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Screening of Sunflower (*Helianthus annuus* Linnaeus) Genotypes Against the Attack of *Odontotermes obesus* (Rambur) (Isoptera: Termitidae)

Muhammad Aslam, Farid Asif Shaheen and Abdul Rehman
Department of Entomology, University of Arid Agriculture Rawalpindi, Pakistan

Abstract: Out of ten genotypes of sunflower (ISB 1-99, FJ 1-99, Sehala 1-99, Bahatar 1-99, Jatli 1-99, Jhelum 1-99, Dena 1-99, Hysun-33, Sohawa 1-99 and Triumph-573) screened against the attack *Odontotermes obesus* at Chaccanwali Deri Farms under UGC/UAAR Sunflower Project, Hysun -33 showed the highest number of termites per 30^3 cm^3 and also the percentage of plants damaged by this pest was highest. In Jhelum 1.99, both the number of termites as well as the percentage of sunflower plants damaged by *Odontotermes obesus* were the lowest. IBD 1-99 and Triumph-573 showed also high percentage of damaged plants and number of termites next to Hysun-33. The other genotypes were some what intermediate based upon the criteria mentioned. The results showed that on different genotypes, the number of termites varied and this information could help in evolving plants resistant to insect pests and thus by sowing the resistant genotypes, the dependence on the heavy use of insecticides will be minimized and ultimately the pollution problems due to injudicious use of insecticides will also be reduced. The number of termites and the damage done by them to the plants were positively correlated. It showed that as number of termites increased, the percentage of damage to plants by termites also increased.

Key words: *Odontotermes obesus* (Rambur), *Helianthus annuus* linnaeus, sunflower genotypes, screening, non-conventional oil seed crop4mthesis stage

Introduction

Sunflower (*Helianthus annuus* Linnaeus: Compositae), a non-conventional oilseed crop (Dogar, 1997; Khan *et al*.,1999) and an ornamental plant can meet the deficiency of oil and protein due to its wide range of adaptability and highest seed oil contents ranging from 40-50 percent (Bakhsh *et al*., 1999). It is being successfully cultivated twice a year on diverse soil types and agroecological zones of Pakistan (Khan *et al*., 1999). It fits well in our cropping pattern and also produces edible oil of high quality. It has the maximum potential for bridging the edible oil gap in Pakistan. Being extremely drought resistant, it is also suited for barani-rainfed areas (Muhammad and Khan, 1981). It is also cultivated in Russia, Romania, Argentina, Chile, Turkey, USA, India, China, France, Australia and several other countries of the world (Khan and Azam, 1979). Efforts are in progress to increase area under this crop (Islam *et al*., 1996). According to PODB (2000), it was grown on an area of 5 lac acres during 2000. As it is very important crop of our country, therefore, its area, cultivation, production, protection from the ravages of pests and diseases, disposal and marketing be encouraged throughout our country especially in the Potohar Region/Areas, where the cultivation of this crop in the past was ignored due to lack of its disposal/marketing (Aslam *et al*., 2000).

The insect pests found on this crop included *Chrotogonus* spp.(Grass hopper), *Agrotis* spp. (Cut worm), *Gryllotalpa* spp. (Mole cricket), *Odontotermes obesus* (White ants), *Agapanthia dahlii* (Stem borer), *Melanagromyza* spp. (Stem girdler), *Aphis gossypii* (Cotton aphid), *Agrius conyolvoli* (Horn worm), *Empoasca* spp. (Jassid), *Suleima helianthana* (*Sunflower bud moth*), *Helicoverpa* (*Heliothis*) spp. (Boll worm), *Spodoptera litura* (Leaf worm), *Hornoeosoma electellum* (Sunflower moth), *Nezara viridula* (Green shield bug) *Diacrisia obliquata* (Hairy catterpillar), *Myllocerus blandus* (Ash weevil), *Zygogramma exclamationis* (Sunflower beetle) and *Smicronyx* spp. (Sunflower seed weevil) (Aslam *et al*., 2000).

Odontotermes obesus is very serious pest of different crops including sunflower. Pearce (1997) indicated that the presence of termites in a region depended on the vegetation types. According to Chaudhry and Ahmed (1972) *Odontotermes obesus* (Rambur) was recorded damaging agricultural crops. Based upon Aslam (1984, 1994a) termites exist always in soil but their number starts increasing with increase in dry spell. According to Aslam *et al*. (2000) *Odontotermes obesus* was found attacking sunflower plants in Fateh Jang, Golra, Daultala and Dena. Its number increased tremendously in the fields of Sunflower at Chaccanwali Deri (Fatah Jang) during spring, 1999. Due to an increase in trend of this pest in this area, keeping into view the past experience and following Pearce (1997) (who indicated that the presence of termites in a region depended on the vegetation types), it was decided to observe its attack on different sunflower genotypes so as to see whether some variation exists in the attack of different sunflower genotypes by *Odontotermes obesus*.

The information may help in selecting genotypes less susceptible to the attack of termites, because use of excessive chemicals for the control of insects is hazardous to our environment, so resistance of sunflower plants against insects especially *Odontotermes obesus* may be used as one of the primary methods in which the pesticide load in the agroecosystem can greatly be reduced (Rafiullah *et al*. (1998). Although host resistance has played a major role in management of diseases in sunflower, there has been little emphasis on resistance as a management tactic for insect pests (Skoric, 1988). Therefore, these studies were conducted to observe some resistance of sunflower genotypes against this serious insect pest of sunflower plants.

Materials and Methods

Ten genotypes of sunflower (ISB 1-99, FJ 1-99, Sehala 199, Bahatar 1-99, Jatli 1-99, Jhelum 1-99, Dena 1-99, Hysun-33, Sohawa 1-99 and Triumph-573) were planted at Chaccanwali Deri Farms'under UGC/UAAR Sunflower Project using 4 replications. All standard agronomic

Fig. 1: Sunflower plants damaged by *Odontotermes obesus* (Rambur) (isoptera: Termitidae)

practices recommended for sunflower sowing were followed. In each plot 100 plants were selected at random for observing the attack of *Odontotermes obesus* to the sunflower plants (Fig. 1) and thus percentage of plants damaged by the termites was computed during early, growing, anthesis and harvesting stages of the crop. Also number of termites were counted from 30^3 cm^3 of soil from each plot by digging the soil with the help of a digging instrument (Khurpa) during early, growing, anthesis and harvesting stages of the crop. The data pertaining to number of termites per 30^3 cm^3 and percentage of damaged plants were subjected to statistical analysis using statistical package SPSS 7.50 for Windows 1996. Means were compared using Duncan Test to reach at some conclusions.

Results and Discussion

Table 1 and 2 reveal that there were great variations in the number of *Odontotermes obesus* and the damage done to sunflower plants by termites. The means in most of the cases differed significantly based on Duncan Test. Table 1 reveals that Hysun-33 showed the highest number of termites per 30^3 cm^3 and also the percentage of plants damaged by this pest was highest (Table 2). In Jhelum 199 both the number of termites (Table 1) as well as the percentage of sunflower plants damaged by *Odontotermes obesus* were the lowest. (Table 2). MD 1-99 and Triumph 573 showed also high number and percentage of damaged plants and number of termites next to Hysun-33. The other genotypes were some what intermediate based upon the criteria mentioned. Chaudhry and Ahmad (1972), recorded *Odontotermes obesus* (Rambur) damaging agricultural crops. Pearce (1997) indicated that the presence of termites in a region depended on the vegetation types. The

Table 1: Mean number of *Odontotermes obesus* per 30^3 cm^3 of soil in different genotypes of sunflower

Sunflower Genotypes	Mean	Duncan Test
IBD 1-99	506.25 ± 06.2500	f
FJ 1-99	265.00 ± 11.9024	d
Sehala 1-99	195.00 ± 06.4550	c
Bahatar 1-99	285.00 ± 16.5831	d
Jatli 1-99	111.25 ± 06.5749	b
Jhelum 1-99	040.00 ± 07.3598	a
Dena 1-99	175.00 ± 05.4006	c
Hysun-33	841.25 ± 32.9378	g
Sohawa 1-99	176.25 ± 05.5434	c
Triumph-573	402.50 ± 11.9896	a

Means followed by the same letters are not significantly different from one another at p=0.05

Table 2: Percent Plants of Sunflower Damaged by *Odontotermes obesus* in different genotypes of sunflower Sunflower

Genotypes	Mean	Duncan Test
IBD 1-99	43.00 ± 4.5461	g
FJ 1-99	21.25 ± 1.4930	de
Sehala 1-99	15.00 ± 1 7795	cd
Bahatar 1-99	19.00 ± 1.5811	de
JatII 1-99	08.25 ± 1.1087	ab
Jhelum 1-99	03.50 ± 0.6455	a
Dena 1-99	11.75 ± 1.2500	be
Hysun-33	72.50 ± 3.2275	h
Sohawa 1-99	22.00 ± 1.0801	e
Triumph-573	31.75 ± 0.8539	f

Means followed by the same letters are not significantly different from one another at p = 0.05

Table 3: Correlation between number of *Odontotermes obesus* per 30^3 cm^3 of soil and percent plant of sunflower damaged of by *Odontotermes obesus* in different genotypes of sunflower

		Number	Damage
Pearson	Number	1.000	0.966**
Correlation	Damage	0.966**	1.000
Sig.	Number		0.000
(1 tailed)	Damage	0.000	

**Correlation is significant at the 0.01 level

results showed that on different genotypes, the number of termites varied. Aslam (1994b) had reported severe attack of termites to the sunflower plants.

Rafiullah *et al*. (1998) had screened several genotypes of sunflower against whiteflies, loopers and jassids in Peshawar. The number of termites and the damage done by them to the plants were positively correlated (Table 3) . It showed that as number increased, the percentage of damage to plants by termites also increased. From the discussion, it was concluded that some such sunflower genotypes were identified which showed less damage by *Odontotermes obesus* and also the percentage of the plants damaged by this insect pest was very low. These genotypes, could therefore, be incorporated in breeding sunflower plants resistant against this insect. Use of sunflower genotypes resistant against insect pests in the sunflower cultivation programmes will be very helpful to the sunflower growers, as they will least depend upon the heavy use of insecticides being used against this serious insect pest. Due to the low dependence on the use of insecticides against the insect, the environmental pollution problems will also be minimized and sunflower growers will be encouraged to grow sunflower and enhance its yield. Moreover, people will be able to consume the sunflower oil free of traces of any insecticide.

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