Missouri Produce Growers Bulletin

A joint publication of the Univeristy of Missouri and Lincoln University

AUGUST 2014

WHO'S WHO

James Quinn
Bulletin Editor
MU Horticulture
573-634-2824
QuinnJa@Missouri.edu

Jaime Pinero State
IPM Specialist
LU Extension
573-681-5522
PineroJ@LincolnU.edu

Dave Trinklein State
Floriculture Specialist
MU Extension
573-882-9631
TrinkleinD@Missouri.edu

Zelalem Mersha
Plant Pathologist
LU Extension
573-681-5522
MershaZ@LincolnU.edu

MU county offices, specialist& phone

Adair– Jennifer Schutter 660-665-9866

Daviess— Tim Baker 660-663-3232

Greene— Pat Byers 417-881-8909

Harrison- H. Benedict 660-425-6434

Henry— Travis Harper 660-885-5556

Morgan— Joni Harper 573-378-5358

Vernon— Pat Miller 417-448-2560

Webster— Bob Schultheis 417-859-2044

Update on Spotted Wing Drosophila….by Jaime Pinero

Since late May, 2014, the Lincoln University (LU) IPM program, working in partnership with MU Extension, has been monitoring weekly the presence and abundance of Spotted Wing Drosophila (SWD) in 25 locations throughout Missouri. SWD is a serious new invasive pest that attacks small fruit crops, some stone fruits (cherry, nectarine, peach), high tunnel tomatoes, strawberry, and wild hosts (including pokeweed, autumn olive, crabapple, nightshade, mulberry, and wild grape). Raspberries, blackberries, blueberries, and elderberry are at the greatest risk. The seasonal activity of SWD (estimated by trap captures and presented as the mean number of males and females per trap per day) is shown below for three selected locations: Osceola (Southwest MO), Columbia (Central MO), and St. Peters (East-Central MO).

Osceola: One SWD trap was deployed at a cherry tree in mid June, and the first SWD captures took place on July 14th, coinciding with the ripening period of the cherry fruit. As soon as the tree was no longer fruiting, the trap was relocated onto a nearby blackberry patch. SWD captures have been increasing steadily, reaching a seasonal peak of about 12 females per trap per day. Insecticides should have been applied from the moment the first SWD were captured; however, the farmer was not interested in protecting the cherries or the blackberries. (see figure on page 3)

St. Peters: This SWD trap was deployed on May 27th on a Mulberry tree, and the first SWD adults were captured on June 24th, coinciding with the onset of the ripening period of mulberry. A sudden increase in captures took place on July 8th (16 SWD females per trap per day), and for the first 2 weeks in August the trap has been catching an average of 6-10 SWD females per day.

Continued on page 3

New Specialist Hired at Lincoln U…..by Dr. Touria Eaton

I am the new State Horticulture Specialist at Lincoln University of Missouri. I will be conducting research based demonstrations and developing Extension and education programs to benefit Missouri farmers in general and small farmers in particular. You can reach me through e-mail at eatont@lincolnu.edu, or by phone at (573) 681 5174.

My Bachelor of Science was from Morocco and in Plant Sciences and Masters and Doctorate degrees were in Plant and Soil Sciences from the University of Massachusetts. As a senior researcher and Extension educator at the University of Massachusetts, I worked with a broad range of farmers with various personal experiences, learning styles, and ethnic and religious backgrounds. I worked closely with farmers, agricultural organizations, and agricultural commissions to develop educational programs that helped farmers increase income and profitability through sustainable practices of nutrient and pest management. My work was with both vegetable and floriculture crops. A unique research project I conducted with vegetables was the production of Brussels sprouts for selling on stalks instead of selling as buds. I have also worked on how to increase fertilizer and water use efficiency through the use of biochar as a soil amendment; and how to increase the nutritional quality of vegetables through cultivar selection and soil fertility regimes. My most recent research projects can be found on the web easily with these links.
http://ashs.org/db/horttalks/detail.lasso?id=11811
http://ashs.org/db/horttalks/detail.lasso?id=11796

I am excited about my new job and am eager to meet and work with the farmers and colleagues from all regions of Missouri.

Genetically, if we assume 'R'=red fruit, 'r'=pink fruit and red is dominant over pink, tomatoes with the genetic makeup of 'RR' and 'Rr' would both have red fruit. Since the (recessive) gene for pink fruit can only express itself in the absence of the (dominant) gene for red, pink-fruited plants genetically would be 'rr' and also homozygous.

Why Not Save Hybrid Seeds?......by Dave Trinklein

Upon paging through a seed catalog, one can't help but be impressed with the number of times the term "hybrid" is used. More and more vegetables (and flowers) are available as F1 hybrids. The cost of hybrid seed is equally impressive, prompting some frugal growers to attempt to save the seeds of hybrids for next year's crop. The result usually is very disappointing; the following article will attempt to explain why.

By definition, a hybrid is simply the offspring that results from the mating of two individual with dissimilar genetic makeup. A more restrictive definition of hybrid is an individual that is the result of a cross between two inbred parents. The result, called a F1 hybrid, was created to exploit the phenomenon of hybrid vigor (or heterosis, as it is scientifically termed). The advantages of hybrid vigor include improved vigor, higher yields, earlier maturity, greater uniformity and an increase in the expression of certain traits.

In this day-and-age of being able to map the entire genetic make-up (genome) of plants and animals, scientists still are at a loss to explain why hybrid vigor occurs. A bit of genetics is required to explain this phenomenon further.

Most plants genetically are diploids meaning they have two sets of chromosomes–one from their male (pollen) parent and one from their female (egg) parent. Contained on these chromosomes are the genes responsible for the expression the various traits of the plant. When the gene(s) for a trait are the same on both the chromosome inherited from the pollen parent as that from the egg parent, the individual is said to be homozygous for that trait. Inbred plants are homozygous for all genes on their chromosomes.

Conversely, when the gene(s) are different the individual is termed heterozygous. For example, fruit color in tomato is controlled by the action of a single gene. Every tomato has two genes for the fruit color trait, one from each of its parents. Genetically, if we assume 'R'=red fruit, 'r'=pink fruit and red is dominant over pink, tomatoes with the genetic makeup of 'RR' and 'Rr' would both have red fruit. The former would be called homozygous for the gene (both genes are the same) for fruit color whereas the latter would be heterozygous (the genes differ). Since the (recessive) gene for pink fruit can only express itself in the absence of the (dominant) gene for red, pink-fruited plants genetically would be 'rr' and also homozygous.

We can use the above to illustrate why F1 hybrids do not "breed true". If a homozygous red-fruited breeding (RR) line were to be crossed with a homozygous pink-fruited (rr) breeding line, all of the F1 progeny would be Rr for fruit color and bear red fruit, since red is dominant over pink. However, when the heterozygous F1 pollinates itself, the result will be both red and pink fruited F2 plants in the ratio of 3 red for every 1 pink. The latter ratio was derived in the mid-1800s by Gregor Mendel, who was one of the first people to study the inheritance of traits in plants.

Most economically important traits (e.g. vigor, yield) are controlled by the action of many genes. Some geneticists believe F1 hybrids are superior because they contain all of the favorable genes for a trait held by both of their parents. But, if this were true then at least some of their progeny should equal their F1 hybrid parents in performance, and this is not the case. Others believe it is the fact that corresponding genes for a trait are in a heterozygous state (differ from each other such as the 'Rr' red-fruited tomato) in the F1 hybrid when compared with either parent, but there are faults with this theory as well.

The method used to develop hybrid parental lines depends on whether the crop in question is self-pollinated or cross-pollinated. Self-pollinated plants such as tomato are high homozygous, as described above. Therefore, crossing any two inbred (e.g. heirloom) tomatoes will result in the production of F1 hybrid seed. However, in an attempt to form inbred breeding lines with numerous good traits, tomatoes are often crossed to form potential breeding lines. Seed is then saved from plants that possess the favorable traits from both parents. This must be done for six generations before the breeding line is considered to be homozygous and a good prospect to serve as a parent in the production of an F1 hybrid.

Continued on next page…….

Hybrid Seeds.....continued

In contrast, cross-pollinated crops such as sweet corn are highly heterozygous. In order to form parental breeding lines, controlled self-pollination must take place for at least six years to form homozygous individuals. Each and every generation of self-pollination results in the loss of plant vigor making the parents of hybrid cross-pollinated plants unproductive, adding to seed cost. Fortunately, the vigor is more than regained in the F1 hybrid.

Suffice to say however they are produced, F1 are worth the added seed cost. Their development is painstaking and expensive. Many, many crosses must be made and evaluated before the plant breeder is likely to find a combination of parents that lead to an improvement for the trait(s) under improvement. Pollination must be strictly controlled and often is still done by hand in naturally self-pollinated species. Once a favorable combination of parents has been identified, the cross must be made each time seed of the F1 hybrid is wanted, since hybrid vigor only last one generation. Again, if the crop in question is self-pollinated this very tedious, time-consuming process must be done by hand.

When seed is saved from F1 hybrids, the resulting progeny tend (genetically) to revert back to the parents that were used to make the cross. The result is a loss of hybrid vigor and its benefits, along with disappointing performance. Again, it is important to remember that hybrid vigor lasts only one generation and results only when two parental lines are crossed. Therefore, saving the seeds from hybrids is not recommended.

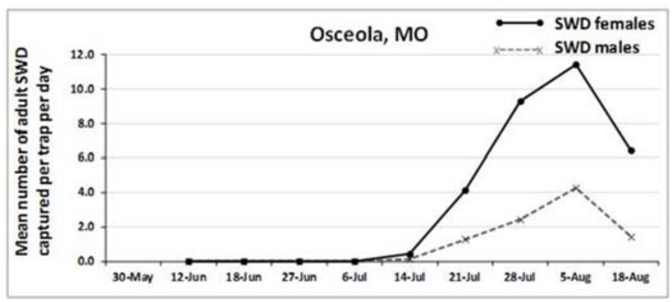
Editor's note. *In 2013 I had some 'volunteer' tomatoes come up where the F1 Hybrid 'Sunsugar' was growing in 2012. I also had a Sunsugar planted in 2013 elsewhere in the garden, so I could compare the progeny to it (I termed it Sunsugar and 'Son of Sunsugar'). The fruit was yellow, of similar size and really quite good, but not as sweet and not quite as tasty. The Sunsugar fruit had a somewhat translucent shine where 'Son of Sunsugar' was a bit opaque. I had these at MU Bradford Farm' annual 'TomatoFest' and a number of individuals tried them and agreed, the F1 fruit was better than the progeny. I had no ability to evaluate vigor or anything else.*

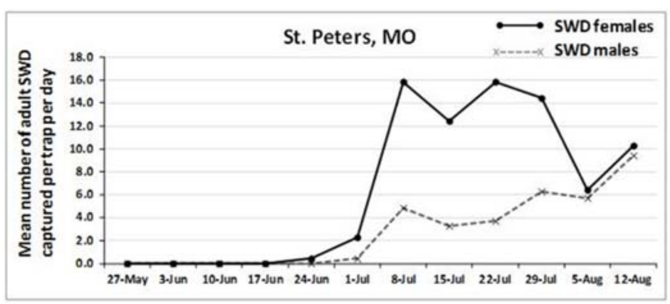
Spotted Wing Drosophila.....continued

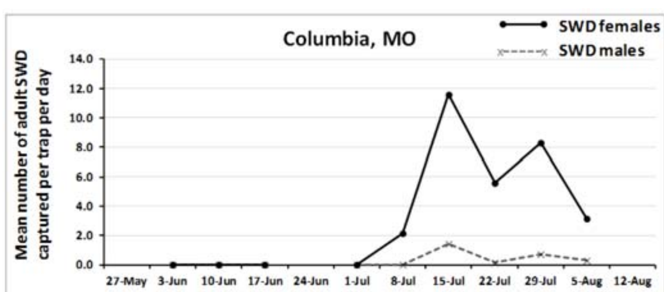
We believe SWD was first reproducing in Mulberry trees and once this tree no longer had fruit, then most likely flies were dispersing onto neighboring farms, possibly causing injury to small fruits if they are grown in that area.

Columbia: The SWD monitoring trap was placed on June 3rd in a commercial blackberry orchard. The first SWD captures were recorded a month later, on July 8th. The farmer was advised to spray an insecticide as soon as the first fruit was changing color. It seems that the first insecticide was applied a little later than expected because a fruit sampling conducted by the LU IPM program revealed infestations by SWD on the first-ripening blackberries. Numbers of SWD have been declining since July 15th to about 4 female SWD per trap per day. Nevertheless, the farmer needs to apply insecticides on a timely manner and with good coverage to achieve the best control possible.

Examples provided above indicate that SWD populations are increasing in Missouri, so farmers who grow fall-bearing raspberries need to monitor for this pest and apply insecticides, as this is the only current way of managing this pest. Timing and good coverage are key components of an IPM program against SWD. Insecticide sprays need to be in place prior to oviposition (egg laying), and coverage needs to be thorough as the adults often hide in the denser portions of the canopy. High pressure and spray volume will be needed to reach these difficult-to-reach spots and provide thorough coverage. Even the best of the insecticides will not consistently last more than 7 days so, at a minimum, weekly applications are needed. Producers must rotate among insecticides with different modes of action to prevent/delay resistance.







UNIVERSITY OF MISSOURI Extension

LINCOLN University

Financial assistance (printing and mailing) for this issue of the IPM newsletter was provided by:

USDA NIFA (National Institute of Food and Agriculture) Extension IPM Support Program through a grant provided to the Lincoln University IPM Program.

The Insert, Announcements, etc.

I hope you find the insert on the 2012 Census Ag of interest and would like to express my appreciation to Robert Garino for assisting with it. Also a warm welcome to Dr. Tourina Eaton to Missouri. She is attending the 15th Central Missouri Vegetable & Greenhouse Farm Tour. This newsletter will be mailed about the time this event is held, our traditional date of the Wednesday before Labor Day, starting at the Central Missouri Produce Auction. Also assisting at that event is another article contributor, Patti Wallace with MU's Plant Diagnostic Clinic. I have really enjoyed and taken full advantage of 'hand carrying' in samples to the lab. So good to have the lab up and running after 2 growing seasons without it. Lastly, thanks to Jaime Pinero for his article and sending his very competent associate, Jacob Wilson, to discuss SWD on the Aug. 27th tour.—-Jim Q.

Missouri Disease Beat……….by Patti Wallace

For the month of July there were 90 samples submitted to the Plant Diagnostic Clinic. Two were for plant / weed identification, 14 turfgrass disease identification and the other 74 were for general plant disease diagnosis. Not included are the countless number of emails, phone calls and walk-ins that trickle or flood in each day. Overall, it has been a steady month with some days busier than others.

The weather has been variable, or perhaps crazy is a better word to describe it. This is the first year I remember wearing a long sleeve shirt on the 4th of July! The cooler weather, especially the low night temperatures, are taking a toll on tomatoes and cucurbits. Both of these crops like warm temperatures. Cool weather can cause flowers to be aborted and / or poor fruit set and development. Cool temperatures coupled with moist conditions in early July also favored powdery mildew, for an early start on pumpkins usually not seen much until late summer.

Below is a list of diseases or issues for vegetables that have been diagnosed for the month of July. Some of the issues we have seen repeatedly, they are marked with an *.

Host	Diagnosis
Green beans	Chemical injury—herbicide
Pepper	Bacterial leaf spot* (*Xanthomonas spp.*)
Rhubarb	Slug damage
Celery	Early blight (*Cercospora spp.*)
Tomato	Chemical injury-herbicide*
Tomato	Adventitious roots girdling* (due to high humidity)
Tomato	Undetermined virus
Tomato	Leaf mold* (*Fulvia fulva*)
Tomato	Sooty mold
Tomato	Pith necrosis*
Tomato	Nutrient deficiency
Tomato	Bacterial canker
Tomato	Rhizoctonia root rot
Tomato	Pythium root rot
Tomato	Bacterial leaf spot* (*Xanthomonas spp*)
Spaghetti squash	Fusarium stem rot