EVALUATION OF CGA-248757 (ACTION) AS A HARVEST-AID IN CENTRAL TEXAS

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Abstract

CGA-248757 (Action) is a new harvest-aid compound under development by Novartis. A field study was conducted in central Texas in 1998 to evaluate the effectiveness of Action as a harvest-aid for picker-harvested cotton. Action (fluthiacet-methyl) was studied alone and in tankmix combinations with other compounds. Products included in the study were Def (tribufos), Dropp (thiadiazuron), Finish (ethephon + cyclanilide), Ginstar (diuron + thiadiazuron), and Prep (ethephon). Action applied as a sequential treatment (2.02 g a.i./acre, followed by the same rate 5 days later) demonstrated more than 91% defoliation and was comparable to the standard, Dropp + Def treatment (92%). The higher rate sequential Action treatment (2.83 g) did not improve defoliation over the 2.02 g treatment. The singular Action treatments, regardless of tankmix partners were ineffective in providing adequate leaf drop for picker-harvest. All treatments showed less than 10% desiccation. Singular applications of Action did not provide terminal regrowth suppression (> 70%) comparable to the sequential Action treatments (< 30%).

Situation

Harvest-aid chemicals prepare the cotton crop for harvest by reducing foliage and plant moisture that interfere with harvesting operations. These compounds generally are classified as defoliants, desiccants and growth regulators. True defoliants are chemicals that cause abscission and shedding of leaves earlier than normal, but do not necessarily kill the entire plant. Defoliation is usually a milder treatment than desiccation, although further plant development, including boll maturation ceases soon after the chemical is applied. Desiccants are chemicals that cause severe injury to plant tissue due to the rapid loss of moisture. In some cases, plant desiccation is so rapid that defoliation does not occur and the dried leaves remain attached to the plant.

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The Central Texas region supports both stripper- and picker-type cotton production. Desiccation of the entire plant is necessary for stripper-harvested cotton. The standard approach for the region is a two-step process. Initially a tankmix of two defoliants is applied for defoliation, followed about a week later with Cyclone (paraquat) for dessication . For picker-cotton, generally a single application of defoliant(s) will be sufficient for good leaf drop. However, for very tall and rank fields, sequential applications may be necessary. Most producer's utilize two- and three-way tankmixes to achieve optimum defoliation. Usually two different defoliants will be tankmixed, and sometimes a boll opener will be added depending on cotton condition. Under rank situations, a defoliant will be applied initially, followed by a defoliant/boll opener tankmix.

Harvest-aid performance is linked to local biotic and abiotic conditions. The eventual success of a harvest-aid treatment is dependent on numerous interactive factors, such as varietal selection, condition of the crop, local seasonal and application weather and the compounds utilized. Novartis has been evaluating CGA-248757 (Action) for potential harvest-aid use. Action {[[2-chloro-4-fluoro-5[(tetrahydro-3oxo-1H,3H-[1,3,4]thiadiazolo[3,4-a]pyridazin-1ylidene)amino]-phenyl]thio]-acetic acid methyl ester]]} is a low use rate, contact herbicide which inhibits protoporphyrinigen IX oxidase. Accumulation of protoporphyrins leads to radical production and cell damage. Activity on foliage of sensitive plants is rapid, similar to paraquat. The compound exhibits both desiccation and defoliation properties.

Objectives

Determine the effectiveness of Action as a harvest-aid for picker-harvested cotton in Central Texas, and evaluate the compound alone, and in combination with other harvest-aid products in both single and sequential applications.

Methods

The study was conducted in the Brazos Bottom, near College Station, Texas. The variety was DP&L 20B. Plots were four rows wide (40 inch row spacing) x 100 feet length. All determinations were made from the center two rows to avoid spray drift influence. Treatments were applied with a self-propelled Lee Spider Sprayer equipped with 11002 flat fan nozzles, spaced on 20-inch centers. The sprayer was operated at 30 psi (CO_2) and calibrated to deliver 10 gallons/acre at a speed of four mph. A nonionic surfactant was added to all treatments at 0.25% v/v. Initial treatments were applied August 12, 1998 between 2:00 and 4:00 pm, and sequential applications were made five days later. Observations were collected 6, 10, 15 and 26 days after initial treatment (DAIT). Terminal and basal regrowth were assessed by counting the number of plants along four feet of row that possessed regrowth

larger than 0.5 inches in diameter (about the size of a dime). Harvest-aid treatments included Def (tribufos), Dropp (thiadiazuron), Finish (ethephon + cyclanilide), Ginstar (diuron + thiadiazuron), Prep (ethephon) and Action (fluthiacet-methyl). Rates for commercial products are reported in product/acre; Action is reported in grams of active ingredient (a.i.)/acre. The field was at 75% open boll at the initial application date.

Results

Harvest-aid treatments are presented in Table 1. At 6 DAIT, the Ginstar (8 oz), and Dropp(0.1 lbs.)/Def(16 oz.) treatments provided over 66% defoliation. All other treatments showed less than 50% leaf drop. Action demonstrated the least amount of defoliation at 6 DAIT. The slow activity of Action appears to be a characteristic of the compound. Ten DAIT all treatments showed considerably more defoliation. The three Action sequential treatments showed good defoliation, with the Action (2.02 g) **fb** Action (2.02 g) + Prep (21 oz.) treatment exhibiting more than 86% defoliation. The tankmix of Dropp (0.10 lbs.) + Def (16 oz.) showed 90% defoliation at 10 DAIT. This combination is generally considered the standard for the area. The singular applications of Action and Action tankmixes did not show adequate defoliation at 10 DAIT. Final defoliation ratings were taken at 15 DAIT, prior to harvest. The three Action sequential treatments demonstrated more than 91% defoliation and were comparable to the standard, Dropp + Def treatment (92%). The higher rate sequential Action treatment (2.83 g) did not improve defoliation over the 2.02 g treatment. The singular Action treatments, regardless of tankmix partners were ineffective in providing adequate leaf drop for picker-harvest. The Finish, Dropp + Finish tankmix, and Def + Prep tankmix showed less than 78% defoliation. Action appears to be ineffective as a singular treatment. Sequential applications of Action applied at the rate of 2.02 g provided the best defoliation. No treatment significantly affected boll opening rates (data not presented). All treatments showed less than 10% desiccation (data not presented). Regrowth ratings were made 26 DAIT. Basal regrowth was present in all treatments and ranged between 90 to 100%. Terminal regrowth was affected by harvest-aid treatment, with the lowest amount of terminal regrowth observed with Ginstar (10%). The next best treatments were in the 30% range and included two of the sequential Action treatments (2.02 g), and all tankmixes containing Dropp, with the exception of the Dropp(0.10 lbs.) + Action (2.02 g) tankmix (70%). Singular applications of Action did not provide terminal regrowth suppression (> 70%) comparable to the sequential Action treatments (< 30%).

Table 1. Central Texas Harvest-Aid Treatments, 1998.

	Treatment	Rate	Timing
1.	Action	2.02 g	—
2.	Action	2.02 g	—
	Prep	21 oz.	—
3.	Action	2.02 g	—
	Action	2.02 g	5 DAIT
4.	Action	2.02 g	—
	Action	2.02 g	5 DAIT
	Prep	21 oz.	5 DAIT
5.	Action	1.21 g	—
	Action	2.87 g	5 DAIT
6.	Action	2.02 g	—
	Dropp	0.10 lbs.	—
7.	Ginstar	8 oz.	—
8.	Dropp	0.10 lbs.	—
	Def	12 oz.	—
9.	Dropp	0.10 lbs.	—
	Def	16 oz.	—
10.	Def	21 oz.	—
	Prep	21 oz.	—
11.	Dropp	0.10 lbs.	—
	Finish	16 oz.	—
12.	Finish	48 oz.	—