

POSSIBILITY TO CONTROL Orobanche cumana Wallr.  
IN SUNFLOWERS BY TREFLAN AND AMEX

By

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Summary

In 1976 and 1977, the author tried to control Or. cumana in sunflowers by applying Treflan and Amex. Or. cumana occurred to a varying degree in all plots treated, non-treated, and the control. The occurrence was considerably lower in the plots treated with Treflan and Amex than in the control. Treflan was more efficient than Amex in controlling Or. cumana. The results show that Treflan and Amex do help but do not offer as efficient protection against Or. cumana as a resistant variety or hybrid does.

Introduction

Orobanche cumana offers serious problems in the production of sunflowers in the USSR, Romania, Bulgaria, Hungary, and Yugoslavia. Yield decreases caused by this parasite range from low, when the attack is weak, to 100% when the attack is strong.

The most intensive work in the solution of this problem was conducted in the USSR, by developing resistant sunflower cultivars. In the period from 1910 to 1927, sunflower cultivars were developed which were resistant to the race A of Orobanche cumana. Those were the cultivars Sarntovsky 169, Kruglik 631, and Kruglik A-41. A more virulent race B, however, seriously attacked the cultivars resistant to the race A. When breeding the variety VNIIMK, new sunflower cultivars were developed (VNIIMK, Peredovic, etc.) which were resistant to both races of Orobanche cumana. In early 1960, a new "Moldavian" race of Orobanche cumana occurred, which attacked the cultivars resistant to the races A and B (Pustavoit, 1966; Buherovich, 1966, 1967; Sharova, 1968).

In view of the fact that the development of sunflower cultivars resistant to Orobanche cumana takes 20-30 years and that the resistance is lost much faster because of the occurrence of new races of the parasite, we decided to try to control the parasite with some herbicides (Treflan and Amex\*) which are otherwise used for the weed control in sunflower plots and which have a considerably longer action than the other herbicides used for the same purpose.

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\* Treflan - Trifluraline a,a,a-trifluoro-2,6-dinitro-N,N,-diphophyl-p-toluidine.

Amex - N-Sec-butyl-4-tert-butyl-2.6-dinitroaniline.

### Materials and Methods

The experiment was conducted during the vegetation seasons of 1976 and 1977 at the experimental field of the Institute of Field and Vegetable Crops in Novi Sad. The experimental plot was on chernozem soil. In 1976, the following sunflower cultivars and hybrids were tested: VNIIMK 8931, Peredovic, NS-H-62-RM, and R-18 (line). In 1977, we added the cultivar Slovenska Siva to the material already included into the test. The planting density of 70 x 35 cm was uniform for all cultivars and hybrids. The size of the basic plots was 3.5 m.sq., i.e., there were 50 plants per plot in a replication. There were four replications.

Before planting in 1976, all combinations except the control were sprayed with Treflan in the quantities of 4 l/ha; in 1977, Amex was included into the test besides Treflan. The quantities applied were 4 l/ha. A portable sprayer was used; the quantity of water was 500 l/ha. Immediately after the spraying, the herbicides were plowed under at 5 cm by a cultivator. The test plots were planted manually. The seeds of Orobanche cumana were planted into the hills together with the sunflower seeds. Prior to the planting, the seeds of Orobanche cumana were mixed with loose earth. A mixture of approximately 50 gr of Orobanche cumana seeds and earth was placed in each hill. The seeds of Orobanche cumana were the mixture of seeds collected in 1974 and 1975 at different localities.

The occurrence of Orobanche cumana was observed two times during the growing season -- 10 days after the end of flowering and 10 days before the harvest. The number of Orobanche cumana plants was counted in each combination. The results were then variation statistically calculated.

### Results and Discussion

It is known that Treflan and Amex maintain a considerably longer herbicidal action than the other herbicides used for weed control in sunflower plots. They control the occurrence of the majority of weeds throughout the growing season of the sunflower. As Orobanche cumana occurs in mid-June, we expected to eliminate its occurrence in the infested plots by applying Treflan and Amex. This hypothesis was based on the results of Soviet authors Vasiljev and Baranova (1974), who successfully controlled Orobanche cumana in laboratory but also had positive results in the control of Orobanche cumana in field conditions.

The results of our experiments are given in Tables 1 and 2.

The analysis of the results in Table 1 showed that there was the largest number of Orobanche cumana plants per sunflower plant in the control and the line R-18. In the plots planted with VNIIMK 8931, Peredovic, and NS-H-62-RM, the number of Orobanche cumana plants was significantly lower in relation to the line R-18 for both LSD 5% and LSD 1%.

There were also significant differences for LSD 5% and LSD 1% between the control and all plots treated with Treflan, regardless of the cultivar grown.

There was obviously a significant interaction between the tested cultivars and Treflan for both LSD 5% and LSD 1%.

Table 2 gives the results of the experiments conducted in 1977.

TABLE 1. Control of *Orobanche cumana* by Treflan in 1976.

Combination	Cultivar				$\bar{x}$	LSD	
	VNIIMK 8931	R-18	NS-H- 62-RM	Pere- dovic		5%	1%
Control	0.27	4.05	0.26	0.44	1.25	0.20	0.27
Treflan	0.01	0.74	0.05	0.09	0.22		
$\bar{x}$	0.14	2.39	0.15	0.26	Chemical		
LSD 5%			0.28		Cultivar		
LSD 1%			0.39				
LSD 5%			0.40		Interaction		
LSD 1%			0.52				

TABLE 2. Control of *Orobanche cumana* by Treflan and Amex in 1977.

Combination	Cultivar					$\bar{x}$	LSD	
	VNIIMK 8931	R-18	NS-H- 62-RM	Pere- dovic	Slov. Siva		5%	1%
Control	1.42	10.84	1.37	1.95	20.09	7.33		
Treflan	0.37	6.18	0.93	0.81	10.82	3.82	1.51	2.01
Amex	0.70	11.80	1.30	2.28	18.11	6.83		
$\bar{x}$	0.83	9.60	1.20	1.68	16.67	Chemical		
LSD 5%			1.95		Cultivar			
LSD 1%			2.59					
LSD 5%			3.37		Interaction			
LSD 1%			4.50					

The analysis of the results in Table 2 showed that the number of *Orobanche cumana* plants was much higher in this than in the previous year. The cultivar Slovenska siva had the largest average number of *Orobanche cumana* plants, the hybrid NS-H-62-RM the lowest. The average number of *Orobanche cumana* plants per sunflower plant was higher in the control than in the plots treated with Treflan or Amex. Conversely, a somewhat larger number of *Orobanche cumana* plants was found with R-18 and Peredovic than in the control. The comparative analysis of the results clearly showed that the reduction in the number of

Orobanche cumana plants per sunflower plant was more efficiently achieved with Treflan than with Amex.

According to the results in Table 2, there were no significant differences for LSD 5% and LSD 1% among VNIIMK 8931, Peredovic, and NS-H-62-RM, but there were significant differences between them and R-18 and Slovenska siva. The comparative analysis also showed that the infestation was significantly stronger with Slovenska siva than with R-18.

Likewise, it may be seen that there were no significant differences between the control and the plots under VNIIMK 8931, Peredovic, and NS-H-62-RM treated with Treflan and Amex. There were significant differences for LSD 5% and LSD 1% between the control and the plots under R-18 and Slovenska siva treated with Treflan and Amex. In the plots treated with Amex only, significant differences were found with the cultivar Slovenska siva.

The interaction between the tested sunflower cultivars and the applied herbicides was significant for both LSD 5% and LSD 1%.

#### Literature

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