



Male gypsy moth



NCDA & CS
Plant Industry Division
Annual Report
2011 – 2012



Table of Contents

NCDA & CS INFORMATION.....	3
Contact Information.....	4
INTRODUCTION	5
ADMINISTRATIVE AND SUPPORT SERVICES SECTION	6
PLANT PROTECTION SECTION	7
Apiary Inspection Program.....	8
Biological Control Programs.....	9
Cooperative Agricultural Pest Survey (CAPS) Program	26
Entomological Programs	31
Nursery Certification Program	43
Plant Conservation Program	45
Plant Pathology Program	50
Regulatory Weed Program.....	55
SEED AND FERTILIZER SECTION	76

North Carolina Department of Agriculture and Consumer Services



Steve Troxler
Commissioner of Agriculture
Chairman, Board of Agriculture

Mission Statement

The mission of the North Carolina Department of Agriculture and Consumer Services is to provide services that promote and improve agriculture, agribusiness, and forests; protect consumers and businesses; and conserve farmland and natural resources for the prosperity of all North Carolinians.

NCDA&CS Key Initiatives:

- **Maintain and restore forests in decline**
- **Implement online food firms database**
- **Expand use of precision agricultural technologies**
- **Implement State Fair Study Commission recommendations**
- **Distribute NC fruits and vegetables to the state's schools**
- **Implement NC farmer's market awareness campaign**
- **Implement strategies related to the Southeastern NC Ag Center**
- **Implement AgWrap**
- **Redesign NCDA&CS' website**

North Carolina Board of Agriculture



Maurice Berry
General Farming



William Johnston
General Farming



C. Osmond Kearney
Livestock and Dairy



Kirk Mathis
Poultry



Bert Pitt
General Farming



Mark Peters
Marketing-Green
Industry



Jeffrey Turner
Tobacco



Casey Armstrong
General Farming-
Equine



Jean Boseman
Peanuts



Larry Sampson
Cotton

North Carolina Department of Agriculture and Consumer Services

Commissioner and Executive Staff

Steve Troxler	Commissioner	(919) 707-3000
N. David Smith	Chief Deputy Commissioner	(919) 707-3033
Howard Isley	Assistant Commissioner	(919) 707-3009
Dr. Richard Reich	Assistant Commissioner	(919) 707-3015
David McLeod	Assistant Commissioner	(919) 707-3010

Director and Administrative Staff

Gene B. Cross	Division Director	(919) 707-3732
Phil Wilson	Section Administrator	(919) 707-3753
Danny Turner	Section Administrator	(919) 707-3735
Cheri Toner	Administrative Officer II	(919) 707-3731

N.C. Department of Agriculture and Consumer Services-Plant Industry Division

Plant Industry Division Web Site: <http://www.ncagr.gov/plantindustry/>

Facilities:

Plant Industry Division-Administrative Offices and N.C. Seed Laboratory

Physical Address: 216 West Jones Street, Raleigh, NC 27603

Mailing Address: 1060 Mail Service Center, Raleigh, NC 27699-1060

Support Operations

Physical Address: 1013 Blair Drive, Raleigh, NC 27603

Mailing Address: 1060 Mail Service Center, Raleigh, NC 27699-1060

Biological Control Services

Physical Address: 950 East Chatham Street, Cary, NC 27511

Mailing Address: 1060 Mail Service Center, Raleigh NC 27699-1060

Witchweed Program Facilities:

Physical Address: 1008 South West Blvd., Clinton, NC 28328

Mailing Address: Same as above

Physical Address: 450 Smith Circle, Room 108, Elizabethtown, NC 28337

Mailing Address: Same as above

Physical Address: Agri-Expo Center, 301 Mountain Drive, Room 204, Fayetteville, NC 28306

Mailing Address: Same as above

Physical Address: O. P. Owens Agriculture Center, 405 Country Club Drive, Lumberton, NC 28358

Mailing Address: Same as above

Crossnore Plant Inspection Station:

Physical Address: 6111 Linville Falls Hwy., Crossnore, NC 28616

Mailing Address: Same as above



True Opportunities for Service

In the next pages, you will have an opportunity to look back on what was a very eventful year for the NCDA&CS, Plant Industry Division. Given human nature, there is a tendency for each of us to take on a nostalgic view and to focus on the “good old days.” However, through these reflections on the Division’s challenges and accomplishments, my sincere hope is that we are better able to look forward to future opportunities for Divisional staff---opportunities that enhance our ability to implement consistent and effective regulatory programs and to effectively serve the citizens of North Carolina.

During this fiscal year, the Plant Industry Division not only responded to change, but we jointly worked to make positive change occur in our Division. With the retirement of our entire leadership team—Seed and Fertilizer Administrator, Plant Pest Administrator and Administrative Officer II positions, we jointly pulled together to ensure our industry partners were not directly impacted during the interim periods. Given other Divisional retirements at the supervisor and field staff levels, each of you continued to focus on Divisional initiatives. A major renovation initiative was completed with the Old Health Building. With a strong commitment from Commissioner Troxler and his executive leadership, building updates included a new heating and air conditioning system, new carpet, new paint, along with significant renovations to our N.C. Seed Laboratory. The Old Health Building is now a clean and productive work environment of which we are extremely proud.

The work accomplishments outlined in this report are a tribute to continued dedication and commitment of Plant Industry Division Staff. Each of you, in some way, stepped up to make a difference in the Division and as such, the NCDA&CS, Plant Industry Division continues to serve as a model for other state partners.

As we look forward to the new fiscal year, there will be a number of true opportunities for service. My sincere hope is that each of you will plug in and contribute to the best of your ability.

Gene B. Cross
Director
NCDA&CS-Plant Industry Division

Accomplishments: Administrative and Support Services Section

The NCDA&CS, Plant Industry Division state-appropriated budget for 2011-12 was \$4,898,188 and included a total staff of 91. For this fiscal year, there were significant increases in the phytosanitary fees collected by field staff. The Plant Industry Division continued its work with other organizations, both public and private, with the administration of cooperative agreements. For the period, just over \$2 million in cooperative agreements was received and administered for work with joint plant pest regulatory programs.

As noted, there were a number of key retirements, resulting in recruitment efforts to fill these key roles. With the retirement of Eddie Martin, Mr. Danny Turner was selected as the new Seed and Fertilizer Administrator. Danny has an extensive background within the Seed and Fertilizer Section, having served as the Field Services Supervisor for a number of years. In addition to his technical background, Danny has an extensive background with the fertilizer industry. Cheri Toner was selected to fill the Administrative Officer II position vacated with the retirement of Georgia Brock. Cheri immediately embraced her new role and is quickly becoming proficient in fulfilling the responsibilities and duties associated with this key position. Finally, Mr. Phil Wilson was selected to fill the position of Plant Pest Administrator that had become vacant as a result of the retirement of Dr. Steve Schmidt. Phil is a long-term employee of the Plant Protection Section, having worked at Support Operations and a majority of his career in the field as a Plant Pest Specialist. Phil brings a wealth of knowledge and background with regards to regulatory enforcement and compliance. With these key roles filled and fully functional, the Plant Industry Division is poised to move forward in constructively addressing critical issues.

Organizationally, several other changes took place in the Plant Industry Division. Within the Plant Protection Section, changes were made to develop Western and Eastern Regions with supervisory oversight for both. At the Raleigh level, a newly-defined Plant Pest Supervisor position was established with direct responsibilities for the nursery and greenhouse industry, phytosanitary certification issues and plant pest related programs. Each of these positions was filled. Based on this re-organization initiative, a new position, the Plant Conservation Program Administrator was developed. The purpose of this position will be to provide for the planning, development and implementation of the Plant Conservation Program. Over the years, plant conservation program work has greatly expanded and additional oversight is needed to ensure mandated program work is completed.

With the transfer of the N.C. Forest Service to the NCDA&CS, the Plant Industry Division worked to transfer the Crossnore Plant Inspection Station over to our new Divisional partner. The original uses for this facility, as administered by the Plant Industry Division, have significantly changed and as such, it was determined this space might be more efficiently utilized by the N.C. Forest Service. This facility transfer was effective July 1, 2012.

The Plant Industry Division, Support Operations Unit provides support for all the Division's programs, including the maintenance of Divisional vehicles, equipment, and staff as needed to meet the needs of the service and regulatory programs. This unit also assists the Division with the implementation of safety/seasonal employee orientation and most recently with the implementation of PureSafety, an on-line safety training program.

Accomplishments: Plant Protection Section

The Plant Protection Section is responsible for implementing laws enacted by the North Carolina General Assembly to protect North Carolina agriculture and its citizens from the entry, establishment, release, and spread of injurious organisms into or within North Carolina.

The mission of the Plant Protection Section is to enhance the quality of life in North Carolina by protecting agriculture and the environment from injurious plant pests, by promoting beneficial organisms, and by protecting rare native plants of the state.

We serve the people of North Carolina by:

- Protecting agricultural crops, horticultural crops and native flora, by preventing or controlling the invasion and spread of injurious insects, plant pathogens, weeds, and other pests of regulatory concern.
- Protecting honey bees by combating the spread of bee pathogens.
- Responding to constantly changing threats to crops, rare native plants, and honey bees by drafting effective and reasonable regulations and by achieving public compliance.
- Supporting agriculture, horticulture and related industries by providing inspection and export services to facilitate the movement of regulated commodities.
- Protecting rare native plants by restoring their habitats, and by propagating and restoring them to the wild.
- Promoting beneficial organisms that serve as biological controls of pest species.
- Providing outstanding service and satisfaction to all our clients.

North Carolina has an extremely wide range of climate, from near tropical along the southeast coast to winter conditions similar to southern Canada in our higher mountains in the west. Such diversity provides suitable environments for an extremely diverse flora and fauna. Extensive international air and sea transportation, both military and commercial, and an extensive Interstate Highway System increase the potential for the accidental introduction of pest organisms into North Carolina. Therefore, North Carolina's Plant Protection Section programs must deal with a wide range of organisms and host-pest interactions.

Major program activities for the period July 1, 2011 through June 30, 2012 are described in the following reports.

Apiary Inspection Program

The NC beekeeping industry remains viable and strong. Our inspectors help beekeepers through field inspections, educational meetings, and field days and strive to assist the beekeepers in any way necessary. Our goal is to continue to improve our overall inspections and in particular our documentation of them. Our ultimate objective is to reduce the rate of honey bee disease and pest problems. The numbers of colonies the office has documented for inspection for fiscal year 2011-12 was 6,246 with 18 hives documented to have American Foulbrood. This compared to a total of 33 the previous fiscal year.

In 2011, a favorable honey flow allowed our beekeepers to recover from several years of difficulty. Unfortunately, 2012 has demonstrated that many of these problems still exist and the honey flow has not been particularly strong. There have been several interesting occurrences this year with regard to bee and brood viability that appear to be associated with poor nutrition. Among these are European Foulbrood, blue brood, and probable toxic nectar and pollen sources. We are working with the federal bee lab in Beltsville to determine the extent of these issues.



The *Varroa* mite persists as a major threat to the beekeeping industry in NC and is likely a contributing factor to some of the circumstances already described. Several new products have been registered for use in controlling this pest; however, the mites have developed resistance to some of these materials in short order and rendered these products ineffective. Although chemical treatment of mites may be necessary, some miticides have been demonstrated to have adverse effects on bees. Another perplexing factor is the growing use of unregistered materials that may also have adverse effects on honey bee health and may not be efficacious in controlling mites. In some cases, the improper use of antibiotics to control diseases can further complicate useful treatment regimes.

Colony Collapse Disorder (CCD) continues to be a major topic of discussion by the popular media regarding honey bees and their plight this year. The press coverage has highlighted the value of honey bees to a broader audience and raised awareness of their importance. Due to the restricted parameters described as symptoms of CCD, this disorder has not yet been documented in NC. This is not to say that it has not occurred here, but we have not seen evidence specifically attributable to this condition.

Another threat facing the beekeeping industry of North Carolina is the establishment of Africanized honey bees (AHB) (*Apis mellifera scutellata*) in southern Florida, along with detections in Georgia. In North Carolina, we are engaged in an outreach program to emergency response personnel to familiarize them to the potential threat of AHB. We are also reaching out to the structural pest industry and its membership. We are collecting samples of bees (particularly those from colonies with overly defensive behavior) in order to determine their geographic origin and their propensity for this behavior. The NCDA&CS and NCSU are collaborating in conducting this survey. At this time, none of the samples collected were determined to be of the AHB type. We are striving to have our inspectors and our lab prepared to deal with any AHB incursion or incident.

We encourage beekeepers to please let us know of any colonies that seem to be displaying any unusual or inexplicable defensive behavior so that we can maintain a beekeeping industry in North Carolina that is not threatened by the reputation of this more defensive type of bee.

We continue to enjoy a good working relationship with our friends in the NC State University Apiculture Research and Extension Program. We have had the opportunity to assist them in some of their projects and would like to express our gratitude for their assistance in many of our projects.

Biological Control Programs



CERCERIS FUMIPENNIS AND
PREY



HEMLOCK WOOLLY ADELGID



IMPORTED FIRE ANT AND
PHORID FLY



KUDZU BUGS



MILE-A-MINUTE VINE WEEVIL

The mission of the biological control program is to manage exotic pests using ecologically-based methods. We focus on “classical” biocontrol that is, reuniting exotic pests with the natural enemies that keep them below damaging levels in their home ranges. Although we are primarily an implementation program, conducting these projects requires research to ascertain the appropriateness of releasing biological control agents or to follow up on agents released. The biological control program of the NCDA&CS was founded in the 1970s to investigate and establish natural controls for the gypsy moth, a visionary undertaking in advance of the invasion of that pest. Today, our projects focus on a variety of exotic pests, and involve laboratory rearing of insects, field releases of natural enemies, surveying, and the operation of a USDA-inspected containment (quarantine) facility. Rooms in the containment facility are available to industry and university researchers for short-term use. Such cooperation allows projects to be completed in a secure environment, and provides the opportunity to work on potential pests before they are established in North Carolina. Seven shipments of exotic material were received by the NCDA&CS Insect Quarantine Facility during 2011/2012.

Summary of Quarantine Activities 2011 – 2012

ID #	SPECIES	FAMILY	STAGE	#	ORIGIN	STATUS
Q10-1	<i>Megacopta cribraria</i> ¹	Plataspidae	Adults/ Egg/larvae	1,830	GA	Insects maintained on kudzu for host preference test.
Q11-9	<i>Sirex noctilio</i> ²	Siricidae	Adults/ Eggs/larvae	64 logs	NY	Logs maintained in quarantine awaiting wasp emergence.
Q12-8	<i>Imperata cylindrica</i> ³	Poaceae	Seeds	2 seed heads	NC	Determine if seeds are viable.

¹Determine host preference of the recently found kudzu bug, *Megacopta cribraria*.

²Dr. Coby Schal, NCSU Entomology Dept., NCSU will utilize *Sirex* to develop semiochemical tools to facilitate early detection, population monitoring, and ultimate control of *Sirex noctilio*.

³Seed from the Federal Noxious Weed *Imperata cylindrica* were examined to determine viability.

c) We attempted to find additional monitoring sites in the NC mountains by surveying ball fields in Buncombe, Polk and Yancey counties. Thirty-three fields were surveyed.

2. Buprestid prey. In 2011 a total of 682 buprestid beetles were collected from *C. fumipennis* in 20 sites spread over 12 counties: two counties in the piedmont (Gaston, Wake), one in the inner coastal plain (Wayne) and nine counties in the mountains (Buncombe, Cherokee, Clay, Macon, Madison, Polk, Surry, Swain, Yancey) (Fig.1). In 2012 we have collected to date 373 buprestid beetles from the wasps in 14 counties; collections are ongoing in the western part of the state.

3. Artificial nests. In 2011 we attempted to establish a *C. fumipennis* nesting site on the grounds of the Beneficial Insects Laboratory (BIL). Female *C. fumipennis* from an active site in Wayne Co. were collected on 2 June and placed on the sand surface of the artificial nest site under wire mesh strainers (n = 10) or larger square cages (n = 2) (Fig. 2c) with a small source of water (Fig. 2d1) and honey. A screwdriver was used to make two 'starter' nest holes, and as soon as the female accepted one (as indicated by a turret - Fig. 2d2), we obscured the other hole and began provisioning her with paralyzed buprestids placed at the edge of the nest (Fig. 2d3). Cages and strainers were removed 7-8 days after the initial introduction, and the females 'set free'. Females under strainers more readily accepted the nest than those in the larger box cages. One female was active in her nest until 21 July. The nesting area was actively monitored during the active season of the wasp in 2012, but no emergence of wasps was noted. Excavation of the nesting area is in progress to gain more information as to the fate of the introduced wasps.

4. Volunteers. In spring of 2012, volunteers were recruited through county extension offices and Master Gardener programs and trained to monitor previously identified *C. fumipennis* nesting sites in the NC mountains. Volunteers (n=10) were recruited in Buncombe, Clay, Polk, Swain, and Yancey counties; their goal was to monitor a nesting site once per week throughout the wasp's active season. The volunteers were provided with pre-paid mailing boxes to send the collected buprestid beetles to the BIL at the end of the season for curation and identification.

5. Biology of *C. fumipennis*. A study is currently underway to compare the number and identity of buprestid beetles captured by *C. fumipennis* to those captured by USDA purple prism traps in a given area. We have five study sites: two in Goldsboro, one in Raleigh, one in Mt. Airy, and one in Asheville. The study is ongoing.

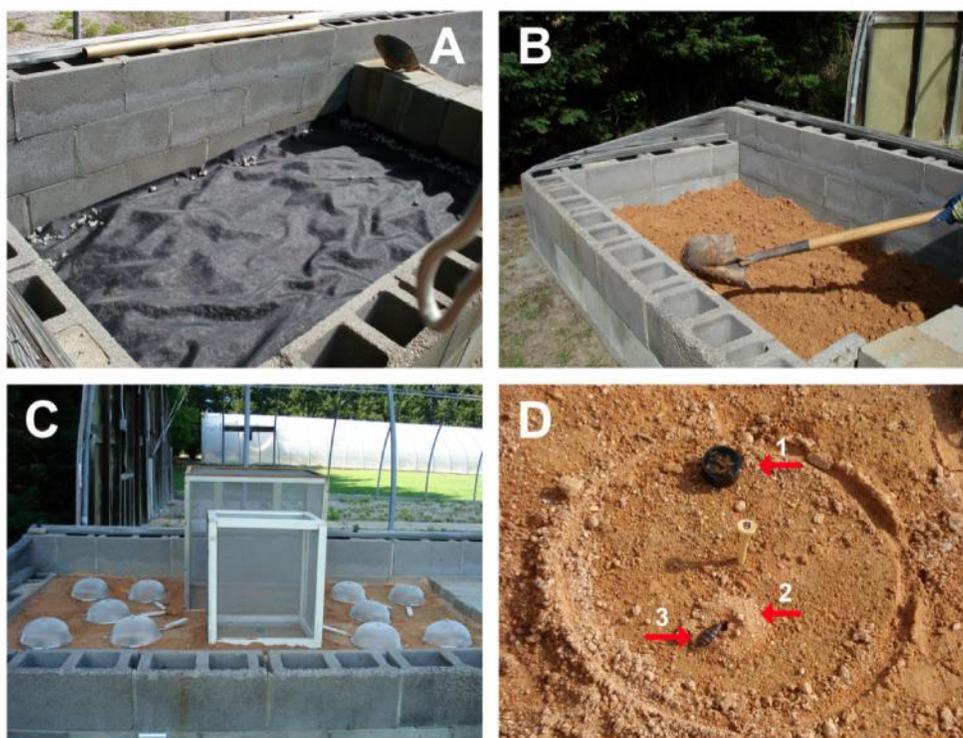


Figure 2. Establishment of a *C. fumipennis* nesting site ('trough nest') on the grounds of the NCDA Beneficial Insects Laboratory. A) A layer of gravel for drainage, covered by fiberglass window screen; B) Filled with infield sand, tamped and allowed to settle; C) Females released under two types of cages; D1) Water source; D2) Turret, indicating acceptance of nest; D3) paralyzed beetle provided to female.

Hemlock Woolly Adelgid Predator Rearing, 2011 – 2012

The hemlock woolly adelgid (HWA) (*Adelges tsugae* Annand, Hemiptera: Adelgidae) occurs across the range of eastern and Carolina hemlocks (*Tsuga canadensis* (L.) Carrière and *T. caroliniana* Engelman), and is a threat to both species. Hemlock is widespread in western North Carolina, and the loss of the hemlock will bring about major changes to those ecosystems. In addition to the loss of unique habitats, dead and dying trees are a safety hazard in recreation areas, as well as aesthetically unattractive (Fig. 1). Chemical control is effective for managing HWA, but is impractical for widespread use in stands that are large, remote or located where streams may be damaged by insecticides. Therefore, a biological control program has been developed to release predators in state and national forests and parks to slow the progress of this devastating insect.

Figure 1. Linville Gorge, NC, September 2012. Dead hemlock trees line the gorge.



The primary objective for this project was for NCD&CS to operate a large-scale central rearing facility to provide biological control agents for the management of hemlock woolly adelgid. *Sasajiscymnus tsugae* (*St*), native to Japan, has been in mass production at the lab since December 2002. In May and July of 2008, newly collected *S. tsugae* from Japan were received in our quarantine facility to broaden the gene pool in the colony. Rearing this season concentrated on the new Japanese strain and a colony of hybrids between new and old beetles. Beetles produced are turned over to USDA-Forest Service personnel for release at selected field sites within North Carolina as well as other states.

The predator beetles are well synchronized with the lifecycle of the adelgid. After a summer of aestivation, the adelgid begins to mature and prepare for oviposition. Once this maturation begins in the field, adelgids on hemlock boughs which are cut and stored in spring-like conditions begin laying eggs. This stimulates reproduction in the beetles, and the mass rearing can proceed. Rearing continues until the adelgid completes two generations, usually by June. The adelgid aestivates as nymphs on new hemlock growth, and *St* feeds on these supplemented with honey in the lab.

Figure 2. Oviposition jar.



For mass production of the colony, mating groups of beetles were placed in 3.8 l jars supplied with a bouquet of hemlock twigs and small squares of gauze (Fig. 2). Early in the season, groups comprised 15 beetles (10 females: 5 males) after the first month, groups were doubled in size. Eggs (on the twigs and gauze) were removed weekly and put in rearing cages supplied with infested hemlock, and after 4 weeks, adult beetles collected and moved into storage cages (Fig. 3). Oviposition jars for the 2011-12 season were set up November 29, 2011. Egg production was halted May 29, 2012. All of our rearing material is provided by USDA-FS personnel, and we are grateful to Virginia Gibbs for the excellent material she sent us. As HWA has spread throughout the natural range of hemlocks, adequate

material has become harder to find. This underscores the need for a supplemental diet on which immature stages can develop.

During the rearing season, a sample of beetles from each colony was sexed and weighed to compare quality. These data are part of a cooperative study with Allen Cohen (Insect Diet and Rearing Research) and Carole Cheah (CT Ag. Exper. Station).

Figure 3. Predator beetle rearing and storage cages.

Results of the season's production are shown in Figure 4. A total of 120,711 beetles were reared (96,090 of the 2008 Japanese strain). Approximately 80,000 were transferred to the USDA-FS and 10,000 beetles were sent to the Maine Department of Forestry for release. The remaining beetles are being maintained at the lab. Egg production and larval development is directly related to the quality of HWA and hemlock that is used in the rearing process. During the 2011-2012 rearing season, HWA quality was variable, primarily due to weather conditions. Adelgids developed very quickly during the warm spring following a mild winter, compressing the rearing season. As in past years, peak adult production occurred during the ovipositor period of the sistens¹ generation. In the field this occurs in the spring, but in the warmer lab conditions, HWA oviposition begins in January. A second peak of production occurred during the progrediens² generation oviposition period, but the return of adult beetles was much lower. These results are consistent with past rearing seasons.



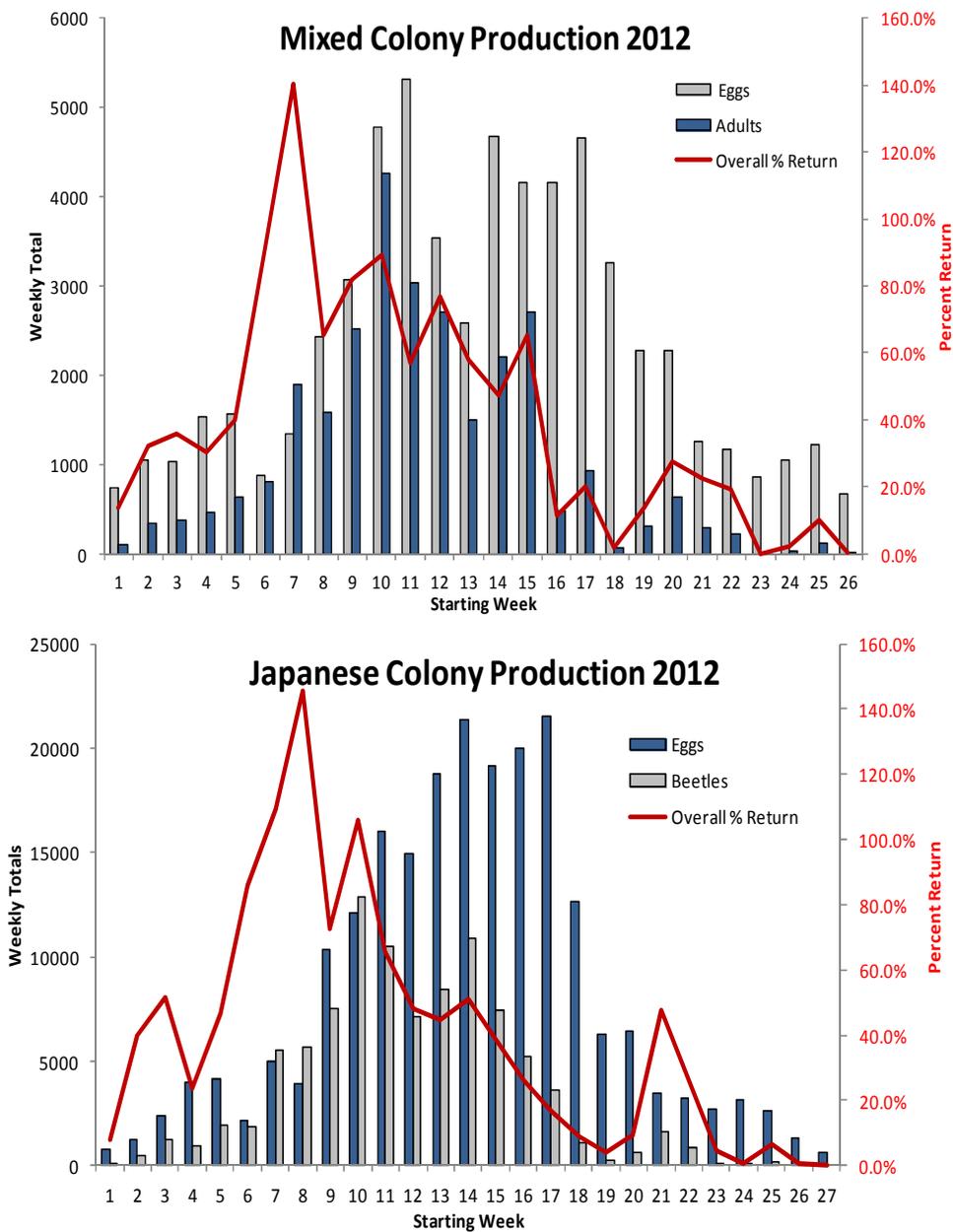
Female *St* beetles were slightly larger than the males. Mean weight of females from the Japanese colony was 0.00067 g (± 0.00011) and males weighed and average of 0.00062 g (± 0.00009). In the mixed colony, females averaged 0.0007 g (± 0.00017) and males averaged 0.00064 g (± 0.00009). Each colony produced slightly more females than males. The percentage of females in the Japanese colony was 54.4% (± 5.1) and the mixed colony produced 55.2% females (± 7.0).

Personnel assigned to the project include Anitha Boniface, Research Specialist, full time, Rebecca Fergus, Research Specialist $\frac{3}{4}$ time, and Whitney Swink, Jesse Anderson, and Jimmy Cheatham, Research Specialists, temporary employees.

¹ Terminology used to describe adelgids. The sistens generation aestivates during the summer, completes its development in the fall and winter, and oviposits in the early spring.

² The progrediens generation begins in the late spring or early summer and completes its life cycle within the same season. Adults lay eggs, and the resulting nymphs settle onto new hemlock growth to become the sistens generation.

Figure 4. Production of *Sasajiscymnus tsugae* 2011-2012. Data shown represents production between November 29, 2011 and June 13, 2012.



Field Release and Monitoring Phorid Flies for Management of Imported Fire Ant Rebecca Norris and Kathleen Kidd

Since the discovery of the imported fire ant (IFA) in NC in 1953 it has spread to 71 of 100 counties. In an effort to slow the spread and decrease population size, phorid flies, *Pseudacteon* spp (Diptera: Phoridae), natural enemies of the IFA have been released in NC through cooperative efforts between NCDA&CS and USDA-ARS. Phorid flies, also known as decapitating flies, lay single eggs into foraging ants. The developing larva moves into the IFA's head where it secretes an enzyme that causes the ant's head to fall off. After completing development, the adult fly emerges from the head to seek out new prey.

Since 2000, three species of phorids, *Pseudacteon tricuspis*, *P. curvatus* and *P. obtusus* have been released in the state (Table 1). The species of phorid flies selected for release at each locality was based on the most prevalent ant colonies present: monogyne colonies with one queen or polygyne colonies with multiple queens. *P. tricuspis* and *P. obtusus* flies typically attack larger workers usually found in the monogyne colonies whereas *P. curvatus* shows a preference for smaller workers common to polygyne colonies (Morrison et al. 1997).

Surveys. Delimiting surveys to monitor establishment and spread of phorid fly species in North Carolina were begun in 2008. To detect the flies, mounds are disturbed to bring ants to the surface, and then observed for about 15 minutes, or until a phorid fly can be seen patrolling the area and attacking ants. Surveys are conducted in late summer or early fall after rain and cooler temperatures allow ant surface activity and mound building to increase.

In 2011 the surveys started August 31 and ended on October 27, 2011. A total of 35 counties were surveyed resulting in 30 positive counties and 5 negative. The phorids are following the northern and western expansion of the fire ants in NC. The phorid fly *P. curvatus* has been found in all full and partial quarantined counties except four, Carteret, Hyde, Polk and Northampton (Fig.1). The phorid fly probably exists in Polk County, but only one site was checked for flies. The lack of flies in the other three counties may be due to windy conditions at time of survey for the coastal counties and significant wind damage and flooding from Hurricane Irene in Northampton County in 2011. In addition to the quarantine counties, they were also found in 4 non-quarantined counties, Warren, Halifax, Macon and Jackson. Since 2008 phorid flies have been found in sixty seven of the seventy one counties surveyed.

A new species of phorid fly, *P. obtusus* was introduced into Pitt County in the fall of 2010 and Randolph County in the fall of 2011. Approximately 1,100 phorids were released in Pitt County and about 3000 *P. obtusus* were released in Randolph County. Since phorids were released over a three week period starting September 8, monitoring for *P. obtusus* in Randolph county will commence in the fall of 2012 when fly populations have time to increase. Pitt County is the only county where the 3 species of phorids were released. To facilitate monitoring for phorid species, in addition to mound disturbance and aspiration of flies, a modified version of sticky traps developed by Puckett et. al. (2007) was used (Fig 2). The traps consist of tri-stands found in pizza boxes, (to keep the pizza from sticking to the box) glued to 60 x 15 mm plastic petri dishes. The pizza tri-stand and sides of the petri dishes are coated with Fluon to prevent the fire ants from escaping and climbing the tri-stand. Two inverted tri-stands were anchored to the single tri-stand with Velcro, and the legs of the inverted stands were coated with Tanglefoot®. Traps were placed at or near the fire ant mounds and baited with live and crushed ants to attract phorids. Flies were ensnared in the Tanglefoot® when they alighted to rest on the upright legs. Traps were retrieved within 24 hours after placement in the field and sent to USDA ARS-CMAVE lab in Gainesville for identification of flies by Dr. Sanford Porter. Only *P. curvatus* was detected using the above methods. The absence of *P. obtusus* at the site may be due to the low number of flies released in 2010. Monitoring will continue in 2012.

It appears that *P. curvatus* is out competing and displacing *P. tricuspis* throughout NC. The only phorid fly species found during this year's survey was *P. curvatus*. The successful spread of this species over *P. tricuspis* may be due to the predominance of polygyne colonies in NC.

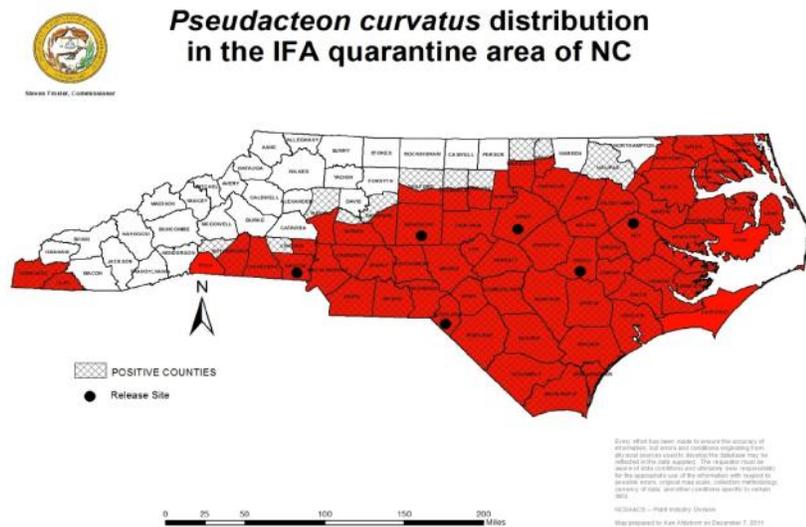
References

- Morrison, L. W., Dall'Agilo-Holvorcem, C. G., and Gilbert, L. E. 1997. Oviposition behavior and development of *Pseudacteon* flies (Diptera: Phoridae), parasitoids of *Solenopsis* fire ants (Hymenoptera: Formicidae). *Environ. Entomol.* 26: 716-724.
- NCDCA & CS Plant Industry Division - Red Imported Fire Ant - www.ncagr.gov/plantindustry/Plant/entomology/documents/FireAntmap2010.pdf
- Puckett, R. T., Calixto, A., Barr, C. L., and Harris, M. 2007. Sticky traps for monitoring *Pseudacteon* parasitoids of *Solenopsis* fire ants. *Environ. Entomol.* 36: 584-588.

Table 1. Releases of phorid flies in NC.

County	Year	Species	Site
Beaufort	2000	<i>Pseudacteon tricuspis</i>	Fallow land
Duplin	2002	<i>Pseudacteon tricuspis</i>	Rest area
Robeson	2003	<i>Pseudacteon tricuspis</i>	Fallow land
Wayne	2004	<i>Pseudacteon tricuspis</i>	Near pasture
	2008	<i>Pseudacteon curvatus</i>	Near Pasture
Wake	2005	<i>Pseudacteon curvatus</i>	Naturalized area
Pitt	2006	<i>Pseudacteon tricuspis</i>	Pasture
	2010	<i>Pseudacteon obtusus</i>	Fairgrounds
	2010	<i>Pseudacteon curvatus</i>	Fairgrounds
Scotland	2007	<i>Pseudacteon tricuspis</i>	Grassy field
		<i>Pseudacteon curvatus</i>	
Gaston	2009	<i>Pseudacteon curvatus</i>	Pasture
Randolph	2011	<i>Pseudacteon obtusus</i>	Zoo garden and entrance to parking area.

Fig. 1 (L). Results of phorid fly surveys, 2008 – 2011. Imported fire ant quarantine counties are shaded red. Fig. 2. (R) Sticky trap for capturing phorid flies.



Bean Plataspid/Kudzu Bug

An exotic hemipteran, *Megacopta cribaria*, was found feeding on Georgia kudzu (*Pueraria montana* var. *lobata*) and aggregating on buildings in the fall of 2009. In the summer of 2010, the insect was found feeding on soybean (*Glycine max*) in Georgia and South Carolina. We began the process of host plant testing at the quarantine facility of NCDA&CS in July 2010, and in the fall of 2010, the plataspid was found in one county in NC. During the spring and summer of 2011, surveys have determined that this insect is widespread in Georgia, South Carolina and North Carolina, and it has also been found in Alabama. Reports from Asian literature indicate that it may feed on soybean, related legumes, and cotton, but this host association is unclear. After the kudzu bug became widespread and was found in the field feeding on kudzu, soybean, and in one field, cotton, our goal has shifted to developing rearing methods in addition to host testing.

To determine the suitability of various crop plants as hosts for the kudzu bug it is necessary to test the ability of the insect to complete its development on those hosts, beginning as a neonate nymph. Field collected adults readily lay eggs on foliage of various types and the screen mesh of their cages. Unfortunately, nymphs have not survived more than a few days after hatching. Objectives for this study have been to develop techniques for rearing newly hatched nymphs and to determine preferences for oviposition and feeding.

Methods and Materials

During 2010 and early 2011, insects for the studies were collected from kudzu growing in Georgia, but mortality during shipment was high. To start our colony for the 2011 season, we collected about 30 adults from Richmond Co, NC on 9 June. About 1000 adults and nymphs were shipped from Georgia on 21 June, but about 2/3rds of them died in transit. On 15 July, we collected several hundred adults and nymphs in Moore and Hoke Counties, NC (Fig. 1). In the lab, the plataspids were offered kudzu bouquets consisting of young, hardened off leaves (trifoliates) with the stems submerged in test tubes. These bouquets were preferred over potted lablab (*Lablab purpureus* (L.) Sweet), and were easier to obtain than kudzu in pots. An additional collection of approximately 600 was made 11 August in Moore Co, with subsequent collections made 30 August, 20 September, 18 October and 9 November.

Feeding choice test. A choice test was set up using adults collected in Georgia. Using screen mesh cages, a lablab plant and a test plant, soybean, peanut, or field peas were placed in the cages. To minimize variability due to position, each combination was duplicated with the test plant either at the rear or the front of the cage. Thirteen bugs (8 female, 5 male) were placed in a small petri dish between the plants on the floor of the cage. Cages were monitored and the position of the bugs recorded. The test began 27 June and concluded 1 July.

No choice feeding test. Two plants of the same species, either lablab, kudzu bouquet, peanuts, soybean, field peas or cotton were tested. Plants were checked daily for the presence of bugs and egg masses. Four females and three males were placed in each cage. The test was conducted between 12 -18 July.

Host Selection. Two plants of the same species, kudzu bouquets, soybean, and peanut were tested using adults and nymphs in separate cages. Adults (6 females and 4 males) were placed on the floor of the cage between plants and two late instar nymphs were placed on each plant. Plants were monitored for presence of bugs and egg masses and nymphs were monitored for molting.

Oviposition. Two plants of the same species, either lablab, kudzu bouquet, peanuts, soybean, field peas or cotton were tested in a no-choice trial. Plants were checked daily for the presence of bugs and egg masses. Four females and three males were placed in each cage. In a second replication, conducted between 9 September and 29 December varying numbers of adults were placed in a cage with 2 plants of a single species and cages monitored for eggs.

For oviposition choice tests, 225-250 adult plataspids were placed in cages (BugDorms) and offered kudzu bouquets consisting of young, hardened off leaves (trifoliates) with the stems submerged in water paired with a pot of another legume for oviposition. Plants tested were lablab, peanuts, soybeans, cowpeas, garden beans, hairy vetch, crimson clover, and cotton. By examining data from these studies, some information on fecundity may also be gleaned.

Field Surveys. In addition to the laboratory studies, kudzu across the state was surveyed for the presence of the plataspid while other fieldwork was being conducted. The presence or absence along with latitude and longitude were recorded and reported to Wayne Gardner of the University of Georgia as well as Ken Ahlstrom, NCDA&CS CAPS coordinator.

Results

Feeding choice test. When allowed to choose between lablab and another host plant, *Megacopta cribraria* generally preferred lablab over peanuts or field peas. Soybean was similar in preference to lablab (Table 1).

No-choice feeding test. Kudzu bouquets were able to sustain the plataspid during the week of the trial. Both lablab and field peas appear to be acceptable hosts, and with soybean showed the least mortality. In this test, cotton did not serve as a host; no bugs were observed on the plants and by the end of the week, all had died (Table 2).

Host Selection. This trial indicated that the bugs will move around on plants, even as nymphs. Nymphs had initially been on the plants but were frequently found on the sides or bottom of the cages. A few of the larger nymphs molted to the adult and stayed on the plants. Kudzu and peanuts appear to be better hosts than field peas. One egg mass was laid on the cage containing field peas, while egg were laid directly onto the kudzu foliage (Table 3).

Oviposition. *M. cribraria* adults readily oviposit when host plants are available, and will also place eggs on non-hosts including cage walls, screen and non-host weeds (personal observation). When presented soybeans, eggs were found as late as 29 December. When given kudzu and an alternate host in a choice test kudzu, soybeans, and crimson clover were preferred for oviposition (Table 4). Bugs laid no or one egg mass on lablab, peanuts, cowpeas, beans, hairy vetch, and cotton. It is notable that in the cowpea and clover cages, a large number of egg masses were laid on the cage walls.

Fecundity. Adults collected throughout the season showed variability in the number of egg masses produced, the number of eggs per mass, and the amount of time before oviposition began after collection. Eggs laid on all hosts were totaled by collection date and averaged to show the mean number of eggs per day, and eggs per egg mass (Table 6). Bugs collected in July produced the most eggs per day, although the number of eggs produced per egg mass was similar until the October collection. It is notable that those collected 30 September and later showed a mean lag of 24.1 (range = 6 – 37) days between collection and oviposition.

Kudzu Surveys. Over half of North Carolina's counties (58/100) are now reported to be infested by kudzu bugs. We reported 13 positive sites, and 1 negative (Table 7). Other findings were reported by researchers from NSCU, Emory University, Winthrop University and the University of Georgia.

Conclusions

We observed that adults and nymphs are often present together in the field, but adults do not seem to live more than about 40-50 days in the lab, suggesting little overlap in generations. Adults collected from the field, therefore, are likely to be of the same generation and approximate age, allowing comparison of their fecundity and host choices. The kudzu bug appears to enter a facultative diapause in the fall, which is overcome by returning it to the warm temperature and neutral day length of the laboratory. Our studies demonstrated that kudzu is the preferred host for oviposition in the lab, although soybean and other legumes are also accepted. Techniques for rearing the bug through its entire life cycle in the lab have not yet been developed in order to fully test the host range of the bug, but the spread of the bug and the experience of those in Georgia and South Carolina indicate that field trials will be more feasible next field season.

Acknowledgments

Laboratory work was conducted by James Cheatham, Research Specialist. Rebecca Norris assisted with field and laboratory work.

Figure 1. *Megacopta cribraria* feeding on kudzu vines. Moore Co, NC 2011. Bugs show a preference for aggregating along the stems and leaf axils.



Figure 2. Life stages of *Megacopta cribraria*, Adults, Eggs, and Nymphs.



Table 1. Results of feeding selection test. Number of bugs feeding on plants by position (front or rear of cage) throughout trial. N=13.

Host	Position	Maximum Number of Bugs Feeding
Peanuts	Front	0
Lablab	Rear	4
Peanuts	Rear	0
Lablab	Front	5
Soybean	Front	2
Lablab	Rear	1
Soybean	Rear	1
Lablab	Front	3
Field Peas	Front	1
Lablab	Rear	0
Field Peas	Rear	1
Lablab	Front	6

Table 2. Results of no-choice feeding test. Number of bugs on plants 12 -18 July (number dead). N=7.

Host	12 July	13 July	14 July	18 July
Lablab	0	2 (1)	4 (2)	1 (3)
Kudzu	1	6 (1)	6 (1)	5 (1)
Peanut	0	2	2	0 (4)
Soybean	0	1	2	1 (3)
Field Pea	0	0	4 (1)	2 (2)
Cotton	0	0 (1)	0 (3)	0 (6)

Table 3. Results of host selection test. Number of bugs on plants. N=10 adults, 4 nymphs.

Host	Kudzu		Field Peas		Peanuts	
	Adults	Nymphs	Adults	Nymphs	Adults	Nymphs
July 19	2	4	1	0	3	2+1 adult***
July 20	7	3	2	1	4	1+1 adult
July 21	9	3	0	1	5	2+1 adult
July 22	6*	2+1 adult	4	1+1 adult	6	0+2 adults
July 25	5	2+1 adult	2*	0	7	0+1 adult
July 26	6	1+2 adults	0	0	5	0+1 adult
July 29	8	0+2 adults	0	0	3	1+1 adult
July 30	8	1+2 adults	0	0	5	0+1 adult
August 1	7**	0+3 adults	0	0	6	0+2 adults

*1 egg mass present.

**3 egg masses present.

***Newly eclosed adult.

Table 4. No-choice oviposition (late season).

Week	Host	# Egg Masses
26 September	Kudzu	13
10 October	Kudzu	11
	Crimson Clover	0
17 October	Kudzu	6
24 October	Kudzu	1
31 October	Kudzu	7
7 November	Kudzu	15
	Crimson Clover	25
	Cotton	0
14 November	Kudzu	6
	Crimson Clover	17
21 November	Crimson Clover	16
	Soybean	7
28 November	Soybean	23
5 December	Soybean	10
26 December	Soybean	9

Table 5. Host preference (oviposition). N= ~250 adults

Host Pairing	# Days	Total # Egg Masses	Starting Date
Kudzu	14	56	22 August
Soybean		42	
Kudzu	11	11	15 September
Soybean		16	
Kudzu	7	37	17 October
Crimson Clover		12	
On cage		25	
Kudzu	10	118	5 August
Peanuts		0	
Kudzu	49	46	15 September
Peanuts		1	
Kudzu	12	71	27 July
Lablab		1	
Kudzu	10	78	10 October
Cowpea		0	
On cage		80	
Kudzu	13	48	29 September
Garden Bean		0	
Kudzu	11	40	29 September
Hairy Vetch		1	
Kudzu	1	41	19 August
Cotton		0	
Kudzu	10	61	24 August
Cotton		0	

Table 6. Fecundity of *Megacopta cribraria* collected in NC 2011. (Mean \pm SD)

Date Collected	Mean Egg Masses/Day	Mean Eggs/Day	Mean Eggs/Egg Mass
15 July	3.6 (\pm 0.0)	87.0 (\pm 0.4)	24.0 (\pm 0.1)
11 August	1.5 (\pm 0.8)	39.5 (\pm 22.4)	25.2 (\pm 0.8)
30 August	1.6 (\pm 0.03)	37.4 (\pm 1.2)	23.6 (\pm 0.4)
20 September	0.9 (\pm 0.3)	20.2 (\pm 6.3)	23.1 (\pm 1.1)
18 October	0.2 (\pm 0.2)	2.8 (\pm 2.8)	10.0 (\pm 6.7)
9 November	0.0	0.0	0.0

Table 7. Kudzu Bug Survey, 2011.

Date	County	Location (Latitude, Longitude)	Host
7/15/11	Cumberland	35.1672°, -78.86317°	Kudzu
7/15/11	Harnett	35.4113°, -78.80994°	Kudzu
7/15/11	Wake	35.61192°, -78.80994°	Kudzu
8/29/11	Chatham	35.7195°, -79.16737°	Kudzu
9/1/11	Orange	35.8955°, -79.24065°	Kudzu
9/9/11	Granville	36.14199°, -78.598184°	Kudzu
9/10/11	Avery	36.02651°, -82.00942°	Kudzu
9/11/11	Wilkes	36.16932°, -81.37311°	Kudzu
9/26/11	Mitchell	35.921767°, -82.05195°	Kudzu
10/6/11	Forsyth	36.061902°, -80.276583°	Kudzu
10/6/11	Guilford	36.061902°, -79.547061°	Kudzu
10/18/11	Clay	35.034750°, -83.839667°	Kudzu
10/18/11	Cherokee	35.082033°, -84.026417°	Kudzu
Several	Alleghany	36.473887°, -81.062073°	Not Found

Mile-A-Minute Vine Biological Control

In the fall of 2010, an infestation of mile-a-minute vine (MAM) (*Persicaria perfoliata*) was reported in Alleghany Co (Poindexter 2010). Subsequently, additional locations were reported by citizens or through a survey of herbaria specimens (Figure 1). In cooperation with the NCDA&CS Weed Program, delimiting surveys were conducted by Plant Industry field specialists, and showed several concentrations of the weed, primarily along the drainage of Elk Creek. The extensive distribution of MAM in Alleghany County, its growth in the midst of native plants, and its preference for riparian habitat made this weed an ideal target for biological control. Although some roadside stands were designated for herbicide treatment, other areas along the creek were selected for biological control using a weevil, *Rhinocomimus latipes* (Figure 2). The weevils have been introduced in several states from Virginia to Massachusetts, and successfully established in those areas.

Mile-a-minute vine and the weevil are native to China. The weevil was identified by entomologists from the USDA Forest Service and the University of Delaware searching for agents to control MAM (Hough-Goldstein et al. 2008). The weevil is host-specific and during extensive lab and field testing did not complete its development on other plants, even those closely related to MAM. The weevils are now being reared at the Philip Alampi lab of the New Jersey Department of Agriculture. Experimental plots were established May 11, 2011 in one area of Alleghany Co. by Appalachian State University ecologists, and a total of 1000 weevils released. These plots were monitored until frost to determine the biology of weevils in western NC and their impacts on the plant community. An additional 200 weevils were released May 26 by NCDA&CS along Elk Creek approximately 4 miles to the northeast (as the crow flies) of the experimental plots. On the same day, 200 more weevils were released at a site near Burnsville, Yancey Co., along Coxes Creek. Both sites were monitored monthly for establishment and spread of the weevils. In September, a large infestation, not adjacent to Elk Creek, was reported by homeowners in Alleghany County, and 800 weevils were released on September 9, with 200 more weevils placed about ½ mile upstream from the May 26 release. More infestations of MAM will likely be identified, and we to plan to release more weevils in late summer 2012.

Smaller plants and less fruiting was observed at both of the May 26 release sites. In Yancey County, weevils were found about 50 m upstream from the release site in plants growing along Coxes Creek. Native tearthumb plants, *Persicaria saggitata* were present at both sites, but no feeding by *R. latipes* was found. It is also notable that the parasitic plant dodder (*Cuscuta* spp) attacked MAM at both locations.

References Cited

Hough-Goldstein, J., E. Lake, R. Reardon, and Y. Wu, 2008a. [Biology and Biological Control of Mile-a-minute Weed. USDA Forest Service, FHTET-2008-10.](#)

Poindexter, D.B. 2010. *Persicaria perfoliata* (Polygonaceae) reaches North Carolina. *Phytoneuron*. 30: 1-9.

Acknowledgments

Numerous people contributed to this project, including Rebecca Norris, Kathy Kidd, Field Specialists Rob Baldwin, Tim Hartley, Daniel Overcash and Chris Elder, Weed Specialist Rick Iverson, and homeowners the Wellens, Walters, and Blums.

Figure 1. Mile-a-minute distribution and weevil releases in NC

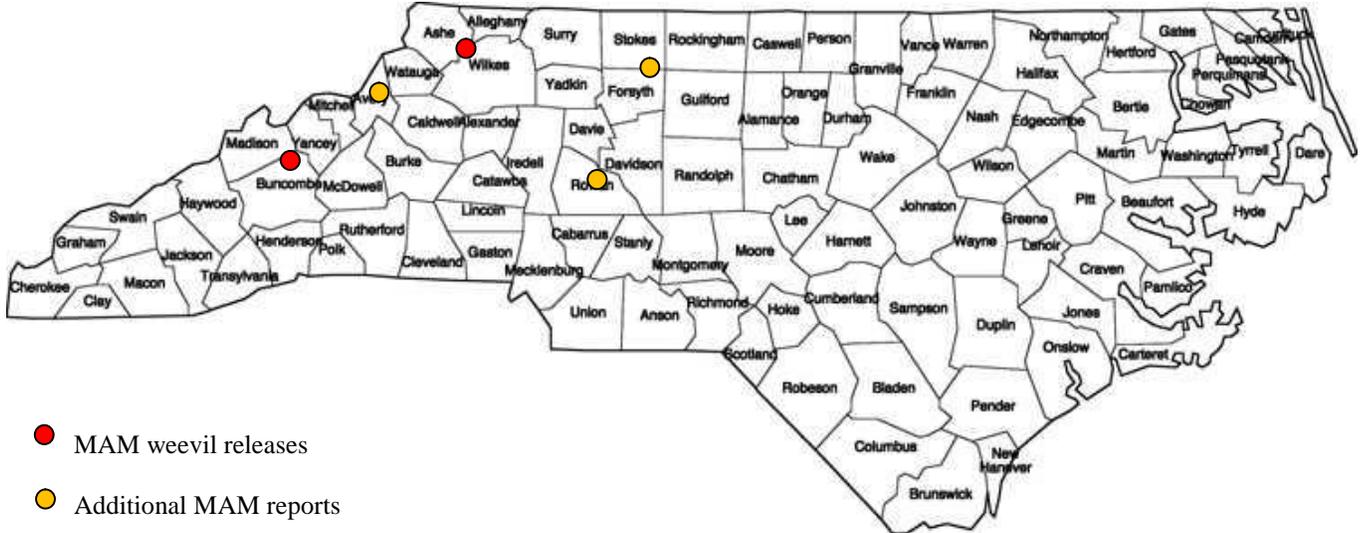


Figure 2. Mile-a-minute vine weevils and feeding damage.



Cooperative Agriculture Pest Survey (CAPS) Program

The Cooperative Agricultural Pest Survey (CAPS) is a joint initiative between the USDA, APHIS, PPQ and the NCDA&CS to fund and implement domestic surveys of harmful or economically significant plant pests and weeds that have not been detected by front-line inspections at our ports of entry. These surveys safeguard our nation's agricultural and natural resources by detecting introductions or early pest infestations which are of concern to our trading partners. Typical surveys target exotic pests, pests of export significance, and pests that are not known to occur in the U.S., but can also include regionally established pests. A strong domestic pest detection infrastructure and headquarters/regional staff is vital to ensuring that scientifically valid, current, and reliable pest/disease survey data is available on a continuing basis. Additionally, staff support is also critical at the state level, and federal funding provides for a State CAPS Survey Coordinator position housed within the NCDA&CS Plant Industry Plant Protection Section.

Survey activities for the 2011- 2012 fiscal year included:

- Identifying buprestids trapped on 22 emerald ash borer (EAB) traps set in seventeen counties for Emerald Ash Borer.
- Deploying 500 EAB traps in 2012
- Setting 74 traps in 22 counties for exotic bark beetles and wood borers.
- Surveying 124 sites at 24 blueberry farms in 5 counties for exotic moths.

As a result of these surveys, no exotic pests were detected, and all data were entered into the NAPIS database.

DISCUSSION

Emerald Ash Borer (EAB)

First detected in the Detroit, Michigan area in July of 2002, the emerald ash borer has spread to Connecticut, Illinois, Indiana, Maryland, Minnesota, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin in the United States, and the provinces of Ontario and Quebec in Canada. Several million ash trees have died as a result of this introduction. A native of China, no natural controls were introduced with the beetle. As a consequence, all species of ash in the US are susceptible to the ravages of this insect.

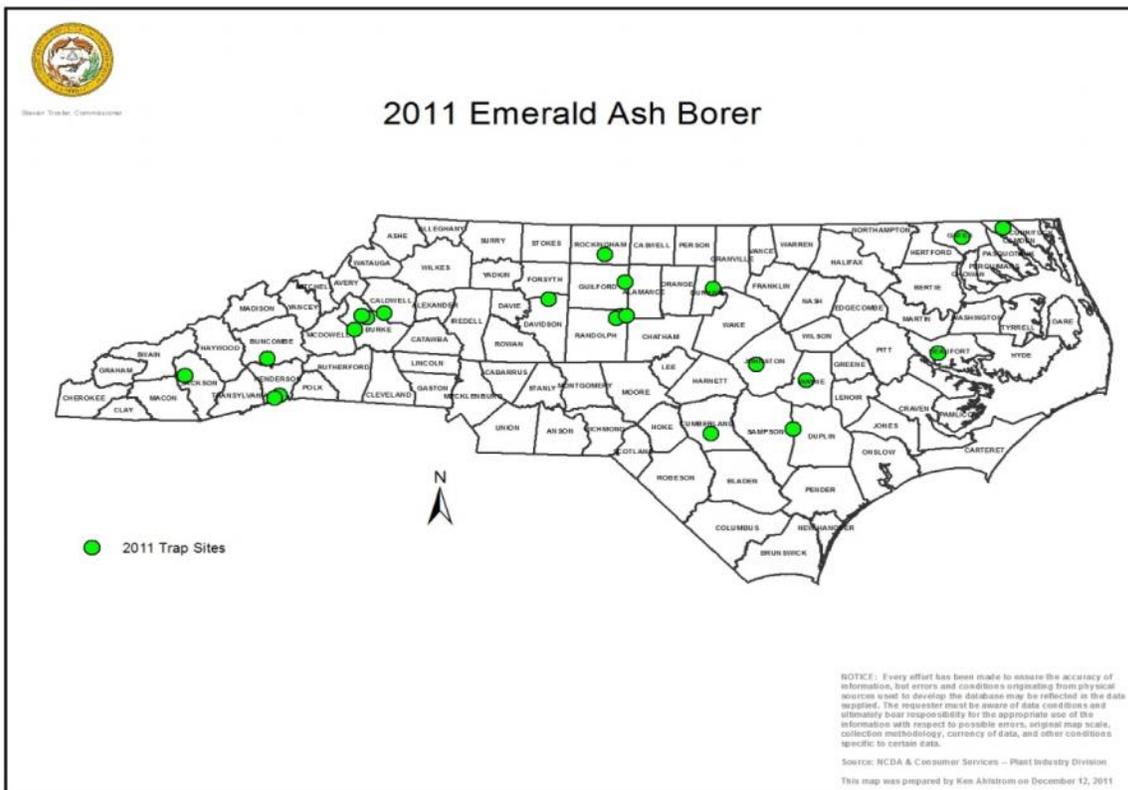
The beetle can be spread in several ways: a) natural flight of emergent beetles, b) transport of infested nursery stock, and c) movement of firewood by campers. The latter may be clearest indication as to the reason for the rapid spread of this pest. Because of this, many states have instituted restrictions on the movement of firewood out of infested areas.

Research in areas of EAB infestations has led to the development of a trap and lure that are attractive to beetles in the family Buprestidae, including Emerald Ash Borer. The trap is a prism shape consisting of 3 - 14" x 24" corrugated plastic panes in a stock purple color. Several holes provide for trap and lure attachment. The lure is an attractant blend of Manuka: Phoebe oil and is placed in a pouch with a release rate of 50mg/day. The pouch has a 60-day life expectancy.

Emerald ash borers attack only ash trees and therefore traps are placed in or as close as possible to ash trees. Ideally, trees 8 inches or greater in diameter should be selected. Traps are located along edges of woods, in open areas, or in open stands such as parks and placed on the sunny side of the tree. Traps should be hung as high as possible but no lower than 5' above the ground.

Initial emergence of EAB occurs after the accumulation of 450 growing degree days (base 50°F) with peak emergence at 900-1100 growing degree days. In North Carolina the trapping season begins at the end of April and continues until approximately July 1st.

In 2011, 22 sites were selected as trap sites. These included 19 nurseries, 2 State Parks, and 1 Research Farm. Counties where traps were placed are Beaufort, Buncombe, Burke, Caldwell, Camden, Cumberland, Davidson, Duplin, Durham, Gates, Guilford, Henderson, Jackson, Johnston, Randolph, Rockingham, and Wayne. Because ash is a minor plant in NC, traps were put out at one per site. No emerald ash borer specimens were found in any trap.

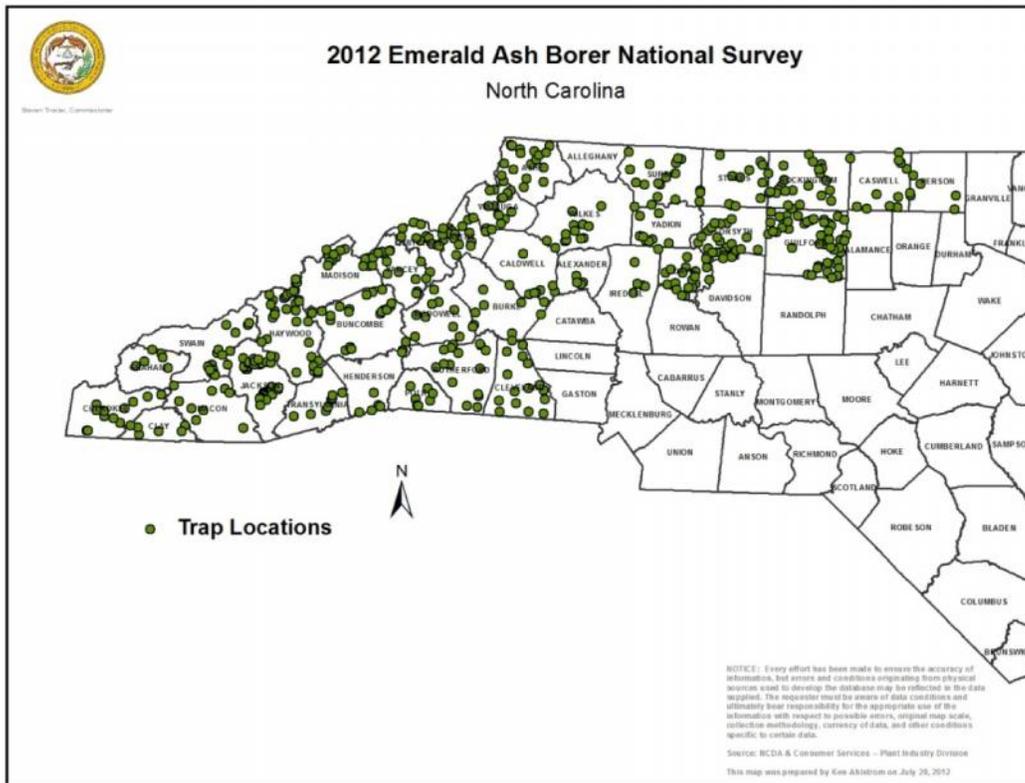


In January 2012, the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine formulated a plan to conduct a national survey in order to delimit the spread of the emerald ash borer and to determine if the borer could be found in states outside the quarantine area. In North Carolina, the original plan was to have 1500 traps placed at predetermined sites where it was thought that ash was present. A committee consisting of personnel from the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA, APHIS, PPQ), the North Carolina Department of Agriculture and Consumer Services, Plant Industry Division, Plant Protection Section (NCDA&CS, PID, PPS), and the North Carolina Forest Service (NCFS) was formed to discuss and implement a trapping survey for North Carolina. Ash trees make up less than 3% of forest in North Carolina, and most ash trees are found in the northern Piedmont Region and the Mountains. These areas are closer to known infestations of EAB in Tennessee and Virginia, therefore the committee proposed that a minimum of five-hundred traps be set out and monitored.

Early scouting for ash trees in the designated counties was conducted by NCDA&CS Field Specialists prior to leaf appearance. All ash trees were generally found in wooded areas away from inhabited areas. A very few were found on homeowner properties and permission was requested to put up a trap.

Five hundred and eighteen traps were put out during the first two weeks of April, monitored and lures replaced after six weeks at all locations. At this time the traps were examined for any suspect wood borers. All traps were removed during the first week of July. Again traps were examined for any suspect borers. During the trapping period, only five suspects were found and sent to Dr. Ken Ahlstrom in Raleigh for identification. Three specimens were click beetles and two were native buprestids. No emerald ash borers were found in any traps.

The map below indicates where traps were located.



Exotic Bark Beetles and Exotic Wood Wasps

Surveys for these pests were conducted using Lindgren funnel traps. Traps were fitted with the "wet option" for collections using recreational vehicle grade antifreeze as a killing fluid. Traps were placed in locations where pines are found in proximity to sites having public access, i. e. parks, campgrounds, race tracks, wood pulp processing plants, and in some cases, tree nurseries.

Wood wasps are pests of conifers and are native to Europe and Asia. The European Wood Wasp, *Sirex noctilio*, a native of Europe, Asia, and northern Africa has successfully established in South Africa, South America, Australia and New Zealand. In 2004 it was detected in New York state in the vicinity of Lake Ontario, and has since spread to 29 counties in NY, 11 counties in Pennsylvania, 5 in Michigan, 2 in Vermont and 1 each in Connecticut and Ohio. Most species of *Sirex* are attracted to stressed trees. These trees are often used to make solid wood packing material (SWPM). With a life cycle lasting a year or more, the insect is easily transported in SWPM such as pallets, and not be detected at the port. Based on its native range in Europe and Asia, it could become established in any climate zone in North America where pine occurs. In South America and Australia where pine is cultivated in plantations, the wasp causes significant tree mortality and is considered a major pest. The wasp has a symbiotic relationship with a fungus that it injects into the trees to weaken them, and makes them more susceptible to larval feeding. Another siricid wood wasp to be surveyed for is the Yellow-horned horntail, *Urocerus gigas gigas* (Linnaeus). This wasp, attacks mainly Norway spruce, Scots pine, larches, and occasionally Sitka spruce and Douglas fir. While not considered to be a serious pest, it is attracted to dead and highly stressed trees.

In addition, several bark beetles pose a threat to NC pine forests. Traps were set at the same locations as those for the siricid species. Target beetles were *Hylurgus ligniperda*, *Ips sexdentatus*, *Ips typographus*, and *Orthotomicus erosus*. A combination of ethanol and α -pinene is used to attract *H. ligniperda*; Ipslure is an attractant for the other three species.

Traps were serviced at approximately two week intervals because after this time the insects begin to disintegrate in the antifreeze and are more difficult to sort and identify.

In 2011, traps were placed at 38 sites in 21 counties (Cabarrus, Camden, Craven, Cumberland, Duplin, Durham, Franklin, Granville, Halifax, Harnett, Johnston, Nash, Northampton, Orange, Pitt, Richmond, Vance, Wake, Warren, Washington, and Wayne). Trapping concluded in the fall of 2011.



None of the targeted species were detected in North Carolina.

Oak Commodity Survey
Subsection: Exotic Fruit Lepidoptera

Pests surveyed were Light Brown Apple Moth (LBAM), Summer Fruit Tortrix Moth (SFTM), and Green Oak Tortrix Moth (GOT). Each of these pests is highly polyphagous, attacking numerous fruit crops. Currently blueberry growers in NC have a thriving export program, and yield losses or pest quarantines would have a negative economic impact. Surveys are conducted using Jackson traps (LBAM), delta traps (SFTM), and wing traps (GOT). Each of these traps is furnished with the appropriate pheromone. All trapping was done at working fields of twenty-five blueberry exporters located in five southeastern counties (Bladen, Cumbeland, Duplin, Pender, and Sampson). Surveys begin in May and conclude in October.

A brief description of the targeted pests follows.

1. Light Brown Apple Moth

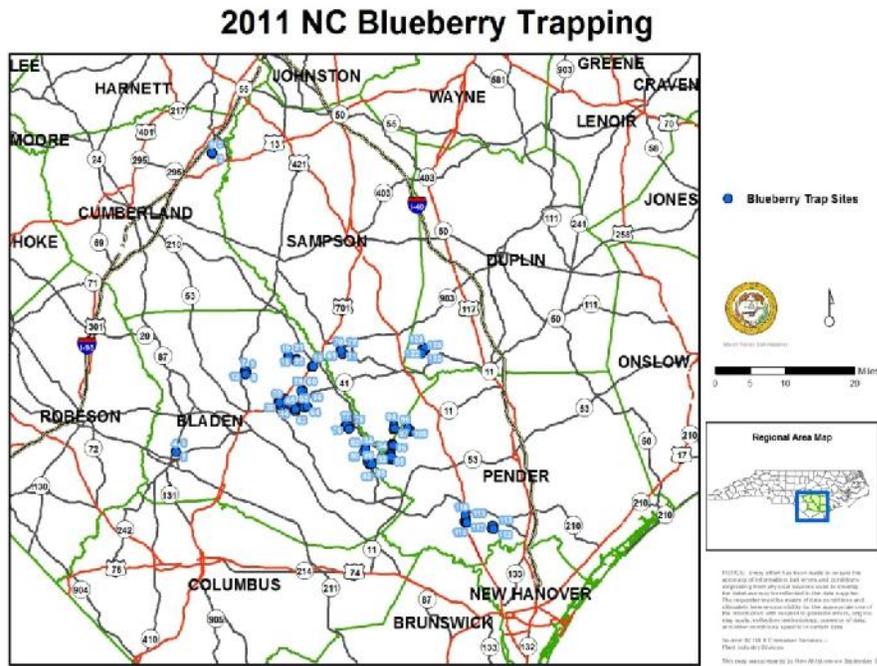
This moth is a highly polyphagous pest of over 120 plant genera in over 50 families with a preference for hosts in the Asteraceae, Fabaceae, Polygonaceae, and Rosaceae families. Host plants include apple, blueberry, camellia, grape, oak, persimmon, pine, potato, strawberry, and viburnum. This pest has been found in California and is now under quarantine in that state. In NC, the crops of concern are apple, peach, and blueberry

2. Summer Fruit Tortrix Moth

This pest has two generations per year and is a serious pest of apples, pears, and peaches. Blueberries, however, are a secondary host. The first generation larvae feed on the leaves and flowers of host plants with adult emergence occurring in June. Second generation larvae feed on the fruit. Adult emergence occurs in August. At the present time this pest does not occur in the US..

3. Green Oak Tortrix Moth

This moth is found throughout much of Europe, northern Africa, and the Middle East. It is a pest of major proportions, causing serious economic losses and mortality whenever outbreaks occur. Its major host is oak, but other tree hosts capable of being damaged by this pest are maple, beech, birch, and willow. Blueberries are also attacked. At the present time this pest does not occur in the US.



None of the target species were detected in North Carolina.

Entomological Programs

2011-2012 Movement of Live Insects for Research, Commercial or Educational Purposes

The NCDA&CS evaluated 84 federal applications, PPQ Permit 526, for the movement of live insects into North Carolina for a total of 37 different species. The large number of applications to move insects to North Carolina reflects the continued market in commercial production, sale, and movement of insects for education, entertainment, and scientific research conducted in North Carolina's academic institutions and the private sector.

2011-2012 Blueberry Export Certification Program

The Canadian Food Inspection Agency requires that all fresh blueberries shipped to Canada come from growers who participate in a Blueberry Certification Program. The program consists of monitoring and control procedures for the blueberry maggot, *Rhagoletis mendax*. Forty nine North Carolina production areas were monitored (5,500 acres total representing 96 fields) throughout the harvesting and shipping period and were issued certification documents. No blueberry maggots were detected in any of the fresh market blueberries being shipped to Canada in 2012.

2011-2012 Boll Weevil Eradication Program

Cotton was grown in 53 counties in North Carolina for a total of 798,341.63 acres during the 2011 season (See table and figure below). An estimated 13,189 traps for an average of 60.5 acres/trap were placed in the field by 11 contractors. No boll weevil was captured during the 2011 season.

County	Acreage	% of Total
EDGECOMBE	81659.30	10.23
HALIFAX	68976.67	8.64
BERTIE	50877.05	6.37
NORTHHAMPTON	45107.07	5.65
MARTIN	45055.44	5.64
BEAUFORT	41246.27	5.17
GREENE	32824.81	4.11
JONES	28086.81	3.52
DUPLIN	24691.80	3.09
CHOWAN	22230.70	2.78
PITT	21938.24	2.75
SAMPSON	21316.12	2.67
JOHNSTON	19005.70	2.38
ROBESON	18409.44	2.31
HARNETT	17868.75	2.24
BLADEN	17506.78	2.19
CUMBERLAND	17228.43	2.16
HOKE	17137.96	2.15
HERTFORD	17099.28	2.14
CRAVEN	16932.72	2.12
LENOIR	15752.89	1.97
HYDE	15490.66	1.94
PERQUIMANS	15149.53	1.90
GATES	15126.90	1.89
WAYNE	12737.58	1.60
NASH	12305.47	1.54
ANSON	9067.47	1.14
CARTERET	8347.92	1.05

County	Acreage	% of Total
STANLY	8102.08	1.01
WASHINGTON	7688.66	0.96
ONslow	6285.79	0.79
WILSON	5114.40	0.64
SCOTLAND	5040.98	0.63
COLUMBUS	4498.35	0.56
PAMLICO	4001.12	0.50
FRANKLIN	3462.33	0.43
PASQUOTANK	3361.70	0.42
WARREN	2955.50	0.37
TYRRELL	2953.20	0.37
CABARRUS	2173.70	0.27
CLEVELAND	1871.70	0.23
LEE	1534.40	0.19
UNION	1518.62	0.19
PENDER	1370.90	0.17
CAMDEN	1303.07	0.16
MONTGOMERY	1031.98	0.13
RICHMOND	1018.40	0.13
IREDELL	951.00	0.12
GRANVILLE	926.82	0.12
DAVIDSON	687.30	0.09
BRUNSWICK	530.80	0.07
ROWAN	484.60	0.06
RUTHERFORD	136.70	0.02
WAKE	103.80	0.01
LINCOLN	56.00	0.01
MECKLENBURG	0.00	0.00
Totals	798341.63	100.00

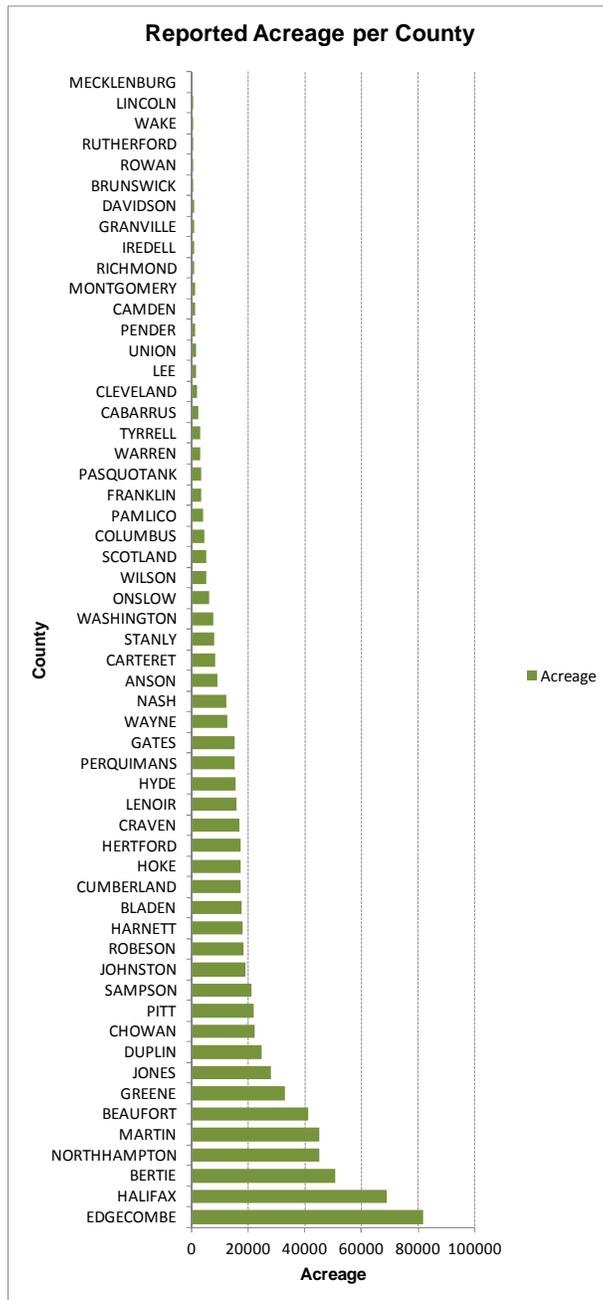


Figure 1. Reported cotton acreage for the 2011-2012 season in North Carolina (USDA Farm Service Agency)

2011-2012 Control and Eradication of the Brown Garden Snail in North Carolina.

The brown garden snail (*Cornu aspersa*) was intentionally and illegally introduced in a small area in Kill Devil Hills, Dare County, North Carolina in the mid 1980s as part of a project intended to raise and sell these mollusks to restaurants and business (heliculture farming). Brown garden snails are non native species of mollusks that can be potentially destructive pest for agriculture and specifically to the nursery industry.

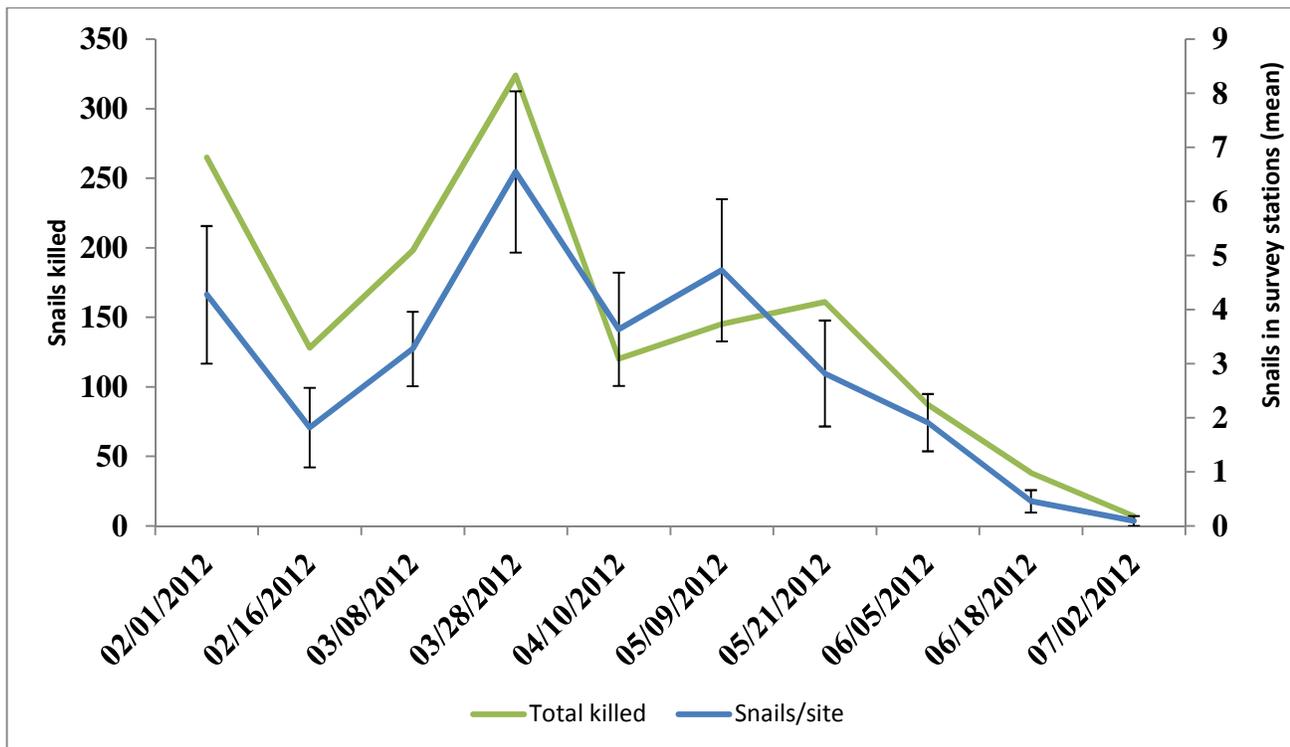


Figure 1. Brown Garden Snail (*Cornu aspersa*)

Since the BGS was reported in NC, and a small population was established in the Kill Devil Hill area, the NCDA&CS has been containing its spread with periodical applications of molluscicides (methaldehyde) and by manually killing snails. In late December 2011, NCDA&CS-Plant Industry started an integrated pest management approach to control and potentially eradicate the existent BGS population in NC. This IPM approach was based on using a more environmentally friendly product, systematically killing snails during periodic inspections and by raising awareness in the community about the importance of keeping the BGS in that area and in reducing the movement of plants and objects from the affected area to non affected areas to reduce the spread. Surveys are conducted biweekly using the already present utility boxes which provide an adequate environment for the snail (dark, humid and cool). The bait used is an iron phosphate-based bait that is normally ingested by the snails. This product will affect the snail digestive system and kill the snail by starvation in two to three days. Unused product will decompose into a fertilizer.

Results of this IPM strategy are promising. Since the implementation of this IPM approach, the population of BGS has been considerably reduced (See Figure 2). As shown in Figure 5, the use of utility boxes to survey the snail population is a very reliable survey method and provides accurate data to estimate the size of the snail population and the effectiveness of the control methods currently employed.

Figure 2. Survey results of BGS in Kill Devil Hill, NC. Total snail counts in the survey stations and total number of snail killed is shown in blue and green lines respectively



2011-2012 Outreach Program

In August 2011 the NCDA&CS-Plant Industry Division in collaboration with the United States Department of Agriculture – Animal Plant Health Inspection Service (USDA-APHIS) started an outreach program in North Carolina as part of a multistate effort to educate the public on the most important invasive forest insect pest species. The main goal of this program, known as the Forest Pest Survey Outreach Program (FPSOP), is to increase the participation of the general public in reporting invasive forest pest species to federal and state agencies. In the first months of the NC-FPSOP, preparations were made to build databases of potential groups to recruit volunteers and provide training in the identification of invasive forest pests. Outreach material was also prepared. Databases of master gardener, hiking clubs, outdoor groups, campgrounds and institutions that might be interested in this project were created. Training was provided in the identification and biology of the most important invasive forest insect pest species including the Gypsy moth (*Lymantria dispar*), Emerald ash borer (*Agrilus planipennis*), Asian longhorned beetle (*Anoplophora glabripennis*), Walnut twig beetle and thousand cankers disease of walnut (*Pytiophthorus juglandis*), and the red ambrosia beetle (*Xyleborus glabratus*) the vector of *Raffaelea lauricola*, the causal agent of Laurel Wilt disease.

Activities and training sessions include:

- Nature Conservancy group in Bald Head Island. Training provided to the staff of the Nature Conservancy facilities. Emphasis given on the identification of the red ambrosia beetle and the symptoms of Laurel wilt disease.
- Training to members of the master garden club of Clay County (Hayesville, NC).
- Training to members of master gardening club in Asheville, NC.
- Talks to several groups of 2nd and 3rd graders at the NC Arboretum.
- Outreach at the “Got to be NC festival”. A booth was set and information was provided to the general public about the FPSOP and invasive forest insect pests.

2010-2011 Imported Fire Ant Survey and Monitoring Program

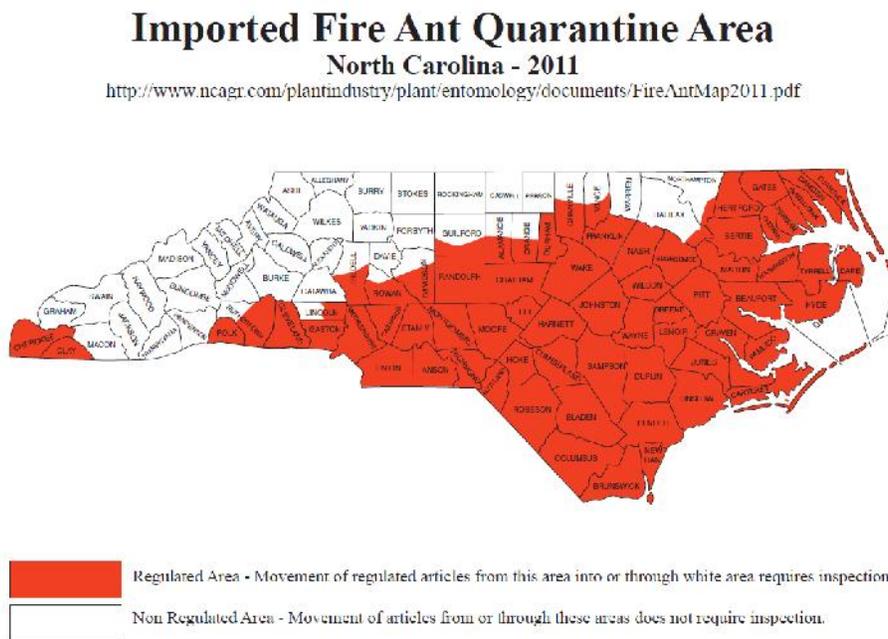
Four to seven temporary employees surveyed a total of 40219 miles in 7299 acres along the existing quarantine line in 31 counties. As a result of these surveys, no new quarantines boundaries in relation to the 2009-2010 surveys were established. A summary of these surveys is presented in the table below.

Table 1. Red Imported Fire Ant (*Solenopsis invicta*) survey results by county.

County	Miles Surveyed	Acres Surveyed	New Sites
Alamance	1160	149	136
Alexander	572	208	66
Buncombe	1233	108	4
Burke	1418	81	1
Caldwell	481	30	1
Catawba	2615	137	44
Dare	850	6	
Davidson	1676	117	161
Davie	803	529	94
Forsyth	600	91	71
Graham	1731	503.5	27
Granville	1494	138	2
Guilford	1356	154	175
Halifax	3710	372	27
Haywood	1099	286	0
Henderson	533	242	26
Iredell	1434	562	153
Jackson	1555	466	24

County	Miles Surveyed	Acres Surveyed	New Sites
Lincoln	776	54	24
Macon	1904	654	22
McDowell	1488	123	6
NorthHampton	1829	208	21
Orange	2130	270	102
Person	1488	116	6
Rowan	767	600	95
Rutherford	1148	58	16
Surry	25	85	1
Swain	1906	583.5	14
Transylvania	778	228	0
Vance	522	50	1
Warren	1138	90	12
Grand Total	40219	7299	1332

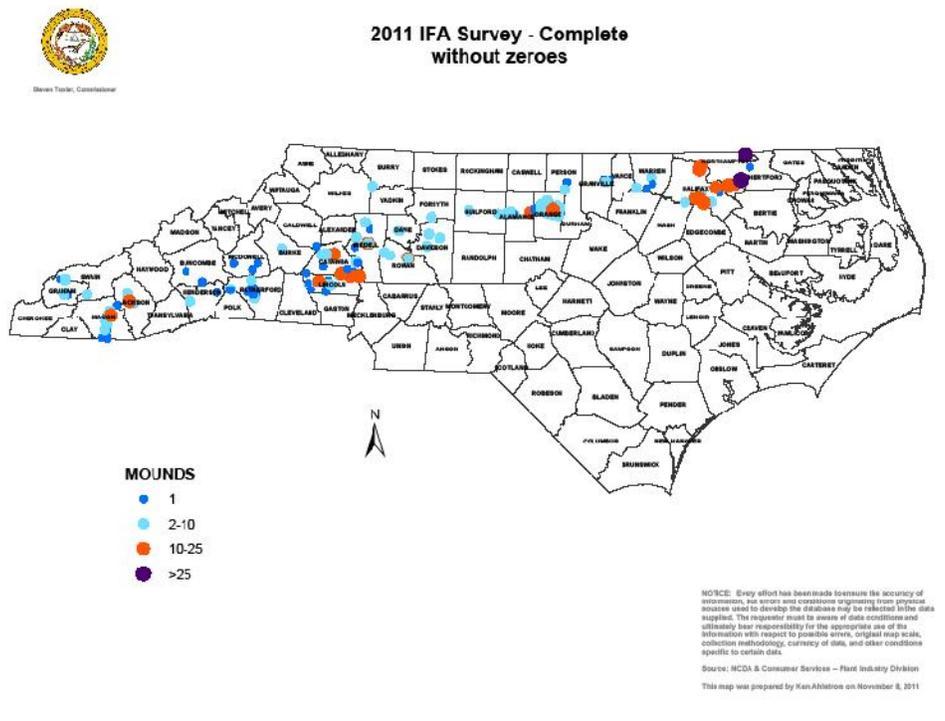
Figure 1. NC Quarantine lines established for 2011.



7,000 copies of this document were printed at cost of \$103.96 or \$0.15 per copy.

02/11

Figure 2. Survey results for 2011-2012



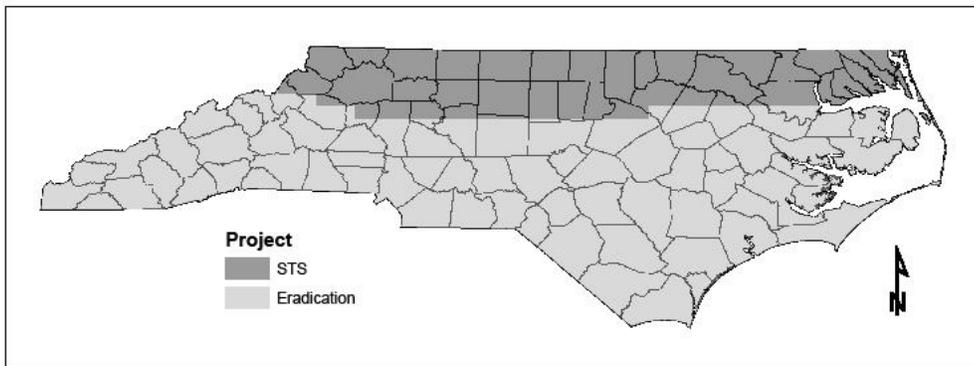
Thirty-two imported fire ant inspection blitzes were carried out at three locations across the state: Weigh stations in Halifax (I-95 corridor in Halifax County), Mount Airy (I-77 corridor in Surry County) and Hendersonville (I-26 corridor in Hendersonville County) in support of the federal fire ant quarantine on movement of articles regulated by the quarantine policies. One hundred fifty five trucks were inspected and soil samples from potted plants were collected for analysis from 26 trucks. Nurseries that were not in compliance with state and federal regulations were contacted.

2011-2012 Gypsy Moth Slow the Spread (STS) and Eradication Program

In 2011-2012 the North Carolina Department of Agriculture and Consumer Services’ Plant Industry Division carried out an extensive survey, treatment, and regulatory program for Gypsy Moth. The program was divided into two separate areas, Slow the Spread (STS) and Eradication. The 2011-2012 Project Boundaries are shown in the map below.



Male gypsy moth



2011 Gypsy Moth Trapping Results

The presence and density of gypsy moth populations in North Carolina is determined by the placement of numerous relatively small traps. These traps are baited with the female sex pheromone, which is attractive to adult male gypsy moths. If a population is present, a portion of the adult males are attracted to and immobilized in NCDA&CS traps.

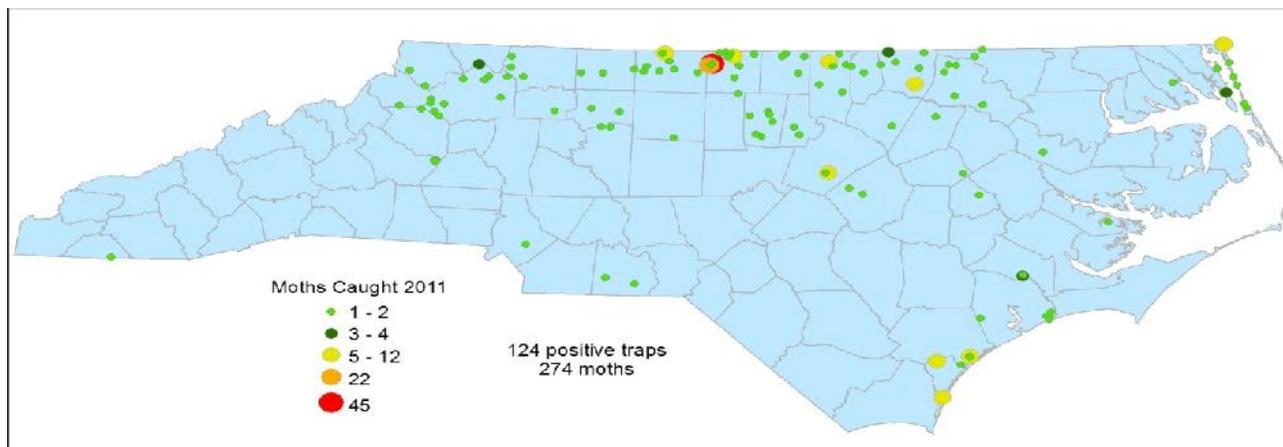
In the Slow the Spread area, traps were placed on a 3-kilometer base grid with 1-Kilometer and 500-meter delimit grids in areas that had high catches or treatments in 2010. The Slow the Spread area was divided into 32 separate trapping bid units. Eleven private contractors placed and removed 9,198 traps at an average cost of \$15.55 per trap.

Two seasonal and three full-time employees downloaded and managed STS electronic trapping data, and conducted quality control checks on 19 percent of the traps placed in STS. Several serious data violations were found and penalty action was taken.

9,917 traps were placed and removed in the USDA-APHIS-funded program area. These traps were placed on a 3-kilometer base grid with 500-meter grids in areas of concern. Of these traps, the North Carolina Forest service placed and pulled 1,103 traps in ten counties. Eighteen temporary employees (most working partial schedules) and twenty permanent NCDA&CS personnel set traps in the remaining counties. Numerous other cooperating agencies were involved, including NC State Parks, Fort Bragg, Sunny Point MOT, and NC Port Authority. Between the STS and APHIS programs, a total of 19,210 traps were deployed in 2011 with 274 moths caught in 124 positive traps.



Gypsy moth trap.



The Onslow County infestation is located entirely on road-less Bear Island, a remote barrier island near Camp Lejeune and entirely within Hammocks Beach State Park. First detected in 2006, it was delimited for several years prior to its first treatment with Gypchek in 2010. The gypsy moth’s introduction and successful establishment are surprising given the island’s remoteness and relative infrequency of the primary host, live oak. Nonetheless, within three years of detection, this gypsy moth population had grown exponentially, resulting in 2,990 moths caught in 2009 alone.

Survey and control activities have been challenging. The harsh field conditions and lack of road access have challenged the stamina of NCDA&CS employees over the last five years. More challenging is the presence of a state rare Lepidoptera endemic to the area, the Crystal Skipper, which could be adversely impacted by some gypsy moth control options. NCDA&CS and NC State Parks have cooperated to ensure that successful control activities are carried out and do not harm the Crystal Skipper.

The block was most recently treated in 2011 with Gypchek (400 acres aerially) and the mating disruption product SPLAT-GM (25 acres from the ground). Moth captures were modest in 2011. However, because of the confounding presence of SPLAT-GM in 2011, the success of the 2011 treatments cannot be evaluated until traps are removed during the 2012 field season.

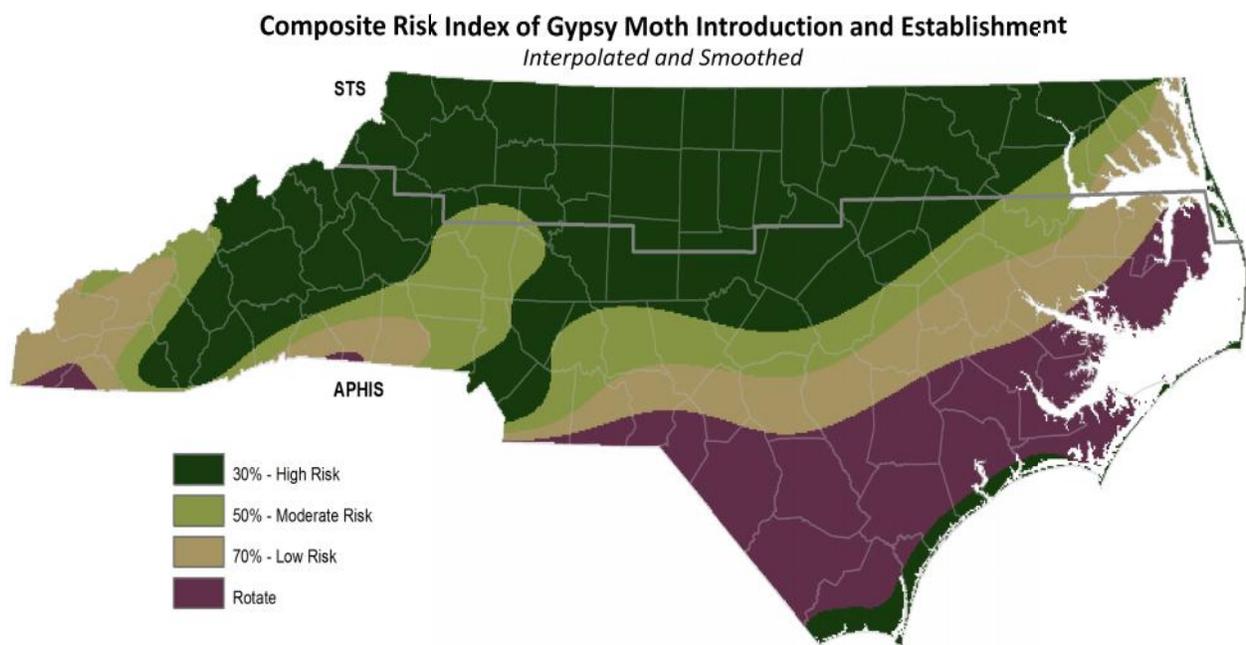
Risk Assessment

Shortly after the conclusion of the 2011 trapping season, USDA-APHIS indicated that FY2012 funding would be significantly decreased from FY2011. It became clear that NCDA&CS would be unable to fund an annual, comprehensive, 3-kilometer-grid survey throughout the USDA-APHIS program area in 2012.

Program personnel explored several options to scale back the gypsy moth survey, including increasing the grid spacing and reducing the survey frequency to every other or every third year. However, these options implicitly assume that North Carolina is homogenous in risk of introduction and establishment of gypsy moth. In an environment of less than ideal funding, the frequency of survey activities is determined by the level of risk. Risk in this context refers to the composite likelihood of gypsy moth introduction, both artificially and naturally, and of post-introduction establishment of a gypsy moth population.

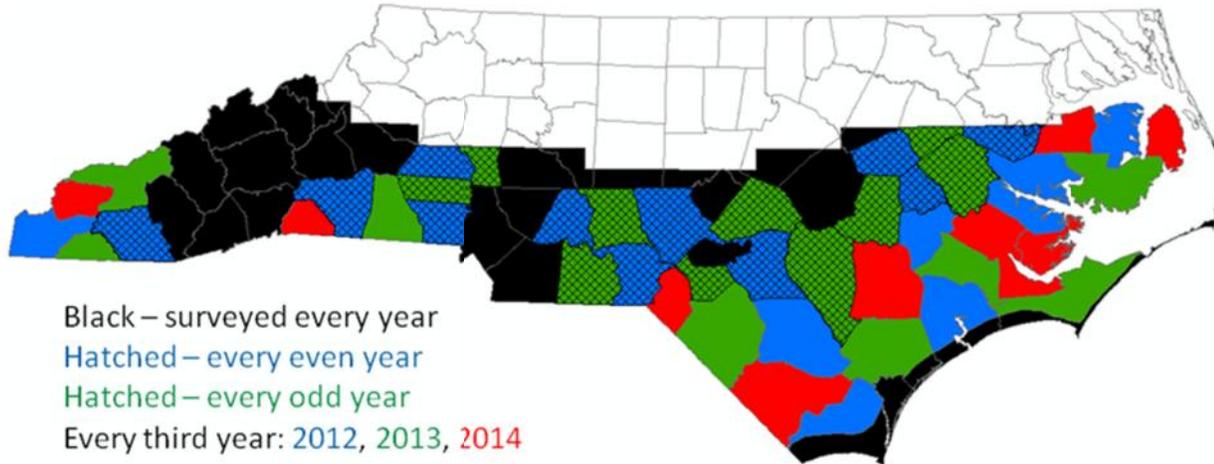
A weighted overlay analysis was chosen as the best method for “adding” the various data layers to create the final composite risk layer. For risk of introduction, a variety of data types were used, including proximity to high moth capture areas, campgrounds, ports, and highway rest stops. For risk of establishment, a US Forest Service-produced shapefile modeling the quality of gypsy moth habitat was used³.

The final product quantitatively categorizes the risk of gypsy moth introduction and infestation throughout the state. It allows for the prioritization of surveying activities at any funding level.



¹Morin, Randall; Liebhold, Andrew; Luzader, Eugene; Lister, Andrew; Gottschalk, Kurt; Twardus, Daniel. 2005. **Mapping host-species abundance of three major exotic forest pests.** Research Paper NE-726. Morgantown, WV: U.S. Department of Agriculture, Forest Service, Northeastern Area.

Master Survey Plan, NCDA&CS APHIS Gypsy Moth Program



Alternate Life Stage Surveys

NCDA&CS conducts ground surveys of locations with unexpectedly high moth captures in an attempt to locate life stages other than the male moths captured in the traps. Egg masses, buff-colored, hairy, and the size of a quarter, are the most common alternate life stage found, though spent pupae and larvae are occasionally located. If found, an alternate life stage confirms that there is a reproducing population at that location. Together with data from gypsy moth traps, this information helps determine whether control measures are necessary at a given location.

After reviewing the gypsy moth monitoring data, eight locations were identified for alternate life stage surveys. NCDA&CS personnel conducted these surveys during the fall of 2011, and successfully found alternate life stages in one of these locations, the future Ruffin block.

2012 Gypsy Moth Treatment

Lower moth captures in 2011 resulted in a greatly reduced treatment program in 2012. The 2012 gypsy moth treatment program consisted of one 1,590 acre block located in a rural area approximately eight miles west of Yanceyville straddling the Caswell/Rockingham county border.

In keeping with NEPA regulations, one mailing was sent out informing landowners of the proposed treatment and inviting them to attend a public meeting. At 14 people, attendance at the February 16 meeting was exceptional given the block's small size and scant population. A second reminder mailing was conducted approximately three weeks prior to the treatment.

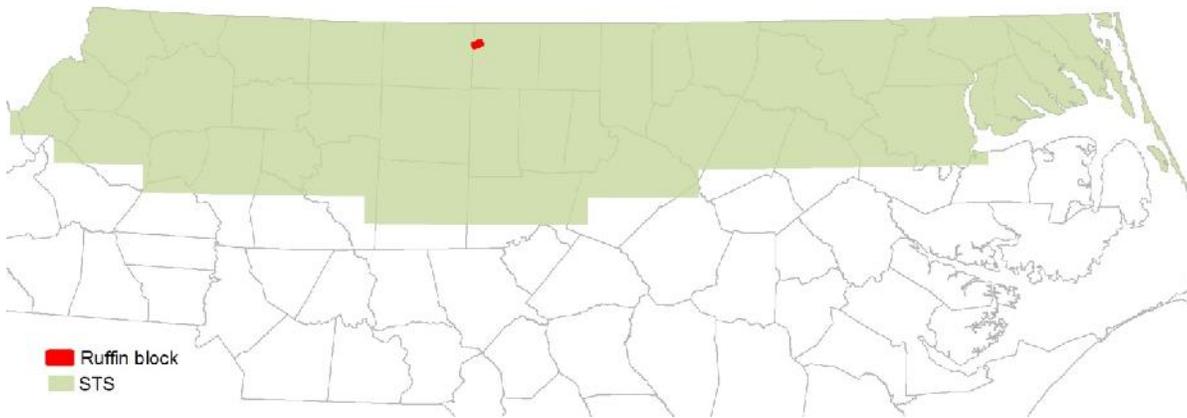
In collaboration with the US Forest Service, an Environmental Assessment was composed. A Finding of No Significant Impact (FONSI) was obtained in late March. No National Pollutant Discharge Elimination System (NPDES) permitting was required as North Carolina's minimum annual treatment area threshold exceeded the treatment acreage. A request for exemption from North Carolina regulations prohibiting the application of pesticides over and near dwellings was applied for and granted. Correspondence and data were submitted in support of the Mating Disruption contractor's pursuit of a Congested Area waiver from the Federal Aviation Administration.

The program maintained a proactive stance on public notification so that all members of the public have the opportunity to remain informed of program activities before, during, and after treatments. An email listserve and Twitter were implemented, in addition to the more customary mailings, phone calls, and personal contact. As a result, the number of complaints received during the course of the project was maintained at a low level.

Because of an exceptionally warm winter and spring, the Ruffin block was treated on May 11, approximately five weeks ahead of schedule based on 30 year average weather. The higher dose of 15 grams per acre of disparlure was used on the 1,590 acre block due to the modestly high moth captures and presence of isolated alternate life stages. The success of the block will be evaluated with a delimit grid in 2013.



Gypsy moth egg mass found in Macon in 2009



2012 gypsy moth treatment block

2011 Gypsy Moth Regulatory Program

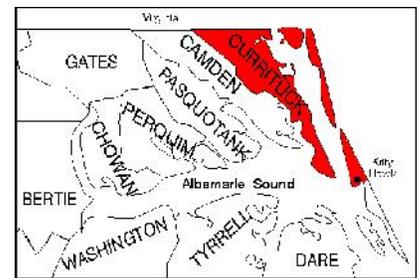
The gypsy moth program also seeks to mitigate the risk of introduction through a comprehensive regulatory program. An area that is generally infested is quarantined such that the movement of certain high-risk articles is strategically restricted and regulated. In North Carolina, Currituck and a small portion of Dare Counties were quarantined in 1988. A map of the US quarantine is below.

Regulated articles may be moved from quarantined to non-quarantined areas if the appropriate personnel undergo training and submit to the stipulations of a compliance agreement with NCDA&CS. These compliance agreements require inspection and/or treatment of articles to ensure that they are free of gypsy moth life stages.

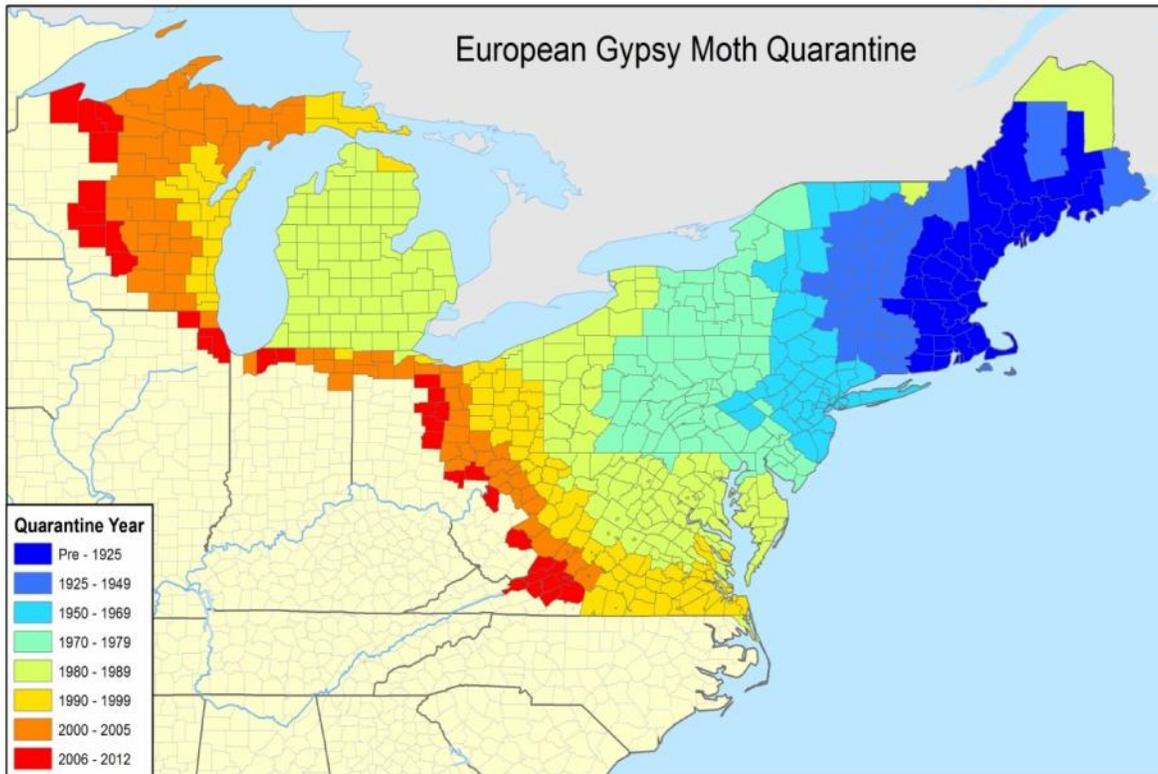
Public education efforts are also an important part of the regulatory program. Regulatory personnel regularly visit NC Cooperative Extension and NC Forest Service offices to update county personnel. Also, program personnel monitor all high-risk locations in the STS program area by placing one or more gypsy moth traps.

Sustained downward economic trends continued to result in operational and personnel downsizing, especially in the timber industry. Multiple compliance agreements were altered to reflect these changes.

During 2011-2012, continued focus was placed on inspection of compliance agreement paperwork. Timber mills, firewood dealers, moving industry offices, and Christmas tree lots were visited to ensure that all parties were meeting their legal obligations. While the majority of companies were compliant, there were several incidences of non-compliance. Each incident of non-compliance was followed up, often in cooperation with the VDACS Gypsy Moth Program, with additional training and inspection to ensure future compliance.



North Carolina quarantine.



2011-2012 Sweetpotato Weevil Trapping Program

NCDA&CS personnel continue the statewide comprehensive sweetpotato weevil trapping survey on all commercially grown sweet potato fields. Traps containing the female sweetpotato weevil pheromone are placed at a density of one trap per ten acres with a minimum of two traps per field. In 2011-2012, a total of 9,993 traps were placed in 3,552 fields.

Surveys were also conducted in sixty four commercial sweetpotato storage and processing facilities and sweetpotato micro-propagation operations throughout the state. Surveys in these facilities were done on a year-round basis and traps were placed inside and outside the main entrances. No sweetpotato weevils were detected.

Nursery Certification Program

NCDA&CS' Plant Protection Specialists inspected 3,950 nursery dealers and nurseries during the 2011-12 season. Eight Stop Sale/Movement notices were issued to prevent the sale of infected or prohibited plants. These plants were either treated or destroyed.

The data show a significant reduction in both the number of nurseries and the number of acres that were certified. This drop is believed to be a reflection of the downturn in the economy and its impact on the nursery industry. A similar reduction was also seen in the number of Nursery Dealer Certificates issued (a loss of 415). Several chain stores chose not to offer plants for sale at their locations and therefore did not renew their certificates. Most of these chains carried a very limited selection in past years. It is not believed this change had a large impact in the reduction of certified nurseries.

A license issued by the NCDA&CS is required by any person selling nursery stock in North Carolina. Nursery stock is defined as "all wild or cultivated plants or parts thereof, trees, shrubs, vines, bulbous plants and roots, grafts, scions and buds". Excluded in North Carolina's definition of nursery stock are "annual plants; cut flowers; tree, field, vegetable, flower or other true seeds; decorative plants or plant parts without roots not intended for propagation; and perennial plants intended for indoor use that are produced in North Carolina." A *nursery license* is required for any person growing and selling nursery stock whereas a *nursery dealer license* is required for any person obtaining and re-selling nursery stock. These licenses certify that plant material has been inspected for and is apparently free from potentially harmful quarantine pests and must be renewed yearly.

The NCDA&CS Plant Protection Section licensed 1,304 nurseries and 3,950 nursery dealers during the 2012 fiscal year (Table 1). Of the 1,304 nurseries, 611 were registered nurseries and 693 were certified nurseries. A *registered nursery* has less than one acre of nursery stock and does not sell outside the state. A *certified nursery* has one or more acres of nursery stock and/or sells outside the state.

Table 1. Number of NC nursery and nursery dealer licenses by year^z

Fiscal Year	Number of Licenses by Category			Total Number of Licenses	
	Registered Nursery ^y	Certified Nursery ^x	Nursery Dealer ^w	Nurseries (Registered & Certified)	Nurseries & Dealers
2010/2011	703	871	2,540	1,574	4,114
2011/2012	611	693	2,646	1,304	3,950

^zData based on receipt of license fees.

^yRegistered nursery – a location with less than once acre of nursery stock with no sales outside the state.

^xCertified nursery – a location with one or more acres of nursery stock and/or sales outside the state.

^wNursery dealer – a location where nursery stock is sold, usually to the end user, but not actually grown.

Approximately 15,500 acres of nursery stock were reported for fiscal year 2012 (Table 2). Acreage is based on condensed, saleable stock and thus does not include roadways or non-production acreage of the nursery. Approximately 37% of the total acres was field stock, 16% was container stock, 39% was turf, and 7% was other (such as herbaceous perennials, strawberries, woody transplants, etc.).

Table 2. Acreage of nursery crops by production/crop type

Fiscal Year	Field Stock	Container Stock	Turf	Other	Total
2011/2012	5,800	2,550	6,050	1,100	15,500

The primary objective of Plant Industry's Nursery Program is to facilitate the movement of nursery stock while preventing the introduction and spread of quarantine plant pests into and within North Carolina. The movement of infested nursery stock represents one of the ways plant pests may be moved from one location to another and has the potential to directly impact both wholesale and retail nursery operations. Given the potential threat of introduced plant pests, including diseases, insects and weeds into North Carolina, along with the potentially devastating impact this threat could pose on North Carolina's nursery industry, a web-based application, *NCPlants*, has been developed. Nurseries and nursery dealers enter all

plant acquisition sources into *NCPlants* to provide an electronic database to help track and isolate source(s) of a pest outbreak should it occur. Prior to this initiative, this information had only been maintained in hardcopy format and as such not readily useable in the event of a pest outbreak thus extending the time to identify the source(s) and isolate the problem. Effective with the 2012-13 nursery certification period, NCDA&CS requires all nurseries to record plant acquisition information in *NCPlants* as part of the licensing process. This requirement was initiated for nursery dealers for the 2011-2012 certification period. Information in *NCPlants* will only be available to NCDA&CS personnel and will assist staff in more effectively tracking nursery plant material from in-state and out-of-state sources in the event of a significant pest outbreak.

Stop sale/movement notices are issued when high levels of pests and/or prohibited plants are noted. Plants can either be treated and/or destroyed when a stop sale/movement notice is issued. During fiscal year 2012, eight stop sale/movement notices were issued.

Phytosanitary Certification Program

2011-12 Export Certification Program

Within the Export Certification Program, Plant Protection Specialists issue phytosanitary certificates to growers and/or brokers to facilitate movement of agricultural commodities to other states and to other countries. Phytosanitary certificates indicate that inspections and other specific requirements of the importing states or countries have been met. State certificates are used for movement within the U.S., and federal certificates are required for movement to another country. Countries and states vary greatly in what they require for various types of commodities such that careful research and interpretation of requirements are needed for each request for phytosanitary certification. Primary use of the USDA PCIT (Phytosanitary Certificate Issuance and Tracking System) to issue federal certificates began in October 2009. Federal certificates were issued for the movement of commodities to 91 countries, while state certificates were issued for 18 states and Puerto Rico. The majority of phytosanitary certificates issued were for lumber, tobacco, cotton, cotton seed, Christmas trees, peanuts, nursery and greenhouse plants, sweetpotatoes, and sweetpotato cuttings.

A phytosanitary certificate provides documentation that a plant, plant part, or plant-based product has been inspected and is apparently free of harmful pests. Each state and country has very specific import phytosanitary requirements that are tailored to protect their agricultural industries and natural environment from potentially harmful pests.

The NCDA&CS Plant Protection and Export Certification Specialists facilitate interstate and international movement of plants, plant parts, and plant-based products by issuing both state and federal phytosanitary certificates to NC growers and brokers. State and federal phytosanitary certificates are issued for interstate and international movement, respectively. The NCDA&CS is responsible for implementing the state export program while the USDA is responsible for implementing the federal export program. However, the NCDA&CS works in collaboration with the USDA to issue federal phytosanitary certificates to support international export of plant-based products from NC.

The USDA PCIT (Phytosanitary Certificate Issuance and Tracking) system has been used to issue both federal and state phytosanitary certificates by NCDA&CS since October 2009. The number of federal and state phytosanitary certificates issued using the PCIT system is included in Table 1. NCDA&CS staff issued 4,252 federal phytosanitary certificates and 206 state phytosanitary certificates in fiscal year 2011/2012. The number of federal phytosanitary certificates issued in 2011/2012 was 50% greater than issued in 2010/2011.

Table 1. Number of phytosanitary certificates issued through the PCIT^z system

Fiscal Year	Federal				State
	Plant or Plant Part	Re-export	Processed Plant Product	Total	Total
2009/2010 ^y	1759	24	0	1783	205
2010/2011	2781	21	0	2808	323
2011/2012	4221	13	18	4252	206

^z PCIT = Phytosanitary Certificate Issuance and Tracking (USDA web based application)

^y Use of PCIT began in October 2009

Plant Conservation Program

NORTH CAROLINA PLANT CONSERVATION BOARD

The Plant Conservation Program(PCP) meets quarterly with members of the NC Plant Conservation Board whose 7 members are appointed by the Governor and the Commissioner of Agriculture. Recent legislative actions by the NC General Assembly created and revised regulations under the purview of the Plant Conservation Program and Board. Some of these changes need further clarification from the Board NCDA & CS legislative staff prior to final implementation.

During the past year there have been a couple of changes to the list of Board members. Dick Bir retired in December of 2011 and was replaced by Dr. Alexander Krings who had been serving on the Scientific Committee for approximately ten years.

NORTH CAROLINA PLANT CONSERVATION SCIENTIFIC COMMITTEE

The Program continues to meet regularly with members of the NC Plant Conservation Scientific Committee. This 7 member committee consists, primarily, of positions designated to the committee by law. More recently, the Committee has begun to focus on commercially traded plants.

PLANT CONSERVATION PRESERVE SYSTEM

The Plant Conservation Program and Board have the regulatory authority to establish Plant Conservation Preserves to protect imperiled plant species. These Preserves are the only state-managed lands selected and designed specifically for plant conservation purposes. The Preserve system currently consisting of 21 Preserves distributed across North Carolina (see map below); this is two more than last year. Cedar Mountain Bog, a 40 acre tract in Transylvania County, was purchased for the protection of mountain sweet pitcher plant (*Sarracenia jonesii*). The newest preserve is the Butner Cedar Glade, a six acre tract; it was gifted to the state by the town of Butner in Granville County.



During the year, two Preserves were expanded with purchases of key tracts from neighboring landowners. Expansion occurred at the following Preserve:

- (1) Eastwood Preserve – Moore County

Expansions are pending in the following areas:

- (1) Boiling Spring Lakes

PRESERVE FIELD TRIPS

Although Preserves are not generally open to the public due to concerns about poaching, a number of field trips were lead by Plant Conservation Staff and partners to selected sites. Preserve tours were conducted at Big Pond Bay, Boiling Spring Lakes, Rocky River-Morgan's Bluff, Hebron Road, Cedar Mountain Bog, Pondberry Bay, and the Eno Diabase Sill. A combined Durham Creek Week Clean-up and tour was held at Hebron Road. Most notably was the tour at a proposed preserve at Redlair Farm and Forest among the big leaf magnolia (*Magnolia macrophylla*).

NATURAL HERITAGE TRUST FUND GRANTS

Nearly all Plant Conservation Preserve acquisitions are funded by the NHTF. Applications were submitted for consideration in the spring of 2012; however, no new grants were awarded during the past year due to lack of funding. The list of applications included the following:

- (1) Cedar Mountain Bog Addition-Fisher Tracts
- (2) Eastwood PCP-Harris Tract
- (3) King Creek Bog-Swing Tract
- (4) Hebron Road-Formerly Danube Addition

SITE ACQUISITION PLANNING

A systematic and comprehensive evaluation of site protection needs was updated this year. This "Portfolio of Important Plant Conservation Areas" continues to guide our efforts in working with land owners and managers across the state to better protect these critical sites. PCP Staff has coordinated with the NC Natural Heritage Program staff to add a new field in their database that tracks attributes of special importance to PCP acquisition efforts and planning.

UNITED STATES FISH & WILDLIFE SERVICE (USFWS) PARTNERSHIP

The Plant Conservation Program and USFWS continued a long-standing cooperative agreement related to the recovery of endangered and threatened species in North Carolina. Grant funds obtained under this cooperative agreement provide critical funds to North Carolina each year. This funding covers research specialist, Lesley Starke and a second research specialist position that was filled as of July 1, 2012 by Yari Johnson. A portion of the remaining funds have funded two temporary employees, Jesse Phillips and Jenna Anderson, during the majority of this period.

PARTNERSHIP PROJECTS

The Plant Conservation Program is a member of several statewide or regional conservation partnerships and staff participates in these partnerships as time allows. The PCP has also continued to work closely in partnership with conservation organizations and land trusts across the state in land acquisition and management. Also of note, PCP has expanded its partnerships with the NC Museum of Natural Science, the NCDA&CS Research Stations, and the NC Forest Service(NCFS) offices and personnel around the state. In addition, staff regularly reaches out to the public with special presentations and by filling information requests.

PLANT CONSERVATION PRESERVE MANAGEMENT & MONITORING ACTIVITIES

The Program continues striving to adequately manage Preserves for the benefit of the rare plant species and habitats present on these sites and to conduct sufficiently detailed monitoring to determine the status of rare species at these sites.

The four member staff conducted 21 different prescribed burns during the year including two night burns. Each burn involved significant planning and preparation as well as mop-up after the burns were conducted. An additional 6 prescribed burns were completed with the help of partner organizations and the NCFS. At least one new rare species was located as a result of these burns: state threatened thick-pod white wild indigo (*Baptisia alba*) was discovered as a new species at Mineral Spring Barrens.

An unexpected success came from a minor equipment issue at the Ochlawaha Bog Preserve: in July of 2011, months after hauling out an entrenched backhoe, PCP staff discovered hundreds of Bunched Arrowhead rosettes. By August of 2011, the rosette count had reached over 1,000. Plots were established by PCP Staff, with the help of a volunteer steward. PCP staff

revisited these plots in April of 2012, the majority of which had flowering plants present. On the nearby Bat Fork Preserve, staff has continued to combat an infestation of the highly invasive Canary Reed Grass.

Staff revisited plots established last year at Pondberry Bay Preserve in conjunction with restoration activities designed to benefit the federally endangered Pondberry, a species found at only 3 sites in NC. Pondberry plants that were exposed to greater sunlight by tree thinning around them showed evidence of drought stress when observed in late summer of 2011. This was also seen in plants that extend beyond the primary clump into greater sunlight on the north side of the bay. These plots were observed again in July 2012 following spring prescribed burning; the burned plants appeared very robust with vigorous growth regardless of sun exposure. Several plants were observed growing taller than the scorched stem left after the burn.

Staff organized a field trip with NC NHP staff and Friends of Plant Conservation members to relocate another rare species at Pondberry Bay Preserve: the Sandhills milkvetch (*Astragalus michauxii*). This trip was successful in that 12 plants, the most ever, were found in one of the previously documented sites; however the second subpopulation was not rediscovered, possibly due to the lack of fire for many decades. PCP staff has since returned to thin hardwood tree species from around the few plants. Another successful rediscovery worth reporting is the single *Litsea* shrub in the bay.

Also at Pondberry Bay, approximately 150 acres of timber was salvaged, sold, and cleared for reforestation as a result of a wild fire. Reforestation of the area was completed during this year.

The PCP staff has been working collaboratively with Dr. Jeff Glitzenstein, Research Associate and Beadle Fellow at Tall Timbers Research Station in Florida, to study the effects of mechanical restoration of pine savanna habitats at two PCP Preserves: Boiling Spring Lakes and Hog Branch Ponds. Previously established ground cover plots in several areas of the Boiling Spring Lakes Preserve were re-censused in June and July of 2012. While we expect this research to have broad and long-term implications, an immediate benefit has been the field surveys conducted by Dr. Glitzenstein in parts of the Preserve where he has thus far located 82 new populations of rare plants.

Management was off to a quick start at the newly acquired Cedar Mountain Bog. PCP staff and an additional work crew of 8, funded through partnership with Carolina Mountain Land Conservancy and USFWS, launched a 2 week-long attack on the invading white pine population around the bog perimeter. This bog is home to the federally and state endangered Mountain Sweet Pitcher Plant (*Sarracenia jonesii*) as well as several other rare species. Concurrent with this effort, a systematic thinning of shrubs and other woody plants was initiated in the bog itself. PCP staff was guided in this thinning by photographs taken 30 and 40 years ago in a significantly more open bog filled with ferns, orchids, and records of other great finds. Before removing the encroaching woody vegetation, PCP staff first established a transect so that all removed stems could be measured, and documented. In spring of 2012, PCP staff, with the help of NCFS, burned the uplands of the bog allowing some fire to penetrate the bog itself. The results of this management was increased light and nutrient availability to the herbaceous species in the bog which sported greater flowering from the pitcher plants than has been recently recorded. Unfortunately, during a follow-up visit, Atlanta Botanical Garden's Conservatory Director, Ron Determann determined that there were no viable seeds produced by the *S. jonesii* plants.



The "Meadow" View from left to right: 1975, 2011 pre-management, 2012 after preliminary restoration and fire.

An additional PCP staff workday was held to continue thinning the bog perimeter wall of tall, dense woody vegetation and to build dams in the small streams that circumnavigate the bog to slow the flow of the stream and allow for more water storage.

Large piles of trees, brush, invasive plants, and trash were cleared from Hebron Road Preserve in Durham with numerous volunteer workdays in collaboration with the Eno River Association who continues to graciously open up their extensive volunteer network to PCP. The Eno River Association has also provided volunteer support for workdays at the Eno River Diabase Sill Preserve, also in Durham.

PCP staff worked with Will Cook of Duke University, and Harry LeGrand of NHP to focus on a mysterious invasive species found on the new Butner Cedar Glade Preserve. We concluded it was waxyleaf privet (*Ligustrum quihoui*) a species that has been poorly documented in the US. This report appears to be the first of its kind in NC. Staff conducted preliminary control operations by mechanically cutting most mature stems. PCP staff also took the opportunity to cut back several relatively thin patches of sacred bamboo (*Nandina domestica*).

Beaver have returned to at least two PCP Preserves: (1) Hebron Road in Durham County- beavers impounded Cub Creek which runs on the property, but due to effects on a city sewer easement, they may need to be removed, and (2) Tater Hill in Watauga County- beavers reactivated a dam in a former lake basin which has coincided with a good season for both Gray's Lily (*Lilium grayi*) and *Geum geniculatum*. With their return, beavers have taken up their former important role on the landscape, in part creating and maintaining habitat for a suite of plant species that have become rare.

PCP staff has also been able to expand collaborations and management partnerships with other land managers with rare plants in the Piedmont. For instance, PCP has developed a stronger partnership with the NCDA&CS Research Stations, who own and manage the Picture Creek Diabase Barrens in Granville County, the world's largest population of smooth coneflower as well as a large collection of other rare plant species. The enhanced working relationship between PCP and the research stations has already resulted in fire management on portions of the site earlier in the year. PCP preliminary estimates suggest the smooth coneflower population may have expanded by over 3,000 flowering individuals as a result! The Eno River Association's Blue Indigo Slopes provides a similar example. This Preserve is home to hoary puccoon (*Lithospermum canescens*) and Wild Blue Indigo (*Baptisia australis* var. *aberrans*). During the year, PCP staff and Eno River Association volunteers have established fire lines which were later used by PCP staff for a prescribed burn. The Eno River Association has two years of pre-burn data from 2008 and 2009 as well as post-burn stem counts for the *Baptisia* so that the impacts of our collaborative management can be tracked.

STEWARD ACTIVITY

Many of the management projects at the Durham Preserves have been enhanced with the reliable help from three volunteer stewards who travel from Wake County to participate in a panoply of activities including, but not limited to, prescribed burning, trash pick-up, invasives control, seed plot establishment, seed collection, etc. Smooth coneflower seeds that were collected last summer were grown by Herb and Pat Amyx at their home for the purpose of reintroduction. Currently, it seems possible that these efforts could double the size of one of our smallest Smooth Coneflower subpopulations.

Rainfall and water level data were collected on a weekly basis starting in August of 2010 through August of 2011 at the Bat Fork Bog thanks to volunteer steward, Tom Baugh. These data are being analyzed by PCP staff to better understand the annual water table pattern at the Preserve, home to federally endangered Bunched Arrowhead (*Sagittaria fasciculata*).

REGULATORY PROGRAMS

The Program is responsible for the protection and conservation of 419 plant species across NC, of which 27 are also federally protected. Program staff meets quarterly with an interagency panel to review permit requests for projects affecting these protected plant species. Over 30 permits were issued and several additional requests were evaluated.

Twice in 2011 law enforcement in the city of Boiling Spring Lakes confiscated poached Venus flytraps and turned them over to the PCP. A total of 103 flytraps of variable sizes/ages were replanted in PCP Preserves. During the 2012 annual flytrap monitoring, PCP Staff saw that several of the bigger replanted flytraps had flowered and all were looking robust.

AMERICAN GINSENG

American Ginseng harvest and exports from North Carolina continued under regulations adopted by the N.C Plant Conservation Board. Without monitoring by the Program, harvest and export from North Carolina will not be allowed by federal authorities who have listed this plant under the Convention on International Trade in Endangered Species (CITES).



NCDA&CS certified 12,213 pounds of wild collected ginseng during 2011, 17 pounds of wild simulated ginseng, and 26 pounds of Woodsgrown ginseng. The amount of wild collected ginseng has declined consistently since 2007 with the exception of the 2011 season. There was a total of 12,758.65 pounds harvested during the season consisting of Wild, Wild-Simulated, and Woodsgrown. A total of 36 license permits were issued during the 2011 ginseng season and excludes a license requirement for non-resident individuals who purchase from registered NC Ginseng Dealers. From these dealers, there was a total of 10,394 harvester/digger entries, 5,842 Harvest Record forms, 1,331 Purchase Record sheets received, 280 Export Certification entries with a total of 12,259 pounds, and 71 Dealer-Dealer entries.

As a result of reporting form changes and requirements, two ginseng dealer meetings were held last August in Crossnore and Sylva. The majority of the registered ginseng dealers participated in one or both meetings where PCP staff discussed new rule changes and held open question and answer periods.

Plant Pathology Program

EXPORT: Disease certification requirements and distribution information

Most agricultural commodities exported to foreign countries must be certified to meet certain plant-pest requirements. Countries differ as to what is important in regard to plant-pest risk. The Plant Pathologist received and handled requests from Field Specialists and NC USDA-APHIS-PPQ personnel for assistance with interpretation of plant disease and nematode certification requirements, development of specific certification procedures and protocols, and determination of disease organism distribution. Examples of specific issues during this reporting period include: blueberry fruit to China; grape cuttings to Chile; inquiry about sampling for pinewood nematode prior to felling pine trees for export; clarification of new requirements for shipping white potatoes to Canada; review of new Canadian requirements for shipping root crops; blueberry and raspberry plants to Mexico; apple grafts to the United Kingdom; soybean seed to South Africa; soybean seed to Argentina; sweetpotatoes to Nicaragua; tobacco to China; fungicide treatment of corn seed as a basis for certification; and clarifying soybean cyst nematode requirements for shipping nursery stock to Canada. The Plant Pathologist also participated in quarterly Trade Support Team meetings, which involved representatives from NCDA&CS Marketing Division and USDA-APHIS-PPQ. In November, Dr. Suzanne Spencer received a Certificate of Appreciation from USDA-APHIS-PPQ for her scientific evaluation and documentation that the nematode *Ditylenchus destructor* has never been reported in NC. This resulted in the removal of North Carolina from the EPPO and Canadian list of infested States.

Similarly, some States have special export requirements. Examples of specific issues related to plant pathogens this year included: dogwood certification for shipping to Florida (dogwood anthracnose issue); grapevine certification for shipping to other States (inquiry from large nursery); peach propagation material for shipment to Oregon (peach yellows issue); roses stopped at the California border which were found to have originated in California initially and tomato plants to New Jersey (special inspections required). Additional interstate certification issues included the following commodities to California: apricot cuttings, bonsai plants, jasmine cuttings, and mondo grass plants. Assistance was also provided to an individual who wanted to take vegetable plants into Tennessee for sale at a weekend farmer's market.

BOXWOOD BLIGHT – A disease new to the U.S.

The fungus *Cylindrocladium pseudonaviculatum* (*C. buxicola*), the causal agent of boxwood blight, was detected in two nurseries in NC in October 2011 (first reported by Dr. Kelly Ivors, NCSU). Although this was the first report of the disease in the United States, it was followed closely by a report from other States. The pathogen is prevalent in Europe and is devastating to boxwood under certain environmental conditions. The detections in NC were related in that the originating nursery sold plants to the second nursery. The originating nursery's manager stated that suspect-plants had been sold only to the second nursery during the previous year, which suggested to NCDA&CS that distribution was limited and eradication was possible. All suspect-boxwood were placed under state stop-sale pending an evaluation and recommendations from the PPQ New Pest Advisory Group (NPAG). APHIS-PPQ requested trace-back (TB) and trace-forward (TF) information from the two nurseries and distributed it to affected States, including NC. PID personnel then conducted the TB and TF inspections. Boxwood blight was not found in any of these other TB or TF locations in NC. Voluntary destruction of suspect-boxwood at the two nurseries was facilitated by NCDA&CS and NC Forest Service personnel, the latter of which led the burning activities to remove infective plant litter on the ground surfaces after all plants were removed from the affected areas.

Nurseries received information from NCDA&CS about this disease through a mail-out as well as an information note distributed by PID personnel at the "Green and Growin'" nursery show (January 2012) and the NC Farm Show (February 2012). Dr. Ivors also presented a webinar on the subject.

Based on information supplied by the originating nursery, the source of the initial infection could not be determined. However, it was believed to be an isolated incident arising from an introduction from an unidentified source. Based on all known information, there was no reason to suspect that the disease was present in any other nursery in NC or in any other NC growing-location managed by either of the two nurseries. This was conveyed to members of the National Plant Board in a letter from the PID Director.

Although no state regulatory agency initiated an exterior quarantine against NC boxwood, out-of-state customers of NC boxwood nurseries would not place orders unless they received reassurances that boxwood blight was not present at their intended-source locations. To meet this demand to facilitate trade, we developed an optional "Boxwood Blight Statement Program" under which a NC nursery would be issued a statement to accompany shipments into other states. For nurserymen to receive a statement, boxwood at their nurseries had to be inspected by NCDA&CS and found to be apparently-free of boxwood blight. They had to agree (under a compliance agreement) to follow certain best management practices and

safeguards to prevent introduction of the disease into the nursery and to self-monitor boxwood for disease symptoms. To facilitate this program, the NCSU Plant Disease and Insect Clinic assayed samples collected during this process at no charge. A Plant Protection Specialist participated in a webinar to explain the statement program to interested parties. As of June 30, there were fifty-three (53) participants in the program. No evidence of boxwood blight was found during any of the NCDA&CS inspections. Follow-up inspections and audits are on-going.

During the normal nursery and nursery dealer inspections in 2012, Specialists are closely inspecting any boxwood present and reporting the effort. We will compile the data at the end of the inspection season, but, to date, no other NC locations have been positive.

EXPORT: Tobacco blue mold oospore survey (for certification of tobacco to China)

A field survey to detect special spore-forms (oospores) of the plant pathogen that causes tobacco blue mold must be completed annually in States where blue mold was reported that year in order for tobacco produced in that State to be certified for export to China. Survey procedures developed by USDA-APHIS-PPQ must be followed. The Plant Pathologist has been the state survey coordinator for this program every year since it began in 2001. She updates the NC survey procedures yearly and sends them to the NCSU Tobacco Pathology Specialist for distribution to NC Cooperative Extension Service personnel (NCCES: county agents) in the event that blue mold is detected. NCCES personnel conduct the survey by collecting samples from affected counties and submitting them to an approved lab (i.e., the NCSU Plant Disease and Insect Clinic). Industry groups pay for sample assays. Although blue mold was detected in some States during the 2011 growing season, it was not detected in NC. As of June 30, it had not been detected in NC during the 2012 growing season

EXPORT: Nematode certification

Before plants and certain other plant products are certified for export to Canada from NC, they must be certified free of soybean cyst nematode (SCN). California has a similar import requirement for reniform and burrowing nematodes. To assist nurseries that request certification, Field Specialists collect soil samples and submit them to the NCDA&CS Agronomic Division's Nematode Assay Section lab according to procedures developed by the Plant Pathologist, who also provides oversight for this program. A sampling table based on numbers of plants or area sampled was developed by the Plant Pathologist so that costs for assays can be predetermined prior to collection and submission. During this reporting period, fifteen (15) NC nurseries or farms were soil-surveyed for nematode certification. This involved the collection and submission of 137 field samples (274 lab assays). Nematodes of regulatory concern were not found in any of the samples. However, high levels of root knot nematodes at one location prevented certification. [Note: Reniform and burrowing nematodes have not been found in any nursery in North Carolina. Reniform nematode was previously found in eight NC counties under agronomic field conditions, but burrowing nematode has never been found at any location.]

The Nematology Assay Section (NAS) Chief cooperates with the Plant Pathologist to test routine samples for soybean cyst nematode (SCN) in order to validate new-county detections. This is possible with the use of PCR testing. SCN was not detected in any new county in NC during this reporting period.

IMPORT: Movement of plant pathogens for research and other purposes

The Federal PPQ Form 526 ("Application and Permit to Move Live Plant Pests or Noxious Weeds") permits the movement of plant pathogens and other pests into North Carolina from other states or countries for research, diagnostic identifications, or commercial uses. USDA-APHIS-PPQ receives the application initially, evaluates it, adds conditions, and forwards the draft permit to the Plant Pathologist via the e-Permit system for evaluation, comments, and approval. Because all plant pathogenic organisms are subject to this requirement, the pest-risk of each organism must be individually evaluated to ensure that adequate safeguards are listed in the conditions of the permits. Ninety-six (96) permit applications were evaluated by the Plant Pathologist, with several requiring further clarification or documentation from PPQ before State approval could be given. Nineteen (19) permits were for receiving non-specified-species or unknown organisms. Organisms requested by species name included 347 fungi and yeasts, 140 bacteria, 18 viruses, and 21 nematodes.

NURSERY: Submission and diagnosis of problem-plant samples

The Plant Industry Division does not maintain a lab for general diagnostic purposes. Plant Protection Specialists collect problem-plant samples from nurseries during nursery inspections and submit them to the NCSU Plant Disease and Insect Clinic (Raleigh) for diagnosis and control recommendations. The Plant Pathologist serves as the liaison between the Specialists and the Clinic, assisting with interpretation of diagnoses and recommendations when necessary. Twenty-three (23) problem-plant samples were submitted during this reporting period, not counting samples submitted for boxwood blight assays or sudden oak death DNA extractions (described in other sections of this report). No pests of regulatory-significance were detected in these samples.

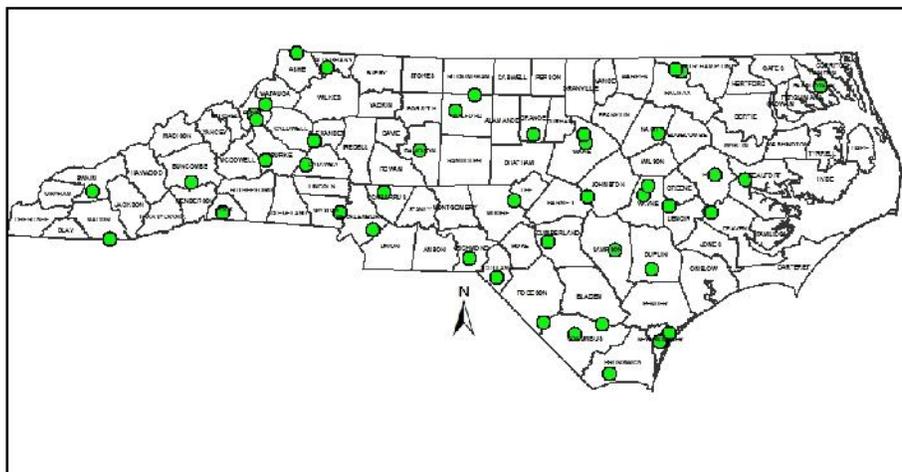
SUDDEN OAK DEATH – Nursery Survey

Sudden Oak Death disease caused by the plant pathogen *Phytophthora ramorum* (*Pram*) is killing thousands of oak trees in California and Oregon. To prevent artificial movement out of the known-infested areas, shipments of nursery host plants are regulated by federal (USDA-APHIS-PPQ) and state quarantines. The host list is broad and continues to expand. However, the highest-risk types of plants appear to be species of *Camellia*, *Kalmia*, *Pieris*, *Rhododendron*, and *Viburnum*. PID personnel have been involved with conducting nursery surveys and regulatory inspections for this disease since 2003. Surveys of forty-six (46) nurseries and nursery dealers were conducted under the CAPS program during the 2011 growing season which spanned FY11 and FY12. During the 2012 growing season, surveys were being done as part of the general nursery inspection program (data not yet compiled). Field Specialists collect and submit samples from plants observed to have suspicious symptoms. These samples are pre-screened by the Plant Pathologist using an ELISA test for *Phytophthora* species. DNA is extracted from ELISA-positive samples and sent to an approved PPQ lab for PCR confirmation. *Pram* was not found in any of the general survey samples in 2011 or 2012 (to date). However, one nursery dealer in Mecklenburg County that was positive in 2008, 2009, and again in 2010 and therefore under a more-intensive monitoring program was found positive again in 2012. Actions at this location are discussed under the section titled “SUDDEN OAK DEATH – Regulatory Issue: Recurring-positive Nursery Dealer”.



2011 CAPS Sudden Oak Death Nursery Survey

46 Nurseries and Nursery Dealers were surveyed by
NCSU Plant Industry Division personnel.
All sites were negative for *Phytophthora ramorum*



July 8, 2011

Map by Ken Ahlstrom NCSU

SUDDEN OAK DEATH – Regulatory Issue: Recurring-positive Nursery Dealer

Ornamental plants at a nursery dealer in Mecklenburg County have tested positive for the plant pathogen *Phytophthora ramorum* (Pram) nearly every year since its first detection there in 2008. Although there were no positive plant or soil detections in 2011, a positive camellia was confirmed in spring 2012. Water samples and baits both inside and outside the nursery continued to be positive. USDA-APHIS-PPQ does not regulate the pathogen -- just the disease -- so it does not take action against water and soil detections, thereby leaving it up to the State to make decisions and act under its own regulatory authority. The following actions were taken at the location over the past year.

- Two whole-nursery plant surveys were completed. Plant samples were collected and assayed according to approved procedures. *Pram* was not found during the October 2011 survey but was detected in camellia samples collected during the April 2012 survey. The subsequent delimiting survey detected *Pram* in floor samples (defoliated leaves) but not in additional plants. All camellias in the area were destroyed and the concrete floor cleaned and disinfested. Trace-back investigations to the NC nursery from which the plants were purchased in 2011 were negative.
- On several occasions, water in a ditch pool on-site and down-stream off-site was baited or sampled by NCFS personnel and found to contain *Pram*. These detections are usually made via PCR, but in at least one case, a culture was recovered. NC is one of five States in the southeast where *Pram* has been found in the water downstream of a confirmed-positive nursery, but, to date, there has been no known establishment of the pathogen in the natural vegetation growing near these waterways.
- Due to the positive water detections, an environs survey of plants along the bank of the ditch draining the site was conducted in May by NC Forest Service, US Forest Service, Clemson University, and NCDA&CS personnel. Plant samples were collected and sent to USFS-designated expert labs. *Pram* was not detected in any of these samples.
- Due to the re-detection in 2012, increased plant-surveillance and monitoring will continue over at least the next two years.

SUDDEN OAK DEATH -- REGULATORY ISSUE: Trace-forward notification

In June, NCDA&CS received a trace-forward (TF) notification for *Phytophthora ramorum* from USDA-APHIS- PPQ for plants shipped to six homeowners in NC. This involved small shipments (1-3 plants or a flat of 12 seedlings) of a minor host [*Gaultheria procumbens* (wintergreen)] from an infected Washington State nursery. The locations were visited by Plant Protection Specialists, and no disease symptoms were observed on the plants.

TOBACCO PLANT INSPECTIONS

The NC Tobacco Plant Certification Regulation requires anyone who moves tobacco plants into NC from another state to do so under an import permit system. There were no import permit applications received during this reporting period. Another aspect of the regulation requires that plants grown in NC and sold for planting in a location more than seventy-five (75) miles away from the place of production must be inspected and certified. A major reason for this requirement is to prevent the artificial movement of blue-mold or virus-infected plants from one growing region into another, which could initiate a premature disease epidemic. There were no certified tobacco plant nurseries during this reporting period.

VEGETABLE PLANT INSPECTIONS

The Vegetable Plant Certification regulation requires weekly inspections and certification of vegetable plants grown in NC if for sale to commercial growers. There were no vegetable plant nurseries certified under this regulation during this reporting period. However, special inspections were conducted at one large production greenhouse nursery to certify plants to meet the vegetable import requirements of another State. The NC Crop Improvement Association (NCCIA) certifies a large number of sweetpotato cuttings and “seed” under its certification program. Because NCCIA certification requirements meet or exceed those of the vegetable plant regulation, NCDA&CS accepts inspections and certification tags of NCCIA in lieu of its own.

The regulation also requires that any vegetable plants or seed potatoes entering NC from another state to be inspected in the state-of-origin and certified to meet certain disease standards. No problems were found during routine spot-inspections during this reporting period; however, very few inspections were conducted as this program has very low priority at the current time. We received a homeowner complaint regarding seed potatoes bought from a local outlet, but no disease organisms were detected on the sample submitted.

The Plant Pathologist and field staff were involved with investigations to determine if an early detection of cucurbit downy mildew in NC was due to movement of infected plants into NC from another State (this would have been an artificial introduction and possible regulatory issue). Normally, this disease is similar to blue mold in that it can blow in from a source many miles away; there is an early-warning, forecasting system in place for cucurbit downy mildew as there is for blue mold. The first detection for the year was very early (early May) and raised concerns about the possible impact on the commercial growers in the area. Within a few weeks, several other positive locations were identified and growers were warned via pest alerts from NCSU that the disease was present so they could take preventative precautions. There was no indication that the early occurrence was due to movement of infected plants into NC.

MISCELLANEOUS ACTIVITIES related to Plant Pathology Issues:

During this reporting period, the Plant Pathologist was also involved with other plant disease-related issues. Examples include:

- answered inquiries from the public as they relate to the White Pine Blister Rust Quarantine, Sudden Oak Death, and other diseases, as well as general plant problems;
- participated in monthly, national conference calls pertaining to the Sudden Oak Death program and provided summaries to the Plant Pest Administrator;
- assisted the Plant Pest Administrator in completing the *Phytophthora ramorum* Advanced Notification Federal Order Feedback Questionnaire summarizing NC's experiences with this Order to help in APHIS-PPQ's evaluation of it;
- maintained and staffed a lab to assay survey samples for Sudden Oak Death;
- served as the contact between NCDA&CS and several state and federal labs involved with testing NC plant samples for SOD, boxwood blight, and other diseases. These included: the Grunwald lab (OR), the SPDN hub lab (FL), the NCSU Plant Disease and Insect Clinic (NCSU), the Ivors lab (NCSU), the Kim lab (PA), the Oak lab (USFS), the Jeffers lab (Clemson SC), the Molecular Diagnostic Lab (PPQ MD), and O'Keefe lab (PPQ PA);
- provided updated operational procedures related to plant pathology programs to Plant Protection Specialists via a secure Plant Protection website designed to serve as an electronic field manual;
- served on the state Cooperative Agricultural Pest Survey (CAPS) committee;
- facilitated NCDA&CS Pesticide Section personnel with obtaining assistance from the NCSU Clinic in eliminating disease as the cause for symptoms observed in an investigation;
- provided copies of Black Stem Rust operational procedures and support documentation to the USDA-APHIS-PPQ program manager upon request to serve as examples of a state interpretation of this federal program and to show how state inspectors are asked to administer it;
- worked around the major disruptions to normal office and lab activities due to major building renovations, temporary relocations, and upgrades to the HVAC and telephone service to maintain the continuity and consistency of assigned programs;
- assisted with training and provided overviews and information to newly-hired individuals during major personnel changes involving the positions of the Plant Pest Administrator, the Field Supervisor/Nursery Program Manager, and a Plant Protection Specialist.
- attended the Fifth Sudden Oak Death Science Symposium and prepared a trip report to share the information with others in the Section;
- participated in monthly conference calls with Plant Protection Specialists and other staff to clarify programs and answer questions.

NURSERY: Strawberry Plant Nursery Certification

Strawberries are defined as nursery stock in NC. The strawberry plant inspection program is outlined and guided by a Memorandum of Understanding (MOU) between the NCDA&CS and the NC Crop Improvement Association (NCCIA). The MOU clarifies roles and overlapping responsibilities for inspection of strawberry plant nurseries. The Plant Pathologist serves as the liaison with NCCIA. NCCIA no longer has a "certified" plant class and does not inspect that generation of plants produced from their "registered" plants. Inspection of these plants now defaults to NCDA&CS Plant Protection Specialists as is the case for all other plants defined as nursery stock. However, NCDA&CS defers inspection of NCCIA registered and foundation plants to NCCIA. The total strawberry plant acreage inspected by NCDA&CS is included in the totals of other nursery stock, as indicated under the nursery program section elsewhere in this report.

Regulatory Weed Program

The North Carolina Regulatory Weed Program protects North Carolina agriculture, public health, and native plant ecosystems from the harmful impacts of noxious weeds. The regulation of noxious weeds is authorized by the North Carolina Plant Pest Law and the Aquatic Weed Control Act of 1991. Program activities include inspections, issuance of Phytosanitary Certificates, issuance of Scientific Permits for movement of regulated articles and the survey, control and eradication of listed noxious weeds. The Witchweed Eradication Project, funded by USDA, APHIS, PPQ, is also a vital part of the Regulatory Weed Program. In addition, the program manager recommends justified changes to the NC Administrative Code that are relevant to noxious weed listings and quarantine boundaries.

Program Accomplishment Highlights

Witchweed Eradication

- The witchweed program continues to make gains in released acres in spite of the discovery of new or re-infested fields. The total acreage of active fields (i.e. fields with fewer than 5 points) is now 1,719 acres in NC.
- 3,772 acres were treated in NC as part of the witchweed eradication program
- A total of 81,440 acres were surveyed to evaluate status of witchweed infestation in Southeastern counties of NC

Tropical Spiderwort

- The only significant infestation of tropical spiderwort (*Commelina benghalensis*) is currently contained within the Cherry Research Farm. Most of the infested acreage is still located within the Farming Systems Research Unit (FSRU) of the Cherry Farm. The number of detected plants continues to decrease.
- The Tidewater Research Station was released from quarantine in May, 2011 but surveys continued there during 2011 with no new detections.

Other Noxious Weeds

- A small infestation of bushkiller (.05 acres) that was confirmed at a private residence in Durham County in spring, 2011 was monitored and treated twice resulting in 99% control of emerging vines.
- Only four tropical soda apple plants (*Solanum viarum*) (a Federal Noxious Weed) were found during the 2011 survey at Martin Meats and Coharie Farms in Sampson county. The plants were bagged and incinerated.
- Small broomrape (*Orobancha minor*) (a Federal Noxious Weed) continues to be confined to only a few plants in several locations of Mitchell County. Annual surveys are necessary to find the plants and destroy them to prevent additional spread. However, a small infestation was discovered on May 23, 2012 at the Western NC Regional Livestock Center near Canton, NC. It was later confirmed as *Orobancha minor* by the Plant Identification team at USDA, APHIS. Treatment with propane burners was done in June, 2012.
- Purple loosestrife (*Lythrum salicaria*) is still confined to only a few plants in Forsyth County and at several other locations throughout the state. Annual surveys are necessary to find the plants and treat them with herbicide to prevent spread. A new large infestation was confirmed near the Henderson County Airport in Hendersonville, NC. Survey and treatment is continuing at that site. A new site with only several plants was also confirmed near a NC DOT project near Greensboro. These plants were pulled by the landowner.
- Approximately 1,700 acres were surveyed for the presence of itchgrass (*Rottboellia cochinchinensis*) in Robeson County. Glyphosate was applied during summer/early fall of 2011 to control emerged plants and pendimethalin herbicide was applied along affected roadsides in early March, 2012 to prevent germination.
- Efforts continued to evaluate efficacy of weevil releases as a biocontrol agent for mile-a-minute vine, *Persicaria perfoliata*, in both Alleghany and Yancey counties.
- Giant hogweed (*Heracleum mantegazzianum*) was confirmed at 3 separate sites near Blowing Rock. Herbicide treatment is underway in 2012.
- Cogongrass was confirmed for the first time in NC in late May, 2012. The small infestation was discovered by Charlotte Glenn, a Pender County Extension Agent. The colony was treated with herbicides on June 5, 2012 and a delimiting survey in cooperation with the NC Forest Service was completed on June 20, 2012. No additional cogongrass was found.

Regulatory

- 98 phytosanitary certificates were issued to support the witchweed quarantine program.
- Two new scientific permits were issued during 2011 to support the tropical spiderwort quarantine at the Cherry Research Farm.
- The following changes to the Noxious Weed Regulations were promulgated on 10/1/2011:

- Moved mile-a-minute (*Persicaria perfoliata*) vine from the list as Class A Noxious Weed to the list as a Class B noxious weed and defined a quarantine area in Alleghany county,
- Deleted Florida betony (*Stachys floridana*) from the list of Class B Noxious Weeds,
- Deleted Durham county as a regulated county for puncturevine (*Tribulus terrestris*) and Franklin county as a regulated county for bushkiller,
- Added crested floating heart (*Nymphoides cristata*), yellow floating heart (*N. peltata*) and water snowflake (*N. indica*) to the list of Class A Noxious Weeds.

Public Relations and Outreach

- The NCDA&CS Weed Specialist served as President of the NC Exotic Plant Pest Council (NC-EPPC) for a second year. The Weed Specialist is also a board member of the Aquatic Weed Control Council and is serving as editor of the NC Vegetation Management Association Newsletter.
- As part of the annual meeting of NC EPPC, the Weed Specialist reached approximately 80 people to provide an alert for invasive plants on the Early Detection and Rapid Response list.
- The Weed Specialist made a presentation at the joint meeting of the Natural Areas Association and the National Association of Exotic Pest Plant councils on the Regulatory Considerations for Biofuel Feedstock Management. Several hundred people from the Southeast U.S. participate in the conference each year.
- Six presentations on cogongrass and other targets for Early Detection and Rapid Response were made around the state as part of a NC Forest Service workshop program on non-native invasive plants. Over 700 small landowners, and government agency personnel were reached during these workshops.
- On numerous occasions, assistance was provided to help identify weeds and provide weed control recommendations in crop, turf, aquatic and non-crop sites.

Weed Survey and Eradication Program Details

Survey Methodology and Rationale

Surveys for all projects were done by visual reconnaissance. Survey objectives are: 1) identify new infestations of target noxious weed (i.e. detection surveys); and, 2) delimit the boundaries where the weeds were mapped in previous years (i.e. delimiting surveys). Detection survey location targets were selected based on probability that subject plant pest would be present. In some instances GPS coordinates were recorded to provide reference points for mapping and relocation, if needed.

Roadsides close to wet areas and home landscapes were targets for Purple loosestrife detection surveys. Locations known to have been infested with small broomrape (*Orobancha minor*) in the past were checked in spring or early summer for reoccurrence of the weed. A known infestation in a hay field was monitored to delimit the size of *Orobancha minor* infestation and prevent additional spread by hand pulling plants at time of survey. Also, past known locations for itchgrass (*Rottboellia cochinchinensis*) were surveyed in June through October to confirm results of 2010 treatments and delimit known past infestations. Cattle slaughter houses and holding farms in Sampson county are surveyed annually for infestations of tropical soda apple.

Since plant species must be identified during the growing season, all surveys are done during the period from full leaf (June) through the first hard freeze (usually mid November). No taxonomic services were budgeted or used in the projects.

The Survey Aide doing itchgrass surveys in Robeson County worked from the end of May through October, 2011.

Results

Mile-a-minute vine (*Persicaria perfoliata*) (Figure 1)

Mile-a-minute vine has now been documented in the following counties: Alleghany, Rockingham and Yancey. The Noxious Weed Regulations were changed to quarantine mile-a-minute vine to portions of Alleghany County. Additional areas may be proposed as more is learned about the extent of infestation in other counties.

To help contain the infestation, the NC DOT is actively spraying mile-a-minute vine along portions of Highway 221 and Irwin Grocery Road in Alleghany County. Also, a weevil that feeds exclusively on mile-a-minute vine (MAM) is being released in Alleghany and Yancey counties to help contain this serious invasive weed (Figure 2). Appalachian State University is monitoring the effectiveness of the weevil in containing the infestation and is also characterizing weevil reproduction, survival and spread in the NC area of the MAM infestation.



Figure 1. Mile-a-minute vine (Alleghany County)



Figure 2. Weevil (*Rhinoncomimus latipes*) feeding damage on mile-a-minute vine in Alleghany County.

Bushkiller (*Cayratia japonica*) (Figure 3)

Bushkiller has now been confirmed on one additional site in Forsyth County and on one site at a private residence in the city of Durham in Durham County. Efforts are underway to eradicate the infestation at the Durham County site. Two treatments at the Durham County site have reduced the infestation more than 99%.

An operational application of a new herbicide, Streamline® (aminocyclopyrachlor + metsulfuron methyl), was made in October, 2010 at the Davidson County bushkiller site. Evaluation on June 10, 2011 indicated good control, but bushkiller is still present at the site and needs to be monitored and treated again to ensure it does not spread.



Figure 3. Bushkiller at a residential site in Durham County.

Broomrape (*Orobanche minor*)

Surveys in Mitchell County were completed by the area Plant Pest Specialist, Tim Hartley during April and May with no significant detections noted.

Orobanche minor was discovered by Rebecca Norris and Kathy Kidd at the Western North Carolina Livestock Center near Canton, NC on May 23. Samples of the plant sent to David Bitzel, USDA Seed Examination Facility in Beltsville, MD were confirmed as *Orobanche minor*. The infestation covered an area approximately 10 to 15 feet wide and 400 ft long, located along the driveway to the offices of the livestock center. Stakeholders of the livestock center were informed of the infestation and a meeting was held on June 6 to discuss treatment options. The infested area was burned with propane torches on June 19 to kill surface seed (Figure 4).

The site will be monitored during 2012 and treated as needed with broadleaf herbicide to eliminate clover, which is a host plant of *Orobanche minor*.



Figure 4. Use of the propane torch to burn Orobanche plants and surface seed in the infested area of the Western North Carolina Livestock Center.

Giant Hogweed (*Heracleum mategazzianum*)

History of reports and location

3 separate locations near Blowing Rock:

- Site 1. One plant along small stream near junction of Highway 321 and Edmisten Road – reported by a garden enthusiast to me via an email in August, 2011.
- Site 2. Several plants in a flower garden in a residential neighborhood in Blowing Rock (corner of Birch St. and Birch St. Extension) – reported by another separate master gardener through Derick Poindexter, Appalachian State University Botanist. Derick Poindexter alerted the Weed Specialist to the site via email in September, 2011.
- Site 3. Several hundred plants in a neighborhood with scattered residences off of highway 221 on the outskirts of Blowing Rock. This site is the source of seed that was collected by the resident who established the plants in a garden in the Blowing Rock neighborhood (site 2). NCDA&CS (Rob Hunt) found this site after talking with the homeowner at Site 2 about the source of the seed for the garden plants.

The origin of plants at site numbers 1 and 3 is unknown.

Why giant hogweed is a concern in NC

- It is listed as a Federal Noxious Weed and therefore a noxious weed in NC
- This is the first time that plants have been officially reported in the state
- Exposure to the sap causes a skin reaction known as photodermatitis that results in large painful blisters with eruptions (*similar to poison ivy – but much worse*). If exposed to sunlight, the blisters leave permanent purple scars.

Actions to date

- Derick Poindexter, Appalachian State botanist, was contacted and he confirmed the hogweed identification at the first site as well as the identification of plants at site 2 based on attached email photos which he received from his contact.
- The plant at site 1 was removed and destroyed.
- Rob Hunt, the local Plant Pest Specialist and Rick Iverson, Weed Specialist, talked with the homeowner about the plants in the garden in the Blowing Rock neighborhood (site 2) and received permission to treat them this year. The homeowner is now aware that this is a dangerous plant, although they have not had photodermatitis symptoms after contact with the plant.
- Rob Hunt and Rick Iverson visited site 3 in October, 2011 to get some idea of the extent of the infestation. There are several hundred plants. Most of them are established along a driveway slope next to another road that leads downhill. There are also scattered plants across the road from the driveway slope on another property.
- Seed heads from several plants at site 3 were cut and placed in bags for destruction by Rob Hunt in late October, 2011. We did not do herbicide treatments in 2011.
- Glyphosate herbicide treatments were applied to plants at both sites May 3 and then again on May 22, 2012.

Cogongrass (*Imperata cylindrica*) (Figure 5)



Figure 5. Cogongrass, showing the distinctive seed head (picture by Charlotte Glen, Pender County Cooperative Extension).

A naturalized colony of Cogongrass was discovered for the first time in NC by the Pender County Horticulture Extension Agent, Charlotte Glen. Cogongrass is considered a serious invader due to its ability to establish on a variety of soils and sites and ability to change ecosystem function by creating conditions for more frequent and hotter fires. It is a Federal and State of NC Noxious Weed that continues to invade thousands of acres across the Southeastern U.S.

The cogongrass infestation is located a few miles south of Wallace on county-owned property that was once a home site. The area infested is estimated to be less than 4,000 square feet in size.

The infested area was treated with a combination of glyphosate and imazapyr herbicides on June 5, 2012. In addition, approximately 292 miles of roadsides surrounding the infestation were surveyed on June 20. No additional cogongrass plants were found during the survey. The patch of cogongrass was burned on June 20 to aid in detecting resprouts as the site is monitored during the 2012 growing season.

Approximately 15 seedheads were collected on June 5 and subsequently examined by experts under a microscope to evaluate seed viability. No viable seeds were found.

Purple Loosestrife (*Lythrum salicaria*)

Sixteen sites near Winston/Salem were surveyed in June and August, 2011 (Table 1). Loosestrife was detected and treated at several of the sites. The plants were treated with a 1.5% solution of Element 3A (triclopyr).

Table 1. Purple loosestrife sites and acreages treated near Wintston/Salem.

Sites	June 6	August 3 & 4	Total Ac. Trtd
I-40 West	4.51	4.51	9.02
Rec Center	2.03	2.03	4.06
Substation	7.66	7.66	15.32
Farmingdale	1.71	1.71	3.42
Oak Grove Church Rd	0	0.22	0.22
Megahertz	1.97	1.97	3.94
Krispy Kreme	0.79	0.79	1.58
Corning Plant	2.05	2.05	4.1
Goose Pond	7.83	7.83	15.66
Chaucer Lane	3.82	0	3.82
Fox Meadow	1.75	1.75	3.5
Villas	0	0.57	0.57
1-40 East Pasture	1.46	1.46	2.92
Wallburg	2.23	2.23	4.46
White Church/Hwy 109	0.85	0	0.85
Willshire Golf Course	3.32	3.32	6.64
Total Acres Treated by Date	41.98	38.1	
		Grand Total	80.08

Purple loosestrife was also discovered on a site occupying several acres at the Henderson County airport and along the City of Hendersonville sewer line right-of-way. The site was discovered by a stewardship biologist with the NC Wildlife Resources Commission. Survey was done to delimit the infestation. Spot herbicide treatment with Rodeo® herbicide (aquatically-approved glyphosate) and Agri-dex® surfactant was completed on October 6, 2011. Following is an aerial image (Figure 6) showing general location of the infestation.

Herbicide treatments at the site are continuing during 2012 in cooperation with the Wildlife Resources Commission (Kelly Hughes treating the edges of the soybean fields and areas in Jackson Park) and City of Hendersonville (treating areas of the sewer line that are infested with purple loosestrife).

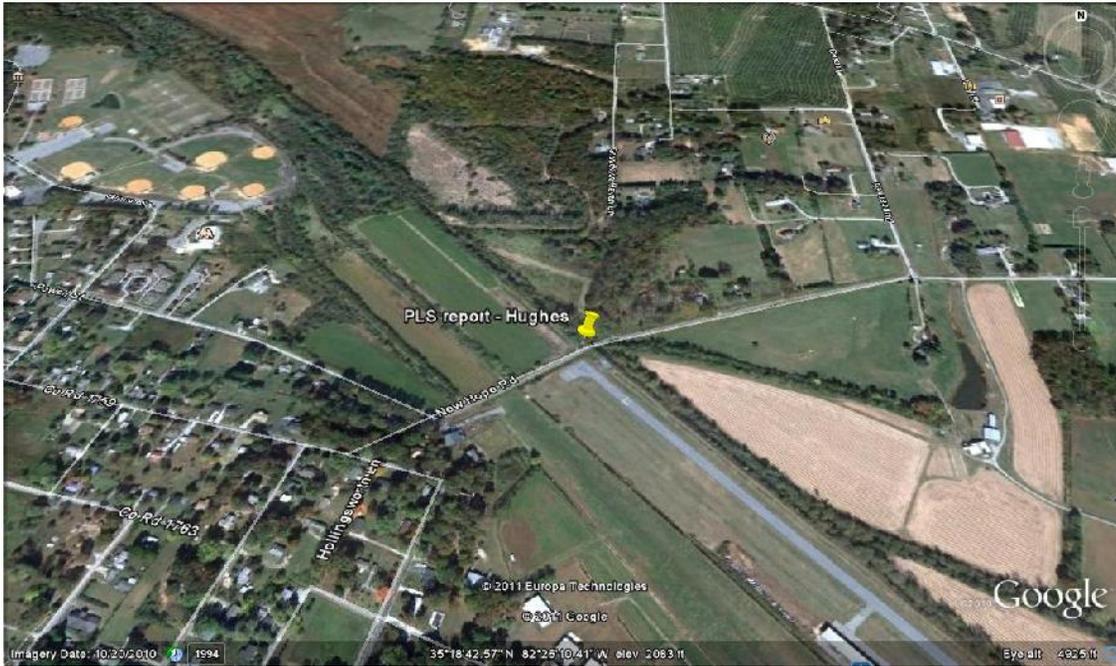


Figure 6. Location of PLS in Henderson County near Jackson Park and Henderson Co. Airport in Hendersonville, NC. The yellow pin marks the NE endpoint of the infestation that runs along New Hope Road at the NW end of the airport.

An Onslow County site continues to be monitored by David Pearce, Plant Pest Specialist. Five plants, with one in flower, were sprayed on June 5, 2012.

Approximately six plants were also discovered by the NC DOT, and confirmed by the local NCDA&CS Plant Pest Inspector, near a DOT project in Guilford County. The owner of the land was contacted and the plants were removed by the landowner prior to September of 2011.

Tropical Soda Apple (*Solanum viarum*)

Survey was done in Sampson County in July and October and at Coharie Farms in Sampson County in October. Table 2 shows acreages and survey results.

County	Date	Location	Fields	Acres	Plants	Survey Crew
Sampson	7/27 /11	Martin Meats	26	260	0	Herbie Ward Earl Brewington Scott Cannady
Sampson	9/29/11	Martin Meats	27	290	3	Rick Iverson Herbie Ward Rondy Godwin Richard A. Smith Rickey Gregory Scott Cannady Earl Brewington Cleveland Chavis Richard Smith
Sampson	9/29/11	Coharie Farms	8	850	1	
TOTALS			61	1400	4	

Martin Meats: Sept. 29 3-small plants, (No Fruit)

Coharie Farms: Sept. 29 1-small plant, (with Fruit)

Itchgrass (*Rottboellia cochinchinensis*)

Fields where itchgrass was detected in 2010 were visited again in 2011 and were mapped to indicate infested areas (Figures 7,8,9 and 10). Approximately 1,700 acres were surveyed and treatments of glyphosate were applied along field borders and ditches where standard weed control practices were not implemented by the growers to maintain soybean and corn crops. Surveys indicated 57 fields (totaling 1,090 acres without itchgrass) and 35 fields (600 acres) with spots of itchgrass mainly along field edges.

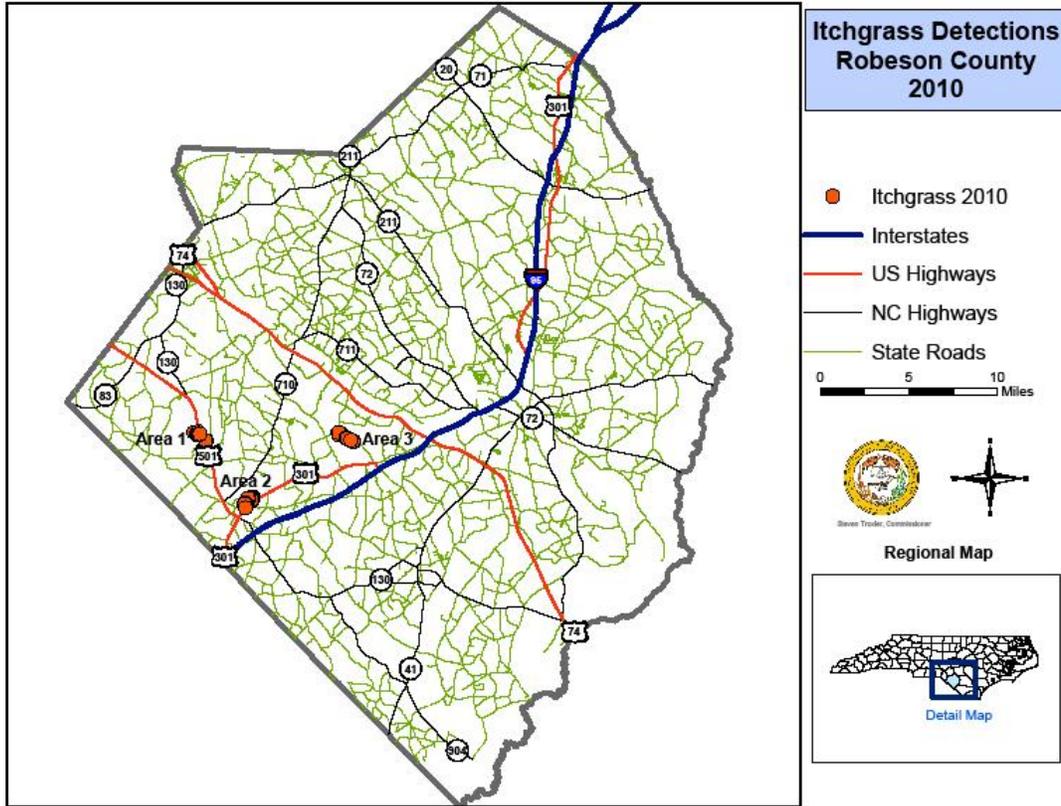


Figure 7. Map showing 3 general areas where itchgrass has been found in Robeson County.

In October and November, 2011 over 1,700 itchgrass seedheads and some whole plants were destroyed at several locations to eliminate contribution of seed to the existing seedbank. Roadside itchgrass sites were treated with pendimethalin on March 16, 2012 in cooperation with the NC DOT.

A NC State summer intern, Brooke Pritchett, was employed through the NC Youth Advocacy and Involvement Office to assist with survey and treatment during the 2011 growing season. The intern started on May 23 and ended her internship on July 29.



Figure 8. Map of itchgrass locations in fields of area 1 in Robeson County.



Figure 9. Map of itchgrass locations in fields of area 2 in Robeson County.

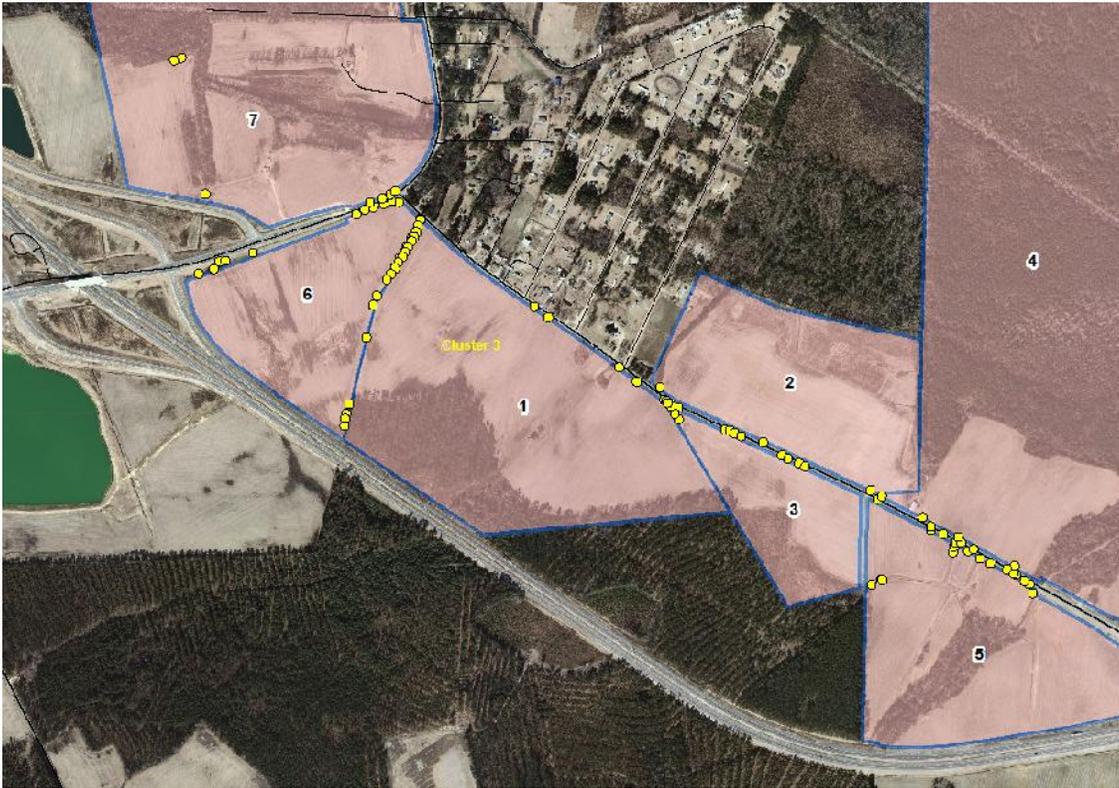


Figure 10. Map of itchgrass locations in fields of Area 3 in Robeson County.

Oriental bittersweet (*Celastrus orbiculatus*)

Each year, Plant Pest Specialists, responsible for counties within the oriental bittersweet quarantine area distribute colored warning tags that retail outlets are encouraged to provide with all purchases of oriental bittersweet. The tags warn purchasers that oriental bittersweet is an invasive plant that should be disposed of in plastic bags destined for landfills and that disposal in a natural setting or mulch piles could lead to establishment of this serious invasive plant.

No stop sale notices were issued in 2011.

Chinese Water Spinach (*Ipomoea aquatica*)

Compliance agreements permitting the culture of Chinese water spinach for human consumption were issued to one grower in Pasquotank County and to one grower in Wake County.

Giant Salvinia (*Salvinia molesta*) (Figure 11)

History of Giant Salvinia in NC:

Giant Salvinia (*Salvinia molesta*), a Federal Noxious Weed, was detected at an aquatic nursery's display at the North Carolina State Fair in 1998, and subsequent surveys by NCDA&CS, NCDENR, and NCSU personnel resulted in detections in 26 counties in North Carolina. All of these infestations have been eradicated. However, in September 2000, naturalized infestations of Giant Salvinia were detected in golf course ponds in New Hanover County and in a canal and wetland at the River Bend Subdivision (Figure 12) near Burgaw in Pender County. Acting under the authority of the Aquatic Weed Control Act of 1991, NCDENR Water Resources personnel began eradication treatments at these sites in November, 2000. Survey of the Northeast Cape Fear River and adjacent wetlands at the Pender County site in 2005 and 2007 yielded no new finds of Giant Salvinia. Survey and monitoring of the River Bend site in Pender County has continued to the present.



Figure 11. Giant salvinia. This plant can double in biomass every 10 days.

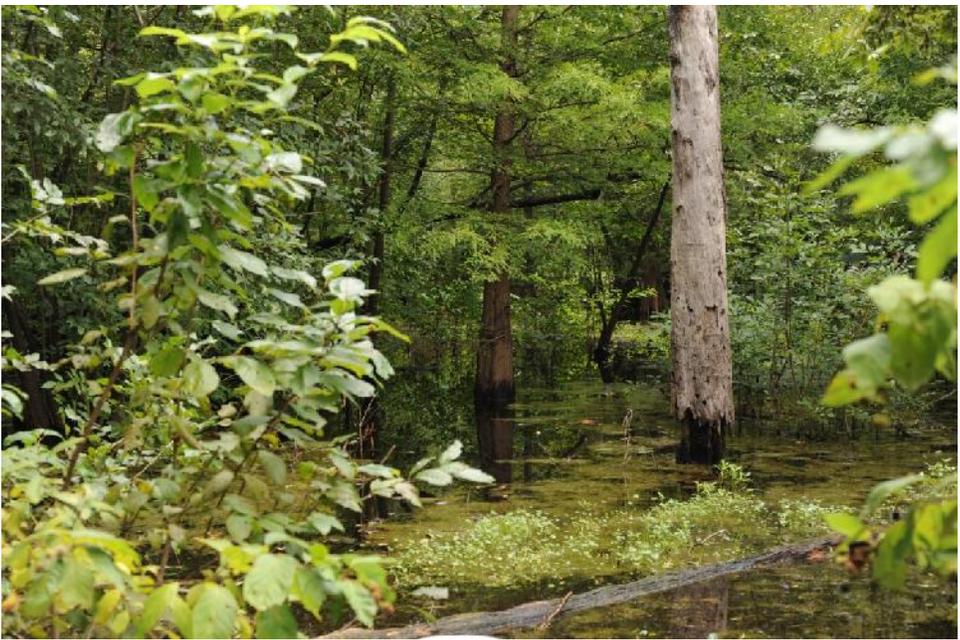


Figure 12. Riverbend Subdivision swamp in Pender County.

A biological control program for Giant Salvinia at the Pender County site was initiated in 2004 with two releases of the Salvinia Weevil (*Cyrtobagous salviniae*) in June and September. Observations throughout 2005 confirmed the successful overwintering and survival of the Salvinia Weevil in Pender County, but this biocontrol effort was not deemed appropriate as we approached eradication of this plant and the biocontrol program was discontinued in 2008.

Current status as of December, 2011:

A contract for survey and treatment of the River Bend Subdivision swamp was awarded for the final time during the 2011 growing season. During 2011, NO giant salvinia plants were discovered. The Giant Salvinia Task Force is still consulted for technical advice on program activities, but the NC Dept of Environment and Natural Resources and the NC Dept. of Agriculture and Consumer Services have partnered in specifying contract requirements and the subsequent awarding of the

contract through the Pender County Extension office. Both agencies also assumed responsibility for contract supervision. Surveys will be done during 2012 to confirm control of *Salvinia* at this site.

Hydrilla (*Hydrilla verticillata*)

During 2011, 194 boat ramps were surveyed for the presence of hydrilla. There is a risk that hydrilla could spread to other bodies of water if boats and trailers are not checked and cleaned before leaving the ramp. The presence of hydrilla at the ramp increases the risk. Twelve ramps at the following bodies of water showed the presence of hydrilla: Chowan River, Lake Gaston, Roanoke River, Roanoke Rapids Lake, Kerr Lake and Shearon Harris Lake. The list was provided to the Water Resources Division of DENR and the Wildlife Resources Commission for consideration in planning the aquatic weed control program.

Witchweed (*Striga asiatica*)

Witchweed Eradication Program Objectives, Methods and Rationale

Witchweed (*Striga asiatica*) is a Federal Noxious Weed and a Class A State Noxious Weed in NC. It is an obligate parasite which attacks corn, sorghum, millet, and other warm season crops in the grass family. Heavy infestations of Witchweed can eliminate yield from these crops, resulting in devastating economic losses. The presence of this quarantined pest also imposes a regulatory burden on crop production and on the movement of farm commodities, equipment, and other regulated articles. The Witchweed eradication program includes an organized and effective set of survey, control and regulatory procedures developed through early USDA, APHIS research. Specific objectives of the program include: 1) characterization of the infestation through survey; 2) control of existing infestations; and, 3) containment by preventing the movement of potentially infested articles out of established quarantine boundaries.

1. **Survey** – Survey is necessary to detect and verify the extent of Witchweed (Detection and Delimiting surveys), evaluate the effectiveness of eradication treatments on infested properties (Appraisal surveys), and verify eradication of Witchweed on sites released from quarantine (Released surveys). Additional survey of terminated acreage is required in order to confirm the long-term effectiveness of the eradication program. Survey is done through the growing season after host plants have started to grow from about the middle of June through the end of October or until the first frost.
2. **Control** – The objective of control treatments is to prevent Witchweed seed production and eliminate Witchweed seed from the soil. Herbicide treatments, hand pulling and disking help to control witchweed host plants and witchweed plants before they can flower and produce seed. Methyl bromide fumigation of additional infested acreage will destroy reserves of witchweed seed in the soil and accelerate completion of the eradication program. Ethylene applications also help to deplete soil reserves of witchweed seed by encouraging germination and subsequent control by exposure to treatments or a non-host crop. Control treatments can be completed during the growing season and into the winter months provided soil moisture and temperature are favorable for soil fumigation.
3. **Regulatory** – Regulatory activities aid in preventing the artificial spread of Witchweed from infested areas to non-infested sites. These regulatory functions facilitate the interstate and intrastate movement of agricultural commodities from Witchweed regulated areas.

Witchweed Eradication Program Data Compilation Description

All control treatments and surveys are tracked in an ACCESS database that updates the status of infested fields and released fields. New or re-infested fields are added to the infested field list when Witchweed is confirmed in new fields or fields that have been previously released. A point system was developed for the program that provides a quantitative measure for moving fields from infested to a released status and from a released status to a terminated status. Infested fields are assigned points depending on the nature of the field and the control activities that were done on it during the season. Once a field accrues five points it is advanced to “Release” status which means it is surveyed on a schedule for a minimum of 10 years and assigned either 0.5 points for a spot survey or 1.0 points for a general survey. Once a field acquires 10 points it is terminated from the program.

The following summary tables show the status of acreage in NC and SC as of the end of survey and treatment for the current growing season which usually occurs by mid-November each year. *Note that this report summarizes witchweed acreage status and activities during the 2011 calendar year even though the report specifies a period that matches the fiscal year which covers the period Oct. 1, 2010 through September 30, 2011.* Since point values for a field are adjusted only once at the

end of the growing season, it is not possible to obtain an accurate end of season account of field status until survey and treatment have ended for the year.

Following is a description of year end activities that are required to summarize year end data:

- A “switchboard” routine is executed in the ACCESS data base that automatically increments point values for released fields to account for surveys done on them during the season.
- Based on input from each inspector, infested field point values are manually adjusted to reflect current field conditions and treatments that were done during the year. In most instances fields will be advanced in point value. Some fields may qualify for release based on reaching a point value of 5. Infested field point value at the **end of the season** is a judgment based on knowledge of witchweed biology, field treatments and current field conditions and can be discussed with the program manager. The new field values are tabulated at the **end of the growing season** after the first frost when it is assumed no more treatments for the year will be implemented and no new witchweed will be found.
- New fields are added to the data base and are assigned a new farm and/or field number. Re-infested field point values are changed to bring them back to values less than 5 so that they will be tallied as infested fields.
- **After the end of growing season**, the data base is queried and standard reports are generated that provide updated statistics for acreages infested, released, surveyed, and treated by county or other criteria.

2011 Witchweed Eradication Program Summary of Results

(Note: Data for SC was derived from the written report submitted by Gilbert Rowe, USDA, APHIS in South Carolina)

This report contains the following Witchweed Status Data Tables for 2011:

- Summary of Infested Acreage Status
- Infested Acres in Quarantined Counties by Point Value
- Other Statistics
- Summary of Surveyed Acreage
- Summary of Treatment Acreage by Crop Type
- Summary of Treatment Acreage by Treatment Type
- Number of Farms and Fields by County with Fewer Than 5 Points

Summary of Infested Acreage Status

North Carolina

Total Acres Infested (0-4.9 POINTS)	1,718.60
Total Acres Released (5-9.9 POINTS)	213.20
New or Re-Infested Acres	70.70
Net Gain in Eradicated Acres (Released minus Re-Infested)	142.50
Total Acres Treated	3,772.14
Total Acres Surveyed	81,440.30

South Carolina

Total Acres Infested (0-4.9 POINTS)	53.10
Total Acres Released (5-9.9 POINTS)	0.00
New or Re-infested Acres	53.10
Net Gain in Eradicated Acres (Released minus Re-Infested)	0.00
Total Acres Treated	251.23
Total Acres Surveyed	8,842.00

Infested Acres in Quarantined Counties by Point Value

North Carolina

County	0-0.9	1-1.9	2-2.9	3-3.9	4-4.9	Total
Bladen	0.00	292.50	132.60	31.00	74.70	530.80
Cumberland	106.90	11.00	61.80	129.20	497.80	806.70
Pender	0.00	0.00	12.50	12.50	4.60	17.10
Robeson	0.00	0.00	0	227.10	101.50	328.60
Sampson	0.00	0.00	4.3	2.40	25.30	35.40
Total	106.90	303.50	198.70	402.20	703.90	1,718.60

South Carolina

County	0-0.9	1-1.9	2-2.9	3-3.9	4-4.9	Total
Marion	5.50	0	0	0	0	5.50
Horry	47.60	0	0	0	0	47.60
Total	53.10	0	0	0	0	53.10
Grand Total	160.00	303.50	198.70	402.20	703.90	1,771.70

Other Statistics

	North Carolina	South Carolina
Acres treated by contract	45.00	0.00
Counties now infested	5	2
No. of bounty payments	0	0
No. of phytosanitary certificates issued	87	0
No. of witchweed finds – assumed to be first detection within a field.	Not tallied in NC	13

Summary of Surveyed Acreage

State	Survey Category	Total Acres
North Carolina	Appraisal	11,573.10
	Release	28,605.00
	Delimiting	20,490.50
	Detection	20,771.70
	Regulatory	0.00
Total		81,440.30
South Carolina	Release	884.00
	Detection	7,958.00
	Total	8,842.00
Grand Total		90,282.30

Summary of Treatment Acreage by Crop Type

State	Crop Name	Number of Acres Treated
North Carolina	Corn	1,344.90
	Soybean	716.67
	Idle (noncrop)	1,147.40
	Other	563.17
Total		3,772.14

State	Crop Name	Number of Acres Treated
South Carolina	Corn	2.30
	Idle (noncrop)	50.00
	Soybeans	15.90
	Other	183.03
Total		251.23
Grand Total		4,023.57

Summary of Treatment Acreage by Treatment Type

North Carolina

Treatment Type	Acreage
Disking	1,573.80
Ethylene	742.80
Hand pulling	322.83
Herbicide as survey aid	287.20
Herbicide to control hosts	423.27
Herbicide to control hosts and/or witchweed	415.11
Methyl bromide soil fumigation	7.13
Total	3,772.14

South Carolina (All data from Rowe's report with the exception of the Hand Pulling treatment)

Treatment Type	Acreage
Disking	42.90
Ethylene	50.80
Goal	0.20
Roundup	95.40
Hand Pull (From the witchweed ACCESS data base)	61.93
Total	251.23
Grand Total	4,023.37

Number of Farms and Fields with Fewer than 5 Points by County

North Carolina

County	Number of Farms	Number of Fields
Bladen	34	50
Cumberland	49	65
Pender	1	4
Robeson	23	30
Sampson	6	7
Total	113	156

South Carolina

County	Number of Farms	Number of Fields
Horry	4	5
Marion	1	1
Total	5	6
Grand Total	118	162

In March, the treatment code list was revised to provide a more meaningful summary of treatment activities. The current coding system included herbicides no longer used. Also, the large number of treatment codes that would be needed exceeded the 2 digit code that was designed into the scan sheets and the data base. The new codes provide a more meaningful representation of treatment objectives and resulted in fewer codes (see below). South Carolina continued to use the old codes during 2011.

New Codes and Descriptors

- 39 - Disking
- 43 - Ethylene application (tractor and hand)
- 94 - Herbicide application to host– Targeted to host weed plants only such as crabgrass in in false-host or no-host crops such as soybeans and cotton
- 95 - Herbicide application to witchweed – Targeted to emerged witchweed AND host weed plants
- 96 - Herbicide application as survey aid – Targeted to all weeds along field edges or elsewhere to provide more visibility for survey
- 61 - Hand Pulling
- 49 - Soil Fumigation (methyl bromide contract and spot application by witchweed staff)

A memo was sent to the field and the Regional USDA, APHIS, Witchweed Program Coordinator to invoke new coding during the 2011 field season and beyond.

General comments

More emphasis is being placed on detection survey to assure containment. Anson, Harnett, Hoke, Richmond, Scotland and Wake counties all had detection surveys done in them with no witchweed detections. As opportunities become available, we are also talking with farmers and others who are seeking pesticide applicators certification points to update them on the status of the Witchweed Eradication Program and to ensure that younger farmers are aware that the quarantine for witchweed is still active. The presentations also provide an opportunity to advertise the bounty program in the hopes of catching infestations that we might miss.

We are having great success in convincing past non-cooperators to work with NCDA&CS, stressing that we are available to help them eradicate a serious pest that, if not treated, will continue to be a liability to them and potentially decrease their farm's value. We continue to release more fields from the program each year, which is sound testimony to the success of the program. However, discovery of new or re-infested fields reminds us that continued vigilance is necessary.

Tropical Spiderwort (*Commelina benghalensis*) (Figure 13)

Survey Methodology and Rationale

Tropical Spiderwort (TSW) survey in 2010 confirmed a continuing infestation at the Cherry Research Station near Goldsboro, NC. Intensive survey at the Cherry Research Farm continued into November, 2011. Fields with confirmed TSW outside of the Farming Systems Research Unit (FSRU), at the Cherry Farm, and at the other Research Farms can be treated with herbicides and fumigants, unlike any of the infested fields in the FSRU, due to the nature of the research in the FSRU.

Surveys outside of the Farming Systems Research Unit at the Cherry Research Farm are completed on every field at least every 3 to 4 weeks and surveys on fields where infestations have been known to occur in the past are done more frequently. Areas are covered on a frequency that will hopefully catch TSW plants before they flower and produce seed. Surveys in the Farming Systems Research Unit are done within a 15 by 15 meter grid. The survey schedule in the Farming Systems Research Unit follows a system dependent on history of past occurrences of TSW. The surveys of high priority fields (highest level of past infestation) are done four times per month, survey of mid-priority fields (fields with moderate infestation or fields next to high infestation fields) are done three times per month and surveys of low-priority fields (fields with no known infestation in the past) are done two times per month. TSW plants that are discovered are bagged and destroyed. Glyphosate herbicide is used to “burndown” vegetation around all fields outside of the Farming Systems Research Unit to improve visibility for surveys.



Figure 13. Tropical spiderwort a.k.a. Benghal dayflower (*Commelina benghalensis*) at the Cherry Research Station.

To prevent the spread of TSW within the quarantined areas, equipment is washed prior to movement from one field to another and all regulated articles are moved outside of the station by permit only.

Survey

One plant pest aide was re-hired in mid May for survey at the Cherry Research Farm and one new plant pest aide was hired in July for part time survey at the Tidewater Research Station. Training for new Plant Pest Aides was not needed since survey aides for both the Cherry Farm and Tidewater Station had done surveys in previous years.

No TSW was discovered during this reporting period at the Tidewater Research Station. A small detection of TSW (13 plants in September) outside of the FSRU at the Cherry Research Farm was discovered in field C4 near a site where a seed longevity/viability study was completed a year ago. The following summarizes survey results during the 2011 growing season at the Cherry Farm within the Farming Systems Research Unit:

The grand total for TSW detections during 2011 was 1,975 plants in the Farming Systems Research Unit. This is slightly more than were found in just the month of July last year. As a comparison, the total for the entire year of 2010 was 5,148 plants. All of the “hot” spots in the heaviest infested plots continue to shrink. The areas in plots 12, 14, 26, 27 & 47 where hundreds of TSW could usually be found are now yielding relatively few plants. In some cases there were no TSW found in these areas. Plots 6 and 13 produced next to nothing. In the hottest spots of plots 26 and 27, we tried to get TSW to germinate and had no success, whatsoever. Except for the peak growth after the rains from Hurricane Irene, there were very few instances of large numbers found in “clumps” with most of these in plot 27. The majority of this year’s finds were one or two plants per occurrence where usually we find much larger numbers grouped together. Plot 15 had zero TSW again this year. No TSW was found in plots 9, 16, 21, 22, 24, 25, 37 and 38 which have had outbreaks in the past.

Following is the summary map for 2011 (Figure 14). Note that the Plot numbers referred to above correspond with the field numbers on the map and the colored squares indicate the spots and number of detects within the fields.

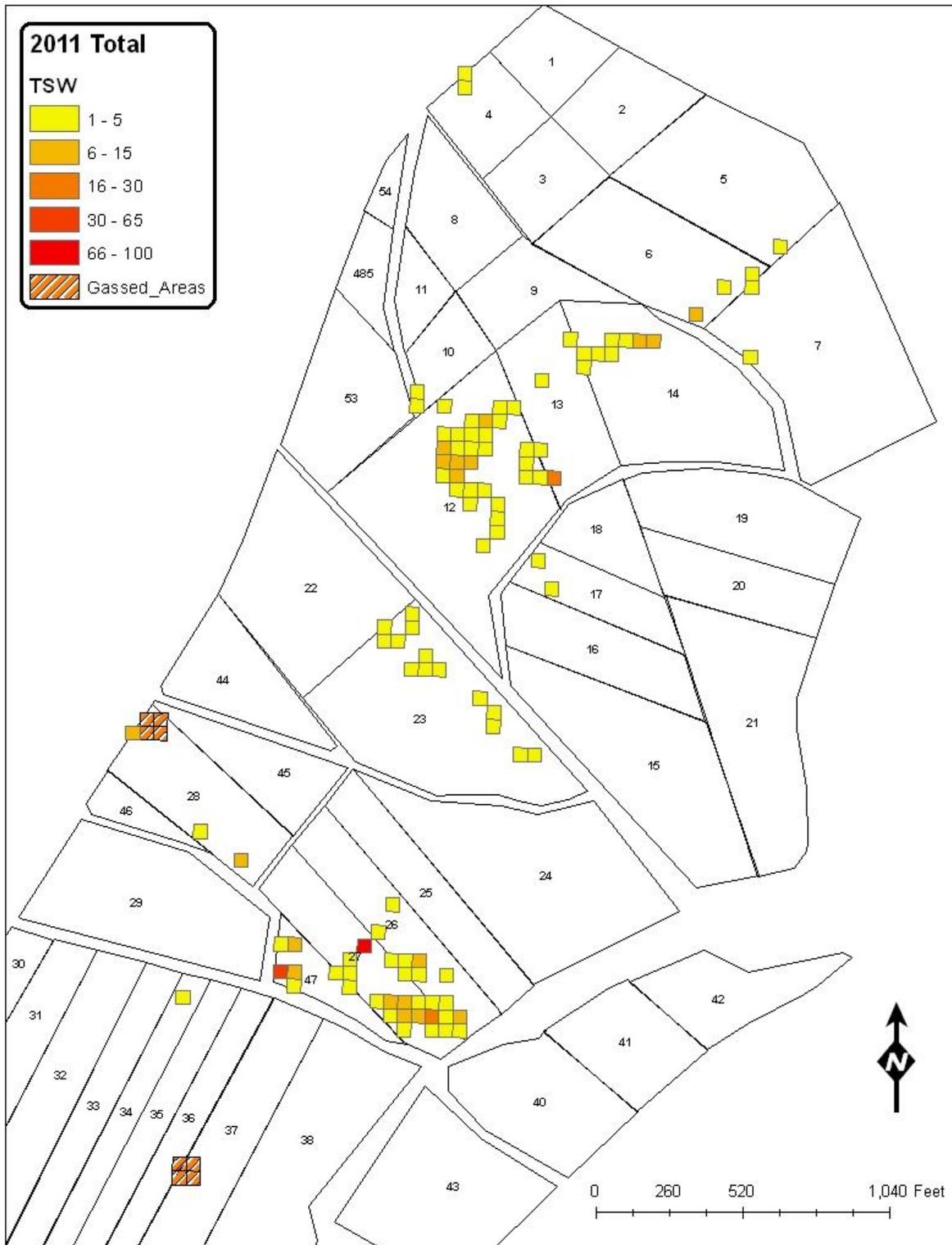


Figure 14. TSW detects through 2011 growing season within the FSRU at the Cherry Farm.

Treatments

All detected TSW plants were pulled and destroyed by incineration in a steel burn barrel on the 200.2 acres of the Farming Systems Research Unit. Field borders were treated with glyphosate herbicide to aid in survey in all parts of the Cherry Farm (2,245 acres), where appropriate. One acre in Field C4, near the site of a terminated seed longevity/viability study, was fumigated with methyl bromide in mid-October, 2011.

Regulatory

Only one scientific permit was issued for use at the Cherry Research Farm to enable researchers to move regulated articles from the farm to a research facility at NCSU in Raleigh, NC.

On April 27th, the Tidewater Research Station was officially released from quarantine for Tropical Spiderwort. Consequently, the following quarantine actions are no longer required, effective April 27, 2011, at the Tidewater Research Station:

- Issuance of certificates or permits to authorize movement of regulated articles;
- Washing of equipment and vehicles prior to leaving the station or when moving from fields E5, C1, E2, H1 and H2 to other parts of the station;
- Utilization of signs at prominent farm locations to announce quarantine procedures for TSW; and
- Registration at the Station Office before visitors and scientists enter the station fields.

However, survey was continued at the Tidewater Research Station until the end of October, to ensure that TSW had been eradicated at this field station.

To control the movement of people and equipment around the quarantined Cherry Research Farm, all visitors are required to register at the Cherry Research Farm central office and sign-in was required for all uses of the mandatory wash stations (Table 3).

Overall, 2011 was another successful year in survey and control work at Cherry Research Farm. We were able to keep Tropical Spiderwort confined to the Farm and no new TSW plants have been detected at the Tidewater Research Station.

Table 3. Quarantine entry registrations at the Cherry Farm during 2011.

<u>Month</u>	<u>Visitor Sign-Ins</u>	<u>Wash Stations Log</u>
January	101	19
February	113	21
March	225	35
April	348	90
May	195	198
June	273	161
July	161	163
August	243	216
September	162	125
October	196	233
November	188	90
December	89	51
Total Sign-Ins	2,294	1,402

Aquatic Dealer Inspections

Aquatic dealer inspections are completed each year by the Plant Protection Specialists. In 2011, approximately 275 active aquatic plant dealers were inspected in 65 counties. No significant issues were discovered during inspections. As part of the inspection process, the plant protection specialists also advised dealers to inform customers about the importance of not disposing of aquatic plants such as water hyacinth, parrot feather and water lettuce into outdoor water bodies.

The aquatic dealer inspection forms were revised to correct errors, add weeds on the noxious weed list and make them easier to use.

Accomplishments: Seed and Fertilizer Section

The mission of the Seed and Fertilizer Section is to improve the profitability and sustainability of agriculture in the state by ensuring the seed, fertilizer, lime, and other soil additives offered for sale in North Carolina meet prescribed standards and are properly labeled.

The mission of this section is accomplished by:

- Ensuring that all locations that offer seed, commercial fertilizers, agricultural liming materials, landplaster, and soil additives for sale in the state are registered.
- Implementing a sound regulatory compliance program by conducting inspections and sampling of seed and fertilizer offered for sale in the state.
- Implementing seed purity, germination, and other specialized laboratory tests in support of the seed regulatory and service programs.
- Implementing a joint federal/state administered biotechnology permitting and inspection program.
- Conducting the fertilizer bioassay and endophyte testing programs.
- Coordinating activities of the N.C. Seed Board such that complaints regarding the failure of agricultural or vegetable seed to produce or perform as labeled or warranted are heard and responses are provided.

The Seed and Fertilizer Section includes 25 staff members with responsibilities and accountability for administrative, field services and North Carolina Seed Lab functions of the unit. The total budget for the Seed and Fertilizer Program for 2011-12 was \$1,573,578, including a state appropriation of \$624,761 and receipts of \$948,817. Revenues included receipts from registrations fees and penalties issued for non-compliance. Each staff member is highly trained for the specialized work duties performed by this Section.

Seed and Fertilizer Field Programs

For fiscal year 2011-12, Seed and Fertilizer Section staff provided a number of services critical to the producers and citizens of this state. Program staff was responsible for registering and issuing licenses for all locations that offered seed, commercial fertilizers, agricultural liming materials, landplaster, and soil additives for sale in the state. For this fiscal year, 4,556 Seed Dealer licenses were issued. Seed dealers include those locations that offer wholesale and retail seed for sale. For the period, 292 Fertilizer Licenses were issued. Fertilizer licenses must be obtained for those individuals or businesses manufacturing or distributing fertilizer in the state.

Seed and Fertilizer Field Staff are responsible for conducting inspections and sampling seed and fertilizer offered for sale in the state. The staff also implemented a regulatory program to ensure full compliance with laws and regulations. An overview of program accomplishments is provided to the right.

Seed and Fertilizer Field Staff also provided support to the N.C. Department of Transportation by sampling 202 seed lots to be utilized on highway projects. The lab tests performed on these seed lots detected several violations and as such remain a critical part of the program.

Commodity prices on all major crops were up in 2012 and this was reflected in additional tonnage being applied. Along with traditional fertilizers, producers also took advantage of animal and poultry waste to provide nutrients to their crops.

N.C. Seed Laboratory

The North Carolina Seed Laboratory is responsible for providing laboratory support for both the regulatory and service areas including the state's seed dealers, producers, university researchers and consumers. The work of this laboratory provides critical seed testing data needed to make management decisions regarding seed stock and for labeling purposes. For 2011-12, the North Carolina Seed Laboratory conducted 3,898 regulatory seed tests and 8,279 service seed

2011-12 Seed and Fertilizer Program Inspection and Regulatory Activities

Number of Seed and Fertilizer Dealer Visits: 4,489

Seed and Fertilizer Samples collected

Official Seed Samples: 2,471 (32,056 lots)

Official Fertilizer/Lime Samples: 1,784 (56,762 lots)

Regulatory Compliance Program

Seed Stop Sales Issued: 28

Seed Stop Sales Issued and Resolved on Site: 472

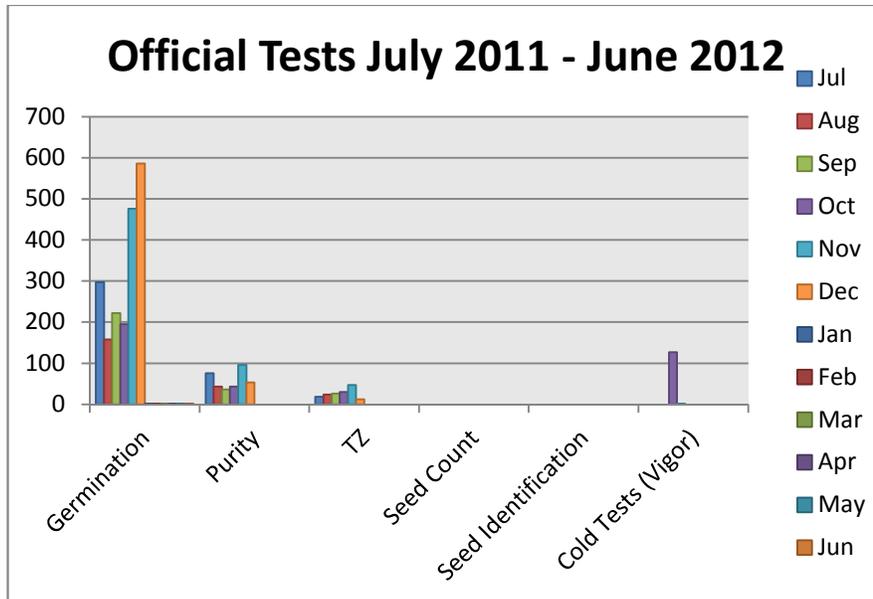
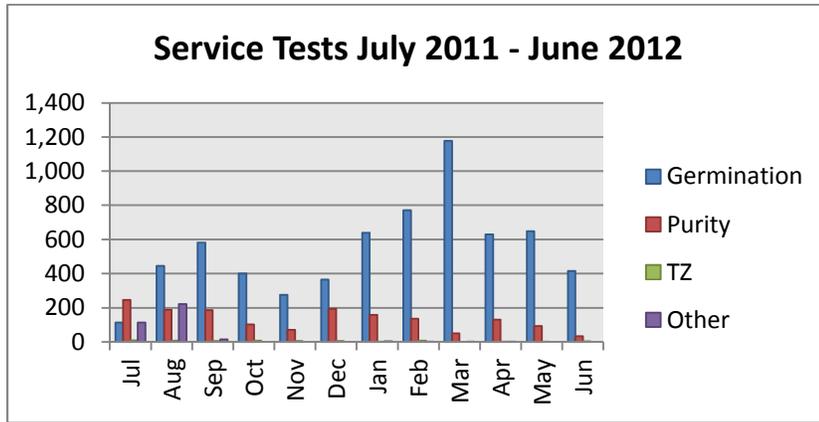
Seed Stop Sales (N.C. Seed Lab): 256

Fertilizer Stop Sales Issued: 13

tests. These tests accounted for required testing involving purity and germination. Multiple tests are generally conducted on each of the samples submitted with 12,177 individual tests carried out. Additional special tests included tetrazolium, accelerated aging, cool test of cotton, cold test of hybrid corn, phenol, Round-up Ready™ tolerance, sand, and moisture testing. There were 676 special tests conducted during the fiscal year. The Seed and Fertilizer Section continued to implement the endophyte testing service. A number of grasses, including tall fescue and perennial ryegrass, contain a fungal endophyte which has a beneficial relationship with the grass host. The tall fescue endophyte, *Neotyphodium coenophialum* (previously *Acremonium coenophialum*), lives exclusively inside plants, and can only be detected through laboratory analysis. This endophyte has been proven to give the grass insect, disease and mammal resistance. Though very beneficial to tall fescue plants, this endophyte produces chemicals which are toxic to a variety of animals. In North Carolina, fescue toxicosis is especially a problem in horses and cattle. A total of 14 pasture samples were processed for producers.

The North Carolina Seed Laboratory and its staff remain active in the activities of the Association of Official Seed Analysts (AOSA) and the Association of American Seed Control Officials (AASCO). At the state level, program staff remains active in the N.C. Seedsmen’s Association (NCSA) and the N.C. Crop Improvement Association (NCCIA). Staff attended the AOSA/SCST annual meeting in New Orleans, LA. Due to peanut testing requirements initiated by the North Carolina Crop Improvement Association, peanut purity testing was resumed for the 2012 crop year.

The NCDA&CS Seed Lab personnel has moved back to its original location, the Old Health Building to new work stations and upgraded equipment to increase the seed analysts’ productivity.



Joint Collaboration with USDA, Biotechnology Regulatory Services

Seed and Fertilizer Section Staff worked with USDA, Biotechnology and Regulatory Services (BRS) to jointly administer a federal/state biotechnology and permitting program. Primary responsibilities included reviewing permits and acknowledgements provided through USDA, Biotechnology and Regulatory Services (BRS) for laboratory, greenhouse, and field tests of genetically engineered crops. For this period, NCDA&CS’ staff reviewed a total of 389 notifications and permits. A joint project with USDA-BRS continued during this period involving NCDA&CS staff with inspections of *Notification and Permit Release Sites*, including pharmaceutical/industrial trials. As a prerequisite for participation in the project, all field staff were required to participate in training focusing on work flow, confidential business information, and steps in effectively completing a field inspection.

N.C. Seed Board

The scope of the N.C. Seed Board is to review complaints from individuals who may have suffered damage from the failure of agricultural or vegetable seed to perform as labeled or warranted, or as a result of negligence. Such performance issues related to seed purity, seed germination, varietal purity, lot number of other lot identification, percent weeds, inert material, other crop seed and test date. For this period, complaints raised were resolved prior to N.C. Seed Board consideration.

N.C. Tobacco Variety Evaluation Program

The Tobacco Variety Evaluation Program continued in joint cooperation with N.C. State University. Samples from 41 flue-cured tobacco seed lots were obtained for planting grow-outs in the variety testing program. All seed lots tested were found truthfully labeled as to variety and recommended for sale by the committee.

Fertilizer and Lime Sampling and Tonnage

Table1: Data of fertilizer samples analyzed for the current and previous fiscal years

FERTILIZER SAMPLING AND TONNAGE						
<u>Year</u>	<u>#Samples</u>	<u>#Compliant</u>	<u>%Compliant</u>	<u>Tonnage Reported</u>	<u>Tonnage Sampled</u>	<u>%Sampled</u>
2011-12	1,195	876	73.31	1,243,164	56,762	1.5
2010-11	1,437	1,019	70.90	1,295,362	33,170	2.56
2009-10	1,651	1,141	69.11	1,251,026	26,539	2.12
2008-09	1,484	1,069	72.52	1,073,286	35,598	3.32
2007-08	2,507	2,186	87.20	1,477,235	70,326	4.76
2006-07	2,473	1,900	76.80	1,605,642	37,259	2.30
2005-06	2,448	1,816	74.10	1,511,419	37,253	2.46
2004-05	2,662	2,065	77.57	1,400,426	44,352	3.17
2003-04	2,773	2,019	72.81	1,591,225	50,458	3.17
2002-03	3,468	2,621	75.58	1,399,516	299,488	21.39

Table 2: Data of lime and landplaster samples analyzed for the current and previous fiscal years

LIME SAMPLING AND TONNAGE						
<u>Year</u>	<u>#Samples</u>	<u>#Compliant</u>	<u>%Compliant</u>	<u>Tonnage Reported</u>	<u>Tonnage Sampled</u>	<u>%Sampled</u>
2011-12	758	541	71.37	767,766	36,965	4.8
2010-11	895	724	80.90	793,925	43,680	5.50
2009-10	729	611	83.81	640,106	35,793	5.59
2008-09	871	720	82.66	687,605	43,295	6.3
2007-08	439	268	61.04	620,469	84,124	13.56
2006-07	1,379	807	58.50	760,637	39,009	5.10
2005-06	1,021	805	78.80	914,990	48,200	5.27
2004-05	1,114	959	59.16	784,620	60,885	7.76
2003-04	719	613	85.26	787,186	31,793	4.04
2002-03	770	618	80.26	695,564	112,286	16.00