WEEKLY CROP UPDATE
UNIVERSITY OF DELAWARE COOPERATIVE EXTENSION

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Vegetable Crops

Vegetable Crop Insects – *Joanne Whalen, Extension IPM Specialist*; jwhalen@udel.edu

Leafminers in Vegetable Crops

Each spring, we receive reports of leaf miners attacking spring planted vegetable crops. There are a number of potential species that attack vegetables including the vegetable leafminer, serpentine leaf miner, spinach leafminer and beet leafminer. Leaf miners can be difficult to control and we have limited experience with control strategies in our area. The following links provide information on some of the potentially important species:

http://entnemdept.ufl.edu/creatures/veg/leaf/vegetable_leafminer.htm

http://entnemdept.ufl.edu/creatures/veg/leaf/a_serpentine_leafminer.htm

http://extension.umass.edu/vegetable/insects/leafminer-beet-and-spinach

Cabbage

Continue to scout for diamondback and imported cabbageworm larvae. Economic levels of diamondback larvae can be found. A treatment should be applied when 5% of the plants are infested and before larvae move to the hearts of the plants.

Melons

Continue to scout all melons for aphids and cucumber beetles Economic levels of aphids can be found in some of the earliest transplanted fields but with the cool weather the beneficial insects (lady beetles and parasitized aphids) will have a harder time keeping up with populations. As a general guideline, a treatment should be applied for aphids when 20 percent of the plants are infested, with 5 aphids per leaf and before significant leaf curling occurs.

Potatoes

Continue to sample for Colorado potato beetle adults and egg-laying. A treatment should be considered for adults when you find 25 beetles per 50 plants and defoliation has reached the 10% level. Once larvae are detected, the threshold is 4 small larvae per plant or 1.5 large larvae per plant.

Snap Beans

All seedling stage fields should be scouted for leafhopper and thrips activity. The thrips threshold is 5-6 per leaflet and the leafhopper threshold is 5 per sweep. If both insects are present, the threshold for each should be reduced by $^{1}/_{3}$. Be sure to also watch for bean leaf beetle feeding. Damage appears as circular holes in leaves and we have seen significant damage in recent years on the earliest planted fields. As a general guideline, a treatment should be considered if you defoliation exceeds 20% prebloom.

Sweet Corn

Continue to sample for cutworms and flea beetles. As a general guideline, treatments

should be applied if you find 3% cut plants or 10% leaf feeding. In order to get an accurate estimate of flea beetle populations, fields should be scouted mid-day when beetles are active. A treatment will be needed if 5% of the plants are infested with beetles.

Off-Color Sweet Corn Seedlings – *Gordon Johnson, Extension Vegetable & Fruit Specialist; gcjohn@udel.edu*

Sweet growers are noting that much of the emerging corn is currently very yellow in color. This is due to cold soils during emergence (cool air temperatures, cloudy weather, and wet soils). In sweet corn seedlings that are more advanced, cold wet soils can reduce root growth and also lead to plants becoming lighter green or yellow. With warmer temperatures expected this weekend, seedlings should green up quickly.

We often seed purpling in some sweet corn varieties in poor growth conditions. This is because purple pigments (anthocyanins) form in response to stresses such as cold soils and wet conditions. Under these conditions, sugars produced are not fully utilized for growth and accumulate, triggering the pigment production (the pigment is a sugar-containing glucoside). Other stresses such as root feeding by insects, compaction, or herbicide injury can increase the purpling. This purpling is very variety dependent and usually shows up in sunny days with cool nights and the corn in the V3-V6 stage. Varieties with more purple pigment genes will show the most purpling. Phosphorus deficiency also can cause purpling in plants but is not common in most of our vegetable soils. In most cases, the purpling will disappear rapidly in warmer weather, unless there is an underlying problem such as insect injury or herbicide damage.

Some growers have commented that as sweet corn is uncovered in clear plastic production systems, plants have turned yellow rapidly. This too is because of colder conditions. We also see sweet corn turn pale at the V3-V5 stage when seed reserves are used up, especially if roots are not growing well. Root activity drives these color changes. As soils warm up and sidedress N is applied, this normally will self-correct.

Other color changes this time of year can be seen as yellowing between the veins of the corn plant, especially in younger leaves. This striping can be variety related and is also often related to poor growing conditions and stresses on the plant followed by rapid growth with better growing conditions. However, we do see occasional problems with yellow striping due to nutrient deficiencies; magnesium deficiency would appear as interveinal chlorosis of older leaves, manganese and zinc deficiencies as interveinal chlorosis of younger leaves.

Yellow or bleached bands across leaf blades can also be caused by low temperatures.

Sunscald can also occur on young sweet corn, especially right after plastic covers are removed in plastic production systems. This will be seen as bleached areas on leaves.

When to Switch Plastic Mulch Colors – *Gordon Johnson, Extension Vegetable & Fruit Specialist; gcjohn@udel.edu*

The past several years have had periods of extreme heat that have caused fruit quality issues in tomatoes and peppers. Research has shown that high bed temperatures and the effects on root function have contributed to these problems.

One solution is to reduce bed temperatures by using white or reflective mulches. These can lower bed temperature by up to 20°F. This in turn can increase root function and reduce fruit disorders such as blossom end rot, white tissue, blotchy ripening and yellow shoulders.

In the past, a rule of thumb has been to switch to white or reflective mulch in the middle of June when days are longer and air temperatures are higher for a longer period of time.

Is there an advantage to switching earlier? Up to the middle of May, black plastic (or other soil heating colors) should be the preferred mulch to get plants off to a good start when soil temperatures can be variable and bed heating improves crop performance. The second half of May can see some very hot weather as can the beginning of June but this varies from season to

season. If we continue to see warming trends and long range forecasts are for warmer than normal temperatures, laying white or reflective plastic for late May and early June may be advised for sensitive crops such as tomatoes and peppers.

Supplemental Label for Fontelis Fungicide

– Kate Everts, Vegetable Pathologist, University of Delaware and University of Maryland; keverts@umd.edu

The fungicide Fontelis has just received a supplemental label for several new uses, including for field, fruit and vegetable crops. A few of the new vegetable uses on the label are the following:

- In-furrow of band applications for seedling diseases of tomatoes and snap bean

- Foliar applications for garlic rust, purple blotch and white rot on bulb vegetables such as onion

- Foliar applications for leaf spots and powdery mildew on brassica leafy vegetables.

- Foliar applications for leaf spots and blights of fruiting vegetables (tomato, pepper, eggplant, etc.)

- Directed spray for basal stem rot (*Sclerotinia rolfsii*) of fruiting vegetables

- Foliar applications of Septoria and powdery mildew on leafy vegetables

- Foliar applications for leaf spots and anthracnose on edible podded and succulent shelled legumes

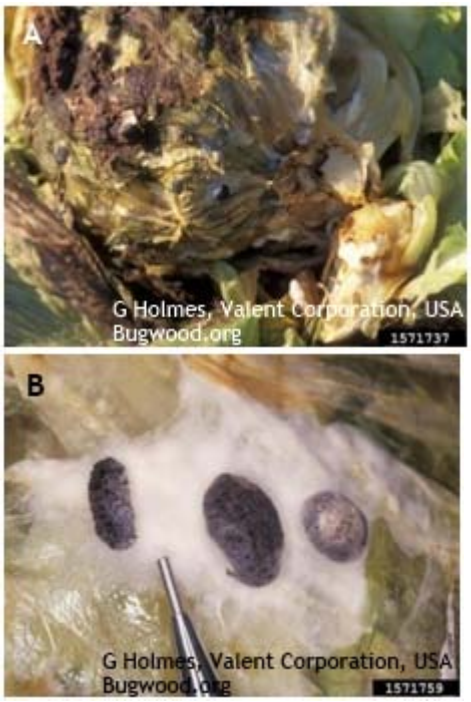
See label for specific guidelines and additional uses.

Lettuce Drop

– Kate Everts, Vegetable Pathologist, University of Delaware and University of Maryland; keverts@umd.edu

Cool moist weather is conducive to the development of lettuce drop caused by *Sclerotinia sclerotiorum* and *S. minor*. The disease produces wet rot or watery decay at the base of plants. Small black irregular sclerotia are often present on the affected tissue (those of *S.sclerotiorum* are larger and more obvious than those of *S. minor*). Some cover crops can increase the incidence of *S. minor*.

Effective management of drop depends on whether it is caused by *S. sclerotinia* or *S. minor*. The biofungicide Contans has worked well on *S. sclerotiorum* when applied in to soil in advance, but is not effective on *S. minor*. The following fungicides also are effective: Cannonball, iprodione, Endura, or Quadris. These fungicides can be applied following transplant or at thinning.



Lettuce drop (*Sclerotinia sclerotiorum*) on plant (A) and close up of sclerotia (B).

Garlic Problems -- Again – *Jerry Brust, IPM Vegetable Specialist, University of Maryland*; jbrust@umd.edu

Last year at about this same time there were calls from growers about their garlic plantings turning yellow and wilting (Fig. 1). When dug up the bulbs were often times blackened and rotting with some or much of the basal plate or roots missing (Fig. 2). The calls are coming in again this year with the same complaint and unfortunately, the same problems—bulb mites and garlic bloat nematode.

Figure 1. Bulb mite/bloat nematode infested garlic field

Bulb mites are a problem of garlic and sometimes of onion that usually go unrecognized. These pests can reduce stands, decrease plant vigor, and increase post-harvest diseases by their feeding on the roots and the stem plate. Bulb mites have a very wide host range, but cause most of their damage to onions and garlic. These mite pests are usually not seen on the bulb and prefer crawling into crevices between the roots and stem plate. Early in the growing season, bulb mites can cause poor plant stands and stunted growth as they feed on roots. Infested plants easily can be pulled out of the soil because of the poor root growth (Fig. 2).

The mite is bulb shaped with its legs moved forward and a bulbous rear end and many long fine hairs (Fig. 3). The mouthparts and legs are purplish-brown while the main body is creamy white. These mites have been described as looking like tiny pearls with legs. The mites are extremely small (from 0.02 to 0.04 inches) and are very slow moving. They are usually found in clusters underneath scales and at the base of the roots.

The garlic bloat nematode *Ditylenchus dipsaci* can destroy a crop of garlic in one season. Symptoms of bloat nematode in garlic plants include: bloated, twisted, swollen leaves, distorted and cracked bulbs with dark rings (Fig.4). These nematodes also can move to the inflorescence and remain in seeds for long periods of time in some plant species, i.e., beans, clover, and alfalfa where they are major sources of nematode dispersal. The nematodes can be spread around fields by equipment or on clothing and shoes. Garlic bloat nematodes can overwinter in soil or crop debris.

It is not just the direct feeding of the nematodes and mites on garlic and onions that causes problems, their feeding also allows pathogens to enter through the wounds they create. These wounds are very good entry points for pathogens like *Fusarium* spp., *Sclerotium cepivorum* (causes the disease white rot), and various soft-rotting bacteria. The white rot fungus does best in cool temperatures, and symptoms include white fungal growth on the stem or bulb with small, dark structures called sclerotia in the decayed tissue. Later in the season, higher than normal amounts of soft rot and *Fusarium* dry rot may be seen because of the wounds caused by these mites (as we saw in a couple of the garlic fields).

There is no program that certifies garlic as nematode-free. Commercial suppliers of garlic bulbs are aware of this important problem, and may send a portion of their crop to a laboratory for nematode testing, but this does not certify a crop as nematode-free. Because the nematode and mite can survive for long periods on infected

plant material, to prevent build-up of the nematode or mite populations in a field, you MUST rotate away from any *Allium* crops (garlic, onions, and leeks) and control nightshades for at least 4 years. DO NOT keep any bulbs or seed from an affected field no matter how clean it looks. You should start from fresh seed or bulbs. Rotation to areas of the farm that have not had garlic or onion plantings for many years with new garlic or onion seed is the best method of control. Growers can, however, use soil fumigants to reduce or eliminate the nematodes from infested areas of the field. Growers also can use bio-fumigant cover crops that can be planted after harvesting garlic. Mustard and sorghum-sudangrass have been shown to reduce nematode populations due to the bio-fumigant constituents they produce. Be sure to clean equipment and storage areas with meticulous sanitation techniques.

Figure. 2 Infested garlic bulbs, misshapen or rotting bulbs, sometimes roots are intact other times there are no roots

Figure 3. Bulb mite

Figure 4. Severe garlic bloat nematode damage to the two bulbs on the right vs. non-infested bulbs on the left

Fruit Crops

Gray Mold (Botrytis Fruit Rot) in Strawberries – *Gordon Johnson, Extension Vegetable & Fruit Specialist;* gcjohn@udel.edu

Most growers should have had at least 2 fungicide sprays for Gray Mold on strawberries already in 2013.

Gray mold is caused by the fungus *Botrytis cinerea*. The reservoir for this fungus is

mycelium in dead strawberry leaves. This mycelium becomes active in the spring and starts to produce spores on this old leaf tissue which then spread to blooms. Most infections start at the bloom stage but symptoms usually do not develop until close to harvest (the fungus does not become active until the fruit enlarges). Ripening fruits can also be infected. Conditions conducive for infection are temperatures between 70 and 80°F and wet conditions (rain, dew, fog, irrigation. The most critical period for applying fungicides to control gray mold is during bloom.

Fungicide Recommendations From our Commercial Production Recommendation Guide: http://extension.udel.edu/ag/vegetable-fruit-resources/commercial-vegetable-production-recommendations/

Start sprays at 5 to 10 percent bloom, because 90% of fruit infections occur through the flower, and repeat every 7-10 days. Increase spray intervals during persistent dry periods, but decrease intervals to 5-7 days during very wet periods.

Four weekly sprays starting at 5-10% bloom are usually sufficient for season-long control. Tank-mix and rotate fungicides from different FRAC codes to reduce the chances for fungicide resistance development.

Suggested Program:
Application #1, apply one of the following:
Captan--4.0 lb 50WP/A plus Topsin M--1.0 lb 70WP
Switch--11.0 to 14.0 oz. 62.5WG/A

Application #2, apply one of the following:
Elevate--1.1 to 1.5 lb 50WDG/A
Pristine--18.5 to 23.0 oz 38 WG/A

Application #3:
same as Application #1

For subsequent applications, rotate between two or more of the following fungicides:
Captan--4.0 lb 50WP/A,
Captevate--3.5 to 5.25 lb 68WDG/A
Elevate 1.1 to 1.5 lb 50WDG/A
Switch--11.0 to 14.0 oz. 62.5WG/A
Pristine--18.5 to 23.0 oz 38WG/A

If Botrytis is a problem it can often be traced back to poor sanitation (removing old leaves from plantings), mistiming of bloom sprays, or a combination of the two. However, we are seeing resistance of Botrytis to several fungicides. If fungicide resistance is suspected, resistance testing may be warranted. There is a laboratory at Clemson University that is doing Botrytis resistance testing.

The following is information on that testing program from Dolores Fernández-Ortuño and Guido Schnabel, Clemson University

"If you are a strawberry grower and you are interested in getting your farm-specific resistance profile to identify ineffective fungicides, send us around 40 dead strawberry flowers or collect spores from newly infected, decaying fruit with a cotton swab. We need about 10 to 15 of those swabs (each from a different fruit and each fruit from plants far enough apart to represent an acre or so). Make sure that you only collect the fungus spores, do not touch the fruit. Mail the flowers or the swabs to Guido Schnabel, Clemson University, 114 Long Hall, Clemson, SC 29634 and tell us the origin of the sample, your name, and e-mail so that we can send you the report electronically. Upon receipt, we need about 3 (for cotton swabs) to 5 (for flowers) working days to get a report to you outlining farm specific gray mold management recommendations."

24c Label for Malathion for SWD Control in Blueberry – *Joanne Whalen, Extension IPM Specialist*; jwhalen@udel.edu

We recently received a 24c label for Gowan's Malathion for Spotted Wing Drosophila (SWD) control in blueberries. This 24C supports an increased rate for better performance and residual. Be sure to read the label for use rate, number of allowed applications, as well as other restrictions. As a reminder, you must have a copy of this 24c label in your possession when you are using this pesticide. To obtain a copy of the label go to http://www.cdms.net/LDat/ld833021.pdf or contact Joanne Whalen at (302) 831-1303.

Agronomic Crops

Agronomic Crop Insects – *Joanne Whalen, Extension IPM Specialist*; jwhalen@udel.edu

Alfalfa

In general, alfalfa weevil populations have been higher in many fields this spring. For alfalfa over 16 inches tall, the threshold increases to 2.5 larvae per stem. Early harvest is often the best option once fields are greater than 16 inches tall and populations exceed 4 larvae per stem; however, there must be enough "stubble heat" after harvest for this technique to provide control. If populations were above threshold before cutting, be sure to check for alfalfa weevil adults and larvae within a week of cutting. Feeding from both stages can hold back re-growth. A stubble treatment will be needed if you find 2 or more weevils per stem and the population levels remain steady.

Field Corn

At this time, we can find both cutworms and slugs feeding in newly emerged corn fields. In addition to black cutworm, which generally attacks later planted corn, we can find a number of other cutworm species present in corn fields at planting time. They include the dingy cutworm, claybacked cutworm and variegated cutworm. Information from the Midwest indicates that the claybacked cutworms can cause economic loss in corn. They overwinter as half-grown larvae in the soil so they can get a "jump" on black cutworms when it comes to cutting each spring. Since they are larger in size, this species can damage very young corn plants. Scouting fields at plant emergence is important, even if at planting materials were used, to catch any potential problems. In addition, a higher rate of an insecticide will be needed to control larger cutworms. As a general guideline, a treatment is recommended if you find 10% leaf feeding or 3% cut plants. If cutworms are feeding below the soil surface, it will be important to treat as late in the day as possible, direct sprays to the base of the plants and use at least 30 gallons of water per acre. For cutworms, fields should be sampled through the 5-leaf stage for damage.

With the continued wet weather, we have seen an increase in slug damage on recently emerged corn. If slugs are damaging plants, you will be able to see "slime trails" on the leaves. Since corn was planted later this year and in many cases fields are just emerging, we could see more injury from slugs that have been hatching and beginning to grow. As indicated in previous newsletters, Deadline M-Ps is available for slug management this year in field corn. This is the only product that we have local experience with in regards to slug management in field corn. We continue to see very good control with Deadline MPs when applied at the 10 lb/A rate as long as you get good distribution of the product (5 pellets per square foot). The best control with the Deadline M-Ps has also been observed when applications were made and there was at least one day of sunny weather after an application. There are also a couple of other products available for slug management in field corn: Sluggo (iron phosphate) and IronFist (sodium ferric FDTA). At this point, we do not have local experience with these two products so will be evaluating them in replicated plots. We hope to get our first applications out today so we should have more information on their efficacy by next week. Please see the following link for comments from Ohio regarding slug management in field crops this season (http://corn.osu.edu/c.o.r.n.-newsletter#2).

Small Grains

Grass sawflies and true armyworms have been found in fields in Kent and Sussex counties. In addition, cereal leaf beetle adults have been found laying eggs and we are seeing the first larvae. Population levels remain variable throughout the state so scouting fields will be the only way to determine if an economic level is present. Depending on the temperature, cereal leaf beetle larvae will feed for up to 3 weeks. Research from Virginia and North Carolina indicates that the greatest damage can occur between flowering and the soft dough stage. Although armyworm can attack both wheat and barley, they can quickly cause significant losses in barley.

You will also need to watch for aphids feeding in the heads of small grains. With the continued cool wet weather and projection for cool

weather again next week, populations could continue to increase and beneficial insects will have a hard time keeping up with populations. The treatment threshold is 20-25 aphids per head with low beneficial insect activity.

Morningglory Control in Soybeans – *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

I always get questions on what to use to control mornningglory in soybeans at about the time to spray postemergence. Morningglory control starts at planting with a preemergence herbicide with broadleaf products such as Canopy, Valor XLT, Envive, Fierce, Prefix, Sonic or the Authority products. These will need to be followed up with a postemergence application in a timely manner for effective control (to morningglory no larger than 3"). The preemergence herbicide slows the growth of morningglory plants and seems to "set them up" for better overall control. This has been more consistent for morningglory control than any tankmixtures or glyphosate additives that I have evaluated.

Soil Disturbance Can Reduce Effectiveness of Some Herbicides – *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

This is an article written by Dwight Lingenfelter and Bill Curran from Penn State and modified for Delaware.

As more farmers use vertical tillage to manage crop residues or to mellow the seedbed prior to planting (especially soybeans), questions have arisen about possible impacts of using these types of tillage operations in combination with certain soybean herbicides. The PPO herbicides (Group 14) in particular are drawing attention in these discussions. The soil applied PPOs include flumioxazin (Valor SX, Valor XLT, and Envive); sulfentrazone (the Authority family lineup and Sonic), fomesafen (Prefix, Reflex); and saflufenacil (Sharpen, Verdict, Optill). In general, if a vertical tillage operation is done before the PPO herbicide application, residual weed control will typically not be negatively affected. However, if the PPO herbicide was applied before the tillage operation then weed control could be compromised. In particular, flumioxazin and saflufenacil-containing herbicides can be affected the most. In this case, any tillage after herbicide application disrupts the uniform layer of herbicide potentially causing weed escapes or patchy weed control.

Wheat Head Blight Update for Delaware – *Nathan Kleczewski, Extension Specialist – Plant Pathology*; nkleczew@udel.edu

We are entering the period where outbreaks of *Fusarium* head blight are possible on winter wheat. This disease is caused by a fungus (predominantly *Fusarium graminearum*) that resides in crop residue (corn stalks, wheat straw, and other host plants). The fungus produces spores on this residue, which are dispersed by rain or wind to the flowering wheat. Once wheat is infected, wheat heads may become bleached (Figure 1) and pink to orange fungal growth may be seen at the base of diseased spikelets. The fungus also produces mycotoxins such as vomitoxin (aka: DON), which are toxic to humans and animals and can be present in infected wheat grain. In this article I will go over some important factors that impact head blight severity and discuss fungicide use to help suppress this disease.

Growers should consider applying fungicides to wheat if the environment favors disease and plants are in a susceptible growth stage. Over the past two weeks Delaware has experienced wet weather associated with persistent cool temperatures. The cool temperatures likely have slowed the development of *Fusarium* spores and the risk for severe head blight outbreaks. However, the risk for head blight will rise if moisture remains high (>90% RH) and temperatures increase. Optimal temperatures for head blight infection are between 59 and 86°F. I encourage all growers to visit the FHB Risk assessment tool at http://www.wheatscab.psu.edu to keep abreast of the blight risk in their area. As of May 7th, the forecasting model shows a small section of

southeast Sussex County with moderate to high levels of head blight risk.

The severity of *Fusarium* head blight is not only impacted by weather, but also by the growth stage of the plant. *Fusarium* infections are most severe at flowering; consequently, this is when you should apply a fungicide. Fungicide treatments will be most effective if applied preventively at early flowering. A link to identifying this stage in wheat can be found at http://www.youtube.com/watch?v=7NJNE1wbVaU. Fungicides applied earlier or later will be ineffective at controlling this disease. In addition, fungicides applied before heading or at the flag leaf stage will not provide scab control. Even if timed properly and applied preventively, a fungicide may only result in approximately 50% disease control. However, the goal of a fungicide application is to reduce the impact of this disease on yield and to reduce mycotoxin levels in grain. Therefore, it is important that you choose the correct fungicides to maximize the benefit of the fungicide treatment.

Figure 1. An example of head bleaching that may occur from infection by the *Fusarium* head blight/scab fungus.

What fungicides should you apply? The best fungicides for control of head scab belong to the triazole class of fungicides (Group 3), but they vary greatly in their level of activity. The two best products for wheat head scab control are Caramba™ (active ingredient: metaconazole) and Prosaro™ (active ingredients: prothioconazole+tebuconazole). Proline™ (active ingredient: prothioconazole) provides some control but often is not as effective as Prosaro™. Products containing only tebuconazole (e.g. Folicur™) have been used in the past to control head blight. However, research from The Ohio State University indicates that Caramba™ and Prosaro™ provide between 10 and 15% greater control of blight, and between 20 to 25% greater control of DON than Folicur™. The nice thing about Caramba™ and Prosaro™ is that they will also give you some control of *Septoria/Stagonospora* glume blotch, rust, and tan spot. Fungicides containing a strobilurin (group 11) should not be applied to heads or flowers because strobilurins may increase DON levels in grain. Examples of these products include Quadris™ Headline™ Stratego™ and Quilt™.

In closing, remember that fungicides are only one part of *Fusarium* blight management and work best when combined with other practices. There are several options that you have to proactively reduce the risk of head blight. These include using resistant wheat varieties, tilling, removing crop debris from the field, and spreading risk by planting several varieties at different dates. Even if these management practices are followed, head scab outbreaks are possible given the right environmental conditions. Visit the FHB risk assessment tool often and monitor the growth stage of your wheat to determine if and when a fungicide treatment is needed. I encourage growers to contact University of Delaware Extension personnel to assist with your wheat disease management needs. Additional information on *Fusarium* head blight management can be found at http://www.scabsmart.org/ and http://www.apsnet.org/edcenter/intropp/lessons/fungi/ascomycetes/Pages/Fusarium.aspx.

Effect of Cereal Cover Crop Species on Full Season Soybean Performance

- *Robert Kratochvil, Extension Specialist – Grain and Oil Crops, University of Maryland;* rkratoch@umd.edu

Does choice of cereal cover crop species affect full season soybean? Does cereal cover crop kill date matter? These are questions that soybean

farmers are asking as Maryland cover crop acreage continues to increase.

To address these questions, three years of research was conducted by planting three cereal species (barley, wheat, and rye) as cover crops at the Wye Research and Education Center (fall 2009 and 2010) and Central Maryland R&E Center-Beltsville (fall 2010 and 2011). A no cover crop treatment (only fall-winter weed growth) also was included. Three (Wye) and two(Beltsville) cover crop spring kill dates that supported varying amounts of cover crop biomass production were used. The kill dates at Wye are defined as 1) extra early kill for only the rye and the no cover treatments (mid-late March during the two study years); and at both Wye and Beltsville 2) early kill date for all treatments (ranged from 13 April to 23 April); and 3) late kill date for all treatments (ranged from 2 May to 16 May). Soybean varieties Asgrow brand3539RR2 (mid-MG 3) and Asgrow brand 4630RR2 (mid-MG 4) were planted into all cover crop treatments between 2 and 3 weeks after the last kill date. Soybean harvest dates were considered normal ranging from 17 October to 3 November during the three years.

Approximately three weeks post-planting, stand emergence was assessed to see if the cover crop species or kill date treatments impacted stand establishment. Over the three year period, no emergence differences were observed indicating that neither choice of cereal cover crop nor spring kill date had a detrimental effect on soybean germination and emergence. The most important criterion when planting full season soybean into a cereal cover crop is attainment of good seed-soil contact.

Starting approximately mid-June each year, a weekly measurement of growth stage progression was done by randomly selecting 5 plants in each plot, determining the growth stage according to Fehr and Caviness (1971), and averaging the growth stage. The primary growth differences observed were associated with the two varieties. Both varieties progressed through vegetative growth similarly. The onset of reproductive growth always was observed for the earlier of the two varieties, as expected. The weekly readings continued until early-mid September. Occasionally, only very minor differences in growth stage progression for the soybeans were observed for either the cover crop species or the kill date treatments. These differences were inconsistent across the assessment dates and are considered to have no influence on soybean growth and performance.

Soybean yield (72 bu/acre average) was excellent during the three years. The most consistent yield difference observed was associated with variety, however there was no consistent trend favoring one over the other. At Wye, the MG 3 variety produced better than the 6 MG 4 variety during 2009-2010 and the opposite occurred during 2010-2011. During 2010-2011 at Beltsville, the MG 4 variety was best and during 2011-2012, there was no yield difference between the two.

Response of soybean yield performance to cover crop species and kill date varied by location. During the two years at the Wye, a cover crop species × (by) kill date interaction was observed. For the March kill date (extra early), soybeans planted into the no cover crop treatment produced 10% (2009-2010) and 4% (2010-2011) better than soybeans following rye.

For the 2010 April kill date (early), soybeans planted following any of the three cover crop species produced the same (62 bu/acre) but soybeans following the no cover treatment yielded nearly 10% more (68 bu/acre). In 2011, the April kill date produced no yield differences (~67.5 bu/acre average) among the four cover treatments.

For the two years the study was conducted at Beltsville, there was no cover crop species × kill date interaction during 2010-2011 but in 2011-2012 this interaction was significant. At Beltsville in 2010-2011, soybeans planted where cover crops were killed during April produced over 6% greater than soybeans following the May kill date. However during this study year, there were no differences in soybean yield associated with any of the cover crop treatments.

During 2011-2012, soybeans following either barley or wheat cover crop produced the same for the two kill dates. However, soybeans that followed either rye or the no cover crop treatment, produced approximately 12% greater

following the May kill date. Based on three years of data collected in this study, answers to the two primary questions about soybean performance following cereal cover crops are:

1. Does choice of cereal cover crop species affect the performance of full season soybean?
The performance of full season soybean following a cereal cover crop cannot be predicted by the cereal species grown. Differences may occur but they will be associated with location and kill date.

2. Does cereal cover crop kill date influence soybean performance?
The optimum kill date for cereal cover crops followed by full season soybean is difficult to predict. Factors that can affect soybean performance for any particular kill date are location, year, weather, and variety.

General

University of Delaware Welcomes New Extension Plant Pathologist – *Nathan Kleczewski, Extension Specialist – Plant Pathology*; nkleczew@udel.edu

My name is Nathan Kleczewski and I am the University of Delaware's new Extension Specialist in Plant Pathology. I am really looking forward to being a part of the UD Extension team, and am excited to work to address Delaware issues with plant diseases. I earned a B.S. in Plant Science from the University of Wisconsin-Oshkosh in 2004 and a Ph.D. in Plant Pathology from The Ohio State University in 2009. I worked as a Postdoctoral researcher at Indiana University from 2009-2010, and Purdue University from 2010-2012. I worked as a Research Plant Pathologist for FMC prior to starting this position. Through my extension and research activities, I will assist growers improve crop productivity by combating disease. My main focus will be field crops, but undoubtedly my role will expand as I settle in. My office is located in 145 Townsend Hall on the University of Delaware's main campus, but I will also be in the fields this summer meeting growers, agents, and other professionals. You can reach me by email nkleczew@udel.edu and phone (302)-300-6962. Feel free to contact me with any plant pathology related questions!

Common Ragweed Resistant to Glyphosate Identified in New Jersey – *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

Working with Bill Bamka, County Educator from Burlington County NJ, UD Weed Science Program confirmed that a population of common ragweed in New Jersey is resistant to glyphosate. The long-term history of the field is not known, but the past couple of years it was planted with soybeans. Last year, the preemergence herbicides did not provide adequate control and multiple applications of glyphosate were used postemergence. This is not the first confirmation of glyphosate-resistant common ragweed in the region; but the first in New Jersey. We have no reports of common ragweed resistant to glyphosate in Delaware.

In this situation, rotating to corn and use of atrazine is the best option. When rotating back to soybeans, use no-till because germination will be less than if tillage is done. The field will need to be treated with a preemergence application of cloransulam (i.e. Sonic or Gangster) or metribuzin (Tri-Cor, Boundary, or Canopy, generics). But there will definitely be a need for a postemergence herbicide and the best options would include Blazer Ultra, Cobra, Reflex, and Liberty (with Liberty Link soybeans). If cloransulam was not used at planting, FirstRate or Permit Plus (with STS soybeans) would also be options.

Kixor Restrictions With Other PPO Inhibiting Herbicides – *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

The label for Sharpen and other Kixor-containing herbicides says not to apply with any other Group 14 (PPO herbicides) or within 30 days of other Group 14 herbicides. Other Group 14 herbicides include flumioxazin (Valor, Valor XLT, Envive, Fierce, etc), Anthem, fomesafen (Reflex, Prefix, Flexstar numerous generic products).

Resistance Management for Palmer Amaranth – *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

Due to the seriousness of glyphosate-resistance, and the tendency of Palmer amaranth to develop resistance to glyphosate, UD Weed Science recommends:

1. The field should be clean at planting, using effective burndown herbicides or tillage;

2. Use a residual herbicide, applied as close to planting as possible (within 7 to 10 days);

3. *Never apply glyphosate alone*; an additional herbicide should be used as a tank mix partner;
a. additional mode of action must be highly effective on Palmer amaranth as well;
b. applications should be made to plants less than 3 inches tall;

4. Be sure to rotate herbicide mode of action
a. use a Group 27 herbicide in corn (Callisto, Impact, or Laudis products), avoid use of Group 14 (Valor, Sharpen, etc) herbicides in corn, except in cases of continuous corn;
b. use a Group 14 herbicide in soybeans (i.e. Valor, Reflex, or Cobra); and

5. Fields with soybeans planted two years in a row need extra precautions to avoid resistance (particularly in regards to Group 2 or ALS herbicides).

In regards to point 3, you need to ask yourself if the herbicide you are adding with glyphosate will kill Palmer amaranth in your situation, if it was applied without glyphosate. Often times the products mixed with glyphosate would not kill Palmer amaranth if it was used alone -- either because it does not have postemergence activity, it is used at a low rate, or it is applied when the weeds are too large. I have seen a lot of advertisements for products such as Prowl H2O, Warrant, Outlook as products to help with resistance management when tankmixed with glyphosate. These products do not have activity on weeds that have emerged from the soil (but, they will control Palmer that germinates after the herbicide is applied). So they should be tankmixed with glyphosate AND another herbicide effective on emerged pigweed plants.

The two photos below illustrate the lack of weed control when products such as Prowl H2O, Warrant, Outlook, Dual etc, are sprayed to emerged weeds (Group 3 and Group 15 herbicides).

Untreated plants on the left, the flat on the right was sprayed with Dual when the Palmer amaranth was in the cotyledon to 1-leaf stage.

Untreated plants on the left, the flat on the right was sprayed with Prowl H2O when the Palmer amaranth was in the cotyledon to 1-leaf stage.

Here is a list of recommended postemergence herbicides for use with glyphosate when Palmer amaranth is present.

Soybean Herbicides
Classic[Grp 2]
Harmony SG[Grp 2] (requires STS soybeans)
Pursuit[Grp 2] / Extreme[Grp 2]
Raptor[Grp2]
Reflex / Flexstar GT
Synchrony XP[Grp 2] (requires STS soybeans)
Ultra Blazer

Corn Herbicides
Accent Q[Grp 2]
Atrazine
Banvel / Clarity
Distinct / Status
Callisto + atrazine
Capreno[Grp 2] + atrazine
Impact + atrazine
Laudis + atrazine

Permit Plus[Grp 2]
Realm Q /Resolve Q /Require Q /Steadfast Q[Grp 2]

Note: Palmer amaranth has developed resistance to Group 2 herbicides (ALS-inhibiting herbicides) in many states, so be sure to use Group 2 herbicides judiciously.

Apply Residual Herbicides as Close to Planting as Possible – *Mark VanGessel, Extension Weed Specialist*; mjv@udel.edu

Preemergence herbicides will provide a period of residual weed control, based on rate and incorporation. Typically we can expect 3 to 5 weeks of residual control in most situations. So if our preemergence herbicide application is made 3 to 4 weeks before planting, we can expect weeds starting to emerge shortly after planting and a need for a postemergence herbicide application 2 to 3 weeks after planting. On the other hand, if preemergence herbicides are made at planting, they will provide enough residual control to allow postemergence application closer to canopy closure.

Announcements

High Tunnel Mixed Vegetable Production Workshop

Tuesday, May 21, 2013 5:00pm -8:00pm
Delaware State University
Smyrna Outreach and Research Center
(884 Smyrna Leipsic Road Smyrna, DE 19702)

This workshop is geared towards persons interested in high tunnel production
in Delaware and season extension in general. The workshop will cover topics such as:

- Starting sweet potato slips in a tunnel to transplant outside
- Demonstration of grafting tomatoes for better yields and disease resistance
- Comparison of five different high tunnels now at the Smyrna Outreach and Research Center, including three that were recently constructed
- Other options for crops in high tunnels
- How to improve results of vegetable production
- Season Extension Strategies

Space is limited; please RSVP by May 17.

To register & if you have any questions or special needs, please contact Dr. Rose Ogutu at (302) 857-6397 or rogutu@desu.edu , or Jasmine Porter at 302-857-758 or jporter@desu.edu.

Northeast SARE, USDA & Delaware State University Cooperative Extension Small Farms Program

Retail Farm Market School

Wednesday, May 29, 2013 9:30 a.m.-3:30 p.m.
Carvel Research and Education Center
16483 County Seat Hwy
Georgetown, DE 19947

Delaware Cooperative Extension will conduct a day-long Retail Farm Market School for anyone who handles, processes or merchandises fresh market produce, such as local farm market vendors. The school is sponsored by the University of Delaware

Cooperative Extension, Penn State University, Delaware Department of Agriculture and Delaware Agritourism Association. Instructors will be Gordon Johnson from UD and John Berry from Penn State. The tuition is $45.

Topics will include produce handling and merchandising, customer service, sanitation and fresh cut produce. The course will be comprised of several delivery modes including professionally produced video segments, take-home text, post-harvest handling references, hands-on activities and a "certification quiz."

Each school participant will receive a full-day of retail farm marketing education and networking, a 40-page text that follows the *school* curriculum, a professional produce knife, a digital produce thermometer, sign blanks and the opportunity to receive a Retail Produce Professional certificate.

Program details are online at: http://extension.udel.edu/weeklycropupdate/files/2013/04/RetailFarmMarketBROCHURE.pdf

Registration deadline is Friday, May 17. Please contact Karen Adams at adams@udel.edu or call (302) 856-7303 ext. 540 to register, obtain additional information and directions. Class is limited to the 35 seats.

Blueberry Educational Meeting and Field Tour

Saturday, June 8, 2013 9:00 – 11:00 a.m.
Bennett Orchards
31442 Peach Tree Lane
Frankford, DE 19945

Do you currently grow blueberries or are you considering commercial blueberry production?

This meeting will be a great opportunity to tour the eight acre blueberry planting at Bennett Orchards and hear from Hail Bennett about his experiences establishing a commercial blueberry planting.

Gordon Johnson, University of Delaware Extension Vegetable Specialist, and Emmalea Ernest will discuss recommendations and research on establishment practices and variety selection.

Joanne Whalen, University of Delaware IPM Specialist, will provide the latest information on Spotted Wing Drosophila management.

Refreshments will be served.

Please preregister by contacting Karen Adams at adams@udel.edu or call (302) 856-7303 ext. 540.

2013 University of Delaware Cooperative Extension Horticulture Short Course: Pest and Beneficial Insect Walks

June 26, 2013 4:00-6:00p.m.
UD Carvel Research & Education Center
Sussex County Extension Office
16483 County Seat Hwy.,
Georgetown, DE
Cost: $15

Tour the grounds of the Sussex County Extension Office in Georgetown to identify insects, diseases and beneficial insects in the landscape.

Instructors: Nancy Gregory, Brian Kunkel, Carrie Murphy, and Tracy Wootten

Register with Tracy Wootten: (302) 856-7303 or wootten@udel.edu

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2013 University of Delaware Weed Science Field Day

Wednesday, June 26, 2013
University of Delaware
Research and Education Center
(old office building)
16686 County Seat Highway
Georgetown, DE 19947

CCA CEUs will be offered along with DE Pesticide credits.

To register, please call Karen Adams at 302-856-7303 ext. 540 or adams@udel.edu. For more information, contact Dr. Mark VanGessel at 302-856-7303 or mjv@udel.edu.

2013 Wye Weed Science Field Day
Thursday, June 27, 2013
Wye Research and Education Center
Queenstown, MD

There will be a morning tour at the Wye Research and Education Center. CCA CEUs will be offered along with MD Pesticide credits.

For more information, contact Dr. Ron Ritter at 301-405-1329 or by email rlritter@umd.edu.

Weather Summary

Carvel Research and Education Center Georgetown, DE

Week of May 2 to May 8, 2013

Readings Taken from Midnight to Midnight

Rainfall:

1.27 inch: May 7
0.19 inch: May 8

Air Temperature:

Highs ranged from 71°F on May 8 to 56˚F on May 3.

Lows ranged from 56˚F on May 8 to 43˚F on May 3.

Soil Temperature:

59.4˚F average

Additional Delaware weather data is available at http://www.deos.udel.edu/monthly_retrieval.html and http://www.rec.udel.edu/TopLevel/Weather.htm

Weekly Crop Update is compiled and edited by Emmalea Ernest, Extension Associate – Vegetable Crops