

Studies on the Antifeedant Against the Caterpillars of *Pericallia ricini* F. (Arctiidae) and *Spodoptera littoralis* Boesd (Noctuidae : Lepidoptera) on Castor (*Ricinus communis* L.)

by

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Organotin compounds have been recently known for their use in insect control as an antifeedant and chemosterilant (Ascher and Rones, 1964; Kencga, 1965). There are enough findings with different organotins proving their antifeeding efficacy and many compounds for moth proofing have been evolved based on their antifeeding properties rather than on insecticidal effects. The present observation was designed to study the effect of TTH (Triphenyl tin hydroxide) on feeding activity of castor bean leaf caterpillar *Pericallia ricini* F. and *Spodoptera littoralis* Boesd. (*Prodenia litura*).

**Review of Literature:** Antifeeding effects of the triphenyl tins have been established by several workers during recent years. Besides being fungicidal in property Brestan (contains 60% Triphenyl tin acetate) was reported to discourage insect pests from feeding on crops. When Brestan was used at 0.54 lb per acre to control leaf spot disease of sugar beet caused by *Cercospora beticola*, Solel (1964) observed the treated plots to be free from the damage caused by *S. littoralis*. Subsequently this was confirmed by Ascher and Rones (1964) with laboratory experiments and concluded that sugar beet leaves dipped in various concentrations of Brestan inhibited feeding of *S. littoralis* and *Agrotis ypsilon* R. the average percentage of leaf area consumed after 48 hours being reduced from 75 for untreated leaves to 44 and 2 for those treated with concentration of 0.01 and 0.1 per cent respectively. They also reported that fentinhydroxide was almost as effective as Brestan. Ascher and Nissim (1965) have compared the efficiency of compounds Brestan, Tinicide and 24055 (1, 1-di-methyl-3-(p-acetamidophenyl)-triazene) as antifeedant at various concentrations with *S. littoralis* and reported that a concentration 0.058 and 0.075 per cent for fentin acetate 0.065 and 0.155 per cent for fentin hydroxide and 0.12 and 0.36 for compound 24055 was necessary to achieve 95 per cent of leaf protection. The compounds Brestan, Du-Ter (20 per cent Fentinhydroxide) and 24055 effectively discouraged the feeding of potato tuber moth, *Gnorimoschema operculella* Zell. and the striped maize borer, *Chilo agamemnon* Bles. respectively on egg plants and maize treated with these compounds at 0.03-0.04 or 0.05 per cent concentrations. (Meisner and Ascher, 1965). Joshi *et al.* (1967) also reported the

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antifeedant property of Brestan against the tobacco caterpillar *S. littoralis* (*P. litura*). Fentinhydroxide and Brestan were also found to be very effective in inhibiting the feeding activity of maggots of *Musca domestica* L. (Ascher and Nissim, 1967).

**Materials and Methods:** The efficacy of TTH as an antifeedant was tested on third stage larvae of *Pericallia ricini* and *Spodoptera littoralis* following the technique developed by Ascher and Roncs (1964) with slight modification as this compound is insoluble in water. The method consisted of treating the circular bits of castor bean leaf. The size of which has been standardised earlier before the conduct of the present study. The different quantity of chemical was dissolved individually in 25 ml of ethanol and this solution was made up to 100 ml in each case by adding distilled water. The leaf bits were dipped in the solution thoroughly and dried in air current after dripping the excess liquid. The treated leaf bits were kept on a filter paper over a padding of water soaked cotton placed in petri-dishes. In this way necessary amount of humidity in petri-dish was maintained which prevented the leaves from drying. Uniformly weighing third instar larvae were let inside the petridishes and covered with their lids. The trial was replicated twice and conducted with ten treatments including suitable controls in the case of *P. ricini* and with nine treatments in the case of *S. littoralis*.

The observations on area of leaf provided as food, weight of caterpillars before and after feeding and leaf area left out by caterpillars after 48 hours were recorded.

**Results and Discussion:** The data on the mean leaf area consumed by the larvae of *P. ricini* and *S. littoralis* at various concentrations, the mean loss or gain of weight by the larvae and the per cent leaf area protected are furnished in Table 1 and 2.

TABLE 1. *Effect of TTH on leaf area consumption and larval weight in Pericallia ricini*

Percentage of TTH	Mean larval weight (mg)		Weight difference (+) mg	Mean leaf area (rodcd cm <sup>2</sup> **	Mean % of leaf area protected
	Initial	Final after 48 hours			
1. Control — water	451	801	+350	77.67	1.36
2. Control — Solvent	370	739	+369	87.27	0.60
3. 0.010	452	608	+154	29.69	42.19
4. 0.025	449	525	+076	12.08	84.66
5. 0.050	426	449	+023	7.57	90.40
6. 0.100	402	371	-031	2.79	96.46
7. 0.150	412	387	-025	1.31	98.36
8. 0.200	435	412	-023	1.83	97.68
9. 0.400	446	422	-022	1.25	98.40
10. Starved	427	396	-031	—	—

\*\*S. E. = 1.06

C. D. (P=0.01) = 3.54

TABLE 2. Effect of TTH on leaf area consumption and larval weight in *Spodoptera littoralis*

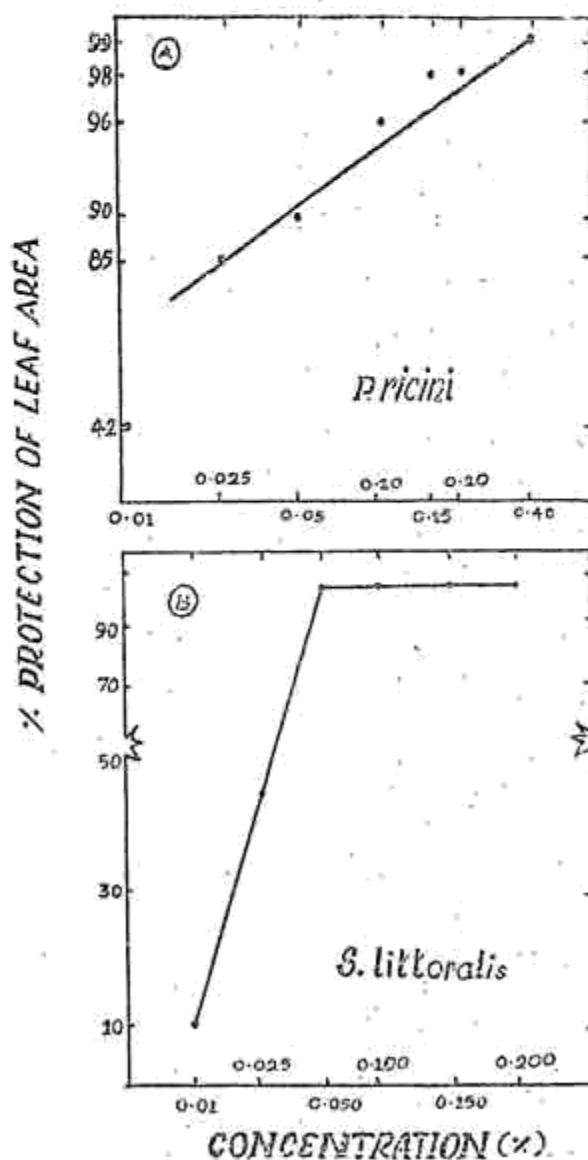
Percentage of TTH	Mean larval weight (mg)		Weight difference (+) mg	Mean leaf area eroded cm <sup>2</sup> **	Mean % of leaf area protected
	Initial	Final after 48 hours			
1. Control — water	258	463	+205	71.50	9.00
2. Control — Solvent	246	449	+203	69.80	11.00
3. 0.010	248	422	+174	23.83	44.00
4. 0.025	211	*	*	1.40	99.00
5. 0.050	238	*	*	1.77	98.00
6. 0.100	243	*	*	0.49	99.00
7. 0.150	262	*	*	0.44	98.00
8. 0.200	248	*	*	0.37	99.00
9. Starv:d	253	*	*	—	—

\*Died after 24 hours.

\*\*S. E. = 1.83

C. D. (P=0.01)=6.12

FIG. A &amp; B. Effect of TTH on Protection of castor leaf.



The figures (A and B) indicate that the chemical at all concentrations tested inhibited feeding of both the insect species. The average leaf area consumed after 48 hours were reduced from 77.67 sq. cm. for untreated leaves to 29.69 to 1.25 sq. cm for those treated with various concentrations in the case of *P. ricini*. A similar reduction in feeding activity of *S. littoralis* has been observed and mean leaf area eroded ranged from 0.37 sq. cm to 23.83 sq. cm while it was from 69.80 sq. cm to 71.50 sq. cm in treated and untreated check respectively. (Plate I & II) The whole data were processed as described by Ascher and Nissim (*loc. cit.*).

In all the observations no repelling effect of any sort was revealed by TTH as the larvae did not move away from the treated leaves. The nibbled the

treated leaves for the first few minutes in all the treatments soon after they are introduced. But subsequently stopped feeding in higher concentrations. The larvae became completely inactive within 18 hours except in the lowest concentration where it took 48 hours.

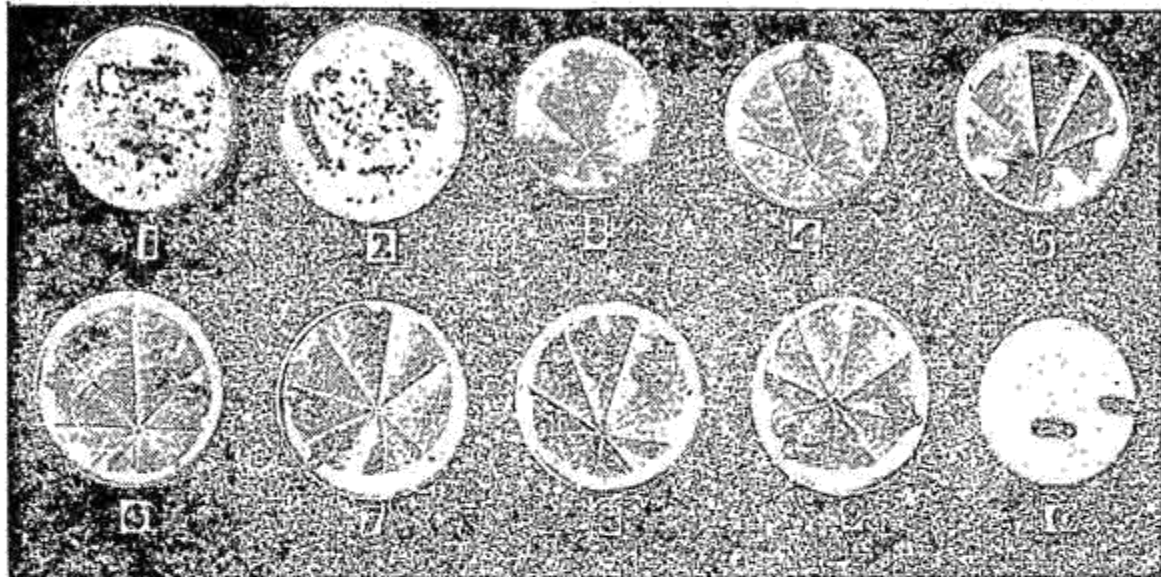


PLATE I. Castor leaf eaten by *Pericallia ricini* F.  
*Legend.* 1. Water 2. Solvent 3. 0.01% 4. 0.025% 5. 0.05%  
 6. 0.10% 7. 0.15% 8. 0.20% 9. 0.40% 10. Starvation

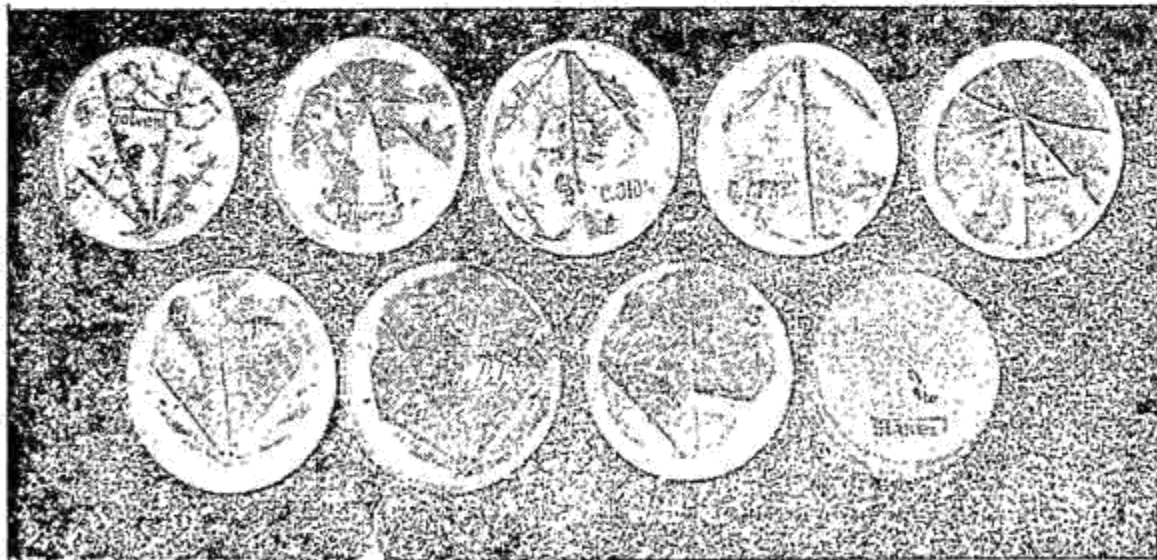


PLATE II. Castor leaf eaten by *Spodoptera littoralis*

The trends in loss of larval weight were almost similar both in respect of caterpillars at higher concentration and completely starved ones. Though the larvae fed on leaves treated with lowest concentration gained weight, not proportionate with weight gain noticed in larvae fed with untreated

These suggest that TTH effectively retarded the feeding activity of both the plant pests.

No larval death was observed throughout the experiment in case of *P. ricini* whereas complete mortality of larvae of *S. littoralis* observed after 24 hours in treatments other than 0.01 per cent and control. This reveals that *S. littoralis* was more susceptible to starvation than *P. ricini*. The death in this case may either be attributed to starvation or to toxic effect of TTH or due to both as reported by Joshi *et al.* (*loc. cit.*) with Brestan. Ascher and Rones (*loc. cit.*) also reported some mortality of *S. littoralis* at various concentrations of Brestan. It can, therefore, be concluded that, TTH even at 0.05 per cent has been found to be very effective as an antifeedant against the larvae of *Pericallia ricini* and *Spodoptera littoralis*.

**Summary:** A study made with triphenyl tin hydroxide showed that this compound at different concentrations effectively prevented the third instar caterpillars of *Pericallia ricini* F. and *Spodoptera littoralis* Boesd. from feeding on castor leaves. The mean percentage of leaf area protected by this compound at various concentrations ranged from 42.19 to 99.00 as against 0.60 to 11.00 in untreated control. Mortality of larvae of *S. littoralis* was observed in all the treatments other than 0.01 per cent and control. No death was noted in the case of *P. ricini*.

**Acknowledgement:** The senior author is grateful to Dr. E. E. Kenega for sparing the chemical for his students on chemosterilants. The authors are thankful to Mr. K. C. Chandy, Lecturer in Entomolgy, and Entomologist and Associate Professor of Entomology for providing facilities in the conduct of the present study.

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