

MSU Extension programs and material are open to all without regard to race, color, national origin, gender, gender identity, religion, age, height, weight, disability, political beliefs, sexual orientation, marital status, family status, or veteran status.



The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

El Departamento de Agricultura de los EE. UU. (USDA, siglas en inglés) prohíbe la discriminación en todos sus programas y actividades a base de raza, color, origen nacional, género, religión, edad, impedimentos, credo político, orientación sexual, estado civil o familiar. (No todas las bases de prohibición aplican a todos los programas.) Personas con impedimentos que requieran medios alternativos de comunicación para obtener información acerca de los programas (Braille, tipografía agrandada, cintas de audio, etc.) deben ponerse en contacto con el Centro TARGET de USDA, llamando al (202) 720-2600 (voz y TDD).

Para presentar una queja sobre discriminación, escriba a USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410, o llame al (202) 720-5964 (voz y TDD). USDA es un proveedor y empleador que ofrece oportunidad igual a todos.



Introduction to Hop Pest Management

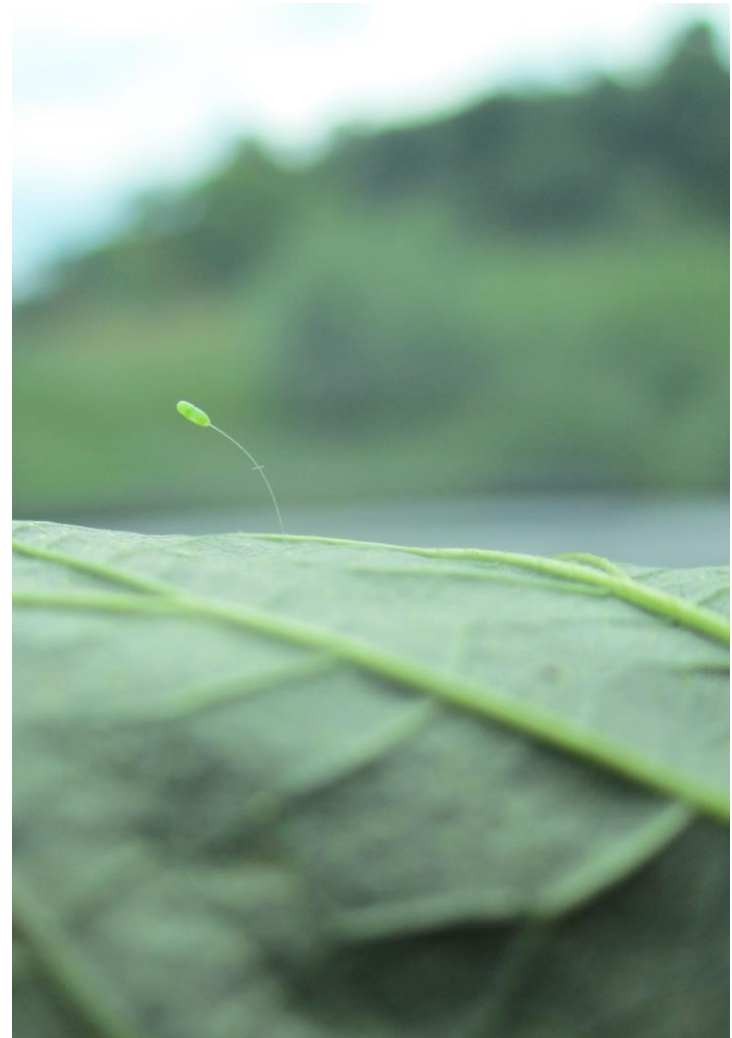


Erin Lizotte, IPM Educator
Michigan State University Extension



Overview

- Scouting protocol
- Primary pests
- Beneficials
- IPM resources



Scouting protocol

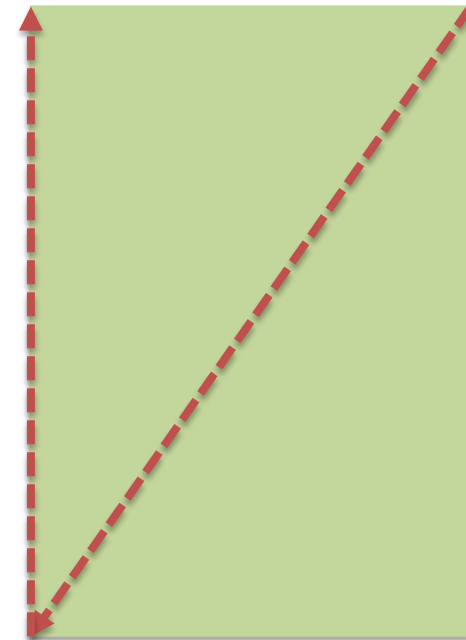
- The more you look-
the more you see
- How many leaves
you collect or
evaluate should
depend on the pest
- Find what works for
you!



General protocol

Walking a transect and an edge

- Walking a transect ensures you get a look at the interior and edge of the hopyard
- Change your route each time to make sure you cover new ground
- Once you locate an issue-consider whether a more thorough evaluation is warranted



General protocol

What am I looking for?



- This becomes more clear over time
- Look for anything out of the ordinary
 - Stunted plants
 - Damaged or cupped leaves
 - Discoloration, chlorosis, bronzing
 - Failure to thrive
 - A huge group of insects (usually it's not valuable to sweat the individual insect you spot munching on a leaf)



General Protocol

- Remove leaves as you move through the yard—turn them over and give a close inspection using a hand lens
- Check leaves from all reachable heights, but favor the lower, denser portion of the canopy
- If checking for a specific pest threshold follow sampling protocol



Primary Pests for MI growers

- Downy Mildew
- Potato leafhopper
- Mites
- Damson hop aphid
- Beetles (chafer and Japanese)



Primary pests – Downy Mildew

- Caused by the fungi *Pseudoperonospora humuli*
- Can cause significant yield and quality losses depending on variety and when infection becomes established
- In extreme cases cones can become infected and the crown may die
- Typically, downy mildew appears early in the season on the emerging basal spikes
- Spikes then appear stunted, brittle and distorted



Downy mildew

- Spore masses appear fuzzy and black on the underside of infected leaves
- As vines expand new tissue becomes infected and fail to climb the string
- Can retrain new shoots but often incur yield loss as a result
- Appearance may vary based on variety and timing



Downy mildew



Downy mildew



Downy mildew



Downy mildew

- Downy mildew overwinters in dormant buds or crowns
- Infection is favored by mild to warm temperatures (60 to 70 F) when free moisture is present for at least 1.5 hours
- Leaf infection can occur at temperatures as low as 41° F when wetness persists for 24 hours or longer



Downy mildew management

- Utilize a protectant fungicide management strategy SEASON LONG to mitigate the risks of early and severe infections
- Varietal susceptibility is important
- Clean planting materials should be selected
- All plant materials removed in pruning should be removed from the hopyard and covered up or burned



Downy mildew management

- Well timed fungicide applications just after the first spikes emerge and before pruning have been shown to significantly improve infection levels season long
- Subsequent applications should be made in response to conducive environmental conditions (temps above 41F and wetting events) every 7-10 days
- Copper, boscalid, fosetyl-AL, pyraclostrobin, and a number of biopesticides have varying **protectant** activity against downy mildew
- Potential resistance to fosetyl-AL



Downy mildew, post infection

- Even under good management, DM can take hold, so including some “curative” fungicides is helpful
- Cymoxanil (e.g. Curzate) has about 2 days post-infection activity and provides 3 days of protection
- Cymoxanil+famoxadone (e.g., Tanos) provides 2 days post infection activity and 5-7 days protection
- Dimethomorph (e.g., Forum) and mandipropamid (e.g., Revus) have the same mode of action and offer 7 days of protectant activity and 1-2 days of post-infection activity
- Phosphorous acid fungicides (e.g., Phostrol) have been shown to provide about 4-5 days protection and post-infection activity of up to 5-7 days



Lastly-don't confuse downy mildew with powdery mildew!

- Powdery mildew is caused by *Podosphaera macularis*, a completely different pathogen
- Powdery mildew has a much lower incidence in Michigan, likely due to environmental factors
- It is important that growers do not mistake downy mildew for powdery mildew as the effective pesticide classes are completely different



Powdery mildew



David Gent, USDA-ARS



Primary pests – Potato leafhopper

- PLH feeding on hops causes what growers have termed “hopper burn”, which causes necrosis of the leaf margin in a v-shaped pattern and may cause a yellowed or stunted appearance as well
- Scouting for PLH should be performed weekly as soon as leaf tissue is present to ensure detection early and prevent injury
- More frequent spot checks should be done following rain storms which carry the first populations north



PLH



Scouting for PLH

- Shake the bine
- PLH will be found on the underside of leaves so flip leaves and shoots over
- Growers may also choose to place two-sided yellow sticky traps in the field to catch PLH
- PLH move in all directions when disturbed
- Although hop plants are susceptible to PLH, they can tolerate some level of feeding and growers should be conservative in the application of insecticides
- At this time there is no set economic threshold for PLH in hops



PLH





PLH Management

- PLH can be managed with neonicotinoids (imidacloprid or thiamethoxam), pyrethroids (bifenthrin or beta-cyfluthrin), organophosphates (malathion) or spinosyns (spinosad)
- Consider that pyrethroids have been shown to cause increases in mite populations and neonicotinoids are longer lasting and narrow spectrum
- Pyganic, Entrust and Trilogy are OMRI approved insecticides organic growers might consider for PLH management



Primary pests – Spider mites

- Two-spotted spider mites (TSSM) are a significant pest of hop in Michigan and can cause complete economic crop loss
- TSSM feed on the liquid in plant cells, decreasing the photosynthetic ability of the leaves and causing direct mechanical damage to the hop cones and act as a contaminate pest



Photo credit: David Cappaert, MSU. Bugwood.org



TSSM

- Leaves take on a white appearance and will eventually defoliate under high pressure conditions
- Intense infestations weaken the plant and reduce yield and quality
- Infested cones develop a reddish discoloration, do not hold up to the drying process, and commonly have lower alpha levels and shorter storage potential



TSSM



TSSM



TSSM

- In the spring only mated females are present, they have overwintered in a dormant stage from the previous season and are ready to lay fertilized eggs
- She appears particularly orange in color this time of the year and has overwintered on debris and trellis structures in the hopyard
- As temperature warm the females feed and begin laying eggs
- Larvae emerge from the eggs in 2-5 days (depending on temperatures) and develop into adults in 1-3 weeks (again depending on temperature)



TSSM

- TSSM like it hot, with the pace of development increasing until an upper threshold around 100F is reached, conversely, cold and wet weather is not conducive to development
- TSSM are very small but can be observed on the underside of leaves using a hand lens
- As the season progresses cast skins and old webbing give infested leaves a dusty and dirty appearance
- The eggs look like tiny clear spheres and are most commonly found in close proximity to adults and larvae
- The larvae themselves are small, translucent versions of the adults
- Adults and larvae also have two dark spots



TSSM



Photo credit: David Cappaert, MSU. Bugwood.org



Scouting for TSSM

- Take leaf samples from 3-6' up the bine, as the season progresses samples should be taken from higher on the bine as the mites migrate
- Use a hand lens to evaluate 2 leaves from 20 plants per yard
- Thresholds developed in the Pacific Northwest
 - 2 adult mites/leaf in June
 - By mid-July, the threshold increases to 5-10 mites/leaf
- The goal is to prevent cone infestation, not 100% control



TSSM Management

- Only manage for mites when absolutely necessary—management disturbs beneficial populations that help keep numbers in check
- There are a lot of labeled miticides including those in the avermectin, acequinocyl, organophosphate, hexythiazox, propagite, tetrionic acids, dicofol, etoxazole and fenazaquin insecticide classes
- OMRI-approved products containing oils, bifenazate, and azadirachtin are labeled for mites
- Consider the PHI (quality?) if close to harvest



Primary Pest

Damson hop aphid

- Hop aphids can reduce plant productivity
- DHA excrete 'honeydew' which makes an excellent growth medium for sooty mold and can greatly reduce the quality and salability of a crop
- Under heavy infestations defoliation can occur
- Aphids may also feed within cones and cause economic damage to the crop even at low levels



Damson hop aphid

- Hop aphids overwinter as eggs on Prunus species
- In early spring eggs hatch into stem mothers which give birth to wingless females that feed on the Prunus host
- In May winged females are produced and travel to hop plants where additional generations of wingless females are produced
- As cold weather approaches winged females and males are produced, move back onto a Prunus host, mate and lay eggs for before winter



Damson hop aphid



Damson hop aphid

- Symptoms of hop aphid feeding include leaf cupping and the appearance of honeydew and the associated black sooty mold
- Hop aphids can be found on the upper and lower surface of the leaves
- Currently we are observing nymphs primarily on the underside and unwinged adults on the upper and lower leaf surface



Management

Damson hop aphid

- Control before the flowering stage may be important to protect crop quality when populations are high
- 8-10 per leaf are tolerated in the Pacific Northwest until cones are present
- Insecticides containing neem (some of which are organic), neonicotinoids (including products containing imidacloprid or thiamethoxam), flonicamid (labeled as Beleaf) or spirotetramat (labeled as Movento) all have activity against hop aphid



Primary Pests

Rose chafer and Japanese beetle

- Both beetles are generalists and feed on dozens of plants
- Beetles are prevalent near grassy areas, particularly irrigated turf
- Grubs feed on grass roots in early spring and again in the fall and can cause significant damage to turf
- Larvae prefer moist soil conditions and do not survive prolonged periods of drought



Rose chafer and Japanese beetle

- RC emerge in June, JB emerge in early July, each are active for around 6 weeks
- They feed on leaves skeletonizing the tissue
- If populations are high, they can remove all of the green leaf material from a plant
- Visual observation of adults or feeding damage is an effective scouting technique
- Because of their aggregating behavior, they tend to be found in larger groups and are typically relatively easy to spot



European rose chafer



European rose chafer




Japanese beetle



Japanese beetle

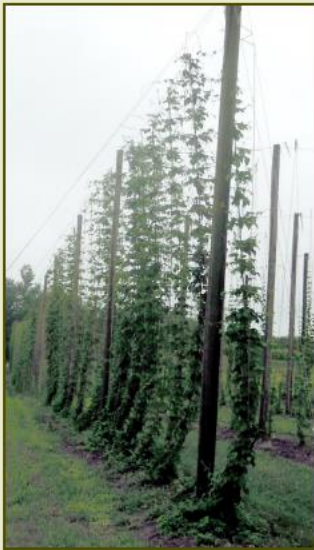


Rose chafer and Japanese beetle

- No established treatment thresholds
 - Malathion is effective, but can take up to 3 days to take effect and provides 10-14 days of residual control
 - Pyrethroids (bifenthrin or beta-cyfluthrin) have good knockdown activity, and 7-10 days of residual control, but can be problematic in hopyards where mites are a concern
 - Neonicotinoids (imidacloprid or thiamethoxam) have contact toxicity for 2-5 days, and residual anti-feedant activity
 - OMRI approved options include neem-based products (azadirachtin) which have a 1-2 day residual and good knockdown activity as well as Surround (kaolin clay) which has had good results in blueberry and grape and acts as a physical barrier and irritant
- 

Registered pesticides

Pesticides registered for use on hops in Michigan 2015



Fungicides registered for use on hops in Michigan 2015¹

Trade name	Common name	FRAC ² group/ resistance risk	Downy or powdery mildew	Rates/notes	PHI ³	REI ⁴
Accrue	spiroxamine	5/ low to med	PM	18 fl oz/A	7	12 hr
Agri-Fos	phosphorous acid, mono & di- potassium salts	33/ low	DM	1.25 qt/ A in 100 gal water. Apply when shoots are 0.5-1 ft long, post training, 21 d post training, bloom, when conditions favor disease.	not listed	4 hr
Aliette WDG	fosetyl-Al	33/ low	DM	2.5 lb/A. Apply when: shoots are 6-12 in tall, after training when vines are 5-6 ft tall, 3 wks after 2nd application, at bloom. Maximum 10 lb/A/season. Do not use with copper compounds— see label.	24 d	12 hr
Badge SC	copper oxychloride copper hydroxide	M1/low	DM	1.8 pt/A. Make crown treatment after pruning but before training. After training additional treatments are needed 10 d intervals.	14 d	48 hr
Champ Dry Prill Champ Formula 2 Flowable, NuCop 3L Kentan DF Kocide 2000 Kocide 3000 Other formula- tions/ manufacturers exist.	copper hydroxide	M1/low	DM	1.33 lb/A; no more than 7.07 lb/A/yr. 1.33 pt/A; no more than 7.3 pt/A/yr. 1.33 pt/a no more than 7 pt/A/yr. 1.32 lb/A 1.5 lb/A no more than 7.57 lb/A/yr. 0.75-1.5 lb/A no more than 8.8 lb/A/yr. Apply as a crown treatment after pruning but before training. After training, additional fungicide treatments are needed at about 10 d intervals. Minimum retreatment interval:10 d.	14 d	48 hr

Compiled by:

Diane Brown-Rytlewski, Erin Lizotte, and Rob Serrine, Extension Educators

Beneficials

Don't forget about the good guys!

- As research into beneficial insects (natural enemies) continues, our understanding of the importance of these partners continues to grow



Insect predators and parasites, known as natural enemies, can control pest populations in agricultural crops and landscapes



Common Natural Enemies

Braconid wasps-Parasitoid

- Parasitize larvae of beetles, caterpillars, flies and sawflies
- Adults usually are less than $\frac{1}{2}$ inch long with an abdomen that is slender and longer than the head and thorax combined



Common Natural Enemies

Soldier beetle-Predator

- Adults of some species feed on nectar and pollen and are often found at flowers, other adults eat aphids, insect eggs and larvae or feed on both flowers and insects
- Larvae are dark, flattened and elongate, and feed in soil, leaf litter or under bark, primarily on eggs and larvae of beetles, butterflies, and moths



Common Natural Enemies

Green Lacewing-Predator

- Adults of many species are not predaceous
- Predaceous larvae have long, curved mandibles that they use to pierce and suck the fluids out of their prey
- The larvae are about 1/8 inch long, look like tiny alligators, and prey on most small soft bodied insects, often pale with dark markings
- Eggs are laid on individual silken stalks



Common Natural Enemies

Lady Beetles-Predator

- Most adults and larvae feed on soft-bodied insects
- These may be important in aphid population control
- Adults are rounded, and range in size from tiny to medium-sized (about ¼ inch long), color ranges from black to brightly colored
- Larvae are active and elongate with long legs, and look like tiny alligators



Common Natural Enemies

Crab spiders-Predator

- Crab spiders stalk and capture insects resting on surfaces or walking, they do not spin webs
- The front two pairs of legs are enlarged and extend to the side of their body, giving them a crablike appearance
- Over 200 species in North America



Common Natural Enemies

Damsel bugs-Predator

- These bugs prey on aphids, leafhoppers, mites, caterpillars, and other insects
- Most often yellowish, gray or dull brown, they are a little over $\frac{1}{4}$ inch long
- Slender insects with an elongated head and long antennae



Common Natural Enemies

Predatory mites

- Predatory mites are often translucent, larger than pest mites and move at a much faster speed across the leaf surface
- Predatory mites play an important role in balancing the pest mite populations and should be protected when possible



Attracting Natural Enemies

- Natural enemies are more likely to thrive in undisturbed areas that provide overwintering habitat, flowers to support their survival and reproduction, and refuge from pesticide applications in crops
- Natural enemies may be conserved with the same plantings that support pollinators



Resources for beneficial insects

- MSU Native Plants Website: www.nativeplants.msu.edu
- Identifying Natural Enemies in Crops and Landscapes, MSU Bulletin, MSUE Bookstore Online



Resources for scouting

- Compendium of Hop Diseases and Pests
- Sign up to receive the MSU hop scouting reports News.msu.edu
- Hops.msu.edu—includes downloadable copies of the registered pesticide guide.
- Facebook-Michigan State University Hop News



IPM Resources



- Enviroweather
- MSUE news and linked resources
- IPM website and associated pages
- Diagnostics lab
- Soil and nutrient testing




Real-time information

MICHIGAN STATE UNIVERSITY

Enviro-weather

Weather-based pest, natural resources, and production management tools

Tools for: [Field crops](#) | [Fruit](#) | [Trees](#) | [Turfgrass](#) | [Vegetables](#) | [Landscape & Nursery](#) | [More weather](#)



Show magnifier

Welcome to Enviro-weather!

For weather-based tools: Click on a station on the map.


For access to specific commodity tools: Select from list above.

Enviro-weather is made possible by the generous support of our sponsors. Help keep it going: [Contribute today!](#)

MICHIGAN STATE UNIVERSITY

Extension

Michigan State University
AgBioResearch



Enviroweather is a weather-based information system to help make pest, production and resource management decisions



Enviroweather disease modeling

Station:

Extension [AgBioResearch](#) [Project GREEN](#)

Model:

Select Date:

East Lansing (MSUHort) Fire Blight Assist Chart(Report issued 1/22/2013 11:06)

Directions for assist chart:

Locate the Biofix Date (the date bloom opened or the date a spray was applied to control Fireblight) on the top row. Follow that column down to determine Epiphytic Infection Potential for that block on each date in the left column. If this number is greater than 100, and the average temperature is greater than or equal to 60 °F, this area will be highlighted, and rain, or trauma (high winds or hail) is all that is needed for infection. Repeat for additional blocks that bloomed or were sprayed on a different date.

2012		Temperature(F)			Rain		EIP for Biofix Date: (Bloom or spray date)						
Day	Date	Max	Min	Avg	in.	Chance of rain	3/21	3/22	3/23	3/24	3/25	3/26	3/27
Thursday	3/22	83	53.6	68.3	0.19	--	150	52					
Friday	3/23	66.4	54.6	60.5	0.44	--	151	53	1				
Saturday	3/24	56.5	50.1	53.3	0.04	--	101	35	1	0			
Sunday	3/25	70.5	44.8	57.7	0	--	108	42	8	7	7		
Monday	3/26	44.6	29	36.8	0	--	0	0	0	0	0	0	
Tuesday	3/27	56.9	27.2	42.1	0	--	0	0	0	0	0	0	0

Enviroweather insect modeling

Tools for: Field crops | Fruit | Trees | Turfgrass | Vegetables | Landscape & Nursery | More weather

Region:

Station:

Model:

Select Date:



Extension

Michigan State University

AgBioResearch



East Lansing (MSUHort) Alfalfa Weevil Development Assist Chart (Report issued 1/22/2013 11:08)

Start scouting for adults when temperatures are greater than 48°F

Life Stage	Predicted Date	Observed Date
1st-2nd instar (light feeding)	4/19/2012 (Temperatures from 3/1 - 4/19 used)	4/19 <input type="button" value="Change Observed Date"/>
3rd-4th instar (major leaf feeding)	5/7/2012 (Temperatures from 4/19 - 5/7 used)	5/7 <input type="button" value="Change Observed Date"/>
Pupa to adult (mating and egg laying - feeding ends)	5/20/2012 (Temperatures from 5/7 - 5/20 used)	-----

[About alfalfa weevil](#) | [About this model](#) | [More weather data for this station](#)

Enviroweather irrigation scheduling

Enviroweather

Weather-based pest, natural resource,
and production management tools

MICHIGAN STATE
UNIVERSITY

Irrigation Scheduler 4.1

[About](#) [User Login](#) [New Users](#)

Irrigation Scheduler overview

Welcome to the Irrigation Scheduler. This program has been brought to you by the support of the GREEN grant and Michigan State University Extension. This program's purpose is to assist Michigan's farmers in managing their water resources efficiently. By accurately recording the amount of rain and irrigation that your field receives you can decide when to apply irrigation. Planning will help with efficient use of resources, benefitting everyone.

Data Inputs

- ▶ **Water Inputs:**
To use the Irrigation Scheduler, you will need to record rainfall and irrigation at each field.
- ▶ **Location/Weather Data:**
Using your location, the three closest [Enviroweather](#) stations are used to compile data and estimate the Reference Potential Evapotranspiration for the day.
- ▶ **Crop Type:**
The type of crop is used to describe how quickly and deep the roots of the crop grow and how much of the Potential Evapotranspiration is used, based on the leaf type and projected leaf canopy cover.
- ▶ **Soil Type:**
The soil type controls how water is distributed through the soil profile when rain or irrigation water is added to the crop. Soils with higher water holding capacities will retain more water, allowing the crop to draw for a longer period of time before exhausting. Soils with low water holding capacities may allow water to pass through the profile in high rainfall events.
- ▶ **Planting Date and Season Length:**
The dates are used to link to the correct weather information, and the season length is used to calculate how mature a crop is on a given date.

Funding: We thank the following for major financial support of this web site: [Project GREEN](#), the [Michigan Agricultural Experiment Station](#), [MSU Extension](#), and [private donors](#). [Join our supporters](#).

Enviroweather

- Access the MSU Agricultural Weather Office Forecasts
- Look up historical weather data and compare across years
- Reference for record keeping (wind speed, directions, temperature)

Expand All | Contract All

Resources for:
Statewide observations

Updated hourly
 ▶ Michigan hourly weather roundup

Updated daily
State and regional forecasts

Regional zone forecasts
 Regional short-term forecasts

Regional forecast discussions
 Extended forecasts
 State forecast
 60-hour guidance forecasts

Precipitation, temperature, and GDD normals

National Weather Service regional climate summaries
 Daily temperature

East Lansing (MSUHort), Michigan

Latest observations at East Lansing (MSUHort)

01/22/2013 11:00 AM (Station online). Measurements by 5-minute average or total unless otherwise indicated.

3.5 F	Air temperature
0.0 in.	Rainfall(01/22/2013)
57.3%	Relative Humidity
-8.2 F	Dewpoint
WNW	Wind Direction (hourly average)
7.6 mi./hr.	Windspeed
Dry	Leaf wetness (tripod-mount)

Weather observations and summaries

- ▶ Overnight temperatures/ [hours below freezing](#)
- ▶ Rainfall comparisons [for Region](#)
- ▶ Temperature, rainfall and degree-day [summary](#)
- ▶ Rainfall comparisons [last 5 years](#) at this station
- ▶ [Soil conditions](#)
- ▶ [More weather](#) for this station

Degree-day tools

- ▶ [Current degree day](#) maps
- ▶ Degree Day accumulations [for Region](#)
- ▶ Degree Day accumulations [for Region](#) (alfalfa and corn development)
- ▶ [Average degree day](#) summary
- ▶ Temperature, rainfall and degree-day [summary](#)



Information portal- msue.msu.edu

The screenshot shows the MSU Extension website interface. At the top, there are browser tabs for 'MSU Extension'. The main navigation bar includes categories like Agriculture, Business, Community, Family, Food & Health, and Lawn & Garden. A dropdown menu is open under 'Agriculture', listing various sub-topics such as Beef, Dairy, Farm Management, Field Crops, Floriculture, Fruit & Nuts, Horses, Nursery & Christmas Trees, Organic Agriculture, Pork, Poultry, Sheep & Goats, and Vegetables. A hand cursor is pointing at the 'Agriculture' dropdown.

Below the navigation, there are several content blocks:

- Flu vaccine and...**: A small article snippet with a photo of a person's arm.
- Managing and weather**: An article by Dr. Jim Hilker, an economist at Michigan State University, discussing market price projections for corn. It includes a photo of a cornfield.

While we don't know what challenges the 2013 season will bring, we do know that when we are armed with knowledge, we can make informed decisions on how to manage for these risks. Dr. Jim Hilker, ag economist at Michigan State University, provides projections for market prices on commodities. His most recent prediction for corn price is:

"There is a 10 percent chance that the price of corn will be higher than \$8.17 and a 10 percent chance that the price will be less than or equal to \$6.39. This indicates that there is an 80 percent probability that the price will fall between these two prices. There is a 50 percent chance the price will be less than or equal to (or greater than) \$7.22."
- Markets**: A section header with a search bar for events.
- EVENTS**: A list of upcoming events:
 - 4-H State Award Workshop**: Date: January 22, 2013. Location: Midland County Service Building, 220 W. Ellsworth, Midland, MI 48640, 3rd floor MSU Extension Learning Center.
 - Webinar: Overview of USDA Rural Development Loan Program**: Date: January 22, 2013. Location: Webinar.
 - Setting Limits for Teens**: Date: January 22, 2013. Location: MSU Extension, Kent County, 775 Ball Ave NE, Grand Rapids MI, 49506.
 - 8 Hour ServSafe Lapeer County**: Date: January 22, 2013. Location: Lapeer County.
 - Money Management**: Date: January 23, 2013 - March 20, 2013. Location: Macomb MSU Extension, 21885 Dunham Road, Macomb, MI 48061.



MSUE ag page


SKIP TO CONTENT ANR @ MSU Michigan State University Extension search this site


MICHIGAN STATE UNIVERSITY | Extension
Home About Events Experts Counties


4-H Agriculture Business Community Family Food & Health Lawn & Garden Natural Resources

Agriculture


- > Beef
- > Dairy
- > Farm Management
- > Field Crops
- > Floriculture
- > Fruit & Nuts
- > Horses
- > Nursery & Christmas Trees
- > Organic Agriculture
- > Pork
- > Poultry
- > Sheep & Goats
- > Vegetables








SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



Agriculture

Supporting agriculture is key to a brighter future. Michigan State University Extension works to increase farmers' success while protecting the environment, ensuring food safety, reaching new markets and advancing agriculture through applied research.

Agriculture is now one of the fastest growing sectors of the Michigan economy. MSU Extension works to ensure it has a thriving knowledge base to become more competitive in local, state, national and international marketing making Michigan's economy stronger.



News

- Grand Rapids area apple maturity report – October 10, 2014
October 13, 2014 | **Phil Schwallier** | Cooler weather has resulted in outstanding apple quality.
- The color of meat depends on myoglobin: Part 1
October 10, 2014 | **Jeannine Schwehofer** | Myoglobin is the iron-rich protein that gives meat its color.
- Landowners determine impacts of oil and gas leasing negotiation efforts in survey
October 10, 2014 | **Curtis Talley Jr.** | Results of a survey sent to 130 landowners in 19 Michigan counties determines their activities in oil and gas leasing and their sources of assistance information.
- Southwest Michigan apple maturity report – October 8, 2014
October 8, 2014 | **Bill Shane** | Harvest of Golden Delicious in southwest Michigan is well underway with Red Delicious ramping up. Rain has hampered harvesting somewhat. Fruit size is generally very good

Find an Expert




Select a county Go

Events

View more events >

- Season Extension to Expand Your Marketing Potential
Date: Oct 13, 2014
Location: Ski Country Farm, 2281 W 7 Mile Rd., Sault Ste. Marie & Beaver Meadow Creek Farms, 5600 S Shunk Rd., Sault Ste. Marie, MI 49783
- Firewise on the Farm Presentation
Date: Oct 22, 2014
Location: North Central Michigan College Library, 1515 Howard Street, Petoskey
- Getting Started With Vegetable Plasticulture - Webinar
Date: Oct 22, 2014
Location: Webinar

Programs

-  **4-H Animal & Vet Science Camp**
-  **4-H Animal Evaluation**
-  **Affordable Care Act**



Agriculture

- > Beef
- > Dairy
- > Farm Management
- > Field Crops
- > Floriculture
- > Fruit & Nuts
- > Horses
- > Nursery & Christmas Trees
- > Organic Agriculture**
- > Pork
- > Poultry
- > Sheep & Goats
- > Vegetables



Sign up for MSUE News



Connect with experts around the country.



SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



Organic Agriculture

Michigan State University Extension's focus on organic agriculture encompasses all aspects of organic farming ranging from fruit and vegetable production to animal agriculture. Through educational programs and research, MSU Extension helps farmers build sustainable organic farms through strong integrated pest management and enhancing soil health.



News

Subscribe to RSS Feed

Landowners determine impacts of oil and gas leasing negotiation efforts in survey

October 10, 2014 | **Curtis Talley Jr.** | Results of a survey sent to 130 landowners in 19 Michigan counties determines their activities in oil and gas leasing and their sources of assistance information.

Farm Bill compliance dates announced

October 10, 2014 | **Dennis Stein** | 2014 Farm Bill safety net programs have several compliance dates now being announced by the USDA FSA that farm landowners and tenant operators need to know.

MSU Extension Beginning Farmer Webinar series continues online

October 7, 2014 | **Jim Isleib** | New topics of interest to beginning farmers and experienced farmers considering new enterprises will be offered in 2015. Recordings of past topics are now available.

MSU helps kids understand agriculture and natural resource sciences

Find an Expert

Select a county

Events [View more events »](#)

Ag Day at the Pumpkin Farm

Date: Oct 18, 2014
Location: Maxwell's Pumpkin Farm, 4676 S. M-18, Beaverton, MI 48612

Garbage to Garden

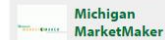
Date: Oct 21, 2014
Location: MSU Extension, 21885 Dunham Rd. Ste. 12, Clinton Twp., MI 48036

Programs

Agricultural Literacy



Farm Bill



Organic Reporting Session



MSUE news

SKIP TO CONTENT | ANR @ MSU | Michigan State University Extension | search this site

MICHIGAN STATE UNIVERSITY | Extension | Home | About | Events | Experts | Counties

- 4-H
- Agriculture
- Business
- Community
- Family
- Food & Health
- Lawn & Garden
- Natural Resources

Agriculture

- > Beef
- > Dairy
- > Farm Management
- > Field Crops
- > Floriculture
- > Fruit & Nuts
- > Horses
- > Nursery & Christmas Trees
- > Organic Agriculture
- > Pork
- > Poultry
- > Sheep & Goats
- > Vegetables



Sign up for MSUE News

MICHIGAN STATE UNIVERSITY Extension BOOKSTORE

Connect with experts around the country.

Ask an Expert

SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



Agriculture

Supporting agriculture is key to a brighter future. Michigan State University Extension works to increase farmers' success while protecting the environment, ensuring food safety, reaching new markets and advancing agriculture through applied research.



Agriculture is now one of the fastest growing sectors of the Michigan economy. MSU Extension works to ensure it has a thriving knowledge base to become more competitive in local, state, national and international marketing making Michigan's economy stronger.

News

Subscribe to RSS Feed

Grand Rapids area apple maturity report – October 10, 2014
 October 13, 2014 | **Phil Schwallier** | Cooler weather has resulted in outstanding apple quality.

The color of meat depends on myoglobin: Part 1
 October 10, 2014 | **Jeanine Schwehofer** | Myoglobin is the iron-rich protein that gives meat its color.

Landowners determine impacts of oil and gas leasing negotiation efforts in survey
 October 10, 2014 | **Curtis Talley Jr.** | Results of a survey sent to 130 landowners in 19 Michigan counties determines their activities in oil and gas leasing and their sources of assistance information.

Southwest Michigan apple maturity report – October 8, 2014
 October 8, 2014 | **Bill Shane** | Harvest of Golden Delicious in southwest Michigan is well underway with Red Delicious ramping up. Rain has hampered harvesting somewhat. Fruit size is generally very good

Find an Expert

Select a county | Go

Events

View more events >

Season Extension to Expand Your Marketing Potential

Date: Oct 13, 2014
 Location: Ski Country Farm, 2281 W 7 Mile Rd., Sault Ste. Marie & Beaver Meadow Creak Farms, 5600 S Shunk Rd., Sault Ste. Marie, MI 49783

Firewise on the Farm Presentation

Date: Oct 22, 2014
 Location: North Central Michigan College Library, 1515 Howard Street, Petoskey

Getting Started With Vegetable Plasticulture - Webinar

Date: Oct 22, 2014
 Location: Webinar

Programs

4-H Animal & Vet Science Camp

4-H Animal Evaluation

Affordable Care Act

Receive customized MSUE News Digests!

- **Agriculture and the Environment**
- Agriculture Policy
- Aquaculture
- Beef Production
- Dairy Production
- Farm Management
- Field Crop Production
- Floriculture Production
- Fruit Production
- Horses
- **Hops**
- Nursery & Christmas Tree Production
- Turf & Landscape
- Organic Agriculture Production
- Pork Production
- Poultry Production
- Sheep & Goats
- Vegetable Production
- **Pest Management**
- Turf
- Water Usage
- Energy
- Fisheries & Wildlife
- Forestry
- Green Energy
- **Invasive Species**
- Lakes, Streams & Watersheds
- Water Quality

AND MORE!



MSUE Bookstore

SKIP TO CONTENT ANR @ MSU Michigan State University Extension search this site

MICHIGAN STATE UNIVERSITY | Extension Home About Events Experts Counties

4-H Agriculture Business Community Family Food & Health Lawn & Garden Natural Resources

Agriculture

- > Beef
- > Dairy
- > Farm Management
- > Field Crops
- > Floriculture
- > Fruit & Nuts
- > Horses
- > Nursery & Christmas Trees
- > Organic Agriculture
- > Pork
- > Poultry
- > Sheep & Goats
- > Vegetables

Sign up for MSUE News



Connect with experts around the country.



SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



Agriculture

Supporting agriculture is key to a brighter future. Michigan State University Extension works to increase farmers' success while protecting the environment, ensuring food safety, reaching new markets and advancing agriculture through applied research.



Agriculture is now one of the fastest growing sectors of the Michigan economy. MSU Extension works to ensure it has a thriving knowledge base to become more competitive in local, state, national and international marketing making Michigan's economy stronger.

News

Subscribe to RSS Feed

- Grand Rapids area apple maturity report – October 10, 2014**
October 13, 2014 | **Phil Schwallier** | Cooler weather has resulted in outstanding apple quality.
- The color of meat depends on myoglobin: Part 1**
October 10, 2014 | **Jeannine Schwehofer** | Myoglobin is the iron-rich protein that gives meat its color.
- Landowners determine impacts of oil and gas leasing negotiation efforts in survey**
October 10, 2014 | **Curtis Talley Jr.** | Results of a survey sent to 130 landowners in 19 Michigan counties determines their activities in oil and gas leasing and their sources of assistance information.
- Southwest Michigan apple maturity report – October 8, 2014**
October 8, 2014 | **Bill Shane** | Harvest of Golden Delicious in southwest Michigan is well underway with Red Delicious ramping up. Rain has hampered harvesting somewhat. Fruit size is generally very good

Find an Expert

Select a county

Events

[View more events »](#)

[Season Extension to Expand Your Marketing Potential](#)

Date: Oct 13, 2014
Location: Ski Country Farm, 2281 W 7 Mile Rd., Sault Ste. Marie & Beaver Meadow Creek Farms, 5600 S Shunk Rd., Sault Ste. Marie, MI 49783

[Firewise on the Farm Presentation](#)

Date: Oct 22, 2014
Location: North Central Michigan College Library, 1515 Howard Street, Petoskey

[Getting Started With Vegetable Plasticulture - Webinar](#)

Date: Oct 22, 2014
Location: Webinar

Programs

- 4-H Animal & Vet Science Camp**
- 4-H Animal Evaluation**
- Affordable Care Act**



We've moved!

- MEN'S
- WOMEN'S
- CHILDREN'S
- ACCESSORIES
- SPIRIT
- DIPLOMA FRAMES
- SPECIALTY SHOPS
- MSU EXTENSION BOOKSTORE

25% off MSU Flags through November 1, 2014! **Coupon Code FLAG14**

MY ACCOUNT

VIEW CART

MSU Extension Bookstore

4-H Youth Development

Agriculture

Child Development & Family Resources

Community Development & Leadership

Food, Nutrition, & Health

Lawn & Garden

Natural Resources Management

Pesticide Applicator Training

Spanish Publications

Water

You are here: Home > MSU Extension Bookstore

CHOOSE A SUB CATEGORY:

- 4-H Youth Development
- Child Development & Family Resources
- Food, Nutrition, & Health
- Natural Resources Management
- Spanish Publications
- Agriculture
- Community Development & Leadership
- Lawn & Garden
- Pesticide Applicator Training
- Water

MICHIGAN STATE UNIVERSITY | Extension BOOKSTORE

Welcome to the MSU Extension Bookstore!

Please note that although most of the products are now available on shop.msu.edu, we are still finalizing the transition. All MSU Extension items will be online and ready for purchase by Wednesday, October 8.

Sort By: Most Popular

40 per page Page 1 of 11

NEXT PAGE



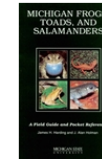
Michigan Butterflies and Skippers



Pursuing What is Best for the World



Michigan Turtles and Lizards



Michigan Frogs, Toads, and Salamanders



eXtension Ask an Expert

SKIP TO CONTENT | ANR @ MSU | Michigan State University Extension |

MICHIGAN STATE UNIVERSITY | Extension

[Home](#) | [About](#) | [Events](#) | [Experts](#) | [Counties](#)

4-H | [Agriculture](#) | [Business](#) | [Community](#) | [Family](#) | [Food & Health](#) | [Lawn & Garden](#) | [Natural Resources](#)

Agriculture

- > Beef
- > Dairy
- > Farm Management
- > Field Crops
- > Floriculture
- > Fruit & Nuts
- > Horses
- > Nursery & Christmas Trees
- > Organic Agriculture
- > Pork
- > Poultry
- > Sheep & Goats
- > Vegetables

Sign up for MSUE News

MICHIGAN STATE UNIVERSITY Extension BOOKSTORE

Connect with experts around the country:

Ask an Expert

SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN

Agriculture

Supporting agriculture is key to a brighter future. Michigan State University Extension works to increase farmers' success while protecting the environment, ensuring food safety, reaching new markets and advancing agriculture through applied research.

Agriculture is now one of the fastest growing sectors of the Michigan economy. MSU Extension works to ensure it has a thriving knowledge base to become more competitive in local, state, national and international marketing making Michigan's economy stronger.

News

[Subscribe to RSS Feed](#)

- [Grand Rapids area apple maturity report – October 10, 2014](#)
October 13, 2014 | Phil Schwallier | Cooler weather has resulted in outstanding apple quality.
- [The color of meat depends on myoglobin: Part 1](#)
October 10, 2014 | Jeannine Schwehofer | Myoglobin is the iron-rich protein that gives meat its color.
- [Landowners determine impacts of oil and gas leasing negotiation efforts in survey](#)
October 10, 2014 | Curtis Talley Jr. | Results of a survey sent to 130 landowners in 19 Michigan counties determines their activities in oil and gas leasing and their sources of assistance information.
- [Southwest Michigan apple maturity report – October 8, 2014](#)
October 8, 2014 | Bill Shane | Harvest of Golden Delicious in southwest Michigan is well underway with Red Delicious ramping up. Rain has hampered harvesting somewhat. Fruit size is generally very good

Find an Expert

Go

Events

[View more events >](#)

- [Season Extension to Expand Your Marketing Potential](#)
Date: Oct 13, 2014
Location: Ski Country Farm, 2281 W 7 Mile Rd., Sault Ste. Marie & Beaver Meadow Creek Farms, 5600 S Shunk Rd., Sault Ste. Marie, MI 49783
- [Firewise on the Farm Presentation](#)
Date: Oct 22, 2014
Location: North Central Michigan College Library, 1515 Howard Street, Petoskey
- [Getting Started With Vegetable Plasticulture - Webinar](#)
Date: Oct 22, 2014
Location: Webinar

Programs

- [4-H Animal & Vet Science Camp](#)
- [4-H Animal Evaluation](#)
- [Affordable Care Act](#)



Not finding what you need? Access our network of universities across the country!

The screenshot shows a web browser window with several tabs open: 'Today's Meeting - erinlizo', 'East Lansing (MSUHort)', 'MSU Extension', and 'Ask an Expert - eXtension'. The address bar shows the URL 'https://ask.extension.org/ask'. The website header is orange and features the 'eXtension more mind reach' logo on the left and navigation links for 'About eXtension', 'Ask an Expert', 'Campus', 'eXtension.org', 'Learn', and 'Search' on the right. Below the header, there is a search bar and links for 'Ask a Question', 'About', and 'Sign in'. The main content area is titled 'Ask a Question' and contains a form with three sections: 'Give your question a title' with a text input field, 'Question' with a rich text editor (including options for Normal text, Bold, Italic, Underline, and icons for bulleted list, numbered list, link, unlink, and insert image), and 'Email' with a text input field. To the right of the form is a grey box with the text: 'Ask an Expert is site where you can get expert answers and help from Cooperative Extension/University staff and volunteers from across the United States.' At the bottom of the browser window, a taskbar shows icons for various applications like Chrome, File Explorer, and Office apps, along with system tray icons and a 'Show all downloads' button.



MSUE Find an Expert

SKIP TO CONTENT | ANR @ MSU | Michigan State University Extension | search this site

MICHIGAN STATE UNIVERSITY | Extension | Home | About | Events | Experts | Counties

4-H | Agriculture | Business | Community | Family | Food & Health | Lawn & Garden | Natural Resources

Agriculture

- > Beef
- > Dairy
- > Farm Management
- > Field Crops
- > Floriculture
- > Fruit & Nuts
- > Horses
- > Nursery & Christmas Trees
- > Organic Agriculture
- > Pork
- > Poultry
- > Sheep & Goats
- > Vegetables


Sign up for MSUE News

MICHIGAN STATE UNIVERSITY Extension BOOKSTORE

Connect with experts around the country:


extension Ask an Expert

SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



Agriculture

Supporting agriculture is key to a brighter future. Michigan State University Extension works to increase farmers' success while protecting the environment, ensuring food safety, reaching new markets and advancing agriculture through applied research.



Agriculture is now one of the fastest growing sectors of the Michigan economy. MSU Extension works to ensure it has a thriving knowledge base to become more competitive in local, state, national and international marketing making Michigan's economy stronger.

News

Subscribe to RSS Feed

- Grand Rapids area apple maturity report – October 10, 2014**
October 13, 2014 | **Phil Schwallier** | Cooler weather has resulted in outstanding apple quality.
- The color of meat depends on myoglobin: Part 1**
October 10, 2014 | **Jeanine Schwehofer** | Myoglobin is the iron-rich protein that gives meat its color.
- Landowners determine impacts of oil and gas leasing negotiation efforts in survey**
October 10, 2014 | **Curtis Talley Jr.** | Results of a survey sent to 130 landowners in 19 Michigan counties determines their activities in oil and gas leasing and their sources of assistance information.
- Southwest Michigan apple maturity report – October 8, 2014**
October 8, 2014 | **Bill Shane** | Harvest of Golden Delicious in southwest Michigan is well underway with Red Delicious ramping up. Rain has hampered harvesting somewhat. Fruit size is generally very good

Find an Expert

Select a county

Events




View more events »

Season Extension to Expand Your Marketing Potential
Date: Oct 13, 2014
Location: Ski Country Farm, 2281 W 7 Mile Rd., Sault Ste. Marie & Beaver Meadow Creek Farms, 5600 S Shunk Rd., Sault Ste. Marie, MI 49783

Firewise on the Farm Presentation
Date: Oct 22, 2014
Location: North Central Michigan College Library, 1515 Howard Street, Petoskey

Getting Started With Vegetable Plasticulture - Webinar
Date: Oct 22, 2014
Location: Webinar

Programs

-  **4-H Animal & Vet Science Camp**
-  **4-H Animal Evaluation**
-  **Affordable Care Act**





- 4-H
- Agriculture
- Business
- Community
- Family
- Food & Health
- Lawn & Garden
- Natural Resources

Experts



Connect with experts around the country:



SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



VISIT THE WEBSITE

Experts

Last Name

First Name

County Topic

Search

Serving Saginaw County

Bollwahn, Shelby

Educator

bollwah1@anr.msu.edu 517-439-9301

Environmental Quality Educator

Conklin, Tina

Educator

conkli74@msu.edu

Animal care and handling practices for advancement for MI livestock industry.

Lindquist, Gerald

Educator

lindquis@msu.edu 231-832-6139, 888-678-3464

Grazing educator



MSUE Events

SKIP TO CONTENT ANR @ MSU Michigan State University Extension search this site

MICHIGAN STATE UNIVERSITY | Extension Home About Events Experts Counties

4-H Agriculture Business Community Family Food & Health Lawn & Garden Natural Resources

Agriculture

- > Beef
- > Dairy
- > Farm Management
- > Field Crops
- > Floriculture
- > Fruit & Nuts
- > Horses
- > Nursery & Christmas Trees
- > Organic Agriculture
- > Pork
- > Poultry
- > Sheep & Goats
- > Vegetables

Sign up for MSUE News

MICHIGAN STATE UNIVERSITY Extension BOOKSTORE

Connect with experts around the country:

Ask an Expert

SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



Agriculture

Supporting agriculture is key to a brighter future. Michigan State University Extension works to increase farmers' success while protecting the environment, ensuring food safety, reaching new markets and advancing agriculture through applied research.



Agriculture is now one of the fastest growing sectors of the Michigan economy. MSU Extension works to ensure it has a thriving knowledge base to become more competitive in local, state, national and international marketing making Michigan's economy stronger.

News

Subscribe to RSS Feed

Grand Rapids area apple maturity report – October 10, 2014

October 13, 2014 | Phil Schwallier | Cooler weather has resulted in outstanding apple quality.

The color of meat depends on myoglobin: Part 1

October 10, 2014 | Jeannine Schwehofer | Myoglobin is the iron-rich protein that gives meat its color.

Landowners determine impacts of oil and gas leasing negotiation efforts in survey

October 10, 2014 | Curtis Talley Jr. | Results of a survey sent to 130 landowners in 19 Michigan counties determines their activities in oil and gas leasing and their sources of assistance information.

Southwest Michigan apple maturity report – October 8, 2014

October 8, 2014 | Bill Shane | Harvest of Golden Delicious in southwest Michigan is well underway with Red Delicious ramping up. Rain has hampered harvesting somewhat. Fruit size is generally very good

Find an Expert

Select a county Go

Events

View more events >

Season Extension to Expand Your Marketing Potential

Date: Oct 13, 2014
 Location: Ski Country Farm, 2281 W 7 Mile Rd., Sault Ste. Marie & Beaver Meadow Creak Farms, 5600 S Shunk Rd., Sault Ste. Marie, MI 49783

Firewise on the Farm Presentation

Date: Oct 22, 2014
 Location: North Central Michigan College Library, 1515 Howard Street, Petoskey

Getting Started With Vegetable Plasticulture - Webinar

Date: Oct 22, 2014
 Location: Webinar

Programs

4-H Animal & Vet Science Camp

4-H Animal Evaluation

Affordable Care Act





Events

Filter Events

My County My Area
 All Counties
 All Topics
 All Programs
 All Certifications
 10/13/2014

Go

Sign up for MSUE News



Connect with experts around the country:



SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



Events

Page 1 of 27 pages 1 2 3 > Last >

Eat Healthy, Be Active nutrition series

Date: October 12, 2014 - November 17, 2014
Location: Private residence, Livonia, MI
 Free 6 week nutrition series.

Eat Healthy, Be Active Nutrition Series

Date: October 13, 2014 - November 17, 2014
Location: Private residence, Livonia, MI
 Free 6 week nutrition series.

ABC's of Bullying Prevention

Date: October 13, 2014
Location: Big Bear Arena, 2 Ice Circle, Sault Ste Marie, MI 49783
 Learn about bullying behavior and strategies for prevention.

Mindful Eating

Date: October 13, 2014
Location: MSU Extension Kent County, 775 Ball Ave NE, Grand Rapids MI 49506
 Learn the benefits of eating with mindful awareness.

Building Strong Adolescents Parenting Series

Date: October 13, 2014 - November 24, 2014
Location: Monroe County MSU Extension, 963 S. Raisinville Rd., Monroe, MI 48161
 A six-week parenting/caregiver program on parenting pre-teens and teenagers.

Season Extension to Expand Your Marketing Potential

Date: October 13, 2014
Location: Ski Country Farm, 2281 W 7 Mile Rd., Sault Ste. Marie & Beaver Meadow Creek Farms, 5600 S Shunk Rd., Sault Ste. Marie, MI 49783
 Join the Michigan Farmers Market Association in our Farm-Based Educational Field Day as we talk about season extension.

Backyard Gardener: Tree Fruit Workshop

Date: October 13, 2014



Events

Events

Filter Events

My County My Area

All Counties

All Topics

All Programs

MAEAP Phase I Credit

- All Certifications
- American Registry of Professional Animal Scientists Credit
- Better Process Control
- Blueberry IPM Scout Training
- Certified Crop Advisor Credit
- Conservation Stewards
- Firewise Model Community
- MAEAP Phase I Credit
- Master Citizen Planner
- Master Gardener
- Master Woodland Manager
- MDA Certified Pesticide Applicator
- Michigan Cottage Food Law
- My Horse University Certificate
- Natural Shoreline Professional
- Pesticide Applicator Recertification Credit (RUP)
- Pork Quality Assurance
- ServSAFE
- Zoning Administrator Certification

SEE HOW SPARTANS MAKE A DIFFERENCE IN MICHIGAN



Eat Healthy, Be Active nutrition series

Date: October 12, 2014 - November 17, 2014
Location: Private residence, Livonia, MI
 Free 6 week nutrition series.

Page 1 of 27 pages 1 2 3 > Last >

Eat Healthy, Be Active Nutrition Series

Date: October 13, 2014 - November 17, 2014
Location: Private residence, Livonia, MI
 6 week nutrition series.

of Bullying Prevention

Date: October 13, 2014
Location: Big Bear Arena, 2 Ice Circle, Sault Ste Marie, MI 49783
 at bullying behavior and strategies for prevention.

ul Eating

Date: October 13, 2014
Location: MSU Extension Kent County, 775 Ball Ave NE, Grand Rapids MI 49506
 benefits of eating with mindful awareness.

Strong Adolescents Parenting Series

Date: October 13, 2014 - November 24, 2014
Location: Monroe County MSU Extension, 963 S. Raisinville Rd., Monroe, MI 48161
 A six-week parenting/caregiver program on parenting pre-teens and teenagers.

Season Extension to Expand Your Marketing Potential

Date: October 13, 2014
Location: Ski Country Farm, 2281 W 7 Mile Rd., Sault Ste. Marie & Beaver Meadow Creak Farms, 5600 S Shunk Rd., Sault Ste. Marie, MI 49783
 Join the Michigan Farmers Market Association in our Farm-Based Educational Field Day as we talk about season extension.

Backyard Gardener: Tree Fruit Workshop

Date: October 13, 2014



The new ipm.msu.edu

ipm.msu.edu

SKIP TO CONTENT ANR @ MSU CANR ENT Integrated Pest Management Program search this site

MICHIGAN STATE UNIVERSITY | Integrated Pest Management 

[Home](#) [About](#) [Publications](#) [Contacts & Permissions](#) [Related Resources](#) [International](#) [Biocontrol](#) [Invasive Species](#)

Topics

[Agriculture](#)

[Green Industry](#)

[Community and Home](#)

[Pesticide Education & Safety](#)

What's Hot?

The growing season is finishing – good time to explore **Enviro-weather**. Our weather in 2012 was worse than challenging. [MSU's Enviro-weather](#) has information and tools to help you manage pests whatever the current



Welcome to Michigan State University's Integrated Pest Management (IPM) resources. The [IPM Program](#) collaborates with faculty and [Extension](#) educators to develop diverse information serving growers of many crops, the landscape/turf "green" industry, and those looking for home and garden pest solutions. Our website includes the resources offered by [Pesticide Education and Safety Program](#).



SKIP TO CONTENT



ANR @ MSU

CANR

ENT

Integrated Pest Management Program



search this site

MICHIGAN STATE UNIVERSITY

Integrated Pest Management



Home About Publications Contacts & Permissions Related Resources International Biocontrol Invasive Species

Topics



Agriculture

Christmas Trees

Fruit

Field Crops

Organic

Urban Ag

Vegetables »

Green Industry

Community and Home

Pesticide Education & Safety

Home > Agriculture > Vegetables

Vegetables

Seasonal updates and advice

- [MSU Extension News](#) – Plant and pest management advice for commercial vegetables. The search at this site includes 2006 and forward *CAT Alert* newsletter articles.

Weather resources

- [Enviro-weather](#) – Weather data with models for making pest and other management decisions

Featured resources

- [Vegetable entomology website](#)



Invasive pest information

SKIP TO CONTENT ANR @ MSU CANR ENT Integrated Pest Management Program search this

MICHIGAN STATE UNIVERSITY | Integrated Pest Management 

Home About Publications Contacts & Permissions Related Resources International Biocontrol Invasive Species

Topics

- Agriculture
- Green Industry
- Community and Home
- Pesticide Education & Safety

What's Hot?

The growing season is finishing – good time to explore **Enviro-weather**. Our weather in 2012 was worse than challenging. [MSU's Enviro-weather](#) has information

Home > Invasive Species > *Spotted Wing Drosophila*

Spotted Wing Drosophila

Welcome to MSU's Spotted Wing Drosophila site

This site contains information and links for growers and homeowners about **a new invasive pest in Michigan**, the Spotted Wing Drosophila.

- [Factsheets](#)
- [Monitoring](#)
- [Crop recommendations](#)

Spotted Wing Drosophila

Brown Marmorated Stink Bug

Multi-Colored Asian Lady Beetle

Garlic Mustard

Emerald Ash Borer

Forecasting Invasion Risks

Photo: Martin Hauser




On-demand webinar series

The screenshot shows a web browser window displaying the Michigan State University Integrated Pest Management Academy website. The browser's address bar shows the URL www.ipm.msu.edu/agriculture/integrated_pest_management_academy. The website header includes the MSU logo and the text "Integrated Pest Management". A navigation menu lists: Home, About, Publications, Contacts & Permissions, Related Resources, International, Biocontrol, and Invasive Species.

On the left side, there is a "Topics" sidebar with a green leaf icon. The "Agriculture" category is highlighted in green. Below it, a list of topics includes: Christmas Trees, Fruit, Field Crops, Organic, Urban Ag, Vegetables, **Integrated Pest Management Academy** (with a right-pointing arrow), Session handouts and presentations, Green Industry, Community and Home, and Pesticide Safety & Education.

The main content area displays the page title "Integrated Pest Management Academy" and a welcome message: "Welcome to the online Integrated Pest Management Academy!". Below this, the section "Online Integrated Pest Management Academy Webinars" is introduced. A paragraph states: "The following prerecorded webinars are available for viewing at any time. Simply click on the webinar titles of your choice. At this time, no pesticide recertification credits are available for viewing these webinars." A note says: "Click on the titles below to view the described webinar:".

Four webinar titles are listed with external link icons:

- Introduction to Integrated Pest Management**: Learn about the history of pest management, the evolution of integrated pest management (IPM) and the tenants that define implementation in the field.
- Integrated Pest Management Resources**: Learn about the integrated pest management resources Michigan State University and Extension have to offer agricultural producers.
- Entomology 101**: In this compact primer on insects learn the vocabulary to help you properly identify insects and better understand the role of insects in the world.
- Plant Pathology 101**: This introductory webinar covers the basics of plant pathogens and introduces viewers to the some popular control methods.
- Soil Science 101**: This webinar highlights the importance of soil characteristics and their potential impacts on agricultural producers. *Due to some technical difficulties, you must follow this*

The Windows taskbar at the bottom shows various application icons (Internet Explorer, Chrome, Word, Excel, PowerPoint, Outlook, OneDrive, Adobe Reader) and system tray information including 97% battery and the date/time: 9:45 AM, 10/24/2014.



Webinars Coming in 2015

Understanding Organic insect management products
What is wrong with my vegetable plants?
Tactics for vegetable disease management
Understanding Late blight of tomatoes and potatoes
How to submit a sample for diagnosis
Understanding Cucurbit downy mildew
Understanding Organic disease management products
Pollinators 101
Vegetable Pollination 101
Beekeeping: Honeybee
Beekeeping: Natives
Protecting pollinators
Vegetable insect scouting
Enviroweather: Cabbage maggot
Enviroweather: Asparagus miner
Enviroweather: Seed corn maggot
Enviroweather: Squash vine borer
Enviroweather: Potato leaf hopper

The screenshot shows a webinar slide titled "The creation of modern agriculture" from Michigan State University Extension. The slide features a bulleted list on the left and a photograph of a large-scale agricultural irrigation system in a field on the right. The list includes: Condensed cultivation, Pesticides are born, The Green Revolution, and Industrialized agriculture. The photograph is credited to Mark McMillan, Colorado State University, Bugwood.org. The webinar interface includes a header with the Michigan State University Extension logo, a table of contents on the right, and a playback control bar at the bottom.

MICHIGAN STATE UNIVERSITY | Extension

The creation of modern agriculture

- Condensed cultivation
- Pesticides are born
- The Green Revolution
- Industrialized agriculture

Mark McMillan, Colorado State University, Bugwood.org

Outline	Thumb	Notes	Search
Slide 1		00:18	
IPM Academy Online		00:29	
Slide 2		00:18	
The creation of modern...		01:44	
Pesticides		01:19	
Heavy reliance on pest...		00:47	
The tipping point		01:17	
What is IPM?		00:35	
Today IPM is:		00:38	
Tenets of IPM (PAMG)		00:41	
Prevention		00:30	
Prevention		01:12	
Prevention		00:39	
Avoidance		00:58	
Avoidance		00:52	
Avoidance		00:53	
Monitoring		01:16	
Suppression driven by ...		01:36	
Decision to treat base...		01:30	
Resources and supplies		01:18	
Integrated Management		00:31	
Slide 22		00:17	
Acknowledgements		00:12	

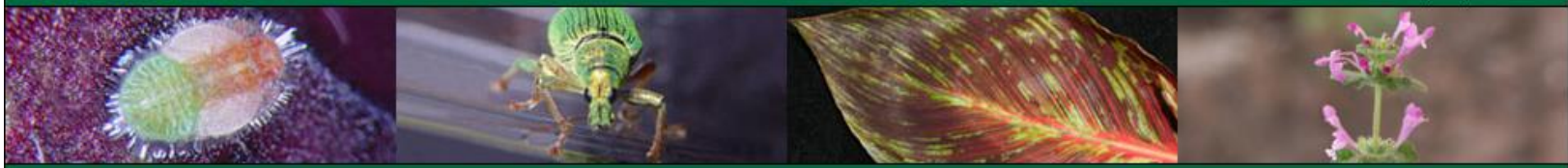
19 Minutes 38 Seconds Remaining



DIAGNOSTIC SERVICES

at Michigan State University

101 Center for
Integrated Plant Systems
East Lansing, MI 48824-1311
Phone: (517) 355-4536
Fax: (517) 432-0899



- Home
- Services & Fees
- Sample Submission
- Submittal Forms
- About the Lab
- Links
- Diagnostic Factsheets
- Diagnostic Newsletters

Providing high quality, timely, client-oriented services related to plant health and pest-related problems.

NEW ADDRESS

The mailing address for MSU Diagnostic Services has been changed to:

Diagnostic Services
578 Wilson Rd., Rm. 107
East Lansing, MI 48824-6469

Click for more info

- Environmental or Cultural Problems
- Herbicide/Pesticide Injury
- Insects and Arthropods
- Plant Diseases

MICHIGAN STATE UNIVERSITY

Department of Crop and Soil Sciences
Soil and Plant Nutrient Laboratory[Sample Instructions](#)[Soil Test Report](#)[Common Questions](#)[Directions to MSU](#) ↗

Soil and Plant Nutrient Laboratory

MSU Soil and Plant Nutrient Laboratory (SPNL) operates as an integral part of Michigan State University providing support to teaching, research and extension programs. The SPNL offers a variety of analytical services on samples of soil, greenhouse growth media, composts, plant tissue, water and other materials related to the growing of plants (crops) received from commercial and part-time farmers, greenhouse operations, golf courses, homeowners, consultants, researchers, and others.

Many county extension operations use soil and plant tissue testing as the foundation for extension programs with their various clientele groups. Researchers in many departments within MSU and other universities have the SPNL analyze soil, plant and water samples as part of their research programs.

www.css.msu.edu/SPNL/

Commodity specific websites

- APPLES.msu.edu
- BLUEBERRIES.msu.edu
- CHERRIES.msu.edu
- GRAPES.msu.edu
- ipm.msu.edu/TURF.htm
- ipm.msu.edu/VEGETABLE.htm
- ipm.msu.edu/LANDSCAPE.htm
- ipm.msu.edu/HOMEPEST.htm
- ipm.msu.edu/CHRISTMASTREE.htm
- ipm.msu.edu/FIELDCROPS.htm
- HOPS.msu.edu
- CHESTNUTS.msu.edu

The screenshot shows the 'Chestnuts' website page. At the top, there is a navigation bar with 'MICHIGAN STATE UNIVERSITY' and 'Chestnuts'. Below this is a large image of chestnut leaves. The main content area is titled 'Sweet chestnut orchard production'. It includes a welcome message, a Facebook link, an 'Events' section with a link to 'Ag and Food Industry Fall Update', and a news section titled 'MSUE Chestnuts News' with an 'RSS Feed' icon. An image of chestnuts is also present in the main content area.





United States Department of Agriculture
National Institute of Food and Agriculture



This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under Agreement No. 2013-41534-21068. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

This program is supported in part by North Central Region - Sustainable Agriculture Research and Extension (NCR-SARE).

