Agri. Res. J. Kerala, 1969, 7 (2) : 107-109

BIOASSAY OF INSECTICIDE RESIDUES ON CROPS
I Persistence of endrin residues on paddy*

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The approach towards insect pest management is fast changing to one involving an integration of the different pest control methods which are compatible and complimentary. In such an integrated system of pest management, insecticides have to be used rationally so as to minimise their residual toxic effect to the natural enemy fauna and a full knowledge of the persistence potential of the insecticides on the various crops is necessary for this. Information on this available in India is very scanty and is confined to the works of Rattanlai and Dhall (1965), Singh and Rattanlal (1967) and Virend, Kavadia and Rattanlai (1968) covering the residues of malathion on lady's finger, parathion on tomato and malathion on rape seed respectively. Hence an attempt has been made in the present investigations to determine the residual life of endrin on paddy plants using a bioassay technique.

Material and Methods

First instar larva of *Corcyra cephalonica,* not more than 24 hours old, was the test insect and a technical grade of endrin the insecticide. Log dose-probit mortality relations between the insect and the insecticide were worked out by confining the larvae in wheat flour, impregnated with graded concentrations of the insecticides, contained in petridishes *(50* mg of the impregnated flour per dish), at 30°c and 80 % R. H. (in desiccators containing potassium hydroxide solution) and observing the mortality after 24 hours of continuous exposure. The impregnation was done from solutions of endrin in acetone; concentrations of endrin in the flour was adjusted by adjusting its contents in the solution. Regression between log dose and probit mortality was worked out and a standard ld-p line drawn passing through the calculated points representing L D 30, L D 50 and L D 70.

To determine the persistence of the residues of endrin on paddy plants, 3 weeks old plants, raised in pots, were sprayed with 0. 03 % endrin emulsion at the rate of 300 g endrin per hectare. A few plants were collected at random from the treated pots on the 1 st, 2nd 4th, 8 th and 16 th days after spraying and cut into small bits. Aliquots weighing 10 to 40g of the chopped up plants were shaken with known quantities of acetone for 30 minutes and the extract decanted. A known quantity (usually 10 ml) of the extract was mixed with 10 g of wheat flour thus impregnating it with the insecticide residues extracted from the plants. Mortality of first instar larvae of *C. cephalonica* exposed to 50 mg of this wheat flour media, taken in petridishes, for 24 hours was ascertained and the concentration of the insecticide

* From M. Sc. **(Ag.)** thesis submitted to the University of Kerala in 1968

in the flour required to give this mortality was read from the standard curve by interpolation. The percentage of the insecticide residues on the plants on a W/W basis was then calculated.

The interference, if any, of the plant substances contained in the acetone extract on the toxicity of the insecticide residues was ascertained by exposing the test insect to wheat flour with similar doses of insecticides dissolved in extracts prepared from different quantities of the plant tissue.

Results

Table 1 gives the results of four replicated determinations of ld-p relations between first instar larvae of *C. cephalonica* and endrin.

Table 1

Regression equations and LD 50 values of ld-p relations between *Corcyra* larva and endrin.

Replication	Regression equations	LD 50 values
1	y= 4.08 x -2.91	1.81
2	y=12.03 x -18.25	1.88
3	y= 0.38 x -4.28	1.78
4	y= 2.93 x - 0.61	1.74

It may be observed that the LD 50 values of the repetitions did not differ significantly thus indicating the reliability of the bioassay technique used.

Figure I represents the standard ld-p line drawn passing through the points representing LD 30, LD 50 and LD 70 calculated from the regression equation y=4.08 x -2.91 (see Table 1).

Table 2 shows that the plant substances extracted by acetone from the rice plant tissues during the process of residue extraction did not affect the response of the test insect to endrin.

Table 2

Mortality of the first instar larvae of *C. cephalonica* exposed to wheat flour with similar doses of endrin dissolved in extracts prepared from different weights of paddy plant materials

Wt. of plant material in 60 ml of acetone extract (g)	Percentage mortality in 24 hours Concentration of the insecticide (ppm)					
	5	6	7.2	8.6	10.4	12.4
10	12.5	23.75	40.00	57.50	68.75	87.5
20	12.5	23.75	43.75	57.50	76.25	87.5
40	11.25	23.75	40.00	57.50	68.25	.87.5

Figure 2 represents the decline of the residues of endrin on paddy plants as determined by the bioassay technique described above. The initial residue of endrin 24 hours alter spraying was 183.36 ppm which during the next 24 hours suffered a drastic decline taking the residue to 62.82 ppm. Then the rate of decline of residue was gradual and slow taking it down to 47.22, 20.00 and 2.26 ppm at the end of 4, 8 and 16 days respectively.

Summary

First instar larva of *Corcyra cephalonica* was found to be a suitable test organism for the bioassay of minute quantities of endrin in wheat flour, by exposing the larvae to the flour impregnated with the insecticide from acetone solution and observing the mortality. A standard ld–p line was drawn using this method and endrin residues on paddy plants extracted with acetone were determined with reference to this standard line.

A deposit of 183.36 ppm of endrin remaining on paddy plants 24 hours after application of 0.03 percent emulsion was reduced to 62.82, 47.22, 20 and 2.26 ppm on the 2nd, 4th, 8th and 16th days after spraying.

Acknowledgement

Thanks are expressed to the Principal, Agricultural College, Vellayani, Kerala, for the facilities provided for the present investigations.

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(Accepted: 8–1–1970)

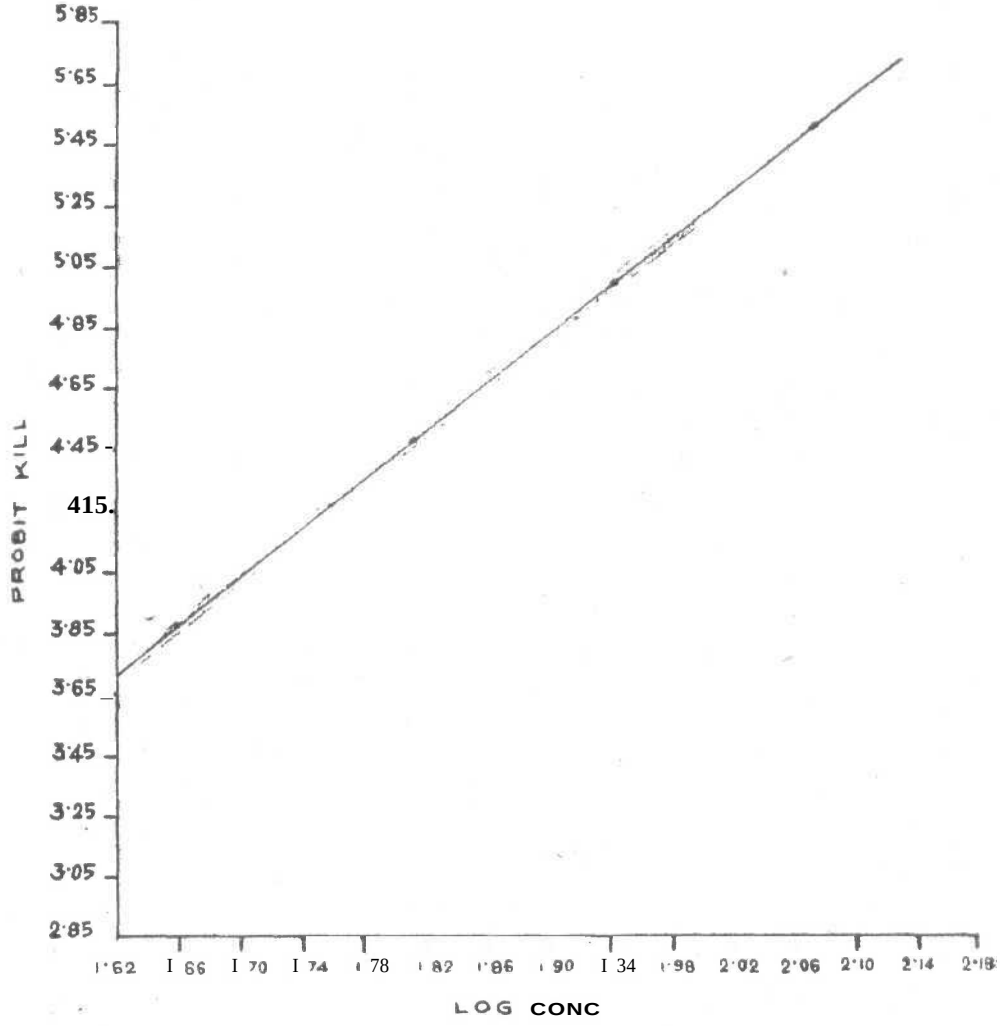

Fig. 1. Standard ld–p relations between endrin Contained in wheat flour medium and 1st instar larva of *Corcyra cephalonica*

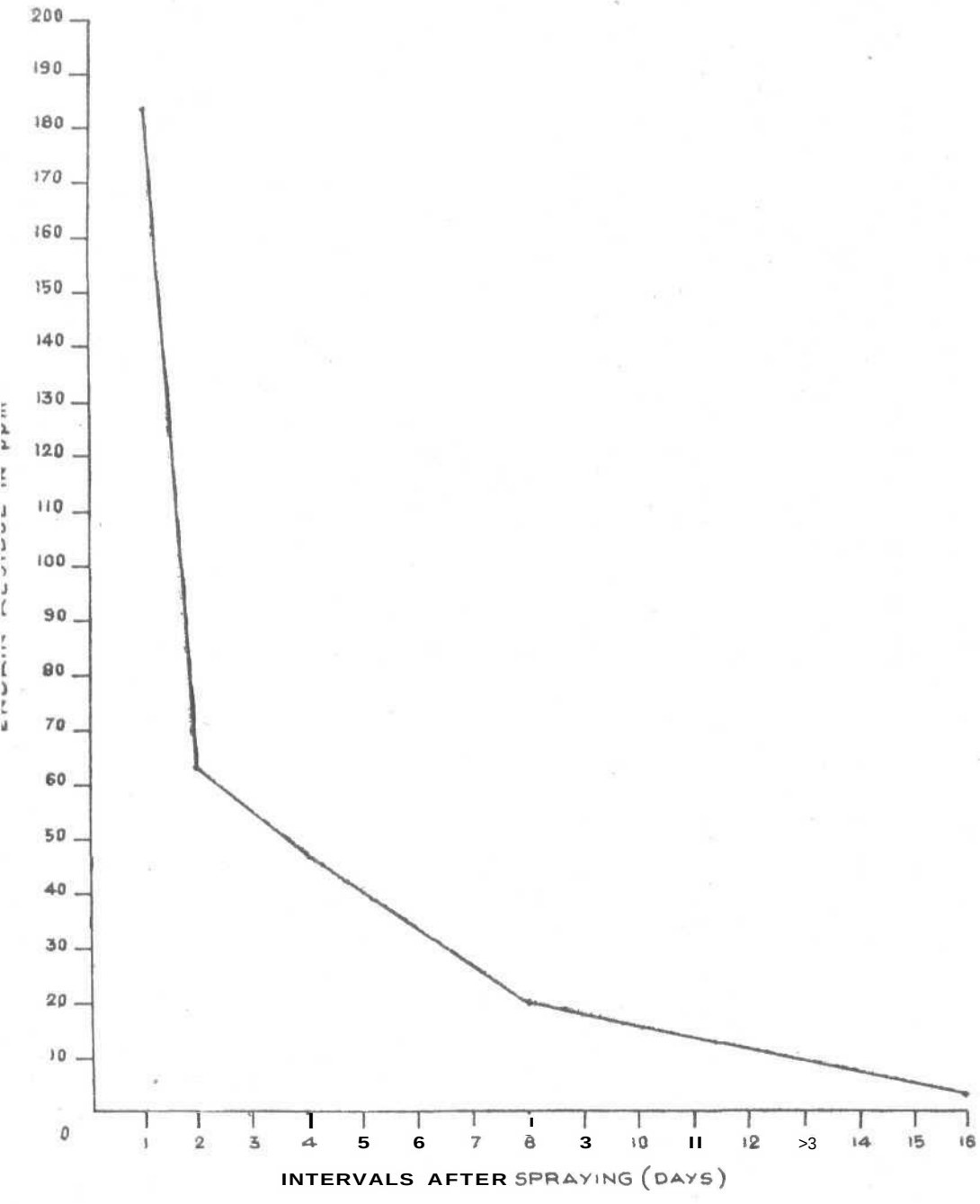

Fig. 2. Decline of endrin residues on paddy plants