R. P. F. III

FINAL REPORT

1. Institute Code No: **Ent. III(176) Pl-72/ICI/H10/1220**

2. I. C. A. R. Code No:

3. Name and Address of Research Institute/Centre:

ICAR Research Complex for Goa (CPCRI)
Ela, Old Goa.

4. Project Title: **Sub Project Title:**
Chemical control of pests of cashew in Goa.

5. Name and Designation of Project Leader

Sub Project leader:
D.Sundararaju Scientist S1(Entomology)

6. Name (s) and Designation(s) of Project Associates including Project Leader and work to be done:

Sl. No.	Name and Designation	Time spent	work done
1.	D.Sundararaju, Scientist S1(Ento)	9 main months	As listed in the technical programme

7. Location of Research Project with complete address (Division/Section/Sub-Centre)

Cashew plantations of Forest Department and Private parties at Go

8. Date of start **Jan - 1978**

9. Date of termination **December 1983**

10. (a) Objectives (Not more than 150 words)

Vide colmn : 2 of the Annexure.

(b) Practical Utility including background information (Not more than 150 words)

Since, the tea mosquito bug and cashew stem borer are becoming major constratins in cashew production of this territory, the effective control measures evolved will comb t this problem and sustained increase in production can be achieved.

FINAL RESEARCH PROJECT REPORT

1. Project No: Ent.III(176) Pl-72-ICI-H10/1220

Main Project: Chemical control of pests of cashew

Sub Project : Chemical control of pests of cashew in Goa.

1. a.Name of sub project leader and Associate:

D.Sundararaju.

2. Objective of sub project:

i) To evolve suitable chemical control measures against tea mosquito bug with spray insecticides.

ii) To find out suitable chemical control measures against cashew stem and root borer by bark application of various insecticides.

3. Technical programme:

(i) About five promising insecticides will be tried as spray against tea mosquito bug.

(ii) Efficacy of certain effective insecticides will be assessed as bark application against stem and root borer and suitable recommendations against tea mosquito bug and stem borer will be formulated.

4. MATERIALS AND METHODS:

a) Chemical control of tea mosquito bug, Helopeltis antonii Sign. (Heteroptera: Miridae)

Four field experiments were conducted during 1978 to 82 at Valpoi and Canacona talukas in 10 year old cashew plantation of Goa Forest Department. There were seven treatments viz., six insecticides in 0.05%(a.i.) concentration and untreated control in RBD with three replications. For each treatment, eight trees were selected and three rounds of sprayings at monthly intervals were given from the last week of November onwards with a rocker sprayer. The pre-treatment counts before the first spray and the post treatment count one month after the third spray were taken on three trees selected randomly per treatment. The total number and damaged shoots and panicles in four branches selected on all the four sides of each tree were counted and percentage of damage worked out. The transformed values of the percentage of damage were statistically analysed.

b. Chemical control of cashew stem and root borer: Plocaederus ferrugineus (Coleoptera: Cerambycid

Ten-year-old cashew trees in the infested plantations at Kalay and Edumol(Canacona) Forest Department Plantations were selected and marked for different stages of infestation viz; early(gummosis and presence of frass), middle(gummosis, presence of powdery frass with yellowing of leaves) and advanced(withering of bark, presence of dry powdery frass and shedding of leaves and drying of twigs).

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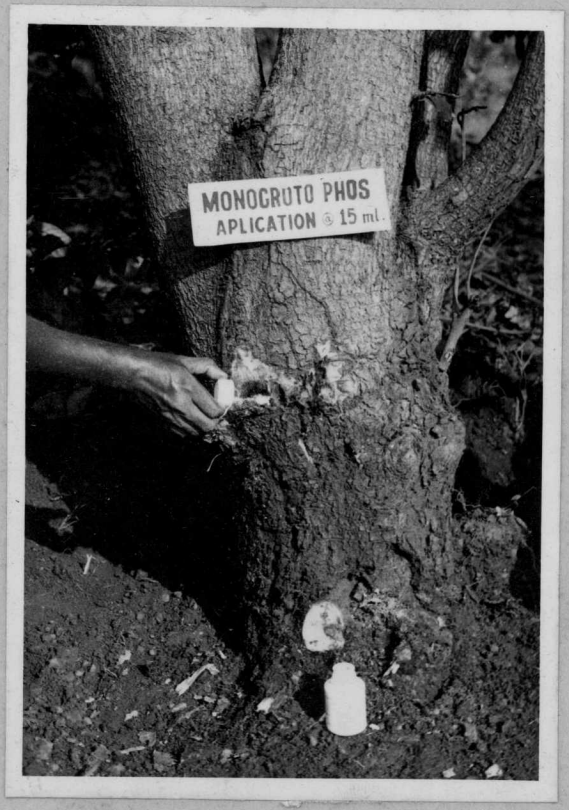

FIG-1

FIG-II

In the marked trees, the withered and dried barks and soil around the infested tree were removed. The padding method of application with monocrotophos 36 EC was followed, for which, a flap of live bark for an area of 30 cm2 near the infested region was peeled out and a layer of absorbent cotton wool was inserted in between the flap of live bark and the trunk portion and 15 ml of monocrotophos 36 EC at each place was slowly poured so that the insecticide got absorbed in the cotton wool(Fig-1). The bark was kept intact and tied tightly with gunny coir thread.(Fig-2). The cut ends were covered with fungicide(copper oxychloride) treated wet clay and BHC 10% dust @ 500 g/tree was raked around the base of the infested tree and earthing up of the soil was done all around the tree just above the point of treatment. The raking of BHC dust alone was also done for comparison. All these treatments were done just before the commencement of South West Monsoon.

During 1979, monocrotophos 36 EC was tested at three doses (15, 30 and 45 ml/tree) and BHC treatment was not tried. During 1981, the same experiment was repeated with two doses (15 and 30 ml per tree) only. During 1982 and 83 the same experiment was repeated with one dose (30 ml per tree) along with the BHC treatments. Since, the cashew plantation is unapproachable during monsoon and post monsoon period due to jungle growth of weeds and bushes, the effect of treatments was assessed during the month of December, six months after treatment i.e. after routine clearing of jungle growth. The percentage of control of infestation was worked out based on the number of trees recovered/totally free of infestation.

b. RESULTS AND DISCUSSION:

a. Chemical control of tea mosquito bug:

Out of four spray trials conducted during 1978-82, in the first two trials conducted at Valpoi Forest Department, Cashew plantation, the level of incidence was very less even in the untreated control. Therefore no conclusions could be drawn. The third trial conducted at Canacona during 1979-80, revealed that eventhough the pre-treatment damage was more than 44%, all the chemical treatments could not reduce damage and data were erratic. However this indicated that early spraying at the beginning of infestation at the time of the emergence of new flushes would be the prerequisite particularly in endemic areas.

The data on shoot and panicle damage of fourth trial conducted at Canacona taluka during 1981-82 are presented in table I. The data on shoot damage revealed that endosulfan and monocrotophos were superior by recording minimum damage of 14.6 and 20.6% respectively followed by phosalone and quinalphos.

Table 1: EFFECTIVENESS OF DIFFERENT INSECTICIDES IN THE CONTROL OF TEA MOSQUITO INFESTATION

Treatments	Shoot damage (%)		Post treatment panicle damage (%)
	Pre treatment	Post treatment	
Endosulfan 0.05%	28.3	14.6(22.37)	9.4(17.58)
Monocrotophos 0.05%	21.7	20.6(27.00)	19.3(25.78)
Quinalphos 0.05%	24.7	29.6(32.78)	19.8(25.76)
Formothion 0.05%	23.9	45.3(42.61)	59.2(50.68)
Phosalone 0.05%	18.6	26.7(31.05)	22.4(27.97)
Fenthion 0.05%	27.0	28.0(37.87)	41.9(40.10)
Control	27.2	71.5(57.96)	54.0(47.30)
C.D. 5%	-	(8.50)	(12.95)

(Figures in parentheses are the transformed values)

Table 2: EFFECT OF MONOCROTOPHOS 36 EC APPLIED BY THE PADDING METHOD IN CONTROLLING CASHEW STEM AND ROOT BORER INFESTATION.

Dosage of Monocrotophos	State of Infestation	No.of trees treated	No.of trees recovered	Percentage of control
At Kalay Govt. Farm, 1979.				
15 ml	Early	4	2	50.0
30 ml	Early	6	5	83.3
45 ml	Middle & advanced	6	Nil	--
At Edumol (Canacona) 1981				
15 ml	Middle & advanced	10	Nil	--
15 ml	Early	9	3	33.3
30 ml	Early	16	13	81.3
30 ml	Middle & advanced	6	Nil	--
At Kalay Govt. Farm, 1981.				
30 ml	Middle & advanced	6	Nil	--
30 ml	Early	7	5	71.4
At Kalay Private Farm, 1981.				
30 ml	Middle & advanced	4	Nil	--
30 ml	Early	21	17	81.0

Table 3: EFFECT OF MONOCROTOPHOS 36 EC (@ 30 ml/tree) APPLIED AS PADDING METHOD + BHC 10% DUST(@ 500 g/tree) IN CONTROLLING CASHEW STEM AND ROOT BORER INFESTATION.

Treatments	Stages of infestation	No.of trees treated	No.of trees recovered	Percentage of control
At Edumol (Canacona), 1982.				
Monocrotophos + BHC	Early	15	14	93.3
-do-	Middle & advanced	5	Nil	--
BHC alone	Early	10	4	40.0
At Kalay Private Farm, 1982.				
Monocrotophos + BHC	Early	15	13	86.7
-do-	Middle & advanced	6	--	--
BHC alone	Early	10	3	30.0
At Edumol(Canacona), 1983.				
Monocrotophos + BHC	Early	23	18	78.3
BHC alone	Early	11	4	36.4

With regard to panicle damage, endosulfan, monocrotophos, quinalphos and phosalone were found to be superior to the other treatments by recording the lowest damage of 9.4, 19.3, 19.8 and 22.4% respectively. Whereas the untreated control trees recorded higher intensity of 71.5 and 54.0% shoot and panicle damages, respectively. The trend of results indicate that next to endosulfan, other insecticides such as monocrotophos, quinalphos, phosalone were also effective in reducing tea mosquito infestation.

b. Chemical control of stem and root borer:

The results of 1979 season indicated that maximum of 83.3% control was achieved with monocrotophos 36 EC @ 30 ml/tree, when the treatment was given at the early stage of infestation (Table 2). However, the trees in the middle and advanced stages of infestation could not be saved by this method also.

During 1981 season, trials conducted at three locations indicated that only early stage of infestation could be controlled with a dosage of 30 ml/tree with an average of 77.9% control (Table 2). The results of 1982 and 1983 (Table 3) indicated that monocrotophos + BHC treatment gave 78.3% to 93.3% control while BHC alone gave a maximum control of 36.4% only of early stage of infestation. Therefore, it is evident that this pest can be successfully controlled only at the early stage of infestation. Further, by the padding method of treatment, maximum control was obtained when the treatment was given in the trees with ground level infestation not exceeding 15 cm above the ground level. The peak infestation of this pest was noticed during summer months (March-May). Generally collections of nuts and apples are done during March to May. During this harvesting period, close and periodical examination of the basal portions the trunk and exposed parts of the roots can be done without any additional effort.

The trees in the middle and advanced stages of infestation are to be removed from the plantation as a phytosanitary measure. This would ensure prevention of spread of the pest to the adjacent trees in the plantation. Trees in the early stages of infestation could be given the above mentioned curative treatments before the onset of the South West Monsoon.

The cost of the curative chemical treatments works out approximately to Rs.8 to 10/= per tree which is equivalent to the cost of one kg of raw cashew nut. If a bearing cashew tree is lost due to stem borer infestation, it would take 5 to 7 years to raise a fresh tree in its place. Timely adoption of curative chemical treatment and phytosanitary measures are effective in combating stem and root borer infestation and saving the infested trees.

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7. Conclusions drawn from the experiment:

a) For chemical control of tea mosquito, besides endosulfan, other insecticides such as monocrotophos, qhinalphos and phosalone may also be recommended as spray at 0.05% concentration.

b) For control of cashew stem and root borer, the trees in the early stage of infestation could be given the above discussed curative treatment before the onset of the South West Monsoon. The trees in the middle and advanced stages of infestation are to be removed from the plantation as a phytosanitary measure.

8. Recommendations to be passed on to the extension agencies:

a. The tea mosquito could be effectively controlled by spraying 0.05% endosulfan, or monocrotophos or quinalphos or phosalone.

b. The stem and root borer could be controlled in the initial stages by phytosanitory measures and padding method of application with monocrotophos @ 30 ml/tree and raking of BHC 10% dust @ 500 g/tree around infested tree.

9. Publications arising out of the project:

(i) List of papers published:

A. Sundararaju, D. 1979. A note on major pest problems of cashew coconut and arecanut and their control in Goa(Abst)., PLACROSYM II Ootacamund, pp-38-39.

b. Sundararaju,D.,1979. A note on major pest problems of cashew, coconut, and arecanut and their control in Goa. Proceedings of PLACROSYM II Ootacamund, pp. 523-29.

(ii) List of papers sent for publication:

a. Chemical control of tea mosquito bug(Helopeltis antonii Sign) in cashew at Goa.

b. Chemical control of cashew stem and root borer, Plocaederus ferrugineus L. at Goa.

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13. Approximate expenditure incurred in the Project: (Give reasons for variation, if any, from original estimated cost)

Rs.16,000/-(including salary)

14. Publications and material (one copy each to be supplied with this proforma)

a) Research papers

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b) Popular articles

c) Reports

d) Seminars and workshops (Relevant to the Project) in which the Scientists have participated:

Attended: 1. International Cashew Symposium, Cochin, March ,1979.
2. PLACROSYM II, Ootacamund June,1979.
3. All India Co-ordinated Workshop on cahsew Calicut Oct,1983.

e) Material developed such as new varieties of crops or breeds of farm animals, implements, products, etc.)

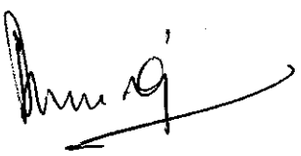
Control measures were evolved against tea mosquito and stem borer.

15. Details (Nos. etc.) of Field/Laboratory Note books and final material and their location.

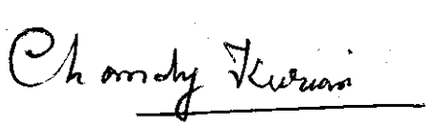
ICAR Complex, Kha.

16. Comments/suggestions of Project leader regarding possible future line of work that may be taken up arising of this project:

17. Signatures with name of Project Leader and Associates:



18. Signature (with comments, if any) of Head of Division/Section/Station :



19. Signature (with comments, if any) of Director :