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North Carolina Pest News

Departments of Entomology and Plant Pathology

Stephen J. Toth, Jr., editor
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CAUTION !

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

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http://ipm.ncsu.edu/current_ipm/pest_news.html

FIELD AND FORAGE CROPS

From: Jack S. Bacheler, Extension Entomologist

Plant Bugs in Cotton

Some cotton fields adjacent to significant corn acreage in the far eastern counties have experienced very large numbers of migrating adult plant bugs in the past few days, apparently mostly from rapidly drying corn. In a few cases, numbers were as high as 50 plant bugs per 100 sweeps, or approximately 6 times the threshold of 8 bugs per 100 feet used in some states. In these fields, the square retention levels had been high a few days ago and are now declining. In other parts of the state, levels have been far more moderate. However, plant bugs in general have been easier to find than in recent years so far in North Carolina. So taking plant bugs a bit more seriously this year may be wise.

This would be a good time to at least check fields for upper square retention and dirty blooms. Neither of these assessments provides a very reliable means of making treatment decisions, but both are easy and should help one decide if further monitoring is needed. For example, if upper square retention is in the 90 percent range, plant bugs are not likely a present problem. Ditto if dirty bloom levels are in the zero to 10 percent range. In the absence of plant bugs, it's not unusual for cotton fields in North Carolina to retain 90 to 100 percent of upper squares through the initial 4 weeks or so of blooming. If dirty blooms are in the 15 to 20 percent range, or if square retention rates drop below about 80 percent, further plant bug assessments are indicated. Six to 8 sets of 25 sweeps per set can help define if plants bugs are at treatable levels. Sweeping in the early to mid morning hours is recommended, as plant bugs may be lower in the plants or

have vacated the field by midday. Remember that plant bugs also damage small bolls. Small boll assessments for internal damage from both plant bugs and stink bugs are inseparable.

Spider Mites and Aphids on Cotton

So far, spider mites have not exploded over significant areas of the state, though treatment of selected cotton fields is still underway. A few cotton fields have also been treated for cotton aphids this past week, but so far nothing out of the ordinary.

Bollworm Moth Flight

We should be less than a week away from the beginning of our major bollworm moth flight. So by no later than about July 15, light trap captures in the far southern part of the state should be increasing.

Stink Bugs on Cotton

Upcoming quarter-sized boll assessments for internal damage from stink bugs should begin within about two weeks after the start of blooming. Presently, we have no monitoring that is more predictive of possible yield losses than the cutting or crushing open of quarter-sized bolls. As mentioned last week, pay particular attention to boll damage during weeks 3 to 6 of blooming. At this time of year, expect higher stink bug levels and damage in the earliest blooming fields. Although, cotton entomologists in the Southeast are still working on defining appropriate thresholds for stink bugs, data to date suggest that thresholds during the initial two weeks of blooming should be high -- perhaps in the 30 to 50 percent damaged boll range. Likewise, high thresholds may be appropriate later in the season when most bolls are no longer vulnerable to stink bug damage. However, for now I would suggest sticking with a 10 percent damaged boll threshold for weeks 3 though 6 of blooming.

Upcoming Cotton Scouting Schools

Northampton County: Monday, July 16 from 9:30 to 11:30 a.m. at the County Administration Building, Jackson, NC. For details, contact Craig Ellison (telephone: 252-534-2711; e-mail: craig_ellison@ncsu.edu).

Halifax County: Monday, July 16 from 1:00 to 3:00 p.m. at the Agricultural Building, Halifax, NC. Contact Arthur Whitehead (telephone: 252-583-5161; e-mail: arthur_whitehead@ncsu.edu) for details. A review of soybean scouting procedures will also be covered.

Nash and Wilson counties: Tuesday, July 24 from 4:00 to 6:00 p.m. at the Agricultural Center, Nashville, NC. For details, contact Charlie Tyson (telephone: 252-459-9810; e-mail: charlie_tyson@ncsu.edu).

From: Kelly L. Ivors, Extension Plant Pathologist

Blue Mold Identified on Burley Tobacco in Western North Carolina

Blue mold was identified on July 11, 2007 in Yancey County, North Carolina. We all knew it was coming and the forecasts from the North American Plant Disease Forecast Center (http://www.ces.ncsu.edu/depts/pp/bluemold/) were predicting spore movement our way. Unfortunately it's a little early to start protecting the burley crop, but if producers aren't growing the blue mold resistant varieties NC 2000 or NC 2002 and the tobacco is not ready to top, a preventative fungicide application is recommended at this time. Please consult the July 7, 2007 *Blue Mold Disease Note* (attached on pages 11-18) for information on this disease and control recommendations.

From: Jim Dunphy, Extension Crop Science Specialist, and Steve Koenning, Plant Pathology Specialist

Soybean Rust Update

Soybean rust was detected on leaves collected from a soybean sentinel plot on a research station in Fairhope in Baldwin County, Alabama on June 25, 2007. Fairhope is located on the east side of Mobile Bay in southwest Alabama.

This is the first report of soybean rust on soybeans in Alabama in 2007. This is the third consecutive year the disease was first observed on soybeans in Baldwin County during the last week of June. Incidence ranged from 8 percent on a maturity group III variety at the R6 growth stage (full sized beans in the top of the plant) to 15 percent on a group IV variety at the R4 growth stage (full sized pods in the top of the plant). Disease severity on infected plants was very low.

This location is about 390 miles from any North Carolina soybeans.

ORNAMENTALS AND TURF

From: Stephen B. Bambara, Extension Entomologist

Springtails

Springtails (collembola) are among the smallest insects in the home landscape. They are flea-like and barely visible. Springtails possess a forked structure folded under the body that when flicked, allows it to catapult around quite well. Springtails may differ in size, shape and color. They are slightly smaller than a flea and do not bite. Springtails prefer moist environments and feed on decaying plant material, fungi, etc. and are most often seen in mulch. Sometimes they may annoy people if they occur by the millions in a yard and show up on the foundation, the driveway or in the swimming pool. If they are very prolific, they may be found indoors on floors. If found in houseplant pots, change the bark mulch and reduce the watering frequency.

Control is not very effective. If desired, they can be hosed off of hard outdoor surfaces with or without a little soap added. Infestations are short lived and rarely justify the expense of control. Determined homeowners may use one of the available lawn products containing a pyrethroid insecticide such as permethrin, bifenthrin or cypermethrin. *Ornamental and Turf Insect Note No. 123* (http://www.ces.ncsu.edu/depts/ent/notes/O&T/lawn/note123/note123.html) contains more information on springtails.

Pompilid and Scoliid Wasps

Pompilid wasps (Fig. 1), also called spider wasps, are all, or mostly black in color. They prey on spiders to feed their young. The wasp stings the spider to paralyze it. It then drags the spider to its nest in the ground. Next, the wasp lays an egg on the spider. The egg hatches into a larva and the larva consumes the spider.

Fig. 1. Pompilid wasp. Image by B. Watson.

Scoliid wasps are dark-colored, relatively large, robust, slightly hairy insects with light yellow spots or other markings. The most common Scoliid wasp in North Carolina is *Scolia dubia* which may be spotted within the next few weeks. Scoliid wasps are considered beneficial insects because they help to control green June beetle grubs and grubs of other insects. They are present in North Carolina from June to October; however, they are most abundant during August. The wasps are often seen hovering a few inches above lawns in search of grubs. The female wasp digs through the soil in search of the grubs, and burrows her own tunnels or follows those made by the grubs. On locating a grub, she stings and paralyzes it. After laying her egg, the wasp larva later hatches and consumes the grub. Since these wasps rarely, if ever, sting humans, no control measures are suggested. For additional information on scoliid wasps, see *Ornamentals and Turf Insect Note No. 12* (http://www.ces.ncsu.edu/depts/ent/notes/O&T/lawn/note12/note12.html).

INSECT TRAP DATA

From: Thomas G. Pegram, Agricultural Extension Agent, Union County

Light Trap Data from Anson, Stanly and Union Counties

	Number of Adult Insects														
	Anson S			Anson N			Union S			Union N			Stanly		
Date	CBW	GR	BR	CBW	GR	BR	CBW	GR	BR	CBW	GR	BR	CBW	GR	BR
July 9	-	-	-	0	0	0	6	36	0	7	4	2	10	0	0
July 11	-	-	-	0	0	0	6	40	0	4	4	0	3	0	0
July 13	-	-	-	10	0	0	7	41	0	10	3	2	4	0	0

CBW = cotton bollworm moths; GR = green stink bugs; BR = brown stink bugs

From: Mike Carroll, Agricultural Extension Agent, Craven County

Light Trap Data from Craven County

	Number of Adult Insects								
Date	THW	TBW	CEW	GSB	BSB	ECB	FAW	BAW	Looper
July 6	3	1	11	1	1	-	2	-	-
July 9	5	1	26	2	1	-	1	-	-

THW = tobacco hornworms; TBW = tobacco budworms; CEW = corn earworms; GSB = green stink bugs; BSB = brown stink bugs; ECB = European corn borers; FAW = fall armyworms; BAW = beet armyworms

Location of trap: Cove City
Cooperators: R&W McCoy Farms and Cove City Fertilizer

From: Colby S. Lambert, Agricultural Extension Agent, Cumberland County

Light Trap Data from Cumberland County

	Number of Adult Insects			
Date	THW	CEW	GSB	BSB
July 11	0	3	5	0
July 13	0	2	5	0

THW = tobacco hornworms; CEW = corn earworms; GSB = green stinks bugs; BSB = brown stink bugs

Trap located in Godwin at Cumberland/Harnett County Line at Lewis Farms off of Highway 301

From: Curtis D. Fountain, Agricultural Extension Agent, Duplin County

Light Trap Data from Duplin County

	Number of Adult Insects		
Date	BW	GSB	BSB
July 2	0	1	0
July 4	0	0	0
July 6	0	4	4

July 9	4	8	0
July 11	1	11	0
July 13	4	7	2

BW = cotton bollworms; GSB = green stink bugs; BSB = brown stink bugs

Trap location: approximately two miles east of Albertson
Cooperator: Justin Murphy

From: Arthur R. Bradley, Jr., Agricultural Extension Agent, Edgecombe County

Light Trap Data from Edgecombe County

	Number of Adult Insects								
	W Edgecombe /a			Coakley /b			Lawrence /c		
Date	CEW	BS	GS	CEW	BS	GS	CEW	BS	GS
July 10	-	-	3	14	0	46	-	-	-
July 11	-	-	6	4	0	28	-	-	-
July 13	-	-	-	8	0	44	-	-	-

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

a = trap located 12 miles west of Tarboro; maintained by Tom Porter.
b = trap located 5 miles east of Tarboro; maintained by Glenn O'Neal.
c = trap located at Lawrence; maintained by Terri Thomas.

From: Alan A. Harper, Lenoir County

Light Trap Data from Lenoir County

June

	Number of Adult Insects							
Date	HW	CEW	ECB	AW	AWC	GSB	BSB	TBW
June 15	0	5	0	5	2	0	0	0
June 16	0	7	0	1	3	0	0	0
June 17	0	0	0	2	2	2	0	1
June 18	0	1	1	1	4	0	0	0
June 19	0	3	0	0	2	2	4	0
June 20	0	5	1	0	3	0	2	0
June 21	----------no electric power----------							
June 22	0	2	0	0	1	0	0	0
June 23	1	10	1	3	14	1	0	1
June 24	0	3	0	1	4	0	0	0

June 25	0	1	1	1	2	1	0	0
June 26	0	0	5	0	6	3	0	0
June 27	0	3	4	1	2	2	0	0
June 28	0	4	1	0	3	1	0	0
June 29	0	4	0	1	2	0	0	0
June 30	0	4	2	1	5	0	0	0

July

	Number of Adult Insects						
Date	HW	CEW	ECB	AW	AWC	GSB	BSB	TBW
July 1	----------no electric power----------							
July 2	0	3	0	0	3	2	0	0
July 3	0	6	2	0	6	1	0	0
July 4	0	1	0	0	3	0	0	0
July 5	0	2	1	0	5	4	0	0
July 6	0	3	1	0	2	1	0	0
July 7	0	3	1	1	3	4	0	0
July 8	----------no electric power----------							
July 9	0	2	2	0	5	3	0	0
July 10	0	2	0	0	0	7	0	0
July 11	0	1	0	0	3	3	0	0
July 12	0	0	0	0	1	1	0	0
July 13	0	2	2	0	5	9	0	0

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

From: Tray Bridgers, Agricultural Extension Agent, Onslow County

Light Trap Data from Onslow County

	Number of Adult Insects			
Date	Bollworms	GSB	BSB	Hornworms
July 4	6	3	0	0
July 6	20	7	0	0
July 9	25	19	3	0
July 11	21	10	0	0
July 13	33	10	13	1

GSB = green stinks bugs; BSB = brown stink bugs

Trap location: Richlands; Cooperator: Richland Farms
Insect counts are from a single black light trap
located approximately 1 mile east of Richlands.

From: Josh Gaddy, Agricultural Extension Agent, Sampson County

Light Trap Data from Sampson County

	Number of Adult Insects			
Date	BW	GSB	BSB	THW
July 2	------ trap set up -------			
July 5	3	0	1	1
July 6	3	0	0	0
July 9	3	7	0	4

BW = cotton bollworms; GSB = green stink bugs;
BSB = brown stink bugs; THW = tobacco hornworms

Black trap located 6 miles south of Clinton on
US-701S on the farm of Mike and James Hope.

From: David E. Morrison, Agricultural Extension Agent, Scotland County

Light Trap Data from Scotland County

	Number of Adult Insects											
	Gibson				John's				Laurinburg			
Date	BW	GSB	BSB	FAW	BW	GSB	BSB	FAW	BW	GSB	BSB	FAW
July 11	13	14	0	0	22	33	1	0	12	10	1	0
July 13	8	10	0	0	17	25	6	0	3	7	0	0

BW = bollworm moth; GSB = green stink bugs;
BSB = brown stink bugs; FAW = fall armyworms

Recommendations for the use of chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services in this publication does not imply endorsement by North Carolina State University, North Carolina A&T State University or North Carolina Cooperative Extension nor discrimination against similar products or services not mentioned. Individuals who use chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical. For assistance, contact an agent of North Carolina Cooperative Extension.

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Burley and flue-cured tobacco- blue mold

Prepared by:
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Last updated:
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Introduction

Blue mold of commercial tobacco is caused by *Peronospora tabacina*, a fungus-like organism that is highly destructive to tobacco seed beds, transplants and production fields in the humid farming zones of the southeastern and eastern U.S., Canada, and countries bordering the Caribbean basin. The disease was first reported in the U.S. in 1921 in Florida and Georgia, and reappeared in the same region in 1931, spreading north into North Carolina, Virginia and Maryland; in subsequent years, it spread farther into the burley tobacco producing areas of Kentucky and Tennessee. In North Carolina, blue mold is introduced each year by windblown spores or from the importation of infected transplants from outside the region because the pathogen does not typically overwinter in this state.

Symptoms

In general, burley tobacco is much more susceptible to blue mold than flue-cured varieties. Once established, blue mold is fairly easy to identify, although symptoms vary with plant age. On beds of seedlings with leaves up to 4 cm in diameter, blue mold is first seen as circular, yellow areas of diseased seedlings. Plants in the center of the affected area may have distinctly cupped leaves. Some of these leaves should exhibit a gray or bluish downy mold on the lower surface; hence the name *blue mold*. The upper surfaces of infected leaves will remain almost normal in appearance for 1-2 days before the plants begin to die and turn light brown. Diseased leaves often become twisted so that the lower surfaces turn upward.

Blue mold can affect plants in the field throughout the growing season. Single or groups of yellow spots (lesions) appear on the older, shaded leaves (Figures 1 & 2). Often the spots grow together to form light brown, necrotic (dead) areas. Leaves become puckered and distorted, large portions disintegrate, and the entire leaf may fall apart (Figure 3). Under continuous favorable weather conditions, blue mold can destroy all leaves at any growth stage. Lesions may occur on buds, flowers, and capsules. In its early stages, blue mold can easily be confused with cold injury, malnutrition, or damping-off. However, the presence of the characteristic downy gray-blue spores on the bottom of leaves (Figure 4) quickly identifies the disease as blue mold and distinguishes it from other problems.

In severe situations, blue mold may also cause systemic stem infections, resulting in partial or overall stunting of the plant, with narrow, mottled leaves (Figure 5). Discoloration (brown streaks) can be found inside these stems. The plants often lodge or snap off if systemic infections occur near the base of weakened stems.

Causal Organism

Tobacco blue mold is a devastating downy mildew disease caused by the fungus-like organism *Peronospora tabacina. Nicotiana* species are the only known hosts. *P. tabacina* is an ‘obligate parasite’, which means that it requires a living host to grow. Although *P. tabacina* is an oomycete,

its sporangiospores (Figures 6 & 7) do not produce zoospores; infection occurs via direct germination of these sporangiospores.

Disease Cycle

The pathogen is not known to overwinter in the more temperate zones; it is assumed that inoculum is introduced each year into the U.S. Sporangiospores can be dispersed thousands of kilometers by weather events and are the primary source of inoculum for epidemics. Likely sources of yearly blue mold epidemics are windblown spores from tobacco crops in Mexico and the Caribbean that move northward, or from wild tobacco in the southwestern U.S. It is unclear whether the pathogen is capable of overwintering in infected debris and the role of oospores in disease is not clearly understood. Another common way blue mold spreads is by the distribution of infected transplants. In some cases, transplants that appear healthy may actually be infected. Farmers periodically buy transplants from distant growers and run the risk of buying diseased plants and introducing blue mold into their region.

Once blue mold is present, its development depends on weather conditions. Spores require wet leaves for germination and infection. Cloudy weather increases susceptibility, but sunlight is fatal to spores and stops the production of new spores. Therefore, blue mold is most severe and can develop rapidly during periods of cloudy, wet weather, but stops developing during sunny, dry weather. A 5- to 7-day, symptom-free incubation period takes place before the appearance of the first visible symptoms (yellow lesions). Incubation becomes longer with less than ideal conditions and with the age of the tobacco plants. The latent period for sporulation is generally 5-7 days. Sporulation can occur the day symptoms first appear, but it usually occurs the following night. Under favorable conditions, a second set of spores is usually produced 7-10 days after initial infection; without chemical control, this cycle may be repeated several times during the growing season, creating a much larger epidemic.

Diagnostic Methods

Blue mold is fairly easy to diagnose; detection is typically based on symptomology and presence of sporangiospores (Figures 6 & 7) on the underside of infected leaves. Although some molecular approaches have been developed that utilize *P. tabacina*-specific PCR primers, diagnostic laboratories do not currently employ these techniques.

Disease Management

Blue mold forecasts. The North American Plant Disease Forecast Center, located at NC State University, issues blue mold forecasts each Monday, Wednesday, and Friday, and more often if necessary, from March through August. The forecasts, plus additional information, are available on the World Wide Web at:
http://www.ces.ncsu.edu/depts/pp/bluemold/

or by calling toll-free at 1-800-662-7301 (press ‘2’ for burley or ‘3’ for flue-cured).

All blue mold collections in recent years have been resistant to Ridomil (mefenoxam). With the development of Ridomil-resistant strains, the disease has become more difficult to control. Some general strategies for blue mold control are:

- Manage your own crop as much as possible.
- Make the environment less favorable for the pathogen to survive and infect your tobacco.

- Keep the pathogen out of tobacco and the area for as long as possible.
- Protect tobacco plants with fungicides when they are most vulnerable. Ridomil will not control blue mold anymore; it is however of value for controlling *Pythium* diseases and black shank.
- Manage the crop to harvest quickly, but not prematurely.
- Don't forget about other diseases; Target spot is often misdiagnosed as blue mold.

Transplant production

To avoid introducing blue mold on infected transplants from out of state, growers should produce their own transplants or obtain them locally. If blue mold shows up in the beds or greenhouse, it is advisable to destroy the transplants rather than plant them. You can prevent blue mold by properly using protectant-type fungicides as outlined below.

The rate for Dithane DF Rainshield is less in greenhouse and float-bed systems because of possible injury of more tender plants produced in these systems. *Important:* Mix only 1 level teaspoon of Dithane DF Rainshield per gallon of spray, and apply every five to seven days. Apply 3 gallons of spray per 1,000 square feet on small (dime-size) plants, and increase to 6 to 12 gallons per 1,000 square feet as plants grow. *Note:* Forum, a new BASF product, is replacing Acrobat 50WP. Forum, Acrobat 50WP, and Actigard 50WG are strictly prohibited in all greenhouse and float-bed transplant systems for blue mold control.

Remember that many cultural and sanitation practices can prevent the establishment of blue mold or slow its spread during transplant production:

- Grow your own plants, or buy them from a reputable, local source.
- Don't seed any earlier than 7-9 weeks before transplanting.
- Manage temperature and ventilation systems to minimize leaf-surface moisture by reducing relative humidity and condensation.
- When blue mold advisories have been issued and weather permits, remove plant bed covers to aid drying of the foliage.
- Irrigate beds early in the day to allow drying before nightfall.
- Follow a recommended clipping schedule for greenhouse plants (remove clippings from trays and dispose of them far from transplants).
- Use a regular, preventative-fungicide spray program in greenhouses and plant beds.
- Promptly destroy ALL plants within the system, should blue mold occur in beds or greenhouses.
- Do not set ANY plants from blue mold infested sources.
- Destroy plant beds as soon after transplanting as possible. Conditions in an old plant bed are usually ideal for the disease and for spreading spores to the crop in the field.

Field production

When blue mold threatens, tank mixes of Acrobat 50WP and Dithane DF Rainshield should be applied weekly anytime between transplanting and topping. Acrobat 50WP is still on shelves but has been replaced with a liquid formulation of dimethomorph with the trade name of *Forum*. The labels require application of Acrobat 50WP or Forum only in tank mixtures. The current recommendation for tank mixing is Dithane DF Rainshield (mancozeb), which has a 24(c) registration in North Carolina. Actigard 50WP, metalaxyl, and mefenoxam are not suitable mixing partners with Acrobat 50WP due to different methods of application and label restrictions.

Actigard 50WG also is effective against blue mold and should be used preventively, but it may be applied with a low-pressure sprayer directed over top of the row. It has a narrow window of use, starting when flue-cured and burley varieties are 12 and 18 inches high (respectively), and up to

topping. Actigard 50WG may be phytotoxic on young tobacco, causing yellowing, stunting, and yield loss if applied when plants are younger than stated above. Actigard 50WG is a systemic product that induces the plant to resist blue mold *beginning four to five days following application*. The induced resistance will persist for approximately 10 days, and Actigard 50WG must then be reapplied to continue protection. Due to this delay in plant response, this chemical is not recommended as the first chemical application when blue mold is forecasted immediately in your area. Use the following guidelines for applying Acrobat 50WP and Actigard 50WG.

When blue mold warnings are issued for your area, begin weekly sprays with tank mixes of Acrobat 50WP (or Forum) and Dithane DF Rainshield using rates in the table below. Apply 20 gallons of spray solution per acre within three weeks of transplanting, increasing the number of gallons per acre as plants grow, up to a maximum of 100 gallons of spray solution per acre (e.g. 40 gal of water/A near layby, 60 gal of water/A when plants are waist high, 80 gal of water/A when plants are chest high, and 100 gal of water/A when plants are shoulder high or near topping). Do not exceed 32 ounces per acre total for the season. Spray to obtain complete coverage, and before blue mold shows up in the field. Because thorough coverage is critical for control, application is allowed only with tractor-driven air-blast equipment, mist blowers, and some aerial equipment. Spray for maximum coverage by using a high-pressure sprayer (100-250 psi), with sprayer drops between rows, and hollow-cone nozzles. For small plantings of up to 1 acre, a backpack mist blower can be used effectively, provided care is taken to cover all plant surfaces with the spray. *Both top and bottom leaf surfaces MUST be well covered.*

Weeks of growth after transplant	Tank mix rate (ounces of product)		Spray volume for tractor-driven sprayer (gallons/acre)	Spray volume for backpack mist blowers (gallons/acre)
	Acrobat 50WP or Forum	Dithane DF Rainshield		
Recently transplanted to 3 weeks after transplanting	2	6	20	10
3-4 weeks (knee high)	3	12	40	20
4-5 weeks (waist high)	4	18	60	30
6-7 weeks (chest high)	6	24	80	40
7 weeks & beyond until topping (shoulder high)	7	30	100	50

As an alternative, Actigard 50WG may be used once flue-cured and burley varieties are 12 and 18 inches high (respectively). Make two over-the-row applications, 10 days apart, at 0.5 ounce of product per 20 gallons per acre. While other products are labeled for blue mold control, some are phytotoxic to burley, and some are not as effective as Acrobat or Actigard. ***Note:*** **Use only properly registered products. It is the user's responsibility to follow all usage directions on the pesticide label.**

Variety resistance. In general, burley tobacco is much more susceptible to blue mold than flue-cured varieties. Although there is no current source of blue mold resistance in flue–cured tobacco, the burley varieties NC 2000 and NC 2002 have shown good resistance to blue mold, however they have no resistance to black shank. Growers not equipped to spray with fungicides might consider growing these varieties, provided black shank is not present. All other commercial burley varieties are susceptible to blue mold, but some appear more tolerant than others.

Other precautions. Cultural and sanitation practices can prevent the establishment of blue mold or slow its spread:

- Avoid planting areas in the field that receive early morning or late afternoon shade. Blue mold will become established in shaded areas first. Once established in the shade, it will move into the rest of the field when weather conditions become more favorable. In addition, avoid shady, moist locations with poor drainage, for example: sites near streams.
- Avoid close plant spacing, both in the row and between rows. Close plant spacing contributes to shading, reduces air movement, and prolongs wetting of foliage, factors that favor disease development.
- Fertilization: avoid excess nitrogen fertilization.
- Topping and sucker control: early topping and improved sucker control slow disease progress.
- Do not harvest early if blue mold begins to develop late in the season. Top plants at the button stage and allow leaves to mature and gain weight normally. Topping slows development and further spread of the blue mold organism.
- DO NOT WAIT UNTIL YOU SEE BLUE MOLD ON YOUR FARM BEFORE STARTING SPRAYS !!

Figure 1.

Circular yellow spots develop on the topside of leaves infected with the blue mold pathogen.

Figure 2.

Groups of blue mold lesions appearing on an old burley leaf; often these spots eventually grow together.

Figure 3.

Heavily infected leaves become distorted and large portions will disintegrate.

Figure 4.

Characteristic downy gray-blue sporulation on bottom of infected leaf.

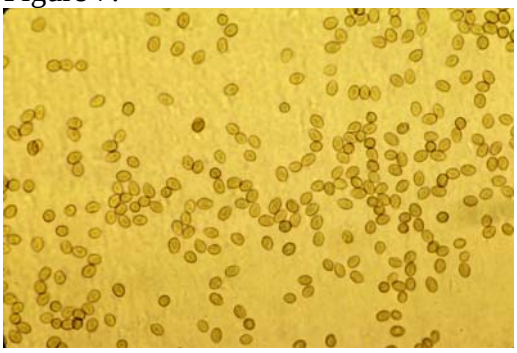
Figure 5.

Burley plant with systemic blue mold infection.

Figure 6.

Sporangiophores bearing sporangiospores of *P. tabacina*.

Figure 7.



Sporangiospores of *P. tabacina*. Unlike other oomycetes, these spores do not contain zoospores.