

**CROP PROTECTION: III. WEEDS.
NEW HERBICIDES WILL HELP
COTTON GROWERS REMAIN COMPETITIVE**
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Weed management is one of the key components of a cotton production system. In spite of intensive use of herbicides and mechanical and cultural weed control, weeds still reduce cotton yields about 8%. Additionally, weeds reduce net profits due to control costs and quality reductions. Grade reductions due to grass, for example, continue to be a costly problem in much of the cotton belt. American cotton growers could not compete in the world market without herbicides. Fortunately, cotton growers have a number of good herbicides at their disposal. Staple herbicide and Roundup Ready cotton will offer additional effective options for weed management and are the focus of this presentation.

Staple herbicide was first commercially available in 1996. This was a significant event in that Staple was the first herbicide that could be applied overtop of cotton for broadleaf weed control without risk of significant adverse effects on the crop. Growers in the Midsouth were pleased with Staple's performance in 1996. Southeastern growers, while generally pleased with Staple, were less enthusiastic about it than Midsouth growers. This probably relates to the widespread problems with sicklepod in the Southeast.

Growers learned that Staple is not a salvage herbicide. Although Staple will control a few species when rather large, for the most part Staple needs to be applied when weeds are 3 to 4 inches tall or less. Growers who applied Staple to large weeds quickly learned the importance of timely application. Growers also learned that Staple is seldom a terminal, or stand alone, treatment. Growers most satisfied with Staple's performance in 1996 were those who applied it to small weeds and then followed with a later directed spray.

Most research has shown that Staple applied postemergence overtop of cotton is no more effective than traditional early directed sprays such as fluometuron plus MSMA. In many cases, Staple has been less effective than the traditional directed sprays because of its more limited spectrum of control. The primary benefit of Staple and the main reason growers anxiously awaited its registration is that it can be applied overtop of cotton. In contrast to DSMA, MSMA, and fluometuron applied overtop, research has shown that Staple applied postemergence overtop does not adversely affect cotton maturity or yield. Some temporary yellowing of the cotton terminal has often been observed in research.

These symptoms disappear within a few days after appearance. Across the Southeast and Midsouth, more early season injury from Staple was observed in growers' fields in 1996 than expected. In many cases, this appeared to be related to cool temperatures at the time of application or shortly before or after application. This increased injury was expressed as greater yellowing of the terminal, slower recovery from the yellowing, and greater suppression of cotton growth than normal. In most cases, however, the crop recovered well and most growers judged the injury as being acceptable.

With timely application, most growers observed acceptable control of those broadleaf weeds normally considered to be susceptible to Staple. Although the Staple label claims only suppression of sicklepod, Southeastern growers were generally disappointed with sicklepod control by Staple. Staple will halt growth of sicklepod for about 12 to 14 days. In most cases, this is sufficient to get a height differential established for directed sprays. Growers who followed Staple with timely directed sprays were generally well satisfied with sicklepod control.

Sicklepod is a very common and very troublesome weed in cotton in the Southeast. Hence, a major concern in the Southeast is how to enhance sicklepod control by Staple. Most of the interest centers around tank mixing MSMA with Staple. The Staple label claims control of sicklepod by Staple tank mixed with 2 lb ai/A of MSMA. These rates of MSMA must be directed, thus eliminating the primary benefit of Staple. Researchers in several states are working with lower rates of MSMA tank mixed with Staple and applied overtop. The research has shown that 0.75 to 1.0 lb ai/A of MSMA tank mixed with Staple increases sicklepod control and/or better suppresses the growth of sicklepod to allow more time before directed sprays are needed. Most weed scientists are reluctant to recommend MSMA overtop as there is a risk of maturity delays and yield reductions. The research, however, has shown that the risk of maturity delays or reduced yields with Staple plus MSMA overtop are similar to those with MSMA alone. Research is now focusing on use of even lower rates of MSMA.

The Staple label will be expanded in 1997 to allow preemergence followed by postemergence application. For most weeds, Staple is more effective when applied postemergence than preemergence. Some weeds, however, are better controlled by Staple applied preemergence. The intent of the revised Staple label is not to replace the postemergence application but rather to enhance control of species marginally susceptible to Staple applied postemergence. Compared to postemergence application alone, preemergence plus postemergence application of Staple should greatly improve control of common lambsquarters, prickly sida, and spurge species. Staple applied postemergence normally controls wild poinsettia. In 1996, however, biotypes of poinsettia tolerant of Staple applied postemergence were encountered in Georgia.

Staple applied preemergence is expected to improve control of these biotypes. Staple also normally controls Palmer amaranth well. However, very heavy populations of Palmer amaranth can overwhelm Staple. A preemergence followed by postemergence application should improve the consistency of Staple under these conditions. Staple applied both preemergence and postemergence should give 15 to 20% better control of sicklepod than Staple applied only postemergence. This relatively small improvement in control of sicklepod may not justify the additional expense. Traditional preemergence broadleaf herbicides such as fluometuron will still be needed in most cases where Staple is applied preemergence and postemergence.

Roundup Ready cotton is scheduled for commercialization in 1997. Although weed management in Roundup Ready cotton will not be as easy nor as simple as it is in Roundup Ready soybeans, Roundup Ready cotton will offer new and effective options for weed management. Roundup will control annual grasses and most annual broadleaf weeds. There are a few annual broadleaf species only marginally susceptible or not susceptible to Roundup. The most widely distributed of these is morningglory species. In research, however, good control of morningglory has been obtained in systems with multiple applications of Roundup or with Roundup applied early postemergence followed by later directed applications of traditional herbicides. Roundup will suppress perennial weeds although more research is needed to better understand how best to utilize Roundup Ready technology in the management of perennials.

Roundup can be applied overtop Roundup Ready cotton through the four-leaf stage. From the fifth leaf through layby, Roundup should be directed to avoid fruit abortion. Preliminary research in North Carolina has shown that Roundup applied overtop of cotton in the nine- to 10-leaf stage caused nearly 50% of the fruit on nodes 6 through 9 to abort. The cotton compensated for fruit loss lower on the stalk by setting more bolls on nodes 15 and higher. Yield response to Roundup applied overtop after cotton has entered a reproductive phase depends greatly upon weather conditions late in the season. Although maturity will be delayed, yields may not be reduced if there is adequate time to mature the additional bolls set in the top of the plant. Roundup directed using the same precision one would use to apply other directed herbicides such as cyanazine did not affect fruit set when applied to cotton larger than the four- to five-leaf stage..

Research has shown that weed control and cotton yield are similar in systems utilizing traditional soil-applied herbicides such as trifluralin and fluometuron followed by Roundup applied postemergence twice and systems utilizing trifluralin plus fluometuron followed by postemergence herbicides such as fluometuron plus MSMA early directed and cyanazine plus MSMA late directed or Staple overtop early followed by cyanazine plus MSMA late directed. Many weed scientists believe there are some advantages in

annual weed control from applying Roundup overtop early and then following it with traditional directed sprays that have residual activity rather than making a second application of Roundup directed. For perennial weeds, it is probably better to make multiple applications of Roundup.

There will be a fee of \$5/acre on stripper cotton and \$8/acre on picker cotton for use of the Roundup Ready technology. Additionally, seed are expected to cost \$2 to \$4 more per bag. This raises the question of how one is to recoup these costs. In particular, can one eliminate use of other herbicides to cover the technology costs? In most field trials conducted across the belt, acceptable control of most annual weeds has been obtained with total postemergence programs. However, when soil-applied herbicides are eliminated, one or more additional postemergence herbicide applications are usually necessary. These additional postemergence applications will offset at least part of the savings from elimination of soil-applied herbicides. Additionally, without soil-applied herbicides, one may need to initiate postemergence treatments sooner.

The need for soil-applied herbicides in Roundup Ready cotton will depend upon a number of things, including the species of weeds present, the weed pressure, and the grower's equipment and labor availability and management skills. After a couple of year's experience, most growers will have decided on the system that best fits their operation. Weed scientists think that most growers will continue to use some soil-applied herbicides. Because of their low cost, dinitroaniline herbicides (pendimethalin and trifluralin) will likely continue to be used in conventional tillage cotton. Clomazone (Command) use likely will decline greatly because of its expense and because one must use disulfoton (DiSystem) or phorate (Thimet) in-furrow to "safen" clomazone. Many growers view aldicarb (Temik) as the superior in-furrow insecticide. Norflurazon (Zorial) use will also likely decline, although not enough research has been conducted to determine whether or not norflurazon will still be needed in Roundup Ready cotton planted in fields with heavy infestations of nutsedge. The greatest unknown is how much preemergence broadleaf herbicide, such as fluometuron, will be used. Some research has shown a definite need for such herbicides while other research has shown that they can be eliminated, especially if an additional postemergence application is made.

Agronomic performance of Roundup Ready cotton is largely unknown. Limited data on performance of a few specific lines of Roundup Ready cotton are available. In North Carolina, for example, Paymaster H1220RR has performed similarly to established varieties such as Deltapine 51. Seed companies have chosen to not enter Roundup Ready varieties in state variety trials. Growers should demand this unfortunate situation be rectified in 1997.



