"STAPLE" - A NEW COTTON HERBICIDE FROM DUPONT

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Abstract

Staple is the first broad-spectrum, low use rate, over-the-top herbicide registered for use on cotton. Staple represents a new family of chemistry with the ability to inhibit the enzyme acetolactate synthase. It is not a sulfonylurea or imidazolinone.

After entering the plant, Staple acts to inhibit cell division and growth. Rat studies indicate the herbicide has low acute oral and dermal toxicity. Cotton has demonstrated excellent tolerance to Staple when application is made early postemergence at the use rate of 1.2 ounces of product per acre. Breakdown within the environment occurs via microbial and photo-chemical pathways. Based on yield results obtained over the last six years, Staple does not adversely affect cotton yield when applied at 1.2 ounces of product per acre.

At the rate of 1.2 ounces of product per acre, Staple will control morningglory species such as entireleaf, ivyleaf, pitted, and sharppod. Staple will also control troublesome weeds such as cocklebur, velvetleaf, prickly sida, devil's claw, hairy nightshade and pigweed species. Staple will provide partial control of sicklepod and yellow nutsedge.

Staple will be packaged in water soluble packets which will result in limited container disposal and loader/mixer exposure.

Introduction

It is a pleasure to announce that Staple, the first broad-spectrum, low use rate, over-the-top cotton herbicide received conditional registration on September 29, 1995. Staple offers the cotton producer the convenience of over-the-top weed control and does it without decreasing yield or causing maturity delays. Plus Staple can be used on most cotton varieties.

The development of Staple began six years ago, in the spring of 1990. We at DuPont would like to express our gratitude to all those involved in the development of this unique product. To the university researchers, private contractors, regulatory people and to the cotton producers who allowed us to work on their farms, thank you!

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 1:49-50 (1996)
National Cotton Council, Memphis TN

Staple represents a new family of chemistry with the ability to inhibit the enzyme acetolactate synthase. This enzyme is unique to plants and required for the synthesis of essential amino acids needed for plant growth. It's not a sulfonylurea or imidazolinone.

Staple is rapidly taken up by roots and foliage. After entering the plant the herbicide acts to inhibit cell division and growth of susceptible species. This takes place rapidly, but death usually occurs slowly, often taking 7 to 14 days.

Staple, like other ALS inhibitors, has low mammalian toxicity. Rat studies show Staple to have low acute oral and dermal toxicity. Skin exposure studies resulted in no irritation to rabbits and Staple was not mutagenic in the Ames test.

Breakdown within the environment occurs primarily through microbial and photochemical degradation. Unlike some other herbicides, soil pH and organic matter do not effect activity.

Staple is formulated as an 85% soluble powder with a use rate of 1.2 ounces of product per acre on a broadcast basis. The product will be contained within a water soluble packet. Four 6 ounce water soluble packets will be packaged within a foil pack. Each six ounce soluble packet will treat five acres broadcast at 1.2 ounces of product/acre. The water soluble packet, foil pack, and cardboard packaging will offer the convenience of limited container disposal as well as reduced mixer/loader exposure.

Based on test results over the last six years, Staple has demonstrated excellent cotton safety when applied postemergence. As can be seen in this slide, visual cotton injury from early postemergence timings is minor at the use rate of 1.2 ounces of product per acre. A surfactant at 0.25% v/v was used with all postemergence applications and the cotton size at application ranged from 1 to 4 leaf. The postemergence ratings are based on observations at 7 and 14 to 28 days after treatment. Visual symptoms, when observed, occur at approximately 4 to 7 days after application. Staple expresses itself as a slight leaf yellowing, transient in nature.

Based on yield results obtained over the last six years from our research farm in Greenville, Mississippi, Staple at 1.2 ounces of product per acre does not adversely effect cotton yield as compared to a weed-free check when application is made on 1 to 4 leaf cotton.

Based on data from Dr. Charles Snipes at Mississippi State University, Staple, at one and a half and three times the use rate, did not result in statistically significant yield reductions when applied to cotton at the cotyledon to 2 leaf growth stage. Both MSMA and Cotoran plus MSMA applied early postemergence had a greater effect on cotton yield. Also using various mapping systems available, including

the system sponsored by the National Cotton Council, data indicate no adverse effect on cotton maturity from early postemergence timings of Staple Herbicide.

As I mentioned earlier, Staple will offer broad-spectrum weed control when applied early postemergence. At the rate of 1.2 ounces of product per acre Staple will be labeled on these weeds. Morningglory species such as pitted, entireleaf, ivyleaf, and sharppod are effectively controlled. Staple will also control troublesome weeds such as prickly sida, cocklebur, velvetleaf, devil's claw and hairy nightshade. Pigweed species such as palmer, smooth, redroot, spiny and tumble are also very sensitive to Staple.

Staple will provide partial control of sicklepod and yellow nutsedge when applied alone at the size indicated. For optimum control of these two weeds, Staple should be tank-mixed with MSMA and applied as a post direct application.

At a DuPont test site near Vicksburg, MS, Staple at 1.2 ounces of product/acre applied early postemergence resulted in excellent control of pitted morningglory, entireleaf morningglory and prickly sida. At application, morningglory were 1 to 3 leaf and prickly sida was up to 1 inch tall. A surfactant was included at 0.25% V/V.

This shot from a test site near Clio, South Carolina shows the activity of Staple on coffee senna which was 2 to 4 inches tall at application. The Staple rate was 1.2 ounces product/acre and the picture was taken at 14 days after treatment.

This slide shows the initial response of cocklebur to Staple at 7 days after treatment and 21 days after treatment. At application the cocklebur had six true leaves.

At a DuPont test site near Helena, Arkansas, Staple at 1.2 ounces of product provided excellent control of entireleaf and ivyleaf morningglory. At application, morningglory ranged in size from cotyledon to 4 leaf.

This slide demonstrates the activity of Staple on velvetleaf at 7 days after treatment and 14 days after treatment.

In summary, the following key points can be made regarding Staple:

- •Staple received conditional registration on September 29, 1995.
- •Staple will deliver broad-spectrum, over-the-top weed control.
- •Staple can be used on most upland varieties.
- •Staple provides excellent cotton tolerance and will not adversely effect yield or cause maturity delays.
- •Staple represents a new family of chemistry which functions as an acetolactate synthase inhibitor.
- •The herbicide is characterized by low use rates and low mammalian toxicity.
- •Degradation in the environment occurs primarily via microbial and photochemical pathways.
- •Staple will be packaged in convenient water soluble packets which will result in limited container disposal and loader exposure.

DuPont's commitment to the cotton industry remains strong. It began in the 1950's with the registration of Karmex and continues with the introduction of Staple. We believe Staple will provide cotton growers with an important new tool for control of a broad range of weeds, and do so in an environmentally friendly way.