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Field Crop Advisory Team Alert

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Soil organic matter in a continuous corn cropping system

Lowell Gentry and Sieglinde Snapp; Crop and Soil Sciences, Kellogg Biological Station

Soil organic matter (SOM) plays a critical role in fertility, water holding capacity, aggregate stability, tilth, and overall soil quality. It has been estimated that 50 percent of the SOM of most soils was lost in the first 100 years after the agricultural conversion of prairies and savannahs. A major goal of the USDA/NRCS has been to decrease soil erosion through practices such as reduced tillage, contour farming, grassed waterways, and buffer strips. These techniques have been instrumental in saving billions of tons of topsoil and have helped conserve SOM levels across the United States, especially on vulnerable lands.

Recently, the predominant cropping system in the Midwest (a corn-soybean rotation) has been under scrutiny in regard to the potential mining of SOM and has been questioned for its overall sustainability. The argument has been made that continuous corn, because of its large volume of stover return, can build SOM. As corn acres increase in response to market demands, the question arises "How will this influence SOM?"

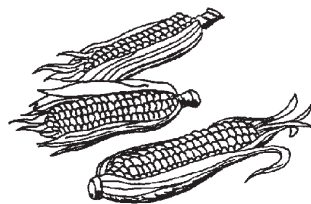
Surprisingly, results from a long term rotation experiment initiated in 1993 at the Kellogg Biological Station indicate that SOM has not increased under a continuous corn cropping system during the past 15 years, but rather has increased for a four-year rotation of corn-corn-

soybean-wheat (see Figure 1 on page 2).

In 1993, this sandy loam soil had 1.5 percent organic matter. After 15 years, SOM has remained the same for the continuous corn cropping system; however, there is a significant increase in SOM due to crop rotation; and a trend for increased SOM for soil receiving cover crop inputs.

Here we explore several possible explanations for this observation: A) microorganisms in low organic matter soils (1.5 percent SOM) may be carbon limited and have a greater propensity to degrade corn residues; B) diversity and quality of biomass inputs may contribute to carbon sequestration; C) greater living cover exists in the rotation (especially when using cover crops) compared with continuous corn (see Figure 2 on page 2); and D) corn grown in northern latitudes becomes source limited and partition more dry matter to grain.

In regard to explanation C, a corn crop only has living roots in the soil for about five months per year, or 20 months over a four-year period. A corn-corn-soybean-wheat rotation has living cover for about 33 months, and adding cover crops such as interseeding crimson clover into corn and frost-seeding red clover into wheat provides living roots for a total of 40 months. We believe that



As the CAT Alert season is winding down, we would like to gather feedback from our readers. We are interested in learning what articles you would like us to publish next season and how the CAT Alerts have been useful. We would like to share your comments with our funding organizations that help us publish the newsletters free on the internet. Please take part in our four question survey available at: www.ipm.msu.edu/cat08field/fc08-21-08.htm

continuous living cover likely plays a role in building SOM over time.

In regard to explanation D, source limitations, such as sunlight, lead to a physiological response of corn where more kernels are set than can be filled, and in an attempt to fill those kernels the plant is forced to cannabolize dry matter from the leaves and stalks to make grain. In 2006, the continuous corn plots at the Kellogg Biological Station produced 159 bu/A of corn with 135 lbs of N/A. The harvest index of this crop, which is the ratio of the amount of grain divided by the entire above ground plant biomass, was 59 percent (many working agricultural models use a value of 50 percent for harvest index). A high harvest index directly reflects the increased partitioning of dry matter from the leaves and stalks to the grain. Therefore due to light limitations in northern states, continuous corn cropping systems return less stover than is generally expected and this may be part of the reason why SOM has not increased in the continuous corn plots over the past 15 years.

Today, with the high price of organic corn, there may be some temptation to grow second year corn. However, we need to remember the benefits of crop rotation, such as improved soil fertility, reduced soil erosion, breaking pest cycles (weed, disease, and insect problem), and spreading the workload. These results from the Living Field

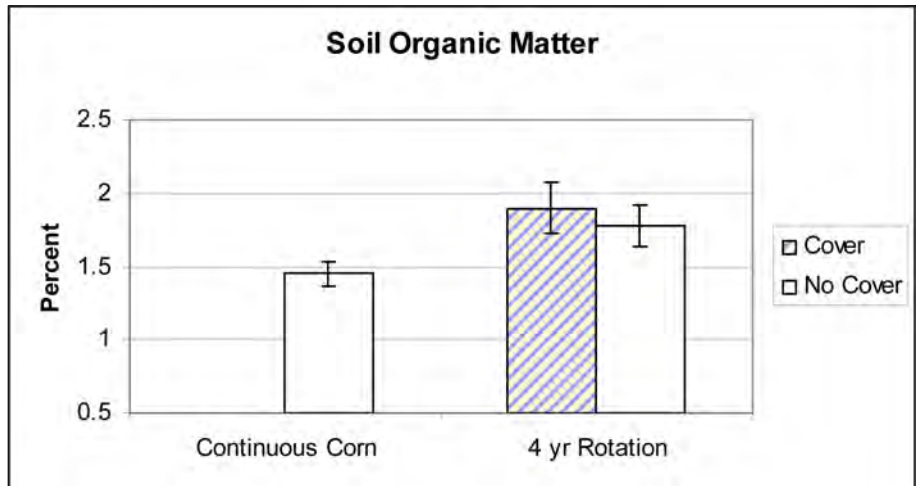


Figure 1. Soil organic matter levels in a continuous corn cropping system versus a four-year rotation during the past 15 years.

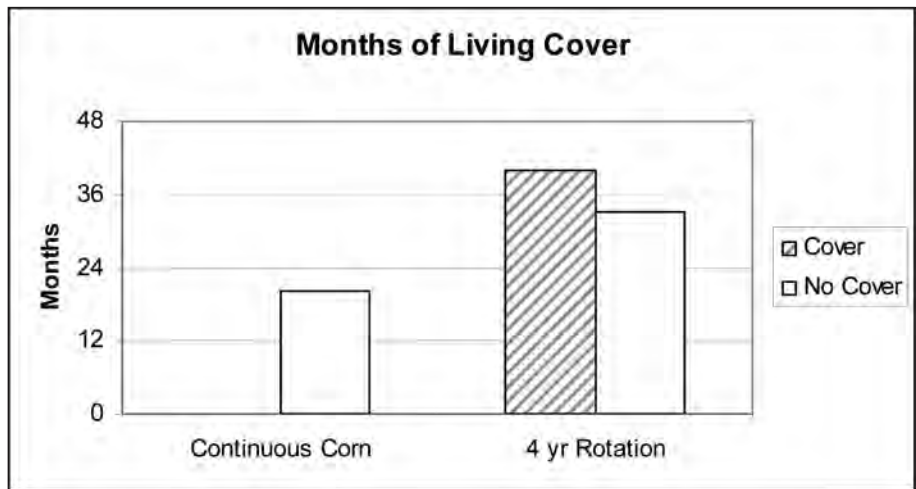


Figure 2. Months of continuous living cover during a four-year period.

Laboratory demonstrate the need for long-term research studies to quantify the accumulative benefits of both crop rotation and the use of cover crops on SOM. For more information about

our long-term research site, go to the Living Field Laboratory at: www.kbs.msu.edu/faculty/snapp/LFL.php **IPM**

Agricultural labor statistics for summer 2008

Vera Bitsch, Agricultural, Food, and Resource Economics

This July, the hourly wage for agricultural workers in the United States stood at \$10.34, up 35 cents from a year ago. Field workers received \$9.66, up 42 cents from a year ago. Livestock workers made \$9.98, up 25 cents from a year ago. This wage rate includes supervisors and other workers, such as bookkeepers and pilots. Wage rates

do not include the value of benefits. Total hired workers are estimated at 1,173,000 individuals, down by three percent compared to last year. The number of hours worked was down two percent at 40.5.

Michigan, Minnesota, and Wisconsin make up the Lake region. For the three states, the number of hours worked stood at

36.5 hours during this July. The total number of workers, excluding agricultural service workers, is estimated at 64,000 individuals, compared to 78,000 during last July. Rain and wet conditions during this year's survey week are probably the main cause for this decline. The average wage rate for all hired workers in the Lake region was

\$10.75 per hour, up 49 cents from a year ago. Only, Hawaii with \$13.33, the Cornbelt I region (Illinois, Indiana, and Ohio) with \$11.00, and the Mountain II region (Colorado, Nevada, and Utah) region with \$10.90 paid higher wages. Field workers in the Lake region earned \$10.10 per hour, up 58 cents. Livestock workers earned \$10.09 per hour, up 76 cents.

In addition to analyzing wage rates by type of worker, NASS provides wage data by type of farm with slightly different results. These data combine field workers and livestock workers, but exclude

other typically higher paid groups. The average hourly wage rates in 48 states, excluding Alaska and Hawaii, during this July were \$9.74 overall, \$9.48 for field crop farms, \$9.71 for other crop farms, and \$9.89 for livestock and poultry farms. Last year those rates were \$9.44, \$9.17, \$9.33, and \$9.75, respectively.

The hourly wage rates in the Lake region were \$10.10 for all farms, \$11.05 field crops, \$9.78 for other crops, and \$10.13 for livestock and poultry farms. Last year the July wages in the Lake region were \$9.44 for all farms, \$9.50 for other crop farms, and

\$9.25 for livestock and poultry farms. There was insufficient data to calculate the wages for field crop farms. As in the April survey, the Lake region has seen wage increases.

To read Dr. Bitsch's complete newsletter go to her website at <http://www.msu.edu/user/bitsch>. Under "News" click on "U.S. Agricultural Labor Statistics for Summer 2008" or 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/index.asp>. Search for "Farm Labor." **IPM**



I – Southeast

Ned Birkey

Weather

Weather has been very, very dry with generally above normal temperatures. The southeast part of Michigan has had less than an inch of rain in the past six weeks.

Crop report

Alfalfa is way over threshold with potato leafhoppers. Some fields have suffered tremendous hopper burn. The third cutting is very short and way past prime maturity. I expect acreage to increase this fall as small square bales of high quality hay are in high demand. The poor yield of the current hay crop will ratchet up prices.

Barley yields were good and there remains interest in increasing barley acreage, both for grain and for straw.

Corn is dented and drying up

every day. I doubt that rains would help except add some test weight. Silage should be made now for many fields, though I would expect high stalk nitrate levels. European corn borer and corn earworm trap counts are very low. I have found one western bean cutworm in traps in Monroe, Lenawee and Washtenaw counties, but no more. There have been several fields sprayed with fungicides and insecticides by airplane and helicopter a couple of weeks ago. There were several drift complaints from adjacent landowners and even construction workers who were "drenched" and wondered if they should go to the emergency room at the hospital.

Soybeans are generally at the R5 growth stage and can still benefit from late August rains, though little is forecast for the next week. Japanese beetles are still feeding and spider mites numbers are increasing. The most I can find for soybean aphids is about 50 per plant, though most have less than that. The variant western corn rootworm traps reached up to 19 this past week, the highest count that I have had in several years, though this is still below the threshold of five per day. Sudden death syndrome and phytophthora root rot are showing

up more. I saw dramatic potassium deficiency symptoms in one field that followed 20 years of alfalfa in which the potassium levels have not been kept up.

Wheat seed treatment is going on and acreage will be high again this fall. The Hessian fly-free date is September 18 for Washtenaw County or September 21 for Monroe County. The Nabisco Flour Mill in Toledo wants more soft, white wheat, which will be a major shift for farmers in this area, who used to raise primarily white wheat years ago.

Miscellaneous

There have been several serious spray drift situations this year. The high commodity prices have gotten some farmers more concerned about yield losses due to herbicide injury. The next field day will be at the Jerry Kuhl farm, Peckins Road, south of Scio Church Road, south of Chelsea. This will be Wednesday, August 27, from 5:00PM to 8:00PM.



2 – Southwest

Bruce MacKellar

Weather

The drought conditions in the southwest region continue to worsen, causing yield losses across the board on field and forage crops. The most notable exception to this seems to be Berrien County, which saw some very beneficial rainfall a couple of weeks ago. Parts of Allegan and Kalamazoo counties also benefited from an isolated thunderstorm in roughly that same time period. But most areas have remained bone dry, with little or no precipitation over the last two weeks and rainfall deficits of 2.5 to 3.5 inches over the last four to five weeks. Clear conditions with low humidity have also contributed to the stress levels of crops. With a chance of showers in the forecast over the weekend, there may be some minor relief in sight, but for many of the parched crops in the area, it will come too late to provide much benefit.

Crop report

Non-irrigated commercial corn has taken it on the chin over the last few weeks. The earliest planted commercial corn may have been able to avoid drought stress during the most critical period at pollination through the early dough stage, but I expect that reduced kernel weight will significantly reduce yields across most of the lower part of the region this season. For longer maturity corn planted after May 10 - 12, there will likely be significant yield losses, in the range of 30 to 60 percent, or more, due to kernel abortion on ear tips as well as poor kernel weights in fields with light soils in dry areas. If feed supplies remain tight, some fields may be good candidates for harvest as forages if cattle operations are close enough to the farm for that option. Areas with heavier soils, or that saw more recent rainfall, should yield better,

but will still likely see significant yield reductions. Purdue Corn Agronomist Dr. Robert Nielsen has an excellent pictorial publication on the web that discusses the effects of drought stress on kernel development following pollination and during grain fill at the following web address: <http://www.ipm.msu.edu/cat08field/fc08-21-08.htm#2a>

If a drought relieving rainfall comes soon enough to help save the central and upper leaves of the plant canopy, there may be some improvement in kernel weight over the next couple of weeks, but for a significant number of fields, it may be a case of too little, too late. Irrigated commercial corn looks to have very good yield potential. You can find some occasional issues with leaf diseases such as gray leaf spot and northern corn leaf blight in a few fields, but most of these seem to be sporadic at best. It is always good to look through your fields for disease pressure to help evaluate the productivity of your varieties, and looking as the plants first begin to show signs of maturity can help you to assess the “stay green” performance of hybrids you raised.

As predicted, we are still detasseling some of the later planted **seed corn** fields because of the spread out planting dates. Most of the early planted fields are moving towards harvest without significant issues. Most growers continue to irrigate to help ensure full kernel development, which can help yields but also ensure better germ for seeds produced at the ear tips. Some fields have been treated for corn earworm and second generation corn borers, with a few western bean cutworm larvae targeted in the mix as well. With the early planted inbred maturing rapidly in the abundant bright sunshine, we can expect to see harvesting begin within the next week. I would encourage seed producers to try to get a cover crop established on their early harvested seed fields.

The majority of **soybeans** are at R5 - R6, with plenty of challenges being found in fields. The drought has really been hammering non-irrigated soybean yield potential, hitting the crop at a time when crop water utilization is at a peak (0.25 – 0.28 inches per day under hot and dry conditions) and yields will most certainly be impacted. Some fields are so stressed that the plants are not fully recovering overnight. The dry weather has helped spider mites and soybean aphids to rapidly increase in numbers, even on irrigated fields. Pathogenic fungi, which normally help keep these pests populations in check, are much less effective at suppressing populations when there is very little moisture in the crop canopy. Under normal environmental conditions, foggy conditions and heavy dews that remain with the plants until late morning from the middle part of August plus an occasional rainy day can help to “crash” these pest’s populations. Spider mites often get established in areas of fields adjacent to gravel roads because the dust often further reduces the effect of the pathogens.

Both spider mites and soybean aphids are capable of building populations very quickly. But that is where the similarities end. Soybean aphids give birth to live young, spider mites lay eggs. This can make controlling mites, especially later in the season, a bit of a challenge because insecticide applications will not kill the eggs. Treatment thresholds for soybean aphids are 250 aphids per plant up through the later growth stages (sizing beans). Spider mite treatment thresholds depend on the severity and the areas of the fields that are impacted. Spider mites also tend to be more mobile than soybean aphids within the field because the pests are able to spin a web and move with the air currents. There are many different insecticide options to control spider mites and soybean aphids. Producers should determine the growth stage

of the beans to make sure that the soybean seeds are still sizing and treatment is warranted. It is also important to consider the pre-harvest interval for the insecticides you plan to use to avoid off-label residue issues or potential harvest delays.

We have also seen a variety of soybean diseases that can be found in fields, including a couple of infections that occurred earlier in the season because of extended wet conditions. The most common diseases that we have seen lately are SDS and brown stem rot. The foliar symptoms of these diseases often occur later in the season, causing rapid tissue decline and death. SDS often exhibits bright yellow leaves with browning tissue between the veins. SDS is closely associated with soybean cyst

nematodes populations. SDS can become an issue even where soybean cyst nematode resistant varieties have been planted and SDS symptoms are not visible.

Brown stem rot tends to occur in much the same way, with less yellowing but darker necrotic tissue along the edges of the leaf. Splitting the stem will often reveal a slight – moderate browning of the vascular tissue.

With these diseases, there are not any rescue treatments. The best that you can do is to gain a better understanding about the conditions that caused the diseases and learn more about selecting varieties that have been rated for incidence in variety trials.

In addition, we are seeing the

aftereffects of white mold and phytophthora on some fields where water stood earlier in the season. Also, areas impacted by soybean cyst nematodes are very likely to suffer more quickly from the effects of drought stress.

In **alfalfa**, conditions have been great for putting up late cutting hay. Potato leafhopper numbers remain high. Folks considering a fall seeding should really look at the 6 - 10 and 8 - 14 day outlooks carefully, since lack of moisture, especially near the soil surface is the largest contributing factor to fall seeding failures. The ability to irrigate may be a very important factor in deciding to go forward with a fall seeding this year. **IPM**

3 – West Central

Fred Springborn and Roger Peacock

Weather

Generally dry weather is persisting across most of the region. Scattered rain showers did bring some relief to a few areas with some areas receiving over an inch of rain. High temperatures have been in the upper 70s to low 80s.

Crop report

Alfalfa harvest continues at

a slow pace with slow regrowth. Potato leafhoppers are present in many fields.

Small grain harvest is complete. A sample of **barley** was diagnosed with loose smut this week. This is a good reminder why it is important to plant clean seed.

Dryland **corn** fields are quite variable due to soil moisture; corn on the lighter soils is under drought stress. European corn borer trap counts remain quite

low. Western bean cutworm trap catches did increase but have remained relatively low.

Soybeans are filling pods. Soybean aphid is present at low levels.

Dry beans are filling pods and early fields are turning and dropping leaves. The first new crop of beans was harvested on August 20. **IPM**

4 – Central

Paul Gross

Weather

There have been scattered showers over the region over the past two weeks that have provided some relief from the very dry conditions. The showers left any where from a trace to over one inch. Overall, the region is very dry and corn yields may now be reduced. Soybeans will still benefit from rains. The only consolation is the cooler temperatures have reduced stress on the crops.

Crop report

The **corn** crop is maturing with

some corn beginning to dent. The crop is in need of rain to finish grain fill. There is concern that we are now losing yield because of dry conditions. We are seeing some nutrient deficiencies. Some farmers have begun to chop some silage to meet forage needs. Be cautious of high nitrate concentrations in drought stressed corn.

Soybeans are filling pods and could use a rain. Spider mites are starting to show up in several fields. The numbers of soybean aphids has remained constant with very little increase in the populations. Continue to scout

fields for these insect pests.

Alfalfa harvest of second and third cutting is underway. Most yields are pretty good, and the hay supply in the area will be okay. Most farmers are reporting good quality. We are still seeing high numbers of potato leafhoppers and several fields have hopper burn. Continue to scout fields for this pest.

Oat harvest has wrapped up with very good yields. Many growers are reporting somewhat lower test weights this year.

Wheat growers are busy preparing fields for fall planting as well as getting seed wheat

conditioned for planting. Wheat growers are reminded that top yields start with top quality seed

planted in clean seed beds. **Dry beans** are beginning to turn and harvest is just getting underway.

It is too early to tell what yields might be. **IPM**

Weather news

Jeff Andresen, Agricultural Meteorology, Geography

Drier than normal conditions persisted across much of Michigan during the past one to two weeks, a notable exception was the Saginaw Valley and Thumb regions of the state, where precipitation was more common, in response to a broad upper air ridge over the central United States. Rainfall totals for the past 30 days remained below one inch from the western Upper Peninsula south and eastward into western and southern Lower Michigan, in many cases less than 25 percent of normal, which has resulted in abnormally dry soils and the appearance of crop moisture stress symptoms in some areas. During the next couple days, moisture will return to the region followed by the passage of a cool front this weekend, which should bring the best chances for significant rainfall in at least two weeks. More fair, dry weather is expected for the majority of next week, and possibly longer.

In the short term, look for an increase in cloudiness Thursday and Friday (August 21 – 22) with a noticeable increase in

temperatures and humidity. Some scattered showers and a couple of thundershowers will be possible through Friday mainly across western sections of the state as a weakening upper air disturbance moves through the region, which are the remnants of the system that brought torrential rains and flooding to Texas and the southern Great Plains earlier in the week. The cool front is forecast to pass west to east through the state late Saturday and early Sunday, with a good chance of showers and thunderstorms statewide, especially Saturday afternoon and evening. Rainfall totals of 0.25-0.50-inch are generally expected with this system, with one inch totals possible in a few areas.

Cooler and drier weather is likely by late Sunday into the first couple days of next week as Canadian-origin high pressure moves back into the region. There is an outside chance that the remnants of tropical storm Fay may impact the region during the middle or latter part of next week. However, most current forecast guidance suggests that the

residual moisture with this system will be suppressed south and east of Michigan due to the presence of high pressure expected over the region. Temperatures Friday and Saturday will warm to above normal levels, with highs from the upper 70s north to near 90°F south and lows from the upper 50s north to mid- 60s south. Early next week, look for cooler readings, with highs from near 70°F north to 80°F south with lows from the 40s north to the low 50s south. Warmer temperatures, highs in the 80s in most areas, are expected again by the middle of next week.

Further ahead, medium range forecast guidance suggests troughing across western sections of the United States with a broad upper air ridge across the east. National Weather Service **6 - 10 day**, covering August 24-28, and **8 - 14 day**, covering August 28 through September 1, outlooks both call for above normal mean temperatures, and for precipitation totals to range from near normal levels in extreme northern and eastern sections of the state to below normal levels elsewhere. **IPM**

Michigan State University Cooperative Agricultural Weather Service
Cumulative Precipitation Summary For 08/20/2008*

STATION	DIST	PRECIPITATION TOTALS SINCE				Actual	Dev. Norm.	04/01/08 (since Apr. 1)				
		08/14/2008 (last week)	08/07/2008 (last 2 weeks)	07/24/2008 (last 4 weeks)	04/01/08			Actual	Dev. Norm.	Actual	Dev. Norm.	
MARQUETTE	WU	0.00	0.12	-1.20	0.98	-2.03	13.92	-0.90				
STEPHENSON	WU	0.46	0.52	-0.80	1.70	-1.31	14.71	-0.11				
CHATHAM	EU	0.01	0.16	-1.17	1.13	-1.90	13.07	-0.92				
SSWARTZ	EU	0.02	0.16	-1.17	0.70	-2.33	12.28	-1.71				
LAKECITY	NWL	0.59	1.10	-0.22	1.76	-0.73	18.79	5.65				
PELLSTON	NWL	0.00	0.53	-0.79	1.22	-1.27	13.60	0.46				
ALPENA	NEL	0.02	0.95	-0.35	0.98	-1.69	14.02	0.81				
HTNLAKE	NEL	0.09	0.54	-0.76	0.67	-2.00	15.35	2.14				
OSSENEKE	NEL	0.05	0.91	-0.39	1.21	-1.46	13.94	0.73				
ROGERCITY	NEL	0.05	0.91	-0.39	1.21	-1.46	15.94	2.73				
FREMONT	WCL	0.00	0.01	-1.63	0.72	-2.18	12.64	-0.90				
LUDINGTON	WCL	0.00	0.02	-1.62	0.46	-2.44	17.29	3.75				
ALMA	CL	0.03	0.48	-0.91	1.42	-1.38	9.82	-4.52				
WHEELER	CL	0.10	0.51	-0.88	1.61	-1.19	10.42	-3.92				
AKRON	ECL	0.51	1.56	0.45	2.63	0.21	13.78	0.82				
BADAXE	ECL	0.34	1.38	0.27	3.68	1.26	17.39	4.43				
PIGEON	ECL	0.35	1.26	0.15	1.70	-0.72	11.25	-1.71				
SAGINAW	ECL	0.11	1.11	0.00	2.04	-0.38	13.60	0.64				
SAGVALLEY	ECL	0.61	0.99	-0.12	1.79	-0.63	12.53	-0.43				
STANDISH	ECL	0.78	1.36	0.25	2.22	-0.20	14.27	1.31				
ALLEDALE	SWL	0.08	0.08	-1.21	0.76	-1.98	17.58	2.50				
GRAPIDS	SWL	0.00	0.00	-1.29	0.59	-2.15	16.03	0.95				
GULLLAKE	SWL	0.04	0.25	-1.04	0.55	-2.19	18.61	3.53				
SOUTHBEND	SWL	0.21	0.27	-1.02	0.90	-1.84	11.82	-3.26				
ALBION	SCL	0.08	0.15	-1.30	1.12	-1.81	16.01	0.98				
BATH	SCL	0.00	0.40	-1.05	0.47	-2.46	10.91	-4.12				
CERESCO	SCL	0.00	0.01	-1.44	0.37	-2.56	15.23	0.20				
COLDWATER	SCL	0.00	0.09	-1.36	0.30	-2.63	12.32	-2.71				
IONIA	SCL	0.17	0.30	-1.15	1.07	-1.86	11.32	-3.71				
LANSING	SCL	0.02	0.61	-0.84	0.74	-2.19	12.12	-2.91				
OWOSSO	SCL	0.03	0.47	-0.98	1.19	-1.74	11.79	-3.24				
FLINT	SEL	0.02	0.59	-0.79	1.24	-1.44	11.82	-2.67				
HELL	SEL	0.00	0.16	-1.22	0.41	-2.27	16.86	2.37				
LAPEER	SEL	0.00	0.67	-0.71	4.57	1.89	15.59	1.10				
PETERSBURG	SEL	0.13	0.60	-0.78	0.67	-2.01	12.74	-1.75				
ROMEO	SEL	0.03	0.64	-0.74	1.59	-1.09	12.20	-2.29				
TIPTON	SEL	0.00	0.06	-1.32	0.16	-2.52	16.03	1.54				
TOLEDO	SEL	1.07	1.07	-0.31	1.11	-1.57	15.74	1.25				

* 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.

ACCUMULATIONS AND PREDICTED DEGREE-DAY ACCUMULATIONS SINCE MARCH 1, 2008 (*)

STATION OR DISTRICT	BASE 42 BE DEGREE-DAYS				BASE 50 BE DEGREE-DAYS			
	AS OF 2007	08/20 2008	BY 08/25 2008	BY 08/30 2008	AS OF 2007	08/20 2008	BY 08/25 2008	BY 08/30 2008
WEST UP NORMS**	2284	2392	2507	2507	1436	1507	1583	1583
MARQUETTE	2573	2130	2262	2262	1659	1276	1360	1360
STEPHENSON	2708	2423	2522	2678	1796	1537	1604	1710
EAST UP NORMS	2061	2167	2279	2279	1234	1300	1374	1374
CHATHAM	2416	1943	2028	2153	1543	1230	1310	1310
SSWARTZ	2489	2144	2237	2375	1575	1273	1332	1419
N.W. LP NORMS	2519	2636	2763	2763	1615	1694	1785	1785
LAKECITY	2781	2305	2597	2747	1815	1595	1657	1739
PELLSTON	2598	2392	2480	2623	1695	1503	1561	1658
N.E. LP NORMS	2464	2579	2703	2703	1564	1642	1728	1728
ALPENA	2746	2510	2603	2752	1803	1594	1656	1756
HTNLAKE	2771	2570	2665	2817	1815	1637	1701	1804
OSSENEKE	2726	2497	2589	2737	1783	1581	1642	1742
ROGERCITY	2789	2460	2551	2697	1853	1548	1608	1706
W. CENT. LP NORMS	2746	2871	3006	3006	1797	1794	1884	1980
FREMONT	3154	2762	2873	3036	2114	1873	1959	2056
CENT. LP NORMS	2830	2956	3093	3093	1873	1959	2056	2056
ALMA	3314	2882	2989	3156	2255	1923	1999	2117
WHEELER	3157	2787	2891	3052	2128	1830	1902	2015
E. CENT. LP NORMS	2845	2974	3113	3113	1885	1975	2074	2074
AKRON	3040	2775	2879	3046	2043	1817	1890	2009
BADAXE	3003	2804	2909	3078	2020	1842	1916	2037
PIGEON	2910	2711	2813	2976	1930	1757	1828	1943
SAGINAW	3273	2961	3072	3251	2222	1968	2047	2176
SAGVALLEY	3049	2877	2985	3158	2037	1912	1989	2114
STANDISH	2873	2612	2710	2867	1905	1691	1759	1870
S.W. LP NORMS**	3104	3242	3390	3390	2091	2189	2297	2297
ALLEDALE	3143	2727	2828	2988	2079	1758	1828	1940
GRAPIDS	3587	3148	3264	3449	2495	2132	2216	2353
GULLLAKE	3868	3404	3530	3729	2749	2342	2435	2585
SOUTHBEND	3719	3252	3372	3563	2605	2211	2298	2440
S. CENT. LP NORMS	3049	3182	3325	3325	2052	2145	2249	2249
ALBION	3439	2535	2626	2773	2341	1553	1613	1710
CERESCO	3313	2971	3078	3250	2234	1955	2030	2153
COLDWATER	3249	3009	3117	3291	2187	1995	2072	2197
IONIA	3195	2881	2985	3151	2147	1902	1975	2095
LANSING	3366	3057	3167	3344	2292	2046	2125	2253
OWOSSO	3102	2895	2999	3166	2068	1919	1993	2114
S.E. LP NORMS	3054	3191	3338	3338	2053	2150	2257	2257
FLINT	3308	3095	3204	3381	2242	2082	2160	2290
HELL	3324	2977	3082	3252	2254	1985	2060	2183
LAPEER	3107	2929	3032	3200	2070	1934	2007	2127
PETERSBURG	3277	3000	3106	3278	2218	1992	2067	2191
ROMEO	3172	2961	3066	3235	2138	1964	2038	2160
TIPTON	3291	3042	3149	3323	2222	2020	2096	2221
TOLEDO	3611	3288	3404	3592	2492	2246	2331	2470



Crop Advisory Team Alerts

Integrated Pest Management Program
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