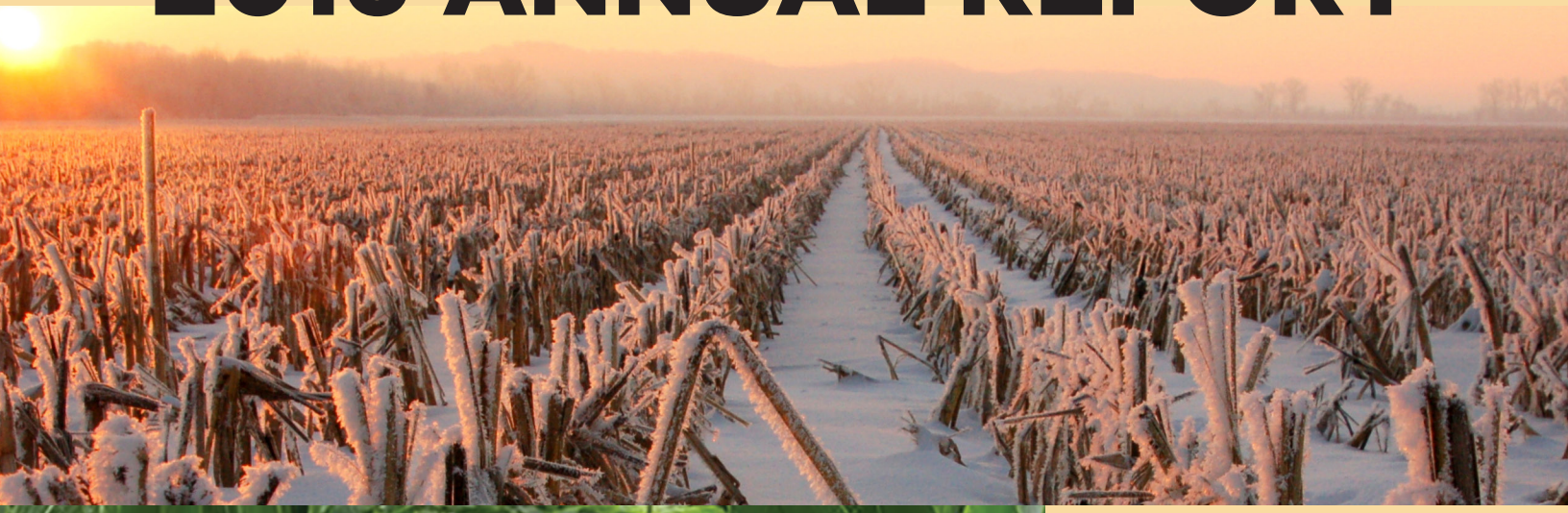


2016 ANNUAL REPORT



Integrated Pest Management

University of Missouri

Lincoln University

Taking an environmentally sensitive approach to pest management

From the Directors

For over 30 years, the University of Missouri IPM program has served the agriculture, horticulture, and urban pest management sectors in educating Missouri's citizens on responsible and sustainable pest management methods. An interlinked community of state faculty specialists, regional extension specialists, the MU Soil Testing and Plant Diagnostic Service, and MU IPM staff strive to deliver timely updates of ongoing and potential pest problems, and the research-based approaches to controlling them. Coordinating our efforts with our partners at Lincoln University broadens the reach of our land grant mission and allows the collective to accomplish even more. In 2016, we unveiled a new IPM website for Missouri that acts as a modernized communication vehicle for our pest monitoring program, newsletter articles, and social media information. Our state and regional specialists are engaged in an array of research programs that aren't just a reaction to current problems, but also proactively plan for future pest threats. I hope you enjoy this 2016 update of our observations and activities, and look forward to serving you again in 2017.

Lee Miller
Associate Professor
Division of Plant Sciences

Lincoln University (LU) has served the needs of underserved Missourians since 1866. Missouri farmers growing specialty crops (vegetables and fruits in particular) are the primary audience of the LU IPM program. This past year has brought about some pest challenges and many opportunities for IPM. Extension activities implemented in 2016 focused on (1) invasive and emerging pests, (2) closing the knowledge gap between IPM and organic agriculture, (3) demonstrating the benefits of ecologically-based IPM, and (4) fostering IPM adoption by small- and mid-scale growers.

Dr. Jaime C. Piñero
Associate Professor
State Extension Specialist - IPM

About IPM

Integrated pest management (IPM) is a sustainable approach to managing insect, pathogens, and weed pests through a coordinated decision-making/action-taking process. The goal of IPM is to mitigate pest damage while protecting human health, environmental quality, and economic viability. The MU IPM program is partially funded by a federal grant. It is multidisciplinary and involves a large team of scientists and extension specialists.

Contents

Production: Amy Hess: editor/designer
Linda Geist: journalist/writer
Lee Miller: editing

Cover photos: Tomato rot by James Quinn, large patch disease on turfgrass by Lee Miller, Japanese beetle by Bugwood.org, rime corn by Pat Guinan, palmer amaranth by Kevin Bradley

Missouri IPM Highlights in 2016

Weed Science

Palmer amaranth growing in a cornfield near West Alton, Missouri in 2016. Photo courtesy of University of Missouri undergraduate Wyatt Coffman

IN BRIEF

■ Palmer amaranth remained the top weed to watch in Missouri. More than 32 of Missouri's 114 counties now report its presence. A multi-herbicide resistant variety was confirmed north of St. Louis in October. It was the first confirmed case in the state. This Palmer amaranth resists glyphosate and PPO. Numerous workshops and field day presentations, magazine and newspaper articles, web postings and radio broadcasts have been given to inform the public about its spread and control.

Multi-herbicide Resistant Palmer Amaranth

Published October 31, 2016

by Mandy Bish and Kevin Bradley

In September, Southern Illinois University weed scientist Karla Gage along with Ronald Krausz, researcher and farm manager of SIU's Belleville Research Center, identified a population of Palmer Amaranth with glyphosate- (group 9) and PPO- (group 14) resistance. This population, found just north of St. Louis in the Mississippi River bottoms, is the first confirmed case of multi-resistant Palmer amaranth in Missouri, and the first known instance of a Palmer amaranth population in Missouri with resistance to post-emergence applications of group 14 herbicides like fomesafen (Flexstar, Marvel, etc.), lactofen (Cobra), or aciflurofen (Ultra Blazer).

The team sent tissue to the Illinois Plant Clinic where the samples were confirmed to have elevated copy numbers of the EPSPS gene, leading to glyphosate resistance, and the sample tested positive for a point mutation in the PPO gene known to confer resistance to PPO-inhibitor herbicides.

PPO resistance in Palmer amaranth was first discovered in Tennessee in 2015 and more recently other populations have been discovered in southern Illinois. Midwest growers have had to contend with PPO-resistant populations of waterhemp for many years, and especially in Missouri and Illinois, multiple-resistant waterhemp is now the rule rather than the exception.

The seedhead of a Palmer amaranth plant can reach over 1.5 feet in length; no other pigweed seedhead will grow to that length.

This new finding with Palmer amaranth re-emphasizes the need for an integrated approach to the management of troublesome pigweed species like Palmer amaranth and waterhemp; one that includes multiple herbicide modes of action and cultural practices that minimize the deposition of weed seed back into the soil. If you have Palmer amaranth populations that you suspect are resistant to the group 14 herbicides, we'd like to hear about it and would be glad to discuss this with you further.

Read the full article online at ipm.missouri.edu/IPCM/2016/8/Palmer_Amaranth_is_Still_on_the_Move_in_Missouri/

IN BRIEF

- Unprecedented dicamba damage in the Bootheel region of Missouri gave MU Extension weed scientists opportunities to educate producers and media during 2016.

Missouri Weed Scientists Hold Forum After Dicamba Damage in Bootheel

by Linda Geist

Dicamba damage made headlines in Southeast Missouri throughout 2016.

More than 100 farmers filed complaints with the Department of Agriculture about illegally-sprayed dicamba damaging 41,000 acres of crops in four counties. Crops receiving damage include soybean, rice, cotton, watermelon, peaches, tomatoes, cantaloupe, alfalfa and flowers.

The Environmental Protection Agency (EPA) had not yet approved a corresponding herbicide label designed not to drift for Monsanto's newly released dicamba-tolerant Xtend soybean or cotton. New lower volatility formulations have now been approved for in-season use in 2017. Dicamba is approved for pre-emergence use and burndown. Growers used the older herbicide to fight glyphosate-resistant weeds, including Palmer amaranth and waterhemp.

On July 29, MU Extension hosted a forum at the Fisher Delta Center in Portageville. The forum was one of many times Dr. Kevin Bradley and other faculty were called upon for advice on dicamba during 2016. During the forum, Dr. Bradley said yield loss depends largely upon dose and timing. Soybean are especially sensitive to dicamba with less than an ounce per acre causing severe damage. Dicamba alters a soybean plant chemically and causes the tissue to elongate. Affected leaves cup and are malformed. Soybean contacted when in the reproductive stage will most likely suffer yield loss.

Weed Science SNIPPETS

- MU weed scientists released an update to the ID Weeds app in 2016. See weedid.missouri.edu
- MU Extension weed scientists provided education of free apps and resources available to help farmers and applicators apply pesticides in safe and effective ways.
- MU Extension continued to educate growers and pesticide applicators about waterhemp. Farmers learned the importance of using full-strength herbicides in a multi-layered approach on this adaptable, prolific seed producer.
- MU weed scientists helped to educate farmers and pesticide applicators about 'flag the technology.' This program provides low-cost ways to reduce errors and limit off-target herbicide drift. (extension.missouri.edu/n/2862)
- MU agronomists and weed scientists worked with MU water quality specialists to instruct farmers on how to avoid atrazine runoff after heavy spring rains in 2016.

Accidental Herbicide Damage on Vegetables

Published: May 23, 2016

by James Quinn and David Trinklein

Buckwheat, cantaloupe and petunia each (left to right) displaying similar spotting from a herbicide drift incident.

MU Extension weed scientists provided research-based information to farmers throughout the state on herbicide wind drift. This came to the forefront during 2016 when numerous produce farms in southern Missouri reported severe Dicamba injury. Modern agronomic practices include the use of more and more non-selective herbicides. RoundUp Ready® crops already are widely planted and are being supplemented with 2,4-D and dicamba-resistant crops.

The latter were developed in an effort to control weeds that have become resistant to glyphosate. Additionally, copious amounts of non-selective herbicides are being used to chemically "burn down" cover crops before the land they occupy is planted in the spring.

(Read the full article at: ipm.missouri.edu/MPG/2016/5/Accidental_Herbicide_Damage_on_Vegetables/

Figure 1. Phosphorus deficient Corn plants – a typical symptom associated with corn grown following fallow.

IN BRIEF

■ In 2016, corn fields in prevented planted acres showed stunted and uneven growth. The answer commonly given to explain the poorer growth is the effect known as Fallow Syndrome.

Stunted Corn Following Prevented Planting — Fallow Syndrome

Published: June 7, 2016.

by Greg Luce

There are many corn fields in Missouri, in particular the NE portion of the state, where corn is stunted and uneven following prevented planting acres. Many farmers, extension and industry agronomists and consultants are working with fields that are showing dramatically poorer corn growth in prevented planting vs fields following a crop in 2015. In a number of cases there are side by side comparisons where soybean or a cover crop was planted in same field last year that had portions unplanted. The answer commonly given to explain the poorer growth behind prevented planting has been the effect of what is known as Fallow Syndrome. In some cases the answers involve multiple factors, and there are fields where not all of the stunted corn growth may be attributed to Fallow Syndrome.

(Read the full article at: www.ipm.missouri.edu/IPCM/2016/6/Stunted_Corn_Following_Prevented_Planting-Fallow_Syndrome)

Agronomy SNIPPETS

■ IPM agronomists led the way in educating Missouri farmers about ways to use unmanned aerial vehicles in farm operations. Dr. Wiebold and Kent Shannon spoke at several extension meetings about the use of this new technology for precision farming.

■ MU forage specialists presented new ways to ammoniate low-quality forage during workshops for beef and dairy producers. Numerous workshops presented ways to reduce ergovaline in forages for cattle, horses and small ruminants. Pasture renovation schools taught farmers how to renovate pastures to avoid using endophyte-free tall fescue. Specialists continued to work with the Grasslands Alliance to educate farmers on this issue.

■ Missouri corn, wheat and soybean fields faced disease pressure from stalk rot, diplodia and rust. Wet weather caused some sprouting of corn in parts of the state. Despite disease and insect pressure in 2016, a bumper crop was raised and MU Extension agronomists advised growers about storage options.

Bill Wiebold is the new director of the Missouri Soybean Center.

IN BRIEF

■ The Missouri Soybean Center at MU focuses on promoting and enhancing soybean research, teaching and Extension.

MU held its first annual Missouri Soybean Symposium-April 2016

by Linda Geist

Some of the country's leading soybean researchers presented at the inaugural event. Bill Wiebold leads the way as the new director for the Missouri Soybean Center at MU. The speakers at this first symposium included Robert Alpers, a farmer from Prairie Home who discussed the challenges of producing sobean in Missouri. Michelle Folta, a PhD student of Plant Sciences discussed using RNA interference to reduce soybean seed raffinose. Doug Allen, USDA Research Scientist discussed using isotope labelling and metabloic flux analysis to understand soybean metabolism. Melissa Mitchum, Associate Professor and member of the soybean center's steering committee discussed soybean cyst nematode. Randy Nelson, USDA/ARS and the University of Illinois professor presented the Poehlman Lecture on the importance of diversity in plant breeding.

(Visit the website at soybeancenter.missouri.edu)

Insect Pests

Brown Marmorated Stink Bugs in Homes

IN BRIEF

■ Brown Mamorated Stink Bugs continued to plague Missouri homeowners as they fled to warm quarters for the winter. Their presence remains mostly in southern Missouri and in urban areas. Missouri specialists contribute to the national BMSB watchlist. ---MEG October 2016

Published: October 11, 2016

by Jaime Piñero and Richard Houseman

The Brown Marmorated Stink Bug (BMSB) is a significant agricultural pest of foreign origin. It was first discovered in Missouri in 2013. Since then they have been slowly spreading throughout the state, mostly in the eastern (including St. Louis area) and the southern regions. In addition to causing damage to many types of plants and fruit in the spring and summer, BMSB becomes a nuisance pest both indoors and out when it is attracted to the outside of houses on warm fall days in search of protected, overwintering sites. High numbers of BMSB result from the release of an aggregation pheromone (a scent that attracts other BMSB to the area). The aggregation pheromone is not the same chemical that causes them to stink. During the winter months BMSB enters a type of hibernation called diapause. During this time they do not feed and do not reproduce. The BMSB is the only stink bug known to congregate inside houses and other buildings the fall. The Brown Marmorated Stink Bug is not harmful to people, houses, or pets. They do not bite, sting, suck blood, or spread diseases; and they do not eat or bore into wood structures. However, adults emit an offensive odor if disturbed or crushed. Read the full article online at: ipm.missouri.edu/MEG/2016/10/Brown_Marmorated_Stink_Bugs_in_homes

Insects SNIPPETS

■ With the retirement of state entomologist Wayne Bailey, MU emeritus professor entomologist Ben Puttler provided input for weekly horticulture and agronomy teleconferences during the 2016 growing season.

■ Sugarcane aphids appeared in southern Missouri sorghum fields. They were found as far north as Boone County. extension.missouri.edu/n/2883

■ Fall armyworms appeared heavily in southern counties of Missouri. ipm.missouri.edu/pestMonitoring/faw/viewall.cfm

■ MU continued to work to improve bee pollination throughout the state. Through IPM efforts, state horticulturists provided beekeeping workshops through the Missouri Pollinator Conservancy Program. agebb.missouri.edu/news/ext/showall.asp?story_num=7040

Japanese beetles plagued parts of Missouri in 2016. What's their outlook?

IN BRIEF

■ Japanese beetles hit Missouri trees and crops heavily in 2016. The beetles shredded the leaves of trees throughout much of the state.

Published: Novermber 21, 2016

by Pat Miller

In 1934 Japanese beetles made it to St. Louis, after being accidently introduced in the U.S. in 1916. They have migrated across much of the state with some areas having extremely high numbers. These beetles are scarce in north Missouri but heavy in the southwest and central areas of the state. Kansas City is typical of north Missouri, and for some reason in the Southeast, despite the weather being favorable, they don't seem to have become as troublesome. Japanese beetles feed on a variety of vegetables, such as beans, asparagus stems, the foliage and silk of corn and the foliage of okra. They also feed on rhubarb, grape, raspberry, elderberry and blackberry, some tree fruits, and hundreds of ornamental plants and trees. In 2016, many Linden trees, a highly preferable food source, were severely defoliated. Commercial pheromone traps are available and help alert to their emergence. The IPM pest monitoring program also operates a broad trapping network for the pest throughout the state. (ipm.missouri.edu/pestmonitoring)

Read the full article at: ipm.missouri.edu/MPG/2016/11/japaneseBeetle/

Bare areas, like this one, can be dormant seeded in late winter to take advantage of the first available spring germination temperature.

IN BRIEF

■ Dormant seeding is the practice of sowing during temperatures not suitable for germination in late fall or winter, in the expectation that germination will occur when temperatures rise in the spring.

Dormant Seeding of Turfgrass in Late Winter

Published: February 26, 2016

by Brad Fresenburg and Lee Miller

Seeding of cool-season turfgrasses such as tall fescue and Kentucky bluegrass is recommended in late August – through mid September in Missouri. This timing allows seedlings enough time to germinate and mature prior to the frigid temperatures of winter, and spares them from the brutal heat and disease pressure of the summer. If you have a sparse or bare area that needs renovating, and have missed this window it's probable weeds will soon infest.

Dormant seeding is the practice of sowing during temperatures not suitable for germination, in the expectation that germination will occur when temperatures rise to suitable levels in the spring. Field trials at Purdue University (Reicher et al, 2000) demonstrated dormant seeding of Kentucky bluegrass or tall fescue in November, December or March can be effective, and reduced the establishment time compared to seeding in April or May. The idea is to beat the weeds to the punch, and take advantage of the very first opportune environment for turfgrass germination. The weed seeds are there and waiting to germinate in the open space; why shouldn't your desired turfgrass seed be there ready to germinate and compete along with them? In addition, the jump on turfgrass maturity will reap benefits later, as the extra few weeks will allow for greater resistance to turfgrass diseases that can completely wipe out a stand of seedlings in late spring/early summer.

With Missouri's broad temperature swings in late fall and early winter, a late winter timing for dormant seeding may be most appropriate. Soil temperatures will normally remain below the germination range in February or March until it's go-time in the spring, therefore reducing the overall time of dormant seed in the field and minimizing the chances for winterkill. When attempting a dormant seeding, seedbed preparation is still very critical for success. Proper seed/soil contact is a necessity so removing any vegetation with a strong hoe or rake will be necessary.

Read the full article at: ipm.missouri.edu/MEG/2016/2/Dormant-Seeding-of-Turfgrass-in-Late-Winter

Horticulture SNIPPETS

■ The Missouri Produce Growers Newsletter was added as a resource for vegetable and small crop producers in the region. The newsletter can be found at ipm.missouri.edu/MPG/

■ MU horticulturists provided information on new ways to garden including high tunnels and raised-beds. ipm.missouri.edu/MPG/2016/11/Wet_summer_leads_to_diseases/

■ Professional lawn care workshops were conducted in Springfield and Kansas City, MO in 2016. Curriculum emphasized environmental stewardship and IPM principles in the lawn and landscape of urban homeowners. The popularity of the series over the last two years spurred design of a new publication *Pest Management for Home Lawns*, that serves as a training aid and bridge between a homeowner and lawncare company. (More information on page 11).

■ Fifty-three Master Gardener programs are located throughout Missouri. IPM faculty contribute greatly to the presentation and delivery of this curriculum. In addition, a web application of online training modules was developed and launched in 2016. For more information, visit mg.missouri.edu.

■ A new web app developed by MU turf management specialists debuted. The free app helps homeowners decide the correct amount of fertilizer to apply to lawns. agebb.missouri.edu/fertcalc/

■ A survey of pesticide applicators showed that only 43 percent of pesticide applicators read the label before application. Applicators also reported that they do not always check wind speed or other conditions before application, instead often relying upon visual assessment. Training took place for 1,958 applicators throughout the state throughout 2016.

Lincoln University IPM Highlights

by Dr. Jaime C. Piñero

Lincoln University (LU) has served the needs of underserved Missourians since 1866. Missouri farmers growing specialty crops (vegetables and fruits in particular) are the primary audience of the LU IPM program. This past year has brought about some pest challenges and many opportunities for IPM. Extension activities implemented in 2016 focused on (1) invasive and emerging pests, (2) closing the knowledge gap between IPM and organic agriculture, (3) demonstrating the benefits of ecologically-based IPM, and (4) fostering IPM adoption by small- and mid-scale growers.

Mass Trapping Systems

Optimizing a Mass Trapping System Design for Organic Japanese Beetle Control

During 2016, the LU IPM program continued with mass trapping studies to provide farmers with a practical and effective organic control option to potentially minimize Japanese beetle damage to crops. Results from a 2016 study indicated that Japanese beetle captures increased significantly by using 32-gallon trash bins with that had ventilation using screen windows, compared to non-ventilated bins. The ventilated bin's average Japanese beetle captures equaled that of the standard mass trapping device. These results support the usefulness of ventilated bins for organic Japanese beetle control.

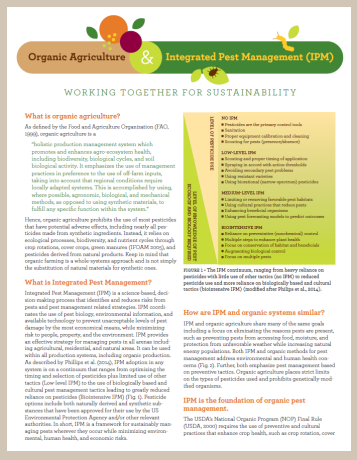
A novel mass trapping system developed to control cucumber beetles in cucurbit crops

LU IPM program researchers developed a simple, mass trapping system for cucumber beetles that has proven to be an effective component of an IPM strategy. When deployed in the cucurbit field, the cucumber beetles are drawn to the traps and away from the cash crop. Upon entering the trap, beetles are killed by their consumption of a carbaryl-laced bait. An article by Dr. Jaime Piñero and Rusty W. Lee III from University of Missouri Extension at Montgomery Count was published in June, 2016. It can be accessed here. ipm.missouri.edu/IPCM/2016/6/A-novel-mass-trapping-system-to-control-cucumber-beetles-in-cucurbit-crops/

Guide Sheets

Bridging the gap between organic agriculture and IPM

■ Organic agriculture and IPM systems and proponents share many of the same goals to address environmental and human health concerns. However, key commonalities and differences between these systems are not always clearly understood. Dr. Jaime Piñero coordinated efforts with the Organic and IPM Working Group to develop a fact sheet summarizing these two systems, including ways to tell if products were produced using organic and/or IPM practices. You can find and download the fact sheet on the working group's website (organicipmwg.wordpress.com). The Organic and IPM Working Group activities are supported by the USDA National Institute of Food and Agriculture, North Central IPM Center.


Organic Agriculture & Integrated Pest Management (IPM)

WORKING TOGETHER FOR SUSTAINABILITY

What is organic agriculture?

What is Integrated Pest Management?

How are IPM and organic systems similar?

IPM is the foundation of organic pest management.

Recent fact Sheets / Guide sheets on key insect pests of fruits and vegetables

■ Fact Sheets on aphids, Harlequin bugs, organic pest management, Spotted Wing Drosophila, Brown Marmorated Stink Bug, and Guide Sheets on mass trapping of cucumber beetles and more are available at the LU IPM website.

Field Days, Workshops, & Demonstrations

High tunnel workshop

High tunnel production of specialty crops has provided many benefits to growers, but the technology does come with some unique pest- and weather-related challenges. In an effort to address these challenges, on March 12, 2016, Lincoln University Cooperative Extension and the University of Missouri Extension in Jefferson County offered a well-received High Tunnel Production Workshop. This training was tailored to the needs of intermediate and advanced high tunnel growers. Soil health and cover crops (Dr. Touria Eaton), insect pests (Dr. Jaime Piñero) and diseases (Dr. Zelalem Mersha) were some of the topics that were presented at this workshop.

Alan T. Busby Organic Farm field day

On June 9th, 2016, the Lincoln Alan T. Busby Farm Organic hosted its Annual Organic / Sustainable Agriculture Field Day. This year, an innovative program involving seven workshops in the morning hours and hands-on field day in the afternoon was implemented. The keynote speaker was Dr. John Ikerd (Emeritus Professor, University of Missouri). While the workshops and field day demonstrations emphasized organic production, the concepts and techniques discussed offer sustainable alternative practices for conventional producers.

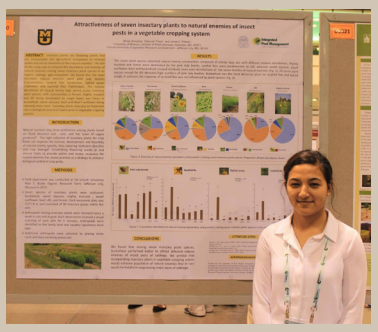
Demonstrations and adoption of IPM strategies

From May to August, 2016, the LU IPM program implemented IPM demonstrations at grower cooperator's land in the Kansas City, Springfield, and Hillsboro areas. From an IPM toolbox, eight grower participants selected the IPM strategies that they best thought could address their pest problems. Examples include mass trapping of Japanese beetle and cucumber beetles, trap cropping targeting cucurbit pests, insectary plants to support beneficial arthropods, releasing beneficial arthropods in high tunnels, and others. A follow-up survey, to be implemented soon, will reveal the extent to which the IPM strategies implemented were effective and the benefits to producers. These extension activities are supported by a NIFA Extension IPM grant.

Research

Can pest suppression result from integrating trap cropping with insectary plants?

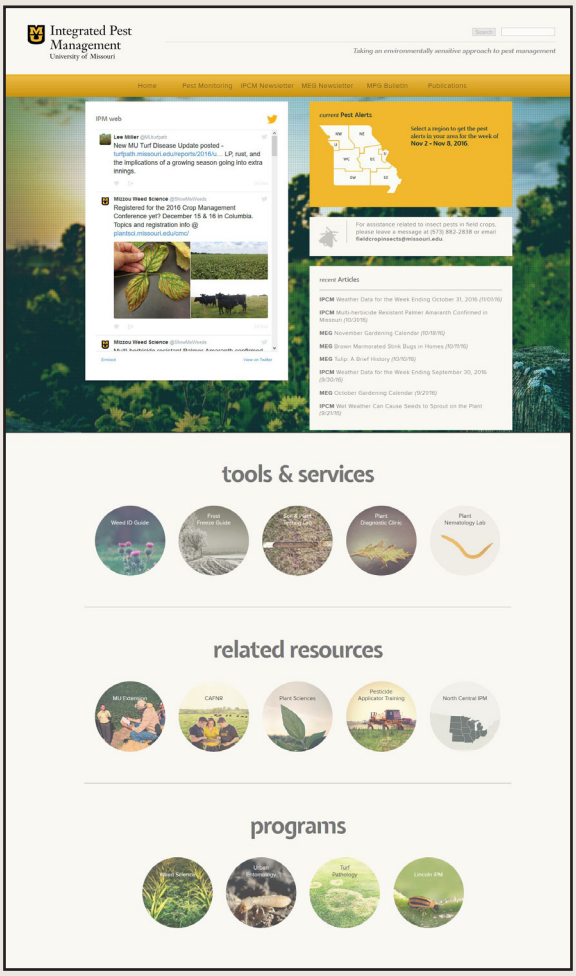
■ Establishing flowering plants in and around fields to provide resources for natural enemies has shown promise as a strategy to enhance biological control of crop pests. Trap cropping, in turn, is an ecological approach by which very attractive plants are planted next to a higher value crop so as to attract the pest resulting in pest suppression in the cash crop. Recent research conducted by Ms. Benita Shrestha (a MS student at MU who is supervised by Drs. Jaime Piñero and Deborah Finke) in the Brassica agro-ecosystem indicates that some combinations of trap crop / insectary plants can be effective at suppressing insect pests.



Japanese Beetle Composting: Converting Pests to Soil Fertilizer using Common Farm Materials

■ LU IPM program researchers have conducted studies aimed at composting large amounts of Japanese beetles that have been captured using mass trapping. Results from research conducted with lettuce indicate that Japanese beetle-based compost and vermi-compost provided nutrients readily available for plants to absorb and can be used to augment fertilization in support of organic production.

What's New on the Web

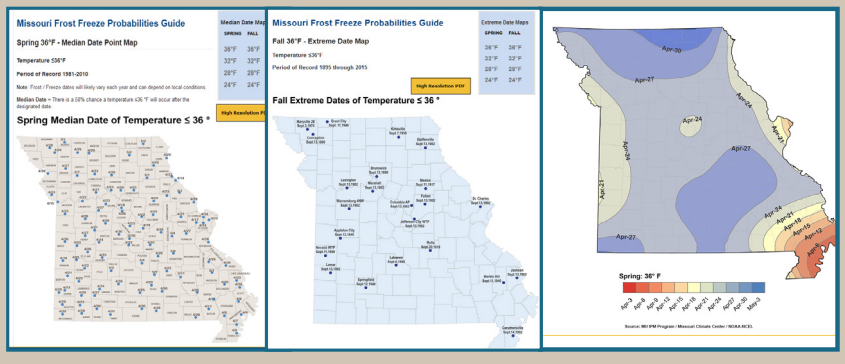


IPM launches new website

The IPM website was recently redesigned. It was created to work with any screen size including your mobile phone. You will find extensive IPM content including our interactive pest monitoring network, current regional pest alerts and access to all IPM newsletters and publications. We also offer links to a collection of tools, services, programs and resources to assist you with your pest management needs. ipm.missouri.edu

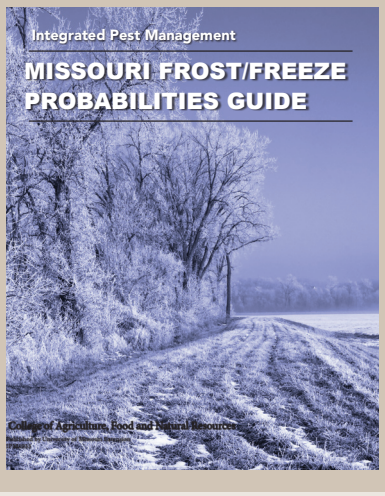
Frost / Freeze Probabilities Guide Website

This website provides frost/freeze probability data (ie: dates of first spring freeze and last fall freeze) for Missouri growers. Data from 103 National Weather Service Stations are displayed as interactive maps and tables.
ipm.missouri.edu/FrostFreezeGuide



Frost / Freeze Probabilities Guide (IPM1033)

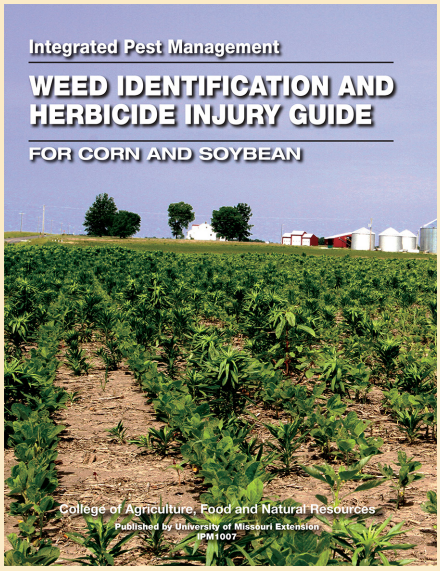
The guide is also provided in print as a downloadable PDF booklet.
extension.missouri.edu/p/IPM1033



What's New in Publications

Weed Identification and Herbicide Injury Guide for Corn and Soybean (IPM1007)

This University of Missouri publication is a resource for identifying weeds and understanding herbicide injury to crops. The first section of this guide provides photos and identification tips for 141 weed species found in Midwest agronomic production systems and includes seedling identification keys to aid in accurate and early identification of common broadleaf and grass weeds. The second section of this guide provides information on herbicide injury to crops, including introductions to herbicide resistance and the site-of-action groups, herbicide-injury diagnostic charts, and photos and descriptions of symptoms for herbicide-injured plants from 15 of the different herbicide site-of-action groups.



extension.missouri.edu/p/IPM1007

Pest Management for Home Lawns (IPM1035)

This pocket-size manual familiarizes homeowners and lawn care professionals with the pest problems that may be encountered in a home lawn and provides information on the most sustainable and integrated management solutions for those problems. It contains descriptions and photos to aid in identification of turfgrasses and the most common lawn weeds, diseases and insects. In addition, it includes tables that indicate the degree of control provided by herbicides, fungicides and insecticides labeled for use on residential lawns.

extension.missouri.edu/p/IPM1035

IPM Newsletters

Current information from university experts regarding plant pest outbreaks and management information is delivered in three IPM newsletters as listed below. Missouri Produce Growers (MPG), the newest monthly newsletter launched in 2016 is for fruit and vegetable producers. Read them all at ipm.missouri.edu.

Integrated Pest & Crop Management
Row Agriculture

Missouri Environment & Garden
Horticulture & Landscape

Missouri Produce Growers (New in 2016)
Fruit & Vegetable Producers

YEAR IN REVIEW

Plant Diagnostic Lab
by Patti Hosack

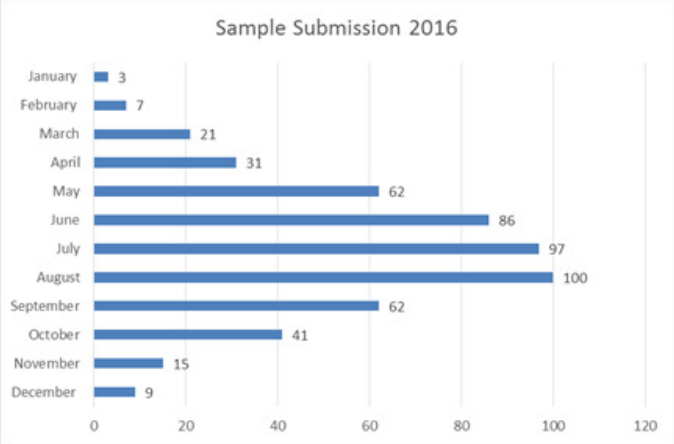


Figure 1. Sample submissions 2016.

■ Since reopening in 2014, this was the busiest year so far. The clinic processed 532 samples (Figure 1) and had countless numbers of emails and walk-ins asking general plant pathology or plant / insect identification questions. Plant disease identification was the most requested service. Overall, 94% of the submitted samples were for plant disease identification while insect or plant identifications accounted for 3% each (Figure 2). Of the samples, submitted for plant disease identification, 33% were categorized as agronomic field crops, 30% ornamental plants, 18% turfgrass, 11% vegetables and 8% fruit producing plants (Figure 3).

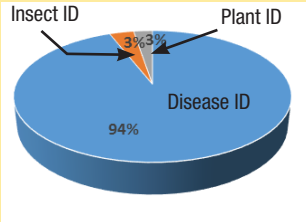


Figure 2. Types of samples

■ Environmental stressors factored in to a lot of the plant disease diagnostics. A hot, dry June followed by a wet July and August definitely added to disease pressure. To attest to the wet summer weather, the most notable diseases were those caused by *Phytophthora* species. *Phytophthora* is an oomycete, or water mold, thus is a water loving organism. It is able to produce a swimming spore (zoospore) that takes full advantage of saturated soil conditions. *Phytophthora* diseases were diagnosed in most types of plants; including types of field crops, ornamentals and those that produce fruit and vegetables.

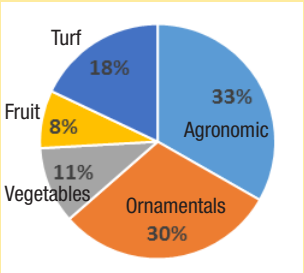


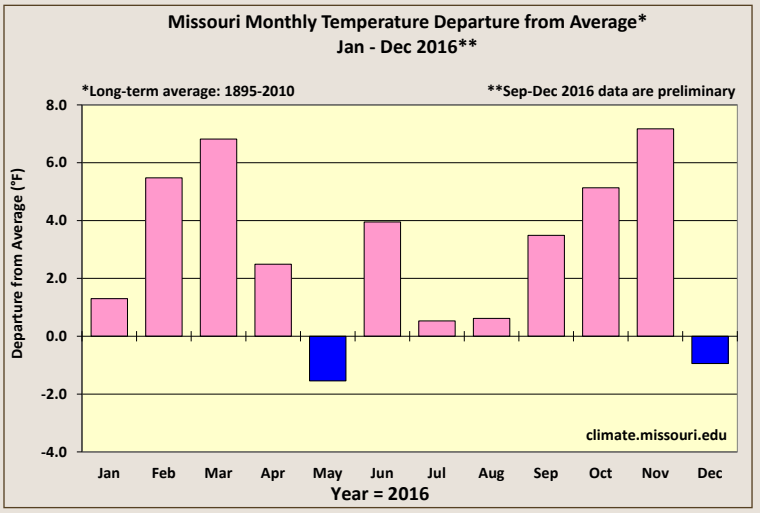
Figure 3. Disease Diagnosis, Sample Category

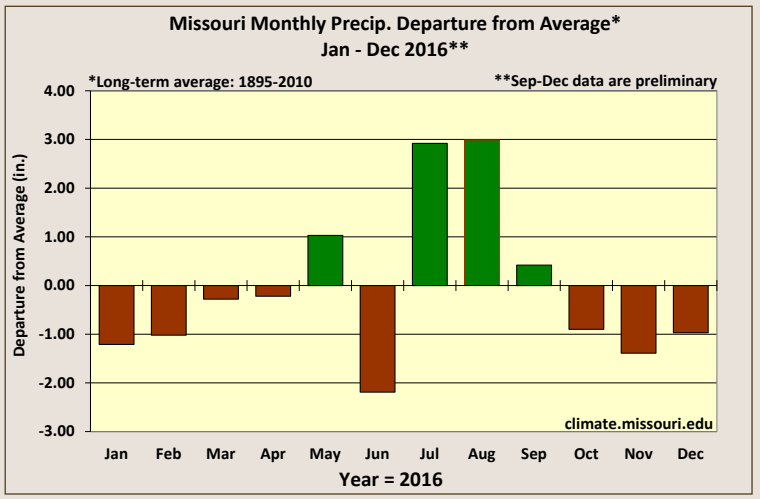
Weather Report
by Pat Guinan

■ Overall, 2016 was very warm - beginning with a warm winter to a warm summer and into fall.

■ Using the Columbia airport as a barometer, the growing season (from last spring frost to first fall frost, 32 F to 32 F) reached 217 days from April 9 – Nov 13, the average is 195. Adding fire to our lack of frost, the fall of 2016 was the warmest in the last 85 years!

■ Rainfall for the year was down about an inch in 2016, with a very sluggish start lasting well into June. This had MU extension preparing for an impending drought doom akin to 2012. July quelled the notion quickly, and started another problem with extreme rainfall events causing widespread disease epidemics throughout the region. October and November returned dry again. Appropriate return of precipitation and cooler temperatures arrived in late November/early December.





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