



Survey and identification of different termite species in Bikaner district of Rajasthan

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ABSTRACT

The survey on termites infesting wheat was conducted at different 18 fields of Bikaner district including Swami Keshwan and Rajasthan Agricultural University campus in Bikaner tehsil during rabi season of 2013-2014. The termite infestation was started from 4th week after sowing i.e. 4th week of December [52nd standard meteorological week (SMW)] except in field no.13th, 16th and 17th where, it was started from 5th week after sowing. The lowest termite damage (<1%) was observed in 4th week after sowing and highest damage was observed (21.85-39.71%) in 13th week after sowing i.e. 4th week of February (9th SMW). Average termite damage was observed from 7.85 to 16.47%. The lowest termite damage was found in Khajuwala tehsil and highest termite damage was found in Bikaner tehsil of the Bikaner district. The termite collected from different wheat fields were preserved in 70 percent alcohol and sent for identification of the species. There were total 22 termite samples sent to Insect Identification Service, Division of Entomology, IARI, New Delhi- 110 012. As per the identification report *Microtermes obesi*, (Holm) and *Odontotermes obesus* (Rambur) were found to damaging the wheat crop.

KEYWORDS: Wheat, Termite,

Received 12.07.2020

Revised 10.09.2020

Accepted 03.10.2020

INTRODUCTION

Wheat [*Triticum aestivum* (Linnaeus) Em. Thell] belongs to family Gramineae, believed to have originated from South West Asia. It is most important cereal cultivated crop in temperate area of the world. Wheat is second important staple food crop after rice. Its value in human diet, both as a source of carbohydrates and protein and its baking qualities make it relatively more important crop than other cereal grains. Wheat flour is used in the form of *chapatti*, *puri*, *bread*, *cake*, *sweetmeats*, *halwa*, etc. It provides characteristic substance "Gluten" which is very essential for bakers. Wheat straw is also used in paper industries and for making temporary huts and roof. The bran, husk and other portion of grain and straw are valuable feed for livestock as well as good source of bedding material for livestock. The ripe unthreshing ear heads are used to decorate items. It provides 20 per cent of total calories for human. Wheat grain contains 12.2 per cent protein, which is more than other cereals. Wheat is one of the leading cereal crops which have provided daily sustenance for a large proportion of the world's population for millennia.

There are many biotic constraints that hamper wheat production of which infestation of insect pests is major one. Wheat crop is attacked by 24 species of insect pests. Major insect pests of wheat are termite, *Odontotermes obesus* (Rambur), gujhia weevil, *Tanymecus indicus* (Faust), cutworm, *Agrotis ipsylon* (Hufnagel), brown wheat mite, *Petrobia lateens* (Muller), armyworm, *Mythimna separate* (Walker), thrips, *Anapothrips flavicinctus* (Karny), aphids, *Macrosiphum granarium* (Kirby), shoot fly, *Antherigona soccata*

(Rondani), stem borer, *Sesamia inferens* (Walker), surface grasshopper, *Atractomorpha crenulata* (Fabrikins), desert locust, *Schistocerca gregaria* (Forskall), stink bug, *Aelia eostrata* (Boheman), cereal leaf beetle, *Oulema melanopa* (Linnaeus), hessian fly, *Mayetiola destructor* (Say), wheat stem maggot, *Meromyza americana* (Fitch), sawfly, *Cephus cinctus* (Nort), white grub, *Holotrichia consanguinea* (Blanch), wireworm, *Agroites mancus* (Say), cricket, *Gryllodes sigillatus*, (Linnaeus) and stalk borer, *Chilo auricilius* (Dudgeon). It is calculated the loss due to termite up to 230 million rupees for all the agricultural crops [6].

Out of these pests, termite ranks first as a pest of wheat not only in India but South Asia too as per the pest ranking system developed by Natural Resource Institute, UK [4]. *Tanymecus indicus* and *Microtermes obesi* were the main insect pest of wheat, damaging 14 and 20 per cent of the plants, respectively in Uttar Pradesh [5]. *Microtermes obesi* caused a significant reduction of 1.67 per cent in grain yield. About 16 species of termite were found to damage the wheat crop in India, of these two species, *Odontotermes obesus* (Rambur) and *Microtermes obesi* (Holm) are found dominant, which caused 80 per cent loss in south Asia [2].

MATERIALS AND METHODS

The survey on termites infesting wheat was conducted at different 18 fields of Bikaner district including Swami Keshwanand Rajasthan Agricultural University campus in Bikaner tehsil during *rabi* season of 2013-2014. For recording observations, 10 spots were selected randomly from each field. The observations on termites were recorded by counting total and infested plants from 1 m² area of each spot at weekly interval. The termite species were collected from different wheat fields and brought to the laboratory. The collected termites were preserved in 70 per cent alcohol and sent for identification of the species to the Insect Identification Service, Division of Entomology, IARI, New Delhi- 110 012.

RESULTS AND DISCUSSION

Survey and identification of different termite species in Bikaner district of Rajasthan.

Survey

The survey on termite infesting wheat fields was carried out during *rabi* season 2013-14 at different 18 wheat fields located in different tehsils of Bikaner district including SKRAU campus in Bikaner tehsil. Three wheat fields were selected in each tehsil. The location wise periodical data on termite infestation in wheat are presented in Table 1 and graphically depicted in Figure 1.

The data presented in Table 1 and Figure 1 showed that the termite infestation was recorded from the 4th week after sowing to 13th week after sowing in all the fields except in 13th, 16th and 17th field in which the infestation started from the 5th week after sowing and continued throughout the study period. The termite damage plant (<1%) was first time noted after 4th week after sowing *i.e.* 4th week of December [52nd standard meteorological week (SMW)] in fields 1st to 12th, 14th, 15th and 18th whereas, the same damage was found in fields 13th, 16th and 17th during 5th week after sowing *i.e.* 1st week of January (1st SMW). The plant damage (%) was 0.57 to 4.63 per cent during 1st week of January in all the 18 fields with the highest damage (4.63%) in field no. 3. The damage increased in all the evaluated fields in subsequent weeks. After 6th week after sowing *i.e.* 2nd week of January (2nd SMW) plant damage ranged from 2.68 to 8.39 per cent in field no. 17th and 3rd respectively. After 7th week after sowing (3rd week of January *i.e.* 3rd SMW), the lowest (4.05%) damage was observed in field no. 16. The damage was in between 4.14 to 10 per cent observed in the remaining fields except field no. 15th, 2nd and 3rd in which it was 10.02, 10.25 and 12.90 per cent respectively. The damage varied from 5.95 to 9.55 per cent in field no. 1st, 4th, 6th, 7th, 10th to 13th and 16th to 18th, whereas, it ranged from 10.42 to 16.19 per cent in field no. 2nd, 3rd, 5th, 8th, 9th, 14th and 15th after 8th week after sowing (4th week of January *i.e.* 4th SMW). After 9th week after sowing, the damage varied from 8.96 to 15.55 per cent in the all fields except field no. 3rd, in which damage was 18.55 per cent. After 10th week after sowing, the lowest (11.16%) and highest (22.51%) damage was recorded in field no. 18th and 3rd, respectively. Termite damage was recorded 13.85 (field no. 16th) to 26.66 per cent (field no. 3rd) after 11th week after sowing (2nd week of February *i.e.* 7th SMW). After 12th week after sowing damage was in between 16.51 to 19.09 per cent observed in field no. 6th, 11th, 13th, 16th and 17th. The termite damage was 20.21 to 22.60 per cent in field no. 1st, 4th, 7th, 9th, 10th, 12th and 18th, while 27.14 to 28.55 per cent was observed in field no. 2nd, 5th, 8th, 14th and 15th and highest damage was recorded in field no. 3rd (31.28%). Termite damage plant was noted 21.85 (field no. 16) to 39.71 per cent (field no. 3) after 13th week after sowing (4th week of February *i.e.* 9th SMW). The average plant damage ranged from 7.85 to 16.47 per cent in different wheat fields. The peak infestation was observed during 9th standard week (end of February) in all the fields while, the lowest infestation was recorded during the end of December (52nd SMW) in all the fields. The overall infestation was highest in field no. 3rd (16.47%) of Bikaner tehsil, whereas it was lowest in field no. 16th (7.58%) of Khajuwala tehsil of Bikaner district.

Sharma et al. [9] conducted survey to know the distribution of termite damage on wheat crop in different parts of India. A total of 1075 fields were surveyed in 11 states covering five mega wheat growing zones and found that the damage caused by termites were more severe in Rajasthan and some parts of Madhya Pradesh. Maharashtra and Karnataka were free from termite infestation. Further, they noted that the damage was lower in clay and black soil, high in sandy loam soil and severe in red soil.

Identification

The termites collected from the different wheat fields at various locations were preserved in 70 per cent alcohol and prepared for identification. The total 22 termite samples were sent to Insect Identification Service, Division of Entomology, IARI, Pusa, New Delhi- 110 012. As per the identification report, *Microtermes obesi* (Holm) and *Odontotermes obesus* (Rambur) were found damaging the wheat crop in different locations.

Rajagopal [8] reported the two most common species *M. obesi* and *O. obesus* were attacking the wheat crop in Northern India. About 16 species of termite found to damaging the wheat crop in India, of these two species, *Odontotermes obesus* (Rambur) and *Microtermes obesi* (Holm) were found dominant in Uttar Pradesh [5, 2].

Gadhiya [3] found that the termite species *Microtermes mycophagus* (Desneux), *Odontotermes sp. redemanni* and *Odontotermes obesus* (Rambur) were found to be damaging the wheat crop. Among them *Odontotermes obesus* (Rambur) was found as the dominant species of termite in wheat. These findings support the present investigation regarding the damage of *Odontotermes obesus* (Rambur) to wheat being the dominant species.

Verma and Thakur [12] recorded nine species of termites in Bihar and Orissa. Out of these *O. assmuthi*, *O. feae* and *M. obesi* were newly recorded in Orissa, while *O. gurdaspurensis* and *Trinervitermes biformis* (Wasm.) were newly recorded in Bihar. Field survey on the occurrence and damage caused by isopteran was conducted by Akhtar and Shahid [2] in cotton in Pakistan. The termite species, *M. mycophagus*, *M. obesi*, *M. unicolor* and *Eremotermes paradoxalis* were recorded to damage the crop.

Verma et al., [13] conducted a survey during 2000 and 2001 in Meerut, Bagpat, Ghaziabad, Bulandshar and Muzaffarnagar districts of Western Uttar Pradesh to assess the per cent incidence and yield reduction in rotation crops sugarcane, potato, pulses (mung beans and urd beans) and wheat due to termite infestation. Maximum termite incidence (49%) and yield reduction (32.6%) were observed in pulses in the Bagpat District. Potato, pulses and sugarcane were found to be more affected in Bagpat and Bulandshar districts because of scarcity of irrigated water, but in Meerut and Muzaffarnagar districts, there was less than 15 per cent termite's infestation and 19 per cent yield reduction in different crops.

Termite (*Odontotermes formosanus*) was considered as economically important pest in Taiwan [14]. Su [10] reported that the number of areas infested with the *Formosan* subterranean termite in United States.

Fig. 1 Infestation of termite in various wheat fields in Bikaner district during rabi- 2013-14

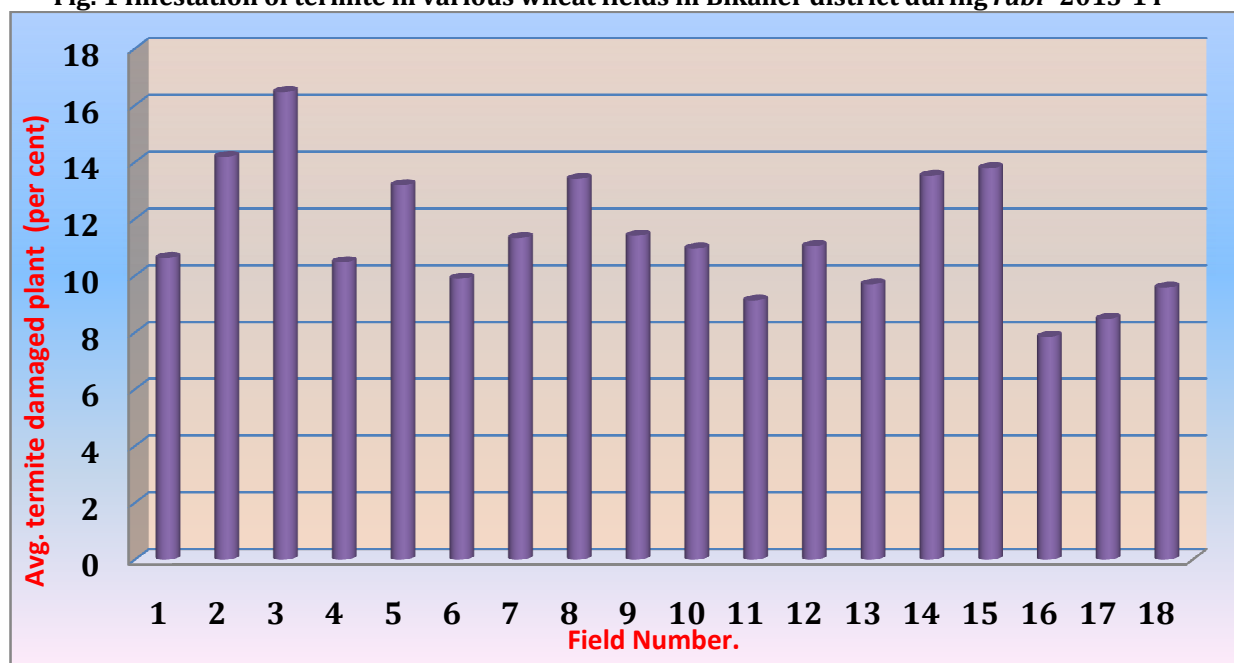


Table 1: Infestation of termite in various wheat fields in Bikaner district during *rabi*, 2013-14

| WAS | Month and week | SMW | Damaged plants (%) due to termite in different fields of various locations | | | | | | | | | | | | | | | | | |
|---------|----------------|-----|----------------------------------------------------------------------------|-------|-------|-----------|-------|-------|-------|-------|-------|---------|-------|-------|-------------|-------|-------|-----------|-------|----|
| | | | Bikaner | | | Dugargarh | | | Nokha | | | Kolayat | | | Lunkaransar | | | Khajuwala | | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 3 | Dec. III | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 | Dec. IV | 52 | 0.83 | 0.52 | 0.38 | 0.95 | 0.45 | 0.73 | 0.49 | 0.58 | 0.54 | 0.85 | 0.40 | 0.52 | 0.00 | 0.58 | 0.48 | 0.00 | 0.53 | |
| 5 | Jan. I | 1 | 2.55 | 3.56 | 4.63 | 2.04 | 2.45 | 1.39 | 2.46 | 3.68 | 3.68 | 1.32 | 1.65 | 2.15 | 0.90 | 1.86 | 1.24 | 0.57 | 1.75 | |
| 9 | Jan. II | 2 | 4.81 | 7.61 | 8.39 | 4.24 | 6.45 | 3.20 | 4.91 | 6.24 | 6.24 | 5.53 | 4.62 | 5.12 | 2.80 | 6.26 | 6.38 | 2.87 | 3.59 | |
| 7 | Jan. III | 3 | 6.95 | 10.25 | 12.90 | 6.22 | 9.51 | 5.30 | 7.07 | 9.85 | 9.85 | 6.22 | 5.75 | 7.31 | 5.41 | 9.15 | 10.02 | 4.05 | 5.97 | |
| 8 | Jan. IV | 4 | 9.16 | 13.49 | 16.19 | 9.41 | 12.04 | 8.34 | 9.55 | 12.40 | 10.42 | 7.47 | 6.35 | 9.36 | 8.03 | 12.40 | 13.21 | 5.95 | 7.81 | |
| 6 | Jan. V | 5 | 12.42 | 15.20 | 18.55 | 11.50 | 14.41 | 10.30 | 12.75 | 15.18 | 12.46 | 10.59 | 9.06 | 11.57 | 11.50 | 15.18 | 15.55 | 8.96 | 9.09 | |
| 10 | Feb. I | 6 | 14.50 | 18.43 | 22.51 | 14.41 | 17.15 | 13.34 | 15.81 | 18.01 | 14.54 | 12.80 | 12.35 | 15.15 | 13.45 | 18.01 | 18.17 | 11.74 | 11.16 | |
| 11 | Feb. II | 7 | 17.10 | 22.60 | 26.66 | 18.14 | 22.25 | 15.26 | 18.09 | 21.11 | 17.03 | 16.37 | 15.37 | 18.29 | 16.80 | 22.11 | 23.47 | 13.85 | 18.03 | |
| 12 | Feb. III | 8 | 21.26 | 27.14 | 31.28 | 22.27 | 28.10 | 18.79 | 22.18 | 27.48 | 22.44 | 20.30 | 19.89 | 22.60 | 19.00 | 28.48 | 28.55 | 16.51 | 20.21 | |
| 13 | Feb. IV | 9 | 27.33 | 37.25 | 39.71 | 26.18 | 32.28 | 23.39 | 31.36 | 33.55 | 28.40 | 26.33 | 25.09 | 29.40 | 26.40 | 34.65 | 34.58 | 21.85 | 27.28 | |
| Average | | | 10.63 | 14.19 | 16.47 | 10.48 | 13.19 | 9.90 | 11.33 | 13.41 | 11.41 | 10.96 | 9.13 | 11.04 | 9.48 | 13.52 | 13.79 | 7.85 | 9.58 | |

WAS: Week After Sowing

SMW: Standard Meteorological Week

Patel and Patel [7] carried out a survey during January, 2000 in kagzi lime (*Citrus aurantiifolia*) orchards in North Gujarat and reported that infestation by termites was found 23 to 34 per cent.

Acda [1] reported that Philippines support 54 known species of termites encompassing 18 genera. Within

these genera, only three families *viz.*, Rhinotermitidae, Termitidae and Kalotermitidae are of economic importance and associated with damage to wood products and timber structures. These species are widely distributed and cause significant structural damages.

Thakur [11] reported eleven species of termites belonging to two families (Rhinotermitidae and Termitidae) and six genera (*Coptotermes*, *Speculitermes*, *Eremotermes*, *Microcerotermes*, *Odontotermes* and *Microtermes*) from Delhi. Among these, seven termite species *Speculitermes cyclops*, *Odontotermes assumuthi*, *O. brunneus*, *O. gurdaspurensis*, *O. obesus*, *M. obesi* and *M. unicolor* were reported for the first time from Delhi.

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CITATION OF THIS ARTICLE

A Kumar, V Singh, H Singh and R Kumar: Survey and identification of different termite species in Bikaner district of Rajasthan. *Bull. Env. Pharmacol. Life Sci.*, Vol 9[11] October 2020 : 05-09