

**EVALUATION OF SOME ANTIFEEDANTS AGAINST LARVAE OF  
*PAPILIO DEMOLEUS* LINN. (PAPILIONIDAE: LEPIDOPTERA) AND  
*PLUSIA PEPONIS* F. (NOCTUIDAE: LEPIDOPTERA)**

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Insect antifeedants are chemicals that prevent insects from feeding on treated foliage. These compounds do not harm non-target organisms and hence are selective inaction. Moreover, antifeedants are not toxic to mammals. These attributes render insect antifeedants ideal for inclusion in insect management programmes. Although many workers (Joshi *et al.*, 1967; Kareem, 1970; Dale and Chandrika, 1972, 1973) have reported the effectiveness and feasibility of using these chemicals against crop pests, plant protection using antifeedants is still in an experimental stage in our country. The present studies involving the larvae of *Papilio demoleus* and *Plusia peponis* were undertaken to assess the relative efficacy of three antifeedants viz., fentin acetate, fentin chloride and AC-24055 under laboratory conditions. The persistence of the chemicals under field conditions was also studied.

**Materials and Methods**

Fourth instar caterpillars of *P. Peponis* used for the experiment were obtained from cultures maintained in the laboratory. Since the adults of *Papilio demoleus* failed to lay eggs under laboratory conditions, the larvae were collected from the field. The antifeedants were evaluated against *P. demoleus* and *P. peponis* by confining the larvae on citrus and snakegourd leaves respectively. Pre-weighed leaf bits (the size of the leaf bits was not a criterion) were thoroughly sprayed with five concentrations of the chemicals viz., 0.2, 0.1, 0.05, 0.025 and 0.0125%. Leaf bits sprayed with distilled water were kept as control. The air-dried leaf bits were kept in petridishes over wet paddings of cotton and filter paper. Two larvae were released over the treated leaf and allowed to remain on it for 48 hours. The treatments were replicated thrice. The leaf bits were again weighed after the experimental period. The mean leaf weight consumed by the larvae in control was taken as unit for calculating the percentages of leaf weight protected by treatments over control.

The persistence of antifeedants under field conditions was assessed by spraying 0.2% solutions on potted citrus and snakegourd plants. The plants were kept open and were watered at the base. The leaves were collected at two days' intervals, weighed and given to the caterpillars as in the first experiment. The persistence was determined by the method elaborated by Pradhan (1967).

\* Part of the M. Sc. (Ag) Thesis of the first author submitted to the Kerala Agri, University.

The phytotoxicity of the chemicals was assessed by spraying 0.2% solutions on potted plants which were observed regularly for symptoms of phytotoxicity up to one month after spraying.

### Results and Discussion

The results relating to the antifeedant action of the three chemicals on *Papilio demoleus* and *Plusia peponis* are given in Tables 1 and 2, respectively. PC<sub>50</sub> values (concentration of the antifeedant required to give 50% leaf protection over control) are also furnished in the tables.

Table I

Fentin acetate, fentin chloride and AC-24005 as antifeedant for the caterpillars of *Papilio demoleus*, on citrus

Antifeedant	Concentration (%)	Mortality (%)	Mean weight of leaf consumed (g)	Mean % of leaf weight protected over control	PC 50	Correlation coefficient between [2] and [5]
[1]	[2]	[3]	[4]	[5]	[6]	[7]
Fentin acetate	Control	Nil	4.98	—	0.0307	0.7930
	0.0125	Nil	3.53	29.1		
	0.02	Nil	2.61	47.5		
	0.055	Nil	2.35	52.7		
	0.1	83.3	0.76	84.7		
	0.2	100.0	0.64	87.1		
Fentin chloride	Control	Nil	4.20	—	0.0267	0.7901
	0.0125	Nil	2.89	31.2		
	0.025	Nil	2.14	49.0		
	0.05	Nil	1.44	65.7		
	0.1	50.5	0.59	85.9		
	0.2	100.0	0.34	91.9		
AC-24055	Control	Nil	4.78	—	0.1435	0.8745
	0.0125	Nil	4.52	5.4		
	0.025	Nil	4.20	12.1		
	0.05	Nil	3.66	23.4		
	0.1	33.3	2.91	41.6		
	0.2	50.0	1.99	58.3		

Table 2  
Fentin acetate, Fentin chloride and AC 24055 as antifeedants for the larvae of *Plusia peponis*, on snakegourd.

Antifeedant	Concentration (%)	Mortality [%]	Mean weight of leaf	Men % of leaf protected control	PC 50	Correlafion co-efficient between (2) and (5)
[1]	[2]	[3]	[4]	[5]	[6]	[7]
Fentin acetate	Control	Nil	6.21	—	0.0384	0.9152
	0.0125	Nil	5.45	12.2		
	0.025	Nil	4.14	33.5		
	0.0	16.6	2.91	53.1		
	0.1	83.3	1.11	72.1		
	0.25	100.0	0.27	95.6		
Fentin chloride	Control	Nil	6.04	—	0.0305	0.7611
	0.0125	Nil	4.81	20.3		
	0.025	Nil	3.50	42.0		
	0.04	Nil	1.94	67.8		
	0.1	66.6	0.81	86.6		
	0.2	100.0	0.17	97.2		
AC-24055	Control	Nil	5.96	—	0.0644	0.8316
	0.0125	Nil	5.31	10.9		
	0.025	Nil	4.20	29.5		
	0.05	Nil	3.01	49.5		
	0.1	16.6	1.88	68.4		
	0.2	100.0	0.86	85.6		

It is seen that there is a direct correlation between the concentrations of the antifeedants and the mean percentages of leaf weight protected over control. As the dose is increased, a corresponding increase in leaf protection is evident.

Both fentin acetate and fentin chloride gave more than 50% protection of leaf against *Papilio demoleus* at concentrations of 0.05% and above (Table 1). But AC-24055 could effect the same degree of leaf protection (> 50%) only at a concentration of 0.2%, the highest tested. Complete mortality of the test larvae was recorded in treatments with 0.1% fentin acetate and fentin chloride while the same concentration of AC-24055 caused only 50% mortality.

All the antifeedants at 0.05% and above gave good protection of leaves against *Plusia peponis* caterpillars (Table 2). The highest dose of the chemicals

effected complete mortality of the insects. Even the lower concentration of 0.1% of fentin acetate and fentin chloride caused mortality as high as 83.3 and 66.6% respectively.

In the experiment to evaluate the persistence of antifeedants on citrus plants, it was shown that more than 50 per cent leaf protection was offered up to 14, 18 and 6 days by the application of fentin acetate, fentin chloride and AC-24055 respectively (Table 3). In the case of *P. peponis*, the residues of antifeedants remained active on snakegourd leaves sufficient to protect 50% leaf weight upto 18 days in both fentin acetate and fentin chloride and for 10 days in AC-24055.

According to the intensity of symptoms, phytotoxicity was graded as 'very high', 'high', 'medium', 'low' and 'nil'. The grading was done based on the leaf spots and necrotic lesions caused by the chemicals. On citrus, phytotoxicity was low for fentin acetate and 'nil' for both fentin chloride and AC-24055. But there was 'medium' toxicity to snakegourd leaves caused by fentin acetate and fentin chloride while it was 'nil' with AC-24055.

Based on the  $PC_{50}$  values, it can be concluded that fentin chloride is superior to the rest of the antifeedants in its action.

Table 3

Persistence of antifeedants under field conditions against caterpillars of *Papilio demo/eus* and *Plusia peponis*

Interval	Mean % of leaf weight protected over control with <i>P. demo/eus</i>			Mean % of leaf weight protected over control with <i>P. peponis</i>		
	[1]	[2]	[3]	[4]	[5]	[6]
2 days	85.61	90.65	59.44	94.78	98.50	82.51
4 "	85.88	92.82	58.46	93.44	97.69	81.20
6 "	83.51	89.55	58.12	92.89	96.43	78.58
8 "	81.41	87.78	47.74	90.22	96.79	67.92
10 "	79.45	88.81	39.21	89.74	94.37	52.25
12 "	77.46	74.48	30.96	78.48	86.56	41.32
14 "	68.81	67.64	20.45	74.63	78.23	24.23
16 "	49.65	62.85	3-37	67.61	63.45	5.25
18 "	23.37	51.27	—	50.32	51.51	—
20 "	12.33	37.47	—	28.43	28.41	—
22 "	0.89	22.29	—	7.15	3.64	—
24 "	—	3.21	—	1.14	—	—

[1] Fentin acetate

[2] Fentin chloride

[3] AC—24055

Summary

The antifeedant action of fentin acetate, fentin chloride and AC-24055 was evaluated on the caterpillars of *Papilio demoleus* and *Plusia peponis*, Fentin chloride ranked first both in the antifeedant action and field persistence on plants, followed by fentin acetate and AC-24055 for both *P. demoleus* and *P. peponis*, The slight phytotoxicity on citrus and snakegourd did in no way affect the vigour of the crops.

സംഗ്രഹം

ഫെന്റിൻ അസിറ്റേറ്റ്, ഫെന്റിൻ ക്ലോറൈഡ്, ഏ. സി-24 55 എന്നീ പ്രതിക്ഷേപ രാസവസ്തുക്കളെ പാപിലിയോ ഡിമോളിയസ്, പ്ലൂസിയ പെപോണിസ് എന്നീ കീടങ്ങളുടെ ലാർവകൾക്കെതിരായി പ്രയോഗിച്ചു. പ്രതിക്ഷേപപ്രവർത്തനത്തിലും പാടങ്ങളിൽ ചെടികളിൽ വീര്യം തങ്ങിനിൽക്കുന്നതിലും ഫെന്റിൻ ക്ലോറൈഡ് മുന്തിയതായി പരീക്ഷണങ്ങളിൽ തെളിഞ്ഞു. നാരകത്തിന്റേയും പടവലത്തിന്റേയും ഇലകളിൽ ചെറിയ പുളളികൾ ദൃശ്യമായെങ്കിലും പ്രതിക്ഷേപരാസവസ്തുക്കൾ സ്വേദ ചെയ്യുന്നതുമൂലം ചെടികളുടെ വളർച്ച പ്രതികൂലമായി ബാധിച്ചതായി കണ്ടില്ല.

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