# 7. Weed Management in Conventional and No-till Burley Tobacco

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An environmentally sound weed management program is a critical part of profitable tobacco production. Although several chemical weed control programs are available for burley tobacco, not all weeds can be handled chemically. Therefore, attention also must be given to other weed management systems, such as crop rotation, early root destruction, cultivation, and growing a healthy crop to better compete with weeds.

## Problems That Weeds Cause in Tobacco

*In Plant Beds*

- Severe competition sometimes leading to stand loss.
- Interference with pulling plants.
- Lower-quality plants.

*In the Field*

- Lower yield and quality.
- Increased production costs.
- Interference with harvesting.
- Chemical imbalances in cured leaf that reduce smoke flavor.
- Increase in the spread of tobacco mosaic virus (TMV) in susceptible varieties, as well as an increase in the spread of black shank through root injury during cultivation. TMV can also be spread mechanically by the tool bars or undersides of tractors when they contact taller plants.
- Increase in the spread of other diseases. Horsenettle and ground cherry increase TMV, etch virus, and vein mottling

virus. You should eliminate horsenettle and ground cherry in and around burley fields.
- Loss of quality. If tobacco is cut and laid on the ground where weeds are present, it can rot and lose quality because of increased moisture associated with the weeds.

Some weeds, such as nutsedge, ragweed, fall panicum, and hairy galinsoga, differ in susceptibility to herbicides (Table 7-1). Therefore, you must correctly identify weeds to properly select a herbicide.

Herbicides labeled for tobacco control weeds by restricting growth during seed germination. They do not affect weed seeds that do not germinate (dormant seeds) or weeds that have emerged from the soil. Exceptions are Spartan, which gives good control of nutsedge 8 to 10 inches tall, and Poast, which gives excellent control of emerged grasses. To select the herbicide and rate, you must keep accurate field records that give the type and number of weeds expected.

## Weed Control in Conventionally Planted Burley Tobacco

### *Crop Rotation*

Crop rotation is important in handling weed problems in tobacco, as well as in disease and nematode management. Large-seeded broadleaf weeds, including cocklebur, morningglory, jimsonweed, and sicklepod, and small-seeded broadleaf weeds, such as ragweed and hairy galinsoga, are not controlled by most tobacco herbicides. They can be controlled more easily in corn. Most perennials are difficult to control in tobacco. Annual grass populations have generally decreased over the years in tobacco fields, whereas ragweed, hairy galinsoga, horsenettle, and nutsedge have increased. It may not be as easy to use rotation as a weed control tool in burley because of the limited availability of land and of other crops to grow in the rotation.

### *Crop Competition*

Crop competition can be an effective tool in weed management. Tobacco grows rapidly, and the large leaves shade weeds. For example, studies at N.C. State University have shown that if ragweed is controlled for as long as two weeks after transplanting flue-cured tobacco, the ragweed will not reduce yields. Weeds coming in later

*Table 7-1. Expected weed control from herbicides labeled for use in tobacco*

| Weeds | Command | Devrinol | Poast | Prowl | Spartan | Tillam |
|---|---|---|---|---|---|---|
| Barnyardgrass | E | GE | FG | GE | F | GE |
| Bermudagrass | PF | P | G | P | P | P |
| Broadleaf signalgrass | E | G | E | G | FG | P |
| Crabgrass | E | E | GE | E | FG | E |
| Crowfootgrass | E | E | F | E | F | E |
| Fall panicum | E | G | E | G | FG | G |
| Foxtails | E | E | E | E | FG | E |
| Goosegrass | E | E | GE | E | FG | G |
| Johnsongrass (seedlings) | G | F | E | G | F | G |
| Sandbur | G | — | — | G | PF | G |
| Texas panicum | G | — | E | G | F | P |
| Nutsedge | P | P | N | P | E | G |
| Apple of Peru | G | P | N | P | E | P |
| Cocklebur | F | P | N | P | FG | P |
| Common purslane | FG | E | N | E | GE | G |
| Hairy galinsoga | G | PF | N | P | FG | P |
| Jimsonweed | G | P | N | P | FG | P |
| Lambsquarters | G | G | N | G | E | G |
| Morningglories | P | P | N | P | E | P |
| Pigweed | P | G | N | GE | E | G |
| Prickly sida | E | P | N | P | P | P |
| Ragweed | G | F | N | P | P | P |
| Sicklepod | P | P | N | P | P | P |
| Smartweed | G | P | N | PF | E | P |

*Note: Ratings are based upon average to good soil and weather conditions for herbicide performance and upon proper application rate, technique, and timing.*
*E = excellent control, 90% or better* *G = good control, 80-89%*
*F = fair control, 60-79%* *P = poor control, 1-59%*
*N = No control* *— = has not been tested*

could still interfere with harvest, however, and increase Granville wilt in flue-cured tobacco.

In burley, crop competition is somewhat limited as a weed control tool because burley is planted later in the season, the rows are wider, and weeds grow fast in western North Carolina. Use good cultural practices to promote rapid tobacco growth, and use as narrow rows as recommended to help shade weeds. With current recommendations for wider rows to leave more space between plants and drive rows to aid in blue mold control, greater pressure will be placed on the weed control program.

*Cultivation*

Mechanical cultivation is still needed in burley tobacco because herbicides cannot completely control all weeds. However, no more than two cultivations are necessary. Excessive and late cultivations can spread TMV and other viruses and injure root systems. Root injury can increase problems with Granville wilt, black shank, and nutrient uptake.

There is probably less need for cultivation in burley tobacco than in flue-cured tobacco because burley usually does not need to be on a row ridge. Also, many burley growers have full-time jobs elsewhere and do not have time to cultivate. When you cultivate, keep it shallow so tobacco roots will not be pruned. In some cases, breaking the soil crust to allow better soil aeration could benefit burley tobacco. But cultivation in burley tobacco increases soil erosion, and most burley is grown on erodible slopes. (See section on "Producing No-Till Burley Tobacco" in this chapter.) The Water Quality Division of the N.C. Department of Environment and Natural Resources has shown that sediment is the greatest cause by far of degraded surface-water quality.

*Herbicides*

In most agronomic row crops, North Carolina growers have rapidly turned to herbicides for weed control with much less cultivation and no hand hoeing. Herbicides are used on about 85 percent of the burley acreage in North Carolina. Adding herbicides to weed control programs in tobacco provides some advantages:

- Increases efficiency as farms get larger and transplanting is extended over a longer period. With herbicide use, growers

do not have to stop transplanting to cultivate the tobacco transplanted first.
- Eliminates the need for hoeing.
- Provides good insurance against wet weather and cultivation problems, especially in clay soils. Most burley soils are very sticky when wet.
- Increases rotation opportunities. With good control of nutsedge now possible, producers may be able to bring more land into a proper rotation.
- Reduces the number of cultivations needed, which saves money and reduces soil erosion.
- Reduces the spread of diseases, especially TMV and other viruses and black shank, as well as reduces nematode populations.
- Increases yields— generally by 150 to 450 pounds per acre.
- Simplifies harvest. Fields are cleaner of weeds for burley harvest.

## Selecting and Applying Herbicides for Conventional Burley Tobacco

*In Plant Beds*

Fumigate with methyl bromide in the fall or use dazomet (Basamid). The only herbicide now available for use after sowing beds is sethoxydim (Poast), which controls young grass weeds.

*In Fields*

Certain herbicides may be applied before transplanting or within seven days after transplanting (Table 7-2). For example, Poast can be applied up to 42 days before harvest. There are advantages and disadvantages to each time of application, but each is suitable for a given weed population and grower's situation. Growers are reminded that it is essential to correctly identify the weed to properly select a herbicide (Table 7-1) and that county Extension agents can help identify weeds. Also, growers should read the label before purchasing a herbicide to see whether the product controls the weed and to determine the proper rate.

*Pretransplant Soil-Incorporated Herbicides (PPI)*

Pretransplant-incorporated herbicides offer several advantages. Growers can tank mix them with other chemicals to save one or more trips across the field, and they can gain more consistent weed control than with overtop applications because there is less dependence on rainfall for activation. In addition, when poor field conditions delay transplanting, a pretransplant-incorporated herbicide will help prevent weed growth that may start in freshly prepared soil.

The most serious disadvantage of using these herbicides is crop injury. Prowl, Tillam, and Devrinol have the potential to limit root growth and cause slow early-season growth (stunting). Spartan does not affect root growth directly; however, foliar symptoms and stunting have been observed. Stunting is most likely during cool, wet springs. Poor incorporation, applying high rates, and tank mixing two or more herbicides increase the chance for injury. Research and observations suggest the possibility of additional root injury and stunting when the full rate of flumetralin was used for sucker control the previous year. Proper crop rotation will prevent this problem. If crop rotation is not possible, you should use the 2-quart-per-acre rate of flumetralin in a recommended sucker control program. (See Chapter 10 for recommended programs.)

If root injury does occur, it is important to remember that slow plant growth is due to a poor root system rather than a lack of nutrients. Adding more nitrogen will not increase the growth rate but

***Table 7-2. Herbicide application methods***

| *Herbicide* | *Soil Incorp. before Trans-planting* | *Surface Applied before Trans-planting* | *Applied Overtop within 7 Days after Trans-planting* | *Applied Overtop up to 42 Days before Harvest* |
|---|---|---|---|---|
| *Command 3ME* | | *x* | *x* | |
| *Devrinol 50DF* | | | *x* | |
| *Devrinol 2E* | *x* | | | |
| *Poast* | | | | *x* |
| *Prowl 3.3EC* | *x* | | | |
| *Spartan 4F* | *x* | *x* | | |
| *Tillam 6E* | *x* | | | |

will contribute to rank growth, slow ripening, more unripe grades, and lower warehouse prices.

Poor incorporation is a leading cause of root injury. Uneven incorporation leads to areas of concentrated herbicide in the soil. When tobacco is transplanted into these areas, root growth is restricted, resulting in root-bare areas often found on shanks of stunted plants. Tractor speed, disk shape, and disk size are all important for uniform incorporation of the chemical. Finishing or smoothing harrows with small, spherical-shaped disks incorporate chemicals more uniformly than larger cutting harrows with cone-shaped disks. Also, finishing harrows incorporate the chemical one-half as deep as the disks run, whereas larger harrows incorporate approximately two-thirds as deep as the disks are run. Deep incorporation increases the probability that the herbicide will contact tobacco root systems and injure them.

Tractor speed should be at least 4 to 6 miles per hour (mph), and the field should be cross-disked to distribute the chemical more evenly. Disking once and bedding the rows will not incorporate the herbicide uniformly. You should never rely on the bedding operation alone to incorporate a herbicide. Doing so drastically increases the probability of crop injury while decreasing the effectiveness of the herbicide. Herbicides should always be incorporated with the proper equipment before bedding.

You can reduce root injury by applying pretransplant herbicides at the lowest labeled rate that field and weed conditions allow, incorporating the herbicide properly, and applying only one pretransplant-incorporated herbicide. Stunting of the crop from improper soil incorporation is most likely to occur with Tillam 6E and Devrinol tank mixed, then Tillam 6E or Prowl, and is least likely with Command.

*Command* gives excellent control of many grasses and offers control of many broadleaf weeds found in North Carolina burley tobacco fields, such as common ragweed, jimsonweed, common lambquarters, prickly sida, Pennsylvania smartweed, and hairy galinsoga, as well as partial control of common cocklebur. Refer to Table 7-1 for a more complete list of weeds controlled by Command and other herbicides. Also, see the Command 3ME label for incorporation and setback restrictions. One weakness of Command is that it offers very poor control of redroot pigweed.

Research with Command has shown that tobacco is sufficiently tolerant of this herbicide. Little or no stunting has been observed; an

occasional white leaf or plant has been noted, but plants recover with no adverse effects on yield or quality.

*Devrinol 2E* gives long-lasting control. It provides some suppression of ragweed and hairy galinsoga if good rainfall comes soon after application. The label has rotation restrictions because of possible soil carryover. Devrinol may leave residues that stunt small grain growth, especially when it is soil incorporated. If the small grain crop is used only as a cover crop, this stunting is not considered a problem. The potential for carryover can be reduced by making band applications to the soil surface rather than by incorporating it in the soil or applying it broadcast on the soil surface. Check the label for restrictions on rotational crops and the use of cover crops. If Devrinol is incorporated, using the lower labeled rate, fall tillage, and destroying stalks and roots early will reduce the chance of carryover to small grains.

*Prowl 3.3EC* gives long-lasting grass control. Does not control ragweed or hairy galinsoga.

*Spartan 4F* may be soil incorporated before transplanting, and weed control from PPI applications of Spartan is more consistent when soil moisture is limited. However, research has shown that stunting is more likely and usually more severe when Spartan is soil incorporated than when it is applied to the soil surface (see discussion of Spartan 4F in the "Pretransplant Soil Surface-Applied Herbicides (PRE-T)" section below).

*Tillam 6E* should be incorporated immediately after application. It gives short-term nutsedge suppression. Apply as close to transplanting as possible because Tillam 6E does not last long in soil. It does not control ragweed or hairy galinsoga.

*Pretransplant Soil Surface-Applied Herbicides (PRE-T)*

*Spartan 4F* provides excellent control of nutsedge, morningglories, and redroot pigweed. It gives fair to good control of hairy galinsoga and poor control of ragweed (Table 7-3). Burley growers who might bed their rows must knock row ridges down to the height of the transplanting before Spartan application. Some stunting of tobacco usually occurs with Spartan, but normal growth resumes and yields

are not reduced. Still, there is not a wide margin of safety with Spartan and tobacco.

Spartan is very sensitive to soil organic matter content and soil type. You must follow the label carefully to obtain expected weed control without stunting the crop. Growers who plan to use Spartan should have a commercial lab test their soil and determine the percentage of organic matter and soil classification.

Although several growers did not get control with Spartan in fields with heavy hairy galinsoga infestations in 1997, growers have achieved good control in more recent years when they followed label rate recommendations more closely. Spartan has given excellent control of hairy galinsoga in research tests. For fields with heavy infestations of hairy galinsoga or the presence of ragweed, Command should be used in conjunction with Spartan. Better control has been obtained if Command is applied immediately after transplanting.

See the Spartan label for rotational crop guidelines because of possible soil carryover. This will not generally be a problem in the burley area. For example, soybeans can be planted anytime after application; wheat, barley, rye, and oats can be planted after 4 months; corn and sorghum after 10 months; and sweet corn after 18 months.

The Spartan label also indicates that the product can be used as a pre-transplant soil-incorporated (PPI) application. However, the possibility of injury to the tobacco is greatly increased and weed control is only slightly better when Spartan is applied PPI rather than PRE-T. Few burley growers have implements that will uniformly incorporate Spartan 2 to 2½ inches deep.

In on-farm tests (Tables 7-3 and 7-4), weed control from Spartan and Command applied PPI was as good as PRE-T applications. The PRE-T applications received adequate rain early on to activate all herbicides applied. Therefore, there was no advantage to incorporating herbicides. Treatments which included Devrinol did not control certain weeds as well as treatments which included Command and Spartan.

*Herbicide Application at or Following Transplanting*

*Devrinol 50DF or Command 3ME* may be applied at or immediately after transplanting. Application at transplanting is encouraged because it is more likely to control early-germinating weed seeds, and the moisture in freshly tilled soil helps move the herbicide into contact with weed seed. Also, application at transplanting saves a trip over the field and

provides insurance against early season rains, which can prevent re-entry into the field. Either herbicide can be used after a pretransplant application of Spartan to improve annual grass, hairy galinsoga, and ragweed control. Command is preferred for the latter two weeds.

Herbicides applied to the soil surface depend on water to move the chemicals into the soil where weed seeds germinate. Therefore, they fit well in irrigated situations. If rainfall does not occur within three to five days, a light cultivation may help activate the herbicide. Lack of rainfall early in the season can result in reduced weed control when herbicides are applied to the soil surface. Some growers have experienced reduced control due to low soil moisture in recent years.

*Herbicide Application Overtop up to 42 Days Before Harvest*

*Poast* gives good control of most annual and perennial grasses when sprayed overtop tobacco and the grass weeds. Poast gives fair to good control of barnyardgrass and excellent control of giant, green, and yellow foxtail; fall and Texas panicum; and broadleaf signalgrass up to 8 inches tall. It also controls large and smooth crabgrass and crowfoot grass up to 6 inches tall. It is effective on volunteer rye and wheat up to 4 inches tall. Poast also controls bermudagrass up to 6 inches tall and rhizome johnsongrass up to 25 inches tall.

Use 1.5 pints of Poast per acre with 2 pints per acre of a nonphytotoxic oil concentrate. If a second application is needed for johnsongrass, use 1 pint per acre with the oil concentrate when the johnsongrass is 12 inches tall. Do not apply more than 4 pints of Poast per acre per season to tobacco including the amount applied in seedbeds. Do not apply to grasses under stress or if rainfall is expected within one hour following application because grass control will be unsatisfactory. Do not apply Poast with other pesticides.

In larger tobacco, you can improve results by using a semi-directed spray to cover grasses that might be under tobacco leaves. Tobacco is very tolerant of Poast. In flue-cured tobacco, however, some slight leaf margin burn has been noted when Poast was applied under high temperatures and humidity. This is less likely in the burley area, but if such conditions do occur at application, reduce the rate of oil concentrate by one-half.

Poast can be very helpful in no-till burley tobacco since grass weeds are not controlled well in some situations. See the label for further details on the use of Poast in tobacco. Do not apply within 42 days of harvest.

*Table 7-3. Average results of on-farm herbicide tests in Buncombe and Yancey counties in 2004*

| Treatment | Rate lb a.i./a | Method of Application | Yellow Nutsedge [a] | Carpet-weed [b] | Goose-grass [a] | Johnson-grass [b] | Redroot Pigweed [a] | Venice-mallow [a] | Black Nightshade [a] | Hairy Galinsoga [b] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | % of Weeds Controlled | | | | | | | |
| Spartan | 0.313 | PPI | 100 | 94 | 96 | 96 | 99 | 89 | 100 | 81 |
| Spartan + Command | 0.313 + 0.75 | PPI | 99 | 99 | 97 | 98 | 99 | 92 | 100 | 92 |
| Spartan + Command | 0.313 + 0.50 | PPI | 96 | 97 | 86 | 92 | 98 | 81 | 100 | 90 |
| Spartan + Devrinol | 0.313 + 1.00 | PPI | 100 | 100 | 93 | 95 | 100 | 73 | 99 | 90 |
| Command + Devrinol | 0.75 + 1.00 | PPI | 35 | 76 | 95 | 95 | 83 | 90 | 67 | 88 |
| Spartan + Command | 0.313 + 0.50 | PRE-T | 99 | 99 | 100 | 96 | 99 | 97 | 100 | 94 |
| Spartan + Command | 0.313 0.50 | PRE-T | 100 | 99 | 99 | 98 | 100 | 94 | 100 | 95 |
| Spartan + Devrinol | 0.313 + 1.00 | PRE-T | 100 | 99 | 93 | 93 | 100 | 93 | 97 | 81 |
| Command + Devrinol | 0.75 + 1.00 | PRE-T | 37 | 72 | 93 | 95 | 89 | 92 | 76 | 82 |

[a] Data from one location.

[b] Data from two locations.

*Table 7-4. On-farm herbicide evaluation test, Mitchell County, 2005*

| Treatment | Rate lb a.i./a | Control of Hairy Galinsoga | | Crop Stunting | |
|---|---|---|---|---|---|
| | | 21 DAT [b] | 42 DAT | 21 DAT | 42 DAT |
| | | ——————% —————— | | | |
| Spartan[a] | 0.31 | 91 | 79 | 9 | 10 |
| Command[a] | 0.75 | 86 | 82 | 0 | 0 |
| Devrinol[a] | 2.0 | 69 | 64 | 3 | 3 |
| Spartan +Command | 0.31 0.75 | 93 | 90 | 6 | 6 |
| Spartan +Command | 0.31 0.50 | 89 | 85 | 7 | 6 |
| Spartan +Devrinol | 0.38 1.0 | 90 | 75 | 9 | 12 |
| Spartan +Devrinol | 0.25 0.75 | 86 | 76 | 7 | 6 |
| Command +Devrinol | 0.75 1.0 | 88 | 86 | 6 | 9 |
| Command +Devrinol | 0.75 0.75 | 79 | 87 | 2 | 2 |

[a] *All treatments applied preplant incorporated (PPI)*
[b] *DAT = Days after treatment.*

## Weed Management in No-Till Burley Tobacco

Researchers have concentrated on the evaluation of new herbicides, especially for better control of broadleaf weeds, and on developing techniques to grow no-till tobacco. Several herbicides have given good control of annual and perennial grasses when sprayed overtop tobacco. These are known as *postemergence grass herbicides*. Poast is now available for postemergence grass control and is a big help in no-till tobacco.

Also, there will be fewer new herbicides for tobacco. Tobacco is a relatively small acreage crop, and it is not profitable for chemical companies to develop herbicides for tobacco. Enide and Paarlan were lost because of the high cost of re-registering.

**Spartan** is a big help for weed control in no-till tobacco. (See section on "Selecting and Applying Herbicides for Conventional Burley Tobacco" in this chapter.) Since 1997, Spartan has been evaluated not only in experiment station tests in no-till burley, but also in on-farm tests. Table 7-5 gives the results of tests conducted at the Upper Mountain and Mountain Research Stations in 1999 comparing the effectiveness of Spartan, Command, and Devrinol in no-till versus conventional-till tobacco.

In this experiment, no-till tobacco was compared to conventional-till to determine what effect not tilling before planting and a good rye mulch has on the performance of several herbicides. In most instances, Spartan, Command, and Devrinol gave better weed control in no-till plots than in conventional-till plots. The weaker a herbicide is on a weed species, the more no-till improved the results. There was less improvement in favor of no-till if the herbicide gave excellent control of a particular weed.

Tables 7-6 and 7-7 show the results from on-farm tests in no-till tobacco in Alleghany and Haywood counties. Spartan rates are based on soil texture and the percentage of organic matter, and many soils where burley tobacco is produced in North Carolina require the highest labeled rate for control of targeted weeds. Applying Spartan before planting and Command after planting was as effective as tankmixing of Spartan and Command before planting.

*Table 7-5. Effect of no-till in rye mulch vs. conventional tillage on weed control, 1999*

| | Upper Mtn. Research Station[a] | | | | | | | | Mtn. Research Station[b] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hairy Galinsoga | | Yellow Nutsedge | | Redroot Pigweed | | Common Purslane | | Yellow Nutsedge | | Pennsylvania Smartweed | |
| | NT | T | NT | T | NT | T | NT | T | NT | T | NT | T |
| Herbicide | % of Weeds Controlled | | | | | | | | | | | |
| Spartan [c] | 89 | 68 | 94 | 82 | 100 | 100 | 98 | 91 | 100 | 99 | 100 | 100 |
| Command [c] | 86 | 61 | 66 | 44 | 79 | 61 | 95 | 90 | 60 | 60 | 94 | 100 |
| Devrinol [c] | 80 | 63 | 69 | 44 | 86 | 76 | 89 | 66 | 78 | 44 | 77 | 89 |
| Spartan [c] + Command [d] | 97 | 78 | 95 | 85 | 99 | 99 | 99 | 97 | 99 | 100 | 100 | 100 |

[a] Control ratings are an average of data taken at 30, 51, and 113 days after planting except for hairy galinsoga, which was at 113 days only. NT = no-till; T = conventional tillage.

[b] Control ratings are an average of data taken at 21 and 44 days after planting.

[c] Applied pre-planting to mulch or soil surface.

[d] Applied immediately after transplanting.

*Table 7-6. On-farm no-till herbicide evaluation test, Alleghany County, 1999*

| Treatment | Rate lb a.i./a | Control of Hairy Galinsoga | | Crop Stunting | |
|---|---|---|---|---|---|
| | | 27 DAT [c] | 48 DAT | 27 DAT | 48 DAT |
| | | ——————% —————— | | | |
| Spartan [a] | 0.25 | 85 | 74 | 0.0 | 0.7 |
| Spartan [a] | 0.31 | 89 | 76 | 1.0 | 1.3 |
| Spartan [a] | 0.38 | 99 | 93 | 0.3 | 1.3 |
| Spartan [a] +Command [a] | 0.25 0.75 | 99 | 95 | 1.3 | 0.7 |
| Spartan [a] +Command[a] | 0.31 0.75 | 97 | 95 | 1.3 | 0.3 |
| Spartan [a] +Command [a] | 0.38 0.75 | 100 | 99 | 1.3 | 1.0 |
| Spartan [a] +Command [b] | 0.25 0.75 | 98 | 94 | 1.0 | 1.0 |
| Spartan [a] +Command [b] | 0.31 0.75 | 99 | 96 | 1.3 | 1.0 |
| Spartan [a] +Command [b] | 0.38 0.75 | 100 | 99 | 1.3 | 2.0 |

[a] *Applied before transplanting.*

[b] *Applied immediately after transplanting.*

[c] *DAT = Days after treatment.*

*Table 7-7. On-farm no-till herbicide evaluation test, Haywood County, 1999*

| Treatment | Rate lba.i./a | Control of Redroot Pigweed | | Control of Yellow Nutsedge | Stunting of Tobacco Plants | |
|---|---|---|---|---|---|---|
| | | 24 DAT [c] | 46 DAT [c] | 46 DAT [c] | 24 DAT [c] | 46 DAT [c] |
| | | % | | | | |
| Spartan [a] | 0.25 | 100 | 95 | 96 | 0.3 | 0.3 |
| Spartan [a] | 0.31 | 100 | 97 | 100 | 0.7 | 0.7 |
| Spartan [a] | 0.38 | 100 | 99 | 100 | 1.7 | 0.7 |
| Spartan [a] +Command [a] | 0.25 0.75 | 100 | 99 | 97 | 0.7 | 0.3 |
| Spartan [a] +Command [a] | 0.31 0.75 | 100 | 100 | 95 | 0.3 | 1.0 |
| Spartan [a] +Command [a] | 0.38 0.75 | 100 | 95 | 100 | 1.3 | 1.0 |
| Spartan [a] +Command [b] | 0.25 0.75 | 100 | 99 | 100 | 1.0 | 1.0 |
| Spartan [a] +Command [b] | 0.31 0.75 | 100 | 96 | 97 | 1.0 | 1.3 |
| Spartan [a] +Command [b] | 0.38 0.75 | 97 | 100 | 100 | 1.0 | 1.3 |

[a] *Applied before transplanting.*

[b] *Applied immediately after transplanting.*

[c] *DAT = Days after treatment.*

## Producing No-Till Burley Tobacco

There appears to be much interest in no-till burley tobacco in North Carolina and other burley-producing states. Many growers see it as the only way to comply with soil conservation requirements. Others see it as a better way to farm, saving topsoil and making agriculture more sustainable. In research tests over 13 years, yields were about the same when tobacco was transplanted into a killed rye cover crop or sod, as compared to conventionally tilled and transplanted tobacco (Table 7-8). Growers are now interested in no-till burley because it is easier to meet conservation requirements where land for rotation is limited. Some growers had to switch to this production practice in 1994.

Here are some experiences and current recommendations on no-till burley:

*1. Transplant properly.* Two systems of mulch or cover may be used: a killed rye cover crop or a killed sod. Three types of transplanting may be used: planting directly into the mulch with a transplanter with a coulter and double disc row opener, transplanting into a narrow tilled strip after using a Ro-Till or similar tillage implement, or transplanting with a sub-surface tillage transplanter (described in item 9 below). With any no-till transplanter, cut press wheels to a 2-inch width and reinforce the rim. The narrow wheel packs soil around plants better.

*2. Select a field with low weed pressure if possible.* Do not try no-till production in fields with bermudagrass or heavy infestations of perennial broadleaf weeds such as horsenettle and trumpet creeper. Control perennial weeds the year before, especially in sod situations. You can, however, grow no-till in fields with nutsedge by using Spartan and in fields with johnsongrass by using Poast. If you do

***Table 7-8. Tobacco yield under conventional and no-till systems at the Mountain and Upper Mountain Research Stations, 1989-94***

| Year | Conventional Tillage | No-Till |
|---|---|---|
| | lb/a | |
| *1989* | *2,943* | *3,268* |
| *1990* | *2,925* | *3,019* |
| *1991* | *2,393* | *2,752* |
| *1992* | *2,095* | *2,413* |
| *1993* | *2,369* | *2,649* |
| *1994* | *2,095* | *1,576* |

not use established sod as the mulch, till land in the fall and seed an Abruzzi rye cover crop.

*3. Incorporate lime and phosphorus in the fall if suggested by soil tests.* Apply soil pesticides for insect and disease control according to label directions based on knowledge of past insect and disease problems and based on nematode assays. Do not apply Ridomil in the fall. Low-lying fields may be bedded before planting the cover crop. Do not leave beds in a peak, however, because planting will be more difficult the next spring.

*4. Sow a small-grain cover crop because a good cover is essential for successful no-till tobacco.* Abruzzi rye is the best cover because it produces a lot of biomass and chemically suppresses weeds. *Sow at a rate of 3 bushels per acre.* Apply fertilizer as for a small grain crop to get good cover-crop growth. The heavier the mulch, the fewer the weeds.

*5. Kill the cover crop.* Spray with Gramoxone Extra plus surfactant about two weeks before planting to kill the cover crop. If Roundup is used, apply it four weeks before transplanting. If Gramoxone Extra is used early, a second application may be needed before transplanting to kill rye regrowth or emerged weeds.

*6. Take weed control action as needed.* If planting into sod, perennial weeds are more likely. Spray with Roundup four weeks before transplanting. Spray again with Gramoxone Extra if needed just before transplanting because annual weeds may emerge through the killed sod before transplanting.

*7. Broadcast phosphorus and potash before transplanting.* Apply nitrogen as a band placement at planting.

*8. Irrigate before transplanting if soil is dry and hard and irrigation is available.* The cover crop will have depleted the soil moisture, and tobacco will grow poorly if it is not irrigated. Apply Ridomil according to the label before transplanting. Rainfall or irrigation will be needed before or after transplanting to move Ridomil into the soil.

*9. Consider using a transplanter.* A commercially available transplanter with a double-disc row opener with a coulter added in front has done a good job of planting into a variety of mulches. An alternative is a coulter followed by a straight shank running 6 to 8 inches deep

or a Ro-Till tillage implement to loosen a furrow followed by a conventional transplanter with a sword opener. The sub-surface tillage transplanter, however, has given us the best stands yet. Developed by Virginia Tech and a no-till cabbage grower, it was used to make successful no-till plantings of tobacco in North Carolina from 1993 through 2000. This planter uses a large, straight coulter followed by a winged knife to loosen a narrow furrow. A conventional transplanter is attached to the row-opener frame. Press wheels need to be narrowed to achieve better packing of soil around transplants.

*10. Transplant as usual.* Field-grown and greenhouse plants have worked equally well. Normally, no-till tobacco grows more slowly than tobacco planted conventionally in early season. Therefore, no-till tobacco should be planted first. If the soil is too dry or too moist, the planter slit may not close tightly in the non-strip-tillage method of planting. Use extra weight on planter press wheels and cut off part of the press wheels' edges to make them narrower. This puts more pressure on the sides of the slit.

*11. Fertilize properly.* If broadcast fertilization was not used, apply the recommended amount of fertilizer in one or two bands 4 to 5 inches deep with a disc opener that will cut through the mulch. Disturb as little soil as possible. Do this at transplanting or immediately after. The second-choice method would be to band the fertilizer on the soil surface and irrigate. Broadcasting phosphorus and potash and side-banding nitrogen works best in no-till.

*12. Control weeds.* Apply Spartan on the mulch and soil surface before transplanting, or apply Devrinol or Command after planting. If it does not rain within five days, irrigate to wet the soil 2 to 4 inches. Irrigation or rainfall is necessary to wash the herbicide off the mulch and into the soil. A tank mix of Command and Devrinol gives good results. Spartan is the best herbicide to use for no-till tobacco. Apply it to the soil surface before transplanting. Do not apply overtop tobacco. For improved control of annual grass, hairy galinsoga, and ragweed, use Command after transplanting. Over several years, we have found that using Spartan before transplanting plus Command or Devrinol after transplanting gives better weed control than a tank mix applied before transplanting. The over-top treatment apparently controls weed emergence caused by the soil disturbance of the transplanter. Observations of Spartan over several years in no-till and conventional-till burley tobacco indicate that better control is obtained in no-till

with borderline tolerant weeds such as hairy galinsoga, ragweed, and annual grasses. The mulch aids in weed suppression (Table 7-5). Stunting of tobacco from Spartan is less likely in no-till than in conventional-till.

*13. Carry out subsequent weeding, if needed,* by pulling up scattered weeds by hand or by by using a lawn mower, string trimmer, or a narrow sickle-bar mower between the rows. Growers have found these methods easier than hand hoeing conventional-till tobacco. You can mount lawn mowers to the cultivator frames on a tractor to make mowing between rows easier. You also can use Poast overtop for postemergence grass control, although Poast will not control broadleaf weeds.

*14. Apply sidedress nitrogen to the surface beside the plants, or 3 to 4 inches deep with a disc-opener applicator.* Increase the total nitrogen rate by one-fourth over what is normally recommended for conventional-till tobacco to make up for the nitrogen the mulch ties up.

*15. Handle insect, disease, and sucker control as you would for a conventional crop.* Viral diseases and black shank have been less of a problem in no-till tobacco. Slugs have been a problem most years in burley. Watch closely for slugs and apply bait at the first sign. Reapply as needed.

*16. Learn proper management skills.* Since no-till crop production requires greater managerial ability, growers trying no-till tobacco must commit to carrying out the necessary practices for success. Those trying it for the first time should do so on a small part of their crop until they learn proper management skills.

## A Precautionary Statement on Pesticides

Pesticides must be used carefully to protect against human injury and harm to the environment. Diagnose your pest problem, and select the proper pesticide if one is needed. Follow label use directions, and obey all federal, state, and local pesticide laws and regulations.