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Studies on the Biology of *Hishimonus phycitis* (Distant) on Healthy and Little Leaf Diseased Brinjal (Solanum melongena L.) *

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The biology of *Hishimonus phycitis* on the infected and healthy brinjal plants revealed significantly reduced egg and nymphal period in the leafhoppers cultured on diseased plants. The adult longevity and fecundity of the vector were favoured and the leafhoppers completed their life cycle in a shorter period in the diseased plant with reduced nymphal mortality. The sex ratio of the adults cultured on diseased plants was in favour of females.

The leafhopper, *Hishimonus phycitis* (Distant) has been established as the vector of little leaf disease of brinjal (*Solanum melongena* L.) (Anjaneyulu, 1969). The biology of this leafhopper has been studied by Bindra and Singh (1969) in the healthy brinjal plants. The present paper deals on the variation in the biology of the vector cultured on healthy and diseased brinjal plants.

MATERIAL AND METHODS

H. phycitis was continuously multiplied in the glasshouse at temperatures ranging from 27°C to 30°C and 70 to 80 per cent relative humidity throughout the period of study. The vectors were confined on potted healthy and diseased brinjal plants (Cv. Pusa Purple Long). The biology of the vector was studied on healthy and diseased plants of 80 to 90 days old.

(i) **Egg period :** To find out the egg period, a newly emerged female with two males cultured separately on healthy plants were collected and confined in the single leaf lobe enclosed in a cylindrical plastic cage for a period of 24 hr. Every day the position of the cage was changed and fresh leaf surface was provided in different leaves of the same age. The area of leaf in which the leafhoppers were confined on each day was marked and labelled for further observations.

From the date of emergence of the nymphs, the incubation period was calculated. After recording the emergence, the nymphs were removed from the leaf lobes. This observation was repeated 14 times in each treatment.

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(ii) **Nymphal period**: The newly hatched nymphs on the healthy plants were introduced into microcages positioned in the healthy and diseased plants. Fifteen replications were maintained for each treatment. Duration of different nymphal instars was assessed by observing ecdysis.

(iii) **Adult longevity**: The longevity of adults on healthy and diseased plants was recorded using freshly emerged adults from respective colonies. The leafhoppers were confined in microcage and the life span recorded, in respect of 15 individuals in each treatment.

(iv) **Fecundity**: Freshly emerged male and female insect from respective colonies were confined on diseased and healthy plants and were allowed to feed and oviposit on the same leaf lobe, until death. The total number of eggs laid by the insect was assessed indirectly by counting the number of nymphs emerged out from the leaf. This observation was repeated 15 times in each treatment.

(v) **Sex ratio**: A pair of freshly emerged male and female adult insect from the respective colonies was confined with leaves on healthy and diseased plants separately. The insects were allowed to feed and oviposit untill death. The nymphs were allowed to grow in the same plant till they become adults and they sexed. This observation was replicated 10 times for each treatment.

RESULTS AND DISCUSSION

Incubation period: The mean incubation period was 9.50 days in leafhoppers cultured on diseased plants while it was 10.43 days on healthy plants. The mean incubation period was reduced to the extent of 8.92 per cent in diseased plants and the difference between the diseased and healthy plant was significant (Table).

Nymphal period: There was significant difference in the duration of first instar among the healthy and diseased plants. The mean duration was 3.46 days in diseased, as against 4.46 days in the healthy plants. The mean duration of second instar and third instar in diseased and healthy plants were not statistically significant.

Significant differences in the nymphal period was observed in the fourth instar. It was completed in 2.53 days in diseased as completed in 2.53 days in diseased as compared to 3.60 days in healthy.

Significant prolongation of the nymphal period was found in the fifth instar stage in healthy plant. The mean duration was 4.60 days on healthy plants. The total nymphal duration was 15.52 days in diseased, as against 18.72 days in healthy and the difference was significant.

Nymphal mortality: There was significant increase in the mortality of nymphs when the leafhoppers were

cultured on healthy plants as against diseased plants. There was 77.21 per cent reduced mortality of nymphs on diseased plants.

Total duration of life-cycle: The total life-cycle from egg to adult was completed in 25.02 days on diseased while it took 29.15 days on healthy plant.

Adult longevity: The life span of the adult was decreased considerably in healthy plant. While the adults on an average lived for 22.47 days in diseased plants, mean longevity of adults cultured on healthy brinjal plants was only 9.27 days, the difference being highly significant statistically.

Fecundity: On an average, the total number of viable eggs laid by leafhoppers cultured on diseased source was 51.13, as against 31.20 on healthy source.

Sex ratio: A perceptible difference was evident in the sex ratio of the leafhoppers on diseased plant compared to those cultured on healthy plant. In the former, the number of females that emerged was more and the mean sex ratio of female / male was 1.88 compared to only 0.65 in the case of leafhoppers cultured on healthy plant (Table).

The overall effect of the diseased plants was in favour of the leafhoppers' biology. The egg period was reduced in the diseased plant which might perhaps be due to the altered physiology of the host tissue. Raghuraman (1968) working on the biology of the *Bemicia tabaci* Genn., on bhendi plants infected with yellow vein mosaic also reported similar difference in the egg period of the insect.

The nymphal duration was also significantly reduced in the leafhopper cultured on diseased plants. Reduced nymphal period in the virus-infected plants has earlier been reported by several workers. Miller (1964) observed that the aphid, *Macrosiphum granarium* Kirby, developed in a shorter period on barely infected with yellow dwarf virus. Reduced nymphal period in *B. tabaci* on *bhendi* plants infected with yellow vein mosaic was also on record (Raghuraman, 1968).

Increased number of eggs was found to be laid by the leafhoppers cultured on diseased plants. Raghuraman 1968 also reported similar observations, in *B. tabaci* reared on *bhendi* infected with yellow vein mosaic Kennedy (1951) observed that sugarbeet mosaic virus altered the physiology of the beet plant and thus, resulted in increased production of nymphs of *Aphis fabae* Scop. Arenz (1951) reported that *Myzus persicae* Sulz., multiplied substantially faster on potatoes infected with either potato leaf roll or a severe mosaic than on healthy plants. The beneficial roll of barely yellow dwarf virus to the aphid vector, *Macrosiphum*

TABLE Biology of Hishimonus phycitis on diseased and healthy brinjal plants.

Particulars	Mean		S.E. of mean difference	F value
	Diseased	Healthy		
Incubation period (days)	9.50 (—8.92)	10.43	0.245	3.796*
Nymphal duration (days) first instar	3.46 (—22.42)	4.46	0.374	2.674*
Second instar	2.66 (—6.99)	2.86	0.372	0.538 NS
Third instar	3.00 (—6.25)	3.20	0.416	0.481 NS
Fourth instar	2.53 (—29.72)	3.60	0.226	4.735**
Fifth instar	3.87 (—15.87)	4.60	0.210	3.476**
Total nymphal duration	15.52 (—17.09)	18.72	0.834	3.837**
Nymphal mortality (%)	11.76 (—77.21)	51.61		
Total life-cycle (days) (egg to adult)	25.02 (—14.17)	29.15		
Adult longevity (days)	22.47 (+142.39)	9.27	2.043	6.461**
Fecundity	51.13 (+63.88)	31.20	2.814	7.082**
Sex ratio ♂/♀ → +	1.88 (+189.23)	0.65	0.115	10.696**

Figures in parantheses denote per cent increase (+) over or decrease (—) from healthy

* Significant at 5% level

** Significant at 1% level

NS Not significant.

granarium Kirby, in the increased production of progeny was also on record (Miller, 1964).

Among the adults cultured on diseased host, the proportion of females was higher which revealed that the preferred host tissue had influenced the sex ratio of the test insect in favour of females. Such variations in sex ratio were reported by Raghuraman 1968 in the case of *B. tabaci* on yellow vein mosaic infected bhendi plants. Alteration of sex ratio in favour of females in the preferred host of insect was also reported in several instances (Teotia and Singh, 1968; Pandey *et al.*, 1968; Thomas *et al.* 1969 and Chelliah, 1971).

An analysis on the distribution of various biochemical components in little leaf infected and healthy brinjal leaves has indicated that infected leaf tissue was markedly superior to the vector species for its survival and multiplication (Srinivasan, 1975). A critical scrutiny on the implications of the vector preferring infected plants in the field would reveal that restricted selection, feeding and breeding on healthy plants might result in limited disease spread. On the other hand, when the diseased plants perished, as they did normally, earlier than their healthy counter parts, surrounding healthy plants would aggravate the disease spread. In the light of these facts, the preference of *H. phycitis* to little leaf infected brinjal plants assumes greater importance.

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