Pak. j. sci. ind. res., vol. 32, No. 3, March 1989

STUDIES ON THE EVALUATION OF DDT AND BHC IN GELATINE SOLUTION AS WOOD PRESERVATIVES AGAINST TERMITES IN COMPARISON WITH DIELDRIN

Azam H. Shah, M.W. Roomi, M. Anwarullah and Mohammad Hussain

PCSIR Laboratories, Karachi-39

(Received September 1, 1988; revised February 21, 1989)

Studies on the evaluation of DDT and BHC in gelatine solution were undertaken as wood preservatives against termite attack by grave-yard testing methods. Wooden stakes treated separately with DDT 3.5% and BHC 2.5% in gelatine solution were found to be safe against termites in soil for four and half and five years respectively. Whereas control stakes were severely damaged within six months. Stakes treated with dieldrin 0.5% in gelatine solution used as standard termiticide for comparison remained unattacked for five years.

Key words: DDT, BHC, Termite control.

INTRODUCTION

Termites or white-ants are widely distributed throughout the world. Roonwal [1] reported 270 species of termites from South Asian countries. In Pakistan 104 species of termites have been reported by Chaudhry and Ahmed [2]. The most destructive and notorious species are *Microtermes obesi, Heterotermes indicola, Coptotermes heimi* and *Odentotermes obesus*. They are commonly found in our country and damage wooden fixtures in the buildings and the major agricultural crops such as cotton, wheat, coconut and sugar-cane, as reported by Chaudhry and Ashiq [3]. Termite damage timber in buildings may be detected by the presence of mud plastering along joints and cracks on the surface. When lightly tapped, damaged wood often has a 'papery' sound. As early as 1945 inorganic compounds such as sodium flousilicate, copper sulphate, lime and lead arsenate had been used for termite control. They were replaced by chlorinated hydrocarbons like DDT, BHC, dieldrin, heptachlor, chlordane and chloropyriphos gradually. DDT and BHC are being manufactured in our country and are in practice for termite control for the last so many decades. According to Alam [4] DDT decomposes at higher temperature and at higher relative humidity in tropical and subtropical countries. Anwarullah *et. al.* [5] reported that in our environmental conditions an emulsion of 0.7% DDT is effective for the control of termites for one year.

Gelatine or animal glue is obtained from the waste products of hides, muscles and bones of different animals. It contains 15% of water and 1 to 4% of inorganic salts [6]. In our case it is used as an adhesive for the fixation of termiticides on wooden cellulose.

The present investigations deal with the fixation of DDT and BHC on wooden surface by using gelatine solution as an adhesive against termites.

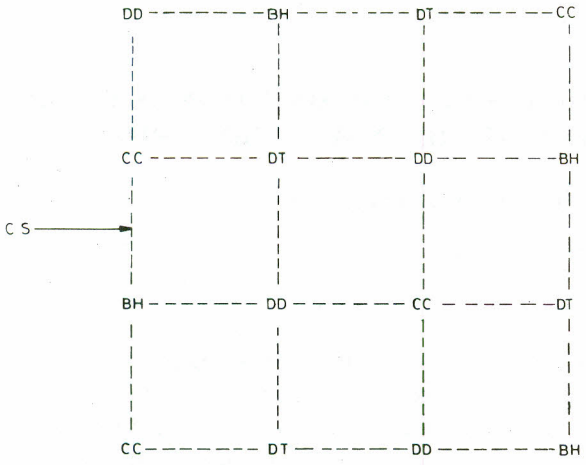
MATERIAL AND METHODS

Chir Wood (*Pinus roxiburghii*) was selected for graveyard testing. Sixty four stakes (24" x 3" x 2") were numbered, weighed and dried in oven at 90°. In order to find out the loss of weight of each stake they were weighed again. Different concentrations of DDT, BHC and dieldrin (0.5, 1.5, 2.5 and 3.5%) were made in gelatine solution. These solutions were painted separately on each stake with brush. The stakes were weighed again in order to determine the exact amount of pesticide absorbed in each case. Afterwards the stakes were placed for drying for 24 hours at 27°. The field techniques as described by Coaton [7], Roonwal [1] and Gay *et. al.* [8] were followed with slight modifications. Sixteen control and sixteen treated stakes were embedded vertically 20" below the soil surface at a distance of 2 feet in termite-infested soil near PCSIR Campus, Karachi. As the effect of pesticides depend upon the weather conditions and type of soil, another set of stakes of the same numbers were installed in the termite mounds at Kathor. The stakes were connected together by the strips of the same wood at a depth of 3" below soil level as shown in Plan No. 1.

Preparation of gelatine solution. Fifty grams of gelatine extracted from animal hides was soaked in 50 ml of water for two hours. Afterwards 50 ml of water was slowly added. The soaked gelatine solution was dissolved in water by stirring at 60°. As gelatine solution gels a mass on cooling, 3.5% phenol and 2.5% zinc chloride were mixed in order to avoid this drawback.

RESULTS AND DISCUSSION

Regular inspections of the treated and control stakes were made at intervals of three months, six months, one year, two years, three years, four years and five years and their conditions with reference to termite attack was deter-



Plan 1. Arrangement of treated and untreated stakes in the field key: DD = Dieldrin, DT = DDT, BH = BHC, CC = Control and CS = Connecting Strip.

mined according to the following rating system:

(a) Safe stakes not showing any contact by termites (S).
(b) Slightly damaged stakes exhibiting pronounced surface attack at a depth not greater than 1/4" (SD).
(c) Damaged stakes attacked to such an extent that requires replacement in service (D).

It was observed that control stakes were severely damaged by termites within six months (Fig. 1 and 2). Damaged control stakes were replaced by new untreated stakes and they were embedded in the same termite infested area. It was further noticed that replaced control stakes were again damaged after six months (Fig. 3). Stakes treated with 2.5% DDT and 1.5% BHC were slightly damaged after two and half years (Figs. 4 and 5). On the contrary stakes treated with 3.5% DDT and 2.5% BHC were not attacked by termites even after four and half and five years respectively (Fig. 6 and 7, Table 1). Stakes treated with 0.5% dieldrin in gelatine solution used as a standard termiticide for comparison remained unattacked for five years (Fig. 8).

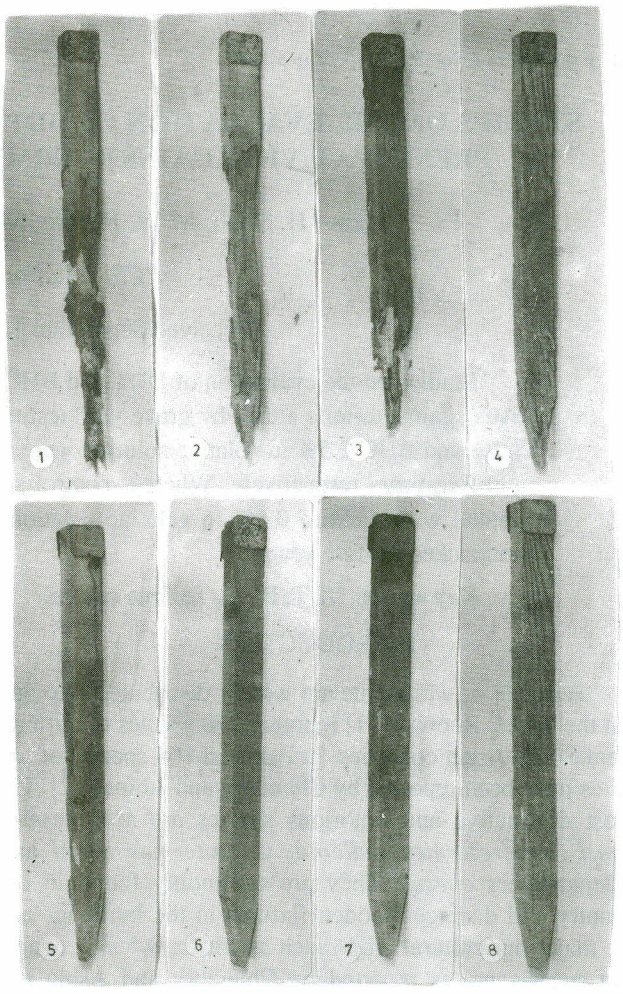


Fig. 1. Control.
Fig. 2. Control.
Fig. 3. Control.
Fig. 4. Treated with 1.5% BHC.
Fig. 5. Treated with 2.5% DDT.
Fig. 6. Treated with 2.5% BHC.
Fig. 7. Treated with 3.5% DDT.
Fig. 8. Treated with 0.5% Dieldrin.

Table 1. Efficacy of BHC, DDT and dieldrin in gelatine solution as wood preservatives against termites.

No. of stake used	Concentration of termiticides in gelatine solution (%)	Condition of stakes in soil						
		6 months	1 year	2 years	2-1/2 years	3 years	4 years	5 years
4	0.5 DDT	S	D	–	–	–	–	–
4	1.5 DDT	S	D	–	–	–	–	–
4	2.5 DDT	S	S	S	SD	–	–	–
4	3.5 DDT	S	S	S	S	S	S	-
4	0.5 BHC	S	D	–	–	–	–	–
4	1.5 BHC	S	S	S	SD	–	–	–
4	2.5 BHC	S	S	S	S	S	S	S
4	0.5 Dieldrin	S	S	S	S	S	S	S
32	Control	D	D	D	D	D	D	D

S = Safe, D = Demaged and SD = Slightly damaged.

Roonwal [1] recommended the use of 5% DDT in water emulsion and BHC 5% in fuel oil for the prevention of termite attack for one year. In our experimentation the thin film of gelatine based solution containing DDT 3.5% and BHC 2.5% coated separately on wooden samples prevented the attack of termites for many years in adverse weathering conditions.

Treated and untreated wooden samples were taken out from PCSIR campus, Karachi, from the comparative point of view, where the soil is usually damp and muddy; and from Kathor where the field is mostly dry. However, no difference was noted in either case.

In the light of our experimentations with the promising results, it is, however, recommended that formulatins containing DDT 3.5% and BHC 2.5% could be used very effectively for the treatment of any kind of wood without involving any risk in order to prevent termite attack for a period of four and half and five years respectively.

Acknowledgement. The authors wish to express their thanks and gratitude to Dr. S.S.H. Rizvi, Director, PCSIR Laboratories, Karachi, for providing necessary facilities during the course of these studies.

REFERENCES

1. M.L. Roonwal, *Termite Life and Termite Control in Tropical South Asia* (Scientific Publishers Jodhpur, India, 1979) pp. 38-39, 53-54.
2. M.I. Chaudhry and M. Ahmed, *Termite Fauna of Pakistan* (Publication of Forest Institute Peshawar, 1972), pp-10.
3. M.I. Chaudhry and Ashiq Ahmed, *Ecology and control of economically important termites of Pakistan* (Publication of Forest Institute of Peshawar, 1980), pp 1-6.
4. Zahurul Alam, *Modern Insecticides and their Uses* (Publication of Agricultural Research Institute, Dacca, 1965), vol. 1, p-65.
5. M. Anwarullah, Azam H. Shah and Roshan A. Qureshi, Proc. Ent. Soc. Kar., **13**, 113 (1985).
6. R. Houwink and G. Salomon, *Adhesion and Adhesive*, (Publication of Elsevier Company N.Y. 1965), vol. 1, pp. 142-143.
7. W.G. Coaton, J. Ent. Soc. S. Afr., **9**, 130 (1947).
8. F.J. Gay, T. Greaves, F.G. Holdaway and A.H. Wetherly, CSIRO Aust. Bull., **227** (1955).