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Departments of Entomology and Plant Pathology

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CAUTION !

The information and recommendations in this newsletter are applicable to North Carolina and may not apply in other areas.

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In This Week's Issue . . .

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FIELD AND FORAGE CROPS

From: Dominic Reisig, Extension Entomologist

Handling Plant Bugs Post Bloom

Plant bugs are still being found and treated even farther into the Coastal Plain than usual. It appears a lot of our fields treated for plant bugs in the past have experienced pressure once cotton blooms and corn dries down. With that in mind, it will pay to be vigilant, although not over reactive, to plant bugs.

Hopefully you have been monitoring both square retention and sweeping for plant bugs in squaring cotton (see previous article here and here). Once blooming has been under way for one to two weeks, square retention is a less

reliable indicator of possible plant bug feeding due to natural square loss for mostly weather-related reasons. In blooming cotton, the presence of plant bugs and their damage is best assessed by continuing fruit examinations, evaluating dirty blooms, and by the use of a black beat sheet (also called a ground cloth, drop cloth or shake sheet). Plant bug feeding on large squares damages their pollen anthers which subsequently show up as easy-to-spot brownish to black anthers when the flower opens. Although we **do not recommend the use of a dirty bloom threshold**, dirty blooms are easy to spot and may indicate plant bug activity. You can use these dirty blooms as a method to identify when a field should be scouted more intensively.

During the bloom period, the black beat cloth (also called a ground cloth, drop cloth or shake sheet) mentioned previously is probably the best tool to access live plant bug levels. This video covers the proper use of the black beat cloth. Because plant bug may be active, they should be counted quickly. Researchers have found that the small plant bug nymphs are much easier to identify on a black beat cloth than older standard white beat cloth. Scouts should be aware that plant bugs may be more common at field edges or in rank areas. These trends should be noted by scouts, as they are sometimes taken into consideration in making treatment decisions. However, this occurrence also points out the need to sample randomly throughout the cotton field.

Finally, once threshold has been met (two to three plant bugs per beat cloth sample [equal to 5 feet of row]), a treatment action can be made. Please use this previous article as a starting point for insecticide choice. Note that our goal is to get to a point where we can manage stink bugs and plant bugs in tandem (generally somewhere in the third to fifth week of bloom).

From: Steve Koenning, Extension Plant Pathologist, and Ron Heiniger, Extension Agronomist, Crop Science

Southern Corn Rust Update for July 18, 2014

Southern has been found in Greene, Lenoir, Jones, Wilson, Wayne and Johnston counties to date. The current weather forecast with nighttime temperatures in the 60°s and moderate daytime conditions with the likely hood of thunder storms for most of the state provide good conditions for southern corn rust (SCR) to develop. Growers with susceptible hybrids (most hybrids are probably susceptible) need to make a fungicide application as soon as possible. Consult the North Carolina Agricultural Chemical Manual for fungicide recommendations on corn. As for fungicide applications on susceptible hybrids, a combination fungicide would probably be best unless they have sprayed recently for plant health with a strobillurin then a straight triazole may be best so they can use a combination in two weeks.

If July and August temperatures get back into the high 90°s and we have less rainfall, the need for fungicides decreases. Late planted corn, however, may be especially vulnerable depending on how many day corn it is.

Do I have Southern Corn Rust or Common Rust?

Distinguishing southern rust from common rust is not terribly difficult. Common rust can be found on both upper and lower leaf surfaces, whereas southern rust will primarily be on the upper side of the leaf or ear husks and be fairly sparse on the underside of leaves.

You can find the current distribution of southern rust on the IPIPE web site at http://scr.ipmpipe.org/cgi-bin/sbr/public.cgi?host=Corn&pest=southern_corn_rust&language_sel=1. Consult the North Carolina Agricultural Chemicals Manual for fungicides labeled for corn.

Southern corn rust on upper surface of the leaf.

ORNAMENTALS AND TURF

From: Steve Frank, Extension Entomologist

Retailers to Labels Neonic-treated Plants

Scientific American is reporting from Reuters that Home Depot, BJ's Wholesale, and other smaller retailers will soon require vendors to label plants that have been treated with neonicotinoid insecticides. Neonicotinoids are among the most commonly used insecticides on ornamental crops and all crops. This class of chemicals includes imidacloprid, dinotefuran, thiamethoxam, acetamiprid, clothianidin, and others. Controversy around neonics revolves around their potential to harm bees and other pollinators. Like most insecticides, neonic are acutely toxic to bees on contact. Since neo-nicotinoids move systemically within plant tissue, they can also contaminate flower pollen and nectar that bees consume. Though this can negatively affect individual bees, the effects on bee populations are not yet known (and very hard to measure). Information about this was recently reviewed in two extension publications and a scientific paper. Of course, there is no news that these outlets will stop selling neonicotinoids to consumers. Nursery and greenhouse growers who produce crops for retail outlets should start figuring out alternative insecticides as this trend is likely to spread.

Potato Leafhoppers Cause Crinkled Leaves on Maples

This time of year the results of potato leafhopper feeding show up particularly in nurseries. Potato leafhoppers are a native insect, but mimic retired folks because they spend winters in Florida and the

Gulf coast. From there adult potato leafhoppers, *Empoasca fabae* (Harris) (Hemiptera: Cicadellidae) migrate between late April and early June. Female potato leafhoppers oviposit along leaf veins and clustered at the base of leaves near the petiole. Development from egg to adult takes about three weeks depending on temperature resulting in five to six overlapping generations per year.

Adult *E. fabae* are 3 to 3.5 mm long, wedge-shaped, and pale green with a row of six, white spots on their backs, between the wings and head. Injury is caused by salivary phytotoxins injected into the plant phloem during feeding. Damaged leaves can have necrotic margins and severe cupping or stunting referred to as "hopperburn". *E. fabae* feeding on buds and meristems causes loss of apical dominance and a witch's "broom" can develop in which many stems grow from the apical tip of nursery trees and may require extra pruning to improve aesthetics and train a central leader.

Host plant resistance can play an important role in managing *E. fabae* and their damage. In general, red maple cultivars that break bud earliest in spring, including clones selected from northern provenances, will support the lowest numbers of *E. fabae* and sustain the least feeding injury by the conclusion of the growing season. Higher levels of foliar nutrient content, particularly nitrogen, will also predispose maples to injury due to increased oviposition, nymphal survival and development rate so do not go crazy with early fertilization. Mites, aphids, and other pests also appreciate high nitrogen provided by fertilizer.

Potato leafhopper arrival can be monitored using yellow sticky cards deployed above the canopy of young maple crop or in close proximity to outer canopy foliage. These traps should be deployed in early to mid-April across the mid-southern U.S. to detect early season arrival of migratory *E. fabae* adults which corresponds to approximately 591 degree-days. Pyrethroids can be applied bi-weekly starting at peak trap catch. However, many applications of pyrethroids may be needed to reduce *E. fabae* populations and damage. Pyrethroids can also cause outbreaks of other pests like mites by killing predators in the canopy. Alternatively, recent research indicates that systemic neonicotinoid insecticides applied as a drench can provide effective leafhopper control for two years. Systemic insecticide drenches need to be applied before leafhopper arrival and can help protect natural enemies within the nursery. Even though neonics can in some cases induce mite outbreaks I think it is still a less intensive approach in terms of both labor, active ingredient, and effects on non-target organisms.

Potato leafhopper. Photo: Steve L. Brown, University of Georgia, Bugwood.org.

From: Matt Bertone, Extension Entomologist

Hoppers, Hoppers Everywhere!

I continue to get reports of numerous hopper-like insects around North Carolina. These insects, planthoppers, froghoppers and leafhoppers (Auchenorrhyncha: Fulgoromorpha and Cicadomorpha), have been extremely abundant this year and can be found on many species of ornamental and food plants. The most common ones this year generally suck on the xylem, which is water-rich but low in nutrients. Thus, these insects produce a lot of honeydew (sugary water drops out of their anus) which can contribute to the growth of sooty mold. Otherwise, these insects generally do little harm to plants, although leafhoppers (especially sharpshooters in the subfamily Cicadellinae) can transmit the bacterial scorch/Pierce's disease pathogen, *Xylella fastidiosa*. The following are some photos showing the most common types:

- Planthoppers (Fulgoroidea) -

Flatidae

Nymphal *Metcalfa pruinosa*, the citrus flatid (Flatidae), on a stem. Flatid planthoppers secrete a waxy field around them and rest in the middle, the barrier sometimes encompassing a great area but always housing one nymph in the center. Here the nymph was encouraged to move.

An adult *Metcalfa pruinosa* is grayish-blue with an orange eyes and black spots. In high numbers they can be a pest, but do not often attain such numbers.

This pale green flatid planthopper, *Flatormenis proxima*, is also common and its young are very similar to the one above.

Acanaloniidae

Nymphs of acanaloniid planthoppers (*Acanalonia*) are hump-backed and usually have a tuft of wax fibers coming from their tail end. They often hop when threatened, but otherwise walk along stems of plants.

Adult acanaloniid planthoppers are leaf-like and similar to flatids, but have wings that are completely reticulate, unlike flatids whose wings are bordered by rectangular cells (see above).

- Spittlebugs and froghoppers (Cercopoidea) -

Cercopidae s.l.

Nymphs of spittlebugs and froghoppers reside in a frothy mass of bubbles they create from gut secretions. Here they try to hide from predators while they suck on plant juices. This one is on a juniper.

Adult spittlebugs and froghoppers are usually shiny and readily hop when disturbed. Here is an adult clastopterid spittlebug. The two-lined spittlebug (*Prosapia bicincta*) is very common in North Carolina, where its young feed on grasses.

- Leafhoppers (Cicadellidae) -

Two sharpshooter nymphs (Proconiini, probably *Oncometopia orbona*) feeding on a new shoot of holly (*Ilex*). A drop of honeydew can be seen coming from the anus of the one on the right. Sharpshooters get their name from their constant ejecting of this liquid in long jets.

An adult broad-headed sharpshooter (*Oncometopia orbona*). These and their close relatives are among out largest leafhoppers.

The glassy-winged sharpshooter (*Homalodisca vitripennis*) is a famous pest, often implicated in trans-mission of *Xylella fastidiosa*. The white patches on the wings of this adult female are made up of microscopic waxy rods called brochosomes. They are kicked onto the eggs to apparently protect them from predators and parasites.

***Cuerna costalis* is another pretty sharpshooter commonly found here in North Carolina on many plants.**

Unlike the previous large (~1 cm) sharpshooters, many are small and brightly colored such as this common *Graphocephala versuta* (~5 mm long).

And now you should be able to identify all the nymphs in this photo (on one shoot of holly)!

From: Mike Munster, Plant Disease and Insect Clinic, and Steve Frank, Extension Entomologist

Tomato Spotted Wilt Virus in Chrysanthemum

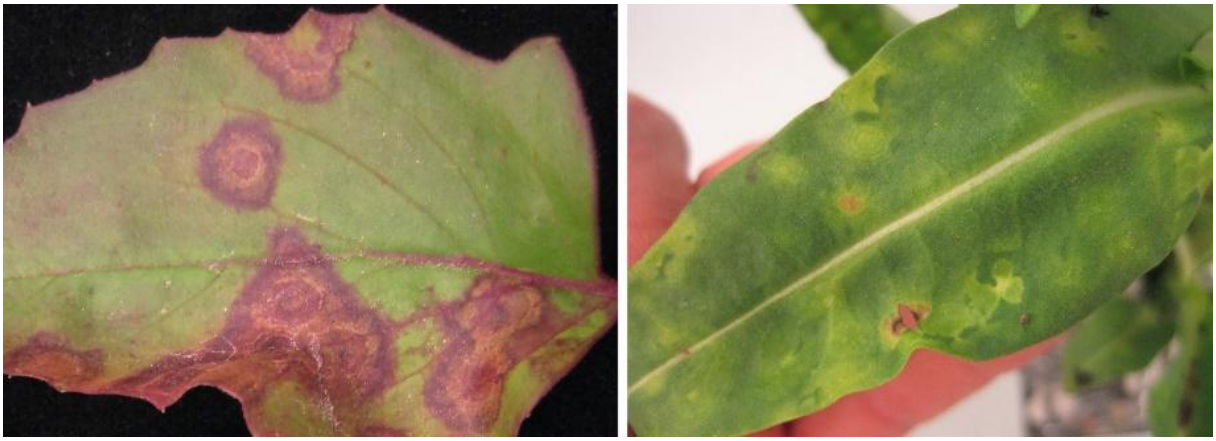
A greenhouse-grown chrysanthemum was received in the Plant Disease and Insect Clinic on July 10, 2014, and diagnosed with *Tomato spotted wilt virus* (TSWV) by Emma Lookabaugh. Symptoms consisted of dark leaf spots, lateral curling of the leaves at some of the spots, and at least one stem lesion. This is a common disease, but has not been diagnosed on chrysanthemum in North Carolina recently.

TSWV symptoms on *Chrysanthemum*.

Tomato spotted wilt occurs on hundreds of field and crops, including peanut, tobacco, tomato, pepper, and potato, as well as on a wide range of ornamentals. In the last 6 1/2 years, we have diagnosed it on the following ornamentals from commercial sources: African marigold, angel-wing begonia, calla lily, *Cyclamen*, *Gaillardia*, *Gerbera*, *Senecio confusus*, *Lisianthus*, *Lobelia*, Madagascar periwinkle, *Sedum*, and Stoke's aster. Its sister virus, INSV, is a frequent problem on many ornamentals.

A different sort of TSWV symptom on mum, from a different sample.

Both TSWV and INSV can cause a wide range of symptoms, including mottling, ringspots, stunting, and necrotic leaf and stem lesions. Both are members of the genus *Tospovirus* and are transmitted by minute insects called thrips*. One curious fact about this transmission is that the virus is acquired by the insect during its larval development, but then the insect itself becomes permanently infected. Of course the virus can be brought into a greenhouse with infected plants, and could be perpetuated through vegetative propagation.



Mottling and ringspot symptoms on TSWV-infected *Senecio* (left) and *Stokesia* (right).

These strategies against TSWV (and INSV) are recommended for greenhouse flower production:

- Avoid growing vegetable transplants and flowers in the same greenhouse, and avoid growing plants of different ages together.
- Screen greenhouse vents and air intakes to exclude thrips from entering the greenhouse.
- Control weeds in and around the greenhouse. Many weeds are susceptible to tospoviruses and can serve as reservoirs of virus and thrips.

- Monitor greenhouses for thrips activity using blue or yellow sticky cards, with the top 2/3 of the card placed above the plant tops. Use two cards per 5000 sq. ft. of greenhouse area.
- Use insecticides to manage thrips populations when necessary. Remove flowers from plants before treatment since the interior of flowers rarely get adequate coverage. It is important to note that some thrips populations have developed insensitivity to commonly used insecticides. In addition, no insecticide can completely eliminate thrips. Utilize the most effective chemistries wisely by rotating insecticides by mode of action (IRAC class) with each application, or at least with every generation of thrips. Always follow label directions and check that products are labeled for the intended crop. Details on insecticides for thrips management can be found in the North Carolina State University Information Note on western flower thrips and the University of Florida's thrips management information.

If you suspect you have infected plants, we recommend having the diagnosis confirmed by a laboratory. Large growers with recurring problems may want to keep a supply of the simple lateral-flow ELISA tests on hand. Suppliers** include AC Diagnostics and Agdia. There is no cure, so all infected plants must be removed and destroyed. The potting mix of these plants should also be discarded, as this is where the thrips vectors pupate. Eliminate old stock plants as these are often sources of thrips and viruses.

More information about TSWV in the following crops is also available:

- peanut
- tobacco
- tomato

* Grammatical footnote: The word thrips is both singular and plural.
** Mention of trade names and companies does not imply endorsement by North Carolina State University or the Plant Disease and Insect Clinic.

INSECT TRAP DATA

From: Arthur R. Bradley, Jr., County Extension Director, Edgecombe County

Light Trap Data from Edgecombe County

	Number of Adult Insects								
	West Edgecombe			Coakley			Lawrence		
Date	CEW	BS	GS	CEW	BS	GS	CEW	BS	GS
July 11	-	-	-	0	3	6	-	-	-
July 14	0	1	0	1	0	1	-	-	-

Abbreviations: CEW = corn earworms; BS = brown stink bugs; GS = green stinks bugs

From: Alan A. Harper, Lenoir County

Light Trap Data from Lenoir County

June

	Number of Adult Insects						
Date	HW	CEW	ECB	AW	AWC	GSB	BSB	TBW
June 3	---------- Put up light trap ----------							
June 4	0	0	0	0	0	2	1	0
June 5	0	0	0	0	0	0	0	0
June 6	0	0	0	0	0	2	0	0
June 7	0	0	0	0	0	0	0	0
June 8	0	0	0	0	0	0	0	0
June 9	0	0	0	0	0	0	0	0
June 10	0	0	0	0	0	3	0	0
June 11	0	0	0	0	0	1	0	0
June 12	0	0	0	0	0	1	1	0
June 13	0	1	0	0	1	0	0	0
June 14	0	0	0	0	0	0	0	0
June 15	0	1	0	0	1	0	0	0
June 16	0	0	0	0	0	0	0	0
June 17	0	1	0	0	1	0	0	1
June 18	0	0	0	0	0	0	0	0
June 19	0	0	0	0	0	0	0	1
June 20	0	2	0	0	0	0	0	0
June 21	0	2	0	0	1	0	0	0
June 22	0	1	0	0	0	1	0	0
June 23	0	0	0	1	1	0	0	0
June 24	0	1	0	0	0	0	0	1
June 25	0	3	0	2	1	1	0	0
June 26	0	1	0	1	0	1	0	0
June 27	0	1	0	0	0	0	0	0
June 28	0	2	0	1	1	0	0	0
June 29	0	0	0	0	2	0	0	0
June 30	0	0	0	0	1	0	0	1

July

	Number of Adult Insects						
Date	HW	CEW	ECB	AW	AWC	GSB	BSB	TBW
July 1	0	2	0	0	1	0	0	0
July 2	0	1	0	0	0	0	0	0
July 3	0	1	0	0	1	0	0	1
July 4	0	2	0	0	0	0	0	0
July 5	0	1	0	1	0	0	0	0
July 6	0	1	0	0	0	0	0	1
July 7	0	0	0	0	0	0	0	0
July 8	0	0	0	0	0	0	0	0
July 9	0	0	0	0	0	1	0	0

July 10	0	0	0	0	0	1	0	0
July 11	0	2	0	0	0	2	0	0
July 12	0	1	0	1	0	1	0	0
July 13	0	0	0	0	0	0	0	0
July 14	0	0	0	0	0	0	0	0
July 15	0	1	0	0	0	0	1	1
July 16	0	1	1	0	0	0	0	0
July 17	0	4	0	0	0	1	0	0
July 18	0	1	0	0	2	1	0	0

Abbreviations: HW = hornworms; CEW = corn earworms; ECB = European corn borers; AW = true armyworms; AWC = armyworm complex; GSB = green stink bugs; BSB = brown stink bugs; TBW = tobacco budworms

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.