

Missouri Produce Growers Bulletin

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Food Safety Draft Rules Releasedby James Quinn

The Food and Drug Administration (FDA) released its long awaited draft rule for the Food Safety Modernization Act (FSMA) on January 4th. Included with this newsletter is an insert, which consists of the following:

- A front page article providing some clarification on how the DRAFT rules would likely affect growers supplying pro-

duce auctions and the facilities themselves.

- A four page summary of the draft rules, published by the FDA on their web site.

The draft rule is subject to change. The produce safety rule is being issued as a proposed rule so that industry, other stakeholders and the general public have an opportunity to review and

comment on what is written. Farmers are encouraged to comment on these proposed rules over the coming 4 months (120 days). The FDA is mandated to hold 3 public meetings during the comment period at locations across the nation. Fortunately the FDA is already in communication with growers for produce auctions, represented by the Food Safety Team. (see article on back page).

Strawberries and Fungicides.....by Pat Byers

Strawberries offer potential as a profitable crop for Missouri farmers. However, strawberry disease management is often a problem because of environmental conditions favorable for disease development, cultivars that are in many cases disease-susceptible, and the presence of diseases at many production sites. Strawberry disease management programs have often focused on intensive fungicide applications. More recently the emphasis has become more integrated, incorporating disease resistance, cultural practices, and biological control, along with the fungicide use, but at lesser amounts.

Strawberry IPM requires a thorough knowledge of disease biology. For a complete discussion of strawberry diseases note the publications in the reference list, particularly the *Compendium of Strawberry Diseases*, for details. For this article I'll use gray mold,

a common and sometimes severe disease in Missouri, as a case study. This disease is caused by the fungus *Botrytis cinerea*, and it attacks strawberry fruit, calyxes, and flowers. Botrytis fruit rot usually begins as a small lesion at the blossom end of the fruit, or where a berry is touching another infected berry. The infected portion is firm and brown while the berry is still green, but it expands and softens as the fruit ripens. A powdery gray mass of spores covers infected berries if the weather remains humid and/or air circulation is poor. Under typical Missouri conditions gray mold can destroy 50% or more of a strawberry crop.

How do we manage gray mold in Missouri? Unfortunately the common strawberry cultivars are not resistant to gray mold (or most other economically significant diseases). This fungus has a wide host range and can survive on plant debris in the soil; thus

disease inoculum is present in or around most strawberry fields. Moist conditions and temperatures between 40°F and 80°F promote it and are expected each year. Biological control of gray mold is not considered practical for in field production, but some research looks promising. Cultural practices to focus on are:

- promoting good air movement among the plants (adequate plant spacing, narrow row width, raised beds, weed control, fertilizing after fruit harvest)
- irrigation by drip instead of overhead sprinklers.

But these alone will not result in sufficient control of gray mold in most growing seasons.

Use of fungicides is highly encouraged if one wants to harvest a high percentage of fruit produced. The fruit will hold better as well. Reduced fungicide use is possible.

Continued on page 3

Downy Mildew on Impatiensby David Trinklein



Photo Above
Terminal leaves of an *Impatiens* plant infected with *Plasmopara obducens*. Note slightly chlorotic and curled appearance with white fuzz on the underside.
Photo courtesy of T. Schubert

Photo below
Closer view of the white fuzz made up of sporangia and sporangio-phores of *P. obducens*, the downy mildew pathogen.
Photo courtesy of T. Schubert



An elderly country philosopher once remarked, “Don’t worry, no matter how bad things seem to be, they can always get worse”. Such is the case with many things in life, including our constant battle to manage plant pests in our production greenhouses. Every time we feel fairly confident in our management regimen, a new pest comes our way to challenge our ability as growers. For 2013 and beyond, that diseases for bedding plant growers might be impatiens downy mildew.

Garden impatiens (*Impatiens walleriana*) is one of our most important bedding plant species. In yearly polls conducted by growers’ associations, impatiens ranks at or near the top of the list of most popular bedding plant based on sales volume. Its ability to produce vibrant displays of color in shady locations makes it unique to the plant world. Plant breeders have been successful in producing a plethora of new cultivars adding additional colors and growth habit to those already available. In short, impatiens are “money makers” for bedding plant producers.

Impatiens downy mildew is a virulent, destructive foliar disease caused by the fungus *Plasmopara obducens*. The latter has the ability to infect *Impatiens walleriana* as well as

hybrids having it as one of its parents. The disease is **not** a problem on New Guinea impatiens. While impatiens downy mildew has been a destructive disease for years in many parts of Europe, it was first identified in the United States in 2004. In 2012, cases of the disease were reported in nearly every state in the eastern one-half of the United States, including Missouri.

Symptoms of impatiens downy mildew usually are separated into two categories: early and advanced. Early symptoms include:

- light-green yellowing or stippling of leaves;
- subtle gray markings on undersides of leaves (sometimes visible);
- downward curling of infected leaves; and
- white, downy-like fungal growth occurring on the undersides of leaves.

Advanced symptoms include:

- stunting in both plant height and leaf size;
- foliage distortion (cupping);
- leaf and flower drop resulting in bare leafless stems; and
- infected stems become soft and plants collapse under continued wet, cool conditions.

Impatiens downy mildew is spread by structures it produces called “zoospores”. The latter are produced in sac-like structures on the undersides of infected leaves. These zoospores are easily dislodged and spread over short distances via splashing water or over long distances through air currents. In most cases the disease organism’s main entry into the bedding plant greenhouse is on infected plant material (e.g. plugs or cuttings) or by wind dispersal from infected plants growing outside the greenhouse. It should be noted that impatiens downy mildew is **not** spread via seed contamination.

For a disease organism to become virulent, in addition to a suitable host (impatiens in this case), there must be an environment surrounding the host conducive to infection. For impatiens downy mildew fungus this includes cool (59-73°F), moist conditions which promote zoospore germination. Normally, the time between initial infection and the production of visible spores varies between 5 and 14 days. If the fungus is present, symptoms usually more subtle under warm, dry conditions.

As with any plant disease, prevention is the best control for impa-

LU is losing its State Horticulture Specialistby Jaime Pinero

Dr. Sanjun Gu, the Lincoln University (LU) State Vegetable Specialist for Missouri, has left LU effective January 15, 2013. Dr. Gu will be working for North Carolina A&T University located in Greensboro, NC. During his time at LU (5 years), he worked tirelessly to assist farmers with expertise in commercial vegetable production. He was successful with numerous grants and was active with two LU farm programs (Small Farm; Outreach and Assistance for Socially Disadvantaged Farmers and Ranchers). His most recent work included evaluations of new tomato / pep-

per varieties in the field and in high tunnels, and grafting of tomatoes and watermelons. The work that Dr. Gu conducted in the 5 years he was at LU is impressive. **Congratulations, Dr. Gu, on your new position with North Carolina A&T State University. You will be missed!**

Lincoln University is currently looking for a new State Horticulture Specialist. We hope the new Specialist will be on board in the Fall, 2013.

Preventing Gray Mold on Strawberry.....continued

As an example, in the past a typical gray mold fungicide program emphasized 6 applications from bloom through harvest. More recently research has demonstrated that most initial gray mold infections take place during bloom, and that 2 or 3 applications during the bloom period give adequate gray mold control for the season. A very simple home garden recommendation may suffice for many small growers- a spray of Captan at these times:

- early in spring when new growth starts (a week or two after mulch removal);
- when plants begin to bloom;
- at full bloom.



Typical symptoms of gray mold rot on strawberry fruit.

Sources for more information

- Midwest Commercial Small Fruit and Grape Spray Guide (MU Bulletin MX377)
- Midwest Small Fruit Pest Management Handbook (OSU Bulletin 861)
- Midwest Strawberry Production Guide (OSU Bulletin 926)
- Compendium of Strawberry Diseases (1998, APS Press)
- Production Guide for Organic Strawberries (NYS IPM Publication No. 226)

Downy Mildew on Impatiens ...continued?

impatiens downy mildew. Greenhouses should be disinfected prior to use and only disease-free plugs and cuttings should be used. Periods of high humidity causing foliage moisture should be avoided. This begins with watering early in the day to allow the foliage to dry quickly. Finally, the impatiens crop should be scouted frequently for early symptoms of the disease.

If symptoms (described above) are observed, prompt action is needed. Place all symptomatic plants and debris in closed bags and immediately remove them from the greenhouse. If sporulation is noticed, remove and discard plants in at least a three foot radius from the infected plant. Additionally, an aggressive preventive fungicide application program should be initiated.

The table below lists an example of a fungicide application program for impatiens downy mildew. Please note that just as insecticides have different modes of action, so do fungicides. A good fungicide program rotates between chemicals with different FRAC numbers.

Given conditions conducive to infection, impatiens downy mildew has the potential of devastating one of our most popular, profitable bedding plant species. An IPM approach to the management of this new disease is advocated. This includes knowing the symptoms of the disease, starting with clean plants, scouting regularly for symptoms, destroying infected plants and initiating an ag-

gressive fungicide application program.

The threat of impatiens downy mildew does not end in the greenhouse. The disease was identified in landscape plantings of impatiens in a number of states last year, particularly those in the north and north-eastern regions of our country. Because the causal organism favors cool, moist conditions, spring and fall are the seasons when symptoms most likely would be observed in Missouri landscapes.

Management of the disease in outdoor settings starts with planting impatiens that

are known to be free of the disease. This, however, might not totally eliminate the disease since it can spread from near-by, infected plants. If symptoms are observed on plants growing outdoors, they should be removed from the landscape with care and disposed of properly. Since the disease organism over-winters in the soil, growing a species other than impatiens in the same area the following year is recommended. For container plantings showing the disease, discard the growing medium and disinfect the container before planting it again.

Application number	FRAC* number	Fungicide(s)	Application method	Rate/ 100 gal.
1	43 + 4	Adorn + Subdue MAXX	Drench	1 fl. oz. 1 fl. oz.
2	40	Stature SC	Spray	12.25 fl. oz.
3	M3	Protect DF + Capsil	Spray	2 lbs. 6 fl. oz.
4	4 +43	Subdue MAXX + Adorn <u>or</u> Adorn + Alude	Drench Spray	1 fl. oz. 1 fl. oz. 2 fl. oz. 2.5 qts.
Rotation	11 11+7	Fenstop <u>or</u> Pageant	Spray Spray	9 fl. oz. 12 fl. oz.

* = Fungicide Resistance Action Committee

Source: Ball Seed Company

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M Extension



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About this mailing list

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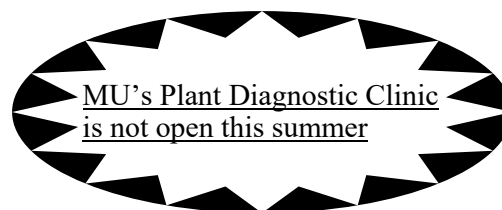
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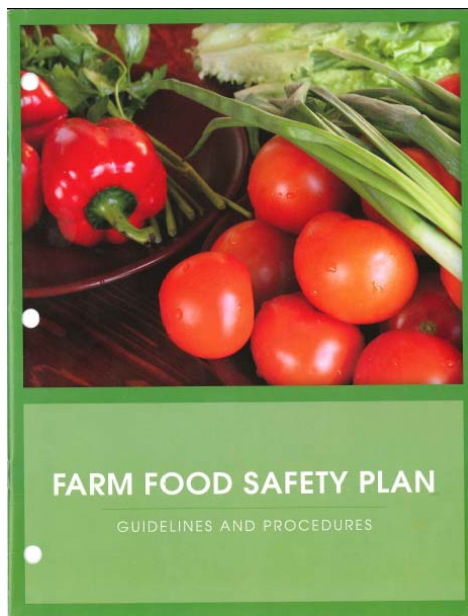


Interested in Getting Started with Farm Food Safety, *but not ready for GAPs yet?*by Tim Baker and James Quinn

The produce auctions in the US are being assisted by The Food Safety Team with the process of developing a plan for food safety on their growers' farms. Each member of this team is a representative of a produce auction. Attlee Stutzman with the North Missouri Produce Auction is our state's only representative. Other states represented are KY, IN, WI, OH, & PA.

This team has developed an excellent resource to assist growers. It consists of a booklet which takes a grower 'step by step' on how to implement a farm food safety plan. It is written 'by and for' small growers in plain and simple language. A three ring binder compliments this booklet. This binder has separator pages with pre-printed tabs to aid a grower in sorting

the different forms and documents they'll need to have for their plan.



It is important to understand that this **will not** make a grower GAP certified. However, it would be a great way to start. If one follows this booklet for a year or two, becoming GAP certified would be a much easier task.

The Farm Food Safety Plan 'Guidelines and Procedures' and the accompanying 3 ring binder are available for purchase from Shrock's Produce Supply. The cost is \$5 for the book, and \$12 for the binder. This does not include postage and handling. They are sold separately. To order, please contact: Shrock's Produce Supply
782 SW 90th Avenue
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