

## WEED CONTROL IN SUNFLOWERS IN NORTH DAKOTA

By

John D. Nalewaja and Clarence M. Swallers  
 Department of Agronomy  
 North Dakota State University  
 Fargo, North Dakota; U.S.A.

Sunflowers, once established in the field, are generally considered good competitors with weeds. However, with cool weather early in the season, sunflower growth is slow and weeds often become established ahead of the sunflowers. In North Dakota, many sunflower fields are infested heavily with weeds each year. In 1965, 1966 and 1967, various herbicides were evaluated as to efficacy for weed control in sunflowers and in 1967 the influence of various weeds in competition with sunflowers was also studied.

In North Dakota, our initial research in chemical weed control in sunflowers began in 1965 with the evaluation of trifluralin, EPTC as a preplant treatment and amiben as a preemergence treatment in six varieties of sunflowers. Weed control was good to excellent with all three herbicides at commercial rates. The six varieties (Peredovik, Mingren, T56002, Advent, Arrowhead, and Mennonite) all had good tolerance to amiben at 3 and 5 lb/A and to trifluralin at 1 to 3 lb/A. The commercial rate of EPTC at 3 lb/A was used exclusively as the literature indicated sunflower tolerance to EPTC. In 1966 and 1967, extensive studies were conducted with several other herbicides in addition to the three already mentioned. The results of the more promising herbicides are summarized below in Table 1.

Table 1. Weed control and response of sunflowers to cultivation and various herbicide treatments<sup>a</sup>/.

Treatments	1 9 6 7						
	1 9 6 6		Percent Weed		Yield lb/A		
	% weed control	Yield lb/A	Foxtail	Penny-cress	Mennonite	Pere-dovik	Average
Trifluralin $\frac{1}{2}$ PPI <sup>b</sup> /	-	-	65	13	925	933	929
Trifluralin 1 PPI	-	-	85	26	1046	1028	1039
EPTC 3 PPI	50	666	68	11	880	890	885
Amiben 2 PE	46	710	50	85	748	767	757
Amiben 3 PE	55	829	64	84	1005	1193	1099
Propachlor 5 PE	70	-	88	29	925	1103	1014
Weedy control	-	450	0	0	447	506	477
Cultivated control	91	1084	91	90	1272	1112	1192
Weed free	100	1335	99	99	1523	1440	1482

Table 1. continued.

Peredovik		1 9 6 7			
%	Iodine	G/100 seeds	Ht. inch	Days to 50% bloom	Menmonite <sup>c/</sup> % large seeds
Oil	#				
51.8	138	5.93	55.0	76	11.6
51.1	139	5.66	56.2	77	7.8
51.3	138	5.34	55.0	76	.9
50.8	139	5.25	55.7	75	4.3
51.2	139	5.39	57.4	72	9.3
52.6	139	5.65	57.4	73	5.3
50.7	139	4.62	52.6	76	0.0
50.3	138	5.94	58.6	71	9.0
49.4	138	6.15	61.7	72	11.6

a/ No cultivation was applied to plots receiving herbicides.

b/ PPI = preplant incorporated and PE = preemergence.

c/ Seeds over a 20/64 round sieve.

In July, 1966 and 1967, the weed control results with these herbicides were not as good as had been anticipated based on previous studies. However, the results indicate the importance of minimal weed control as expressed in the yield increases compared to the weedy control. The poor weed control obtained in 1966 still increased yield 30 to 50%. If one cultivation was applied in conjunction with the herbicide application, we feel commercially adequate weed control would have been achieved with all the treatments.

At present, only EPTC and trifluralin are cleared for use in sunflowers. These herbicides in 1967 gave good foxtail (*Setaria* spp.) control but were not as effective for broadleaves (mainly field pennycress, *Thlaspi arvense* L., in this experiment). Amiben and propachlor are promising herbicides with safety to sunflowers but, at present, do not have label clearance. Amiben has the advantage of better broadleaf weed control compared to the other herbicides. Preliminary results from 1968 indicate extensive tolerance of sunflower to a large number of preemergence herbicides.

In 1967, the influence of the herbicides upon the oil of the sunflowers was also studied. The percent oil or the iodine number of the oil was not influenced by any of the herbicides.

Weedy, weed free and cultivated treatments were included in the herbicide evaluation trials for weed control in sunflower. From these treatments, the importance of weed competition in sunflowers was evident. When no weed

control practices were applied, yields were reduced 66 and 68%, and with cultivation 19 and 20% in 1966 and 1967, respectively. The 20% yield reduction with cultivation as compared to the weed free sunflower plot is probably low compared to losses under normal conditions as the weed population at the Fargo Experiment Station is lower than in most agronomic fields. Also, the cultivation was hoeing all weeds allowing only a 4 to 6 inch band in the row for a light weed infestation. Percent large seed (seeds over 20/64 round sieve), plant height and grams/100 seeds related positively to the degree of weed control.

In 1967, another experiment was conducted to determine the period during the season of greatest weed competition and to compare wild mustard (Brassica kaber L.), wild oats (Avena fatua L.), and foxtail (Setaria glauca L.) competition in sunflowers. Weed competition was most important for the first 4 weeks in the season with no increase in competition from longer periods of weed growth. Thus, early season weed control is essential for maximum sunflower yields.

Wild mustard was a greater competitor at a given density with sunflowers than was either wild oats or foxtail. In North Dakota, wild mustard occurs abundantly throughout the state, often infesting sunflower fields. The presently cleared herbicides are not completely effective in controlling wild mustard; therefore, further research is necessary to obtain a herbicide for broadspectrum selective weed control in sunflowers.

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