acid into the wound. Not surprisingly, they can be a real pest in nurseries and Christmas tree plantations. They will aggressively defend the mound by biting those who dare to disturbed it. This can make life very unpleasant for those who happen to share their yards with Allegany mound ants. Mature mounds may reach over 30 inches in height, six feet across, and the subterranean galleries may go to a depth of six feet beneath the ground.

Mound ants feed on most any type of small insect or arthropod they find as they forage or hunt over the ground. The ants also collect the honeydew secretions from sap-sucking insects such as aphids and leafhoppers. They rarely enter homes or buildings in search of food, which is a very good thing.

More on control options for mound ants

There are two approaches to controlling a colony of mound ants: you can chose to drench or dust, or possibly a combination of both. Keep in mind that because of the colony's large size and determination of its occupants, mound ants are very difficult to control. Dusting the top of the mound and around the perimeter with an insecticidal dust like Sevin Garden Dust can be effective if repeated enough times. The dust is picked up by the ants and spread throughout the colony. The dust will cake up and become ineffective if rained on, so dusting requires multiple treatments over several weeks to have any effect on the mound.

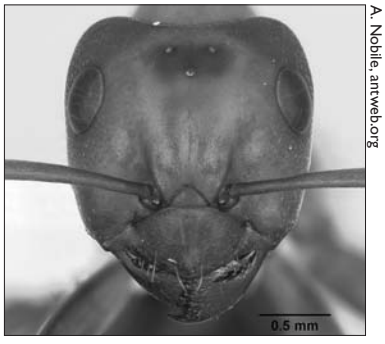
Drenching a mound with a liquid insecticide, like liquid Sevin, requires the top of the mound be scraped away with a shovel to expose the large tunnels below it. To confine and concentrate the insecticide on the mound, it's best to shovel out a depression or bowl centered on the mound. This will cause the insecticide to drain into the mound and not run off. It is safe to assume that the ants will not ignore this intrusion, so be prepared by having on long pants, which

S. Katovich, USDA Forest Ser., forestryimages.org.

A colony of Allegany mound ants in the Huron National Forest in northern Michigan.

A. Nobile, antweb.org

An Allegany mound ant up close.



A. Nobile, antweb.org

The business end of a mound ant. They don't sting, but their sharp mandibles shown here can deliver a painful bite.

should be tucked into socks or boot tops. A brush will be useful to remove ants that crawl on to you during the operation. After opening a mound, pour in about one gallon of the diluted material per foot of mound diameter so that it soaks or drenches into the soil. Repeat the process at two week intervals until no further activity is observed. **IPM**

Weather news

Jeff Andresen, Agricultural Meteorology and Geography

Almost as if on cue with the beginning of astronomical summer (solstice this year was 1:45 AM EDT on June 21), a large upper air ridging feature formed across central sections of the United States bringing the first major heat wave of the summer season. The upper air ridging pattern and heat will gradually give way to northwesterly flow and a cooler weather pattern by early next week.

In the short term, high pressure will dominate weather across the state and region with warm, dry weather expected Friday, June 26, and most of Saturday, June 27. A cool front is forecast to move across the state late Saturday into Sunday, bringing a good chance for showers and thunderstorms to much of the state. For a change, best chances for rainfall will be across northern sections of the state. Rainfall totals of 0.25-0.5 inch are expected in most areas with some scattered 0.5-1.0 inch amounts possible. Temperatures will fall back from highs in the 80's Saturday to the 70's by Sunday following the passage of the front. Low temperatures are expected to range from the mid-50's north to the low 60's south Saturday morning falling back into the 50's by Monday morning. Much cooler temperatures are likely early next week with highs generally ranging from the mid- or upper 60's north to the mid-70's south with lows in the 50's. With cooler air aloft, scattered late afternoon and early evening showers and thundershowers will be a possibility Monday, Tuesday and Wednesday, although areal coverage will likely be scattered (with some areas remaining dry).

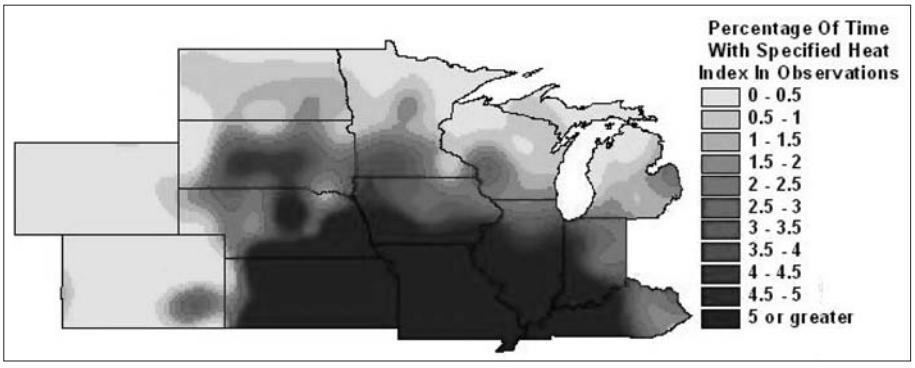
Further ahead, medium range forecast guidance suggests a westward shift of the upper air pattern mentioned above with the center of the ridge across the Great Plains and northwesterly flow across the Great Lakes. The NOAA Climate Prediction Center **6-10 day outlook**, covering July 1-5, calls for mean temperatures to fall back to below normal levels statewide with near normal precipitation totals. For the **8-14 day period**, July 3-9, the outlook also calls for below normal mean temperatures statewide and for precipitation totals to range from near normal levels across eastern sections of the state to above normal levels in the west.

Frequency of heat wave conditions in the Midwest

Given the recent heat and humidity, it is interesting to consider climatologically how frequent this type of weather occurs in Michigan. Based on a study of the frequency of high heat index conditions (an index combining air temperature and relative humidity which describes how hot a human feels) across the Midwest by Seth Binau and Todd Rieck of the National Weather Service, the answer may surprise you. The percentage of time the heat index value is at or above 95EF (a level at which nearly everyone is very uncomfortable, and for some potentially dangerous) across the Upper Midwest during the months of June, July and August (the warmest months climatologically) from 1971 to 2000 is given in Figure 1. The numbers in Michigan, generally from 0-2.5 percent, are relatively low compared to portions of the mid-Mississippi and Lower Missouri Valley regions (greater than 5 percent). The influence of the Great Lakes is apparent with lowest values in the state along the shore of Lake Michigan in western Lower Michigan northward into the eastern Upper Peninsula. In some locations within these areas, a heat index of 95EF did not occur from 1971 to 2000 (i.e. a value of zero percent).

In contrast, the highest values and greatest frequency of hot or humid conditions in Michigan are found across southern sections of the Lower Peninsula northeastward into the Thumb region. The high values in the Thumb region are somewhat surprising. They are likely due more to the relatively greater frequency of high humidity values than high temperatures. Another way of considering a value of 2 percent is to remember that there are 2,208 hours in the June through August period in a given year, and 2 percent of this period is just over 44 hours. Assuming that the 95EF value on a typical heat wave-type day might last about five hours (during the late afternoon and early evening), that implies a frequency of about eight to nine days per year in which these conditions are present. While these levels are certainly an important element of the climate in parts of the state, they are much less than other parts of the Midwest, and a very small fraction of what occurs on average across some southern sections of the United States. Something to remember on a frigid day next winter. **IPM**

Figure 1. Heat index from 1971-2000.



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

STATION OR DISTRICT	BASE 42 BE DEGREE-DAYS AS OF 06/25 2008	BY 2009	BY 06/30	BY 07/05	BASE 50 BE DEGREE-DAYS AS OF 06/25 2008	BY 2009	BY 06/30	BY 07/05
WEST UP NORMS**		954	1074	1186		537	618	692
HOUGHTON	681	714	791	904	315	367	415	484
IRONWOOD	829	944	1046	1195	426	521	589	687
MARQUETTE	767	782	867	990	390	415	469	547
STEPHENSON	999	987	1094	1250	554	547	618	721
EAST UP NORMS		794	904	1008		401	471	538
CHATHAM	729	770	861	989	389	402	462	544
SSMARIE	823	809	904	1039	397	403	464	546
N.W. LP NORMS		1099	1228	1349		632	721	803
BEULAH	1151	1128	1237	1400	647	624	698	809
LAKECITY	1088	1044	1145	1296	623	576	644	746
PELLSTON	1018	892	978	1107	565	492	550	637
N.E. LP NORMS		1054	1181	1302		598	685	766
ALPENA	1070	952	1044	1184	596	514	574	667
HTNLAKE	1152	1075	1179	1337	661	584	653	758
ROGERCITY	1032	994	1090	1236	561	543	607	705
VANDERBILT	1039	973	1067	1210	588	540	604	701
W. CENT. LP NORMS		1242	1378	1508		735	832	922
FREMONT	1249	1284	1398	1561	729	730	812	927
LUDINGTON	1096	1099	1197	1336	606	585	651	743
MUSKEGON	1259	1382	1505	1680	716	799	889	1015
CENT. LP NORMS		1303	1443	1575		785	885	977
BIGRAPIDS	1229	1223	1332	1489	734	708	786	897
E. CENT. LP NORMS		1297	1438	1574		780	881	977
SAGINAW	1387	1327	1460	1655	842	755	855	999
STANDISH	1151	1100	1211	1372	672	603	683	798
S.W. LP NORMS		1463	1611	1754		897	1005	1109
GRAPIDS	1469	1532	1650	1831	901	920	1006	1138
GULLLAKE	1711	1684	1814	2013	1097	1032	1129	1277
HOLLAND	1441	1538	1657	1838	881	930	1017	1151
SOUTHBEND	1562	1678	1808	2006	969	1038	1135	1284
WESTOLIVE	1299	1404	1513	1678	762	830	908	1027
S. CENT. LP NORMS		1438	1586	1726		883	991	1093
ALBION	1447	1474	1594	1769	884	878	966	1094
COLDWATER	1430	1561	1688	1874	864	948	1043	1182
LANSING	1444	1442	1559	1731	881	836	920	1042
S.E. LP NORMS		1415	1564	1706		862	971	1073
DETROIT	1614	1622	1753	1945	997	965	1061	1202
FLINT	1491	1384	1495	1660	923	797	877	993
MILFORD	1312	1335	1443	1601	782	761	837	948
MTCLEMENS	1407	1465	1583	1757	854	857	943	1068
ROMEO	1380	1342	1450	1609	823	770	847	959
TIPTON	1448	1460	1578	1751	874	862	948	1074
TOLEDO	1556	1657	1790	1987	962	1005	1105	1252

* 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 09:25, 06/26/09

Michigan State University Cooperative Agricultural Weather Service
Cumulative Precipitation Summary For 06/25/2009

STATION	DIST	PRECIPITATION TOTALS SINCE 06/19/2009 (last week) Actual	06/12/2009 (last 2 weeks) Actual	Dev. Norm.	05/29/2009 (last 4 weeks) Actual	Dev. Norm.	04/01/09 (since Apr.1) Actual	Dev. Norm.
HOUGHTON	WU	0.11	2.13	0.39	2.83	-0.64	6.25	-2.36
IRONWOOD	WU	0.32	0.89	-0.85	2.02	-1.45	7.10	-1.51
MARQUETTE	WU	0.32	0.89	-0.85	2.02	-1.45	7.11	-1.50
STEPHENSON	WU	0.00	0.20	-1.54	1.59	-1.88	8.65	0.04
CHATHAM	EU	0.00	0.03	-1.40	1.09	-1.84	7.50	-0.42
SSMARIE	EU	0.40	0.48	-0.95	1.79	-1.14	6.32	-1.60
BEULAH	NWL	0.50	0.58	-0.77	2.89	0.13	8.49	0.78
LAKECITY	NWL	0.25	0.36	-0.99	3.30	0.54	9.98	2.27
PELLSTON	NWL	0.07	0.07	-1.28	1.14	-1.62	4.33	-3.38
ALPENA	NEL	0.25	0.38	-0.99	2.18	-0.48	7.92	0.28
HTNLAKE	NEL	0.11	0.17	-1.20	2.34	-0.32	9.15	1.51
ROGERCITY	NEL	0.23	0.39	-0.98	2.21	-0.45	8.07	0.43
VANDERBILT	NEL	0.21	0.32	-1.05	1.95	-0.71	8.02	0.38
FREMONT	WCL	0.42	0.84	-0.42	2.04	-0.66	8.63	0.40
LUDINGTON	WCL	0.24	0.25	-1.01	2.14	-0.56	9.23	1.00
LUDINGTON	WCL	0.24	0.25	-1.01	2.14	-0.56	9.23	1.00
MUSKEGON	WCL	0.40	1.69	0.43	2.77	0.07	9.14	0.91
BIGRAPIDS	CL	0.58	1.50	-0.10	3.18	0.19	9.61	1.02
SAGINAW	ECL	0.93	2.08	0.60	3.24	0.46	10.62	2.89
STANDISH	ECL	0.30	1.54	0.06	3.20	0.42	9.49	1.76
GRAPIDS	SWL	2.72	4.14	2.48	4.95	1.74	13.00	3.68
GULLLAKE	SWL	1.93	2.93	1.27	4.09	0.88	11.05	1.73
HOLLAND	SWL	4.62	8.78	7.12	10.24	7.03	19.84	10.52
SOUTHBEND	SWL	1.47	2.81	1.15	6.52	3.31	12.15	2.83
WESTOLIVE	SWL	1.12	2.34	0.68	3.14	-0.07	11.51	2.19
ALBION	SCL	2.02	2.48	0.77	3.76	0.61	11.73	2.72
COLDWATER	SCL	2.39	2.54	0.83	4.46	1.31	12.70	3.69
LANSING	SCL	1.81	3.37	1.66	4.29	1.14	14.84	5.83
DETROIT	SEL	3.25	3.79	2.13	5.20	2.22	13.10	4.28
FLINT	SEL	0.88	4.55	2.89	6.46	3.48	14.31	5.49
MILFORD	SEL	2.71	4.11	2.45	4.73	1.75	12.77	3.95
MTCLEMENS	SEL	0.00	0.00	-1.66	0.00	-2.98	0.00	-8.82
ROMEO	SEL	3.06	5.44	3.78	6.21	3.23	9.88	1.06
TIPTON	SEL	1.34	2.38	0.72	3.88	0.90	11.77	2.95
TOLEDO	SEL	0.82	3.24	1.58	4.15	1.17	11.67	2.85

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