NC STATE UNIVERSITY COLLEGE OF AGRICULTURE & LIFE SCIENCES

North Carolina Pest News

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 . . .

See current and archived issues of the *North Carolina Pest News* on the Internet at: http://ipm.ces.ncsu.edu/2014-north-carolina-pest-news-archive/

ANNOUNCEMENTS AND GENERAL INFORMATION

Field Days Scheduled

The Sorghum Field Day begins at 8:30 a.m. on Thursday, August 14, 2014, and the Corn Aflatoxin Field Day starts at 1:00 p.m. The field days include a joint luncheon at 11:30 a.m. Both field days will be held at the Upper Coastal Plain Research Station, Rocky Mount, NC.

FIELD AND FORAGE CROPS

From: Dominic Reisig, Extension Entomologist

Stink Bug Management in Cotton

Stink bugs are tearing through cotton that has bolls, although they are spotty in some areas. Both plant bugs and especially stink bugs and their damage vary widely across North Carolina, **but are generally at much higher levels than we've seen during the past few years**. They were also high in 2013. Our "major" bollworm moth flight in central and northern North Carolina is picking up this week and should during the week based on typical timing, development in corn, and what I am picking up in pheromone traps. This flight will likely be very heavy based on numbers I have seen in corn.

Figure 1. Warty growth on the inner boll wall resulting from stink bug injury.

Count any stained lint or warty growths as stink bug injury (Figure 1). Simple punctures without warts should not be counted.

Scout for stink bugs by splitting and examining the inside walls of 1-inch diameter bolls for warts and/or stained lint (any amount of even subtle injury is scored as a damaged boll). Be sure to observe the 10% injured boll threshold level during weeks 3 to 5 of the bloom period. Please download either the Android

or iPhone Cotton Stink Bug Decision Aid App for additional information about stink bug scouting, identification, injury and other information. **Search for "stink bug decision" in the iTunes app store or using Google play**. You can also see an online version here.

If present in moderate to high levels, stink bug injury can result in significant yield losses. In making spray/no-spray decisions, remember that the cost of the treatment and insecticide typically translates into the value of 10 to 12 pounds of lint. Insecticides targeted for stink bugs generally do a good job with plant bugs. Although Bidrin and Bidrin XP II offer excellent control of stink bugs and plant bugs, be aware of these products' 6-day reentry interval. Some screening results are below (Figure 2).

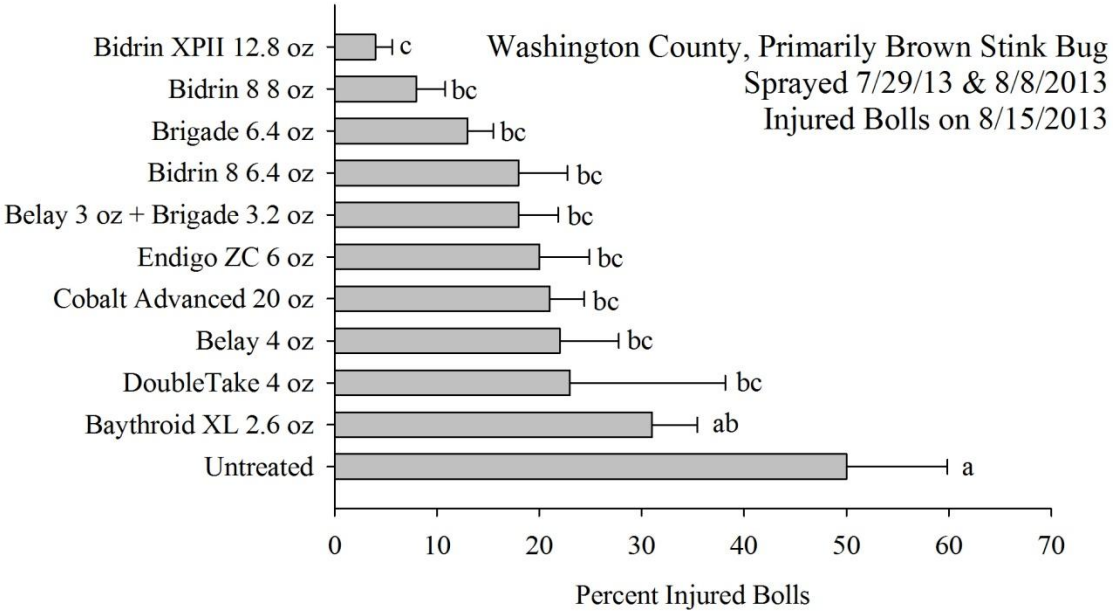

Figure 2. Insecticide screening results on brown stink bug in cotton 2013.

Where Are the Kudzu Bugs?

We have rapidly become accustomed to dealing with kudzu bugs in our soybeans throughout the season. So the question is, "where are they now?"

I have been slow to join the bandwagon, but am now on board. I think the cold winter has knocked our populations back. Many folks have noted dead bugs in overwintering spots. Furthermore, spots where kudzu bugs are showing up now are near traditional "hot spots" where they have overwintered. Because of this fact, I think our greatest chance for kudzu bug infestations are going to be localized around these traditional hot spots. You probably shouldn't expect kudzu bugs to show up at threshold levels in new spots this year.

Believe it or not, the kudzu bug migration into soybeans is in full swing. It is really wimpy compared to previous years. From what I can gather, our population levels are 10 to 20 times lower than last year. Right now, kudzu bugs are moving into soybeans, mating and laying eggs. I have noticed nymphs within the past weeks. We can expect a few fields to hit threshold within a couple weeks. If you do not find kudzu bugs at **one nymph per sweep (one per "swoosh" of the net)**, you do not need to treat.

It is especially critical to use a sweep net in situations like this year. We can expect most of our fields at risk for kudzu bug (which are few) to be borderline situations. Many fields in the past were obvious treatment situations. Those fields were so full of kudzu bugs that you could smell them through the AC system pulling up to the field. This year, you will find one nymph per sweep a lot easier and quicker using the sweep new than you will walking into a field and parting the canopy. Small hairy green nymphs blend in with the stems and will be difficult to spot. **Most fields won't need to be treated for this insect!**

Midseason Soybean Insects

Because we won't be dealing with many kudzu bugs this season (see article), we need to focus our efforts on the other pests that are around. These include the corn earworm/tobacco budworm, stink bugs and defoliators (loopers, armyworms, etc.).

The first pest we will likely have to manage is corn earworm/tobacco budworm. These insects can defoliate, but are more serious pests of seeds forming in the pod. They should never be sprayed at flowering, but should be controlled when pods are present (especially at R4 to R7). Thresholds vary with sampling method and row spacing; I suggest using the earworm/budworm online threshold calculator as a guide for treatment. Corn earworm can usually be controlled with pyrethroids - unless there are resistant worms present. Resistant earworms and tobacco budworm should be controlled with a worm-specific insecticide (such as Belt, Blackhawk, Prevathon or Steward). Earworms and budworms are very difficult to tell apart without specialized training. I recommend a pyrethroid as a first shot. If this fails, switch to one of the worm-specific materials listed above.

Stink bugs move in an out of soybeans throughout the season. You might notice a lot of them when soybean is flowering (R1-R2), but they do not cause yield loss at this point. Focus your control when the seed is forming (R5-R6). Seed producers should also treat at R7 to avoid quality loss. Like corn earworm/tobacco budworm, the thresholds vary with sampling method and row spacing. You can use the stink bug online threshold calculator to figure out when to treat. Green stink bug can be managed with a pyrethroid. Add in something like acephate (Orthene) or use acephate alone to kill browns.

Defoliators like soybean loopers and armyworms are more of a problem later on in the season. There are two reasons for this. One is that many are migratory pests that do not overwinter here. So they can build as the season progresses. The second is that we often treat with a pyrethroid midseason. This is to manage things like earworms and stink bugs and is often needed. The disadvantage is that we knock out all

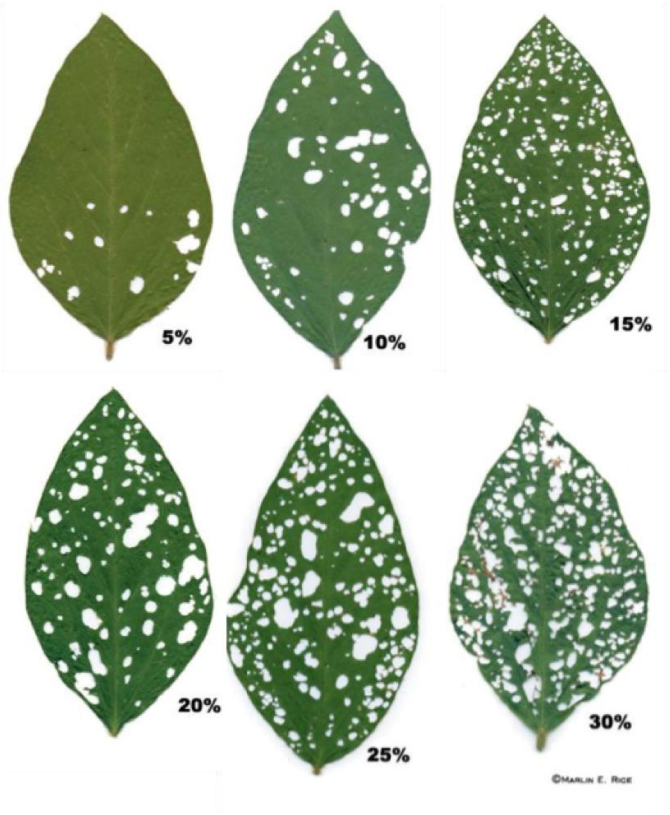

Figure 1. Image from Iowa State University Extension.

the beneficial good-guy insects, releasing these worms to eat foliage. You should only treat for defoliators when the canopy loss is 15% after bloom (Figure 1). For soybean looper, beet armyworm, and corn-strain fall armyworm, use a worm-specific insecticide (such as Belt, Blackhawk, Prevathon or Steward).

FRUIT AND VEGETABLES

From: Hannah Burrack, Extension Entomologist

Mealybugs in North Carolina Grapes

During the last two weeks, there have been several reports of mealybugs in wine grape vineyards. Mealybugs are sucking insects, the females of which are often coated with white wax. As a by-product of their feeding, mealybugs produce a sweet, sticky liquid called honeydew, which can contaminate fruit itself or can become a medium for the growth of sooty mold, a name given to several fungi that produce a black mat on plant surfaces.

Grape cluster with mealybugs and sooty mold. Photo: Hannah Burrack.

Grape mealybug on the surface of a fruit. Photo: Hannah Burrack.

Identifying the problem

Growers that have vineyards affected by mealybugs should confirm what species of mealybugs they have. This is very important for several reasons. First, we know we have one species, the grape mealybug, in North Carolina, but there are three other species that may also be present on grapes in other parts of the U.S. None of these other species have been from the North Carolina. If we are dealing with a new species for the area, we need to know. Second, one of these other species, the vine mealybug, is a very efficient vector of grape leafroll disease. The other mealybugs are not as efficient and are more of a problem as primary pests in clusters. Grape leafroll disease is present in North Carolina, but we do not know if many of the infections are due to infection at plant source and how many infections are due to local spread.

Because mealybugs have been relatively rare in North Carolina, our assumption has been that much of the grape leafroll disease we see originated at the plant source. To get a correct species identifica-

tion, growers should contact their local county horticulture Extension agent to assist with proper collection of samples. Samples should be sent into the North Carolina State University Plant Disease and Insect Clinic, which is the fastest means of processing them. Physical samples, rather than photographs are strongly recommended, as mealybugs must be observed under a microscope to determine which species they are.

Samples should consist of infested plant tissue (leaves or fruit) with mealybug adults present. These samples should be stored in sealed containers and shipped to the North Carolina State University Plant Disease and Insect Clinic. Ice packs can be included to keep insects from overheating.

Taking action to manage mealybugs

Mealybug management recommendations are available in the Southern Region Small Fruit Consortium Bunch Grape IPM Guide. You will notice that these recommendations start at bud swell – there is a good reason for this. Mealybugs are best managed early in the season or following harvest. This is because early in the year, mealybugs are moving from their overwintering location to new growth, and post harvest they are moving back to their overwintering sites. This time of year, in late summer, mealybugs are likely sheltered in closed clusters and insecticides directed at them now are unlikely to provide acceptable control because they cannot penetrate clusters. A strategy for dealing with unmanaged, late season mealybug populations is removing infested, sooty mold covered clusters so they are not harvested and to minimize spread. Note where in the vineyard these affected vines are and target them for treatment post harvest and in the spring. Systemic insecticides applied to soil early in the growing season often provide good mealybug control as do a range of other materials.

More information

Bunch Grape IPM Guide – Southern Region Small Fruit Consortium

Grape mealybugs – UC IPM Program

Vine mealybug – UC IPM Program

(Originally posted at: http://entomology.ces.ncsu.edu/2014/07/mealybugs-in-north-carolina-grapes/)

From: Lina Quesada-Ocampo, Extension Plant Pathologist

Basil Downy Mildew Outbreaks in North Carolina

Several basil growers, homeowners, and garden centers have reported outbreaks of basil downy mildew to the Vegetable Pathology Lab at North Carolina State University. Over 100 outbreaks across the United States have been reported to a tracking system set up by Cornell University in a Google document. Additional information for this effort can be found on a basil downy mildew information website created by Dr. Margaret McGrath. This year in North Carolina, we have confirmed outbreaks in Wake, Chatham, New Hanover, Orange, Mecklenburg, and Johnston counties.

Figure 1. Sporangiophore and sporangia of *Peronospora belbahrii* (Saunia Withers, North Carolina State University Vegetable Pathology Lab).

Figure 2. Symptoms of basil downy mildew, note browning of leaves (Saunia Withers, North Carolina State University Vegetable Pathology Lab).

Figure 3. Basil downy mildew sporulating on the abaxial side of a leaf (Saunia Withers, North Carolina State University Vegetable Pathology Lab).

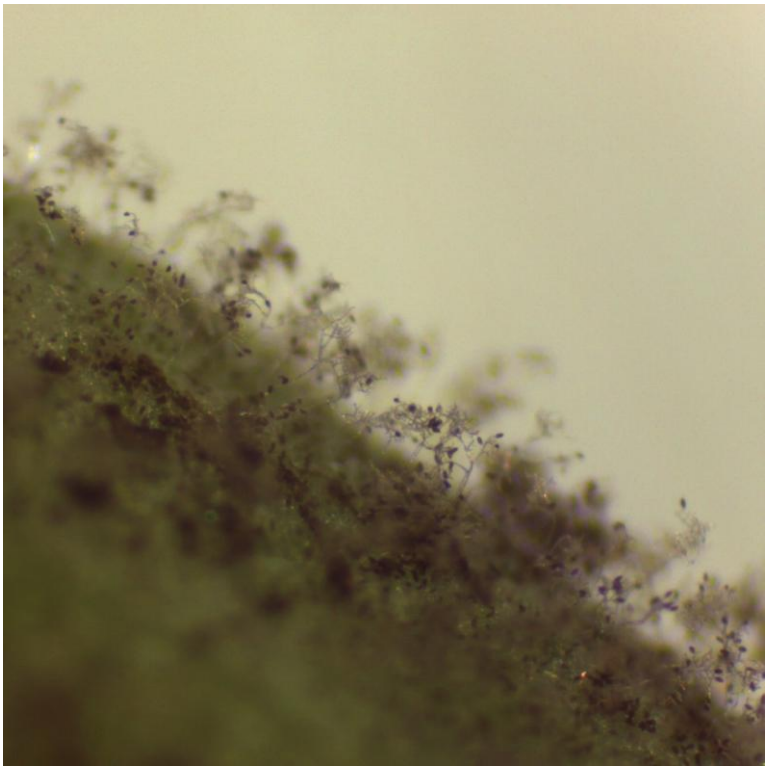

Figure 4. *Peronospora belbahrii* sporangiophores bearing sporangia (Saunia Withers, North Carolina State University Vegetable Pathology Lab).

Downy mildew has become a yearly challenge for basil growers since 2008. It has been reported in several states and much like cucurbit downy mildew, it comes to North Carolina every year once environmental conditions are favorable for disease. Basil downy mildew is caused by the oomycete pathogen *Peronospora belbahrii* (Figure 1). Symptoms of the disease can be mistaken by nutritional problems since they manifest as a yellowing or browning of leaves (Figure 2). However, if the abaxial side of the leaf is inspected, profuse, dark sporulation will be covering the surface of infected leaves (Figure 3). Usually, the sporulation is obvious enough that it can be seen without a microscope or hand lens, however, when you take a closer look at the sporulation on the leaf with a hand lens or dissecting microscope, you will be able to see the typical sporangiophore structures bearing sporangia found in downy mildew pathogens (Figure 4).

Peronospora belbahrii produces airborne spores and can also be seedborne, and like other oomycetes, such as *Phytophthora* and *Pythium*, this downy mildew pathogen thrives in humid conditions. Using pathogen-free seed is essential to prevent basil downy mildew and if the disease becomes established in your operation, consider removing infected plants to eliminate them as a source of inoculum. Reducing moisture by using drip irrigation vs. overhead irrigation, watering early in the mornings so foliage dries quickly, and allowing enough space between plants to increase air circulation will also help control this pathogen.

While resistant varieties are not yet available, some varieties have been found to be less susceptible. Red basil ('Red Leaf' and 'Red Rubin'), Thai basil (Queenette'), lemon basil ('Lemon', 'Lemon Mrs. Burns', 'Sweet Dani Lemon Basil'), lime basil ('Lime'), and spice basil ('Spice', 'Blue Spice', 'Blue Spice Fil', 'Cinnamon'), presented less severe downy mildew symptoms in a previous study.

Application of fungicides is the most effective strategy to control basil downy mildew. Conventional products labeled for basil with active ingredients (a.i.) that have shown efficacy in controlling downy mildew include: Ranman (a.i. cyazofamid, FRAC code 21), Revus (a.i. mandipropamid, FRAC 40), Quadris (a.i. azoxystrobin, FRAC 11, not for greenhouse use), and ProPhyt (a.i. phosphorous acid, FRAC 33). Organic products including Actinovate (a.i. *Streptomyces lydicus*), Double Nickel 55 (a.i. *Bacillus amyloliquefaciens*), MilStop (a.i. potassium bicarbonate), Regalia (a.i. *Reynoutria sachalinensis*), Trilogy (a.i. neem oil), and OxiDate (a.i. hydrogen dioxide) are labeled for basil, however, efficacy data does not show high level of control with these products. Regardless of the product, it is important to apply them in a way that you achieve good coverage on both sides of the foliage and that you apply the products before disease begins. Fungicides are most effective when applied in a preventive, weekly spray program.

With the arrival of basil downy mildew in North Carolina this year, we encourage commercial growers and homeowners alike to be diligent in checking basil leaves for downy mildew. If you think you have downy mildew in your basil please contact your local Extension agent and send photos and/or physical samples to the Plant Disease and Insect Clinic so we can assist you with diagnosis of the disease. If downy mildew is confirmed in your samples by an expert, please consider making a report to warn others that the pathogen is in the area. The report can be anonymous so that only the county information is provided.

Follow us on Twitter and Facebook for more vegetable disease alerts.

INSECT TRAP DATA

From: Richard W. Rhodes, County Extension Director, Bertie County

Light Trap Data from Bertie County

	Windsor		Hexlena TNT		Woodard	
Date	CEW	GSB	CEW	GSB	CEW	GSB
July 28	5	6	4	27	-	-
July 30	2	0	2	3	2	1

Abbreviations: CEW = corn earworms; GSB = green stink bugs

From: Mike Carroll, Agricultural Extension Agent, Craven County

Light Trap Data from Craven County

	Number of Adult Insects				
Date	BW*	GSB	BSB	AW	HW
July 16	------ Date Initiated -------				
July 18	13	0	0	0	1
July 21	28	0	0	0	2
July 23	30	1	0	0	1
July 25	18	1	0	0	1
July 28	105	1	0	0	2
July 30	76	1	0	0	1
August 1	136	1	0	2	1

Abbreviations: BW* = bollworms; GSB = green stink bugs;
BSB = brown stink bugs; AW = true armyworms;
HW = tobacco hornworms

*Bollworms reflect corn earworm and tobacco budworm counts

Cooperator: Cove City Fertilizer

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	BSB	GSB	CEW	BSB	GSB	CEW	BSB	GSB
July 11	-	-	-	0	3	6	-	-	-
July 14	0	1	0	1	0	1	-	-	-
July 16	0	0	0	0	0	3	-	-	-
July 18	0	0	0	-	-	-	-	-	-
July 21	0	1	0	-	-	-	-	-	-
July 23	1	0	0	5	0	1	-	-	-
July 25	1	0	1	8	2	6	-	-	-
July 28	14	1	1	15	0	1	-	-	-
July 30	5	0	0	-	-	-	-	-	-
August 1	12	0	0	43	0	1	-	-	-

Abbreviations: CEW = corn earworms; BSB = brown stink bugs; GSB = green stinks bugs

From: Arthur Whitehead, Jr., County Extension Director, Halifax County

Light Trap Data from Halifax County

	Hobgood		
Date	CEW	ECB	HW
July 24	7	0	0
July 26	19	0	0

Abbreviations: CEW = corn earworms; ECB = European corn borers; HW = hornworms

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
July 19	1	1	0	0	0	1	0	0
July 20	0	2	0	0	1	2	0	0
July 21	0	7	1	0	1	6	0	0
July 22	1	8	0	0	2	3	0	0
July 23	0	9	1	0	0	3	1	1
July 24	0	11	0	0	0	3	3	0
July 25	0	8	0	0	4	2	1	0
July 26	0	26	0	0	0	5	0	0
July 27	0	18	0	0	2	7	2	0
July 28	0	20	0	1	3	8	7	0
July 29	0	26	0	1	1	2	0	0
July 30	0	36	0	0	1	0	0	0
July 31	0	52	0	1	1	6	0	0

August

	Number of Adult Insects							
Date	HW	CEW	ECB	AW	AWC	GSB	BSB	TBW
August 1	0	36	0	2	0	7	0	1

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

From: Craig Ellison, Agricultural Extension Agent, Northampton County

Light Trap Data from Northampton County

	Number of Adult Insects								
	Galatia			Seaboard			Woodland		
Date	CEW	GSB	BSB	CEW	GSB	BSB	CEW	GSB	BSB
July 26	-	45	2	-	-	-	-	-	-
July 29	7	15	1	4	6	0	-	-	-
July 30	0	0	0	-	-	-	-	-	-
July 31	0	0	0	2	1	0	-	-	-
August 1	0	-	-	-	-	-	1	0	0

Abbreviations: CEW = corn earworms;
GSB = green stink bugs; BSB = brown stink bugs

From: Robeson County

Light Trap Data from Robeson County

	Number of Adult Insects					
Date	CEW	ECB	AWC	AW	GSB	BSB
July 29	43	-	1	-	3	0
July 30	24	2	0	1	0	0
August 1	41	0	0	-	1	0

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

From: Scotland County Extension Center

Light Trap Data from Scotland County

	Number of Adult Insects														
	Gibson					John's					Laurinburg				
Date	CEW	ECB	HW	TBW	AW	CEW	ECB	HW	TBW	AW	CEW	ECB	HW	TBW	AW
July 25	5	2	0	-	0	-	-	-	-	-	-	-	-	-	-
July 28	4	4	0	288	0	5	0	0	559	0	2	1	0	55	-

Abbreviations: CEW = corn earworms; ECB = European corn borers;
HW = hornworms; TBW = tobacco budworms; AW = true armyworms

From: Washington County

Light Trap Data from Washington County

	Number of Adult Insects	
Date	CEW	GSB
July 15	1	1
July 18	4	2

July 25	3	-

Abbreviations: CEW = corn earworms;
GSB = green stink bugs

From: Tyler Whaley, Agricultural Extension Agent, Wayne County

Light Trap Data from Wayne County

	Number of Adult Insects			
	Goldsboro			
Date	CEW	GSB	BSB	HW
July 7	-	2	-	-
July 9	-	1	-	-
July 11	-	1	-	-
July 14	-	2	-	-
July 16	4	6	2	-
July 18	1	2	1	-
July 21	5	5	1	2

Abbreviations: CEW = corn earworms; GSB = green stink bugs;
BSB = brown stink bugs; HW = hornworms

From: Norman E. Harrell, Agricultural Extension Agent, Wilson County

Light Trap Data from Wilson County

	Number of Adult Insects														
	Kenly					Fountain					Pender's				
Date	CEW	ECB	GSB	BSB	HW	CEW	ECB	GSB	BSB	HW	CEW	ECB	GSB	BSB	HW
July 23	1	-	1	0	-	12	0	-	-	1	-	-	-	-	-
July 25	-	-	-	-	-	20	5	-	-	7	-	-	-	-	-
July 26	3	0	-	-	1	-	-	-	-	-	-	-	-	-	-
July 28	3	0	-	-	3	5	-	29	5	3	-	-	-	-	-
July 30	2	-	0	0	-	-	-	-	-	-	1	-	0	0	-
August 1	3	-	0	0	-	6	-	10	0	-	9	-	0	0	-

Abbreviations: CEW = corn earworms; ECB = European corn borers;
GSB = green stink bugs; BSB = brown stink bugs; HW = hornworms

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.