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BROOMRAPE DEVELOPMENT ON SUNFLOWERS PLANTED AT DIFFERENT DATES

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SUMMARY

Study was conducted at the Thrace Agricultural Research Institute during 1990-91 for the purpose of finding answers to the question of what the effect of *orobanche* is on sunflower planted at different dates. Sunflower varieties Türk-Ay-1, Vniimk-8931, Sundak and TR-259 were planted at 5 different dates with fields infested with *Orobanche*. The first appearance of *Orobanche* shoots on the soil surface was earlier at late planting dates compared to early planting dates. It was also observed that *Orobanche* shoots per plant were fewer when sunflower planting was made late.

Key words **: *Orobanche*, broomrape, sunflower, planting time, broomrape development.**

INTRODUCTION

Broomrape (*Orobanche cumana* Wallr.) is a problem especially in Eastern and Mediterranean countries. It became a major problem in some periods and affected sunflower production and acreage in Turkey. There have been much research undertaken concerning control of orobanche and elimination of its damage to sunflower in the world, and in Turkey. In particular, these studies have shown that the best way to control broomrape was developing *Orobanche*-resistant varieties and hybrids. Broomrape-resistant hybrids have been developed and planted in *Orobanche*-infested areas in Turkey.

The parasite is capable of generating new physiologic races which develop on sunflower varieties that were previously resistant (Pustovoyt, 1975). Vniimk-8931 which was known to be resistant to broomrape races A and B was most widely grown variety in sunflower areas of Turkey before 1980. However, when broomrape attack has reached to a level to become a limiting factor for growing sunflower, a race determination study was conducted during 1983-88. The results showed that there were at least five physiologic races (A, B, C, D, E) of *Orobanche* present in Turkey (Uludere et al., 1988). At present, some broomrape-resistant hybrids have been under cultivation without any *Orobanche* problem.

However, other control methods should be investigated in case of new races arise or susceptible sunflowers be planted.

Sunflower is mainly planted in April in *Orobanche*-infested areas of Turkey. It has been observed that the number of *Orobanche* shoots decreased when sunflower broomrape test nurseries were planted late at the institute. Especially, none or very few *Orobanche* shoots developed when sunflowers were planted on the second half of May or first half of June (Aydin, unpublished). With this situation it may be thought that broomrape parasitism could be controlled by late planting. However, in these conditions seed yield could be decreased since late planting will move the vegetation period to a time that when rainfall is scant.

Table 1: Number of days to first *Orobanche* appeareance above ground after sunflower emergence

Variety	Planting date	No of days to first *Orb.* appearance	
		1990	1991
TÜRK-AY-1	I	45	50
	II	44	45
	III	36	38
	IV	32	47
	V	31	44
VNIIMK-8931	I	44	50
	II	40	42
	III	33	33
	IV	29	38
	V	27	33
SUNDAK	I	42	49
	II	38	42
	III	33	33
	IV	29	38
	V	27	29
TR-259	I	65	—
	II	57	—
	III	59	—
	IV	61	—
	V	—	—

MATERIAL AND METHODS

The study was conducted at the Thrace Agricultural Research Institute during 1990-1991. Although the planting area was infested with *Orobanche*, additional inoculation was made with *Orobanche* seeds collected from sunflower fields in the Thrace Region. In the trial two open pollinated varieties (Sundak and Vniimk-8931) and two hybrids (Türk-Ay-1 and TR-259) were used. Where Türk-

Ay-1 has some tolerance and TR-259 shows resistant reaction to broomrape, other cultivars have been known to be susceptible to broomrape.

Planting was made at five different dates with 13-15-day interval. The experiment design was split plot in randomized complete block. Main plots were cultivars and planting dates were subplots. Four rows with 10.5 m row lenght and 1m row distance were planted in 3 replications. Planting was started in the first half of April and finished in the first week of June when the 5th planting date was done.

First *Orobanche* shoot appearance was observed and defined as the number of days from sunflower emergence date. At physiological maturity, total sunflower plants per plot, plants parasitized by *Orobanche* per plot and *Orobanche* shoots per plot were counted. Three indices of parasitism, as defined by Vranceanu et al. (1986) were calculated. "Frequency" was calculated as the percent of sunflower plants attacked by broomrape. "Intensity" was the average number of broomrape shoots per parasitized sunflower plant. "Attacking rate" was the average number of broomrape shoots considering all sunflower plants per plot.

Table 2: Frequency, intensity and attacking rate scores of *Orobanche* infection on varieties at different dates

Planting date		Varieties							
		TÜRK-AY-1		VNIIMK-8931		SUNDAK		TR-259	
		1990	1991	1990	1991	1990	1991	1990	1991
1st DATE	F	98.9	25.5	100.0	56.5	100.0	77.8	2.2	0.0
	I	11.3	2.4	17.0	2.5	17.6	3.5	1.0	0.0
	A.R	11.2	0.6	17.0	1.4	17.6	2.7	0.02	0.0
2nd DATE	F	93.5	11.8	98.2	50.0	99.4	70.9	9.4	0.0
	I	8.1	1.3	21.3	1.8	17.9	3.1	2.9	0.0
	A.R	7.6	0.2	20.9	0.9	17.8	2.2	0.3	0.0
3rd DATE	F	79.2	18.5	97.6	73.3	99.3	82.4	1.7	0.0
	I	5.2	1.8	14.6	2.7	8.9	4.0	1.0	0.0
	A.R	4.2	0.3	14.2	2.0	8.8	3.3	0.02	0.0
4th DATE	F	81.0	2.3	96.3	32.7	92.0	56.3	5.7	0.0
	I	3.9	1.2	9.4	2.2	11.4	1.9	2.1	0.0
	A.R	3.1	0.02	9.0	0.7	10.5	1.1	0.12	0.0
5th DATE	F	30.1	1.5	77.6	26.9	95.0	44.7	0.0	0.0
	I	2.0	1.7	3.8	1.7	5.6	2.0	0.0	0.0
	A.R	0.6	0.02	2.9	0.5	5.3	0.9	0.0	0.0

RESULTS AND DISCUSSION

First appearance of *Orobanche* shoots above ground as days from plant emergence has shown in Table 1. First *Orobanche* appearance depending on planting dates were 27-65 days in 1990 and 29-50 days in 1991. At early planting dates *Orobanche* shoot appearance takes more time comparing with late planting dates. Similar results were also obtained by Ekiz (1970). At high soil temperatures *Orobanche* shoot development becomes faster.

First *Orobanche* shoot appearance of variety Sundak was 27-42 days in 1990 and 29-49 days in 1991 depending on planting dates. It was 27-44 days in 1990 and 33-55 days in 1991 for Vniimk-8931. *Orobanche* shoots observed 31-45 days in 1990 and 44-50 days in 1991 on hybrid Türk-Ay-1. For these 3 cultivars *Orobanche* shoot appearance occurred earlier in 1990 than in 1991. The reason was that the average daily temparatures in April and May were higher in 1990.

In 1990, at first 4 planting dates, few *Orobanche* shoots were observed in resistant hybrid TR-259 (1.69-9.3 %). First *Orobanche* shoot appearance in TR-259 plots were 57-65 days after emergence. It is also noted that first *Orobanche* shoot appearance takes more days in the two hybrids (TR-259 and Türk-Ay-1) when compared with the two open pollinated cultivars (Sundak and Vniimk-8931).

Three indices obtained from *Orobanche* observations for cultivars and planting dates have shown in Table 2. In general, *Orobanche* shoots have reached almost maximum level at flowering time. At early plantings frequency, intensity and attacking rate scores were usually higher when compared with late plantings. Orobanche infection was also higher in 1990 than in 1991.

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DESAROLLO DEL JOPO EN GIRASOL SEMBRADO EN FECHAS DIFERENTES

RESUMEN

Un estudio fue llevado a cabo en el Instituto de Investigación Agraria de Tracia durante 1990-91 con el propósito de encontrar respuestas en relación al efecto del Orobanche sobre girasol sembrado en distintas fechas. Las variedades de girasol Türk-Ay-1,Vniimk-8931, Sundak y TR-259 fueron sembradas en 5 fechas differentes en campos infectados con jopo. La primera aparición de jopos en la superficie del suelo fue más tardía en fechas de siembra tardía en comparación con fechas tempranas. Se observó también que el número de jopos por planta fue menor cuando la fecha de siembra fue más tardia.

DÉVELOPPEMENT DE L'OROBANCHE SUR DES TOURNESOLS SEMÉS À DIFFÉRENTES DATES

RÉSUMÉ

Cette étude a été menée à l'Institut de Rechearche Agricole de Thrace en 1990-91, avec pour objectif la connaissance de l'effet de l'orobanche sur des tournesols semés à différentes dates. Les variéteseurnesol Turk-ay-1, Vniimk-8931, Sundak et TR-259 ont semées à la surface du sol sont apparues plus précocement dans premières tiges d'orobanche à la surface du sol sont apparues plus précocement les semis tardifs que dans les semis précoces. Il été aussi observé que le nombre de tiges d'orobanche par plante était plus faible dans les semis tardifs de tournesol.