Broadleaf crop response to preplant, low-dose rate of dicamba, Carrington, 2021.
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The field study is being conducted at the NDSU Carrington Research Extension Center with support from the ND Soybean Council and Northarvest Bean Growers Association. Study objective is to evaluate soybean, pinto bean and sunflower plant growth and seed yield response based on timing of planting following application of preplant, low-dose soil rate of dicamba with or without water activation. Experimental design was a randomized complete block with a split-plot arrangement (main plot=crop; split plot=herbicide; and split-split plot=planting date) and four replications. The irrigated trial was established with field pea as prior crop on conventional-till Heimdal-Emrick loam soil with 3.9% organic matter, 7.6 pH, 41 ppm P, 312 ppm K, 2.01 ppm Zn, and 0.45 mmho/cm soluble salts (0- to 6-inch depth). Dicamba (Clarity at 4 fl oz/A [0.125 lb ai/A]) was soil applied with a CO_2-hand-boom plot sprayer delivering 17 gal/A at 35 psi through TJ Turbo 02 nozzles to the center 6.7 ft of 10- by 25-ft plots on May 13 with 44 F, 63% RH and 5 mph wind to wet soil surface. Planting dates were May 19 and June 1; 6 and 19 days, respectively, following application of dicamba. Crop cultivar and targeted stands: soybean - Peterson Farms Seed '19B04' and 150,000 plants/A; pinto bean - 'ND Palomino' pinto bean and 70,000 plants/A; and sunflower - Mycogen '8N270CLDM' and 20,000 plants/A. Crops were planted in 30-inch rows. Irrigation and rainfall totaled 0.08 inch between application of dicamba and the first planting date; and 2.16 inches between application of dicamba and the second planting date; and 22.5 inches June 1-Sept. 29. Seed harvest with a plot combine occurred on the following dates: pinto bean=Sept. 9 (plants hand-pulled and placed in swathes Sept. 7); soybean=Oct. 4; and sunflower=Nov. 1.

Soybean plant stand (trial average=119,500 plants/A) was similar among treatments (Table 1), though the density tended to be reduced with early planting following application of dicamba. Plant development, height and canopy closure generally were not impacted by dicamba. Plant injury with early planting after application of dicamba was 32-43% when evaluated during the first 4 weeks after plant emergence but declined over time. Minimal (4-5%) or no plant injury was observed with the late planting date following application of dicamba. Seed yield was excellent and did not differ among treatments. Seed test weight and count also were not negatively impacted by dicamba.

Table 1. Soybean response to preplant dicamba, Carrington, 2021.

Treatment		Plant													
		Stand	Development			Injury (%)[1]			Height (cm)[2]		Canopy closure (%)		Seed		
					Physiological	WAE[3]									
Planting		plt/A	Emergence	Flower	maturity (R8)						Visual	Canopeo	Yield	TW	Count
date	Herbicide	20-Jun	Day of year			1 to 2	3 to 4	6 to 8	3 to 4	6 to 8	28-Jun	2-Aug	bu/A	lb/bu	no./lb
	untreated check	133,470	155	194	263	0	0	0	31	66	26	98	77.2	56.4	2,920
19-May	dicamba	110,890	156	197	265	43	32	14	27	60	16	94	72.9	56.2	2,920
	untreated check	116,200	160	200	267	0	0	0	26	58	20	94	76.2	55.9	2,800
1-Jun	dicamba	116,870	160	199	266	4	5	0	24	59	16	95	71.5	56.2	2,800
CV (%)[4]		11.4	0.3	0.7	0.5	51.7	63.4	125.2	8.2	11.8	11.1	3.7	7.40	0.8	2.2
LSD (0.05)[4]		NS	NS	2	NS	6	4	4	NS	NS	NS	NS	NS	NS	NS

[1]Biomass reduction. Dates of injury notes: first planting=14-Jun, 28-Jun and 12-Jul; second planting=20-Jun, 6-Jul and 19-Jul.

[2]Dates of height notes: 2-Jul and 21-Jul.

[3]WAE=weeks after plant emergence.

[4]Statistics include all three crops in analysis.

Pinto bean plant stand, averaging 77,500 plants/A, was similar among treatments (Table 2). Plant development, height and canopy closure were not impacted by dicamba. Plant injury with early planting after application of dicamba was 14-28% when evaluated during the first 4 weeks after plant emergence but declined over time. Minimal (7%) or no plant injury was observed with the late planting date following application of dicamba. Seed yield, test weight and count were not negatively impacted by dicamba.

Table 2. Pinto bean response to preplant dicamba, Carrington, 2021.

Treatment		Plant													
		Stand	Development			Injury (%)[1]			Height (cm)[2]		Canopy closure (%)		Seed		
						WAE[3]									
Planting date	Herbicide	plt/A	Emergence	Flower	Physiological maturity (R8)	1 to 2	3 to 4	6 to 8	3 to 4	6 to 8	Visual	Canopeo	Yield	TW	Count
		20-Jun	Day of year								28-Jun	2-Aug	cwt/A	lb/bu	no./lb
19-May	untreated check	72,380	155	192	237	0	0	0	31	59	27	91	31.31	59.3	1,210
	dicamba	71,720	156	192	240	28	14	9	28	55	22	96	29.90	59.1	1,260
1-Jun	untreated check	83,000	159	193	239	0	0	0	29	60	25	95	30.67	59.0	1,270
	dicamba	83,000	160	193	241	7	0	0	30	57	23	98	30.44	59.1	1,270
CV (%)[4]		11.4	0.3	0.7	0.5	51.7	63.4	125.2	8.2	11.8	11.1	3.7	7.4	0.8	2.2
LSD (0.05)[4]		NS	NS	NS	NS	6	4	4	NS	NS	NS	NS	NS	NS	NS

[1]Biomass reduction. Dates of injury notes: first planting=14-Jun, 28-Jun and 12-Jul; second planting=20-Jun, 6-Jul and 19-Jul.

[2]Dates of height notes: 2-Jul and 21-Jul.

[3]WAE=weeks after plant emergence.

[4]Statistics include all three crops in analysis.

Sunflower plant stand, averaging 25,900 plants/A, was similar among treatments (Table 3). Plant development, height and canopy closure generally were similar among treatments. Plant injury was essentially absent following application of dicamba. Also, seed yield and test weight were similar among treatments.

Table 3. Sunflower response to preplant dicamba, Carrington, 2021.

Treatment		Plant											
		Stand	Development			Injury (%)[1]			Height (cm)[2]		Canopy closure (%)	Seed	
Planting date	Herbicide	plt/A	Emergence	Flower	Physiological maturity (R8)	WAE[3]					Visual	Yield	TW
		20-Jun	Day of year			1 to 2	3 to 4	6 to 8	3 to 4	6 to 8	28-Jun	cwt/A	lb/bu
	untreated check	24,570	152	204	247	0	0	0	63	158	54	25.80	29.9
19-May	dicamba	29,880	153	203	249	0	0	0	60	144	57	30.00	30.3
	untreated check	23,910	161	211	252	0	0	0	44	142	32	25.21	27.9
1-Jun	dicamba	25,230	162	211	251	5	0	0	37	144	26	24.14	29.9
CV (%)[4]		11.4	0.3	0.7	0.5	51.7	63.4	125.2	8.2	11.8	11.1	7.4	0.8
LSD (0.05)[4]		NS	NS	2	NS	NS	NS	NS	NS	NS	NS	NS	NS

[1]Biomass reduction. Dates of injury notes: first planting=14-Jun, 28-Jun and 12-Jul; second planting=20-Jun, 6-Jul and 19-Jul.

[2]Dates of height notes: 2-Jul and 21-Jul.

[3]WAE=weeks after plant emergence.

[4]Statistics include all 3 crops in analysis.