

**NEW WEED MANAGEMENT
TECHNOLOGIES FOR COTTON:
A PERSPECTIVE FOR NORTH CAROLINA
AND GEORGIA**

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Abstract

Prior to 1995, cotton was the only major agronomic crop in the U.S. without a true POST-over-the top herbicide for annual broadleaf weed control that did not adversely impact crop yield and/or maturity. A registration for Staple and advances in biotechnology led to the registration of Buctril for selective postemergence (POST) weed control in BXN cotton. Roundup Ready cotton will likely receive registration within the next 18 months. Consequently, cotton producers have several different options for POST control of annual broadleaf weeds. The following summarizes research experiences with these three new herbicides over the past four years.

Staple is a new herbicide from DuPont. Cotton tolerance to Staple applied POST over-the-top is generally very good. Staple works by inhibiting the synthesis of branch-chain amino acids (called ALS inhibition) in sensitive plants. This mode-of-action is similar to numerous other herbicides including Accent, Arsenal, Beacon, Broadstrike, Classic, Exceed, Harmony Extra, Oust, Peak, Pursuit, and Scepter. Staple is a very effective herbicide for POST control of common cocklebur, Florida beggarweed, pigweed species including Palmer amaranth, *Ipomoea* morningglories except for tall morningglory (poor control), and spurred anoda. If applied to small weeds, it will control bristly starbur, coffee senna, prickly sida, smartweeds including Pennsylvania and ladythumb, velvetleaf, and wild poinsettia. Application timing is critical as weeds rapidly become more tolerant as they increase in size. For example, bristly starbur is controlled 100% when Staple is applied on plants less than 1.5 inches tall, 2 inch tall starbur are controlled less than 20%.

Staple does not control common lambsquarters, common ragweed, Florida pusley, or sicklepod. Occasionally, Staple will suppress or control sicklepod, however it is extremely erratic. Staple provides some suppression of yellow nutsedge. Staple provides significant residual control of pigweed species, prickly sida, and wild poinsettia. There are some rotational restrictions with Staple, particularly regarding corn and peanuts. However in our research, peanuts have exhibited good tolerance to preemergence soil applications. As a result, peanuts grown in rotation should have no problems with Staple carrying-over from cotton.

A critical concern with Staple is the further development of ALS resistant weeds. Several troublesome weeds including common cocklebur, smooth pigweed, and Palmer amaranth (to name only a few) have developed resistance to other ALS-inhibiting herbicides across the U.S. At least one common cocklebur population with resistance to Scepter in Missouri and one smooth pigweed population with resistance to Pursuit on the Eastern Shore of Virginia also have resistance to Staple, even though Staple was never used in these fields. This type of resistance is called cross-resistance. Cross-resistance with herbicides (where resistance to one herbicide confers resistance to one or more other herbicides) is not an uncommon occurrence with ALS-active herbicides. Producers who use Staple should develop a resistance management program to prevent the further development of resistant weed populations. This problem will be especially pertinent in regions where cotton is produced in a monoculture. Staple application more than once a year or year after year in the same field, will increase the likelihood of resistance problems.

Buctril can only be used on transgenic BXN cotton. Application to non-transgenic cotton will result in death of non-transgenic cotton. Buctril is a contact herbicide that provides no residual control. Consequently, there are no rotational restrictions. Buctril does not control grasses or perennial sedges (purple or yellow nutsedge). Buctril provides good to excellent control of bristly starbur, coffee senna, common cocklebur, common lambsquarters, common ragweed, Florida beggarweed, Florida pusley, all morningglories, smartweeds including Pennsylvania and ladythumb, spurred anoda, tropic croton, velvetleaf, and wild poinsettia. Buctril can control small prickly sida, pigweed species, and Palmer amaranth. For good control results, application to weeds less than one inch tall is strongly advised.

Buctril alone does not control sicklepod. However, tank mixes of Buctril at 0.375 lb ai/ac with MSMA at 0.75 lb ai/ac will control or suppress cotyledon to one-leaf sicklepod. Research trials in Georgia and North Carolina have shown excellent results in heavy sicklepod pressure when Cotoran was applied PRE at 1.5 lb/ac followed by Buctril plus MSMA applied EPOST and followed by a late post-directed application of Bladex plus MSMA. It is critical to apply post-directed herbicides once you get a height differential on sicklepod.

There have been no documented cases of weeds developing resistance to Buctril. The major concern with BXN cotton has been the inconsistent yield performance of BXN varieties across the Cotton Belt. In some trials, BXN varieties have been competitive with premium non-transgenic varieties. However in other trials, BXN varieties did not yield competitively with premium varieties.

Roundup provides excellent control of annual grasses and also is effective controlling rhizome johnsongrass and bermudagrass. Roundup controls many annual broadleaf weeds including common cocklebur, common lambsquarters, common ragweed, smartweeds including Pennsylvania and ladythumb, pigweed species including Palmer amaranth, and Florida beggarweed. Application must be timely for good control of morningglories, prickly sida, and sicklepod. These weeds rapidly become more tolerant as they increase in size. Roundup does not control dayflower and has difficulties controlling hemp sesbania. Higher rates and multiple applications of Roundup will control perennial sedges and perennial broadleaves.

Roundup should be applied to four-leaf cotton or earlier. Later application to larger cotton may reduce yields and/or delay maturity. Roundup may be applied in a hooded sprayer on larger cotton, but keep the Roundup off of the cotton.

Roundup will have no rotational restrictions as the herbicide is rapidly inactivated by soil contact. There have been no cases of weeds developing resistance to Roundup and it has been commercially available for more than 20 years. Roundup will be extremely effective for controlling arsenical-resistant cocklebur, ALS-resistant cocklebur, postemergence grass herbicide resistant johnsongrass, dinitroaniline herbicide (Treflan and Prowl) resistant goosegrass and Palmer amaranth, and ALS resistant smooth pigweed and Palmer amaranth.

Another potential advantage for the cotton industry is the widespread recognition of Roundup by the American public. It is found in many garages and sheds and is commonly sold in department stores and even in grocery stores. Other than Raid bug spray and flea collars, it may be the most recognized pesticide in the U.S. This familiarity should help the industry as new biotechnological advances are brought to the marketplace.

If managed properly, biotechnological advances will represent the dawn of a new era in pest and weed management opportunities and flexibility for cotton producers. Registrations from biotechnology are likely to be at least as beneficial in the long term to cotton producers, as the registrations of Treflan, Cotoran, and Zorial.