Food Safety Modernization Act – Produce Safety Rule Update
Meredith Melendez, Mercer County Senior Program Coordinator and Wes Kline, Ph.D., Cumberland County Agriculture Agent

In January of 2011 the Food and Drug Administration was given the task of implementing the Food Safety Modernization Act. This is the largest change to the FDA since its inception, and is intended as a prevention measure to food illness outbreaks. The Act will include science based standards for soil amendments, worker hygiene, packing, temperature controls, animals in the field and water. The mandate given to the FDA to complete the creation of this Act included a long to-do list, and a specific timeframe to complete these tasks. Growers expected to get a first glance at the Produce Safety Rule draft this past January. The draft has yet to be released and it is uncertain when it will be. Once released there will be a 75 to 90 day comment period as well as three listening sessions held regionally throughout the country. The FDA is reporting that while they have missed deadlines, such as the Produce Safety Rule draft, they have made much progress. The FDA has met its foreign inspection requirement by completing 600 foreign facility inspections this past year, the recall website has been revamped to make it more user friendly, updates have been made to the food safety guidance for the seafood industry and two traceability pilots have been launched. Once the Produce Safety Rule draft is released, all growers, exempt or not, are encouraged to read the draft and make comments. Comments may be made anonymously.

Growers utilizing large packing houses, major distributors or commodity specific organizations are receiving education on conforming to third-party audit specifics as well as how to adhere to industry standards. Where does this leave the small and medium scale farms? Rutgers Cooperative Extension and the NJDA have collaborated to hold 44 food safety educational workshops for growers throughout the state since 2004. These sessions will continue and be updated as more information about the Act is made public. These educational sessions have been open to all growers in the state, but to date a large number of participants have already been through a third-party audit due to wholesale sales to a purchaser requiring the audit. Those growers not currently required to have an audit, and not meeting the exemption requirements listed below, will undergo their first audit within three years.
FSMA from page 1

of the Act becoming law. It is expected that the rule will affect large scale farms first by giving them one year to comply; medium scale farms two years to comply; and small scale farms three years to comply. There is not yet a definition as to what constitutes a large, medium, or small scale farm.

Many small farms in the state are exempt from these coming FDA regulations due to the Tester-Hagan amendment. A farm that has average sales of $500,000 or less a year, sells the majority of its products via direct sales, and sells product within 275 miles of the farm is exempt from the Act. Exemption from complying with the Food Safety Modernization Act means that qualifying farms will not have to prepare a food safety plan, will not have to keep detailed records, and will not have to comply with food safety rules set by the FDA. The ability of this exemption to stay true will be based on research into past food illness outbreaks as well as any future outbreaks that may occur. Because of this, all produce growers should be thinking about their current food safety activities and where there is room for improvement.

Creating a farm food safety plan is the first step in preparing for the Food Safety Modernization Act as well as fully documenting your farm’s commitment to food safety. This Food Safety column will be a regular feature in the P&PA Veg Crops edition and each week it will focus on specific sections of a food safety plan. We encourage growers, including those not required to have a plan, to create one along with this column. We will continue to offer educational sessions specific to retail operations as well as wholesale operations about the Food Safety Modernization Act. Specific questions or concerns can be directed to:

Wes Kline, Agriculture Agent
Rutgers NJAES Cooperative Extension of Cumberland County, wkline@njaes.rutgers.edu

Larry Hardwick, Chief
NJDA, Bureau of Commodity Inspection and Grading larry.hardwick@ag.state.nj.us

Meredith Melendez, Senior Program Coordinator, Agriculture
Rutgers NJAES Cooperative Extension of Mercer County melendez@njaes.rutgers.edu

Vegetable Disease Update

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology and Wesley Kline, Ph.D., Cumberland County Agricultural Agent

✔ Asparagus – Phytophthora crown and spear rot
– In fields with low spots (poorly drained soils) or fields with a history of crown and/or spear rot apply Ridomil Gold 4SL (mefenoxam, 4) at 1.0 pt/A, or Ultra Flourish 2E/A (mefenoxam, 4) at 2.0 pt/A, or MetaStar 2E (metalaxyl, 4) at 2.0 qt/A over beds just before 1st harvest. For new plantings, apply the same after planting or after crown covering. Do not apply Ridomil or MetaStar one day prior to harvest or illegal residues may result. For more information please see 2012 New Jersey Commercial Vegetable Production Recommendations Guide.

✔ Cabbage – Damping-off – To help control losses due to damping-off pathogens apply Ridomil Gold (mefenoxam, FRAC code 4) at 1 to 2 pt/A 4SL, MetaStar (metalaxyl, 4) see label, or Quadris (azoxystrobin, 11) at 0.40 to 0.80 fl oz 2.08SC/1000 row ft (for Rhizoctonia only), or Ridomil Gold at 1 to 2 pt/A 4SL plus Quadris at 0.40 to 0.80 fl oz 2.08SC/1000 row ft. in a band up to 7 in. after seeding. For more information please see 2012 New Jersey Commercial Vegetable Production Recommendations Guide.

✔ Cole crops – Downy Mildew and Alternaria –
The spring season is just around the corner and it’s not too early to think about Downy mildew and Alternaria control. Symptoms of downy mildew include purple to yellowish-brown spots on upper leaf surfaces. A grayish-white spore mass will develop and cover the underside of leaves under ideal temperatures (night temperatures of 46 to 61°F and day temperatures below 75°F). Downy mildew can kill young plants. Heavily infected leaves may drop providing entry points for bacterial infections (black rot and soft rot). Symptoms of Alternaria on infected leaves include small, expanding circular lesions with concentric rings that may have a ‘shot-hole’ appearance as lesions age. Heavily infected seedlings may result in damping-off. Control of Downy mildew and Alternaria begin with preventative fungicide applications. Use one of the following at the first sign of disease and continue every 7 to 10 days (Please refer to the pesticide table on page F26 of the 2012 NJ Commercial Vegetable Production Recommendations to determine which fungicide is labeled for each specific crop.): Quadris (azoxystrobin, 11) at 6.0 to 15.5 fl oz 2.08SC/A, or chlorothalonil (M5) at 1.5 pt 6F/A or OLF, or Cabrio (pyraclostrobin, 11) at 12.0 to 16.0 oz 20EG/A, or Endura (bosalid, 7) at 6.0 to 9.0 oz 70WG/A, or Ridomil Gold Bravo (mefenoxam + chlorothalonil, 4 + M5) at 1.5 lb 76.5WP/A (14-day schedule), Manzate Pro-Stick (mancozeb, M3) at 1.6 to 2.1 lb 75DF/A, or Switch (cyprodinil, 9) at 11.0 to 14.0 oz 62.5WG/A (Alternaria only). For downy mildew only, ap-

See Disease Update on page 3
Septoria blight is spread by wind-

Purple blotch begins with preventative fungicide appli-

Applications of Quadris or Pristine at high rates will

Leeks (overwintered, spring transplanted) - Pur-

an application of Actigard (acibenzolar-S-methyl, P) at 1.0 oz 50WG/A

✔ Leeks (overwintered, spring transplanted) - Purple blotch

✔ Lettuce – Bottom Rot/Drop – Spring lettuce season is beginning and growers should take precautions to help control Bottom rot (Rhizoctonia) and Lettuce drop (Sclerotinia) which may cause potential problems. For Bottom rot, apply Endura 70W (boscalid, FRAC code 7) at 8.0 to 11.0 oz 70WA, or iprodione (FRAC code 2) at 1.5 to 2.0 lb 50WP/A or OR should be applied one week after transplanting or thinning and 10 and 20 days later. For Lettuce drop, apply Endura (FRAC code 7) at 8.0 to 11.0 oz 70WG/A or iprodione (FRAC code 2) at 1.5 to 2.0 lb/A, or Quadris (azoxystrobin, 11) at 0.40 - 0.80 fl oz/1000 row ft. 2.08SC beginning one week after transplanting or thinning and again at 10 and 20 days later. For more information on control of Bottom rot and Lettuce drop and other important diseases of lettuce please see the 2012 New Jersey Commercial Vegetable Production Recommendations Guide.

✔ Parsley – Septoria Blight /Bacterial (blight) leaf spot – Leaf spots caused by Septoria blight are easily distinguished by small, angular to round leaf spots with grayish-brown centers with a definitive dark, brown margin. Numerous black fruiting bodies develop in the center of lesions. Septoria blight is spread by wind-

✔ Strawberry – Anthracnose fruit rot -Strawberry anthracnose can be extremely destructive during warm, wet weather causing significant fruit rot. Symptoms of Anthracnose include blackish-brown circular spots on maturing green fruit and soft, sunken (flat) circular lesions on ripe fruit (see VDOW). On ripe fruit, lesions can expand rapidly and are often covered with a pinkish-orange spore mass. Spores are spread from infected to healthy fruit with splashing water. Control of Anthracnose always begins with a 7 to 10 day preventative spray program no later than 10% bloom and/or prior to disease development. For control apply the following combinations:

#1) captan (M3) at 4.0 lb 50WP/A plus Pristine (pyraclostrobin + boscalid, 11 + 7) at 18.5 to 23.0 oz 38WG/A
#2) captan (M3) at 4.0 lb 50WP/A plus Abound (azoxystrobin, 11) at 6.0 to 15.5 fl oz 2.08SC/A or Cabrio (pyraclostrobin, 11) at 12.0 to 16.0 20WG/A, or Tilt (propanozone, 3) at 3.0 to 4.0 fl oz. 3.6F/A every 7 days. A fixed copper at labeled rates can also be included if bacterial leaf spot is an issue. Bacterial leaf spot (Pseudomonas syringae) of parsley can also show up at the same time as Septoria blight. Leaf spots caused by Bacterial blight appear as small brown to black spots on the leaves. The pathogen can be soil or seed borne and develops during cool, moist weather. The disease spreads during cool, rainy weather or with overhead irrigation; and is exacerbated by high plant density. The same control measures listed for Septoria will assist in preventing the spread of Bacterial leaf spot as long as the fixed copper is included with azoxystrobin and the fungicides are applied preventative. If Oxidate is used, follow the label carefully.

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driven rain, heavy dews and overhead irrigation. Workers and equipment may also spread the disease during wet conditions. Best management practices include i) proper crop rotations of at least 2 years and by using clean or treated seed ii) scouting fields early for symptom development iii) keeping workers and equipment out of fields with wet foliage iv) plowing under residue of harvested crop and avoid planting in fields adjacent or near previously infected fields. Rotate applications of Quadris (azoxystrobin, 11) at 6.0 to 15.5 fl oz 2.08SC/A or Cabrio (pyraclostrobin, 11) at 12.0 - 16.0 20WG/A with Tilt (propanozone, 3) at 3.0 to 4.0 fl oz. 3.6F/A every 7 days. A fixed copper at labeled rates can also be included if bacterial leaf spot is an issue. Bacterial leaf spot (Pseudomonas syringae) of parsley can also show up at the same time as Septoria blight. Leaf spots caused by Bacterial blight appear as small brown to black spots on the leaves. The pathogen can be soil or seed borne and develops during cool, moist weather. The disease spreads during cool, rainy weather or with overhead irrigation; and is exacerbated by high plant density. The same control measures listed for Septoria will assist in preventing the spread of Bacterial leaf spot as long as the fixed copper is included with azoxystrobin and the fungicides are applied preventative. If Oxidate is used, follow the label carefully.

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#2) captan (M3) at 4.0 lb 50WP/A plus Abound (azoxystrobin, 11) at 6.0 to 15.5 fl oz 2.08SC/A or Cabrio (pyraclostrobin, 11) at 12.0 to 14.0 oz 20EG/A
#3) Captevate (captan + fenhexamid, M3 + 17) at 3.5 to 5.25 lb 68WDG/A

For subsequent applications, alternate:
captan (M3) at 4.0 lb 50WP/A plus Abound (azoxystrobin, 11) at 6.0 to 15.5 fl oz 2.08SC/A, or Cabrio (pyraclostrobin, 11) at 12.0 to 14.0 oz 20EG/A plus captan (M3) at 4.0 lb 50WP/A, or Captevate (captan + fenhexamid, M3 + 17) at 3.5 to 5.25 lb 68WDG/A

See Strawberry Anthracnose on page 4
To help manage fungicide resistance development, do not make more than 2 consecutive applications of either: Pristine (pyraclostrobin + boscalid, 11 + 7), Cabrio (pyraclostrobin, 11) or Abound (azoxystrobin, 11) before switching to another fungicide chemistry.

✔ Strawberry – Botrytis (Gray Mold) and Blossom blight – can cause serious losses in strawberry plantings in high tunnels and the field if not controlled properly. Development is favored by moderate temperatures (59 to 77 °F) with prolonged periods of high relative humidity and surface wetness. Control of Gray mold (see VDOW) begins with preventative fungicide applications. Apply at 5 to 10 percent bloom and every 10 days until harvest. During periods of excessive moisture, spray intervals of 5 to 7 days may be necessary. Rotate fungicide chemistries to aid fungicide resistance management.

Application #1: Pristine (pyraclostrobin + boscalid, 11 + 7) at 18.5 to 23.0 oz. 38WG/A
Application #2: captan (M3) at 4.0 lb 50WP/A, Captevate (captan + fenhexamid, M3 + 17) at 3.5 to 5.25 lb 68WDG/A, or Switch (cyprodinil, 9) at 11.0 to 14.0 oz. 62.5WG/A
Application #3: Pristine (pyraclostrobin + boscalid, 11 + 7) at 18.5 to 23.0 oz. 38WG/A

For subsequent applications, rotate between two or more of the following fungicides:
- Captan (M3) at 4.0 lb 50WP/A, or Cabrio (pyraclostrobin, 11) at 12.0 - 14.0 oz 20EG/A,
- Switch (cyprodinil + fludioxonil, 9 + 12) at 11.0 to 14.0 oz. 62.5WG/A, or Pristine (pyraclostrobin + boscalid, 11 +7) at 18.5 to 23.0 oz 38 WG/A, or
- Switch (cyprodinil + fludioxonil, 9 + 12) at 11.0 - 14.0 oz 62.5WG + Abound (azoxystrobin, 11), or
- Switch (cyprodinil + fludioxonil, 9 + 12) at 11.0 - 14.0 oz 62.5WG + Cabrio (pyraclostrobin, 11) at 12.0 - 14.0 oz 20EG/A.

Vegetable Diseases of the Week

Andy Wyenandt, Ph.D., Specialist in Vegetable Pathology

Vegetable Diseases of the Week from page 6

Early Planted Vegetables

- Use clear poly plastic covers. Most commonly, these come with slits or perforations to vent excess heat. They can be placed over direct seeded or transplanted crops with wire hoop supports (low tunnels) or they can be placed over ridges with transplants or seeds planted in the depression between the ridges. Zip tunnels and vented systems, where clear plastic can be easily closed and opened, have also been used. High tunnels also use poly plastic for protection and heat accumulation.
- Use spun bond poly or woven poly floating row covers to insulate, frost protect, reduce wind, reduce heat loss from soils and beds, and accumulate some heat. They can be placed directly over low growing crops such as strawberries or can be used with wire supports for other crops. The insulation they provide can protect 2-8°F depending on thickness. Usually a 0.9-1.2 oz. cover is used to provide protection but not limit light too much.
- For smaller plantings, use of additional heat sinks to absorb heat during the day and then release it at night can promote earliness. Heat collection devices are usually filled with water and may be clear or black plastic containers or tubes.

Combinations of these practices will provide greater cold protection, heat accumulation, and earliness. This could include plastic mulch + row cover, plastic mulch + clear row cover + floating row cover, plastic mulch + clear row cover + heat sink, plastic mulch + clear row cover + floating row cover + heat sink. Use of these combinations in a high tunnel will further enhance success with early planted summer vegetables.
Organic Farm Calls:
White Rot on Garlic, Leek, & Onion
Jack Rabin, Associate Director - Farm Programs

Last week a central Jersey grower of organic produce called to report problems in a field of overwinter garlic. The grower reported there is no history of previous allium crop production in the field. Two different varieties are being grown. On inspection, one variety shows yellow, stunted and wilting plants in small patches in the field; the other variety is vigorous and symptom free.

What might be the cause of this problem? What steps do you take to find the definitive answer? What can our organic grower do to avoid further crop loss?

What might be the cause of this problem?

With allium crops – Garlic, Leek, and Onion – we think of four problems in this scenario:

- Onion maggot
- Overwinter weather injury followed by soft rot bacterial infection
- Pink root
- Onion white rot, *Sclerotium cepivorum*

Further inspection shows: no maggot damage (it's too early), nor pink root. We look for evidence of overwinter injury followed by soft rot bacteria invasion, either from rough conditions or from tender less well-adapted varieties. Some bacterial soft rot is present. But, in this field yellow wilting plants are found in small groups; a pattern not consistent with typical winter injury. We pulled 4-6 weak plants and half had mats of white mycelia on the bulbs.

What steps give the definitive answer?

We took samples to the Rutgers Plant Diagnostic Lab, where Sebrina Tirpak put them under the microscope, giving us the diagnosis we suspected: black spherical bodies (sclerotia) of *Sclerotium cepivorum* are seen.

What does our grower need to do?

Immediate roguing and removal of diseased plants should be carried out, including removal of neighboring plants showing symptoms. Sclerotia can live for 2 decades in soil, waiting for next long term rotation of susceptible onion crops. Root exudates specific to *Allium* spp. from the next crop stimulate the sclerotia to germinate and invade the crop. Long-term rotations are a must, but not a complete solution.

Discussion – Prevention & Treatment

How do white rot sclerotia get there? There were no previous allium crops. As one variety did not show symptoms, sclerotia may have been introduced with the planting stock. I am not aware whether sclerotia live on wild onion. On any farm, but particularly in organic production, avoid introducing onion white rot sclerotia to the farm in contaminated planting stock. If white rot is introduced, long rotations out of allium crops, and not moving equipment through affected fields to new onion fields is advised.

Treatment of onion white rot in organic production fields. Management of onion white rot fills books. Our Vegetable Pathology Specialist, Andy Wyenandt recommends Contans WG, an OMRI Listed biological fungicide material effective on sclerotia, applied as a spray drench or chemigation. It consists of the natural soil fungus, *Coniothyrium minitans*. It reportedly attacks the sclerotia survival structures of the fungus in the soil.

The APS Compendium of Onion and Garlic Diseases and Pests offers white rot guidance: avoid introduction, plant removal, long rotations, avoid over-watering during ideal infection periods 60-65 degrees F, and try and identify varieties reported to offer some field tolerance. UC Davis offers similar advice: [http://www.ipm.ucdavis.edu/PMG/r584100511.html](http://www.ipm.ucdavis.edu/PMG/r584100511.html)

Even conventional agriculture has limited effective options for onion white rot. These include fungicides like Folicur 3.6F (tebuconazole) or pre-plant fumigation with Vapam HL (Metam Sodium) or Telone C-35 (Dichloropropene and chloropicrin). Metam Sodium is among the most widely used crop protection chemicals in the US because of its water-soluble ease of use as a fumigant, solving many problems on a wide variety of horticultural crops. These are all unavailable in organic production. Buyers beware of gimmicky products. While investigators worldwide test onion white rot control alternatives, they show mixed reliability. High cost, inconsistency, and insufficient control prevent wide adoption of alternatives.

See White Rot on page 6
What’s in literature for organic production?
Spent mushroom compost had no effect on onion white rot. Onion waste compost materials have reduced sclerotia viability and disease incidence as effective as Folicur fungicide in field trials. These likely work by acting as sclerotia germination stimulants.

Commercial products containing vesicular-arbuscular mycorrhiza, *Glomus intradices*, were shown to provide season long onion white rot disease suppression nearly as effective as Folicur 3.6F fungicide on organic muck soils of Ontario, Canada. I am not sure if the tested product, MIKRO-VAM, is available as an OMRI Listed product.

Other natural or synthetic fungal germination stimulants have been tested as pre-plant treatments. This is because fungal sclerotia are stimulated to germinate by volatile thiols and sulfides released by soil microorganisms from secretions from the roots of *Allium spp*. Diallyl disulfide (DADS), or mixing macerated onion products and spraying on fields two weeks prior to planting has been tested; similar in concept to stale seedbed technique for weeds. Biological control with *Trichoderma spp*. has been tested.

Avoiding Failures with Early Planted Vegetables
Gordon Johnson, Extension Vegetable & Fruit Specialist

Reprinted from Weekly Crop Update, April 6, 2012, University of Delaware Cooperative Extension

The mild weather has many growers eager to get an early start with summer vegetables. Early markets are often the most profitable with higher prices. However, growers should proceed with caution and realize that failures can occur if cold sensitive vegetables are planted when temperatures are sub-optimal. As we get back to more seasonable weather in April, there will be many nights ahead with temperatures in the 30s and frosts and freezes are still a concern.

Each vegetable crop has a minimal temperature at which growth will occur. Our summer vegetables such as tomatoes, peppers, cucumbers, watermelons, and squash simply do not grow if temperatures are in the 40s or 50s. Squash and cucumbers do not put on growth with temperatures below 60°F, cantaloupes, watermelons, tomatoes, peppers, and eggplants will not put on growth with temperatures below 65°F. If temperatures are below these minimums, plants will just “sit still” and will be at risk of cold injury, wind injury, and damage from early season insects and diseases. Cold soils will limit root growth, further placing plants at risk due to inadequate water uptake and the risk of desiccation. Excess cold can also stunt some summer vegetables so that they do not fully recover. This is especially true of cantaloupes.

When planting summer vegetables early, growers need to consider all the tools available to maximize heat accumulation and minimize heat loss. The following is a list of these tools:

- Use raised beds or ridges. Ridges that are oriented east-west with crops planted on the south side, will benefit from the additional heat accumulation from the increased solar radiation on that side. Sandy soils heat up quicker due to lower water content.
- Use planted windbreaks, most commonly rye, between beds or rows. Windbreaks reduce heat loss from cold winds and help to accumulate heat. Rye reaches full height by the end of April on most of Delmarva. Cold winds are the most damaging to summer crops. Sand blasting during dry wind storms can actually cut plants off at the soil level. Growers doing field plantings for early crops in unprotected areas should always use windbreaks.
- For direct seeded crops, choose cold tolerant varieties, plant shallow and into well drained soils, and choose protected fields for earliest plantings. Also till soils well ahead of plantings to allow for them to heat up. Plant as soon as soil temperatures are adequate for germination. Also choose seed that has high quality and performs well in a cold germination test.
- To warm the soil more quickly, use plastic mulches. Plastic mulches increase soil temperature and help hold heat during night periods. They can increase soil temperatures 5- 20°F depending on mulch color. In order of lowest to highest heat accumulation Black < Red < Blue < Olive/Brown < Clear in selecting mulches. Mulches should be laid tight on a firm moist bed that is clod free. This will allow for more effective heat transfer and accumulation. Loose plastic and cloddy soils will reduce plastic mulch benefits.

See Early Planted Vegetables on page 4
Temperatures averaged above normal, averaging 48 degrees north, 52 degrees central, and 51 degrees south. Extremes were 75 degrees at Pomona on the 5th and 28 degrees at Newton on the 4th. Weekly rainfall averaged 0.01 inches north, 0.00 inches central, and 0.06 inches south. The heaviest 24 hour total reported was 0.15 inches at Downstown on the 2nd to 3rd. Estimated soil moisture, in percent of field capacity, this past week averaged 96 percent north, 92 percent central and 91 percent south. Four inch soil temperatures averaged 47 degrees north, 50 degrees central and 50 degrees south.

The following table contains meteorological information since the start of the growing season March 1st. The table is updated each Monday and the following is an explanation for each column.

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*FEBRUARY GROWING DEGREE DAY TOTALS 59

Counties for Weather Station Locations

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<td>Cape May Court House</td>
<td>Cape May</td>
</tr>
<tr>
<td>Downtown</td>
<td>Gloucester/Atlantic county line</td>
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<tr>
<td>Glassboro</td>
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<tr>
<td>Hammonton</td>
<td>Atlantic</td>
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<td>Pomona</td>
<td>Atlantic</td>
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<tr>
<td>Seabrook</td>
<td>Cumberland</td>
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<tr>
<td>South Harrison</td>
<td>Gloucester</td>
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</table>
PLANT & PEST ADVISORY
VEGETABLE CROPS EDITION CONTRIBUTORS

Rutgers NJAES Cooperative Extension Specialists
- Gerald M. Ghidiu, Ph.D., Vegetable Entomology
- George Hamilton, Ph.D., Pest Management
- Joseph R. Heckman, Ph.D., Soil Fertility
- Bradley A. Majek, Ph.D., Weed Science
- Andy Wyenandt, Ph.D., Vegetable Pathology

Rutgers NJAES-CE County Agricultural Agents
- Atlantic, Richard W. VanVranken (609-625-0056)
- Burlington, Raymond J. Samulis (609-265-5050)
- Cape May, Jenny Carleo (609-465-5115)
- Cumberland, Wesley Kline, Ph.D. (856-451-2800)
- Gloucester, Michelle Infante-Casella (856-307-6450)
- Hunterdon, Winfred P. Cowgill, Jr. (908-788-1338)
- Middlesex, William T. Hlubik (732-398-5260)
- Monmouth, Bill Sciarappa, Ph.D. (732-431-7260)
- Morris, Peter J. Nitzsche (973-285-8300)
- Passaic, Elaine Fogerty, Agric. Assistant (973-305-5740)
- Salem (856-769-0090)
- Warren, William H. Tietjen (908-475-6505)

Vegetable IPM Program (732-932-9802)
- Joseph Ingerson-Mahar, Vegetable IPM Coordinator
- Kristian E. Holmstrom, Research Project Coordinator II

Newsletter Production
- Jack Rabin, Associate Director for Farm Services, NJAES
- Cindy Rovins, Agricultural Communications Editor

Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The pesticide user is responsible for proper use, storage and disposal, residues on crops, and damage caused by drift. For specific labels, special local-needs label 24(c) registration, or section 18 exemption, contact RCE in your County.

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For back issues of the Plant & Pest Advisory: www.rce.rutgers.edu/pubs/plantandpestadvisory