Indian J. Ent., **63** (4) : 456-459 (2001)

PARASITES EFFECTED REDUCTION IN FECUNDITY AND RESIN YIELD OF TWO STRAINS OF INDIAN LAC INSECT, *KERRIA LACCA*

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ABSTRACT

As a result of parasitisation during rainy season crop, fecundity and resin production capability of two strains *i.e.* kusmi and rangeeni of the Indian lac insect, *Kerria lacca* (Kerr) were adversely affected. Though no significant difference in size of the healthy and parasitised lac cells was recorded, quantity of the resin produced declined by 17.92% and 17.44%, while fecundity decreased by 32.55% and 34.71% for kusumi and rangeeni strains, respectively. Incidence of parasitisation in female lac insects was 28.13% and 32.18%, respectively for kusmi and rangeeni strains. No inter strain differences due to parasitisation were observed.

Key Words : *Kerria lacca*, parasites, fecundity, resin yield

Insect enemies of Indian lac insect, *Kerria lacca* (kerr) cause considerable damage to the lac crop. Varshney (1976) has reported thirty different parasites of lac insects. Though considerable work on damage caused by lac predators and their management has been done, studies on extent and nature of damage caused by parasites have remained neglected. Whatever little has been done, pertains mostly to extent of parasitistion and relative / seasonal abundance of parasites associated with lac insect (Srivastava *et. al.*, 1984; Srivastava and Chauhan, 1984; Srivastava and Mehra, 1984). Also, Majumdar *et. al.*, (1962) showed interrelationship amongst population of parasitoids of lac insect, and Chowdhury *et. al.*, (1971) worked out relationship between density of lac insect and its parasitoids. Fecundity of lac insect and the resin secreted by it are two important economic parameters; the former being important for propagating next crop while the later is product of commerce. But losses caused by parasites in terms of crop yield and reduced fecundity have not been quantified as yet. With these considerations, damage done to lac crop by parasites was investigated.

MATERIAL AND METHODS

Mature individual female lac insect cells were collected from the field from lac crops on *Butea monosperma (palas)* and *Schleichera oleosa (kusum)* during rainy season generation as lac culture is more vulnerable to parasites in this season. Cells were put individually in 5 ml glass vials and mouth plugged with cotton. Size, weight of lac secreted and fecundity of each cell were measured after a month of storage. The cells were grouped into healthy and parasitised based on the presence of small neatly cut hole (s) in the cells by emerging parasite (s) and / or presence of the parasite (s) in the cell / vial.

Since female cells are globular in shape, average of horizontal and vertical diameter measured with the help of a screwgauge was taken as cell size. Weight of resin secreted by

individual cell was recorded using an electronic balance. Total number of larvae that emerged from the female lac insect in the vial and the larvae which could not emerge were counted after breaking the cell open. The whole count was used as fecundity of the female.

Collected cells were grouped into different classes on the basis of their size. Mean value of each class was used to compare various parameters of healthy and parasitised cells by paired 't' test (Panse and Sukhatme, 1985).

Results and Discussion

Loss in resin yield

Lac insect is gregarious in nature and resin secreted by these coalesce to form a continuous encrustation. The thickness of lac encrustation is one of the criteria for assessing quality of broodlac. It is evident from the data (Table 1) that size of parasitised as well as healthy cells did not differ much but comparison of weight of the resin secreted by the two revealed that the amount of the resin produced by the parasitised cells was significantly lower ($P<0.05$). Average reduction of 17.44% and 17.92% in the resin yield of parasitised cells of *rangeeni* and *kusmi* cells, respectively, was observed. Hence visual assessment of broodlac quality on the basis of encrustation thickness alone may prove to be deceptive unless weight is also taken into account.

Reduction in fecundity

Female lac insects are not only chief lac producers but they also serve to propagate next crop as broodlac (analogues to seed in other crops). Any adverse effect on fecundity of lac insect would have far reaching implications on the next crop. Mehra and Majumdar (1963) have studied emergence of larvae from parasitised female lac cells and concluded that emergence of larvae is not always hampered by parasitisation which is contrary to the observations of the present study, where it was found that decrease in fecundity of lac insect due to parasitisation ranged between 10-100%. The average fecundity of parasitised cells was reduced by 32.55% in *kusmi* ($P<0.01$) and 34.71% in *rangeeni* ($P<0.05$) strain (Table 1). Thus, 48.26 to 53.16% more broodlac would be required as compared to healthy broodlac for inoculating the same number of trees. If parasitised at an early stage the lac insect is practically eaten up by the developing parasitoid rendering the lac useless for broodlac purpose. Moreover, the broodlac harbouring parasites if used for raising next crop would serve as source of infection to new lac culture.

Per cent parasitism

Percentage of parasitism recorded was 32.18% and 28.13%, respectively for *rangeeni* and *kusmi* strains which is much higher than the earlier reports of average 4.8-9.9 per cent parasiltism based on seven years data (Narayanan, 1962). Reinterpretation of the same data by Srivastava and Chauhan (1984), however, revealed that average per cent parasitism for the crop on the basis of females alone worked out to be 20 to 37. In certain years and some localities it was as high as 50%. Jaiswal and Saha (1995) have found positive and significant correlation between density of lac insects and number of parasitoids. So it is highly likely that actual per cent parasitism would be higher than recorded since lac insects generally form a continuous encrustation and the present study was confined only to isolated female lac insects.

Table 1 : Effect of parasitisation on fecundity and resin production on two strains of the Indian lac insect, *Kerria lacca* (Kerr) during rainy season crop

A. *Rangeeni* strain

Size range (mm)	Healthy cells: Mean size (mm)	Frequency	Mean weight (mg)	Mean fecundity	Parasitised cells: Mean size (mm)	Frequency	Mean weight (mg)	Mean fecundity
2.26-2.50	2.40	1	3.23	151	2.38	1	3.20	150
2.51-2.75	2.68	6	4.58	248	2.65	3	4.50	188
2.76-3.00	2.85	12	6.38	357	2.88	8	6.02	227
3.01-3.25	3.12	28	9.50	418	3.10	10	8.03	302
3.26-3.50	3.38	10	11.85	530	3.36	5	10.08	316
3.51-3.75	3.63	2	14.65	689	3.65	1	11.89	388
Total	181.10	59	521.07	24325	84.82	28	204.23	7518
Mean	3.07	-	8.83	412	3.03	-	7.29	269
t- value					ns		2.699*	3.123*

B. *Kusmi* strain

Size range (mm)	Mean size (mm)	Frequency	Mean weight (mg)	Mean	Mean size fecundity	Frequency (mm)	Mean weight (mg)	Mean fecundity
2.51-2.75	2.64	2	5.64	198	2.65	1	5.65	200
2.76-3.00	2.90	8	7.50	231	2.88	2	7.01	164
3.01-3.25	3.15	15	11.63	300	3.13	3	10.20	188
3.26-3.50	3.40	20	16.62	359	3.41	8	12.80	241
3.51-3.75	3.68	30	19.80	431	3.65	15	16.65	280
3.76-4.00	3.85	11	23.35	480	3.86	4	19.22	298
4.01-4.25	4.10	5	27.61	520	4.12	2	21.68	311
4.26-4.50	4.45	1	34.60	596	4.40	1	22.30	300
Total	321.43	92	1601.63	35330	127.91	36	514.46	9334
Mean	3.49	-	17.41	384	3.55	-	14.29	259
t - value					ns		2.808*	4.411**

P = * < 0.05; ** < 0.01

Damage caused by parasites varies depending upon the virulence of outbreak and stage of development of lac encrustation at which the damage is inflicted. Instances of superparasitism (as many as 19 larvae have been reported from a mature female lac cell), multiparasitism and hyperparasitism are not uncommon in lac insect which can further aggravate the problem. Extensive studies are required to assess the quantum of damage done by parasitic complex as well as by individual parasites to devise effective control strategies for better lac crop.

ACKNOWLEDGEMENT

The authors are thankful to the Director, ILRI and Head, Division of Lac Production for providing facilities and Mr. Parvez Alam Ansari for rendering technical assistance.

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(Received:- September, 1998)