EFFECT OF VARIETY AND PLANTING DEPTH ON WHEAT RESPONSE TO FLUMIOXAZIN

(UKREC 2009-2010)

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INTRODUCTION

Flumioxazin is the active ingredient in Valor and a number of other soil-residual products used in soybeans, and certain other crops. When Valor is used at 2 oz/A, the rotational crop restrictions require at least one inch of rain and a minimum of 30 days between the application and planting wheat. Based on research in 2009, flumioxazin did not injure wheat when applied at planting or early preplant at 30, 14, or 7 days prior to planting. The fact the field was limed just prior to planting may have impacted the persistence of flumioxazin in this study.

The objective of the research was to determine if planting depth or wheat variety influenced tolerance of wheat to early preplant applications of flumioxazin. Flucarbazone was another herbicide included as an option for comparison

PLANTING DEPTH STUDY (Table 1)

METHODS: Herbicide treatments included flumioxazin at 1 or 2 oz ai/A (2 to 4 oz of Valor SX/A) and flucarbazone at 0.21 oz ai/A (0.3 oz of PrePare/A). These were applied 14 days prior to planting Pioneer 25R63 at a rate of 31 viable seed/ft^2. Seed were planted no-till into clipped corn stalks at depths of ½, 1, and 2 inches. The experimental design was split plot with seeding depth as main blocks and herbicide treatments as subplots. A non-treated check was included for each seeding depth in order to evaluate effects of herbicide and seeding depth.

Corn residue cover was approximately 95% at the time of herbicide application. The residue cover after planting was 89% for ½ inch depth, 82% for 1-inch depth, and 77% for 2-inch depth. During the 14-day period between herbicide application and planting wheat, a total of 4.49 inches of rain occurred. Soil temperature for this 14-day period averaged 53^0F (or 8^0F below average for the period.) Soil pH was 6.14; organic matter 2.18%, CEC 12 meq/100 g, and texture of sand 7.53%, silt 80.58%, and clay 11.89%.

Data reported in table 1 include wheat plant stands, heights, and canopy cover. Visual ratings of phytotoxicity on November 12 and March 26, indicated no visible symptoms of discoloration and are not reported. Wheat was harvested; however, yields are not reported due to variability in soils within the field were confounded with some of the treatments.

RESULTS: According to the statistical analysis, plant stands for the non-treated

checks were similar, however the ½ inch depth tended to have fewer plants than those in the 1 and 2 inch depths. Flumioxazin at both 1 and 2 oz ai/A rates reduced wheat stands for the ½ inch seeding depth, but did not appear to affect stands where wheat was planted at 1 or 2 inch depths.

Height measurements on November 12 indicated flumioxazin at 2 oz ai/A caused stunting of wheat seeded at the ½ inch depth. However, the differences in heights on May 26 for the ½ inch seeding depth were not statistically significant. Height measurements for the 2 inch depth indicated a slight trend in shorter plants for flumioxazin at the 2 oz ai/A rate; yet, the difference was not statistically significant. However, height measurements on May 26 indicated the high rate of flumioxazin stunted wheat.

WHEAT VARIETY STUDY (Table 2)

METHODS: This study was originally planted October 20, 2009. It was discovered that stands were erratic; therefore, another trial was planted November 24 and was used for this report. Herbicide treatments were the same as those in the seeding depth study and included flumioxazin at 1 or 2 oz ai/A and flucarbazone at 0.21 oz ai/A. These were applied November 12, 2010 (12 days prior to planting).

The five wheat varieties used in this study were Branson, Dinah, Pembroke, Pioneer 25R63, and Southern States (SS)8302. Seed were planted no-till into clipped corn stalks at depth of ¾ inches. The corn residue cover ranged from 80 to 91% and was statistically similar across all plots. The first rain event occurred approximately 4 days after application. During the 12-day interval, a total of 1.12 inches of rain occurred and soil temperature was 5^0 F above average. Soil pH was 6.11, organic matter 2.25%, CEC 14.7 meq/100 g, and texture of sand 5.37%, silt 75.70%, and clay 18.85%.

The experimental design was split plot with variety as main blocks and herbicide treatments as subplots. A non-treated check was included for each seeding depth in order to evaluate effects of herbicide within each depth.

RESULTS: Due to the late planting, wheat emergence was slow and was not complete until early March. Visual ratings of chlorosis of plants that were emerged on January 23 indicated all five wheat varieties were injured from flumioxazin at the high rate of 2.0 oz ai/A. Flumioxazin at the low rate of 1 oz ai/A also caused chlorosis for Branson, Dinah, and SS8302. Chlorosis diminished by March 26, yet flumioxazin at both rates was still causing some discoloration in Branson, Dinah, and SS8302 (data not reported).

The only treatment that limited wheat stands was with Dinah treated with flucarbazone.

Wheat height measurements recorded March 8 were somewhat variable but indicated flumioxazin at the 2 oz ai/A limited growth of Pembroke. Heights recorded on May 26 indicated that flumioxazin at 2 oz ai/A limited the growth of Dinah, Pembroke and SS8302. Flumioxazin at 1 oz ai/A also reduced the height of Pembroke on May 26.

None of the herbicides reduced wheat yields when compared with the non-treated checks within each variety. Yields ranged from 88.2 bu /A for Branson treated flumioxazin at 2 oz ai/A to 111.28 bu/A for Pioneer 25R63 treated with flucarbazone.

The high yields observed in Pioneer 25R63 and SS8302 reflects the differences in yield potential due to varieties and not to the effects of the herbicides.

SUMMARY

Flumioxazin applied 14 days ahead of planting at 1 and 2 oz ai/A reduced Pioneer 25R63 wheat stands by 21 and 25%, respectively, when seed were planted only ½ deep. However it did not appear to affect stands when seed were planted 1 or 2 inches deep. Some early stunting was observed at the ½ inch planting depth when flumioxazin was applied at the 2 oz ai/A rate. The high rate of flumioxzain also stunted wheat seeded at the 2 inch depth. Flumioxazin at the 2 oz ai/A rate caused early chlorosis in all five wheat varieties. Flumioxazin at the low rate also caused some chlorosis in Branson, Dinah, and SS8302. Flucarbazone limited wheat stand of Dinah, however, flumioxazin did not appear to limit stands of any of the 5 varieties in this study. Dinah, Pembroke, and SS8302 did have some late season stunting from flumioxazin at the 2 oz ai/A rate. Pembroke also had some late season stunting from flumioxazin at the low rate. The injury that was observed from flumioxazin did not limit yield of any of the five varieties in this study.

Table 1. Impact of flumioxazin and flucarbazone on stand, height, and canopy cover of wheat seeded at 1/2, 1, and 2 inches deep. (UKREC 2009-2010) [1]

Depth of Seeding [2]	Herbicide [3]	Wheat [4]			
		Stand 11-11-09 (Plants/ft^2)	Height 11-12-09 (cm)	Height 5-26-10 (cm)	Canopy Cover 5-26-10 (%)
½ Inch	flumioxazin 1 oz ai/A	19.0	7.5	89.2	64
	flumioxazin 2 oz ai/A	18.0	6.8	88.8	63
	flucarbazone 0.21 oz ai/A	22.0	8.0	89.5	81
	non-treated check	24.0	8.3	90.3	84
1 Inch	flumioxazin 1 oz ai/A	26.6	8.8	91.7	79
	flumioxazin 2 oz ai/A	25.5	8.0	91.0	75
	flucarbazone 0.21 oz ai/A	25.5	8.3	92.2	83
	non-treated check	24.3	8.0	93.4	85
2 Inches	flumioxazin 1 oz ai/A	24.5	8.3	90.9	75
	flumioxazin 2 oz ai/A	27.0	7.3	89.1	70
	flucarbazone 0.21 oz ai/A	29.3	8.5	89.7	73
	non-treated check	27.0	8.3	92.6	80
LSD $_{(0.05)}$		3	1.1	2.9	9

[1] Herbicides were applied October 7, 2009. Pioneer 25R63 was planted no-till 14 days after herbicide applications into corn stalks on October 21, 2009. Liquid Nitrogen was split applied at 40 units/A on 02-26-2010 and 80 units/A on 03-31-2010

[2] Seed depth measurements:

½" depth averaged 0.44 inches and ranged from 0 to 0.75"

1" depth averaged 1.1" and ranged from 0.5 to 1.75"

2" depth averaged 2.0" and ranged from 1.75 to 2.75"

[3] flumioxazin 1 oz ai/A = Valor SX at 2 oz/A

flumioxazin at 2 oz ai/A = Valor at 4 oz/A

flucarbazone at 0.21 oz ai/A = PrePare at 0.3 oz/A

[4] Plant stands recorded from 5 random sites per plot on November 11, 2009; wheat height from 6 random plants on November 12, 2009 and May 26, 2010. Visual estimate of percent canopy cover was made on 5-26-2010.

Table 2. Impact of flumioxazin and flucarbazone on chlorosis, stand, height, and yield of five wheat varieties. (UKREC 2009-2010) [1]

Wheat Variety	Herbicide [2]	Wheat [3]				
		Chlorosis 1-23-10 (%)	Stand 03-08-10 (Plants/ft^2)	Height 03-08-10 (cm)	Height 05-26-10 (cm)	Yield 06-15-10 (Bu/A)
Branson	flumioxazin 1 oz ai/A	15	30.3	4.9	76.7	95.7
	flumioxazin 2 oz ai/A	19	23.0	5.2	76.5	88.2
	flucarbazone 0.21 oz ai/A	0	26.8	5.6	78.1	91.8
	non-treated check	0	24.0	5.3	75.9	88.5
Dinah	flumioxazin 1 oz ai/A	8	24.5	4.9	84.3	99.8
	flumioxazin 2 oz ai/A	18	25.0	5.1	83.1	96.9
	flucarbazone 0.21 oz ai/A	1	22.8	5.4	85.6	100.1
	non-treated check	0	28.5	5.5	86.6	105.5
Pembroke	flumioxazin 1 oz ai/A	5	22.8	5.7	77.9	92.0
	flumioxazin 2 oz ai/A	13	23.3	5.5	77.2	93.0
	flucarbazone 0.21 oz ai/A	0	29.8	6.0	82.1	101.2
	non-treated check	0	22.5	6.5	81.2	94.3
Pioneer 25R63	flumioxazin 1 oz ai/A	5	24.8	5.6	84.4	107.1
	flumioxazin 2 oz ai/A	13	25.5	5.5	82.0	108.1
	flucarbazone 0.21 oz ai/A	0	26.3	5.3	83.9	111.3
	non-treated check	0	27.8	5.4	84.4	104.5
SS8308	flumioxazin 1 oz ai/A	9	35.0	5.7	85.2	103.8
	flumioxazin 2 oz ai/A	18	32.0	5.4	81.0	105.6
	flucarbazone 0.21 oz ai/A	0	28.8	6.0	86.3	106.0
	non-treated check	0	31.5	5.4	86.7	107.8
LSD $_{(0.05)}$		6	5.5	0.8	3.2	9.7

[1] Herbicides were applied November 12, 2009. Wheat was planted no-till 12 days after herbicide applications into corn stalks on November 24, 2009. Seeding depth was 0.75 inches. Liquid Nitrogen was split applied at 40 units/A on 02-26-2010 and 80 units/A on 03-31-2010

[2] flumioxazin 1 oz ai/A = Valor SX at 2 0z/A
flumioxazin at 2 oz ai/A = Valor at 4 oz/A
flucarbazone at 0.21 oz ai/A = PrePare at 0.3 oz/A

[3] Wheat stands and heights were taken from 5 random sites/plot on March 8, 2009. Heights were also taken from 6 random plants on May 26, 2010.

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