

Missouri Produce Growers Bulletin

A joint publication of the University of Missouri and Lincoln University

APRIL 2015

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New Insecticide Alternative to Neonicotinoids, Safer for Bees.....by Jaime Piñero

Flupyradifurone is a new insecticide with a distinct spectrum of activity belonging to a unique mode of action (the way an insecticide kills a pest). Trade name is Sivanto (produced by Bayer). This insecticide is intended to be used on a wide range of crops including fruits and vegetables. An important advantage of Sivanto is that it's safer for bees when compared to very toxic products including certain pyrethroid, neonicotinoid, organophosphate and avermectin insecticides. It is in the insecticide rotation group 4D.

Field studies have examined pollinator-attractive crops while honey bees were actively foraging after the crops had been treated through various application methods (seed, soil and foliar) to demonstrate very high exposure. Overall, studies show no adverse effect on overall bee colony performance or overwintering ability when compared to untreated colonies. The company claims that this compound is practically non-toxic to adult honeybees. The EPA has confirmed the safety of the use for the public, farm workers and wildlife.

Flupyradifurone is registered for a large number of crops to protect against piercing and sucking insects such as aphids, whiteflies, thrips, and psyllids, all which have become increasingly resistant to other pesticides and are difficult to control. The registration of flupyradifurone will provide growers in the U.S. with a new pest resistance management tool as part of an IPM program.

Editor's note- This insecticide is new so it has not been listed yet in current (2015) edition of the Midwest Vegetable Production Guide for Commercial Growers.

Powdery Mildew on Tomato.....by Dave Trinklein & Zelalem Mersha

While by no means a new disease, powdery mildew on tomatoes has been somewhat rare in Missouri until recently. The increase in the popularity of heated greenhouse and high tunnel tomato production has led to the creation of more ideal conditions for the fungi causing the disease to become virulent. The result has been several reports of this troublesome fungal disease in our state this year.

Powdery mildew is a disease of tomato leaf tissue that seldom kills the plant, but certainly has the prospect of drastically reducing yields by: a) invading the green leaf areas of tomatoes which oth-

erwise will enable the plant absorb more solar radiation and produce more food through photosynthesis, and b) exposing tomato fruits to the sun (sun scald damage) after heavily infected leaves shrink in size. Pathogens that cause powdery mildew have a fairly narrow host range. This simply means the fungus that causes powdery mildew on tomatoes is not the same as the one responsible for powdery mildew on the likes of squash or pumpkin.

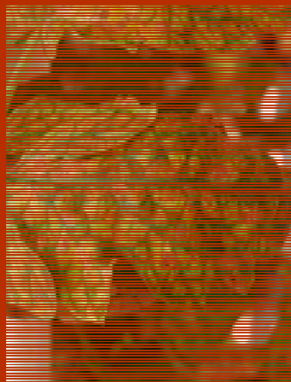
In the case of tomato, three species of fungi most often are responsible for causing the powdery mildew disease: *Leveillula*

taurica, *Oidium neolycopersici*, and *Erysiphe orontii*. All produce airborne spores which land on leaves, germinate and infect the plant, given environmental conditions are conducive.

Traditionally, most cases of powdery mildew on tomato involved the fungus *Leveillula taurica*. It was first reported from California's Imperial Valley in 1978 but subsequently been found throughout North America. Initial symptoms appear as irregularly shaped bright spots or "blotches" up to one-half inch in diameter on the upper surface of leaves.

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Powdery Mildew on Tomato.....continued



Top photo: Typical *Leveillula* symptoms (photo by Sally Miller of Ohio State Univ.).

Lower: Tomato leaf with *Oidium* mycelium. (photo from Univ. of Massachusetts-Amherst)

As the spots enlarge, they eventually turn brown. Powdery, white colonies of mycelium (vegetative part of the fungus) later appears on the lower surface of the leaves as the disease progresses. Symptoms usually are not apparent on stems or fruits.

Recent, outbreaks of tomato powdery mildew, like this year in Missouri, have been traced to species of fungi in the genus *Oidium*. This disease was first reported in Canada in 1994 and then in the United States in 1996. Symptoms caused by *Oidium* appear as powdery, white colonies of mycelium on the upper surface of leaves. Yellowing, necrosis and defoliation can occur as the disease progresses.

Temperature and relative humidity are important environmental factors that affect powdery mildew severity. Unlike some other fungal pathogens, powdery mildew does not require standing water on leaves to be infective. High relative humidity along with moderate temperatures (60 to 77 degrees F.) favors disease development. Germination of conidia (seed like spores that land on a leaf surface and initiate new infection) and secondary infection readily occur under high relative humidity, and conidia are readily windborne to spread the disease to the next leaf or plant.

The management of powdery mildew disease on toma-

atoes should follow integrated pest management (IPM) tactics. Start with clean, certified seeds or healthy, disease-free transplants. If the latter are purchased, inspect them thoroughly for early signs/symptoms of the disease. Producers who grow their own transplants should be especially vigilant for the disease in the transplant-rearing greenhouse.

The inoculum for the disease cannot overwinter outdoors under Missouri conditions. Therefore, tomato growers utilizing heated greenhouses or high tunnels can start with a "clean slate" each year if plant debris from the previous crop is eliminated. Soil preparation via deep plowing can help rid the production area of remaining inoculum on plant debris that might have been missed. Since moderate temperatures along with high relative humidity favors disease outbreak, the combination of high temperatures and low humidity can limit powdery mildew severity. Unfortunately, maintaining the latter combinations of environmental conditions in the early greenhouse or high tunnels can be very challenging. Therefore, chemical application might be required.

Unfortunately, the spray regimen recommended for the control of powdery mildew caused by *L. taurica* (please see Midwest Vegetable Production Guide) is not very effective for controlling *O. neolycoopersici* and related species. A recent study reported sulfur applied as a wettable powder and potassium silicate (K₂SiO₃) to be the most effective chemicals to control powdery mildew of the

Genus *Oidium* in growth chamber conditions. Under field conditions, hydrogen peroxide (H₂O₂) also was effective.

The authors of this article are skeptical concerning the use of sulfur in a greenhouse tomato operation because of its acrid, objectionable smell. The latter holds the potential of tainting at least the odor of tomato fruits, if not their taste. Additionally, there are questions concerning the validity of warranties on polyethylene plastic films used to cover greenhouses if sulfur is used inside.

This leaves potassium silicate as the chemical control of choice. The exact mode-of-action of this compound on powdery mildew has yet to be determined. However, recent research pointed to the fact that silicon acts to prevent fungal penetration through the formation of a "physical barrier" of some type.

It must be emphasized that potassium silicate is preventative in action and not curative. Therefore, regular application when environmental conditions are conducive to powdery mildew infection is needed if the disease is to be controlled.

In closing, powdery mildew represents another challenge to successful tomato production. However, through the use of IPM strategies reduction of yield from the disease can be kept to a minimum in most cases.

2015 Food safety comments.....continued (from back page)

Our understanding is that the FDA is not trying to 'get' farms for having contaminated produce and then quarantine or shut them down. Rather, the FDA wants to understand how widespread or how abundant a pathogen might be occurring. But if a farm has a contamination problem we really don't know what further actions the FDA would take; we hope they would be reasonable in allowing the farm to remedy the problem and not cause serious economic harm.

The FDA has assured the Produce Auction Food Safety Team that produce auctions will receive an exemption from Current Good Manufacturing Practice and Hazard Analysis and Risk-Based Controls for Human Food regulation as a food facility. A food facility is generally processing produce in some way, which an auction is not, and complying with these regulations would be very complicated and difficult. We hope that the final rule of the Food Safety Modernization Act, expected this fall at the latest, will define the situation.

Response of FDA to questions about their inspections in 2014 at Missouri Produce Auctions.....by FDA/CFSAN Produce Safety Staff, including Tywana Paul

Specifically, why FDA collects produce samples at "auctions" and "road side stands". Why FDA was collecting samples at the produce.

Within the past year, FDA has not conducted any sampling assignments specifically targeting select produce commodities sold at produce auctions. However, as part of general domestic produce sampling assignments, some samples may have been taken by FDA at produce auctions.

FDA collects and tests samples for a variety of purposes, such as for research to answer particular questions and to fill data gaps, to test for the presence of chemical residues, or to test for the presence of microbial pathogens. An example of a recent sampling assignment involved collecting and testing domestically-grown produce to collect information on the presence of targeted foodborne pathogens in fresh commodities such as lettuce, cilantro, cucumbers, and spinach, to name a few. One sampling assignment goal includes expanding surveillance of fresh produce by typically collecting samples as close to the farm as possible. Other goals of FDA's produce sampling assignments include: to sample a broader range of produce items to obtain or add to baseline data regarding the incidence of contamination with pathogens; to assist in identifying conditions and practices that could lead to, or spread contamination; and to protect public health by taking appropriate regulatory action on product lots found to be contaminated.

FDA has used data from sampling assignments in the past to analyze for trends, identify vehicles associated with foodborne illness outbreaks, identify conditions and practices likely to cause contamination through follow-up inspections, and to help prioritize research needs as well as outreach & education to industry. Results from past sampling assignments have not

been traditionally made public. However, FDA is currently transitioning to a new approach for microbiological sampling that involves collecting a statistically significant number of samples over a shorter period of time, to better inform risk analyses and decision making. As part of this pilot, FDA plans to begin publishing summaries of assignment findings on the FDA website.

Currently, produce auction houses are typically required to register as food facilities under section 415 of the Federal Food, Drug, and Cosmetic Act, unless an exemption from the facility registration requirement applies. In general, food facilities required to register would be subject to the requirements of the proposed Current Good Manufacturing Practice and Hazard Analysis and Risk-Based Preventive Controls for Human Food regulation when that regulation is finalized, unless an exemption from that regulation applies. In addition, on September 29, 2014, based on its outreach efforts and public comments, FDA issued published proposed revisions to this proposed rule and had accepted comments on the revisions until December 15, 2014.

General Background on FDA's Sampling and Testing of Produce (why, when, how and results)

At any given time throughout the year, FDA typically has a variety of sampling assignments underway, occurring simultaneously. FDA sample collection assignment timeframes can vary, but usually are twelve months in duration. Data analysis typically occurs after an assignment has been completed and after all test results have been compiled.

For more information, please go to: <http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm334115.htm>.

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.

On the insert and other comments...by James Quinn

My apologies for not getting a winter edition out, in case you noticed. I'll try to make up for it by getting an extra edition out this growing season, maybe on a special topic, e.g. if the final rule for the food safety modernization act is released, widely expected this late summer or early fall.

I hope you find the insert of some value or interest. Kansas State University is doing some great work under the direction of Cary Rivard, based on their research farm near Kansas City. So their environment is reasonably similar to much of what Missouri growers encounter.

As always, please let any of the LU or MU specialists know about a topic you'd like addressed.

Comments on food safety issues as we begin the 2015 growing season

..... by *James Quinn and Freeman Gingrich*

Training on food safety is an important part of bringing growers current on this important and developing topic. So for the 2nd year, a training was conducted at Morgan County Seeds in a similar format (see photo to right). It started with a general presentation about food safety (James Quinn) and was followed with step by step instructions on how to use the 'Farm Food Safety Plan Guidelines and Procedures' booklet and accompanying binder (Freeman Gingrich). This was developed by the Food Safety Education Team. The workshop benefited from having a USDA GAPs inspector on hand to answer questions, that being Mark Troup of Missouri Department of Ag.

Regarding the FDA article (see page 3), there are a number of items that should be discussed or mentioned. First, the FDA has the legal right to pull samples from businesses and farms selling produce. It is very important that these

samples are taken from typical produce being sold, therefore, it would be very beneficial for the auction manager to assist with sample collection at an auction. Any FDA inspector is expected to identify themselves and should be directed to the produce auction manager, as soon as coming to the facility. We encourage the auction to make any of these samples available **at no cost** and pull them from

representative lots of commercial quantity (NOT from small lots). Second, it would be better for the samples to be pulled at the auction instead of a farm. The auction can (or should) assist in keeping track of what samples were pulled for which farms. The sampling methodology may be improved if samples are taken from several farms.

If a sample is pulled, a request should be made to have the results of that test be sent to the business or farm from which it was taken, as well as to the auction. We can't predict what crops they will focus on, but we know cantaloupes (Listeria) and tomatoes (Salamonella) have been of interest.



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