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FIELD AND FORAGE CROPS

From: Jack Bacheler, Extension Entomologist

Thrips Giving Us a Break?

By North Carolina standards, this year appears to be at a reasonable level for thrips populations and their associated damage for many cotton producers. In most areas of the state, thrips levels are low to moderate compared to the past five growing seasons. However, we have had a few reports of high,
“treatable” thrips levels on 1 to 2 true leaf cotton behind seed treatments – this would be expected in
cotton that’s three weeks or more beyond April to May 20 planting dates.

On June 2, in our April-planted cotton tests at Rocky Mount, the untreated check plots were very
“ragged.” And although levels found with a hand lens were on the low side, our washed samples
averaged nine immature and three adult thrips per plant in the untreated checks; the Aeris seed treatment
alone (without a foliar Orthene spray) had six immatures per plant and just under two adults per
seedling. We looked at the same treatments (and others) with a hand lens and could only find
approximately one-third of the level of immature as with the washing technique. Using the threshold of
1 thrips per true leaf with a hand lens would have put the seed treatment at approximately two times the
action threshold of four thrips per plant on the 4-leaf cotton. On the plus side, the newest unfolding true
leaves looked shiny and smooth on all of the treatments except for the untreated checks, indicating little
if any recent thrips damage.

In our May 26 planted cotton, even the untreated check plots looked good at this point with essentially
no damage to the rapidly-expanding cotyledons. I would expect that this cotton will “grow off” quickly
and that even the low rate Temik and the seed treatment alone plots will not suffer from thrips damage.
This has generally been our experience with cotton planted after May 20.

At this time of year, pay particular attention to the bud area of the plant and the newest unfurling leaf.
This past week, I have seen several cases of 2 to 4 leaf, “rough looking” cotton that had undamaged
buds, shiny new uppermost leaves, and few if any thrips (even though the cotton first 4 true leaves
looked “rough” as in Fig. 1). The figure below shows a seed treatment that provided three good weeks of
thrips control (note the healthy cotyledons), but during the next two weeks the subsequent 4 true leaves
were heavily damaged. Although hidden and too small to see in the image, the newest unfolding leaves
in these plants were healthy.

![Image of seed-treated cotton seedlings 5 weeks after planting.](image_url)

Fig. 1. Seed-treated cotton seedlings 5 weeks after planting. Image by Jack Bacheler.
Other Cotton Insects

Although things could change rapidly, no reports of significant spider mite or cotton aphid infestations have come to our attention during the past week.

Wednesday North Carolina IPM Project Cotton Insect Updates

For weekly cotton insect updates from the North Carolina IPM Project, see the following:

Cotton Insect Corner: http://ipm.ncsu.edu/cotton/insectcorner/radio/index.html
Cotton Insect Teletip (North Carolina access only): 1-800-662-7301
Syngenta’s Pest Patrol (national access): 1-877-285-8525

New Stink Bug Scouting Device

We have developed a stink bug scouting aid and an associated educational bulletin for the Southeast that will be available this coming week. A link to the bulletin may be found on the following website: http://ipm.ncsu.edu/cotton/insectcorner/pdf/AG_730_WPrint-NC.pdf. We will distribute and cover the use of these devices at our upcoming cotton schools, and also mail these materials to county agents with cotton responsibility and to others who request sets. We hope that this self-contained device will result in more uniform, accurate and efficient scouting for stink bug damage on correctly-sized bolls . . . and hopefully get more folks involved in scouting. Each of my colleagues in Virginia, South Carolina and Georgia has also received the templates, lanyards and educational materials (with their own logos!). We hope that these field devices will be put to good use in the coming months. I hope to begin announcing dates, places and times for our cotton scouting schools beginning with next week’s issue of the North Carolina Pest News.

From: Dominic Reisig, Extension Entomologist

Corn Earworms in Field Corn

Corn earworm larvae are out and feeding in corn. The first generation of these caterpillars feed in the whorl (Figs. 2 and 3), but rarely cause economic damage. Economic damage in corn usually occurs from the second generation feeding on the ears. Yield loss due to ear feeding is still low, with yield loss estimated at 3 to 5%.

Usually, for first generation corn earworm, the earliest planted and largest corn in the area is where the highest pest population abundances are found. Insecticidal treatments are normally ineffective, since the caterpillars feeding within the whorl are protected. Corn with a single, or double, Bt gene targeted for above-ground caterpillars may provide some protection, depending on the Bt gene used. Corn with three or more Bt genes targeted for above-ground caterpillars provide the best protection against corn earworms in the whorl stage (first generation) and when the second generation feeds on the ear.
FRUIT AND VEGETABLES

From: Kelly Ivors and Frank Louws, Extension Plant Pathologists

Cucurbit DOWNY Mildew Fungicide Recommendations for 2010

Growers in high risk areas should consider the following in developing a spray program to manage cucurbit downy mildew (Fig. 4), caused by Pseudoperonospora cubensis.

Ranking of efficacy for fungicides to control downy mildew: Presidio = 4.5; Ranman = 4.5; Tanos = 3.5; Previcur Flex = 3.5; Gavel and mancozeb = 2.5; Bravo = 2.

Presidio, Ranman and Previcur Flex are best tank mixed with a protectant such as mancozeb or chlorothalonil. Highly effective products tend to be expensive. The Presidio label requires this product to be tank mixed with another fungicide with a different mode of action if applied as a foliar spray – chlorothalonil or mancozeb are the best options. One important consideration is that products have different preharvest intervals (PHI). A product with a PHI greater than 1 day such as mancozeb (PHI = 5 days) cannot be used when growers harvest 2 or more times per week. Another important consideration is fungicide resistance management, hence growers should alternate sprays with fungicides in different groups so that the pathogen does not develop insensitivity to the chemical. To date, Previcur Flex has performed modest in North Carolina trials, but has failed in Georgia trials possibly due to resistance.
### Cucurbit POWDERY Mildew Fungicide Recommendations for 2010

The best products for controlling powdery mildew on cucurbits are:

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Efficacy rank*</th>
<th>Active ingredient(s)</th>
<th>Fungicide group</th>
<th>PHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quintec</td>
<td>5.0</td>
<td>quinoxyfen</td>
<td>13</td>
<td>3 day</td>
</tr>
<tr>
<td>Procure</td>
<td>5.0</td>
<td>triflumizole</td>
<td>3</td>
<td>0 day</td>
</tr>
<tr>
<td>Flint</td>
<td>4.0</td>
<td>trifloxystrobin</td>
<td>11</td>
<td>0 day</td>
</tr>
</tbody>
</table>

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**Presidio**

- **Trade name**: Presidio
- **Efficacy rank**: 4.5
- **Active ingredient(s)**: fluopicolide
- **Fungicide group**: 43
- **PHI**: 2 day

**Ranman**

- **Trade name**: Ranman
- **Efficacy rank**: 4.5
- **Active ingredient(s)**: cyazofamid
- **Fungicide group**: 21
- **PHI**: 0 day

**Tanos**

- **Trade name**: Tanos
- **Efficacy rank**: 3.5
- **Active ingredient(s)**: famoxadone + cymoxanil
- **Fungicide group**: 11 + 27
- **PHI**: 3 day

**Previcur flex**

- **Trade name**: Previcur flex
- **Efficacy rank**: 3.5
- **Active ingredient(s)**: propamocarb
- **Fungicide group**: 28
- **PHI**: 2 day

**Gavel**

- **Trade name**: Gavel
- **Efficacy rank**: 2.5
- **Active ingredient(s)**: zoxamide + mancozeb
- **Fungicide group**: 22 + M
- **PHI**: 5 day

**Dithane/Manzate/Penncozeb**

- **Trade name**: Dithane/Manzate/Penncozeb
- **Efficacy rank**: 2.5
- **Active ingredient(s)**: mancozeb
- **Fungicide group**: M
- **PHI**: 5 day

**Bravo/Equis**

- **Trade name**: Bravo/Equis
- **Efficacy rank**: 2.0
- **Active ingredient(s)**: chlorothalonil
- **Fungicide group**: M
- **PHI**: 0 day

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* 5 = excellent control, 1 = poor control

**When disease pressure is severe, an organosilicone surfactant should be tank mixed with Ranman.**

If spraying as a **preventative** when disease has not been identified in the county, use either:

- Tanos + mancozeb or chlorothalonil, or
- Previcur Flex + mancozeb or chlorothalonil, or
- Gavel

on a 7 day schedule, rotating among them when possible.

Once downy mildew has been identified in the county or field, use either:

- Presidio + mancozeb or chlorothalonil, or
- Ranman + mancozeb or chlorothalonil

on a 7 day schedule, rotating every other week with one of the above **preventative** combinations.

**Additional Notes:** The lower use rates are effective when tank mixed with a protectant. Under high pressure or high disease risk, growers should adopt higher use rates (e.g., up to 4 ounces for Presidio and 2.75 fluid ounces for Ranman).

**Special for Watermelons:** Chlorothalonil has been known to cause some sun scald and other issues when applied to nearly mature watermelon fruit. Hence, chlorothalonil is not recommended as a tank mix partner for sprays on watermelon during fruit development.
These products can be used in a spray program in combination with the above recommended downy mildew products for controlling both powdery and downy mildew. Since the downy and powdery mildew pathogens are not closely related, fungicides that are effective against downy mildew do not have very good control efficacy against powdery mildew, and vice versa.

From: Allan Thornton, Extension Associate, Horticultural Science Department

**Downy Mildew Confirmed on Cucumbers**

Downy mildew was confirmed on cucumbers in Columbus County late last week (May 27) and in Duplin County early this week (June 1). It is probably scattered all over North Carolina, even if symptoms have not been observed yet.

General recommendation is to spray on a 5 to 7 day schedule with high pressure and enough water volume (25 to 50 gallons per acre depending on canopy size) to obtain coverage. Presidio and Ranman are the top tier products for efficacy. Previcur Flex, Gavel, and Tanos would be the second tier. Presidio, Previcur Flex, and Tanos require a broad spectrum fungicide to be tank mixed. Ranman requires a surfactant and Gavel can be used alone. Bravo, mancozeb products (Dithane, Pencozeb), Curzate, and copper fungicides are good tank mix partners. Preharvest intervals (PHI) should be considered when selecting products. Gavel and mancozeb products have a 5 day PHI while all others are 3 or less.


From: Kelly Ivors, Extension Plant Pathologist

**North Carolina Surrounded by Tomato Late Blight**

This season, late blight on tomatoes isn’t late. It’s already been identified on tomato transplants produced in greenhouses and many public box stores in Kentucky, Louisiana, Pennsylvania and Maryland. Although it has yet to be found in North Carolina, growers and homeowners should be aware of this threat and scout their fields and home gardens.

Without proper preventative measures, some diseases like late blight can completely defoliate and destroy a crop within two to three weeks. Due to moderate temperatures, frequent rainfall, and heavy morning dew during the growing season, late blight, caused by *Phytophthora infestans*, can be severe in the mountains of North Carolina, as well as in late plantings in the Piedmont. Despite intensive efforts for over 150 years to control *P. infestans*, it remains one of the world’s most costly plant pathogens, concerning either direct losses and/or in the need for intensive use of costly fungicides. The recent spread of aggressive, fungicide-resistant strains of this pathogen on tomatoes in North Carolina has further aggravated the problem, making the pathogen much harder to control.

The pathogen attacks all aboveground parts of the tomato plant. The first symptoms of late blight on tomato leaves are irregularly shaped, water-soaked lesions (Fig. 5); these lesions are typically found on the younger, more succulent leaves in the top portion of the plant canopy. During humid conditions,
white cottony growth may be visible on the underside of affected leaves (Fig. 6). As the disease progresses, lesions enlarge causing leaves to brown, shrivel and die (Fig. 7). Late blight can also attack tomato fruit in all stages of development. Rotted fruit are typically firm with greasy spots that eventually become leathery and chocolate brown in color (Fig. 8); these spots can enlarge to the point of encompassing the entire fruit.

Fig. 5. The first symptoms of late blight on tomato leaves are irregularly shaped, water-soaked lesions. Image from Kelly Ivors.

Fig. 6. During humid conditions, white cottony growth of *P. infestans* may be visible on the underside of affected leaves. Image from Kelly Ivors.

Fig. 7. *P. infestans* can cause leaves to turn brown, shrivel and die. Image from Kelly Ivors.
Late blight of tomato is caused by the fungus-like organism *Phytophthora infestans*. The pathogen is best known for causing the devastating Irish potato famine of the 1840's, which killed over a million
people, and caused another million to leave the country. Besides tomatoes, *P. infestans* can only infect a few other closely related plants including potato and related *solanaceous* weeds such as hairy nightshade. The pathogen is favored by cool, wet weather; clouds protect the spores from exposure to UV radiation by the sun, and wet conditions allow the spores to infect when they land on leaves. Nights in the 50's and days in the 70's accompanied by rain, fog or heavy dew are ideal for late blight infection. Under these conditions, lesions may appear on leaves within 3 to 5 days of infection, followed by white cottony growth soon thereafter (Fig. 6). This white cottony growth is a sign of rampant spore (sporangia) production (Fig. 9). Although spores may also be produced on tomato fruit, they are more commonly produced on leaves. Sporangia can be spread readily by irrigation, equipment, wind and rain and can be blown into neighboring fields within 5 to 10 miles or more, thus beginning another cycle of disease.

**Disease Management**

**Host resistance**

Plant resistance is not currently an integral component in late blight management for commercial production of fresh market tomatoes. However, new breeding lines resistant to some strains of *P. infestans* have recently been developed at the Mountain Horticultural Research and Extension Center in Fletcher, North Carolina by tomato breeder Dr. Randy Gardner. A new campari-type (small fruited) variety called “Mountain Magic” that has resistance to some strains of *P. infestans*, in addition to early blight, should be available to growers next year.

**Chemical**

There are several diseases that attack tomato leaves and fruit in this region. Therefore it is necessary to use a combination of different products in a spray program to optimize management of these diverse pathogens, including strobilurins, mancozeb, and chlorothalonil. One consideration is that different products have different preharvest intervals (PHI). A product with a PHI greater than 1 day such as mancozeb (PHI = 5 days) cannot be used when harvests are done 2 or more times per week. Another important consideration is fungicide resistance management. For example, pathogens may develop insensitivity (resistance) to the strobilurins (i.e., Amistar, Cabrio, Quadris or Tanos) if these products are used too frequently.

The application of fungicides plays a significant role in the control of late blight of fresh market tomatoes; however, mefenoxam resistant strains of the pathogen have been identified throughout the Southeast. Fungicides containing mefenoxam are recommended only when weather favors disease development and resistant populations have not been identified in the area that season.

Commercial growers in western North Carolina should apply protectant products since controlling late blight preventatively is better than after infection. Before late blight infection occurs, mancozeb products such as Maneb, Dithane, Manzate, and Penncozeb work well early in the season before harvest (5-day PHI); chlorothalonil products (Bravo, Equus) work best during fruit growth (0-day PHI). In addition, several other chemistries such as cyazofamid (Ranman) and mandipropamid (Revus) work well against this pathogen. Check the North Carolina State University tomato spray program website at [http://www.ces.ncsu.edu/fletcher/programs/plantpath/](http://www.ces.ncsu.edu/fletcher/programs/plantpath/) for help on spray schedules and rates.
ORNAMENTALS AND TURF

From: Steve Bambara, Extension Entomologist

Phengodes Glowworms

In the May 28, 2010 issue of the North Carolina Pest News, I mentioned the greatness of fireflies. They are beetles that produce light and eat snails. Running a very close second are Phengodid beetles. This less common group of insects is also known as "glowworms" and these beetles also live in moist organic areas. The females don't fly, but the males do. The larva-like females can produce light. Males (Fig. 10) typically have reduced forewings and dramatic or ornate antennae that they use to locate females. Here is the best part: these beetles are predaceous on certain types of millipedes. Logically, they are most active during the dark hours, and as the Ghost states to Hamlet (Act I, Scene V), "The glow-worm shows the matin to be near, And 'gins to pale his ineffectual fire." Shakespeare may not have known, in 1602, that only the females glow. For more information and photographs of glowworms, see the University of Florida Extension Note at http://edis.ifas.ufl.edu/pdffiles/IN/IN60900.pdf, or reread "Hamlet."

Fluffy Flatid Planthoppers Starting to Jump

Flatid planthopper activity is beginning in some areas with the first appearance of nymphal feeding and fluffy waxy spots appearing on tender shoots of plants such as hosta, crape myrtles, hydrangeas, maples, etc. The nymphs themselves are largely disguised by waxy fluff (Fig. 11). The diagnostic characteristic is that they jump when you touch the fluff. As the summer weeks pass, the waxy residue mass will expand a little. Eventually, the adults (Fig. 12) will leave and only the white wax will be left behind.
Usually there aren't enough over which to be concerned, but if washing them off occasionally with a hose does not disrupt them satisfactorily, insecticidal soap or other suitable insecticide should be adequate. There is a good chance that some county Extension agents will soon hear reports of this “critter” from inquiring gardeners.

**Bagworms**

Bagworms (Fig. 13) hatched a couple weeks ago and are still quite small. Therefore they can be difficult to find although they have constructed tiny bags that can be seen on leaves and needles of infested plants. It is easier to look for the large bags left from last year’s bagworm adults. These will be empty, but are a good indication that small bagworms are likely roaming a plant. This is because female bagworms are flightless and overwinter and lay eggs in their bags on trees and shrubs. Thus, baby bagworms hatch and grow up on the same plant as their mother was on the previous year.

![Small bagworm on cherry laurel. Image by Steve Frank.](http://www.ces.ncsu.edu/depts/ent/notes/O&T/trees/ort081e/ort081e.htm)

Early in the year the best strategy is to hand pick the bags before eggs hatch to prevent infestations. Although it is too late for that now, at this point the small caterpillars have not eaten much or caused much damage. This increases dramatically as they will grow until they easily defoliate branches, causing unsightly ornamental plants. Small caterpillars are also much easier to kill than large ones. This is because they have less body mass to dilute toxins and their protective bags are not as thick. Therefore less toxic chemicals such as *Bt* formulations can be very effective when targeting small caterpillars. Other chemical options that are considered compatible with natural enemies are Acelepryn, TriStar, and spinosad. More information can be found in *Ornamentals and Turf Insect Information Note No. 81* at [http://www.ces.ncsu.edu/depts/ent/notes/O&T/trees/ort081e/ort081e.htm](http://www.ces.ncsu.edu/depts/ent/notes/O&T/trees/ort081e/ort081e.htm).
Recommendations for the use of chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services in this publication does not imply endorsement by North Carolina State University, North Carolina A&T State University or North Carolina Cooperative Extension nor discrimination against similar products or services not mentioned. Individuals who use chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical. For assistance, contact an agent of North Carolina Cooperative Extension.