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Weed Management Studies

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Abstract

Effective weed management is critical for profitable crop production. A series of experiments was conducted to evaluate the effectiveness of herbicides available for corn and soybean production. One experiment compared Authority and Valor, two preemergence herbicides labeled for controlling broadleaf weeds in soybean. Both products have the potential to cause significant injury under certain environmental conditions.

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Weed Management Studies

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Introduction

Effective weed management is critical for profitable crop production. A series of experiments was conducted to evaluate the effectiveness of herbicides available for corn and soybean production. One experiment compared Authority and Valor, two preemergence herbicides labeled for controlling broadleaf weeds in soybean. Both products have the potential to cause significant injury under certain environmental conditions.

Materials and Methods

The experimental area was fall–chisel plowed and field cultivated in the spring immediately prior to planting. Soybean (Latham 2038) was planted on May 6 in 30-in. rows. Herbicide treatments were applied on May 7 in 20 gallons of water. Rainfall events in the two weeks after planting were: 5/8 – 0.25 in.; 5/13 – 0.6 in.; 5/17 – 0.25 in.; 5/21- 3.6 in. The entire experimental area was treated on June 14 with 8 oz of Assure II plus a crop oil concentrate to control grasses. Crop injury was visually rated on June 4 and 14, whereas weed control was evaluated on June 14.

Results and Discussion

The activity of preemergence herbicides is strongly affected by rainfall events following application. Delays in rainfall can result in poor weed control, whereas excessive rain can predispose the crop to injury. All herbicides provided good to excellent control of waterhemp and lamb's quarter, and the addition of cloransulam (FirstRate) to Valor (Gangster) did not improve control (Table 1). All herbicides except the low rate of Authority provided acceptable control of velvetleaf. Although these products normally do not provide much activity on grasses, they provided excellent early-season foxtail control, probably

due to the continuous replenishment of soil moisture.

Significant soybean injury was observed on June 4 with all treatments containing Valor. The injury was greater at the 3-oz rate than the 2.5-oz rate, but the addition of FirstRate did not increase the injury caused by Valor alone. The injury was characterized by burning and distortion of the unifoliate and trifoliolate leaves. Soybean recovery was rapid and no significant injury was observed on June 14.

A similar experiment was conducted in 2003 on these herbicides with completely different results. Although soybean injury was not a problem, waterhemp, common lamb's quarter, and velvetleaf control was below 50% for all treatments. The primary difference between years was early-season rainfall. In 2003, significant rainfall did not occur until three weeks after planting. This allowed weeds and soybean to become established prior to herbicide activation. In 2004, more than 0.75 in. of rain fell within the first week after soybean planting.

Both Valor and Authority disrupt normal plant growth by interfering with the synthesis of chlorophyll. Soybean injury typically occurs with these products when heavy rainfall occurs at soybean emergence, resulting in significant contact of the herbicide with the emerging cotyledons and plumule. Under certain conditions, the growing point of plants can be killed or the stem girdled by the herbicide. In this study, the heavy rainfall event (3.6 in. on May 21) occurred after the soybean had fully emerged, therefore reducing the significance of the injury. The damage on the soybean was caused by splashing of herbicide onto expanded leaves. It is likely that the injury would have been more severe if the large rain had occurred

a week earlier or if the soybean had been planted a week later.

While production of Authority has been discontinued, Valor can still play an important role in soybean weed management. Injury potential is strongly influenced by timing of the first rainfall event following application. In addition, crop injury is more likely on poorly drained soils. In no-till, early preplant applications will reduce the potential for injury by increasing the likelihood that the herbicide is moved into the soil profile prior to soybean emergence.

Table 1. Effectiveness of Valor and Authority for preemergence broadleaf control in soybean.

Herbicide	Rate	% Injury June 4	% Injury June 14	% Waterhemp control	% Velvetleaf control	% Lamb's quarter control
Authority	6.8 oz	3 c	0 a	87 a	73 b	100 a
Authority	7.9 oz	3 c	2 a	87 a	88 a	92 a
Valor	2.5 oz	10 b	5 a	88 a	83 a	100 a
Valor	3 oz	23 a	5 a	100 a	97 a	100 a
Ganster (Valor + FirstRate)	(2.5 oz + 0.75 oz)	13 b	7 a	93 a	100 a	100 a
Control	-	0 c	3 a	0 b	0 c	0 b

Values with the same letter do not differ.