

**MANAGEMENT OF PREDATORS AND PARASITOIDS IN  
LAC CULTURE THROUGH BROODLAC TREATMENT USING  
NOVALURON AND *BACILLUS THURINGIENSIS* VAR. *KURSTAKI***

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**ABSTRACT**

The safety of novaluron and *Bacillus thuringiensis* var. *kurstaki* formulations was evaluated against lac insect *Kerria lacca* (Kerr) and for their efficacy against associated predators and parasitoids. Four concentrations of novaluron 5%EC viz., 0.00125, 0.0025, 0.005 and 0.01% a.i. and two concentrations of *Bt* formulations, 0.34 and 0.51% a.i. were evaluated by dipping of brood lac (functional seed of lac culture) in insecticidal formulations for 5, 10 and 15 min. Non-significant differences amongst these treatments about survival of settled second instar larvae clearly indicated the safety of these insecticides to lac insect. Treatment of brood lac in insecticidal formulations for 5, 10 and 15 min duration exerted significant reduction in the population of lepidopteran predators *Eublemma amabilis* Moore (Noctuidae) and *Pseudohypatopa pulverea* Meyrick (Blastobasidae) which infest brood lac. The treatment of *rangeeni* brood lac with 0.0025% a.i. novaluron for 5 min resulted in significant reduction in the population of *E. amabilis*, *P. pulverea* and *Tachardiaephagus tachardiae* (parasitoid of lac insect). Dipping of *rangeeni* brood lac in *B. thuringiensis kurstaki* formulation (0.34% a.i.) also resulted in significant reduction in *E. amabilis* and *P. pulverea* populations. The treatment of *kusmi* brood lac with 0.005% a.i. for 5 min duration provides effective control of both key predators. Novaluron and *Bt* formulations can be safely and effectively integrated through brood lac treatment in IPM programme of lac production system.

**USE OF BLACK PEPPER AND CLOVE AGAINST PULSE BEETLE  
*CALLOSBRUCHUS MACULATUS* (F.) IN GREEN GRAM**

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**ABSTRACT**

An experiment was conducted to evaluate the effect of pepper powder, solvent extracted piperine and clove oil against pulse beetle *Callosobruchus maculatus* in stored green gram at the Post Harvest

Technology Center, Bapatla, Guntur District, Andhra Pradesh during 2015 and 2016. There were 11 treatments viz., pepper powder mixed with grain at four different doses i.e., 0.1, 0.2, 0.3 and 0.4% (w/w), pepper powder in sachet @ 1 g and 2 g, cotton swab impregnated with piperine solution @ 3.0% (w/v), plywood piece impregnated with piperine solution @ 1.5% and 3.0% (w/v), plywood piece impregnated with clove oil @ 0.5 ml along with an untreated control. Significant differences were observed among the treatments in population buildup and grain damage due to different doses at exposure times. Grain mixing of pepper powder had a dose response relationship as the adult emergence decreased with dose of from 1 to 4% at all the exposure periods. The mean total emergence and the % grain damage were significantly less in the treatments. Among the pepper treatments, direct mixing of powder with grain was observed to be the most effective over surface placement of piperine extract through plywood pieces or cotton swab.

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### **INTERCROPPING FOR MANAGEMENT OF *HELICOVERPA ARMIGERA* IN CHICKPEA**

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### **ABSTRACT**

Experiments were conducted to study the influence of intercrops in the management of gram pod borer *Helicoverpa armigera* (Hubn.) in chickpea. Minimum larval population/plant was observed recorded in chickpea + linseed (3: 1) during the *rabi* over two years i.e., 2014-15 and 2015-16. The lowest pod damage by *H. armigera* was also observed with chickpea + linseed. The maximum yield was obtained with chickpea + linseed, with maximum increase in yield over control being in chickpea + linseed followed by chickpea + coriander.

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### **COMPATIBILITY OF INSECTICIDES WITH PROPICONAZOLE AGAINST FOLIAR APHID *RHOPALOSIPHUM MAIDIS* (FITCH) AND YELLOW RUST IN WHEAT**

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## ABSTRACT

Occurrence of foliar aphid infestation and yellow rust infection is often simultaneous in wheat growing areas of North-Western Plains Zone (NWPZ). Farmers usually apply insecticides and fungicides separately for their management. Combined application of pesticides can be practiced saving cost, time and labour. Hence, a study was conducted during 2014-15 and 2015-16 to determine efficacy of two insecticides, imidacloprid @ 100 ml/ ha and thiamethoxam @ 50 ml/ ha, and one fungicide, propiconazole @ 500ml/ ha alone as well as in combinations using two spray volumes of 250 and 500 l against foliar aphid and strip rust. The aphid population during 2014-15 after 15 days of spraying was observed to be the least (2.5 aphids/earhead) in sole application of imidacloprid @ 100 ml/ ha, while during 2015-16, the least population (1.9 aphids/ earhead) was in combination treatment of propiconazole with thiamethoxam @ 50 ml/ ha in 250 l of water. The strip rust severity in combination treatments was 5-10% as compared to 40-60% in control plots. Coccinellid population in combination treatments ranged from 13.0-19.6/ plot as compared to 39.6-42.3/ plot in control plots. The studies indicated that mixing of broad spectrum fungicide, propiconazole did not influence the efficacy of two insecticides against foliar aphid.

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## ON ACRIDIDAE (ORTHOPTERA: ACRIDOIDEA) FROM KERALA

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## ABSTRACT

A faunistic survey conducted on the acridid fauna of Kerala, India revealed 41 species belonging to 30 genera in 10 subfamilies of the family Acrididae. These led to five new records from Kerala. The subfamilies Oedipodinae and Catantopinae were observed to include maximum abundance.

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## VALIDATION OF IPM MODULE FOR PIGEON PEA POD BORER

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## ABSTRACT

Pigeonpea (*Cajanus cajan* L. (Millsp.)) is attacked by more than 300 species of insects of which gram pod borer, *Helicoverpa armigera*, spotted pod borer, *Maruca vitrata* and pod fly, *Melanagromyza obtusa* are the most important. The misuse of pesticides has resulted in hazards like pesticide residues, resistance and pest resurgence. Integrated pest management (IPM), an ecological approach of which a module was evaluated for its adoption in pigeonpea over two years. The results revealed that IPM module can reduce number of sprays with high economic returns as against farmer's practice. IPM package consisting of seed treatment with *Trichoderma viride* and vitavax @ 10 g and 2 g/kg seed, respectively, intercropping with green gram (1:7 row ratio), monitoring through pheromone traps @ 10 /ha, erecting bird perches @ 50/ ha and spraying of NSKE (neem seed kernel extract) 5% or neem formulation (1500 ppm) @ 5ml/l at flower bud initiation stage, followed by need based spraying of chlorantraniliprole @ 0.3 ml/ l (at 50% flowering), indoxacarb @ 0.75 ml/1 or flubendiamide @ 0.2 ml/1 or emamectin benzoate @ 0.4 g/1 and dimethoate @ 2 ml/1 at 10 days interval was the most effective with higher cost benefit ratio *i.e.*, 1: 3.23 in IPM module compared to farmer's practice (1: 2.12).

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## REPRODUCTIVE ISOLATION IN LAC INSECTS- *KERRIA LACCA* AND *KERRIA CHINENSIS*

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### ABSTRACT

Lac insects belongs to the family Tachardiidae (=Kerridae) of the order Hemiptera, and superfamily Coccoidea. In this family, there are 99 species under 9 genera, of which 26 species under two genera occur in India. Natural populations of *Kerria* spp. are distributed throughout India and *K. chinensis* in the northeastern states is also cultivated to a certain extent. Cross breeding study done between lac insects, *K. lacca* and *K. chinensis* revealed that female cell weight was more in mated *K. chinensis* (14.5 and 29.6 mg) as compared to virgin *K. chinensis* (5.7 and 8.8 mg) in summer and rainy seasons, respectively. The physical growth of fertilized female indicated successful mating between the two species. Mated females secreted more resin compared to virgins; however, no embryonic development was observed in their ovaries and hence no young ones emerged from mated *K. chinensis*, indicating reproductive isolation. Therefore, it is inferred that *K. lacca* and *K. chinensis* are distinct species, which is corroborated with analyses using molecular markers. The ecological speciation is perhaps involved in *K. chinensis* during evolution.

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## BIOCHEMICAL CONSTITUENTS IN LEAVES OF PRIMARY HOST OF TASAR SILKWORM *ANTHERAEA MYLITTA*

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**ABSTRACT**

The present study attempts to evaluate some important biochemical constituents of the three primary host plants, i.e., *Terminalia tomentosa* (asan), *Terminalia arjuna* (arjun) and *Shorea robusta* (sal) of the tropical tasar silkworm *Antheraea mylitta* Drury. The biochemical constituents, like protein, ascorbic acid, reduced glutathione (GSH) and level of lipid peroxidation were assayed. The results indicate that the concentrations of protein, ascorbic acid and reduced glutathione (GSH) are highest in sal followed by Asan and are found to be the least in Arjun. The level of lipid peroxidation is highest in Asan and lowest in Sal.

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**NUTRITIVE VALUE OF VARIEGATED GRASSHOPPER  
ZONOCERUS VARIEGATUS (L.)**

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**ABSTRACT**

The act of eating insects (entomophagy) has been on the increase due to their medicinal and nutritional importance. This study examines the gender differences in the nutritive value of adult variegated grasshopper *Zonocerus variegatus* (L.). The proximate (crude protein, fibre ash, fat and carbohydrate), mineral ( $\text{Na}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  and  $\text{Fe}^{2+}$ ), vitamin (A, B<sub>1</sub>, B<sub>2</sub> and C), anti-nutrients (flavonoids, tannin, saponin, alkaloid and antraguinone) assays and heavy metals compositions (Pb, Cu, Zn, Cd and Ni) of newly emerged male and female adults were analyzed by standard methods. Adult female *Z.variegatus* had significantly higher ( $p<0.05$ ) crude protein, ash, fibre and carbohydrate than the male. Similar trend was observed for mineral composition and vitamins assay of the adults. Anti-nutrients and heavy metal composition of the adults varied from 0.210- 8.82% and 0.113-1.264 mg/100g, respectively with the female showing higher values. Adult female *Z.variegatus* is thus more nutritious than the male.

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# PARASITOID WASPS OF SYNANTHROPIC FLIES FROM IRAN

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## ABSTRACT

Synanthropic flies belong to the order Diptera and these are considered as medical or veterinary pests. This study is an attempt to identify native parasitoid wasps of these flies for selecting a suitable biological control agent. The pupae of *Musca domestica*, *Lucilia sericata* and *Sarcophaga haemorrhoidalis* were used for attracting parasitic wasps, with 50 pupae of each species placed in dishes. The results revealed parasitoids viz., *Nasonia vitripennis*, *Pachycrepoideus vindemmiae* and *Spalangia nigroaenea* (Hymenoptera: Pteromalidae), with majority being *N. vitripennis*. *Spalangia nigroaenea* was obtained only from house fly pupae. Of the three parasitoids, only *N. vitripennis* exhibited polyembryony with 11 adults from single pupa. The study reveals that *N. vitripennis* might be a candidate for biocontrol of synanthropic flies, and *S. nigroaenea* is suitable for specific control of house fly.

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## VESPIDAE (HYMENOPTERA) FAUNA OF POONCH DISTRICT, PAKISTAN

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## ABSTRACT

Faunistic studies on the Vespidae of Poonch District, Azad Kashmir, Pakistan revealed twelve new records: These include *Allorhynchium argentatum* (Fabricius, 1804), *Antodynerus flavescens flavescens* (Fabricius, 1775), *Delta dimidiatipenne* (de Saussure, 1852), *Polistes dominula* (Christ, 1791), *P. olivaceus* (De Geer, 1773), *P. rothneyi carletoni* van der Vecht, 1968, *P. stigma tamulus* (Fabricius, 1798), *P. wattii* Cameron 1900, *Ropalidia brevita* (Das and Gupta, 1989), *Vespa orientalis* Linnaeus, 1771, *V. velutina* (Lepelletier, 1836) and *Vespula flaviceps* (Smith in Horne & Smith, 1870). The diagnostic characters of family, subfamilies and genera, the local distribution along with remarks of these new records are provided.

**Key words:** Vespidae, Poonch, Azad Kashmir, new records, diagnostics, subfamily, genus, species, remarks