

The Bean Aphid Control with Systemic Pesticides

by

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Introduction: According to Martin (1947 and 1949), Systemic insecticides are those formulations which are absorbed by the plants and translocated to other parts in such quantities that they have insecticidal action. Based on the decomposition of such chemicals within the plants, three broad categories of systemic poisons have been recognised. The first group includes chemicals like selenium which remain more or less in a stable form and do not undergo any disintegration. The second comprises of compounds like Schradan, Pestox, Hanane, etc., which even after absorption persist in their original form and act as insecticides until they are decomposed. The last category includes insecticides like Systox and Metasystox, which after absorption get transformed into other toxic substances that also act as insecticides. As a result of this phenomenon, the toxicity of the original formulation is enhanced considerably.

Nagaraja Rao and Krishnaswamy (1952), have recorded the usefulness of Schradan, Sytam, Pestox, Tetrax and Isopestox in the control of aphids and mites. Sundaram (1952) after testing a number of organic pesticides, has concluded that BFPO reduces appreciably the incidence of *Lecanium viride* Gr, on coffee. Ripper (1952) in his paper read at the Third International Congress of Crop Protection held at Serbonne has dealt at considerable length on the work done with systemic insecticides in different countries.

The present investigation is mainly intended to evaluate the efficacy of three more recent and potent formulations, of systemic chemicals in the control of the bean aphid-*Aphis craccivora* Koch on, *Gliricidia maculata*. This pest thrives on a variety of hosts, viz., *Dolichos lablab*, *Vigna catjang*, *Arachis hypogeanae*, *Phaseolus radiatus*, *Phaseolus mungo*, *Medicago sativa*, *Indigofera* sp. and a few other leguminous crops as well.

Materials and Methods: The outbreak of a serious incidence of the above mentioned pest at Coimbatore on *Gliricidia* plants, was availed of to study the insecticidal efficacy of three systemic pesticides, viz., *Systox* (50% Demeton-Diethoxy thiophosphoric ester

of 2 ethylmercapto-ethanol), *Metasystox* (Thioglycol dimethyl phosphoric ester) and *Hanane* (50% Dimefox-a mixture of Bis dimethyl amino fluorphosphine oxide and Bis dimethyl amino phosphorous anhydride). A set of five plants, replicated four times was taken under each treatment.

Systox and Metasystox were applied directly on the plants as a spray at 0.05% concentration (one fluid ounce of the chemical in 12½ gallons of water) and through the medium of irrigation water at the same strength in another set of plots. For the latter method, the spray fluid was taken in a roscan and poured evenly around the base of the plants. Hanane, available in the form of water soluble capsules (weighing one ounce each) was inserted into the soil at a depth of six inches. One capsule was utilised to cover an area of one hundred square feet. All the plants under observation were watered once a week.

For assessing the population (counts) of insects before and after the treatments, twenty five mature leaves were taken at random per plant. Thus for each variant 500 leaf samples were examined. For ensuring uniformity, only the apterous forms present on the leaves were counted. The efficacy of the different chemicals was adjudged with reference to the reduction in aphid population at the end of 48 hours and one week after the insecticidal application.

Similar observations were made at weekly intervals extending to a period of six weeks from the date of treatment to assess the residual toxicity of the different variants. The effects of the insecticidal treatments on the adults and grubs of *Chilomenes sexmaculata* Fabr., noted in appreciable numbers on the plants were also assessed.

A gist of the data gathered together with summary of statistical analyses is furnished in the appendices I, II & III.

Discussion of Results and Conclusions: The figures presented in the Table go to show that direct application of Systox and Metasystox has been quite efficient in the control of the aphid, causing 98 to 99 per-cent reduction in population in 48 hours. The irrigation treatments gave the same degree of relief only in the course of a week. A marked decline in the density of the population was evident under Hanane after a lapse of a week, reaching the cent percent level in the course of a fortnight.

Regarding residual action, the figures indicate that the treatments were able to ward off a recrudescence of the pest for a period of three to four weeks. The toxic effects began to decline after this interval as may be evident from the population recorded at the end of the fifth and sixth week after treatment.

A few dead specimens of adults and grubs of the predator *Chilomenes sexmaculata* Fabr., were noted on the plants directly treated with Systox and Metasystox. This Coccinellid was found to thrive successfully on the plants under the irrigation treatments and those under Hanane application.

The possibilities of controlling this aphid by means of irrigation treatment and by the use of water soluble capsules containing a systemic formulation can thus be considered as novel and more recent developments in the evolution of insecticidal measures of pest control.

Acknowledgment: The author is indebted to Sri P. A. Seshu, Statistical Assistant for his help in the statistical analyses of the data.

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APPENDIX I

Results of Experiments Designed to Assess the Insecticidal Efficacy

Lay out: Randomised blocks, replicated four times. Weather conditions that prevailed during the period of experimentation (May to June):

Total number of plants under each treatment: Twenty. Range of maximum temperature ... 77.0 to 96.5 F.

Age of the Plants: About three years. Range of minimum temperature ... 68.0 to 75.4 F.

Variants: Six. Range of relative humidity ... 70.0 to 100 %.

Quantity of the chemical applied: Rainfall in inches ... 6.40"

- (a) Direct application as a spray—quarter of a gallon per plant.
- (b) Irrigation treatment—Half a gallon per plant.
- (c) Hanane application—Four capsules to cover an area of about 400 sq. feet.

Treatment	Initial population on 125 leaves selected at random (Mean of 4 Replications)	Population on 125 leaves selected at random at the end of the specified periods after treatment (Expressed as mean of 4 Replications).				
		48 hours	One week	Four weeks	Five weeks	Six weeks
(A) Systox spray direct application at 0.05 %	384	4	Nil	20	54	67
(B) Systox spray fluid applied as irrigation at 0.05 %	298	88	Nil	38	59	92
(C) Metasystox spray direct application at 0.05 %	389	27	Nil	00	14	22
(D) Metasystox spray fluid applied as irrigation at 0.05 %	412	87	Nil	00	24	57
(E) Hanane capsules placed inside the soil at a depth of six inches	428	00	107	00	48	82
(F) Control	422	417	498	714	642	602

APPENDIX II

Summary of Statistical Analyses.

(i) Insect population counts recorded 48 hours after the treatment.

	Treatments						SE _m	CD (P = .01)
	A	B	C	D	E	F		
Adjusted mean insect population count ...	7.63	113.49	23.10	53	26.23	10.62	28.31	120.01

Conclusion: E, F, B, D, C, A.

APPENDIX III

Summary of results.

(ii) Insect population counts recorded one week after treatment.

A week after treatment, the insect counts were 'Nil' in treatments, A, B, C, and D. Only the data in respect of treatments E and F were therefore analysed.

Treatments	Mean insect counts	Standard error of mean	Critical difference (P. 0.01)
E.	107	29.73	345.56
F.	498

Conclusion: F, E.

Utilisation of Farm Resources in Coimbatore Taluk

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Introduction: Farm production results from combining in various proportions the different factors of production land, labour, capital and management. Profit maximisation, then, is an attainable condition only when the farmer decides on the amounts and combinations of these four major resources of production. Any attempt to maximise farm profits, therefore, requires a prior knowledge of the productivity and returns of these resources used in farm production. So a study was undertaken in 1958-59 to estimate the nature of resource returns from a random sample of farms in Coimbatore taluk. Such information on resource utilisation and productivity will help to determine the quantity of particular categories of resources which should be employed and how the several resources should be combined for maximum production.