

Missouri Produce Growers Bulletin

A joint publication of the University of Missouri and Lincoln University

APRIL 2013

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Understanding Tomato Fruit Set....by Dave Trinklein

Few things are as frustrating to tomato producers as to produce vigorous, health plants that fail to set fruit. Unfortunately, failure of tomato plants to set fruit (or blossom drop) seemingly is becoming a more common problem. Undoubtedly, we can attribute fruit set problems experienced last summer to the brutal, hot summer. High temperature, however, is not the only cause for failure of tomato fruit to set. This article explores tomato fruit set and causes for the failure of fruit to set properly.

Tomato bears "perfect"

flowers meaning they have both male (stamens) and female (pistil) parts in the same flower. The pistil of a tomato flower is shaped somewhat like a bowling pin. The top of the pistil is known as the "stigma", the middle part (neck of the bowling pin) is called the "style", and the bottom part is the termed the "ovary". The yellow stamens are fused together to form a cone around the pistil which is in the center of the flower. Pollination is accomplished when mature pollen produced by the stamens lands on the mature stigma of the

pistil. Simultaneous maturity of both male and female parts is important since tomatoes are about 98 percent self-pollinated.

Most often the transfer of pollen from stamen to pistil occurs because of air movement in the field or mechanically shaking (vibrating) the flowers in greenhouse/high tunnel settings. The latter causes pollen to shed from the stamens of a flower and land on its mature stigma. Bumble bees represent a biotic form of pollination assistance often employed by larger greenhouse operations in an attempt to save labor costs.

Continued on back page

Spotted Wing Drosophila.....by Jaime Pinero

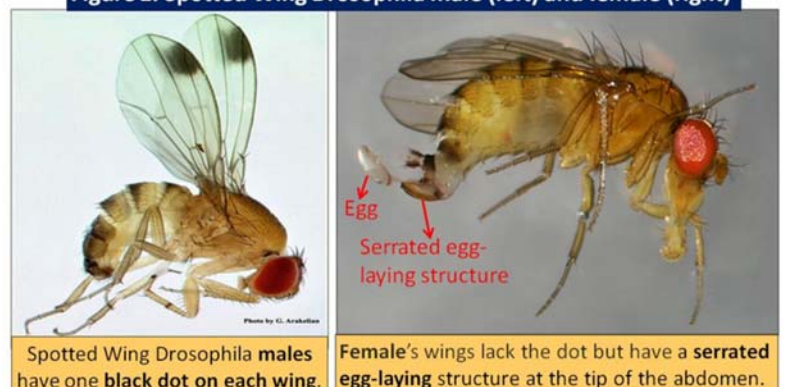
Spotted Wing Drosophila (SWD) is a small vinegar fly (about 0.1 inches in length) that for the last two years has been causing economic damage to berries, grapes, and softer-fleshed fruit such as peach in several areas of the US including the Midwest. SWD is also able to attack some vegetables such as tomatoes and peppers. Unlike most other vinegar flies that reproduce on damaged / fermenting fruits, SWD females can cut into healthy fruit using their serrated ovipositor (see Figure 1) to inject eggs under the skin. The adult SWD lives for about two weeks and each female can

lay more than 300 eggs. The larvae hatch and feed inside the fruits, causing them to rot. This insect reproduces so quickly that a few adults can give rise to thousands of flies in just a couple of months.

It is very important that farmers learn how to monitor for this invasive pest to determine whether SWD is present.

Continued on page 2

Figure 1. Spotted Wing Drosophila male (left) and female (right)



The Dreaded Drosophila ...continued

**“Spotted
Wing
Drosophila is
a real threat
to the
production of
berries and
other fruits in
Missouri”-
Jaime Pinero**

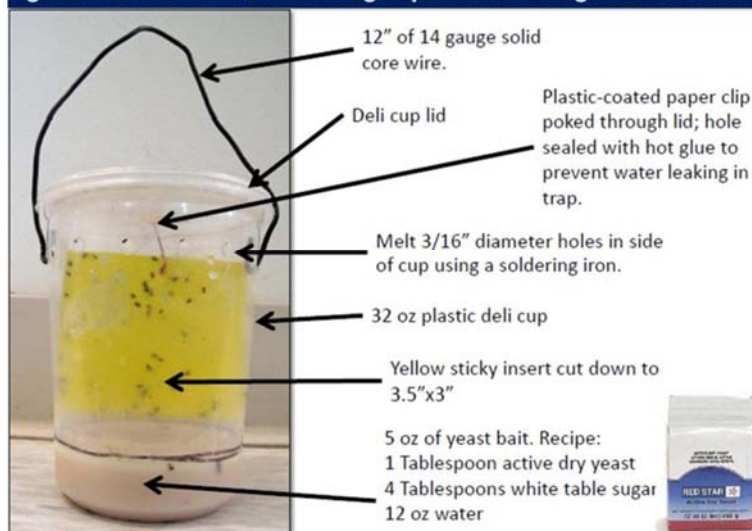
The most effective and economical trap can be prepared using a clear plastic deli-type cup baited with a mixture of water, dry active yeast, and sugar, as shown in Figure 2. Note the small holes that are made on the sides of the trap which allow flies to enter. A small yellow sticky card can be placed inside the cup so that flies that are attracted by the bait and enter the trap are retained by the card. This allows for easier fly identification.

For small acreage (or in a high tunnel), researchers suggest setting up one trap for one acre or less whereas for larger farms a minimum of three traps per 5 acres should be placed. Monitoring traps need to be placed inside the vegetation, in the shade. It is also a good idea to put a trap in adjacent woods where activity can be earlier if there are wild berry-bearing plants. Put traps out just before fruit starts to ripen. Check traps and replace yeast + sugar bait on a weekly basis.

On May 30, 2013, starting at 2:00 PM Lincoln University will be offering a field day showcasing IPM among other activities at the organic Busby farm in Jefferson City, MO. At this event, **ready-to-use traps and baits will be provided free of cost to farmers that wish to monitor for SWD.**

Registration fee for this field day is \$5.00. Dinner will be provided at no additional charge. For more information about SWD or about the field day, contact Jaime Pinero (573-681-5522, or at pineroj@lincolnu.edu) or Jacob Wilson (573-681-5591, or at wilsonj@lincolnu.edu).

Figure 2. How to make a monitoring trap. Source: Michigan State University)



MELCASTBy Zelalem Marsha

Lincoln University (LU) Cooperative extension, through its newly opened Plant Pathology Program, has extended the use of **MELCAST** for Watermelon and Cantaloupe growers at four selected areas in Missouri. Locations selected for accessing the weather based data support system in 2013 include Clarkton, Hornersville, Kennett and LU's Washington Carver Farm in Jefferson City. The financial support was obtained from the NC-IPM as part of a project on integrated disease management of watermelon in Missouri. LU has also funded MELCAST in previous years so that farmers could access the data at no charges.

This year, the research project at Carver Farm in Jefferson City would be focusing on comparing fungicide spray plans (MELCAST-based or calendar-based), different mulching systems (black plastic or trimmed cover crop mulch) and alternating different fungicide combinations. The farm will be holding a field day on August 28th, where initial results will be viewed or discussed. How to use MELCAST will be explained in the next newsletter.

Other items of interest

Update- Food Safety Modernization Act

- It appears from the FDA web site that all the public meeting have been held. There were 3, one each in Washington DC, Portland, OR and Chicago.
- The deadline for comments regarding the proposed rule are due by May 16th.

Also accompanying this newsletter

- Results from a grafted tomato study conducted by Dave Trinklein.
- An article discussing the lingering effect of the drought on the subsoil.

Field day and farm tour planned for Aug. 28th

- As with previous years, a central Missouri farm tour is being planned for the last Wednesday before Labor Day. It will likely start at the produce auction, visit a farm or two, and end at LU's field day.

Marketing fresh produce in Vernon and Bates Counties

By James Quinn and Patricia Miller

A number of produce auctions have sprung up around the state. While the auction process can be exciting and you may capture peak prices occasionally, there is another model for marketing produce and that is a wholesale/retail marketing point. Four businesses have developed using this marketing model, all in the Rich Hill area (which is near the border of the counties of Bates and Vernon about an hour south of Kansas City).

Wholesale/retail marketing point businesses are fresh produce warehouse and distribution facilities that charge a commission for the service they provide. Growers deliver their product, after which it is sorted and aggregated for the buyers to pick up. Wholesale/retail outlets may have several levels of buyers: large wholesale, smaller wholesale, peddlers, restaurants and retail. A large wholesale buyer may leave a refrigerated truck at the site so that time is saved in loading, and it can provide cooling to the produce when needed. The facilities are generally owned by a single person or a farm family; they are responsible for collecting and paying the bills. As with produce auctions, the facilities are often used as distribution points for packaging materials (e.g. produce boxes). Compared to produce auctions, the operations are a bit more casual- growers and buyers come by with produce at varying times through the day to deliver or pick up product. Business hours are more or less Mon. to Fri. from 8 to 5, with adjustments made for busy or slow times (e.g. Saturday hours may be added). Most of the produce is handled during the months from May to October, with June to Sept. being the peak period, but April and November may see some activity too. Some may also provide a regular 'store' type setting for retail customers.

The four wholesale/retail marketing points are:

- Bates County Produce started in 1992 year and is located on State Rd Hwy PP Rich Hill, MO 64779 (mail to Daniel Hoover RR 3, Box 55-d).
- Twin County Produce started in 2000 and is located at S 3100 Rd- Vernon County (mail c/o Wayne Mazelin RR 3 Box 103-a, Rich Hill).

- Vernon County Produce started in 2004 year and is located at 2646 S 1100 Rd, Rich Hill (mail c/o Jeremiah Brubaker).
- Maple Grove Produce started in 2007 year and is located at 10507 S 1300 Rd, Richards, MO 64778 (mail c/o Mose S. Troyer).

The way the prices, volumes, and type of fresh produce are negotiated for sale is quite different than at produce auctions, being more relationship based and predictable. Wholesale markets typically have contracts with their buyers. These may be a set price which would guarantee the seller a price even before he plants. And since he knows what his price will be, he can use that to decide what crops and varieties to produce. Or the price may be set at the going market price. Since he develops a long-term relationship with his buyer, there is an exchange about other crops to grow. This will lead to an expanded base of crops to be grown. This diversity will lessen the risk of just growing a few crops, any of which might have a failure that year.

Growers have to be able to gain the confidence of the buyer that they can supply the large quantity and specified quality needed. So it will take years of experience and a lot of acres to get the large contracts. A disadvantage of this system is that if the crop doesn't meet the buyer's specifications, he may reject the crop, leaving the grower with a large quantity of produce that may be difficult to move. However, crop that isn't contracted may still be sold at one of the other venues (e.g. peddlers or retail).

These businesses feel the wholesale/retail market has three main benefits- savings of time, stable pricing, and guaranteed crop quantity(s) to grow. For auctions the grower may have to travel further and will wait in line till his turn comes. The price he will get is unknown and a market isn't guaranteed. Different lots of the same produce may go for a different price depending on the demand that day for that item. A glut on that day may result in lower prices. Both systems have their advantages and disadvantages and will suit some better than others.

How the Old Order Mennonites and Amish started into supplying fresh produce

is an interesting and somewhat familiar story. They began to settle in Rich Hill in starting in 1992, from several states including Kentucky & Pennsylvania. As farmers, they were already growing vegetables and molasses sorghum. This business model developed from these crops. They began growing vegetables and selling them retail, as well as to some peddlers. They also established a sorghum processing facility, the seasonal aspect of this process being a community activity. The opportunity to expand into wholesale production was prompted by serious flooding that occurred for several years in the early 90's in the KC bottoms where vegetables were grown. The aspect of a community effort for the sorghum processing seemed a natural approach for sorting and washing produce. That usage has stayed with the facility and in the peak times up to and more than 20 may be involved with their sorting and packing line.

While this community does not use telephones, motorized vehicles or electricity, some of these marketing points are ahead of their time. At least two are GAPs certified. Additionally, quite a number of supplying farms are as well. These area farms and delivery points were even part of a USDA pilot program evaluating an alternative method for GAP certification, called 'Group GAPs', a process in which a number of growers work through the process together. A December 2012 report on this pilot program by the Wallace Center termed the results encouraging; thus it may serve as an option for other Amish and Mennonite communities to consider.

Growing these vegetables and fruit is a vital part of this farming community. Over 30 farms in the Rich Hill community and 15 in the Richards community (just to the south) grow fresh produce commercially. At least 300 acres are in vegetable production which the farms have, more or less, specialized for, as well as a bit of fruit. There might be some livestock produced, but much is for personal use. Forage and some grains are needed for the horses as well. It is impressive to visit in August, to see bins of seedless watermelons stacked floor to ceiling and semi-trailers parked along the loading dock. It is similar to melon farms in the bootheel, and great that a large amount of produce for Kansas City can be grown so close by.

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M Extension



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.

About this mailing list

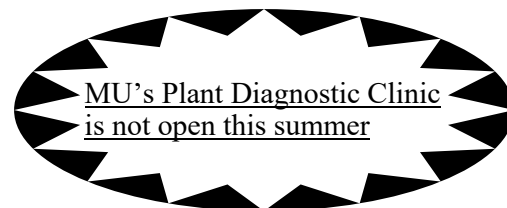
You are being mailed this newsletter because you were involved in some type of MU Extension program recently. Names and addresses are only kept by your local specialist or James Quinn. They will not be shared with anyone else. If you would like to be removed please let me know-

James Quinn

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Understanding Tomato Fruit Setcontinued

Research has shown that blossom drop in tomato can be influenced both by the environment (and related stress) as well as by plant nutrition. When daytime temperatures exceed 85 degrees F or nighttime temperatures exceed 70 degrees F, pollination suffers due to pollen becoming "tacky" and non-viable. Conversely, nighttime temperatures below 55 degrees F also promotes blossom drop. Low temperatures affect pollen viability as well as the growth rate of the pollen tube that forms shortly after a pollen grain lands on a mature stigma.

Relative humidity plays a major role in the transfer of pollen from the stamen to the stigma. The ideal relative humidity range for pollination of tomato is 40 to 70 percent. At lower humidity levels the pollen tends to dry and has trouble sticking to the stigma; at higher levels the pollen does not shed from the stamen properly.

Nitrogen nutrition also has been demonstrated by research to influence blossom drop. At high levels of nitrogen the plant is encouraged to produce excessive vegetative growth at the expense of fruit set. There is a fine line between having adequate amounts of nitrogen for good growth and excessive amounts.

Water stress is yet another reason for fruit set failure of tomato. Lack of water or excessive wind represents two types of stress that are detrimental to good fruit set. Water stress coupled with high temperatures is a very unfortunate combination of environmental circumstances when it comes to tomato fruit set.

Nutritional stress also has deleterious effects to fruit set. After a tomato plant has set a large number of fruit on its bottom clusters, there is competition between developing fruit and developing flowers for nutrients. Commonly, the fruit wins this competition resulting in poor fruit set of the middle flower clusters. Once the bottom fruit is harvested and the nutritional stress reduced, upper flower clusters

tend to set normally, temperature permitting.

Finally, insects and disease also can adversely affect fruit set. *Botrytis* (gray mold) and heavy infestations of bacterial spot or speck have been shown to reduce fruit set. Although pests and diseases might amplify the problem of failure of fruit to set, they rarely are its primary cause.

The question arises, then, "What can be done?" Clearly we have little control over temperature. Greenhouse and high tunnels can be cooled somewhat by covering them with shade cloth after temperatures have warmed in late spring/early summer. Growers producing tomatoes on a small scale outdoors might consider the use of floating row cover or a similar material to shade their plants. Of course shading will have no effect on nighttime temperatures which we know (when above 70 degrees F) will reduce fruit set.

Additionally, keeping plants vigorous through proper watering and fertilizing is helpful. Be mindful of the fact that both the water and nutritional demands of a tomato increase as it grows and sets fruit. MU Extension publication G6462 (Watering and Fertilizing Tomatoes in a High Tunnel) is a useful reference for tomato growers on the subject of water and fertilizer requirements for tomato.

If tomato plants do an extraordinary job of setting fruit on their bottom clusters, fruit pruning should be considered. If probably is unrealistic to expect a tomato plant to "size" more than four (or five) fruits per cluster. Allowing all fruits that set to mature adds to the nutritional stress the lower fruits put on the plant and add to blossom drop problems.

Finally, good insect and disease control will help to assure that these factors do not add to blossom-drop problems but also will help assure a high-yielding crop with good quality.