

ACCELERATE™:ing ENDOTHALL AS A COTTON DEFOLIANT

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Abstract

The objective was to identify physiological limitations to the consistency in performance of Accelerate™ (endothall; Elf Atochem) as a cotton (*Gossypium hirsutum* L.) defoliant. Arrays of droplets of preparations containing ¹⁴C- or technical-grade Accelerate were applied to leaves on mature plants. The removal of ¹⁴C-Accelerate from the leaf surface during 24 h (used here as an estimate of uptake) varied by leaf position in the canopy. Ammonium sulfate enhanced uptake. Accelerate efficacy is greater with a late-afternoon application than with earlier ones. A synergism in activity exists between Accelerate and Scythe (Mycogen).

Introduction

Accelerate is an alkyl amine salt of endothall, which is marketed by Elf Atochem (King of Prussia, PA) for use in cotton defoliation. Accelerate by itself does not provide consistent leaf drop, but as a mix partner can increase performance of other defoliants. The study seeks to identify limitations to consistency in performance of Accelerate. Results are presented for: 1) penetration of Accelerate into the leaf tissue and 2) the effects of a) time of day and b) mix partners on visual symptoms of leaf injury. Experiments were performed on leaves of mature field-grown cotton.

Materials and Methods

'Deltapine 50' was grown at the Texas A&M Univ. farm in Burleson Co. No plant growth regulators were applied. Technical-grade and ¹⁴C-endothall preparations, and the alkyl amine salt, were generously supplied through Elf Atochem. An array of 50 droplets (10 microliters total) of defoliant preparation was applied with a microsyringe to the upper surface of a leaf, typically in afternoon. After 24 h, the leaf was rinsed in tap water and the radiolabel content of the rinse determined. Some preparations contained mix partners or adjuvants.

Results and Discussion

In a preliminary experiment, leaves were rinsed 6 min after application of ¹⁴C-Accelerate. All (100 +/- 3% [95% c.i. (confidence interval)]) of the applied radioactivity was recovered in the rinse, thus the method is quantitative.

The percentage of 1.5% ¹⁴C-Accelerate removed from surfaces of leaves during 24 h after application (an estimate of uptake) varied by leaf position in the canopy (ranging from 16 to 72% in one experiment). The position effect on uptake is not direct because the pattern of removal relative to position was not consistent among experiments.

Of nine adjuvant preparations, only those with ammonium sulfate led to greater removal of ¹⁴C-Accelerate from the leaf surface (78 +/- 6% [95% c.i.]) than did a water preparation (49 +/- 16%). Nasir Malik (Elf Atochem, King of Prussia, PA; personal communication, 1996) observed an enhancement of endothall activity in preparations containing ammonium sulfate. An enhanced uptake might provide a partial explanation of enhanced activity.

The percent of leaf surface area necrotic 7 d after treatment with 0.5% Accelerate was greater when the application was in late afternoon (26 +/- 6% [95% c.i.]) rather than earlier (13 +/- 4%).

Accelerate (0.5%) combined with 3% Scythe (Mycogen; fatty acid) led to a significantly greater percentage of necrotic leaf surface area (ca. 23%) than did other mixes (including Scythe with other compounds, and other compounds alone or in mixes without Scythe) (ca. 6%) in each of two experiments. A synergism appears to exist between these compounds.

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Disclaimers

The mention of trade names does not imply endorsement by the Texas Agric. Exp. Station. The experimental use of proprietary products does not imply endorsement of any manner of use other than those recommended by the responsible companies. Technical comments should be addressed to the authors.