ISSN No:-2456-2165

Insecticidal Activities of Some Essential Oils on Subterranean Termites

Richa Srivastava, Dr. Kamin Alexander, Dr. E. P. Lal
Department of Biological science, Shuats
Parayagraj

Abstract:- Termites show destructive effect on wood and their product. Termites are considered as very serious pest which destroys wood at tremendous rate. To detect the insecticidal activities of clove leaf essential oils, Garlic essential oil, Neem Oil, Orange Essential oils against the adult termites it was examined under different concentrations. It was concluded that by increasing the concentration the mortality rate was increased. The result showed that clove oil and garlic oil was proved to be very effective at little concentrations also.

Keywords:- *Adult Termites, Clove Leaf Oil, Garlic Essential Oil, Orange Essential Oil, Neem Oil, Concentrations.*

I. INTRODUCTION

Infestation of any pest is a major threat to society. Wood is the most essential used material for the purpose of construction. In Nigeria, more than 80% of products are made by using timber, for eg. Building, furniture, veneers, sleepers, pulp and paper, plywood, and fuel wood (Akanbi and Ashiru 2002). Termites feed on wood and wooden product so being the source of energy to the termites woods are threatened whether it is furniture or tree. Wood is being used since ancient times in different varieties and is directly associated to our civilization.(Tolunay et al.2008).Termites are considered as highly destructive polyphagous insects. Destruction by termite of the wood, is a chronic problem everywhere including tropical areas such as Sub Sahara Africa ,resulting in mandatory material loss which impose a major impact on timber which is a demanding material(Obi et al.2008).There are more than 40 genra of termites.(Tho1992), subterranean termites are come out to be most widespread genus exploring around the houses and buildings (Tho and Kirton 1990)it also infects forest , plants, living trees.(Kirton et al.1999). `Cellulose present in wood is food for termites. Termites can digest anything which will be softer than their harder mandibles(Christopher Dunway et.al.) Termites are able to build a very hard termitaria which is visible from a distance. Isopteran families has been estimated about of 25,000 species .Only 300 species are considered as pest. Termites are considered as social insects distributed mainly in terrestrial environment all over the world. Termites attacks on animal dung, living wood ,dead wood, decomposition of organic wastes.281 genra of termites have been described(Kambhampati and Eggleton 2000).

II. MATERIAL & METHODS

*Clove Leaf Oil
*Garlic Essential Oil
*Orange Essential Oil
*Neem Oil

Isopterans are small to medium sized insect which are usually white or colourless. As they are polyphagous insects so they have mandibulate i.e. chewing mouthparts and apart from hymenopterans these are the only insects to live in social group. 4 different essential oils were used. Six different concentrations were made made for each of the FOUR oils.so a total of 6×4=24 concentrations were prepared. The clove oil, Garlic Oil, concentration was made from 0.6 to 0.1ml. The Neem oil and orange essential oil concentrations was 0.6 to 1 ml. The essential oil were mixed with distill water and sprayed on termite affected area's with the help of a sprayer.

Statistical Analysis: A. Laboratory treatments:

The percent mortality and percent net mortality caused by different treatments on different instars in the three methods was calculated by using Abbots formula (1925):

$$\text{Percent mortality} = \frac{\text{Mortality in test}}{\text{Mortality in control}} \times 100$$

$$\text{Percent net mortality} = \frac{\text{Percent mortality in test} - \text{per cent mortality in control}}{100 - \text{Percent mortality in control}} \times 100$$

ISSN No:-2456-2165

Statistical analysis:

The data recorded on various aspects during the experiment was statistically analysed by the method suggested by **Fisher (1958).**

III. RESULT AND DISCUSSION

Concentration	Net percent mortality			
	Clove oil	Garlic oil	Neem oil	Orange oil
T_0	0.00	0.00	0.00	0.00
T_1	7.41	3.70	4.06	3.70
T_2	11.11	7.41	7.76	7.41
T_3	22.22	14.81	18.87	14.81
T_4	37.04	25.93	33.69	25.93
T_5	44.44	40.74	41.09	40.74
T_6	62.96	48.15	59.61	48.15
F- test	S	S	S	S
S. Ed. (±)	4.781	4.982	4.781	4.982
C. D. (P = 0.01)	13.373	13.935	13.373	13.935
C. D. (P = 0.05)	9.868	10.283	9.868	10.283
CV	6.173	8.818	6.173	8.818

Four different essential oil with distill water tested against the termites for the protection. The net percent mortality of the termites were evaluated by analysing LC50.All the treatment were significantly superior ov er control. The combination of clove leaf oil with distill water was most effective as shown in the result.The garlic essential and distill oil is the 2nd most effective combination followed by orange oil and distill water. The least effective was neem oil.

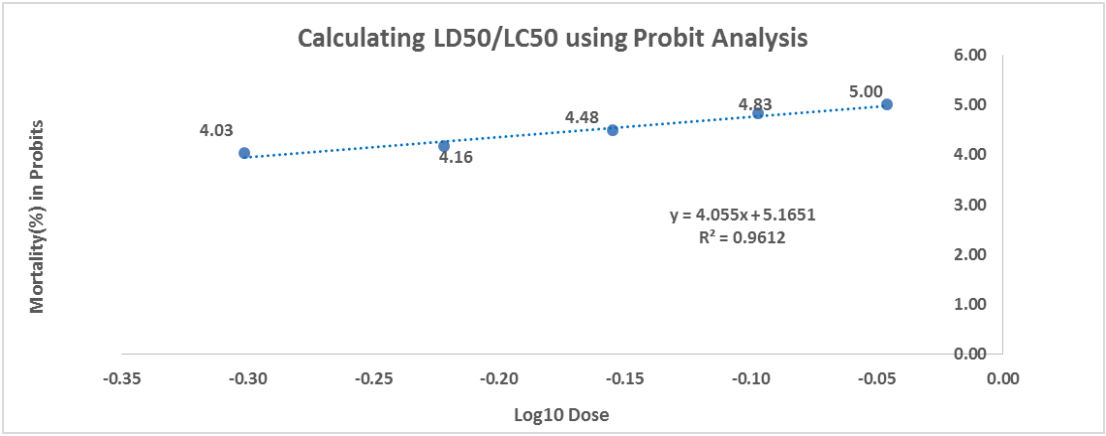

Fig 1. Clove oil

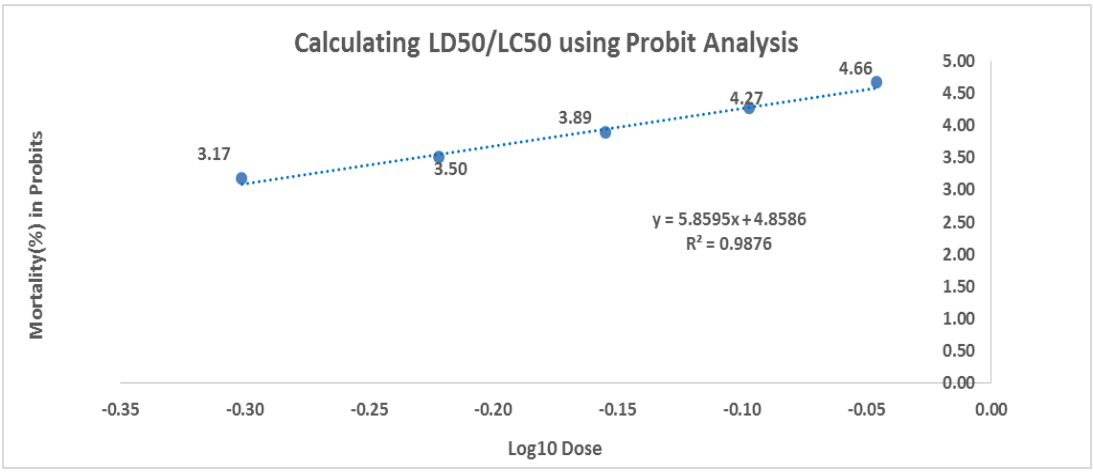

Fig 2. Garlic oil

ISSN No:-2456-2165

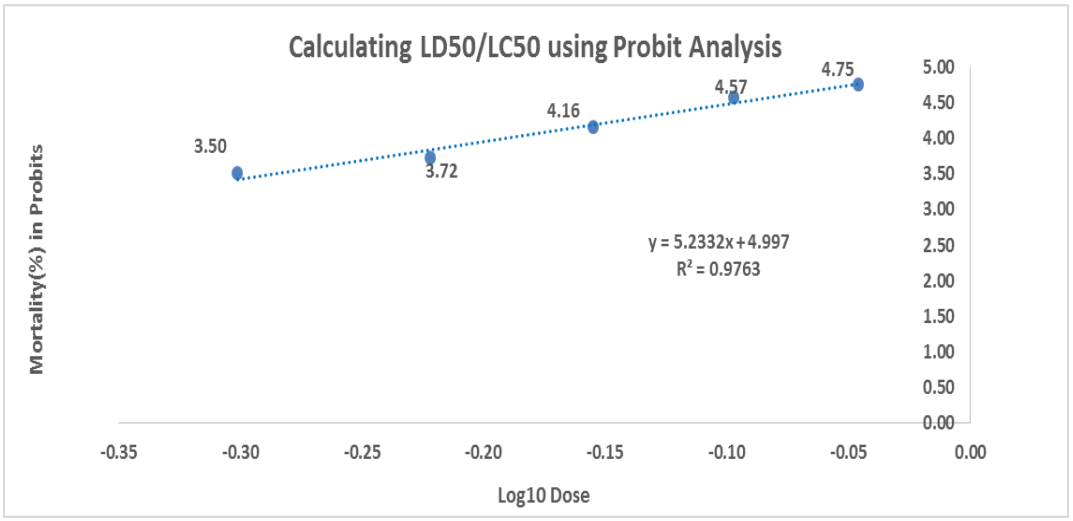

Fig 3. Neem oil

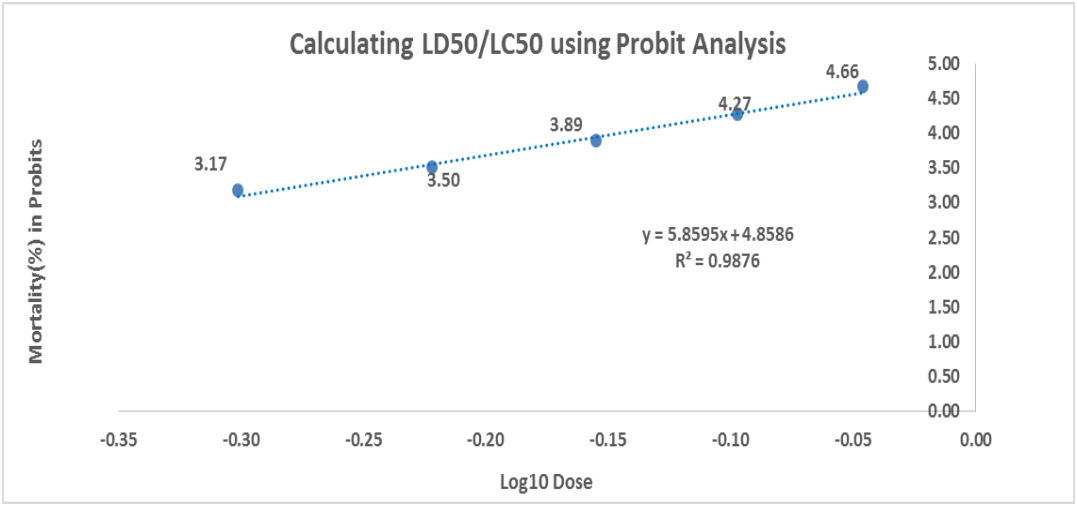

Fig 4. Orange oil

IV. CONCLUSION

The study confirmed that termites had toxic effect of essential oils on their body. The net percent mortality was recorded with the toxic effect of essential oil using ANOVA, which compared favourably with control. Analysis of the result were significantly higher in treated (oil combination) than in control (untreated).So, it was concluded that the use of essential oil with distill water can be used as protection against termites or to make termite free zone. Among the other essential oils ,limonene is known to contain insecticidal, antifungal and antibiotic activity(Ibrahim et. al 2001.Regnault Roger et al.2012).Several other studies shows that monoterpenes and their relative simple structures (_+)-limonene ,induces insect mortality ,by hindering the secretion of enzyme acetylcholinesterase (AchE)(Bruno et al.1999;Viegas Jr et al.,2003).

REFERENCES

[1]. Chaudry MI, Ahmad M, Malik NK, Akhtar MS, Arshad M (1972). Termites of Pakistan. Identification, distribution and ecological relationship. Final technical report, PL-480 Project No. A17-fs-12-Peshawar. pp 70.

[2]. Chen G, Esenther GR, Roweell RM (1986). Termite resistance of wood treated with copper (II) compounds derived from tri-and dialkylamine-boric acid complexes. Forest Prod J. 36 (5), 18-20.

[3]. Christos GA, Kontodimas DC, Kavallieratos NG, Veroniki MA (2005). Insecticidal effect of Neem Azal Against three stored-Product Beetle Species on Rye and oats. J Eco Entomol. 98(5), 1733-1738.

[4]. Donald JB, Delong DM, Tripileds AA (1979). An introduction to study of insects. Saunders College Publishing Holt, Rinchert and Winston, the Dry Press. pp 240-241.

[5]. Huang ZY, Zhang YG, Chiu SF (1990). Preliminary studies on the toxicity of the extract from Ajuga nipponensis against the termite coptotermes formosanus Shiraki. Environ Entomol. 12 (4), 187-193.
[6]. Hutchins RA (1997). Evaluation of the natural antitermitie properties of Aleurites fordii (tung tree) extract. J Miss Acad Sci. 42(3), 165-172.
[7]. Iqram F, Khan MA, Khan SM (2003). Invitro evaluation of plant extracts and antagonistic fungi against Zanthomonas campestris pv. Citri (Hasse) dye. Pak J Bot. 35 (5), 967-970.
[8]. Jalees S, Sharma SK, Rahman SJ, Verghese T (1993). Evaluation of insecticidal properties of an indigenous plant, Cannabis sativa L., against mosquito larvae under laboratory conditions.
[9]. JKambhampati S, Eggleton P (2000). Phylogenetic and Taxonomy In Termite Evolution Sociality, Symbioss, Ecology, Abe T, Bignell DE, Higase M (Eds). Kluwer Academic Publishers, Dordrecht, pp. 1-23.
[10]. Lin TS, Wang CL (1988). The anti-termite properties of extracts from Melia azedarach Linn. Bull Taiwan Forestry Res Inst. 3(4), 255-261.
[11]. Parihar DR (1981). Some observations on distribution and pest status of termites attacking forestry plantations in the Rajasthan Desert India. Indian J Forest. 4, 22-25.
[12]. Park IK, Shin SC (2005). Fumigant activity of plant essential oils and components from garlic (Allium sativum) and clove bud (Eugenia caryophyllata) oils against the Japanese termite (Reticulitermes speratus Kolbe). J Agric Food Chem. 53, 4388-7392.
[13]. Salihah Z, Shah M, Sattar A (1988). Survey of sugarcane termite of Nowshera and Charsadda Teshils. Proc 8th Pakistan Cong Zool. 8, 289–97.
[14]. Serit MI, Hagiwara N, Kim M, Yamamoto T, Takahashi S (1992). Meliaceae and Rutaceae limonoids as termite antifeedants evaluated using Reticulitermes speratus kolbe (Isoptera: Rhinotermitidae). J Chem Ecol. 18(4), 593–603.
[15]. Zaheer A, Bill M, Vincenzo P (1998). "Does Trust Matter? Exploring the Effects of Interorganizational and Interpersonal Trust on Performance." Organ Sci. 9 (2), 141-159.