

Effect of some organic amendaments on termite infestation in wheat

V. C. GADHIYA¹, P. K. BORAD² AND DEB SUSHMA³

Department of Entomology, B. A. College of Agriculture,
Anand Agricultural University, Anand - 388 110 (Gujarat)

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ABSTRACT

With a view to know the effect of organic amendaments on termite in wheat, an experiment was carried out at Anand Agricultural University, Anand during *rabi* season of 2010-11. Among the tested eleven organic amendaments, the soil application of castor cake, vermicompost and neem cake @ 1 tonne/ha at the time of land preparation before sowing were found to be more effective in suppressing the termite population and produced 3516 to 4223 kg/ha grain and 4247 to 5659 kg/ha straw yield. The NICBR of these amendaments were 1 : 1.35, 1 : 2.53 and 1 : 1.38, respectively. There was no detrimental effect of evaluated insecticides on the seed germination and number of tillers per plant in wheat.

Key words : Termite, organic amendaments, wheat

The successful story of green revolution in India is mainly attributed to increase in wheat production. Among the insect pests which cause damage to wheat crop in field, termite acts as a major insect pest of the crop in India and particularly under rainfed situation. Considerable losses to the extent of ₹ 280/- million in grain crops including wheat were reported by Fletcher and Ghosh (1912). Mehta and Verma (1968) calculated the loss due to termite up to ₹ 230/- million for the Agricultural crops.

The most common species of termites attacking the wheat crop are *Microtermes obesi* Holm) and *Odontotermes obesus* (Rambur). These two species probably account for about 80 per cent of the total loss (Roonwal, 1979). 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 crop is attacked by 24 species of insect pests (Singh, 1998). Among these, termite is rank first as a pest of wheat not only in India but South Asia too (Geddes and Iles, 1991). 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) were found dominant (Chhillar *et al.*, 2006). The yield losses were recorded 43 to 80 per cent in wheat due to termite damage (Sattar and Salihah, 2001 and Chhillar *et al.*, 2006). Considering the importance of termite, a study was carried out to know the effect of organic amendaments on termite infesting wheat crop at Anand Agricultural University, Anand during *rabi* season of 2010-11.

MATERIALS AND METHODS

A field experiment was laid out at Anand Agricultural University, Anand during December, 2010. Wheat variety GW 496 was used. The gross and net plot size were 5 x 4 m and 4 x 3 m, respectively with a row distance of 30 cm. There were 12 treatments including control. The details of respective soil amendaments are given in Table 1. Each treatment was applied at the time of land preparation and then the seeds were sown. To know the effect of soil amendaments on germination, 2 m area from each treatment were selected 10 days after sowing and germination count were recorded. To see the effect of soil amendaments on tillering, 10 plants from each plot were counted after 28 days of germination. The termite infestation was recorded from three, one meter randomly related rows at weekly interval starting from one week after germination till harvest. The grain and straw yield of wheat were also recorded.

^{1&3} P.G. Scholer, ² Professor & Head

RESULTS AND DISCUSSION

Germination

No significant effect on seed germination was observed due to organic amendments. In all the treatments germination ranged between 83 to 91 per cent (Table 1). The lowest (83 %) seed germination was recorded in the plots treated with cotton cake and orgo natural organic manure. The highest (90.97 %) germination was recorded in the treatment of poultry manure followed by *Calotropis gigantea* leaf powder.

Tillering

No adverse effect of organic amendments was observed on tillering of wheat (Table 1). The maximum tillering was recorded in FYM (3.57) while minimum was noticed in cotton cake plots (2.97).

Termite damage

The data revealed that the application of castor cake (2.32%) significantly superior in reducing the termite infestation in wheat crop than all other organic amendments except vermicompost (Table 1). The plots treated with neem cake (3.38%) were equally effective

as vermicompost and found at par with *C. gigantea* leaf powder (4.11%). In past, Singh and Singh (2003) reported that application of neem cake @ 2 kg/ tree was very effective against termite. Furrow application of neem cake at 700 kg/ha was next to the endosulfan in their effectiveness (Patel *et al.*, 2008). Singh *et al.* (2010) reported that use of dry powder of immature neem kernels and leaves effectively control the termite and increase the yield of wheat with economic return. Jatropha cake, poultry manure and tobacco dust noted 5.18, 5.41 and 5.91 per cent damaged plants, respectively and they were at par with each other but significantly more effective than remaining amendments. Of the evaluated organic amendments, the maximum damaged plants (8.76%) were observed in plots treated with mahua cake and it was at par with FYM (8.29%) and cotton cake (8.68%).

Grain yield

The significantly higher grain yield was obtained from the plots treated with castor cake (4222.22 kg/ha) and it was statistically at par with vermicompost (3833.33 kg/ha) and neem cake (3516.67 kg/ha). Application of neem cake at sowing and 40 days after

Table 1 Effect of organic amendments on termite damage and yield of wheat

Organic amendments	Germination (%)	No. of tillers/plant	Termite damaged plants (%)	Yield (kg/ha)		NICBR
				Grain	Straw	
FYM @ 10 ton/ha	88.33	3.57	16.73(8.29)	1916.67	2206.67	0.45
Vermicompost @ 1 ton/ha	87.00	3.30	10.10(3.08)	3833.33	4547.22	2.53
Neem cake @ 1 ton/ha	86.67	3.24	10.59(3.38)	3516.67	4247.22	1.38
Castor cake @ 1 ton/ha	88.00	3.17	8.77(2.32)	4222.22	5658.33	1.35
Mahua cake @ 1 ton/ha	87.00	3.00	17.22(8.76)	1802.78	2088.89	-0.25
Cotton cake @ 1 ton/ha	83.00	2.97	17.13(8.68)	1869.44	2185.00	-0.86
Tobacco dust @ 1 ton/ha	86.33	3.17	14.07(5.91)	2080.56	2611.11	1.44
Jatropha cake @ 1 ton/ha	85.33	3.30	13.15(5.18)	3013.89	3505.56	1.19
Poultry manure @ 1 ton/ha	90.97	3.27	13.45(5.41)	2875.00	3298.89	30.42
<i>Calotropis gigantea</i> leaf powder @ 1 ton/ha	89.00	3.17	11.69(4.11)	3061.11	3622.22	6.97
Orgo natural organic manure @ 1 ton/ha	83.00	3.33	14.74(6.47)	1955.56	2430.56	-0.81
Control	88.00	3.13	23.29(15.63)	1033.33	1156.67	-
S. Em. ±	5.18	0.25	0.53	252.91	217.28	
C. D. at 5%	NS	NS	1.48	741.81	637.30	
C. V. %	10.33	13.41	9.51	16.86	12.02	

Figures in parentheses are retransformed values; those outside are arcsine value.

emergence increased groundnut pod yield (Rao *et al.*, 1991). The grain yield was harvested between 2875 and 3061.11 kg/ha from the plots treated with *C. gigantea* leaf powder, jatropha cake and poultry manure (Table 1). Among the evaluated organic amendments, the minimum yield (1802.78 kg/ha) was obtained from the plots treated with mahua cake and it was at par with cotton cake (1869.44 kg/ha), FYM (1916.67 kg/ha), orgo natural organic manure (1955.56 kg/ha) and tobacco dust (2080.56 kg/ha).

Straw yield

The significantly highest straw yield was obtained from the plots treated with castor cake (5658.33 kg/ha) than all the evaluated organic amendments (Table 1). The plots treated with vermicompost and neem cake produced 4547.22 and 4247.22 kg/ha straw, respectively. *Calotropis gigantea* leaf powder, jatropha cake and poultry manure applied plots harvested 3622.22, 3505.56 and 3298 kg/ha straw yield, respectively and they were significantly more than remaining amendments. Among the tested organic amendments, minimum straw yield was recorded in plots treated with mahua cake (2088.89 kg/ha) and it was statistically at par with tobacco dust (2611.11 kg/ha), orgo natural organic manure (2430.56 kg/ha), FYM (2206.67 kg/ha) and cotton cake (2185.00 kg/ha).

Economics

Looking to the NICBR, the highest return was obtained with the treatment of poultry manure (30.42). The NICBR of *C. gigantea* leaf powder and vermicompost was 6.97 and 2.53, respectively (Table 1). The treatments of tobacco dust, neem cake, castor cake and jatropha cake gave 1.19 to 1.44 NICBR. The NICBR was poor (-0.81 to 0.45) in the treatment of FYM, orgo natural organic manure, cotton cake and mahua cake.

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