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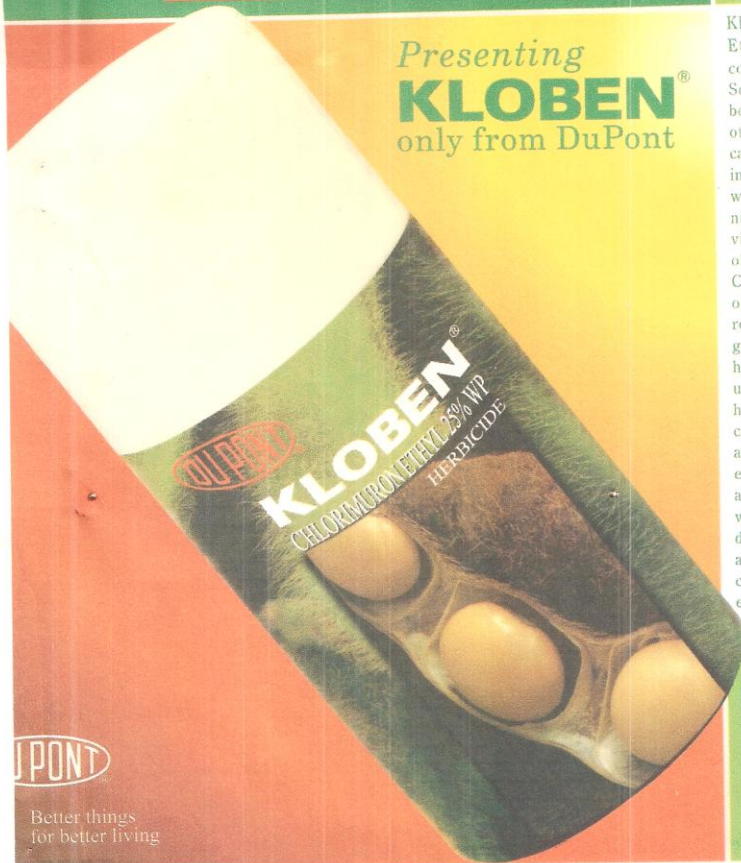
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BLATTICIDES

STUDIES ON AGROCHEMICALS AS BLATTICIDES AGAINST AMERICAN COCKROACHES (*PERIPLANETA AMERICANA* L.) (ORTHOPTERA: BLATTIDAE)

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ABSTRACT

Experiments were carried out to study the effectiveness of six pesticides, viz., Malathion, Dichlorvos, Chlorpyrifos, (Nuvan), Fenvalerate, Cypermethrin, and Deltamethrin as blatticide. Water based emulsion of three concentrations i.e. 0.01%, 0.005% and 0.0025% of each pesticide were sprayed on American cockroaches (*Periplaneta americana*) and rate of mortality was recorded. Effectiveness of all the six pesticides on American cockroaches were noted as : Cypermethrin > Deltamethrin > Fenvalerate > Dichlorvos > Malathion > Chlorpyrifos. Knock-down effect was seen in Cypermethrin and Deltamethrin and minimum mortality was noted in case of Chlorpyrifos.

KEY WORDS : American roach, Blatticides

INTRODUCTION

Cockroaches are among the most gregarious household pests found in all parts of the world. They belong to Insectan order Dictyoptera and family Blattellidae. They are found in buildings where dark, concealed areas, food and water/humidity are available. In India some of the common species of cockroaches are American cockroach (*Periplaneta americana* L.), Oriental cockroach (*Blatta orientalis* L.) and German cockroach (*Blattella germanica* L.).

For controlling cockroaches, use of insecticides is well known throughout the world. It gives quick and long lasting results. Cockroaches can also be controlled through sanitation, elimination of breeding and hiding places. Improved sanitary conditions increased the efficacy of insecticide treatments (Coby Schal, 1988). Ali El-Refai *et al.* (1991) evaluated toxicity of Dursban, Diazinon, Pesguard and Chlordane against developmental stages of German and American cockroaches by Imerson technique.

Fales and Bodenstien 1963, Blow 1976, and Iwuala *et al.* 1981 studied effects of various pesticides on the adults and nymphs of both the species of German and American cockroaches. Clyde *et al.* 1988, worked on the evaluation of Fenoxcarb against German cockroaches.

No systematic work has been done to compare the effectiveness of various commonly available pesticides which are also used in agriculture, in controlling American cockroaches. The present paper deals with studies on comparative effectiveness of Malathion, Dichlorvos, Chlorpyrifos and synthetic pyrethroids such as Fenvalerate, Cypermethrin and Deltamethrin to control the same.

MATERIAL AND METHODS

In the present study, 0.01%, 0.005% and 0.0025% concentrations (a/i) in water of Malathion 50 E.C., Dichlorvos 76 E.C., Chlorpyrifos 20 E.C., Fenvalerate 20 E.C.,

TABLE 1

Percent mortality of American cockroach (*Periplaneta americana*) using 0.01% concentration of various pesticides.

Pesticides Evaluated	Percent Mortality									
	0-2	2-4	4-6	6-8	22-24	24-26	26-28	28-30	46-48	48-50
1. Malathion	74.4	14.4	6.7	4.5						
2. Dichlorvos	76.7	16.7	6.6							
3. Chlorpyrifos	41.1	15.6	12.3	8.9	15.5	4.4	2.2			
4. Fenvalerate	88.9	11.1								
5. Cypermethrin	100.0									
6. Deltamethrin	100.0									

TABLE 2

Percent mortality of American cockroach (*Periplaneta americana*) using 0.005% concentration of various pesticides.

Pesticides Evaluated	Percent Mortality									
	0-2	2-4	4-6	6-8	22-24	24-26	26-28	28-30	46-48	48-50
1. Malathion	65.5	13.4	8.9	6.7	5.5					
2. Dichlorvos	62.3	18.9	10.0	5.5	3.3					
3. Chlorpyrifos	26.8	15.6	13.3	16.6	16.6	7.8	3.3			
4. Fenvalerate	55.5	14.4	12.3	13.3	4.5					
5. Cypermethrin	81.1	18.9								
6. Deltamethrin	76.7	17.8	4.4	1.1						

TABLE 3

Percent mortality of American cockroach (*Periplaneta americana*) using 0.0025% concentration of various pesticides.

Pesticides Evaluated	Percent Mortality									
	0-2	2-4	4-6	6-8	22-24	24-26	26-28	28-30	46-48	48-50
1. Malathion	50.0	20.0	6.7	7.8	6.7	3.3	3.3	2.2		
2. Dichlorvos	37.8	18.9	13.4	13.4	7.7	3.3	3.3	2.2		
3. Chlorpyrifos	14.4	18.9	12.3	7.7	20.0	11.1	5.6	5.6	3.3	1.1
4. Fenvalerate	38.9	15.6	8.9	11.1	16.6	7.8	1.1			
5. Cypermethrin	72.2	21.1	6.7							
6. Deltamethrin	60.0	26.7	7.8	3.3	2.2					

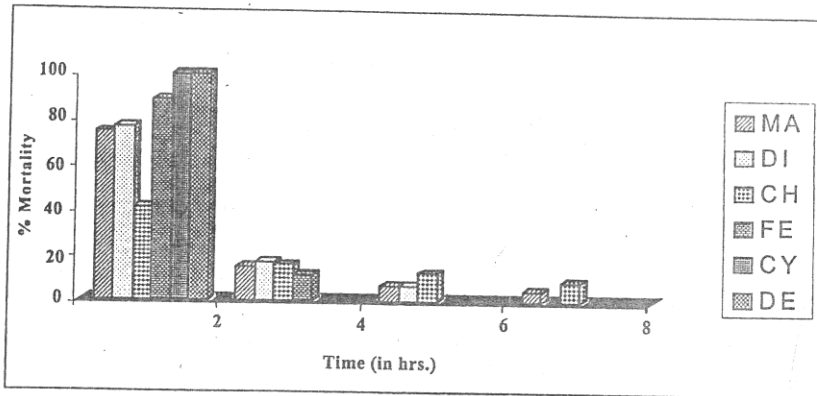


Fig. 1 : Percent mortality of American cockroaches with respect to time, using 0.01% concentration of pesticides.

Abbreviations : MA - Malathion, DI - Dichlorvos, CH - Chlorpyrifos, FE - Fenvalerate, CY - Cypermethrin, DE - Deltamethrin

Cypermethrin 25 E.C., and Deltamethrin 2.8 E.C. were evaluated to control American cockroaches (*P. americana*). In each of the three replica of each concentration, 30 ml. pesticidal emulsion were used. The experiments were conducted only on adult male and female cockroaches.

Experiments were carried out in galvanized tin boxes (26 cm x 21 cm x 15cm size) fitted with mosquito wire mesh sieve on its left, right and top to avoid persistence of pesticides.

Water based emulsions of each concentration mentioned above were sprayed inside the boxes and on cockroaches kept inside the boxes. After completion of one set of experiments, each box was thoroughly washed with detergent mixed hot water and dried for 24 hrs. in direct sun light. For each concentration, three replicas (ten adult cockroaches each) were taken. Constant amount of pesticidal emulsion (30 ml.) was used in each replica. Hourly mortality of experimental cockroaches was noted. Percent mortality was calculated for each concentration and presented in Tables 1-3, Fig. 1-3.

RESULTS AND DISCUSSION

As reported in Table - 1 and Fig. - 1, in case of 0.01% concentration of Malathion the mortality in first two hours was 74.4% and all the cockroaches (in three replicas) died within 8 hrs. In Dichlorvos the mortality was 76.7% in first two hours and in the next two hours it was 16.7% but all the cockroaches died within 6 hrs. In case of Chlorpyrifos, mortality of cockroaches was 41.1% in first two hours. However all cockroaches died within 28 hours. When emulsion of 0.01% (a/i) concentration of Fenvalerate was sprayed in experimental cages, the mortality was 88.9% in first two hours, but within four hours all the cockroaches died. However in case of Cypermethrin and Deltamethrin, all the cockroaches died within two hours.

It is clear from Table - 2 and Fig. -2 that percentage mortality of cockroaches was 65.0 % in first two hours in case of Malathion when the concentration of the emulsion was 0.005%. In total 4 hours the mortality was 13.4% and all the cockroaches died within 24 hrs. However,

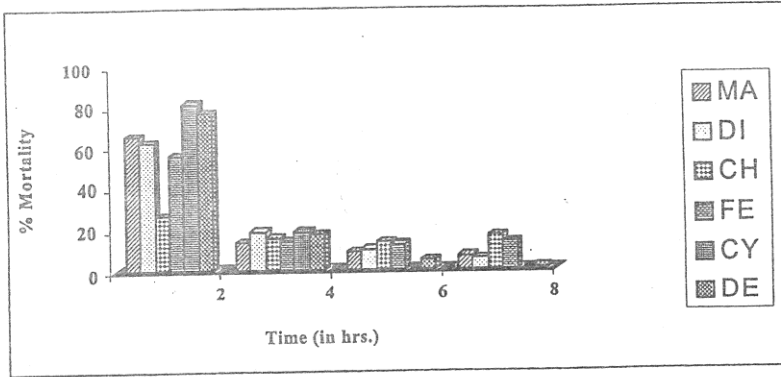


Fig. 2 : Percent mortality of American cockroaches with respect to time, using 0.005% concentration of pesticides.

Abbreviations : MA - Malathion, DI - Dichlorvos, CH - Chlorpyrifos,
 FE - Fenvalerate, CY-Cypermethrin, DE - Deltamethrin

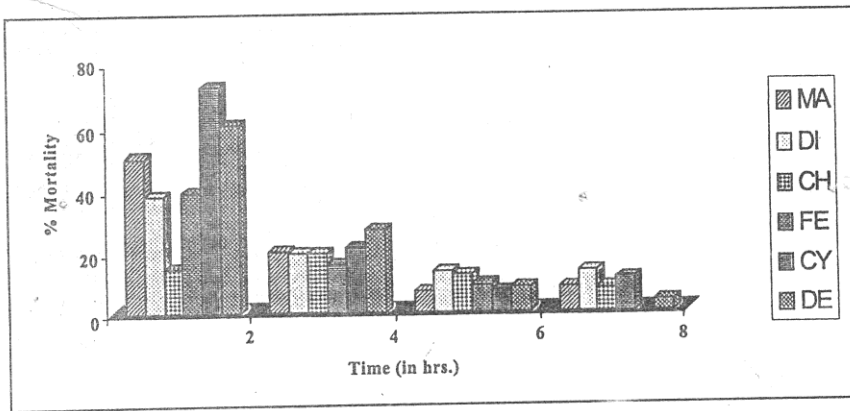


Fig. 3 : Percent mortality of American cockroaches with respect to time, using 0.0025% concentration of pesticides.

Abbreviations : MA - Malathion, DI - Dichlorvos, CH - Chlorpyrifos,
 FE - Fenvalerate, CY-Cypermethrin, DE - Deltamethrin

in Dichlorvos the mortality was 62.3% within first two hours and remaining cockroaches died within 24 hrs. In case of Chlorpyrifos the mortality was 26.8% within first two hours. Percentage mortality of cockroaches was 4.5% within 24 hours when the concentration of the emulsion of Fenvalerate was 0.005%. However, in this case only 55.5% mortality was noted within first two hours. In case of Cypermethrin the maximum mortality was observed as 81.1% within first two hours and the experiment completed within four hours. The mortality of American cockroaches was 76.7% in first two hours and all the cockroaches died within eight hours in case of Deltamethrin. When the concentration of the emulsions was 0.0025% in case of Malathion 50.0% mortality was noted within first two hours and all the cockroaches died within 30 hours. In Dichlorvos and Fenvalerate it was nearly equal i.e. 37.8% and 38.9% within first two hours. However, it was 14.4% within first two hours in Chlorpyrifos and remaining cockroaches took 50 hours to die. Synthetic pyrethroids such as Cypermethrin and Deltamethrin gave excellent results even in the lowest concentration of the emulsion as maximum as 72.2% in Cypermethrin and 60.0% mortality were seen in first two hours. All the cockroaches died within six hours in Cypermethrin and 24 hours in Deltamethrin (Table - 3, Fig -3).

CONCLUSION

From the foregoing results and discussion it can be concluded that synthetic pyrethroids (Cypermethrin and Deltamethrin) gave excellent results even in 0.0025% concentration, as 100% mortality in Cypermethrin and 94.5% mortality

in Deltamethrin was observed within 6 hours. Less mortality was recorded in Chlorpyrifos not only in 0.01% but in 0.025% concentration also. Similar behaviour was observed in case of Malathion, Dichlorvos (both 30 hrs.), Fenvalerate (28 hrs.), when the concentration of emulsion were 0.0025%.

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CHIEF OF CROP RESEARCH INSTITUTE RESIGNS

The Director General of the International Crops Research Institute for Semi-Arid Tropics (ICRISAT) at Patancheru Andhra Pradesh, Dr. Shawkid M. Barghouti, has resigned, effective September 1 1999. No reasons were given for his decision.

ICRISAT said that the Governing Board has established a search committee to select a new Director General as soon as possible. "In the meantime, it is seeking to provide an environment where the process of restructuring and renewal, and the planned programme of research at ICRISAT, continues", it said.

ICRISAT said during the last 18 months, Dr. Barghouti had guided it through a period of significant change and growth. As a result of the restructuring of the Institute's research programmes, natural resource management, genetic resources and enhancement, and socio-economics and policy, the mission of ICRISAT is being achieved more effectively in Asia and Africa.