

Insect plant interaction-selection of potential host plants for oviposition by the adult female white cabbage butterfly *Pieris brassicae*

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Abstract

Observations on the oviposition preferences in the females of *Pieris brassicae* in response to different plant species/varieties and forms were made. The index of preference values were calculated on the basis of the number of eggs laid on each plant. The results indicated that fresh, intact and undamaged plants of *Brassica oleracea* (*B.o.capitata* and *B.o.botrytis*) were preferred for egg laying.

Key words: Oviposition, selection of plants, White cabbage butterfly, *Pieris brassicae*.

Introduction

Selection of a host plant for oviposition by the female can be crucial in determining the success for her future generation. Oviposition choice is especially important in insects which have immature stages relatively immobile. Many workers such as Singer *et al.*, 1988; Wiklund, 1975; Jones, 1977; Chew, 1977; Rausher, 1978, 1979 and Stanton, 1979, have emphasized the importance of oviposition preference. Intra-population variation in oviposition preference would have important consequences for resource utilization patterns and would play a key role in shifting to new host plant Tabashnik *et al.* 1981.

This study was conducted to observe the oviposition preferences in the adult female white cabbage butterfly, *Pieris brassicae* in relation to different plant sources. Different plant species viz., (*Brassica oleracea/ Lycopersicon esculentum*); two varieties of *Brassica oleracea* (*Brassica oleracea capitata/ Brassica oleracea botrytis*) in different forms (intact plant/macerated) and fresh plant/plant with egg load/damaged plant were used. The number of eggs laid by female in each experiment were carefully calculated and shown in the table. The index of preference by the ovipositing female has also been calculated.

Material and methods

Method used for observation of oviposition: For observation of oviposition in females of *Pieris brassicae* the method of Tabashnik *et al.* 1981 was followed. The plant samples were placed in the screen cages of 28 cm x 22 cm x 22 cm size, in two pots (pot A and

pot B). Female/females placed individually or in groups 5-10 (as required in the experiment) inside the screen cages. After 24 hours plants were removed from the cages and the eggs were counted. Later, New plant samples were placed in the cages containing same or different females. The method was repeated 5-10 times in the similar fashion.

Method used to calculate Index of preference values: The Index of preference values were calculated by using the following formula:

$$\frac{eA}{eA + B} \times 100 = aeA\%$$

where:

eA = No. of eggs laid on pot A; eA+B = No. of eggs laid on pot A+B; aeA% = percent of age of eggs on A.

The values of >50% show the tendency of female to prefer plant sample in pot A as compared to pot B, whereas the the values <50% show preference to pot B over pot A. The values close to 50% show weak or no preference.

Results

The egg laying preferences by the females of *Pieris brassicae* were observed in five different experiments. In each experiment two plant sources placed in two pots, identified as pot A and pot B and the preference between the two plants for oviposition by the female was observed. The observations were repeated five times using the same or different females each time. The number of eggs laid on each pot in each experiment are shown in the following table.

Table 1.

Showing oviposition preference by the females of *Pieris brassicae* in relation to different plant sources

Pot No.	Plant Source	Number of the eggs laid by female						I.P.values of pot A over B
		Number of the observations						
		1	2	3	4	5	Total	
A	<i>B.o.capitata</i>	70	110	50	200	125	555	51.05%
B	<i>B.o.botrytis</i>	95	69	82	130	156	532	
A	<i>B.o.capitata</i>	90	56	68	46	40	300	91.74%
B	<i>L.esculentum</i>	0	0	7	12	8	27	
A	<i>B.o.capitata</i> (Fresh)	150	90	170	97	105	612	80.0%
B	<i>B.o.capitata</i> (with egg load)	25	37	41	32	20	155	
A	<i>B.o.capitata</i> (Fresh)	83	160	157	99	116	615	78.44%
B	<i>B.o.capitata</i> (fed by larvae)	34	42	29	34	30	169	
A	<i>B.o.capitata</i> (intact plant)	78	86	160	155	171	650	84.63%
B	<i>B.o.capitata</i> (macerated)	27	28	35	17	11	118	

Discussion

In the first experiment the index of preference between *B. o. capitata* and *B. o. botrytis* was 51.05%. The value being close to 50% suggests that pest shows equal preference for both the plants, whereas in the second experiment between *B. o. capitata* and *Lycopersicon esculentum* the value of 91.74% suggests that *B. o. capitata* is highly preferred over *L. esculentum*.

In the next experiment *Brassica oleracea capitata*, fresh plant and plant with egg load were placed in the cage to observe the ovipositional preference. The index preference value for fresh plant over egg bearing plant was around 80%. The value suggests that fresh plants are usually preferred by the females for oviposition, presumably, to avoid intra-specific competition.

In the fourth experiment fresh plant and damaged plant of *Brassica oleracea capitata* were used. The obtained index of preference value was 78.44%, which indicates preference for fresh plant over damaged one.

In the last experiment intact plant/macerated *Brassica oleracea capitata* were put in the cage and the obtained value of index of preference was 84.63% indicating that females prefer intact plant over macerated one for oviposition.

The results of fourth and fifth experiments confirm the findings of other workers that different types of volatile compounds in different concentrations are secreted by the damaged or injured cells of the plant, which attract the natural enemies of the

pest, hence such types of plants are usually avoided by the ovipositing females.

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