

Sunflower Response to Preplant Dicamba

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INTRODUCTION

Preplant (PP) soil-applied diglycolamine salt of 3,6-dichloro-o-anisic acid (DGA) dicamba at low rates (less than or equal to 0.25 lb ai/A) is a useful, low-cost tool for burndown of early-season annual broadleaf weeds. However, label restrictions exist for broadleaf crops due to potential plant injury. Restriction for sunflower is 120 days between application of dicamba and planting.

OBJECTIVE

Build a North Dakota database that provides a reference for farmers and crop advisers to make decisions if considering use of this weed management strategy for sunflower production, based on crop response with rainfall/irrigation and planting dates following application of dicamba. Data may also be useful for potential dicamba label revision.

MATERIALS AND METHODS

A field study was conducted during 2021-22 by North Dakota State University to evaluate sunflower response to a low-dose rate of PP dicamba based on precipitation following application and planting interval. Dryland trials were conducted at Prosper (conventionally tilled Kindred-Bearden silty clay loam soil; 4.2-4.3% organic matter [OM]; and 6.6-7.0 pH); a center-pivot irrigated site near Carrington (conventionally tilled Heimdal-Emrick loam soil; 3.6-3.9% OM; and 7.6 pH); and Minot (no-till loam or sand loam soil; 3.3-3.7% OM; and 4.8-5.1 pH) (Figure 1). Experimental design was a randomized complete block with factorial arrangement and four replications. DGA dicamba (Clarity® or Sterling Blue®) at 0.125 lb ai/A was applied during May 7-13, 2021 and May 27-June 3, 2022 (Table 1). Sunflower was planted 2-7 days and 14-20 days after application of dicamba. Rainfall ranged from 0-0.08 inch between application of dicamba and first planting dates, and total precipitation as rain and irrigation was 0.62-0.74, 2.16-3.01, and 0.84-0.96 inches at Prosper, Carrington, and Minot, respectively, at the second planting dates.

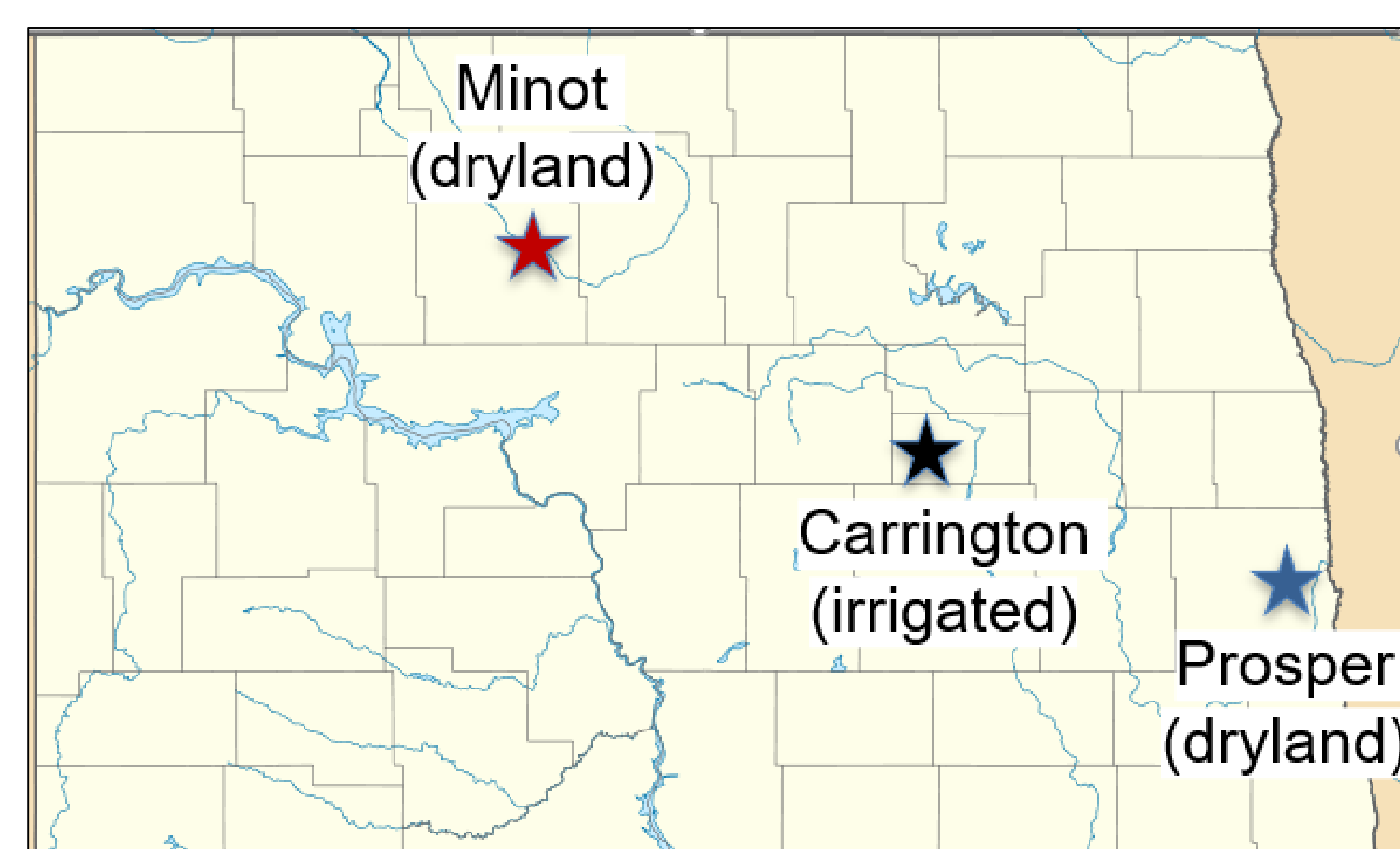


Figure 1. Locations of North Dakota trials.

Location	Dicamba application date	First planting date	Total water (inches) from dic app	Second planting date	Total water (inches) from dic app
2021					
Prosper	May 17	May 19	0	June 2	0.74
Carrington	May 13	May 19	0.08	June 1	2.16
Minot	May 7	May 14	0	May 27	0.96
2022					
Prosper	June 3	June 10	0	June 17	0.62
Carrington	June 3	June 6	0	June 23	3.01
Minot	May 27	June 1	0.06	June 16	0.84

Table 1. Trial establishment information.

RESULTS

Visually evaluated sunflower plant injury (reduction of biomass compared to untreated checks) from dicamba, 1-2 weeks after plant emergence, was 4-23% at Prosper, 0 at Carrington, and 23% at Minot with the first planting dates over the two years of the study (Figure 2). Plant injury from dicamba associated with the second planting dates were <10% at all locations, ranging from 0-9%. Early season plant stand reduction with dicamba compared to untreated checks with first planting dates ranged from 0-22%. Second planting date stands with dicamba were similar to untreated checks, except at Minot in 2021 (12% reduction). Seed yield was similar among dicamba treatments and untreated checks in all trials (Table 2).



Figure 2. Injury symptoms with early planted sunflower, Prosper, 2021.

Planting date	Treatment	Cwt/Acre				4 site-year average
		Carrington 2021	Prosper 2022	Carrington 2022	Minot 2022	
First	Untreated check	25.8	41.4	20.1	23.9	27.8
	Dicamba	30.0	41.0	19.4	23.5	28.5
Second	Untreated check	25.2	41.8	21.1	21.9	27.5
	Dicamba	24.1	42.4	26.3	23.1	29.0
LSD (0.05)		NS				x

Table 2. Seed yield among planting dates and dicamba compared to untreated checks.

SUMMARY

PP-applied dicamba at a low rate for initial broadleaf weed control caused low to moderate early season sunflower plant injury, primarily with planting within a week of dicamba application and without rain. Generally minimal reduction of plant stands occurred with dicamba. Seed yield associated with dicamba was similar to yield of untreated checks among all site-years.