



## With Over-The-Top Herbicide Applications 4/01

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### **Glyphosate, Staple® and Buctril® Herbicides**

Glyphosate, Staple and Buctril herbicides are used to selectively control annual morningglory species, pigweed species and other broadleaf weed species in cotton without injuring seedling cotton. Buctril can only be used on transgenic BXN® cotton varieties and herbicides containing glyphosate (Roundup UltraMax®, Touchdown®, Staple® Plus, Glyphosate Original® and Glyphomax®) can only be used on transgenic Roundup Ready® cotton varieties. In contrast, Staple can be used on all cotton varieties. Glyphosate, Staple, and Buctril, can be sprayed over-the top of cotton as early as the cotyledon to first true leaf growth stage. Thus, broadleaf weeds that emerge with dry-planted cotton in response to irrigation can be efficiently controlled. In cotton that is planted to moisture, weeds frequently emerge after the crop and some are protected from herbicide sprays by the developing cotton foliage. Since thorough coverage of the growing points and leaves of target weeds will result in the best control, two nozzles per crop row should be used, especially if the cotton is more than 3 inches tall.

As with most postemergence foliar applied herbicides, glyphosate, Staple and Buctril should be sprayed on young, actively growing weeds that are at the correct stage of growth. Do not spray water-stressed weeds or weeds under stress due to adverse environmental conditions (e.g., wind and temperature extremes) as this may result in poor weed control. For best results, apply these herbicides several days prior to a cultivation rather than following a cultivation because cultivation may cover target weeds with dust or dirt that reduces the effectiveness of the herbicide, or may partially dislodge weed seedling roots and induce moisture stress. Cultivation several days after a glyphosate, Staple or Buctril application may improve weed control.

Glyphosate containing herbicides control grass and broadleaf weeds and suppress purple and yellow nutsedge. Despite this broad spectrum of weed control, one of the dinitroaniline herbicides (e.g., Prowl® [pendimethalin] or Treflan® [trifluralin]) is still commonly used with Roundup Ready cotton to lower the risk of postemergence weed control failures due to high weed densities, adverse weather, equipment problems and application errors. Since neither Staple nor Buctril are effective on grasses, they should be used in conjunction with a

### ***Cotton Weed Control Notes***

preplant dinitroaniline herbicide to control germinating seedlings of annual and perennial grasses and small seeded broadleaves (e.g., pigweed species). Do not tank-mix Staple or Buctril with a postemergence grass herbicide such as Fusilade®, Poast®, or Select® because antagonism will reduce grass weed control. Either apply these grass herbicides at least 3 days before, or 7 days after a Staple or Buctril application. Buctril has no activity on purple or yellow nutsedge. Although Staple has some activity on nutsedge species, it usually does not provide significant early season nutsedge suppression.

### **Glyphosate Herbicide Application**

Glyphosate is available in products with 3 or 3.75 lb a.e./gal (4 or 5 lb a.i./gal) and is typically applied at 0.75 lb a.e./A or 1 lb a.i./A. Do not exceed 0.75 lb a.e. per sprayed acre in any single application. No more than 3 lb a.e. per sprayed acre can be applied from crop emergence through layby. Do not apply over-the-top of cotton after the fourth true leaf growth stage of cotton (i.e., when the fifth true leaf is larger than a quarter) because this may result in yield reductions. A maximum of 2 applications can be made over-the-top per season. No more than two post-directed applications should be made per growing season. In practice, excellent weed control can be obtained with one over-the-top application followed by one post-directed application. In some cases, a third post-directed application may be necessary (i.e., when a dinitroaniline herbicide was not applied prior to planting). Sequential applications must be at least 10 days or 2 nodes of cotton growth apart, whichever is longer. However, superior results can be obtained by making the second application 21 days or more after the first application after some regrowth of suppressed weeds or emergence of additional weeds occurs (e.g., emergence or regrowth following an irrigation). Annual morningglory species should be sprayed at the 1 to 2 true leaf stage; plants with 4 or more leaves can be difficult to control. In general, broadleaf weeds should be less than 6 inches tall for best results, refer to the manufacturers label for detailed information. Glyphosate should be applied before the largest individuals of the target weed species exceed the maximum specified size. Sprayed weeds show symptoms and die within 7 to 10 days. Best results are obtained when spraying actively growing, non-water-stressed weeds, especially with perennials such as purple and yellow nutsedge.

For ground applications with broadcast equipment, apply glyphosate in 5 to 20 gal/A and for aerial applications, apply in 3 to 10 gal/A. Superior results will be obtained if the water carrier volume is in the range of 5 to 10 gal/A. Use even flat fan nozzles (e.g., XR8001VS) at low pressure (e.g., 20 PSI) to avoid drift. The performance of glyphosate is adversely affected by alkaline water (i.e., pH greater than 7) containing divalent cations such as calcium, magnesium, and manganese. The single most effective method for improving glyphosate performance with poor quality water is to add 1 to 2 percent dry ammonium sulfate by weight (8.5 to 17 lbs per 100 gallons) to the spray solution. Fill the spray tank with the required amount of water. Add the ammonium sulfate and ensure that it is completely dissolved before adding glyphosate. Thoroughly clean the spray system with clean water after use to reduce equipment corrosion. Many formulations of glyphosate contain surfactants so it is not necessary to add additional surfactant, refer to the manufacturer's label. However, if the product does not contain surfactant or if the carrier volume is greater than 15 to 20 gal/A, addition of 0.25 to 0.5% (v/v) non-ionic surfactant may improve weed control. Glyphosate has no soil residual activity and does not affect rotational crops. Glyphosate can be tank-mixed with Staple for increased weed control in situations where morningglory plants are larger than 2 true leaves, where the cotton stand is not competitive, where cultivation cannot be used, and where additional control measures cannot be applied (see below).

### **Staple and Staple Plus Herbicide Application**

Staple (common name: pyriithiobac sodium) is applied at rates of 1.2 to 1.8 oz of product/A (1.0 to 1.5 oz a.i./A). No more than 2.4 oz of product can be applied per planted acre per year. Under arid conditions, where weed infestations are severe, or where weeds are at the upper limit of the acceptable size range, use the high rate of 1.8 oz product/A especially if annual morningglory species are the target weeds. Staple can be tank-mixed with glyphosate to improve weed control on larger weeds and where cultivation or other weed control measures cannot be used. Broadcast application of one package of Staple Plus (a co-package of Staple and glyphosate) on 7.5 acres is equivalent to using 0.8 oz a.i./A of Staple and 0.75 lb a.e./A of glyphosate. Additional Staple can be added up to the maximum labeled rate of 1.8 oz product/A. Staple and Staple Plus should be applied in a band to reduce herbicide costs, to avoid exceeding the maximum amount of Staple herbicide that can be applied per planted acre per year when 2 applications are planned, and to minimize the residual effects of Staple on following crops.

Staple should be applied before the largest individuals of the target weed species exceed the maximum size specified on the label (generally less than 1" to 2" in height or diameter). Annual morningglory species should be sprayed at the

1 to 2 true leaf growth stage. Although sprayed weeds develop symptoms slowly, they stop growing immediately after application and are killed or stunted enough that they are not competitive within 14 to 21 days after treatment. Weeds exceeding 3" to 4" in height or diameter often regrow.

Apply Staple and Staple Plus in a spray volume of 10 to 20 gal/sprayed acre. Use flat fan nozzles at a pressure of 20 to 40 psi at the boom. A spray adjuvant must be used to obtain good weed control; use either a crop oil concentrate at 1% v/v (2 quarts/50 gal) or a non-ionic surfactant at 0.5% v/v (1 quart/50 gal). Refer to Dupont's Approved Adjuvant List to select a suitable adjuvant because some surfactants are antagonistic to Staple activity. Ammonium sulfate can be added to Staple Plus to improve the performance of glyphosate in poor quality water (see above). Staple can be tank-mixed with most insecticides but do not tank-mix with malathion or dimethoate as crop injury may result. Observe the rotational crop restrictions on the label following Staple applications. Cotton can be replanted anytime following a Staple application.

### **Buctril Herbicide Application**

Buctril (chemical name: bromoxynil) is applied at a rate of 1.0 pint of product/sprayed acre (0.5 lb a.i./A). No more than 3 pints of product can be applied per sprayed acre per season. A maximum of 2 applications can be made in the time interval between cotton emergence and when cotton reaches 12 inches in height. One additional application can be made after cotton exceeds 12 inches in height.

In general, a Buctril rate of 0.5 lb a.i./A will control only the smallest broadleaf weeds. Buctril should be used in conjunction with a preemergence dinitroaniline herbicide applied prior to planting because Buctril is ineffective on grasses and weak on pigweed species. Annual morningglory species should be sprayed at the cotyledon to partially expanded first true leaf growth stage. Leaves of larger plants will be burned off but the plants will regrow from green stems. A second application will be necessary when new growth is observed. Good spray coverage of weeds is especially important for acceptable results with Buctril since it functions as a contact weed killer. Buctril should be applied in a spray volume of 10 to 30 gal/sprayed acre. Flat fan, twin orifice flat fan (e.g., TJ60-8003EVS) or hollow cone nozzles may be used at a pressure of 30 to 40 psi at the boom. Add a spray adjuvant (i.e., a crop oil concentrate or a non-ionic surfactant) to improve weed control. Buctril can be tank-mixed with most insecticides (see label for tank-mix compatibility information). Buctril has no soil residual activity and does not affect rotational crops.

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*Because labels are subject to frequent change, always consult the label attached to the product before using any herbicide. The user must assume responsibility for proper application and for residues on crops as well as for damage or injury caused by herbicides, whether to crop, person or property. Any products, services, or organizations that are mentioned, shown, or indirectly implied in this publication do not imply endorsement by The University of Arizona.*