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Incidence of associated fauna of lac insect *Kerria lacca* (Kerr.) in *rangeeni* strain at Kanker district of Chhattisgarh

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Abstract

Incidence of associated fauna of lac insect *Kerria lacca* (Kerr.) in *rangeeni* strain was conducted during 2015-16 and 2016-17 at Kanker district of Chhattisgarh. In the present studied incidence of various insect associated with lac insect in *rangeeni katki* strain was recorded in rainy seasons in five blocks of Kanker district. It was indicating that the incidence of various insect viz. *E. amabilis* was recorded with peaked density (8.38 and 9.19/30 cm stick lac) on second fortnight of August and *P. pulvereus* with peaked density (6.61 and 6.77 /30 cm stick lac) on first fortnight of September as major and *Chrysopa. sp.* was recorded as minor predators in *rangeeni katki*. Among the Parasitoids *T. tachardiae* was recorded with peaked density (7.17 and 7.38 /30 cm stick lac) as major potential parasitoids whereas *A. purpureus*, *E. tachardiae* and *Parechthrodryinus clavicarnis* was recorded as minor parasitoids and also recorded the beneficial fauna (Hyper-parasitoids) *B. tachardiae*, *Pristomerus sulci* and *B. greeni* in *rangeeni (katki)* strain.

Keywords: Incidence, associated fauna, lac insect *Kerria lacca* Kerr

Introduction

The term lac seems to have been derived from the Sanskrit word *Laksha* meaning a hundred thousand (Ogle *et al.*, 2006) [8] and is suggestive of the large number of insects involved in its production. The description of the lac insect and its host plant *Butea monosperma* (*Lakshataru*) is recorded in the *Atharva Veda*. It is also mentioned in the *Mahabharata* that *Kauravas* built the highly inflammable *lakhshagriha* or *Jadugriha* (Lac house) with a motive of physically eliminating *Pandavas* by setting the Lac palace on fire (Chattopadhyay, 2011) [1]. *K. lacca* is a scale insect belonging to order Hemiptera, Sub order- Homoptera, Super family- Coccoidea, Family- Tachardiidae. *K. lacca* is exploited for their product of commerce viz. resin, dye, and wax. Cultivation of lac not only provides livelihood to millions of lac growers, but also helps in conserving vast stretches of forest and biodiversity associated with lac insect complex. Lac ecosystem is complex multi-trophic web of flora and fauna. 22 species of lac predators, 30 species of primary and 45 species of secondary parasites, beside several fungal pathogens, represent a rich biodiversity of this ecosystem. Moreover, this natural lac complex also maintains a variety of other tree flora, micro-fauna and soil microorganisms. Several of the insect of the fauna associated with lac insect are species - specific (exclusive to the ecosystem) and hence, loss of even one species of lac insect poses a danger losing many other related species (Sharma *et al.*, 2006) [10].

Eupelmus tachardiae (Hymenoptera: Encyrtidae), *Tachardiaepagus tachardiae* (Hymenoptera: Encyrtidae), *Tachardiaepagus somervilli* (Hymenoptera: Eulophidae), *Coccophagus tschirch* (Hymenoptera: Eulophidae), *Aprostocetus purpureus* (Hymenoptera: Eulophidae) are Major lac parasitoids (Varshney, 1976; Sharma *et al.*, 2006; Jaiswal and Singh, 2013; Daharia and Katlam, 2013) [12, 10, 3, 2].

According to Narayanan (1962) [7] super parasitism can occur but typically one parasite larva occurs in single scale. The parasitoids have life cycle of about one month, compared to 4-9 months for *K. lacca*. *Tachardiaepagus tachardiae*, *Aprostocetus purpureus*, *Coccophagus tschirchii* have 10-12 generation on commercial lac in a year, compared to 9 generation for *Parechthrodryinus clavicarnis* Cameron, an encyrtid that can be either a primary or secondary parasitoids. *T. tachardiae* and *A. purpureus* are the most abundant lac associated parasitoids belongs to the order hymenoptera (Chattopadhyay, 2011) [1].

Chhattisgarh is the major lac cultivated area in all over the India. Kanker is the major lac cultivated area and second largest production after Korba in Chhattisgarh. So it is necessary to identified lac insect predators and parasitoid and takes precaution for management of lac insect fauna. Keeping this in view incidence of associated fauna of lac insect *Kerria lacca* (Kerr.) in *rangeeni* strain was conducted at Kanker district of Chhattisgarh.

Materials and Methods

Incidence of associated fauna of lac insect *Kerria lacca* (Kerr.) in *rangeeni* strain was conducted during 2015-16 and 2016-17 at Kanker district of Chhattisgarh. To recorded the predators and parasitoids of lac insect *K. lacca* Kerr. The untreated different host plants, palas (*B. monosperma*), and ber (*Z. mauritiana*), 4 plants was randomly selected for the survey of associated fauna of natural bio agent (predators and parasitoids) of lac insect at farmers field in *rangeeni katki* (rainy) crop seasons from Kanker, Narharpur, Charama, Durgukondal and Bhanupratappur block of Kanker district of Chhattisgarh.

The associated natural enemies of lac insects was recorded from infested lac encrusted twigs of 30 cm length 4 plants (4 twigs of each plant), at fortnightly interval, collected samples was kept in 60 mesh nylon basket (bag) for 10-15 days for the emergence of natural enemies, and calculate the total number of egg/larva/pupa/adults of predators/parasitoids/hyper-parasitoids in block wise. The collected samples were identified by scientist laboratory at IINRG, LPU, Namkum, Ranchi, Jharkhand.

Results and Discussion

In the present studied incidence of various insect associated with lac insect in *rangeeni* strain was recorded in rainy seasons. It was indicate that the incidence of various insect viz. *E. amabilis* and *P. pulvereae* was recorded as major and *Chrysopa. sp.* was recorded as minor predators. Among the Parasitoids *T. tachardiae* was recorded as major potential parasitoids whereas *A. purpureus*, *E. tachardiae* and *Parechthrodryinus clavicarnis* was recorded as minor parasitoids and also recorded the beneficial fauna (Hyper-parasitoids) *B. tachardiae*, *pristomerus sulci* and *B. greeni* in *rangeeni (katki)* strain in five blocks of Kanker district of Chhattisgarh during year 2015-16 and 2016-17. (Table 1 and 2).

Incidence on the basis of two year pooled mean population of *E. amabilis* in was active from 1st fortnight of August to 2nd fortnight of October and reached its peak population with 8.38 insect per 30 cm stick lac during 2nd fortnight of August *rangeeni, katki* (rainy) strain,

Studies was based on pooled mean population of *P. pulvereae* was first appeared with 2.95 per 30cm stick lac in first fortnight of August, which active from 1st fortnight of August to 2nd fortnight of October. Suddenly increased with its peak mean population 6.61 per 30 cm stick lac in first fortnight of September in *rangeeni, katki* (rainy) strain,

Two year pooled mean showed its peak population of lac insect predator *Chrysopa sp.* was recorded peak density with 4.05 insect per 30 cm stick lac in first fortnight of August, which active from 1st fortnight of August to 2nd fortnight of October in *rangeeni, katki* (rainy) strain,

Based on the pooled mean population of lac insect parasitoid *T. tachardiae* was recorded active from 1st fortnight of September to 2nd fortnight of October. It gradually increased and reached peak mean population with 7.17 insect per 30 cm

stick lac in second fortnight of October in *rangeeni, katki* (rainy) strain,

On the basis of pooled mean population of *A. purpureus* was recorded its first appearance in first fortnight of September with 0.60 insect per 30 cm stick lac, whereas the population gradually increased and reached maximum mean population 2.33 insect per 30cm in second fortnight of October in *rangeeni, katki* (rainy) strain,

Investigate based on two year pooled mean population of *E. tachardiae* in *rangeeni, katki* (rainy) strain was recorded first appearance in first fortnight of September with 0.22 insect per 30 cm stick lac. The maximum mean population with 0.99 insect per 30 cm stick lac in second fortnight of October,

Study the two year pooled mean population parasitoid *P. clavicornis* was first observed in first fortnight of August with mean population 0.27 insect per 30 cm stick lac. The highest mean population was observed in second fortnight of October with 1.60 insect per 30 cm stick lac in *rangeeni, katki* (rainy) strain,

Investigate the two years pooled mean population of hyper-parasitoids *B. tachardiae* was recorded its first appearance in second fortnight of August with mean population 0.39 insect per 30 cm stick lac. Highest mean population was recorded in second fortnight of October with 1.05 insect per 30 cm stick lac in *rangeeni, katki* (rainy) strain.

Two year pooled mean population of hyper-parasitoid *P. sulci* in *rangeeni, katki* (rainy) strain was recorded its first appearance in first fortnight of September with the mean 0.30 insect per 30 cm stick lac, the highest mean population was recorded during the second fortnight of October with the mean population 0.60 insect per 30 cm stick lac.

The study of two year pooled mean population of *B. greeni* was noticed first appearance in the first fortnight of August with 0.29 insect per 30 cm stick lac. Which increase and reached the peak mean 1.69 insect per 30 cm stick lac in first fortnight of September in *rangeeni, katki* (rainy) strain.

Present trends was similar to Jaiswal *et al.*, (1998) was reported that the lac insect beneficial parasitoids of *B. greeni*, *A. Tachardiae*, *Pristomerus sulci* and *B. Tachardiae* population to the extent of 69,60,100 and 100 per cent respectively.

According to Uike (2015)^[11] The *E. amabilis* and *P. pulvereae* were recorded as key predator and *Chrysopa sp.* was recorded as minor predator. Among the parasitoids *T. tachardiae* recorded as a major status in Kanker district of Chhattisgarh, and seasonal incidence of predators and parasitoids viz. *E. amabilis*, *P. pulvereae*, *chrysopa sp.*, *T. tachardiae*, *E. tachardiae* and *A. purpureus* in Gariaband district of Chhattisgarh. Comformity with present studies.

Present studies more or less similar to Meena *et al.*, (2018)^[5] reported that during the investigation 11 species of fauna associated with *Kerria lacca* (Kerr.) from 8 families under 3 were recorded representing predator species *E. amabilis*, *P. pulvereae*, *C. zastrowi*; primary parasitoids *T. tachardiae*, *A. purpureus*, *T. clavicornis*, *E. dewitzi* and hyper-parasitoids *A. fakhruhajiae*, *E. tachardiae*, *B. greeni*, *B. tachardiae*.

Present findings are agreement with Mohansundram *et al.*, (2018) who reported that variation in lac associated fauna in relation to different lac host plant for both *rangeeni* and *kusmi* strain. Lac associated fauna viz. *T. tachardiae*, *A. purpureus*, *P. clavicornis*, *E. amabilis*, *P. pupvereae* and hyper parasitoids *B. greeni*, *B. tachardiae* and *Elasmus clavipennis* was observed in *katki, baisakhi, jethavi* and *aghani* crop of different host plant viz. palas, ber, kusum, semialata and redgram.

Table 1: Population density of lac insect associated fauna on *rangeeni* strain during 2015-16

Fortnightly interval dates	Population density of lac insect associated fauna on <i>rangeeni</i> strain (Number of insect per 30 cm stick lac)									
	Predators			Parasitoids				Hyper-parasitoids		
	<i>E. amabilis</i>	<i>P. pulvereae</i>	<i>Chrysopa sp.</i>	<i>T. tachardiae</i>	<i>A. purpureus</i>	<i>E. tachardiae</i>	<i>P. clavicornis</i>	<i>B. tachardiae</i>	<i>P. sulci</i>	<i>B. greeni</i>
15-Aug	3.73	2.88	3.98	0.00	0.00	0.00	0.23	0.00	0.00	0.28
30-Aug	8.48	6.40	3.65	0.00	0.00	0.00	0.50	0.35	0.00	1.25
15-Sept	4.40	6.53	3.33	2.00	0.55	0.20	0.93	0.53	0.28	1.65
30-Sept	3.38	2.43	2.45	3.33	0.80	0.35	1.15	0.60	0.38	0.65
15-Oct	2.58	1.63	2.00	5.05	1.43	0.68	1.40	0.93	0.48	0.35
30-Oct	1.23	0.98	1.20	7.00	2.18	0.95	1.60	1.03	0.65	0.15

Table 2: Population density of lac insect associated fauna on *rangeeni* strain during 2016-17

Fortnightly interval dates	Population density of lac insect associated fauna on <i>rangeeni</i> strain (Number of insect per 30 cm stick lac)									
	Predators			Parasitoids				Hyper-parasitoids		
	<i>E. amabilis</i>	<i>P. pulvereae</i>	<i>Chrysopa sp.</i>	<i>T. tachardiae</i>	<i>A. purpureus</i>	<i>E. tachardiae</i>	<i>P. clavicornis</i>	<i>B. tachardiae</i>	<i>P. sulci</i>	<i>B. greeni</i>
15-Aug	3.55	3.03	4.13	0.00	0.00	0.00	0.30	0.00	0.00	0.30
30-Aug	8.28	6.50	3.65	0.00	0.00	0.00	0.50	0.43	0.00	1.23
15-Sept	4.40	6.70	3.55	2.33	0.65	0.23	1.00	0.48	0.33	1.73
30-Sept	3.25	2.73	2.68	3.73	0.90	0.50	1.23	0.65	0.40	0.85
15-Oct	1.73	2.35	2.33	5.60	1.48	0.83	1.40	0.83	0.50	0.40
30-Oct	1.00	1.20	1.30	7.33	2.48	1.03	1.60	1.08	0.55	0.15

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