

Factors Affecting Sunflower Tolerance to Sulfentrazone

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Introduction

- Weed control in no-till sunflower cropping systems is limited by a lack of effective herbicides that do not require incorporation.

- Sulfentrazone received Section 18 Special Exemption registration in 1999 and 2000 for use in no-till and reduced till sunflower fields to control kochia.

- Numerous occurrences of crop injury in 1999 were related to one or more factors including herbicide rate, time of application, soil and weather factors, and seeding depth.

Objective

- To quantify the effects of herbicide rate, seeding depth, and application timing on sunflower tolerance to sulfentrazone.

Materials and Method

Greenhouse Study

Experiment 1: Sulfentrazone Rate by Seeding Depth

- Sunflower Hybrid: Cargill SF187A

- Experimental Design: Complete Randomized Block, 4 replicates

Treatments:	Rate (g/ha)	Seeding Depth
	140	2 cm
	210	4 cm
	280	

Field Studies

- Location: Colby, KS

- Soil: Keith silt loam, pH 7.9, organic matter 1.8%

- Sunflower Hybrid: Triumph 562

Experiment 2: Sulfentrazone Rate by Seeding Depth

Experimental Design: Split plot, main plots = herbicide rate, subplots = seeding depth, 5 replicates.

Treatments*:	Rate (g/ha)	Seeding Depth
	105	1.9 cm
	140	3.2 cm
	158	
	210	

*Herbicides applied postplant preemergence at 112 L/ha and included glyphosate at 700 g ae/ha.

Experiment 3: Sulfentrazone Rate by Timing

- Experimental Design: 4x4 factorial, RCBD, 4 replicates

Treatments*:	Rate (g/ha)	Timing
	105	45 DPP
	140	30 DPP
	158	15 DPP
	210	PRE

*All plots were spayed with glyphosate at 700 g ae/ha preemergence.

Results and Discussion



Figure 1: Visible injury to sunflower 10 DAP (L to R: 0, 140, 210, & 280 g/ha).

Results and Discussion

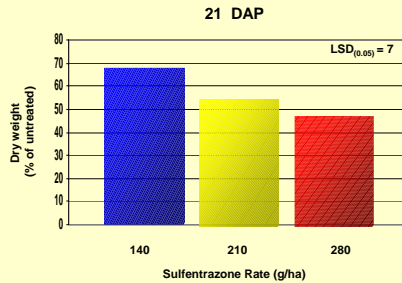


Figure 2: Influence of sulfentrazone rate on sunflower plant dry weight averaged over seeding depths in the greenhouse.

- As sulfentrazone rate increased, sunflower plant dry weight decreased.

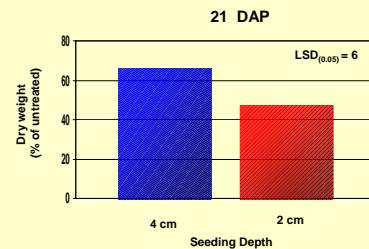


Figure 3: Influence of planting depth on sunflower plant dry weight averaged over herbicide rates in the greenhouse.

- As seeding depth increased, sunflower plant dry weight increased, signifying less crop injury.

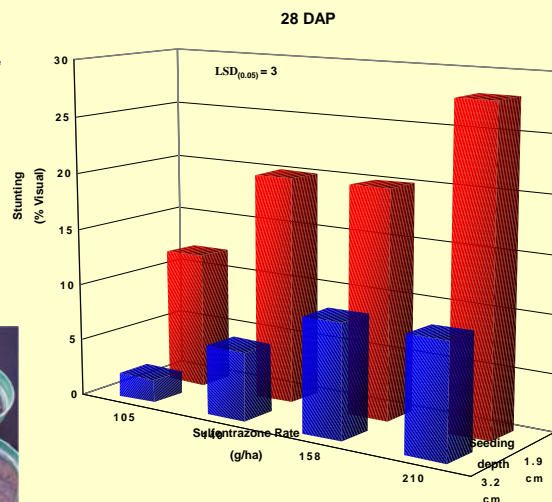


Figure 4: Influence of planting depth on stunting at different herbicide rates.

- Sunflower seeded 3 cm deep were stunted less than sunflower seeded 2 cm deep, regardless of sulfentrazone rate.

- Within seeding depth, stunting trended higher as sulfentrazone rate increased.

Results and Discussion

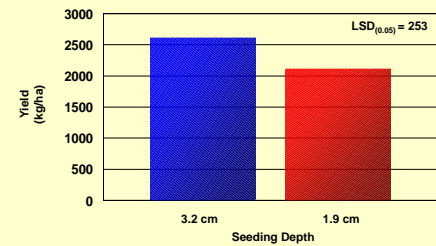


Figure 5: Influence of seeding depth on sunflower yield averaged over sulfentrazone rates.

- As seeding depth increased, sunflower yield increased, indicating less crop injury.

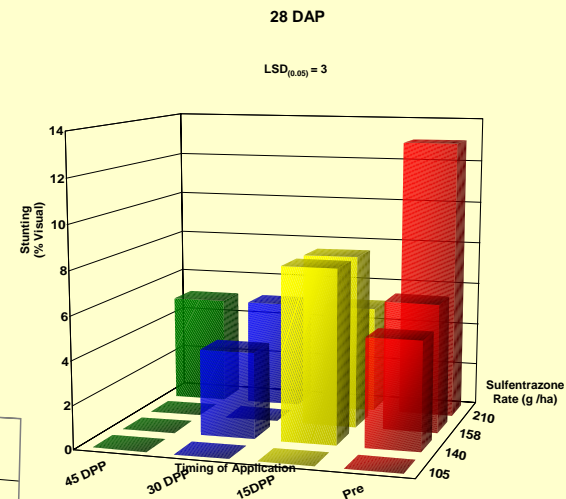


Figure 6: Influence of sulfentrazone rate and application timing on sunflower stunting as a percent of the untreated control.

- Rate by timing interaction was significant at $P = 0.06$, caused by considerably more injury at the 210 g/ha rate applied PRE and inconstant response within other timings.

- Sunflower injury trended higher with increasing sulfentrazone rate and application closer to seeding.

Conclusion

- Application timing, herbicide rate, and seeding depth individually and collectively influence sunflower tolerance to sulfentrazone.

- Sunflower stunting was decreased and seed yield was increased by applying sulfentrazone 15 to 45 days preplant compared with preemergence application, and by seeding sunflower at least 3 cm deep compared with shallower seeding.

- Both preplant application and deeper seeding increased use rate flexibility.