

Weed Management in Tobacco

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General Information

South Carolina tobacco producers face tough challenges in weed management. Annual grasses, pigweeds, sicklepod, yellow nutsedge and morningglory complex, common cocklebur, and eclipta are the most common and troublesome weeds in South Carolina tobacco fields. Weeds compete with tobacco for water, nutrients and sunlight. While low levels of weed infestations may not reduce tobacco yield, late season weeds can interfere with harvest and reduce leaf quality. A successful weed management plan will use multiple production methods to keep these weed populations low.

While options for weed management in tobacco production are limited, adequate weed control can be obtained with proper herbicide selection and application. Tillage and seedbed preparation should eliminate all emerged weeds prior to planting. The transplant bed should be smooth and level at the time of preplant incorporated (PPI) herbicide application to insure even application across the field. This will allow for uniform incorporation of PPI herbicides with tillage. Activating rainfall or irrigation is needed for optimum preemergence herbicide activity and weed control. Timely shallow cultivation (no deeper than two inches) when weeds appear after crop establishment will provide season long weed control. Deep cultivation only brings more weed seeds to the surface prolonging weed interference. Use of specific herbicides depends on the weed spectrum of your field, economic considerations and your application system. Consider your situation and tailor a weed control program to your needs. The following sections will guide you in the decision making process. Always read and follow label directions, as labels frequently change.

Crop Replant and Rotation Restrictions for Tobacco Herbicides¹

| | Corn | Cotton | Grain Sorghum | Peanuts | Soybeans | Sunflower | Tobacco | Wheat |
|------------------------|-------------------------|--------|---------------|---------|----------|-----------|---------|-------|
| Command | 9 M | None | 9 M | 9 M | None | 12 M | None | 12 M |
| Devrinol | 12 M | 12 M | 12 M | 12 M | 12 M | 12 M | 12 M | Fall |
| Prowl H ₂ O | Spring | None | None | None | None | None | None | None |
| Spartan | 10 M | 18 M | 10 M | None | None | None | None | 4 M |
| Tillam | No information on label | | | | | | | |
| Poast | 120 D | None | 120 D | None | None | 120 D | None | 120 D |

¹ M = months, D = days.

Herbicides for Weed Management in Tobacco

Preplant Incorporated (PPI) and Preemergence (PRE) Herbicides for Weed Management in Tobacco

| Rate/Acre Broadcast | | | |
|---|-------------|-------------------|--|
| Herbicide | Formulation | Active Ingredient | Remarks/Precautions |
| Command 4EC (clomazone) <i>Apply PPI</i> | 1.5-2.0 pt | 0.75-1.0 lb | Apply COMMAND 4EC to the soil surface prior shallow tillage (no deeper than 2 inches) or immediately after transplanting. Excellent control of prickly sida and annual grasses. Good control of ragweed. See label for other restrictions and drift control measures. Command may persist and cause injury to small grain cover crops. COMMAND 3 ME may be applied up to 7 days after transplanting. MOA=13 |
| Command 3ME <i>Apply PRE</i> | 2.0-2.67 pt | 0.75-1.0 lb | |
| Devrinol 2EC (napropamide) <i>Apply PPI</i> | 2.0 qt | 1.0 lb | Apply DEVRINOL 2EC preplant incorporated by shallow disking or apply DEVRINOL 50DF otop transplants immediately after transplanting. Do not apply DEVRINOL 2EC over-the-top of transplants. If rainfall is not received within 24 hours of a post-transplant application, irrigation or tillage is necessary for activation. Controls pigweed, ragweed and other broadleaf weeds. Will not control morningglories. Some growers have had good success with DEVRINOL tank mixed with PROWL or TILLAM. MOA=15 |
| Devrinol 50DF <i>After Transplanting</i> | 2.0 lb | 1.0 lb | |
| Prowl H ₂ O 3.8EC (pendimethalin) <i>Apply PPI</i> | 1.57-2.1 pt | 0.75-1.0 lb | Apply on soil surface and incorporate with a disk set to cut 3-4" deep. Disk twice for thorough mixing. Use the higher rate of chemical in each rate range where weed pressure is heavy. Controls most annual grasses and pigweeds. MOA=3 |
| Prowl 3.3EC | 1.8-2.4 pt | | |
| Spartan 4F (sulfentrazone) <i>Apply PPI or PRE</i> | 8.0 oz | 0.25 lb | Apply SPARTAN 4F to the soil surface following land preparation prior to transplanting. Use a well calibrated sprayer with good agitation. Avoid excessive overlap of spray swaths. SPARTAN 4F may be mechanically incorporated, but no deeper than 2 inches. Excellent control of morningglory, pigweed, lambsquarters and yellow nutsedge. Good annual grass suppression. For improved grass control, tank mix with COMMAND 4EC or PROWL. MOA=14 |

¹**Mode of Action (MOA)** identifies the site of action(s) of that particular product. This aids in rotating herbicide products to avoid resistance problems.

Preplant Incorporated (PPI) and Preemergence (PRE) Herbicides for Weed Management in Tobacco (cont)

| Rate/Acre Broadcast | | | |
|--|-------------|-------------------|---|
| Herbicide | Formulation | Active Ingredient | Remarks/Precautions ¹ |
| Tillam 6EC (pebulate) <i>Apply PPI</i> | 2.67 qt | 6.0 lb | Apply and incorporate immediately with a disk set to cut 4-6" deep. Drag or cultipack to help seal chemical in soil. Provides good control of most grasses and nutsedge. TILLAM is not persistent in the soil and weeds germinating late in the season will not be controlled. MOA=8 |

¹ **Mode of Action (MOA)** identifies the site of action(s) of that particular product. This aids in rotating herbicide products to avoid resistance problems.

Postemergence (POST) Herbicides for Weed Management in Tobacco

| Rate/Acre Broadcast | | | |
|----------------------------|-------------|-------------------|---|
| Herbicide | Formulation | Active Ingredient | Remarks/Precautions ¹ |
| Poast 1.5E (sethoxydim) | 1.5 pt | 0.28 lb | Apply to control annual grasses, johnsongrass and bermudagrass. Always add COC at 2 pt/A. Apply 1.5 pt/A for control of rhizome johnsongrass. A second application of 1 pt/A may be needed for johnsongrass regrowth up to 12" tall. For bermudagrass, apply 1.5 pt/A before stolons reach 6" long. A second application of 1 pt/A may be needed for control of re-growth. MOA=1 |

¹ **Mode of Action (MOA)** identifies the site of action(s) of that particular product. This aids in rotating herbicide products to avoid resistance problems.

Layby Herbicides for Weed Management in Tobacco

| Rate/Acre Broadcast | | | |
|---|-------------|-------------------|--|
| Herbicide | Formulation | Active Ingredient | Remarks/Precautions ¹ |
| Devrinol 50DF (napropamide) | 2.0 lb | 1.0 lb | Controls annual grasses and some broadleaf weeds. Make application following last cultivation. Direct spray into row middles using drop nozzles. Will not control emerged weeds. MOA=15 |
| Prowl H ₂ O 3.8EC (pendimethalin) | 1.0-1.57 pt | 0.5-0.75 lb | Apply on soil surface and incorporate with a disk set to cut 3-4" deep. Disk twice for thorough mixing. Use the higher rate of chemical in each rate range where weed pressure is heavy. Controls most annual grasses and pigweeds. MOA=3 |
| Prowl 3.3 EC | 1.2-1.8 pt | | |

¹ **Mode of Action (MOA)** identifies the site of action(s) of that particular product. This aids in rotating herbicide products to avoid resistance problems.

Weed Response¹ to Herbicides for Tobacco Weed Management

| | PPI or PRE | | | | | POST | LAYBY | |
|-------------------------|------------|----------|-------|---------|--------|-------|----------|-------|
| | Command | Devrinol | Prowl | Spartan | Tillam | Poast | Devrinol | Prowl |
| Broadleaf weeds | | | | | | | | |
| cocklebur, common | 5 | 3 | 2 | 7 | 2 | 0 | 2 | 2 |
| lambsquarters, common | 8 | 8 | 8 | 8 | 8 | 0 | 8 | 8 |
| morningglory spp. | 4 | 3 | 4 | 9 | 2 | 0 | 4 | 3 |
| pigweed spp. | 4 | 8 | 8 | 7 | 8 | 0 | 8 | 8 |
| pusley, Florida | 7 | 9 | 9 | 7 | 8 | 0 | 8 | 9 |
| ragweed, common | 6 | 6 | 3 | 3 | 2 | 0 | 7 | 6 |
| sicklepod | 2 | 3 | 2 | 1 | 2 | 0 | 2 | 2 |
| sida, prickly | 9 | 6 | 2 | 8 | 2 | 0 | 7 | 6 |
| smartweed, Pennsylvania | 7 | 3 | 2 | 8 | 2 | 0 | 2 | 2 |
| Grasses | | | | | | | | |
| crabgrass | 9 | 9 | 9 | 7 | 9 | 8 | 9 | 9 |
| crowfootgrass | 9 | 9 | 9 | 7 | 9 | 8 | 9 | 9 |
| johnsongrass, seedling | 7 | 7 | 8 | 6 | 8 | 8 | 7 | 8 |
| panicum, Texas | 8 | 4 | 8 | 6 | 5 | 8 | 4 | 8 |
| Sedges | | | | | | | | |
| nutsedge | 3 | 3 | 2 | 9 | 8 | 0 | 3 | 2 |

¹Key to Response Ratings: 0 = no control; 10 = 100% control; --- = Insufficient Data.

Trade Name and Ingredient Index for Tobacco Herbicides

| Trade Name | Active Ingredient(s) | Formulation ¹ | MOA ² | Manufacturer |
|--------------|----------------------|--------------------------|------------------|-------------------|
| Command | clomazone | 4 EC; 3ME | 13 | FMC |
| Devrinol | napropamide | 50DF; 2EC | 15 | United Phosphorus |
| Prowl 3.3 EC | pendimethalin | 3.3 EC | 3 | BASF |
| Prowl H2O | pendimethalin | 3.8 CS | 3 | BASF |
| Poast | sethoxydim | 1.5 E | 1 | Micro Flo |
| Spartan | sulfentrazone | 4 F | 14 | FMC |
| Tillam | pebulate | 6 EC | 8 | Syngenta |

¹Abbreviations: DF=dry flowable; E or EC=emulsifiable concentrate; F=flowable; L=liquid; S=water solution; ME or CS = micro-encapsulated; SC=soluble concentrate; EW=oil-in-water emulsion; WDG=water dispersible granule; WDL=water dispersible liquid.

²Mode of Action (MOA) identifies the site of action(s) of that particular product. This aids in rotating herbicide products to avoid resistance problems.

Tobacco Sucker Control - 2009

D.T. Gooden, Ph.D., Professor Emeritus and Tobacco Extension Specialist

Chemical sucker control is necessary for high yields of good quality tobacco. Good sucker control reduces hand labor, and results in efficient use of harvesting equipment. It is difficult to obtain 100 percent sucker control; however, good management techniques will reduce production costs through reduced hand-suckering labor.

It is important to keep the maleic hydrazide (MH) residue in cured tobacco as low as possible to protect our markets. Growers are using new sucker control programs that offer excellent late-season sucker control while keeping MH residues to a minimum. A good sucker control program must use CONTACT MATERIALS, LOCAL SYSTEMICS, and MH, for best results. In modern flue-cured tobacco production, it is often necessary to control suckers 10-12 weeks, which is longer control than expected with MH alone. Prime⁺ or Flupro, when combined with the proper use of contacts and MH, offer good season-long control of tobacco suckers.

Consider the following points in a tobacco sucker control program:

1. Produce a uniform crop of tobacco.
2. Don't use excessive rates of nitrogen!
3. A good job with contacts is a must for good sucker control. The first contact application should be applied when approximately 50 percent of the plants are at the button stage.
4. Use the correct concentration of contact (See the following table).
5. Top tobacco as soon as practical after first application of contact.
6. Apply MH according to label instructions.
7. Choose to use Prime⁺ or Flupro in addition to the recommended rate of MH if you are concerned about MH residue and poor late-season control.
8. Keep MH Residues to a minimum.
 - Use labeled rates of MH.
 - Do not apply MH more than one time.
 - Allow seven (7) days or more between MH application and harvest. **Harvesting too soon after MH application is a major reason for high MH residues!** If harvest and application are needed at the same time, harvest first!
 - Use Prime⁺ or Flupro along with recommended rate of MH.

Tobacco Sucker Control - 2009

| CONTACTS | | | | |
|---|--|-----------|----------|--------|
| Product Name | Active Ingredient | Use Rate | REI | PHI |
| Off-Shoot T EC Sucker Plucker EC Fair 85 EC Royaltac M EC | 1 octanol and 1 decanol mixture 6.01 to 6.04 lb/gal | 2.0 gal/A | 24 hours | 7 days |
| Remarks: Mix with 48 gal water and apply 50 to 60 gal mixture/A. Use two TG-3 nozzles and a TG-5 nozzle in center or equivalent at 20-25 psi pressure. Apply at early button stage before suckers are 1-2 inches long. Second application may be made 3-5 days later using 2.5 gal in 47.5 gal of water. Top tobacco as soon as is practical after first application. Mixing of other pesticides and surfactants with fatty alcohols is prohibited. | | | | |
| Antak EC Royaltac EC Fairtac EC | n-decanol 5.7 to 5.72 lb/gal | 1.5 gal/A | 24 hours | 7 days |
| Remarks: Mix with 48.5 gal water and apply 50 to 60 gal of solution/A. Use two TG-3 nozzles and a TG-5 nozzle in center or equivalent at 20-25 psi pressure. Apply at early button stage before suckers are 1-2 inches long. Second application may be made 3-5 days later using same concentration of solution. Top tobacco as soon after first application as is practical. <i>Mixing of other pesticides and surfactants with fatty alcohols is prohibited.</i> | | | | |
| SYSTEMICS | | | | |
| Product Name | Active Ingredient | Use Rate | REI | PHI |
| Royal MH-30 EC Super Sucker Stuff EC Fair Plus EC | maleic hydrazide (MH) (21.7% potassium salt) 1.5 lb/gal | 1.5 gal/A | 12 hours | 7 days |
| Remarks: Apply with 40 to 50 gal of water/A using 40 psi pressure and TX-18 nozzles or equivalent. (Royal MH-30 is labeled for coarse or fine spray. Coarse application would be as fatty alcohols are applied.) Apply after tobacco reaches the full flower stage or 7-10 days after application of the last contact material. Applying systemics during periods of drought or when plants are wilted may result in poor sucker control. Applications made in the morning are best after dew has dried. Make only 1 application unless rainfall occurs within 6 hours of application. <i>Wait at least 7 days before harvest.</i> | | | | |
| Sucker Stuff EC Fair 30 EC Royal MH-30 XTRA | maleic hydrazide (MH) (30.2% potassium salt) 2.25 lb/gal | 1.0 gal/A | 12 hours | 7 days |
| Remarks: Apply with 40 to 50 gal of water/A using 40 psi pressure and TX-18 nozzles or equivalent. (Royal MH-30 XTRA is labeled for coarse or fine spray. Coarse application would be as fatty alcohols are applied.) Apply after tobacco reaches the full flowering stage or 7-10 days after application of the last contact material. Applying systemics during periods of drought or when plants are wilted may result in poor sucker control. Applications made in the morning are best after dew has dried. Make only 1 application unless rainfall occurs within 6 hours of application. <i>Wait at least 7 days after application before harvest.</i> | | | | |
| Sucker Stuff 80 WS Royal MH-30 SG WS Fair 80 SP WS | maleic hydrazide (MH) (79.6% potassium salt) 60% | 3.75 lb/A | 12 hours | 7 days |
| Remarks: Apply with 40 to 50 gal of water/A using 40 psi pressure and TX-18 nozzles or equivalent. (Royal MH-30 SG is labeled for coarse or fine spray. Coarse spray would be as fatty alcohols are applied.) Apply after tobacco reaches full flowering stage or 7-10 days after application of the last contact material. Applying systemics during periods of drought or when plants are wilted may result in poor sucker control. Applications made in the morning are best after dew has dried. Make only 1 application unless rainfall occurs within 6 hours of application. <i>Wait at least 7 days after application before harvest.</i> | | | | |

| LOCAL SYSTEMICS | | | | |
|--|--|--------------------------------------|----------|-----------|
| Product Name | Active Ingredient | Use Rate | REI | PHI |
| Prime ⁺ EC Flupro EC | flumetralin 1.2 lb/gal | 1.0 gal/A | 24 hours | 7 days |
| <p>Remarks: <i>Machine application:</i> Mix with 49 gal water and apply 50 gal mixture/A. Use two TG-3 nozzles and a TG-5 nozzle in center at 20-25 psi pressure. <i>Hand application:</i> Using the just mentioned solution apply 1/3 to 2/3 oz/plant using a hand-held drop line. Apply 5 days after application of contact material or at elongated button stage to early flower. Suckers missed will continue to grow and should be removed by hand. Some phytotoxicity may occur on small upper leaves. Stunting of small grain, corn, and tobacco may occur the next season. Do not over-apply. <i>Wait at least 7 days after application before harvest.</i></p> | | | | |
| SEQUENTIAL (local systemic + systemic) | | | | |
| Product Name | Active Ingredient | Use Rate | REI | PHI |
| Prime ⁺ and maleic hydrazide EC Flupro EC and maleic hydrazide | flumetralin (1.2 lb/gal) + maleic hydrazide (various formulations) | 2.0 qt + MH (recommended rate) | 24 hours | 7 days |
| <p>Remarks: Mix Prime⁺ or Flupro EC with adequate water to make 50 gal of solution. Apply 50 gal of mixture/A. Use two TG-3 nozzles with TG-5 nozzle in center at 20-25 psi pressure. Apply Prime⁺ or Flupro EC 5 days after first contact or at elongated button to early flower stage. Apply maleic hydrazide one week later according to manufacturer's directions. Using Prime⁺ or Flupro may result in some phototoxicity to small upper leaves. Also, do not over-application; stunting of rotational crops may occur in the following season. <i>Wait at least 7 days after application before harvest.</i></p> | | | | |
| SEQUENTIAL (late application contact) | | | | |
| Product Name | Active Ingredient | Use Rate | REI | PHI |
| Fair 85 EC Off-Shoot T EC Sucker Plucker EC | 1 octanol and 1 decanol mixture 6.01 lb/gal | 2.5 gal/A | 24 hours | 7 days |
| <p>Remarks: Mix 2.5 gal contact with 47.5 gal water and apply as for contacts. Make application 3 to 4 weeks after MH application if suckers are beginning to grow.</p> | | | | |
| SEQUENTIAL (late application of local systemic) | | | | |
| Product Name | Active Ingredient | Use Rate | REI | PHI |
| Prime ⁺ EC Flupro EC | flumetralin 1.2 lb/gal | 2.0 qt/A | 24 hours | 7 days |
| <p>Remarks: Mix with adequate water to make 50 gal of solution. Apply 50 gal solution per acre. Use 2 TG-3 nozzles and one TG-5 nozzle in center at 20-25 psi pressure. Apply Prime⁺ or Flupro 3-4 weeks after MH application if suckers are beginning to grow. <i>Wait at least 7 days after application before harvest.</i></p> | | | | |
| COMBINATION (contact + systemic type fatty alcohol) | | | | |
| Product Name | Active Ingredient | Use Rate | REI | PHI |
| FST-7 EC Leven 38 EC | n-decanol (38.3%) 3.12 lb/gal + maleic hydrazide (11.1% potassium salt) 0.66 lb/gal | 3.0 gal/A | 24 hours | 7 days |
| <p>Remarks: Mix with 47 gal water/A and apply at 20 psi pressure using two TG-3 nozzles and a TG-5 nozzle in center. For best results, apply a contact-type chemical at the button stage and apply FST-7 or Leven 38 7-10 days later. Leaf injury may occur if rate is exceeded. <i>Wait at least 7 days after application before harvest.</i></p> | | | | |

| TANK MIX COMBINATION | | | | |
|--|--|--|----------|--------|
| Product Name | Active Ingredient | Use Rate | REI | PHI |
| Prime ⁺ and maleic hydrazide Flupro and maleic hydrazide | flumetralin (1.2 lb/gal) + maleic hydrazide (various formulations) | 2.0 qt/A + maleic hydrazide (recommended rate) | 24 hours | 7 days |
| <p>Remarks: Mix 2 qt of Prime⁺ or Flupro with recommended rate of maleic hydrazide (follow manufacturer's recommendation) in sufficient water to make 50 gal of solution. Apply 50 gal of mixture/A. Apply as a coarse spray using 2 TG-3 nozzles and 1 TG-5 nozzle in center. Apply after tobacco has reached full flower stage or 7-10 days after last contact. The use of Prime⁺ or Flupro may result in some phytotoxicity to small upper leaves. Do not over application; stunting to rotational crops may occur the following season. <i>Wait at least 7 days after application before harvest.</i></p> | | | | |

Tobacco Harvest Management – 2009

D.T. Gooden, Ph.D., Professor Emeritus and Tobacco Extension Specialist

Ripe tobacco with medium to heavy body and an orange color is preferred by most tobacco companies. Tobacco must be mature before it can ripen. Ripening is a naturally occurring process that must occur before the tobacco is harvested.

Tobacco should be harvested in three or more stalk positions, as this allows buying companies to select tobacco from various stalk positions to make their blends.

CHEMICAL COLORING AGENTS

Ethephon is a coloring agent that can be used in tobacco to enhance curing time. Ethephon will not solve problems such as over-fertilization or late-maturing tobacco. Ethephon consistently shortens yellowing time, thus quicker barn turnaround.

| TOBACCO COLORING AGENTS | | |
|---|----------------|--|
| CHEMICAL | RATE | REMARKS |
| Ethephon 6.0 lb/gal (Prep EC, Super Boll EC, Mature XL EC, Ethephon 6) | 1.33-2.67 pt/A | Use when remaining leaves are physiologically mature. Test treat a few plants ahead to determine if chemical will cause yellowing. Mix in 40-60 gal water/A and apply at 40-60 psi pressure so that all leaves are covered. The REI is 48 hours; workers entering the field(s) must adhere to PPE. Delay in harvesting could result in loss of yield and quality and may cause leaf drop. Treat only the amount that is planned for harvest at the time. |

Tobacco Insect Control – 2008-2009

Francis P. F. Reay-Jones, Ph.D.

Integrated pest management (IPM) is the ecological approach to pest control. It uses ALL suitable techniques to reduce pests below economic levels. It is not the intention of IPM to do away with chemicals. If anything, IPM is designed to protect chemicals from being lost or becoming ineffective. When insect pest populations reach economic threshold levels, control measures must be taken. The ultimate line of defense against insect enemies is the use of chemicals. These control costs can be very expensive, but the cost of not controlling could be total crop destruction. With IPM, when chemicals are used, it is because they are necessary; facts replace hunches.

IPM is needed even in high cash crops such as tobacco. Indiscriminate use of insecticides destroys beneficial insects. This can cause minor or secondary pests to become major pests and major pests to reach serious levels earlier. Overuse of insecticides may also contribute to a resistance buildup by the pests and make control even harder.

Natural Control - This includes weather, beneficial insects, diseases, etc., and results in the death of most insect pests (sometimes as many as 95-97%). Perhaps as many as 50%, or even more, of the potential insect pests are destroyed by beneficial insects before they can do much damage to tobacco. Beneficial insects are very important.

Economic Threshold - This is a level at which a treatment would be profitable and a decision to treat should be made. Economic thresholds may be affected by such things as location, size of insects, presence of beneficials, time of growing season, stage of growth, and the size and condition of the tobacco plant. Economic thresholds are continually changing. When in doubt, consult with your county Extension agent. Current economic thresholds are:

Tobacco budworms - Treat when four or more plants out of 100 (4%) are infested with budworms during the first 4 weeks after transplanting. After the fourth week and until plants have buttoned, treat when 10 or more plants out of 100 (10%) are infested. When using CU-263, you may be able to wait a little longer before treatment.

Tobacco hornworms - Treat when 10 or more worms (without parasite cocoons) are found per 100 plants (10%). Worms having white parasite cocoons eat much less, and more of these can be tolerated before treatment is required.

Aphids - Treat when 10% of the plants checked have 50 or more live aphids on at least one leaf.

Flea beetles - Treat when there is an average of three flea beetles per plant early in the season, when the tobacco is small, or an average of 20 flea beetles per plant late in the season, when the tobacco is large. Flea beetles are normally a problem only early in the season (shortly after transplanting) and late in the season (when the harvest of lower leaves moves the flea beetles up the stalk).

Cutworms - Treat when 10% of the plants checked show cutworm damage.

Scouting - Scouting tobacco for various pests was part of the Tobacco IPM program that began in Dillon County in 1979. The program expanded to Florence and Horry counties in 1982 and to Marion County in 1983. Private scouting began in 1984, and continues. Ultimately, we hope that all tobacco in this state will be scouted at least once a week for all crop pests, by trained scouts or by the growers.

THRIPS

Thrips are responsible for the transmission of tomato spotted wilt virus (TSWV) in tobacco. Thrips are very tiny insects, barely visible with the naked eye. Although there are many different kinds of thrips found on tobacco, only three of those species are capable of transmitting the disease. One of those, *Frankliniella fusca* (the tobacco thrips), is the most common thrips found on tobacco.

Transmission of the disease seems to be most common during a fairly short period of time early in the season. Insecticide applications to control the thrips seem to provide very little help in controlling the disease. By the time that the insecticide kills the thrips, they have already transmitted the disease. The application of Admire (or generic brands of imidacloprid) or Platinum insecticides prior to transplanting does provide some suppression of the disease. However, the suppression of TSWV by Admire[®] and Platinum[®] does not appear to be directly related to thrips control.

Host-plant resistance work is being conducted by Clemson University researchers. In the future, this may provide the best control strategy for this disease.

APHIDS

For several years now, we have been seeing fewer green aphids and more red aphids, with the latter being more difficult to control. Some taxonomic work suggested that the aphid that we have had on tobacco for the past few decades was not the green peach aphid, *Myzus persicae*. A new species, the tobacco aphid (*Myzus nicotianae*), was described. We have now come full circle. Other taxonomists have looked at the situation and come to the conclusion that these are both the same species, the green peach aphid. The green peach aphid does come in both a red and green color form, with the red generally being more difficult to control.

Aphids secrete a sugary substance known as honeydew. Honeydew is sticky, and a perfect site for the development of sooty mold. Once honeydew and sooty mold are present on the leaves, they are nearly impossible to get off. As aphids molt, they leave their cast skins behind. I have received numerous calls from growers (by the way of the county agents) who complained of getting poor control of aphids with Orthene. When I examined the situation, what I found was tobacco leaves covered with cast skins, honeydew, and sooty mold. There were no live aphids. Orthene will kill the aphids, but it will not (nor will anything else) get rid of the cast skins and damage.

Tobacco that has been damaged by aphids will carry that damage all the way to the warehouse floor. Leaves will be thinner, black, and stuck together. The result is a mess. The tobacco is of very poor quality and, justifiably, brings a lower price. The way to avoid aphid damage to your tobacco is to control the aphids before they build up to such high numbers.

The red form of the green peach aphid is more difficult to control than the green form. In the past, research has shown that, of materials labeled for use against aphids on tobacco, only Orthene and Thiodan did an adequate job of control. That situation has been complicated by the fact that the tobacco companies do not want Thiodan residues in the tobacco. Some have said that tobacco will be spot-tested for Thiodan residues on the market floors and, if certain markets are exhibiting Thiodan residues, they will shift their buying to other markets. We no longer include Thiodan in our recommendations. In the Spring of 1996, Admire received its first label for aphid control on tobacco. More recently, Platinum has been labeled on tobacco. Both Admire and Platinum will give excellent control of the red and green forms of the green peach aphid.

PRECAUTIONS USING INSECTICIDES

ALL insecticides should be applied in accordance with label precautions and restrictions.

Di-Syston, Furadan, Lannate, Mocap, and Supracide are ALL HIGHLY TOXIC and should be applied with utmost care. Most insecticides recommended on tobacco may burn leaves or distort growth under certain conditions.

TOBACCO INSECT CONTROL IN THE PLANT BED

| INSECT | PRODUCT | AMOUNT PER 1000 SQ FT | MIXING AND APPLICATION | REI |
|-----------------------|-----------------------|-----------------------|--|-----|
| Aphids & Flea Beetles | Acephate (Orthene 97) | 3/4 tbsp | Mix spray using 3/4 tbsp per 1 gal water/1000 sq ft. | 24 |
| Cutworms | Acephate (Orthene 97) | 3/4 tbsp | Mix spray using 3/4 tbsp per 1 gal water/1000 sq ft. | 24 |
| Slugs or Snails | Metaldehyde 5B | 2 lb | Scatter around margins, walkways, and open spaces in beds. | 12 |

TOBACCO INSECT CONTROL IN GREENHOUSES

Acephate (ORTHENE 97) is labeled for use on tobacco in greenhouses to control cutworms, flea beetles, the green peach aphid, and the tobacco aphid, at a rate of ¾ lb/A. Apply to foliage at the equivalent of 3/4 tbsp in 3 gal water/1000 sq ft of bed. Apply evenly to ensure thorough coverage. Note: Floatbed water should be disposed of in the transplanted field through the transplant water or through foliar spray.

Imidacloprid - ADMIRE PRO has replaced ADMIRE 2F. Both products have the same active ingredient (imidacloprid), However the ADMIRE PRO formulation is more concentrated, therefore the rates will be different. For aphids and flea beetles, it is labeled at 0.5 fl oz/1000 plants, and for mole crickets and wireworms, it is labeled at 0.6-1.2 fl oz/1000 plants. For tomato spotted wilt suppression, use 0.8-1.2 fl oz/1000 plants.

- ADMIRE 2F and generic brands are also labeled for use on tobacco as a drench to trays or flats prior to transplanting. These new generic brands include ADVISE, ALIAS, IMIDA E-AG, COURAZE, and NUPRID. An assessment of these products at the Pee Dee REC in 2007 suggests a similar effectiveness regarding insect control. For aphids and flea beetles, they are labeled at 1 fl oz/1000 plants, and for mole crickets and wireworms, they are labeled at 1.4-2.8 fl oz/1000 plants. Although this is a greenhouse application, they control these insects in the field. For tomato spotted wilt suppression, use 1.8-2.8 fl oz/1000 plants.

Triamethoxam (PLATINUM 2 SC) is labeled for use on tobacco as a drench to trays or flats prior to transplanting. For aphids, flea beetles, and Japanese beetles, it is labeled at 0.8-1.3 fl. oz/1000 plants, and for wireworms, it is labeled at 1.3 fl oz/1000 plants. Although this is a greenhouse application, it is for control of these insects in the field.

An insecticidal soap, **M-Pede**, is also labeled for use on tobacco in the greenhouse. However, its effectiveness has not yet been established.

TOBACCO INSECT CONTROL IN THE FIELD

Note: Although endosulfan (Thiodan and other brands) is still labeled on tobacco in South Carolina, it is no longer included in our recommendations. Tobacco companies consider residues to be a serious problem.

| INSECT | PESTICIDE AND FORMULATION | AMOUNT PER ACRE | MIXING AND APPLICATION | REI (hrs) |
|------------------|---|----------------------------|---|-----------|
| WIREWORMS | Ethoprop (Mocap 15 G [R]) | 13 lb | Broadcast granules with spreader or apply sprays evenly over area at least 7-10 days before transplanting and disc to mix 2-4 inches into soil. | 48 |
| | Chlorpyrifos (Lorsban 15 G or 4 E [R]) | 13.5 lb or 2 qt | Apply as preplant broadcast granules or a preplant broadcast spray in not less than 10 gal spray/A. Incorporate into soil 2-4 inches. CAUTION: Do NOT apply to foliage. | 24 |
| | Carbofuran (Furadan 4 F [R]) | 1.5 gal | Apply preplant broadcast and incorporate. Note: May cause leaf flecking on lower leaves. | 48 |
| | Imidacloprid (Admire Pro) | 0.6-1.2 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting. | 12 |
| | Imidacloprid (Admire Pro) | 0.8-1.2 fl oz/ 1000 plants | Apply in transplant water in a minimum of 100 gal/A. | 12 |
| | Imidacloprid (Admire 2F and generic brands) | 1.4-2.8 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting. | 12 |
| | Imidacloprid (Admire 2F and generic brands) | 1.8-2.8 fl oz/ 1000 plants | Apply in-furrow or transplant water. | 12 |
| | Thiamethoxam (Platinum 2 SC) | 1.3 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting, or in transplant water in a minimum of 100 gal/A. | 12 |

TOBACCO INSECT CONTROL IN THE FIELD (cont.)

| INSECT | PESTICIDE AND FORMULATION | AMOUNT PER ACRE | MIXING AND APPLICATION | REI (hrs) |
|--------------------------------|---|---|---|-----------|
| APHIDS | Acephate (Orthene 97) | 0.75 lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. | 24 |
| | Methomyl (Lannate LV [R] or SP [R]) | 1.5 pts or 0.5 lbs. | Apply in 20-40 gal spray/A for complete coverage. | 48 |
| | Imidacloprid (Admire Pro) | 0.5 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting. | 12 |
| | Imidacloprid (Admire Pro) | 0.6 fl oz/ 1000 plants | Apply in transplant water in a minimum of 100 gal/A. | 12 |
| | Imidacloprid (Admire 2F and generic brands) | 1.0 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting. | 12 |
| | Imidacloprid (Admire 2F and generic brands) | 1.4 fl oz/ 1000 plants | Apply in-furrow or transplant water. | 12 |
| | Thiamethoxam (Platinum 2 SC) | 0.8-1.3 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting, or in transplant water in a minimum of 100 gal/A. | 12 |
| | Imidacloprid (Provado 1.6 F) | 2-4 oz | Apply in 20-40 gal spray/A for complete coverage. | 12 |
| | Thiamethoxam (Actara) | 2-3 oz | Same as above. | 12 |
| Pymetrozine (Fulfill 50 WG) | 2.75 oz | Same as above. Do not make more than two applications per season. | 12 | |

TOBACCO INSECT CONTROL IN THE FIELD (cont.)

| INSECT | PESTICIDE AND FORMULATION | AMOUNT PER ACRE | MIXING AND APPLICATION | MIN. DAYS PRIOR TO HANDLING |
|-------------------------|---|----------------------------------|---|-----------------------------------|
| FLEA BEETLES | Acephate (Orthene 97) | 0.5 - lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. | 12 |
| | Carbaryl (Sevin 80S or 4F) | 1.25-2.5 lb 1-2 qt | Apply in 20-40 gal spray/A for complete coverage. | 12 |
| | Methomyl (Lannate LV [R] or SP [R]) | 0.75-1.5 lb or 0.25-0.5 pt | Same as above. | 48 |
| | Carbofuran (Furadan 4 F [R]) | 1.0 gal | See under wireworms | 48 |
| | Imidacloprid (Admire Pro) | 0.5 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting. | 12 |
| | Imidacloprid (Admire Pro) | 0.6 fl oz/ 1000 plants | Apply in transplant water in a minimum of 100 gal/A. | 12 |
| | Imidacloprid (Admire 2F and generic brands) | 1.0 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting. | 12 |
| | Imidacloprid (Admire 2F and generic brands) | 1.4 fl oz/ 1000 plants | Apply in-furrow or transplant water. | 12 |
| | Thiamethoxam (Platinum 2 SC) | 0.8-1.3 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting, or in transplant water in a minimum of 100 gal/A. | 12 |
| | Imidacloprid (Provado 1.6 F) | 2-4 oz | Apply in 20-40 gal spray/A for complete coverage. | 12 |
| | Thiamethoxam (Actara) | 2-3 oz | Same as above. | 12 |

TOBACCO INSECT CONTROL IN THE FIELD (cont.)

| INSECT | PESTICIDE AND FORMULATION | AMOUNT PER ACRE | MIXING AND APPLICATION | MIN. DAYS PRIOR TO HANDLING |
|---|---|--------------------------|--|--|
| BUDWORMS | Acephate (Orthene 97) | 0.75 lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. | 12 |
| | Bacillus Thuringiensis* | (see label) | Same as above. | |
| | Methomyl (Lannate LV [R] or SP [R]) | 1.5 pts 0.5 lbs | Same as above. | 48 |
| | Spinosad (Tracer) | 1.4-2.9 oz | Same as above. | 4 |
| | Emamectin benzoate (Denim [R]) | 8-12 oz | Same as above. | 48 |
| | Carbofuran (Furadan 4 F [R]) | 1.5 gal | See under wireworms. | |
| | | | CAUTION: Budworm control has been inconsistent ranging from poor to excellent. May cause leaf flecking on the lower leaves. | |
| | Bacillus Thuringiensis | 5-10 lb | Commercially prepared bait. Place small pinch in bud of each plant with a gloved hand or mechanical applicator. | Bait |
| HORNWORMS | Acephate (Orthene 97) | 0.75 lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. | 12 |
| | Bacillus Thuringiensis* | (see label) | Same as above. | |
| | Methomyl (Lannate LV [R] or SP [R]) | 1.5 pts 0.5 lbs | Same as above. | 48 |
| | Carbaryl (Sevin 80S or 4F) | 1.25-2.5 lb 1-2 qt | Apply in 20-40 gal spray/A for complete coverage. | 12 |
| | Spinosad (Tracer) | 1.4-2.9 oz | Same as above. | 4 |
| | Emamectin benzoate (Denim [R]) | 8-12 oz | Same as above. | 48 |
| | LOOPERS | Acephate (Orthene 97) | 0.75 lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. |
| Bacillus Thuringiensis* | | (see label) | Same as above. | |
| Methomyl (Lannate LV [R] or SP [R]) | | 1.5 pts 0.5 lbs | Same as above. | 48 |

| | | | | |
|--------------------------|--|-------------------------------|--|------------------------------------|
| | Emamectin benzoate (Denim 8-12 oz [R]) | Same as above. | 48 | |
| INSECT | PESTICIDE AND FORMULATION | AMOUNT PER ACRE | MIXING AND APPLICATION | MIN. DAYS PRIOR TO HANDLING |
| GRASSHOPPERS | Malathion (Malathion 57 EC) | 1.5 pt | Apply sprays in 20-40 gal spray/A for complete coverage. Early spraying around field borders aids in preventing infestations. | 12 |
| | Acephate (Orthene 97) | 0.25-0.5 lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. | 12 |
| STINK BUGS | Acephate (Orthene 97) | 0.5-0.75 lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. | 12 |
| JAPANESE BEETLES | Carbaryl (Sevin 80S or 4F) | 1.25-2.5 lb 1-2 qt | Apply in 20-40 gal spray/A for complete coverage. | 12 |
| | Acephate (Orthene 97) | 0.75 lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. | 12 |
| | Thiamethoxam (Actara) | 2-3 oz | Same as above. | 12 |
| | Thiamethoxam (Platinum 2 SC) | 0.8-1.3 fl oz/ 1000 plants | Apply as a drench to flats or trays prior to transplanting, or in transplant water in a minimum of 100 gal/A. | 12 |
| CUTWORMS | Chlorpyrifos (Lorsban 15 G or 4 E [R]) | 13.5 lb or 2 qt | Apply as preplant broadcast granules or a preplant broadcast spray in not less than 10 gal spray/A. Incorporate into soil 2-4 inches. CAUTION: Do NOT apply to foliage. | 24 |
| | Acephate (Orthene 97) | 0.75 lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. | 12 |
| VEGETABLE WEEVILS | Acephate (Orthene 97) | 0.5 to 0.75 lb | Apply in 20-40 gal spray/A for complete coverage or in transplant water in a minimum of 100 gal/A. | 12 |

ON-FARM CONTROL OF TOBACCO MOTH AND CIGARETTE BEETLE

| INSECTICIDE | DOSAGE | HOW, WHERE, AND WHEN TO APPLY |
|--|----------------------------|--|
| Heat treatment Tobacco moth and Cigarette beetle <i>(all stages)</i> | 140°F | Hang in barn for a few hours. CAUTION: Tobacco must be thoroughly dried at temperature below 100°F before increasing temperature or color will change and result in decreased price. |
| Dichlorvos (Vapona) Resin strips Tobacco moth <i>(moth only)</i> | 1 per 1,000 cu ft of space | Effective in reasonably tight storage facilities. Hang one resin strip per 1,000 cu ft of storage space. Replace if live moths are noticed. |
| Bacillus Thuringiensis* Tobacco moth <i>(larvae only)</i> | (see label) | Apply as a fine mist. Spray leaves in layers as tobacco is being sheeted, re-sheeted, or placed in a pile for storage. Good coverage is essential. CAUTION: Avoid excessive moisture. |

*The only Bt product labeled for this use in South Carolina is Dipel.



Tobacco Disease Management

Bruce Fortnum, Ph.D. Extension Specialist

General Information

Endemic diseases such as black shank, bacterial wilt and root-knot nematodes always cause significant disease losses in South Carolina. These important and potentially devastating diseases of tobacco can best be managed through a combination of control methods. It is urged that growers identify disease problems in their fields and follow disease management suggestions based on rotation, variety selection, sanitation and chemical treatments. A sound disease management strategy cannot be developed without the proper identification of the disease problems in your fields. Disease development is a dynamic process and can change over time. Low disease losses in your fields in the recent past does not assure disease losses will remain low!

Disease Management Strategy

Disease losses affect tobacco yields, quality and profitability. Disease control options can be expensive to use and costly especially if the wrong control option is chosen. Great care needs to be exercised to assure a return on your control investment.

Rotation: The best defense against most diseases and the least expensive is a good, well-planned rotation. However, the diseases must be correctly identified within particular fields to develop a sound rotation plan. Any rotation is better than no rotation, but certain crops will do a better job of suppressing certain diseases. While some growers take a chance and do not rotate, sooner or later they will get caught with unexpected losses. Some diseases, such as bacterial wilt or black shank, may destroy entire fields! Also, some diseases such as mosaic and nematodes may be causing more damage than realized through observation because the plant may not completely die. Losses to these diseases are easily masked in a year in which rainfall was plentiful. Although difficult to see, these losses substantially reduce farm income! Losses to the three major diseases in South Carolina, that consistently reduce yields from year to year, can be reduced through a planned rotation program.

Host Resistance: Selection of resistant varieties provides a highly effective and inexpensive method of reducing losses to disease. Varieties differ in resistance to black shank, bacterial wilt, tobacco mosaic, Fusarium wilt and root-knot nematodes, so any one variety will not be the best choice in all fields. Study the disease ratings within the tobacco production guide to select appropriate varieties for your farm.

Chemical Treatments: Selection of chemical treatments should be your LAST CONSIDERATION in a disease control strategy. Rotation, variety selection and proper sanitation reduce populations of pathogenic organisms to levels that can be controlled by chemical applications. Choose your chemicals to match the disease pressure in your fields.

Bacterial Wilt Control

BEST MANAGEMENT SYSTEM FOR CONTROL OF BACTERIAL WILT

The following points should be considered to help control bacterial wilt:

1. Crop rotation to include soybeans
2. Use of host resistance
3. Multipurpose soil fumigation
4. Hand topping or prioritize order of topping, and harvesting (healthy tobacco first). Consider use of the redesigned topper blade based on the Burch system, redesigned toppers will be available in limited supply in 2009
5. Eliminate or reduce stalk wounding at harvest. Keep harvesters clean and properly adjusted to avoid stem injury and operate mechanical harvesters at the proper speed.
6. Use Roundup to kill stalks or immediate stalk destruction following last harvest
7. Maintain proper drainage in field
8. Use of a winter cover crop

MULTI-PURPOSE CHEMICALS FOR BACTERIAL WILT AND NEMATODE CONTROL.

| MATERIAL | RATE/A | REMARKS | REI |
|---|----------|---|---------------------------------------|
| Telone C17 | 10.5 gal | <u>CAUTION:</u> 3-week waiting period between Application and Transplanting. | 5 days |
| Chlor-O-Pic | 3.0 gal | Same as above. | 48 hr and gas conc. less than 0.1 ppm |
| <p>Remarks: Multi-purpose fumigants require waiting periods of up to 3 weeks before tobacco can be safely transplanted into fumigated soils. Good disease control by fumigation is possible whenever soil moisture and soil temperature conditions (55° F at 6 inches is best) are favorable. Cold, wet soils will not allow fumigants to work to the best of their capability. In-row multipurpose fumigation can be applied during the subsoiling operation. Placement of fumigant below the clay subsoil should be avoided. Soil moisture should not be excessive at the point of injection or poor control will be achieved.</p> | | | |

Black Shank Control

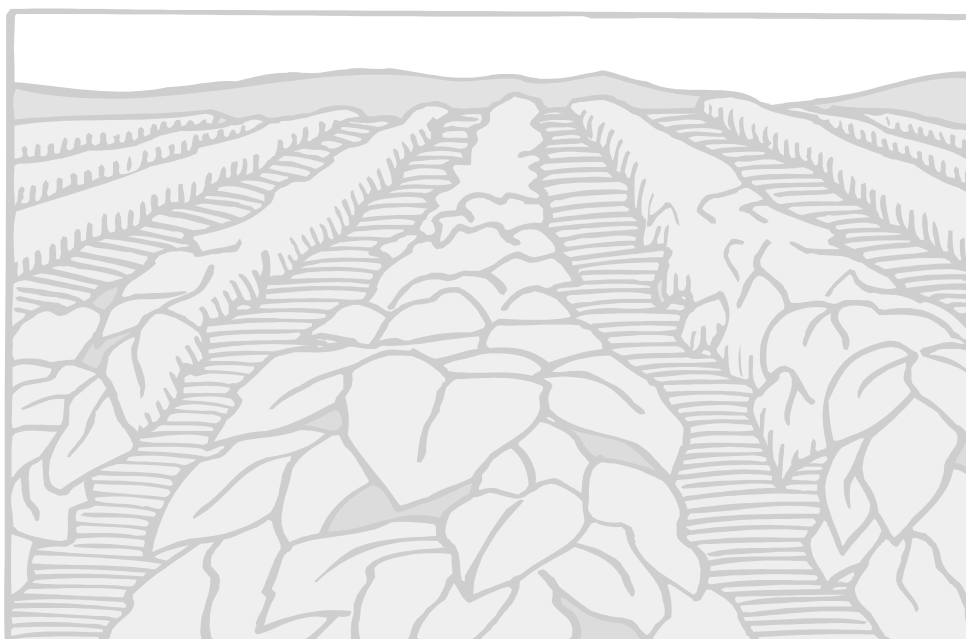
Black shank can cause significant losses in South Carolina tobacco. Black shank is caused by a fungus (*Phytophthora parasitica* var. *nicotianae*), which lives in the soil and attacks the plant primarily through the roots. Wounds are not required for infection by the black shank fungus. **High soil moisture favors root colonization by the black shank fungus**, although effects of early season infections become most apparent when soil moisture becomes limited. Sustaining high disease losses from black shank is tragic, because we know that rotation is very effective in reducing levels of the fungus in the soil. Any rotation is effective to some degree, because tobacco is the only host of the black shank fungus. The longer the rotation, the more effective the control. Therefore, rotation is the backbone of a successful control strategy, which also should use resistant varieties, chemicals and cultural practices.

Control Strategy for Black Shank

| FIELD INFESTATION LEVEL | ROTATION | VARIETAL RESISTANCE OPTIONS | CHEMICAL CONTROL |
|---|-----------|-----------------------------|---|
| High (More than 6% disease) | 1) 4 year | Moderate to high | Nematicide |
| | 2) 3 year | High only | Multipurpose <u>or</u> Ridomil + Nematicide |
| | 3) 2 year | High only | Ridomil + Nematicide |
| Moderate (1% - 6% disease) | 1) 3 year | Low to High | Nematicide |
| | 2) 2 year | High only | Multipurpose <u>or</u> Ridomil + Nematicide |
| | 3) None* | High only | Ridomil + Nematicide |
| Low (Less than 1% disease) | 1) 2 year | Low to high | Nematicide |
| | 2) None* | High only | Multipurpose <u>or</u> Ridomil + Nematicide |
| <p>Remarks: Continuous culture (tobacco following tobacco) is not recommended. However, if this cropping system is chosen, use only varieties with high resistance and a black shank control chemical. Do NOT consider continuous culture if the infestation level is greater than 6% of the plants having black shank. Continuous use of new varieties with high resistance and the ph gene without crop rotation may lead to the development of new strains of the pathogen reducing the effectiveness of the newer resistant cultivars. Numerous fields have been observed with race 1 of black shank, which can cause disease on varieties with the ph gene. Producers should consider rotating tobacco varieties to include lines with and without the ph gene (see tobacco variety table in South Carolina Tobacco growers Guide). In addition, continuous use of new varieties with high resistance to black shank without crop rotation may lead to losses from other diseases such as Fusarium wilt (see disease resistance ratings in SC Tobacco Growers Guide).</p> <p>Tobacco following tobacco is not recommended regardless of the level of resistance in the newer tobacco varieties! Ridomil Gold can be used at layby at the rate of 0.5 OR one pt/A if no more than one pint was applied preplant. Ridomil Gold can be applied up to 1.5 qt/A if applied 1 pt preplant plus 0.5-1 pt/A at first cultivation followed by 0.5-1 pt/A at layby. If race 1 occurs within your field (disease observed in a variety with the ph gene which imparts immunity to race 0) consider using a variety with high resistance that does not contain the ph gene.</p> | | | |

RIDOMIL GOLD FOR BLACK SHANK CONTROL

| ROTATION | RIDOMIL GOLD EC APPLICATION | REI |
|---|---|-------|
| None (Continuous tobacco is NOT recommended) | 1 qt/A preplant broadcast <u>OR</u> 1 pt/A preplant broadcast + 1 pt /A layby* <u>OR</u> 1 pt/A preplant + 1 pt/A first cultivation + 1 pt/A layby* | 48 hr |
| 2 year (Tobacco in alternate years) | 1.5 pt /A preplant broadcast <u>OR</u> 1 pt/A preplant broadcast + 0.5 pt /A layby* | 48 hr |
| 3 year or more (Tobacco every third year or more) | 1 pt /A preplant broadcast <u>OR</u> 1 pt/A preplant + 0.5 pt/A layby* | 48 hr |
| Remarks: *Apply Ridomil at layby cultivation using two drop nozzles per row directed to the sides of the bed. REI = reentry interval | | |



Nematode Control

Damage caused by nematodes are difficult to estimate because damage to roots may not be apparent in above ground symptoms, yet significant reductions in yields can occur with moderate levels of nematodes. Nematodes may increase the incidence of other diseases such as black shank, bacterial wilt and Fusarium wilt. The reduced use of fumigants during wet springs always results in dramatic increases in nematode damage and demonstrates the importance of soil fumigation!

Good disease control by fumigation is possible whenever soil moisture and soil temperature conditions (55° F at 6 inches is best) are favorable. Cold, wet soils will not allow fumigants to work to the best of their capability. In-row fumigant nematicides should be applied during the subsoiling operation. **Placement of fumigant nematicides below the clay subsoil should be avoided.** Soil moisture should not be excessive **at the point of injection** or poor control will be achieved.

TOBACCO NEMATICIDES

| NEMATICIDE | RATE/A | ROOT KNOT CONTROL | | REMARKS* |
|---|-------------------|--|--|---|
| | | <u>Southern</u> <u>(M. incognita)</u> | <u>Peanut</u> <u>(M. arenaria)</u> | |
| FUMIGANTS: | | | | |
| Telone II | 6 gal | Excellent | Excellent | FR REI = 5 days |
| MULTIPURPOSE CHEMICALS:** | | | | |
| Telone C17 | 10.5 gal | Excellent | Excellent | FR REI = 5 days |
| Chlor-O-Pic | 3 gal | Excellent | Very Good ¹ Very Good ¹ | FR REI = 48 hr and gas conc. less than 0.1 ppm |
| NONFUMIGANTS: | | | | |
| Nemacur 3 | 1.3-2 gal | Good | Fair | B & I REI = 48 hr |
| Mocap 6EC | 1-2 gal | Good | *** | B & I REI = 48 hr |
| Furadan 4F | 1.5 gal | Poor | Poor | B & I REI = 48 hr |
| TANK MIXES: | | | | |
| Nemacur 3 + Lorsban 4E - R | 1-2 gal + 2 qt | Good | Fair | B & I REI = 48 hr |
| Nemacur 3 + Mocap 6E | 1 gal + 2-4 qt | Good | Fair | B & I REI = 48 hr |
| Remarks: * FR - Fumigant row; B & I - Broadcast and incorporate. ** Multipurpose chemicals have effectiveness for nematodes, and Bacterial wilt. *** Not registered for this nematode species. ¹ Although some root galling may occur at the end of the growing season, yield responses are similar among the multipurpose fumigants. REI = reentry interval. | | | | |

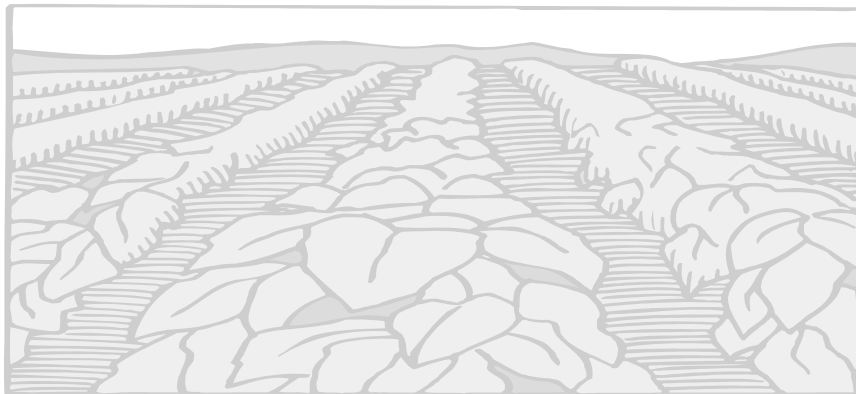
Tomato Spotted Wilt

Control: TSW infections occur through wounds in epidermal cells caused by tobacco thrips. Generally insecticides have been ineffective in reducing virus transmission because very little time is required to transmit the virus. The insecticide may kill the insect but only after the plant has already acquired the virus. Thrips population's peak in April and May and then decline in June. This approximates the timing of TSW seen in South Carolina. Imidacloprid (Admire 2F and Admire pro) applied as a greenhouse tray drench and to a much lesser extent as a transplant water treatment has been shown to reduce TSW in field plantings in Georgia and in South Carolina. The reduction in TSW may not be directly related to control of the thrips. Newer aphid control materials such as Platinum also reduce TSW. (see insecticide section for application rates)

Actigard is a new pesticide labeled for the control of blue mold on tobacco. Actigard works through stimulating the plants own defense mechanisms, commonly referred to as systemic acquired resistance (SAR). Excellent blue mold control has been observed following Actigard application. Data suggests that Actigard will also reduce TSW. Use of Actigard in combination with Admire or Platinum is additive providing a better alternative to producers than Admire or Platinum alone. Both products used together can reduce losses 50-60% on a regular basis. **However, the potential of plant injury exists with the use of Actigard. If you are considering the use of Actigard in 2008 for TSW suppression, check with your county agent for details.**

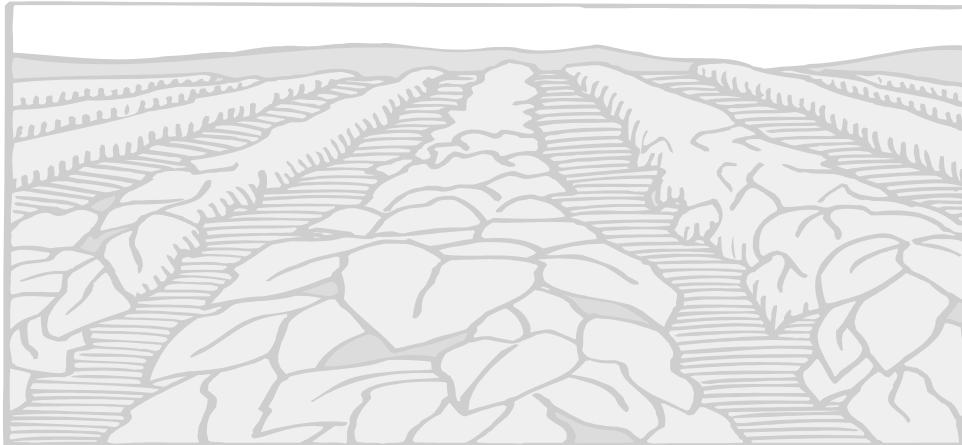
The following points should be considered to help control Tomato Spotted Wilt:

1. Avoid early planting
2. Apply Admire or Platinum as a tray drench
3. Use healthy disease free seedlings to reduce stand loss to other pathogens
4. Follow fertility recommendations - avoid excessive nitrogen application
5. Irrigate if possible to assure sustained crop growth
6. Consider use of Actigard (see information on labeling above) if expectation of disease loss is high or if severe losses to TSW were experienced in previous years.



Target Spot Control

| FOLIAR TREATMENTS* | RATE | REMARKS |
|---|---------------|--|
| Quadris Flowable | 6.0-12.0 oz/A | Apply on a 7-14 day interval with shorter intervals under conditions conducive to disease development. For ground application apply Quadris in sufficient water volume for adequate coverage and canopy penetration. Do not tank mix with Thiodan. Quadris should be applied as a component in an Integrated Pest Management strategy . Check label for application information and potential crop injury. REI = 4 hours |
| Remarks: REI = reentry interval. | | |



Blue Mold Control

Blue mold occurs in Florida and Georgia almost every year and has the potential to cause severe losses in South Carolina. Ridomil resistant strains have been observed in other states and pose a possible threat to the tobacco crop in South Carolina. Blue mold is potentially one of the most destructive diseases of tobacco. It is caused by a fungus (*Peronospora tabacina*) that is airborne, and disease can spread very quickly, leading to epidemics, if not properly managed. Acrobat has received a label for blue mold control but should be used in combination with another fungicide.

FIELD BLUE MOLD CONTROL

| FOLIAR TREATMENTS* | RATE | REMARKS |
|--|-----------------------|--|
| Ridomil Gold | 0.5-1 pt/A | Broadcast and incorporate 2-4 inches at or before transplanting. An additional 0.5 pt/A may be used at layby if no more than 1 pt/A was applied at planting. REI = 48 hr. Rates of 0.5-1 pt/A Ridomil Gold per acre should be used at or before transplanting. If necessary, an additional 0.5 pt can be used at layby, if no more than 1 pt/A was used at planting. Growers should be reminded that the Ridomil label does <u>not</u> allow foliar applications. Soil-applied Ridomil gives better control for longer periods of time and reduces the threat of resistant spores building up. The amount of Ridomil Gold used will depend on control necessary for black shank. |
| Mancozeb (Dithane DF) | 1.5 - 2.0 lb/ 100 gal | Use only in the field if there is a threat of Ridomil-insensitive blue mold. Mix 1.5 -2.0 lb per 100 gallons of water, spray foliage weekly for complete coverage up to a maximum of 100 gallons per acre. Do not spray after appearance of first button or within 21 days of harvest, whichever is earlier. REI = 24 hr |
| Manzate (Dupont Manzate Pro-stick Fungicide) | 1.5 - 2.0 lb/ 100 gal | Use in the field if there is a threat of Ridomil-insensitive blue mold. Mix 1.5 to 2.0 pounds per 100 gallons of water, spray foliage weekly for complete coverage up to a maximum of 100 gallons per acre. Discontinue sprays when the threat of blue mold no longer exists. In flue-cured, do not spray after appearance of first button or within 21 days of harvest, whichever is earlier. |
| Acrobat 50 WP | 2-7 oz /A | Use only in the field if there is a threat of Ridomil-insensitive blue mold. Mix 2-7 oz per 10-100 gallons of water depending on crop size. Consult label for spray concentration. Spray foliage every 5-7 days for complete coverage. Do not exceed 32 oz/A per season. Begin application when the Blue Mold advisory states that conditions favor development of blue mold, and before the onset of disease. Consult the label for specific application information. LABEL MUST BE IN THE POSSESSION OF THE USER AT THE TIME OF FUNGICIDE APPLICATION. Do not spray after appearance of first button or within 21 days of harvest, whichever is earlier. REI = 24 hr. Do not use Acrobat alone. Use in combination with other fungicides labeled for blue mold control except mefenoxam or metalaxyl. |

| | | |
|--|---------------|---|
| Actigard 50 WG | 0.5 oz/A | <p>Begin application after plants reach a height of 12 inches. Apply on a preventative schedule when blue mold threatens. Another registered blue mold product should be used prior to 12 inches for early season control and after the final application if conditions are conducive for disease. Make up to 3 applications on a 10-day schedule. Apply in a minimum of 20 gals./A. Application of Actigard may result in leaf yellowing. This cosmetic yellowing normally disappears after final application.</p> <p>REI = 12 hr.</p> |
| Quadris Flowable | 6.0-12.0 oz/A | <p>Quadris application should begin prior to disease development or at first indication that blue mold is in the area. Do Not apply Quadris as a curative application. If blue mold is present in the field, initiate application with Acrobat MZ prior to Quadris application. Apply on a 7-14 day interval with shorter intervals under conditions conducive to disease development. For ground application apply Quadris in sufficient water volume for adequate coverage and canopy penetration.</p> <p>Do not tank mix with Thiodan. Check label for potential crop injury.</p> <p>REI = 4 hours</p> |
| <p>Remarks: REI = reentry interval.</p> | | |



Greenhouse Disease Control

TOBACCO GREENHOUSE DISEASE CONTROL

| DISEASE | CHEMICAL | RATE/50 GAL WATER | REMARKS* |
|--|--|-------------------------|---|
| Blue Mold Damping off, Stem rot and Target spot | Mancozeb (Dithane DF) | 0.25 lb/50 gal water | For greenhouse and floatbed systems, use 1/2 lb per 100 gal water (one level teaspoon per gallon). Spray every 5 to 7 days to the point of run-off. Apply 3 gallons of the fungicide spray mixture on small plants (dime size), gradually increasing the spray volume to 6 to 12 gallons per 1000 sq. ft. as plants enlarge until transplanting to the field. For stem rot, use enough volume to wet the base of plant stems. REI = 24 hr. |
| | Manzate (Dupont Manzate Pro- stick Fungicide) | 0.25 lb/50 gal water | For greenhouse and float-bed systems, use 1/2 pound per 100 gallons of water (one level teaspoon per gallon). Spray every 5 to 7 days to the point of run-off. Apply 3 gallons of the fungicide spray mixture on small plants (dime size), gradually increasing the spray volume to 6 to 12 gallons per 1000 sq. ft. as plants enlarge until transplanting to the field. For stem rot, use enough volume to wet the base of plant stems. |
| Pythium | Terramaster 4EC | 1.4 oz/100 gal water | Do not apply as a drench or in irrigation water. Apply this product only to tobacco float-bed water. Consult the label for mixing directions. Crop injury can occur with improper mixing. Terramaster 4EC used as a preventative treatment before symptoms occur, mix 1.4 fl. oz of Terramaster /100 gal of water no sooner than three weeks after seeding. A sequential preventative application of 1.4 fl oz/100 gal of water can be made 3 weeks after the first application. Do not apply Terramaster 4EC later than 8 weeks after seeding. REI = 12 hr. |
| | Terramaster 4EC | 1.4 oz/100 gal water | Terramaster 4EC used as a curative treatment when symptoms first appear, mix 1.4 fl oz of Terramaster /100 gal of water no sooner than three weeks after seeding and when leaves are at least 1 in. in diameter. If Pythium symptoms recur after the first application, a second application of 1-1.4 fl oz/100 gal of water can be made. Allow at least a 3-week interval between the first and second application. Do not apply Terramaster 4EC later than 8 weeks after seeding. No more than 2.8 fl. oz. of Terramaster 4EC /100 gal of water may be applied to each crop of transplants. REI = 12 hr. |
| <p>Remarks: The potential for phytotoxicity exists when Dithane DF is used on tobacco seedlings. To minimize potential for damage, 72 hours prior to large scale application, the user should test for potential phytotoxicity by applying the fungicide to a small sample area growing under similar conditions. In general, injury is greater in greenhouse systems. Ridomil Gold, or Acrobat are not labeled for use in greenhouses, or floatbed plant production systems. REI = reentry interval.</p> | | | |