



Missouri Produce Growers Bulletin A Joint Publication of the University of Missouri and Lincoln University

Final Rule of FSMA is Published, but Questions Remain

By James Quinn and Londa Vanderwal Nwadike\*

The long awaited final Produce Safety Rule for the Food Safety Modernization Act (FSMA) was released just after the Western Produce Auctions held their annual meeting near Windsor on Nov. 13th. Raymond Yoder gave a good presentation about the need of this final rule and the benefits it might bring, but he certainly would have preferred it finished prior to that. Thus he couldn't go into any specifics. However, Raymond reiterated that produce auctions had received 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. Thus how the produce auction facilities are to be regulated or defined should be in the Produce Safety Rule.

Unfortunately, we are still waiting for some critical clarifications about the final rule from the Food and Drug Administration (FDA). These clarifications are more about the specifics of its enforcement. Much of what will be required of the growers to 'do', has been resolved. The purpose of this article is to inform you about what the different universities will be doing to assist, and when we'll be providing more complete information.

The FSMA is requiring more rigorous training. The lead institution for this is Cornell University (NY) and there is now a 3 party structure for communicating on this subject, called the Produce Safety Alliance (Cornell Univ., the FDA and USDA) which has a dedicated website http://producesafetyalliance.cornell.edu/. Beginning this year, regional training will occur around the country for educators, who will later provide training to growers. For this region that training is scheduled for Feb. 9-10th, in Joplin. It is most probable that grower trainings will NOT occur until after the 2016 growing season. Future grower trainings will be conducted by a PSA (Produce Safety Alliance) lead trainer and assisted by a PSA trainer. The Joplin training will get educators, such as the article co-authors, approved as PSA trainers.

In November of 2014 this newsletter addressed the proposed FSMA law, and a FDA fact sheet and Q&A piece was inserted. Most of those revisions did carry through to the final rule. There is some uncertainty on whether growers will actually have to be inspected (like with GAPs certification) or if they'll just have to take a training and then keep suitable records to show they are complying. Also undetermined is whether produce auction facilities

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A Note from the Author

I hope you like the new look and name to the newsletter, but its focus will be the same as the old one. This fall the University of Missouri's IPM (Integrated Pest Management) program, which oversees the USDA grant that pays for the printing and mailing of this newsletter, offered to put it under their information resources. These resources include two other newsletters, Missouri Environment and Garden or MEG and Integrated Pest & Crop Management or IPCM, website hosting, and additional (related) publications. Below is a quick review of the changes, one at a time:

- The new name is "Missouri Produce Growers Bulletin" or MPG Bulletin for short. It seemed to compliment nicely the other newsletter acronyms and captured the spirit of the old name.
The layout revised to what you see.
The content for all past and current newsletters is now on the web, searchable by article, and full PDF editions posted chronologically. This is the link for the newsletter: http://ipm.missouri.edu/MPG/
Subscribing for future articles is also available. Just go to the web site at http://ipm.missouri.edu/MPG/, and fill in the subscribe fields and hit 'submit'. You will receive an email notification each time a new article is published.

I will still serve as primary editor, but the MU's IPM staff will layout the newsletter. I will still be overseeing the printing and mailing, so the mailing list will still be under my control. By the time a few more editions have passed, most readers will likely have forgotten the old 'look'. With that, I wish each of you a Happy New Year, and a suitable time to bring in a 'change'.

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# Increasing beneficial insects for enhanced pollination and biological control using insectary plants

By Dr. Jaime Piñero, Lincoln University IPM program.

Honeybees, bumble bees, and ladybeetles are beneficial insects that most producers are able to recognize easily. However, there are many other types of beneficial insects such as predatory insects (lacewings, larvae of hover flies, minute pirate bugs, etc.) as well as parasitic flies and wasps which often are more difficult to recognize. Predatory insects and parasitic wasps kill many of the insect pests that otherwise would reproduce and damage your vegetables.

Most species of beneficial insects require food in the form of pollen (a source of protein to reproduce), nectar (a source of energy to survive), as well as prey / hosts and shelter. Their effectiveness -- either, as pollinators or for natural pest control -- may not be met in agricultural landscapes if those types of resources are lacking. Thus, establishing flowering plants in and around fields to provide pollen and nectar resources for natural enemies has shown promise as a strategy to enhance biological control of crop pests.

Vegetable producers can increase the abundance of natural enemies of insect pests by planting insectary plants. Beyond providing effective natural pest control, the friendly insects also assist in pollination. For example, the larvae of hover flies are predators while adults assist with pollination.

What types of plants attract the most beneficials?

## The top five plants that can be planted annually\* are:

1. Sweet alyssum (white variety). It belongs to the mustard family. Flowering period is long (several months). Natural enemies attracted include minute pirate bug, lacewings and ladybugs (predators) as well as small parasitic wasps that can attack aphids and other small insects.
2. Buckwheat. It is very attractive to honeybees, hover flies, soldier beetles, parasitic wasps and parasitic flies. Plus, predatory insects including assassin bugs, shield bugs, and predatory stink bugs.
3. Fennel. This plant attracts many ladybeetles, wasps, and hover flies. Fennel is also a host plant for the caterpillars of the anise swallowtail butterfly.
4. Sunflower. This plant can attract predatory insects such as big-eyed bugs, wasps, lady beetles and predatory bugs.
5. Mustard. It is very attractive to lacewings, ladybeetles, and parasitic wasps that attack aphids and other small-sized insects.

*\*This list includes plant species that consistently have been identified through research and are also easy to establish / maintain. Dozens of other plant species can supplement this list.*

**Encouraging natural enemy activity might reduce the oscillations in pest populations and regulate insect pests and mites below economic thresholds. Make sure to have insectary plants during the entire growing season. This may require re-seeding some plant species such as buckwheat and mustard.**

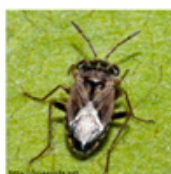
## Examples of key natural enemies visiting insectary plants



Lady bug



Minute pirate bug



Big-eyed bug



Tachnid fly



Hover fly



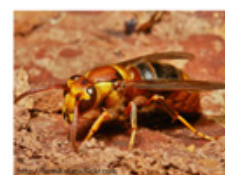
Lacewing



Soldier beetle



Assassin bug



Predatory wasps



Parasitic wasps

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are specifically mentioned, or if a generic description is used for a facility typical of this type. And then how these facilities would ‘comply’ with the rule.

We expect these questions to be resolved within a month or two. At that time we’ll send out a special newsletter edition dedicated to the final Produce Safety Rule and what appears to be most relevant to growers selling to produce auctions.

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## New insect and disease control products in 2016 Midwest Veggie Guide - By James Quinn

The Midwest Vegetable Production Guide for Commercial Growers is revised annually, and the 2016 mentions several new fungicide and insecticides. Below is a quick review on those. But first a reminder regarding Endosulfan. It is no longer labeled for use on ANY vegetable crops. If you have some still on hand, it is restricted to only two applications that Missouri growers are likely to consider- livestock ear tags or strawberry (perennial/biennial), and then only until July 31, 2016. As always, read the label for use rates/instructions. [The other options are pineapple and vegetable crops for seed]. A number of growers have mentioned that nothing works quite as well as Endosulfan did in specific instances: like late season aphid outbreaks and on stink bugs. Look for a future article about replacement options.

### New products:

- Nematicide- Nimitz is the first new chemical registered in over 2 decades. It is not a fumigant.
- Fungicide- Aprovia Top® has been added to the Cucurbit Crops and Fruiting Vegetables chapters. Labeled for powdery mildew for cucurbits, with the same mode of action (MOA) as Luna Experience (FRAC 7 & 3). It is labeled on more diseases but hasn’t been tested independently enough yet. For tomatoes, this MOA combination is new. The profile of diseases controlled is similar to Quadris or Cabrio. It is labeled on leaf mold, but hasn’t been tested sufficiently yet. FRAC is the acronym for fungicide resistance action committee.
- Fungicide- Orondis Ultra® has been added to the Cucurbit Crops and Fruiting Vegetables chapters, and in a new chemical class (FRAC U15). It has a very specific

application for late blight of tomatoes and Phytophthora blight of peppers, and for cucurbits on downy mildew and Phytophthora blight.

- Fungicide- Zing® has been added to the Cucurbit Crops, Fruiting Vegetables, and Potato chapters. It is a combo of 2 active ingredients. One is the same as in Gavel (zoxamide- FRAC #22), and the other is chlorothalonil (in Gavel it is mancozeb). Good rating for Alternaria blight, Anthracnose and downy mildew. For tomatoes, it provides control of early blight, late blight and Septoria leaf blight.
- Insecticide- Verimark®, Sivanto®, and Nealta® are new insecticides that were added for various crops.
  - o Verimark is a systemic soil either applied or by drip irrigation. It protects against chewing and sucking insects such as whiteflies, psyllids, aphids, leafminers, loopers, thrips, some beetles and Lepidopteran species (sorry, not stink or squash bugs or cucumber beetles). But it has a short preharvest interval (1 day) so may be good late season for aphids (apply via drip system). The active ingredient is cyantraniliprole (same as Exirel) and same MOA as is Coragen (IRAC 28). IRAC is the acronym for insecticide resistance action committee.
  - o Sivanto is a systemic insecticide in a new IRAC subgroup, 4D. Group 4 includes subgroup ‘A’ which has a number of systemic insecticides referred to as ‘neonicotinoids’ or ‘neonics’, such as imidacloprid (Admire was the most well-known label for vegetables). It will have similar uses as Admire.
  - o Nealta is a miticide newly available from the IRAC group 25.

Slug control recommendations were added to Cole Crops and Leafy Vegetables.

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# The 'State' of Vegetable Grafting in the U.S.

By James Quinn and Pat Byers

The authors of this article had an opportunity to attend an exciting two-day workshop in Michigan, the National Vegetable Grafting Symposium and Extension In-Service Training, which brought together leading researchers and extension agents from across the US. It was recent (early December), so we thought this was a good opportunity to summarize 'the latest' in this newly developing area of vegetable production. The workshop was funded by the USDA.

Tomatoes received much of the attention, and are the source of most grafted vegetables in the US. Interestingly, in Asia watermelons and other cucurbits are most grafted. In Asia they have become highly efficient at producing the grafted transplants, thus the cost is much less. And because watermelon spacing is much lower per acre than tomatoes, the cost increase to plant an acre of grafted watermelons is much less as well. We'll return to watermelons later.

Both in the US and around the world, resistance to soil borne pathogens is the leading reason to consider grafting. The economics are very compelling in this situation as crop yields decrease, sometimes dramatically, unless grafted plants with resistant rootstock are used. There is much research occurring in this area. An example is with tomatoes, where more than 50 tomato rootstock varieties are now described. They vary significantly in pathogen resistance.

In many regions and systems, grafted vegetable plants routinely outperform ungrafted counterparts in terms of vigor, stress tolerance and/or yield. But, is the increased expense of grafting paid for in these situations? Usually, but certain conditions make it more likely, such as:

- Techniques used to produce fruit with grafted plants often need to be different than in standard, ungrafted systems (in order to maximize the return on investment in grafted plants). Management of fertility, irrigation, pruning and trellising, and crop protection, as well as harvest regimens and plant populations, may need to be altered. For instance, grafted greenhouse tomatoes often use the twin leader system when trained up a string, which generally cuts plant population in half.

- More intensive production systems are more likely to benefit (e.g. greenhouse or high tunnel tomatoes vs field grown). The value of the crop is generally higher and the harvest season is longer, thus there is more time to recoup added production expenses. But there are glitches; for example, grafted tomato plants were noted as often set back about one week, and if first harvested fruit are very highly priced, this may have economic consequences.
- When the scion has lower vigor, such as heirloom tomato varieties. The fruit prices are also higher.

Much remains to be learned. For instance, researchers in NY documented grafted tomatoes in high tunnels were MORE likely to get foliar diseases. Why? The plants grew so vigorously that the foliage was thicker, setting up conditions that made the plants more disease-prone. Note that the rootstock imparts resistance mostly to the 'roots', not up into the scion, or top part. This points out a challenge in 'experimenting' with just a row or two of grafted plants. If you put them on the fertility regimen of ungrafted plants, they may grow bullish, the phenomenon of plants that are overly vegetative to the point of not setting fruit.

Grafted watermelon plants have shown an odd, but beneficial characteristic, improved fruit quality. The flesh tends to be denser and redder (higher lycopene levels). The plants are so vigorous that spacing needs to be increased, which saves some cost but also impacts weed control tactics.

With all the work being done in this area by researchers, seed companies, growers, and extension specialists, a unified source of information was recognized to be beneficial. So a website was formed that will be revised to stay current- [www.vegetablegrafting.org](http://www.vegetablegrafting.org). Other crops receiving grafting interest are melons, cucumber, peppers and eggplant. There is a list of suppliers of grafted plants on the website. Additional suppliers can be added, but need to be willing to ship or deliver plants regionally.

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