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Insecticidal Studies by Chemical Insecticide Control of Garden Pest-Earwig

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Introduction

The economic status of the earwig is established by several workers as a pest over plants and vegetables, for instance as an undesirable pest on cultivated plants in Canada (GIBSON and GLENDENNING 2018). In India CHERIAN and BASHEER (2009) was the first to established a statement on Euborellia stali Dohrn. (Forficulide) as a pest of groundnut in south India and also a pest of farm, garden and orchard (Pandey 2016). The available literature reveals that no work has so far been done on the control of earwigs. The present investigation deals with the chemical control of earwig Euborellia annulipes and Labidura bengalensis infesting apple, cabbage, carrot, cucumber and ornamental plants like zinia, dahila etc.

Material and Methods

Adults of earwigs were collected from conceal places and reared in the laboratory of D.A.V. College, Kanpur. In control of *E. annulipes* the insecticides were employed as: carabaryl, aldrin, dieldrin, chlordane, endrin, nuvan, basudin, malathion, heptachlor and phosdrin where as against *L. bengelensis* carbaryl, dieldrin, endrin, telodrin, heptaehlor, lindane, nuvan, chlordane, folithion, basudin, solvirex and malathion were used and formulated their technical grade, except carbaryl which was formulated from the commercial 80% wettable powder. The stock solution of all insecticides was prepared in benzene; from this stock solution of different concentration of insecticides were prepared using benzene as solvent and triton X-100 as emulsifier as 5.0 per cent respectively. In case of carbaryl different concentrations were prepared by adding required quantity of water.

1 cc of each concentration of the insecticides was taken in a small specimen tube and was spread under the Potter's tower at a constant pressure of 4 lb/square inch in petridishes of 75 mm in diameter. While spraying lower concentrations of insecticides were followed by heavier concentrations. The spray deposits in petridishes were allowed to dry under a fan in the laboratory for about five minutes. After complete drying of the insecticidal films 10 newly emerged earwigs (2 days old) were introduced in each petridish by a narrow mouthed specimen tube. Immediately after introducing the petridishes were closed up with their lids. The petridishes with the insects were then kept in controlled room maintained at 27 ± 1° C and 75 ± 5% RH. Mortality counts were taken 24 hr after treatment.

Results and Discussion

Relative toxicity of different insecticides against E. annulipes was worked out by calculating the ratio between their Lc50 valves. It would thus be seen from Table 1 that carbaryl was the most toxic than other insecticides and placed in the top position. Out of ten insecticides tested against the above pest, carbaryl, aldrin, dieldrin, chlordane, endrin, nuvan, basudin malathion and heptachior were found 30.62, 3.62, 3.5, 3.25, 2.62, 2.18, 1.47, 1.43 and 1.43 times respectively, more toxic than phosdrin taken as unity. Table 2 indicate that all the twelve insecticides tested against L. bengalensis were found to be more toxic than malathion being carbaryl, dieldrin endrin, telodrin, heptachior, lindane, nuvan. chlordane, folithion, basudin and solvirex, 14.16, 13.33, 11.23, 10.83, 8.95, 5.83, 5.41, 5.00, 1.35, 1.22 and 1.16 times more toxic than malathion taken as unity.

Table -1 Chemical Control of E. anuulipes

Insecticide	Heter-ogeneity	Regression equation	$Lc_{.50}$	Fiducial limit	Relative toxicity
Carbaryl.	$X^2_{(3)} = 0.42$	$Y = 1.76 \ X + 2.08$	0.0049	0.00062 0.00035	30.621
Aldrin	$X^2_{(3)} = 5.22$	$Y = 1.66 \ X + 2.04$	0.00058	0.00078 0.00041	3.621
Dieldrin	$X^2_{(3)} = 1.28$	$Y = 1.75 \ X + 1.98$	0.00056	0.00068 0.00036	3.50
Chlordane	$X^2_{(3)} = 1.66$	$Y = 1.62 \ X + 2.24$	0.00052	0.00060 0.00038	3.25
Endrin	$X^2_{(3)} = 1.10$	$Y = 1.78 \ X + 2.06$	0.00042	0.00063 0.00036	2.621
Nuvan	$X^2_{(3)} = 1.92$	$Y = 2.02 \ X + 1.77$	0.00035	0.00052 0.00033	2.18
Basudin	$X^2_{(3)} = 1.26$	$Y = 1.62 \ X + 1.28$	0.00033	0.00023 0.00015	1.47
Malathion	$X^2_{(3)} = 3.82$	$Y = 1.43 \ X + 1.76$	0.00023	0.00023 0.00015	1.43
Heptachlor	$X^2_{30} = 3.82$	$Y = 1.43 \ X + 1.76$	0.00023	0.00023 0.00015	1.43
Phosdrin	$X^2_{(3)} = 1.54$	$Y = 2.35 \ X + 0.014$	0.00016	0.00017 0.00012	1.00

The data were not found to be significantly heterogeneous at P = 0.05, Y = Profit kill, X = Log (conc. X 10) Lc,50= concentration calculated to give 50% kill.

Table- 2 Chemical Control of L. bengalensis

Insecticide	Heter-ogeneity	Regression equation	$Lc_{.50}$	Fiducial limit	Relative toxicity
Carbaryl	$X^2_{(3)} = 2.08$	$Y = 1.25 \ X + 2.78$	0.0068	0.00474 0.00828	14.16
Dieldrin	$X^2_{(3)} = 2.69$	$Y = 0.73 \ X + 2.94$	0.0064	0.0038 0.0112	13.33
Endrin	$X^2_{(3)} = 2.06$	$Y = 1.08 \ X = 2.04$	0.0054	0.00414 0.00780	11.23
Telodrin	$X^2_{(3)} = 3.48$	$Y = 0.85 \ X + 2.53$	0.0052	0.00322 0.00769	10.83
Heptachlor	$X^2_{(3)} = 3.98$	$Y = 1.53 \ X = 0.98$	0.0043	0.00380 0.00446	8.95
Lindane	$X^2_{(3)} = 4.72$	$Y = 0.98 \ X + 2.62$	0.0028	0.00206 0.00438	5.83
Nuvan	$X^2_{(3)} = 2.98$	$Y = 0.68 \ X = 3.33$	0.0026	0.00160 0.00422	5.41
Chlordane	$X^2_{(3)} = 3.24$	$Y = 0.55 \ X + 3.86$	0.0024	0.00068 0.00232	5.00
Folithion	$X^2_{(3)} = 2.021$	$Y = 0.79 \ X = 3.58$	0.00065	0.00012 0.00028	1.35
Basudin	$X^2_{(3)} = 0.76$	$Y = 0.68 \ X + 3.92$	0.00059	0.00034 0.00101	1.22
Solvirex	$X^2_{(3)} = 0.29$	$Y = 0.62 \ X = 3.88$	0.00056	0.00033 0.00054	1.16
Malathion	$X^2_{(3)} = 2.86$	$Y = 0.66 \ X + 3.84$	0.00048	0.00026 0.00072	1.00

The data were not found to be significantly heterogeneous at P = 0.05, Y = Profit kill, X = Log (conc. X 10) $Lc,_{50}$= concentration calculated to give 50% kill.

Thus considering the above aspects, it is obvious that amongst different insecticides tested against E, annulipes carbaryl, 1drin, dieldrin and chlordane and against L. bengalensis carbaryl, dieldrin, endrin, and telodrin had a very high safety margin eg. to the pests. The findings are in agreement with the work of JONES (1917) and WORKMAN (2015) who recommended the control of earwigs with chemical spraying. Some workers (BEALL, 2015; MACKIE, 2016, STENE, 2018 and GUPTA and VARVARY, 2010) also control the earwigs through traping and baiting process.

SUMMARY

The relative toxicity of all insecticides have been calculated by taking Lc. 50 values against E. anriulipes. Carbaryl, aidrin, dieldrin, chiordane, endrin, nuvan, basudin malathion and heptachlor were found to be 30.62, 3.62, 3.50, 3.25, 2.62 2.18, 1.47, 1.43 and 1.43 times toxic than phosdrin taken as unity where as against L. hen galensis carbaryl, dieldrin, endrin, telodrin, heptachior, lindane, nuvan, chiordane, folithion, basudin and solvirex were respectively 14.16, 13.33, 11.23, 10.83, 8.95, 5.83, 5.41, 5.00, 1.35, 1.22 and 1.6 times toxic than malathion.

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