

**CHARACTERIZATION OF POTENTIAL NATIVE *BACILLUS THURINGIENSIS* STRAINS  
ISOLATED FROM INSECT CADAVERS AGAINST COTTON APHID**

***APHIS GOSSYPHII* GLOVER (HEMIPTERA: APHIDIDAE)**

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**ABSTRACT**

The cotton aphid *Aphis gossypii* is one of the important sucking pests of cotton. Studies on toxicity of *Bacillus thuringiensis* (*Bt*) against hemipterans are rare. In the present study, five native *Bt* strains viz., VKK-AC1, VKK-AC2, VKK-BB1, VKK-BB2 and VKK-PX1 isolated from insect cadavers showed consistent mortality of adults of *A. gossypii* in pre-solubilized, solubilized as well as in trypsinized form. The LC50 values for these showed that VKK-AC2 and VKK-BB1 were the most effective followed by VKK-PX1 and VKK-BB2. SDS-PAGE gel analysis of toxins showed 20-135 kDa bands in presolubilized and 20-106 kDa in solubilized form. As regards trypsinized form protein profiling of all the five native *Bt* strains showed two bands each in the range of 60-66 kDa which were highly toxic. All the shortlisted *Bt* strains viz., VKK-AC1, VKK-AC2, VKK-BB1, VKK-BB2 and VKK-PX1 amplified novel band of 275-292 bp with *cry4* gene specific primers.

**INCIDENCE OF APHID *MACROSIPHUM EUPHORBIAE* THOMAS  
ON POTATO IN NORTHERN KASHMIR**

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**ABSTRACT**

The investigations on the incidence and severity of foliage aphid *Macrosiphum euphorbiae* Thomas on potato (*Solanum tuberosum* L.) in northern Kashmir Valley were undertaken at Baramulla, Kupwara and Bandipora districts in the two cropping seasons 2011 and 2012. Observations revealed that it appeared in the 2<sup>nd</sup> week of April to 1<sup>st</sup> week of May and attained peak in June in plains and mid hills; while at the high hills, it appeared by the end of May to 1<sup>st</sup> week of June with peak being at the end of June to 1<sup>st</sup> week of July. Maximum incidence of 16.00±4.98% was at Ajas Bandipora followed by 15.55±5.56% at Pattan Baramulla; and the least incidence of 8.00±3.12% was observed at Gurez, Bandipora in 2011. Similarly, during 2012, the maximum incidence of 16.00±5.24% was observed at Pattan Baramulla, and the least of 8.88±2.88% at Gurez. Based on pooled data, a maximum incidence of 15.77±0.21% was observed at Pattan Baramulla and the least of 8.44±0.43% was again at Gurez.

**HEALTHY MANAGEMENT OF HONEY BEES (*APIS MELLIFERA*) WITH  
WINTER PACKING OF HIVES IN KASHMIR**

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#### ABSTRACT

*Apis mellifera* colonies does not hibernate in winter, their bees form cluster, clinging tightly onto the combs of hive. Thermal management strategies are employed to protect the colony from freezing. In the present study survival in the extreme cold for extended periods in chilly winter in Kashmir was studied during the 40 days starting from 20<sup>th</sup> December to January 30<sup>th</sup>, when the winter mortality is more. It was observed that such mortality varied considerably in different regions in the survey conducted during 2008-2012. 72.55% farmers were observed using gunny bags as packing material over the bee hives, while 26.93% used rice straw. Highest (80%) survivability of bees was obtained with combination of paper rice straw and gunny bags as packing material. The economics of migratory and non migratory honey bees was also worked out.

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#### **BIOEFFICACY OF ETHIPROLE 40+ IMIDACLOPRID 40 (GLAMORE 80WG) AGAINST BIHAR HAIRY CATERPILLAR, *SPILARCTIA OBLIQUA* (WALKER)**

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#### ABSTRACT

Bioefficacy of ethiprole 40+ imidacloprid 40 (Glamore 80WG) against 14d old larvae of *Spilosoma obliqua* (Walker) by leaf dip method revealed a feeding inhibition of 87.60 and 81.86% @0.833 and 0.666% at 24HAF (hours after feeding) as compared to control, respectively. The LC<sub>50</sub> values against 9d old larvae at 2.5, 3.0, 3.5, 4.0 and 5.0 days after feeding (DAF) were 1.018, 0.802, 0.606, 0.464 and 0.334%; and against 14d old larvae at 4.0 and 5.0 DAF were 0.628 and 0.563%, respectively. The LT<sub>50</sub> values against 9d old larvae were 51.08, 81.90 and 96.85 hr @0.833, 0.666 and 0.499%, respectively. The LC<sub>50</sub> values against 9d old larvae in atomization method at 3, 4 and 5 DAE (days after exposure) were 0.466, 0.369 and 0.324%, respectively; and against 5d old larvae it was observed to be 0.293 and 0.130% at 3 and 4 DAE, respectively. With the topical exposure method, it neither showed morbidity nor mortality up to 4 DAE to the five doses (4.15 to 20.82µg/larva) against 14d old larvae.

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#### **FIELD EFFICACY, NON-TARGET TOXICITY AND ECONOMICS OF NOVEL SYSTEMIC MOLECULES AGAINST *LIPAPHIS ERYSIMI* K. AND SEASONAL INCIDENCE IN MUSTARD**

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#### ABSTRACT

Population of mustard aphid *Lipaphis erysimi* Kalt., was observed to build up from mid December and attained peak after mid January irrespective of plant parts of rapeseed variety *Subinoy* during 2013-2014 and 2014-2015

at Instructional Farm, Jaguli, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal. Minimum temperature, relative humidity and dew point were observed to be positively correlated with population build up; while, maximum temperature and rainfall showed a negative relationship. The field efficacy of azadirachtin 5% w/w, pyriproxyfen 10 EC, flonicamid 50 WG, acephate 75 SP, dimethoate 30 EC, chlorpyrifos 20 EC, imidacloprid 17.8 SL, thiamethoxam 25 WG, thiacloprid 21.7 SC and acetamiprid 20 SP revealed that flonicamid (84.9 to 94.7% mortality) and pyriproxyfen (81.7 to 93.00%) effectively managed this pest up to 15-18 days followed by imidacloprid (77.5 to 89.00%) and thiacloprid (71.9 to 85.8%) for first 10 days. Azadirachtin and organophosphates showed significant results for first 5-6 days with 44.1 to 56.3% and 52.7 to 74.1% mean population reduction during first and second season, respectively. Flonicamid and pyriproxyfen were found to be comparatively safe to the predators viz. *Coccinella septempunctata* and *Episyrphus balteatus* in contrast to others. Highest mean seed yield (16.3 q/ha) was obtained with flonicamid along with 1: 10.06 cost: benefit ratio followed by thiacloprid (1: 8.24), imidacloprid (1: 7.72) and pyriproxyfen (1: 7.55).

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**IMPACT OF DISSEMINATION OF IPM STRATEGIES AGAINST  
INSECT PESTS OF TRANSGENIC COTTON IN PUNJAB**

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**ABSTRACT**

Integrated Pest Management (IPM) module for the management of major insect pests of cotton developed by Punjab Agricultural University, Ludhiana was disseminated in 129 villages of four blocks of Bathinda district, Punjab viz., Talwandi Sabo, Mour, Bathinda and Sangat. Two non-IPM villages in each block adjoining to IPM villages were selected as check. The dissemination of IPM strategies reduced the incidence of insect pests in IPM villages as compared to non-IPM villages. The mean population of jassid nymphs and whitefly adults/ three leaves was lower in IPM villages (0.75, 0.79) as compared to non-IPM villages (1.61, 2.58). Mealybug population/ 2.5cm central shoot was lower in IPM villages (0.11) over non-IPM villages (0.49). The tobacco caterpillar infestation was also lower in IPM villages (0.13) than in non-IPM villages (0.62). Population of natural enemies including spiders, predatory bugs, ladybird beetle, green lace wing was highest in IPM villages (0.54) while lowest in non-IPM villages (0.23). The adoption of IPM module resulted in 18.82% reduction in number of sprays in IPM villages over non-IPM villages. The reduction in cost of spray in IPM was 15.87% over non-IPM villages. The average cost of cultivation was Rs. 26752/ ha in IPM villages, which was marginally higher than in non-IPM villages (Rs. 26684/ ha). Average seed cotton yield was higher in IPM villages (22.57q/ha) in comparison to non-IPM villages (19.98 q/ha). The average net return in IPM villages was Rs. 43210/ha, which was more than non-IPM villages (Rs. 35263/ha), with an additional profit of Rs 7945/ha.

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**BIOLOGY OF THE INVASIVE MEALYBUG**

***PHENACOCCLUS MADEIRENSIS* GREEN ON COTTON**

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## ABSTRACT

During last decade many invasive mealybugs were reported as major threat to agriculture in India. Among these, the recently introduced mealybug, *Phenacoccus madeirensis* Green (Hemiptera: Pseudococcidae) was observed expanding its horizons to cotton growing areas of South Karnataka and Maharashtra. Since it is necessary to study its lifecycle, so as to identify the vulnerable stage, the present study was undertaken during 2014-15 under laboratory conditions on cotton. The results revealed that its males had a slightly longer nymphal period ( $22.4 \pm 1.49$  days) compared to females ( $20.96 \pm 1.03$  days) due to additional pupal stage. Fecundity of female ranged from 215-398 eggs/ female. The pre-ovipositional, ovipositional and post-ovipositional periods lasted for  $9.6 \pm 0.93$ ,  $5.56 \pm 0.69$  and  $4.12 \pm 0.81$  days, respectively. Adult female lived for  $25.04 \pm 1.50$  days, while its adult males lived for only  $2.48 \pm 0.49$  days. The total developmental period of females lasted for  $48.28 \pm 2.12$  days and in males  $24.88 \pm 1.98$  days.

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### **MANAGEMENT OF WHITEFLY *BEMISIA TABACI* (GENN.) ON POTATO WITH AZADIRACHTIN AND INSECTICIDE COMBINATIONS**

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## ABSTRACT

Field trials were conducted on potato (variety Kufri Pukhraj) to evaluate azadirachtin, and its combinations with thiamethoxam, imidacloprid, spinosad, and triazophos against *Bemisia tabaci* at the Central Potato Research Institute Campus Modipuram, Meerut during 2012-13 and 2013-14. The pooled data revealed that neonicotinoids alone and in combination with azadirachtin showed higher efficacy against whitefly in reducing population on potato crop. Cumulative mean efficacy after third insecticidal spray indicated that thiamethoxam (57.9%) and imidacloprid (55.5%) were highly effective followed by triazophos (54.6%). Combination treatments with azadirachtin showed moderate efficacy and azadirachtin alone was the least effective, followed by spinosad. The highest yield (19.12 t/ha) was obtained with thiamethoxam and it was at par with imidacloprid (18.33 t/ha) and triazophos (18.22 t/ha). Imidacloprid was found to be the most effective and stood second highest among all the treatments with maximum C: B ratio 1: 6.29.

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### **VARIATION IN TOXICITY OF SOME INSECTICIDES AGAINST *SPODOPTERA LITURA* (F.) FED ON DIFFERENT HOSTS**

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## ABSTRACT

*Spodoptera litura* (F.) reared on three host plants viz., castor, cotton and soybean showed variation in susceptibility to indoxacarb 15.8EC and chlorantraniliprole 18.5SC. In its F<sub>3</sub> generation these two insecticides were more toxic when reared on castor (0.036 ppm LC<sub>50</sub> -indoxacarb and 0.035 ppm- chlorantraniliprole) followed by soybean. Higher LC<sub>50</sub> of indoxacarb and chlorantraniliprole (0.172, 0.184 ppm, respectively) was observed when reared on cotton indicating that feeding on cotton induced tolerance.

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**BIODIVERSITY OF GRASSHOPPERS AT AMIRDHI FOREST AND  
ADJOINING AREAS OF VELLORE, TAMILNADU**

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**ABSTRACT**

As there is no systematic survey of grasshoppers and their faunistics are available, present study was conducted in Vellore. The grasshopper fauna and identification of grasshopper species found in the Amirdhi forest and the adjoining places was undertaken. The results revealed >=15 species identified based on their external morphology.

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**WHITEFLY, *BEMISIA TABACI* (GENNADIUS)  
AS INFLUENCED BY HOST PLANTS IN HARYANA**

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**ABSTRACT**

Surveys at Hisar (Haryana) and nearby areas conducted at fortnightly intervals from 2011 to 2014 identified the host plants of whitefly, *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) and evaluated its populations on them. The results revealed that among the 114 host plants (belonging to 32 families) identified, 35 were weeds, 25 ornamentals, 20 field crops, 17 vegetables, 13 medicinal plants and 4 fruit crops. Based on number of specie/ family serving as hosts and population density, it was observed that plants belonging to the family Fabaceae, Asteraceae, Solanaceae, Malvaceae and Cucurbitaceae were the most preferred and important families. Host plants supporting it during spring, summer and winter seasons are also categorised. Implications with respect to management are discussed.

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**EMERGING INSECT PESTS IN INDIAN AGRICULTURE  
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#### ABSTRACT

One of the major challenges to humankind is threat to food security due to emerging and invasive pests. Increased global trade in agriculture has increased the chances of the introduction of exotic pests. Papaya mealybug (*Paracoccus marginatus* Williams and Granara de Willink), cotton mealybug *Phenacoccus solenopsis* (Tinsley), coconut mite (*Aceria guerreronis* Keifer), serpentine leaf miner (*Liriomyza trifolii* Burgess) and tomato leaf miner [*Tuta absoluta* (Meyrick)] are some examples. Insect pests on an average are estimated to cause 15-20% yield losses in principal major food and cash crops. Pest whose status has been changing from minor to major or secondary to primary pest is termed as an emerging pest. *Bemisia tabaci* (Gennadius) on cotton, *Helicoverpa armigera* (Hubner) on vegetables and pulses, *Spodoptera litura* (Fabricius) on vegetables, cotton and oilseeds, *Pieris brassicae* Linnaeus on crucifers, *L. trifolii* on vegetables and *Atherigonia* spp. on spring maize, have become increasingly severe during last decade. Increasing incidence of aphid complex, comprising of *Sitobion avenae* (Fabricius), *Rhopalosiphum maidis* (Fitch) and *Schizaphis graminum* (Rondani) is now observed on wheat, barley and oat. Mites of the Eriophyiidae and Tetranychidae family have emerged as major pests of bean, brinjal, cotton, cucurbits, okra, apple, ber, citrus and mango in Northern India. *Maruca vitrata* Geyer has emerged as a predominant pest in recent years in all pigeonpea and cowpea growing areas of India causing up to 42% damage in cowpea in Andhra Pradesh. The invasive pest, coconut eriophyid mite, *Aceria gurreronis* Keiffer caused 64.16- 89.42% nut infestation in at Thane, Maharashtra in 2014. During 2015-16 an epidemic of whitefly was noticed during August in the cotton growing areas of Haryana and Punjab (Kranthi, 2015). In this review the situation of emerging insect pests of crops is discussed along with the probable reasons for their changing pest status.

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#### **BIOCONTROL PERFORMANCE OF EGG PARASITOID *USCANA MUKHERJII* (MANI)**

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#### ABSTRACT

Experiments on biological control of two bruchid pests *Callosobruchus maculatus* (Fabricius) and *C. chinensis* Linnaeus with an egg parasitoid, *Uscana mukherjii* (Mani) (Hymenoptera: Trichogrammatidae) were conducted. *Cajanus cajan* (L.) Mill sp, *Vigna radiata* (L.) Wilczek and *Cicer arietinum* L. were used as hosts for these bruchids. The parasitoid reduced *C. maculatus* survival by 34.7, 42.4 and 25.4% and reduction in weight loss by 30.6, 34.8 and 18.7% on *C. cajan*, *V. radiata* and *C. arietinum*, respectively under no choice condition. Whereas in free choice test, 48.1, 37.7 and 33.14% reduction in survival was recorded which resulted in 48.5, 39.6 and 43.0% reduction in weight loss on *C. cajan*, *V. radiata* and *C. arietinum*, respectively. While in case of *C. chinensis*, reduction in survival was 29.8, 32.0, and 22.6% which resulted with 24.5, 19.9, and 20.45 weight loss on *C. cajan*, *V. radiata* and *C. arietinum*, respectively in no choice test. In free choice test, 26.8, 28.8 and 28.7% reduction in population of *C. chinensis* was recorded with reduction in weight loss being 30.7, 21.4 and 44.9% on *C. cajan*, *V. radiata* and *C. arietinum*, respectively. Results conclude that *U. mukherjii* could be a useful component of IPM to manage *C. maculatus* and *C. chinensis* on the stored pulses.

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**KINETICS OF  $\alpha$ -AMYLASE ACTIVITY IN ASIA-I AND ASIA II-1 GENETIC GROUPS OF WHITEFLY, BEMISIA TABACI (HEMIPTERA: ALEYRODIDAE)**

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**ABSTRACT**

Whitefly, *Bemisia tabaci* (Gennadius.) has drawn global attention in recent past with its wide distribution across the world as it causes severe damage to crops directly by sucking the plant sap and indirectly as vector of several viral diseases. This pest is considered as a species complex and Asia represents the largest diversity with the distribution of about 16 out of 35 genetic groups recorded so far. Investigations were carried out on kinetics of a key digestive enzyme,  $\alpha$ -amylase in adults of isogenic female lines of *B. tabaci* genetic groups Asia I and Asia II-1. Asia I has shown the higher specific activity of  $0.267 \pm 0.007$   $\mu\text{mol/ml/mg}$  compared to that of  $0.209 \pm 0.009$   $\mu\text{mol/ml/mg}$  in Asia II-1. However, kinetics of  $\alpha$ -amylases revealed the high affinity of this enzyme in Asia II-1 with the least  $K_m$  value of  $0.03372 \pm 0.001$  compared to that of  $0.0353 \pm 0.002$  in Asia I genetic group. Highest enzyme activities were recorded at  $35^\circ \text{C}$  in both the genetic groups of *B. tabaci*. Kinetics study of metabolically important digestive enzymes would improve our understanding on the metabolic capabilities of *B. tabaci* species complex.

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**A NEW SPECIES OF PIPUNCULIDAE (DIPTERA) FROM INDO-NEPAL BORDER OF CHAMPARAN DISTRICT, BIHAR**

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**ABSTRACT**

The paper describes and illustrates a new pipunculid (big headed fly) species *Pipunculus (Cephalops) pokharensis*, sp. nov. The specimens were collected from localities in the Indo-Nepal border of Champaran district which has humid, mountainous, low tropical vegetation. The new species resembles *Pipunculus (Cephalops) deminitens* Hardy but can be differentiated in its smaller body, propleural fan with 4-5 bristles, 1<sup>st</sup> abdominal segment with 3 stout black bristles on both sides, and piercer of ovipositor reaching up to 4<sup>th</sup> abdominal segment.

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**BIOLOGY OF PARACOCCLUS MARGINATUS ON PARTHENIUM HYSTEROPHORUS**

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**ABSTRACT**

The biology of *Paracoccus marginatus* William and Granara De Willink (Pseudococcidae: Hemiptera) when reared on *Parthenium hysterophorus* L. revealed that its incubation period varied from 2 to 5 days and females had three nymphal instars. The first instar nymphal stage lasted for 6.44 days, and for second and third instars it was 6.30 and 5.72 days, respectively. The nymphs took 19 to 24 days in case of females (mean of 21.67 days). In case of male it was four nymphal instars with two nymphal instars besides an additional pre-pupal and pupal stages; first and second instar lasted for 6.44 and 7.01 days, respectively. For both male and female, the developmental time was accounted separately from second instar onwards. Crawlers developing into male differentiated in second instar, and it was indicated by change in colour from greenish yellow to slight pink. These took 17 to 22 days for developing (mean 19.3 days), due to additional pupal stage. The adult longevity in male ranged 2 to 4 ( $2.58 \pm 0.39$ ) days. The total developmental period in female was from 41 to 65 ( $61.5 \pm 3.26$ ) days, while in male it was 24 to 35 ( $31.3 \pm 5.87$ ) days. The morphometrics of egg, nymphal instars, pupae and adults for both male and female had also been studied. The eggs were greenish yellow to green and are laid in an egg sac which is 2-3 times bigger than the body length and entirely covered with white cottony wax secretion produced by female.

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## **BIOCHEMICAL CHANGES IN SPIRALLING WHITEFLY AFFECTED CASSAVA LEAVES AND IMPACT ON ERI SILKWORM *SAMIA CYNTHIA RICINI* BOISDUVAL**

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### **ABSTRACT**

Changes in the biochemical constituents including nutritional and anti-nutritional values of the cassava varieties H226 and MVD1 infested by spiralling whitefly, *Aleurodicus dispersus* Russell and its influence on economic traits of eri silkworm *Samia cynthia ricini* Boisduval were studied. The moisture, crude protein, total carbohydrate, nitrogen, phosphorus, potassium and total minerals, tannins and HCN of leaves of both varieties were drastically reduced following infestation. The larvae fed with infested leaves from both varieties showed significant adverse effect on economic traits *i.e.* increase in total larval period and reduction in other traits namely larval weight, effective rate of rearing, cocoon yield, shell yield, shell ratio, fecundity and hatchability compared to those of healthy leaves recording lower larval duration and higher values of other corresponding traits. For all parameters adverse effect was more pronounced in the lot fed with infested MVD1 leaf than the variety H226.

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## **BIOEFFICACY OF PESTICIDES AGAINST GREEN APPLE APHID *APHIS POMI* DE GEER AND BIOSAFETY TO NATURAL ENEMIES IN APPLE ORCHARDS**

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### **ABSTRACT**

Field experiments were carried out to evaluate the bioefficacy of pesticides against green apple aphid (*Aphis pomi*) and biosafety to their natural enemies during 2014. Three pesticides viz., imidacloprid (17.8SL) @0.17,



0.28, and 0.58ml/L. dimethoate 30EC @ 1.0, 1.5 and 2.0ml/L; thioclorpid (21.7SC) @ 0.1ml, 0.2ml and 0.4ml/L; cypermethrin (25EC) @ 1.0, 1.5, and 2.0ml/L; chlorpyrifos (20EC) @ 1ml, 1.5ml and 2 ml/L of water were compared with the treated check (Dichlorovas 76 EC) @ 1ml/L of water, along with untreated control. Imidacloprid 17.8SL @ 0.28ml/L was the most effective with highest reduction in aphid incidence (87.16%) and natural enemies showing 62.85% change, and caused less effect of parasitisation. Thus it has only slight harmful insecticidal effect on the non target organisms (as per the recommendations of International Organisation of Biological Control) as compared to other evaluated pesticides. Thus, it can be considered as a potential pesticide for the management of green apple aphid in apple orchards.

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**POPULATION DYNAMICS OF GREEN APPLE APHID *APHIS POMI* DE GEER (HOMOPTERA: APHIDIDAE) AND ITS NATURAL ENEMIES IN APPLE ORCHARD OF KASHMIR**

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**ABSTRACT**

Population dynamics of green apple aphid (*Aphis pomi*) in relation to the natural enemies and weather parameters was studied in three districts viz., Srinagar, Budgam, and Ganderbal of Kashmir during 2012-13 and 2013-14. The peak population of *A. pomi* was recorded as 39.5 and 37.0 aphids/ shoot in Srinagar; 42.6 and 47.0aphids/shoot in Budgam and 41.3 and 54.8 aphids/shoot in Ganderbal at 2<sup>nd</sup> fortnight of June during 2012-13 and 2013-14, respectively with exception during 2013-14 in Ganderbal the peak was attained at 1<sup>st</sup> fortnight of July. The natural enemies include coccinellids, syrphid fly and Chrysoperla and were recorded highest in 1<sup>st</sup> fortnight of July except Srinagar was on 16<sup>th</sup> June during both years. Highest percentages of parasitization was found on 2<sup>nd</sup> fortnight of July and were ranged 14.2 to 15.2% and 13.4-15.6% during 2012-13 and 2013-14, respectively. The *A. pomi* overwintering nymphs was 0.3 and 0.5/10 buds and their mean maximum population was 0.66 and 1.0/ 10 buds on 2<sup>nd</sup> fortnight of December during 2012-13 and 2013-14, respectively in Srinagar and trend was also similar in other location of Kashmir. The temperature played major role to build-up the population of aphid, its predators and parasitoids and after attaining peak population of natural enemies, the aphid population tends to decrease. Relative humidity had a positive influence along with temperature on aphid population and rainfall had negative influence on aphid population.

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**LEAFHOPPER FAUNA ASSOCIATED WITH RICE ECOSYSTEM IN THRISSUR DISTRICT, KERALA**

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**ABSTRACT**

A study was undertaken in Department of Agricultural Entomology, College of Horticulture, Vellanikkara during 2015-2016, to document the leafhopper fauna associated with rice ecosystem in Thrissur district of Kerala. Leafhoppers were collected from paddy fields of Vadakkanchery and Kole lands. Different parts of leafhoppers viz., head, pronotum, scutellum, male genitalia, abdominal apodemes and female seventh sternum

were studied in detail and illustrations were made. Results revealed nine species of leafhoppers associated with rice: *Cofana spectra* (Distant), *C. lineata* (Distant), *Nephotettix nigropictus* (Stal), *N. virescens* (Distant), *Exitianus indicus* (Distant), *Maiestas dorsalis* (Motschulsky), *Hecalus porrectus* (Walker), *H. lutescens* (Distant) and *Doratulina* sp. Occurrence of *H. lutescens* (Distant) in rice ecosystem is a new report for Kerala. *C. lineata* and *H. porrectus* are new records on rice in Kerala. A dichotomous taxonomic key to separate these nine species is also given below.

**The following are short communications, these have no abstracts**

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**RED SPIDER MITE *TETRANYCHUS CINABARINUS* (BOISD.) ON WATERMELON CULTIVARS**

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**NEW RECORDS OF COLEOPTERANS ON APPLE IN HIMACHAL PRADESH**

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**EFFECT OF NON-EDIBLE OILS ON WHITEFLY AND  
INCIDENCE OF PALCV IN EARLY POTATO CROP**

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**BIOLOGY OF *SERRODES* SP.NR. *PARTATA* HAMPSON ON  
*SAPINDUS LAURIFOLIUS* VAHL**

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**SEARCHING NEW SOURCES FOR APHID RESISTANCE IN POSTRAINY SORGHUM**

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**DIAGNOSTICS OF SOME INDIAN SPECIES OF MALADERA**

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**INCIDENCE OF PIPUNCULIDS (DIPTERA) IN RICE FIELDS OF INDO- NEPAL REGION**

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**EASY AND RESOURCE CONSERVING LARVAL REARING METHOD FOR BANANA STEM WEEVIL, *ODOIPORUS LONGICOLLIS* (OLIVIER) (COLEOPTERA: DRYOPHTHORIDAE) IN LABORATORY**

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**HOST RANGE, NATURAL ENEMIES AND DAMAGE POTENTIAL OF COTTON MEALYBUG *PHENACOCCLUS SOLENOPSIS* TINSLEY (HEMIPTERA: PSEUDOCOCCIDAE) IN ODISHA**

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**RECORDS OF RHINYPTIA SPP. (SCARABAEIDAE) FROM MAHARASHTRA**

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**ABSTRACT**

Survey was conducted on scarabaeids in Maharashtra during 2012-13 led to collection of beetles belonging to the genus *Rhinyptia*. These were studied along with previously preserved specimens for their taxonomic characters. This led to identification of *Rhinyptia indica* and *R. nigrifrons* along with an indetermined species. The manuscript includes illustrations of salient morphological characters including male genitalia.

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**NYMPHALIDAE (LEPIDOPTERA) FROM TAMIL NADU**

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**ABSTRACT**

An updated checklist of the Nymphalidae (Lepidoptera) from Tamil Nadu is presented here. This list is based on the nymphalids collected from various districts of Tamil Nadu viz., Coimbatore, Dharmapuri, Dindigul, Erode, Madurai, Perambalur, Salem, Theni, The Nilgiris, Tirunelveli, Tiruppur, Tiruchirappalli, and Tuticorin and on a detailed analysis of available published data. A total of 45 genera and 106 species are known, which fall under 11 subfamilies viz., Apaturinae (2 spp.), Biblidinae (4), Charaxinae (6), Cyrestinae (2), Danainae (10), Heliconiinae (9), Libytheinae (4), Limenitidinae (20), Morphinae (3), Nymphalinae (13), Satyrinae (33). Nearly 56 species were collected from parts of Tamil Nadu, these catalogued alphabetically by genus and species under respective subfamily and presented.

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**FIELD EFFICACY OF ENTOMOFUNGAL PATHOGENS AGAINST  
SORGHUM STEM BORER, *CHILO PARTELLUS* (SWINHOE)**

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**ABSTRACT**

The field experiment was carried out to assess the efficacy of four isolates of entomofungal pathogens of *Beauveria bassiana* (Bb-5a, Bb-23 and Bb-45) and *Metarhizium anisopliae* (Ma-35) against sorghum stem borer, *Chilo partellus* (Swinhoe) during *kharif* 2015 and 2016 at the ICAR-National Bureau of Agricultural Insect Resources (NBAIR), Attur

Farm, Yelhanka, Bengaluru. All the tested fungal isolates showed suppression of damage and the pooled data revealed lesser deadhearts (6.4-11.8%), stem tunnelling (3.51-7.4 cm/plant), galleries (0.3-1.3 no./plant) and exit holes (0.43-1.62 no./plant) compared to untreated control, which showed 18.4% deadhearts, 9.61 cm stem tunnelling/plant, 1.9 galleries/plant and 2.02 exit holes./plant. Amongst the four isolates tested, Bb-23 and Bb-5a revealed significantly superior effect in lowering the incidence of deadhearts, stem tunnelling, galleries and exit holes, with higher yield of 11.61 and 11.52 q/ha respectively.

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**INFESTATION AND POPULATION DYNAMICS OF STRIPED FLEA BEETLE  
*PHYLLOTRETA STRIOLATA* FABRICIUS IN CRUCIFEROUS VEGETABLES IN KASHMIR**

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**ABSTRACT**

Field surveys to study the infestation and population dynamics of the most abundant striped flea beetle, *Phyllotreta striolata* Fabricius, on two abundantly grown cruciferous crops viz., kale (*Brassica oleraceae* L. var. *acephala*) and turnip (*Brassica rapa* L.) revealed that these suffered with moderate and severe infestation, respectively. The maximum infestation was at cotyledonary stage as compared to true leaf stage. The pooled data of two year study revealed the maximum mean % infestation, severity, and number of flea beetle catches/sweep on turnip as compared with kale. Southern zone revealed the highest mean % infestation, severity and number of beetle catches/sweep followed by the Central and Northern zones. The extent of damage, severity and population build-up was more during 2012 compared to 2013. Emergence of the overwintering generation started from the second fortnight of March up to the end of May in kale while the subsequent generations started emerging at the beginning of June and the maximum trap catches were obtained during the second fortnight of July i.e. from 27<sup>th</sup> to 29<sup>th</sup> standard weeks and the minimum catches by the end of October. In turnip, the pest started its activity in the first week of August i.e. from 32<sup>nd</sup> standard week, immediately after sowing and remained active until end of October. Maximum catches of flea beetles were observed in the second fortnight of September i.e. in the 38<sup>th</sup> standard week and thereafter it decreased to its lowest during the end of October. The study further revealed that the temperature influenced the activity of the flea beetles significantly.

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**SEX PHEROMONE BLENDS FOR RICE CASEWORM *PARAPONYX STAGNALIS* ZELLER**

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**ABSTRACT**

Studies on sex pheromone of rice caseworm, *Paraponyx stagnalis* (Zeller) using EAG and GC-MS indicated the presence of four pheromone compounds viz., Z-13-octadecenyl acetate, Z-9-hexadecenal, Z-11-hexadecenal and Z-11-hexadecenyl acetate in the ovipositor extract. Five different blends prepared from the tentatively identified compounds were evaluated for their field efficacy in rice fields at Pattambi, Kerala. Pheromone blends with Z-13-Octadecenyl acetate alone and with Z-11- Hexadecenal as a two component blend in the ratio of 1:1 were found promising in attracting more number male moths of rice caseworm in the field study.

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**CHEMICAL ECOLOGY OF ACEROPHAGUS PAPAYAE NOYES AND SCHAUFF  
VIS-À-VIS GAS CHROMATOGRAPHY**

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**ABSTRACT**

The chemical ecology of the parasitoid *Acerophagus papayae* Noyes and Schauff was studied with Gas Chromatography-Mass Spectrometry (GC-MS) volatiles analysis. The biochemical constituents and secondary metabolites in the host plant leaves revealed variation in influencing the growth and development of papaya mealybug *Paracoccus marginatus* Williams and Granara de Willink, which indirectly influenced the parasitoid efficiency too. Healthy and infested leaves of papaya and tapioca were analysed for the released volatile compounds (VOCs), and identified with GC-MS. It was observed that the VOCs like octanol, isocaryophyllene, hexadecane, pentadecane, heptadecane, morphinan and octasiloxane might probably attract the mealybug for sustained feeding in papaya. In tapioca, heptane, pyran, á-ocimene, octadien-3-ol, decane, butylated hydroxytoluene and dibutyl phthalate (DBP) were observed as probable reasons for repelling or prohibiting the mealybug from feeding.

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**EVALUATION OF QUISQUALIS INDICA AND SAMADERA INDICA AS  
BOTANICAL PESTICIDES AGAINST SPODOPTERA LITURA (F.) IN POLYHOUSE**

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**ABSTRACT**

The crude methanol and ethyl acetate extracts of *Quisqualis indica* L. and *Samadera indica* Gaetrn., were evaluated for their antifeedant and insecticidal action against third instar larvae of *Spodoptera litura* F. under laboratory condition. Maximum antifeedant activity was observed in crude methanol extracts of *S. indica* (45.62%) and *Q. indica* (31.87%) at 5% concentration. Significantly superior insecticidal action (93.51%) was noticed in *Q. indica* methanol extract 5%, while *S. indica* methanol extract 5% showed 73.55% larval mortality after three days of exposure. Results of pot culture study conducted under polyhouse revealed that crude methanolic extract of *Q. indica* and *S. indica* at 5% reduced the population to less than half with mean population of 3.2 and 3.8 larvae/ plant two weeks after spraying. These reveal that these plants could be exploited as botanical pesticides in polyhouse.

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**IMPACT OF NUMBER OF SPRAYS OF INSECTICIDES ON MANAGEMENT OF  
SHOOT GALL PSYLLA APSYLLA CISTELLATA BUCKTON IN MANGO**

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**ABSTRACT**

Field investigations were conducted during 2014-15, 2015-16 and 2016-17 to evaluate the impact of number of sprays of insecticides on management of shoot gall psylla *Apsylla cistellata* Buckton in mango cv. Dashehari. Two sprays of thiamethoxam+ profenophos during second fortnight of August to first week of September resulted in maximum yield, gross and net returns, and gave tremendous impact with reduction of incidence of shoot gall psylla and drying of branches. Nevertheless, one spray of thiamethoxam + profenophos exhibited maximum C:B ratio i.e. 3.33 during 2015-16 and 2.44 during 2016-17 which was superior over all other treatments including two sprays, and with less expenditure. Thus either one or two sprays of thiamethoxam+ profenophos gave almost similar result in terms of yield, gross and net returns and reduction in incidence. Therefore, single spray helped the farmers in effective, economical and ecofriendly management of shoot gall psylla in mango. These results also reveal that the three sprays of monocrotophos, quinalphos and dimethoate recommended earlier neither provide satisfactory results nor cheaper, as compared to one or two sprays of thiamethoxam + profenophos.