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Infestation Trend of *Odontotermes obesus* (Rambur) on Wheat Crop (*Triticum aestivum* Linnaeus) in Rainfed Conditions

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Abstract: In the experiment conducted at University of Arid Agriculture Rawalpindi during 2002, it was concluded that there was great difference in mean infestation of *Odontotermes obesus* during 2nd and 9th week of the year 2002. Mean infestation percentage was maximum (7.89%) during 2nd week of the year 2002. The infestation rate then declined somewhat and remained between 5.90%- 3.10% during next five weeks. Infestation trend during 9th week declined uncertainly. Then mean infestation decreased to minimum level (1.58%) during 9th week. The reason of this great difference might be that as the crop grew to maturity, it became more vigorous and became resistant to termite attack. During the observation of the environmental factors, it was seen that rainfall and temperature were negatively correlated with mean infestation indicating inverse relationship. Humidity was positively correlated with mean infestation of *Odontotermes obesus* indicating direct relationship.

Key words: *Odontotermes obesus*, Quadrature method, environmental factors, *Triticum aestivum*

Introduction

Wheat (*Triticum aestivum* L.) is cereal of choice in most countries in the world. It is grown on an area larger than any other crop. It provides more protein in the world's diet than any other crop. The world trade in wheat exceeds trade in all other grain combined. Pakistan agriculture is wheat dominated and is characterized by intensive and continuous crop production. In barani area it is grown on 1310.5 thousand hectares with total production of 1210.5 thousand tons. However, its average yield is very low (1990 kg/hectare) compared to the other developed countries.

Pakistan is not self sufficient in wheat and in 1998-99 about 2334 tons of wheat were imported. In Pakistan, it was cultivated on an area of about 8332 thousand hectares with a production of 18055 thousand tons during 1998-99. In NWFP, it was cultivated on an area of more than 1918 thousand hectares and its production as 1356 thousand tons during 1997-98 (Anonymous, 1999). Numerous factors are responsible for low yield of wheat. Orthropod pests are one of these and are known to attack wheat crop world wide. About hundred species of orthropod pests cause reduction in grain yield, quality and increase in production cost. Most of these pests belong to eight major orders, Orthoptera, Homoptera, Coleoptera, Lepidoptera, and Hymenoptera, Diptera and Isoptera in the class Insecta and mites in the class Arachnida (Hatchett *et al.*, 1987.) Six species of termites including, *Odontotermes guptai*, *Odontotermes gurdaspuriensis*, *Odontotermes obesus*, *Microtermes obesi*, *Eremotermes pradosalis*, *Microtermes*

mycophagus attack wheat crop in Pakistan (Akhtar and Shahid, 1987).

Different species of termites attack different crops in different areas. In Lahore, mostly *Odontotermes guptai* causes damage to the wheat crop. While in Multan, *Microtermes mycophagus* causes damage to wheat crop. Similarly in Rawalpindi *Microtermes obesi* and *Odontotermes obesus* are responsible for damage to the wheat crop. *Odontotermes obesus* is very serious pest of different crops including wheat and sunflower. Pearce (1997) indicated the presence of termites in a region depending on the vegetation types. According to Chaudhry and Ahmed (1972) *Odontotermes obesus* was recorded damaging agricultural crops. Based upon Aslam (1984 and 1994) termites exist always in soil but their number starts increasing with increase in dry spell. According to Aslam *et al.* (2002) *Odontotermes obesus* was found attacking sunflower plants in Fatah Jang, Golra, Daultala and Dina. Therefore the studies were conducted to observe the infestation trend of *Odontotermes obesus* on wheat crop at different stages of crop growth in rainfed conditions.

Materials and Methods

The experiment was conducted in the experimental area of the University of Arid Agriculture Rawalpindi, during 2002 to study the infestation trend of *Odontotermes obesus* on wheat crop. The crop was sown in an area of 70 m x 15 m (1050 sq. meters) using all the agronomic practices. When crop reached at seedling stage, the plants were selected as samples using random sampling

techniques through quadrat method. A quadrat of 1 sq. meter area was used during sampling of wheat plants. Fifteen quadrats were spread in total crop area cultivated. Total plants and infested plants by termites were counted. The percentage of infestation in each quadrat was determined. Data were recorded on weekly basis. Termites collected from sampled plants and non-sampled plants were identified as *Microtermes obesi* and *Odontotermes obesus*. Infestation percentage of termites on wheat crop from seedling stage to earing stage was studied on weekly basis. The effect of temperature, relative humidity and rainfall was also studied on the infestation trend of termites on weekly basis. The data were analyzed by statistical packages NIS Excel, M-stat for descriptive statistics (mean and standard deviation).

Results and Discussion

The seasonal attack of termites (*Odontotermes obesus*) on wheat crop and mean infestation is given in the Table 1. It showed gradual decline in infestation percentage from maximum to minimum. Mean infestation percentage was maximum (7.89%) during 2nd week of the year 2002. The infestation rate then declined somewhat and remained between 3.10-5.90% during the next five weeks. Infestation trend during the 6th week declined uncertainly. Then mean infestation decreased to minimum level (1.58%) during the 9th week. The weekly mean infestation of termites is also shown in the Fig. 1.

The effects of temperature, relative humidity and rainfall on the activity of termites is given Table 2 shows that percent infestation of *Odontotermes obesus* and temperature were negatively correlated indicating decrease in termite attack with increase in temperature and vice versa. The correlation between mean infestation *Odontotermes obesus* and relative humidity was positive indicating the direct relationship. Rainfall and mean infestation *Odontotermes obesus* were again negatively correlated.

Table 1 shows that there was great difference in mean infestation of *Odontotermes obesus* on wheat crop during the 2nd and 9th week of year 2002. The reason of this great difference may be that as the crop grew to maturity, it became more vigorous and resistant to termite attack. Shahid and Akhtar (1992) recorded more damage percentage as the crop was reaching to maturity stage. The other reason of this decline in infestation may be the lack of organic inputs at the maturity stage. When organic inputs are in high doses there will be more attack of termites and vice versa. During 2nd week, when the crop was in seedling stage there were more organic inputs and ultimately more infestation percentage was resulted, but as the crop grew to maturity, it utilized all the organic inputs resulting low infestation.

Table 1: Percent mean infestation of termites on wheat during 2002 at University of Arid Agriculture Rawalpindi

Weeks of 2002	Mean infestation/week
2 nd	7.89±0.233
3 rd	5.90±0.841
4 th	5.74±0.473
5 th	5.09±0.660
6 th	2.63±0.980
7 th	3.96±0.795
8 th	3.10±0.880
9 th	1.58±0.535

Table 2: Correlation between percent mean infestation of *Odontotermes obesus* with temperature, relative humidity and rainfall

Variables	Correlation
Temperature-mean infestation.	-0.293
Relative humidity-mean infestation.	+0.128
Rainfall-mean infestation.	-0.524

Correlation is significant at 0.01 levels

Table 3: ANOVA for mean infestation of termites on wheat crop

SOV	Sum of squares	Degree of freedom	Mean square	F-value	P-value	F-Crit.
Quadrates	772	14	55	1.31	0.21	1.79
Weeks	443	7	63	1.50	0.17	2.10
Errors	4117	98	42	-	-	-
Total	5333	119				

Satapathy *et al.* (1999) reported that high doses of NPK fertilizers increase level of infestation by termites. The natural enemies of termites like predatory ants, a few ectoparasitic mites and entomophilic nematodes resulted are favoured by less windy microhabitats resulted from dense vegetation (Sherma, 1991). When the crop reached the maturity the natural enemies became active and hence infestation was reduced. During the observations of the effects of environmental factors it was seen that rainfall and temperature were non-significantly negatively correlated with mean infestation indicating the inverse relationship. Rana *et al.* (2001) showed that irrigation and infestation were negatively related. According to Barbosa (1993) temperature and relative humidity did not significantly affect the number of termites. Akhtar and Amanullah (1989) recorded that rainfall created suitable conditions of temperature and relative humidity for termites.

From Table 3, it is clear that results are non significant in both factors (quadrates and weeks).

These non significant results show that infestation was uniform throughout the field. The reason of uniform infestation may be the uniform spreading of organic matter (Satapathy *et al.*, 1999). The other reason may be the lower bulk density, increased porosity and lower moisture contents of the soil, because soil lower in moisture contents and well porous favouring the uniform infestation. (Subhash *et al.*, 1997). In case of weeks there was no significant change in infestation from seedling stage to maturity. The reason may be the ecological

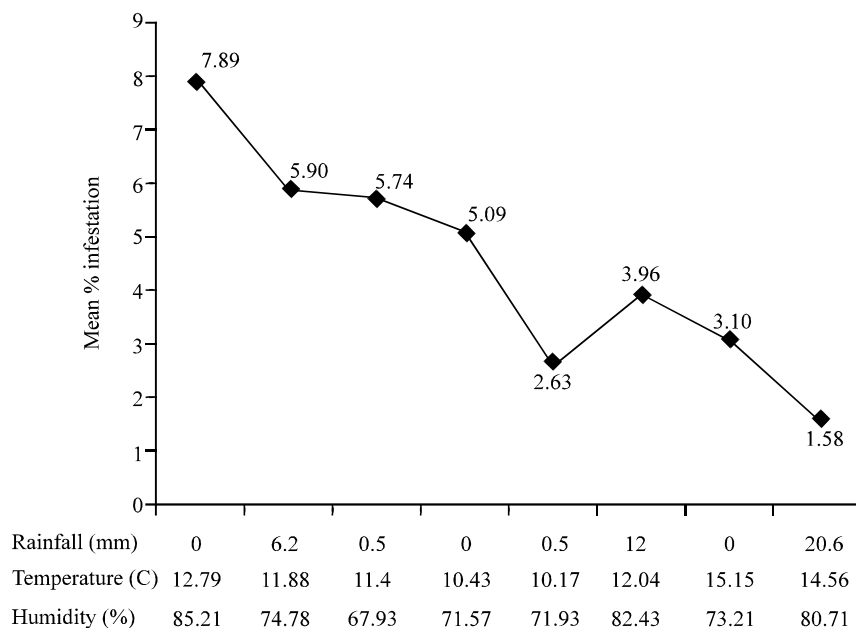


Fig. 1: Relationship of mean infestation of *Odontotermes obesus* per week with rainfall (mm), temperature © and humidity (%)

factors affecting the termite activity (Thakar 1994). Based upon above discussion it is concluded that mean infestation of *Odontotermes obesus* was maximum during 2nd week of the year 2002, when crop was in seedling stage. But, with the passage of time infestation of *Odontotermes obesus* decreased. The temperature and rainfall effected the activity of *Odontotermes obesus* negatively. But the humidity was positively correlated with mean infestation of termites.

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