

**REPELLENCY IN SOME INDIGENOUS PLANTS FROM ASSAM
AGAINST LESSER BANDICOOT RAT, *BANDICOTA BENGALENSIS***

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ABSTRACT

To find out the repellent effect, plants viz. *Polygonum hydropiper*, *Capsicum chinense*, *Ricinus communis*, *Azadirachta indica* leaf, *Azadirachta indica* seed kernel and *Jatropha curcus* were evaluated with lesser bandicoot rat, *Bandicota bengalensis*. Both choice and no-choice feeding trials were conducted. It was observed that consumption of treated baits by both sexes under choice test was reduced in comparison to no-choice test because of availability of an alternate plain food. In repellency test, *A. indica* seed kernel recorded significantly higher repellency index (66.26%- male; 65.06%- female) under choice feeding test followed by *C.chinense* (49.92%- male; 49.06%- female). Under no choice feeding trials also, *A. indica* seed kernel showed the highest repellency index of (77.75%- male; 78.58%- female) followed by that of *C chinense*(64.39%- male; 64.1%- female)

**GENETIC VARIABILITY OF THE BRUCHID *CALLOSBRUCHUS MACULATUS* (F.)
AS REVEALED BY RANDOM AMPLIFIED POLYMORPHIC DNA**

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ABSTRACT

Twenty random decameric primers were used to investigate the genetic variability of the populations of bruchid beetle, *Callosobruchus maculatus* (F.) collected from 12 localities of Tamil Nadu. Of these, two primers (B12 and B20) yielded clear, consistent and scorable amplicons for all the populations with a total of 249 loci in the molecular weight range of approximately 310 to 2300 bp. 78% of the fragments were polymorphic and no species- specific RAPD band was recorded. The dendrogram analysis groups the 12 populations in two major clades with no geographical bias in clustering and the similarity coefficient values <50% for most of the populations, indicating great degree of genetic heterogeneity.

**DISSIPATION PATTERN AND ACCUMULATION OF
LAMBDA-CYHALOTHRIN AND BETA-CYFLUTHRIN IN TOMATO**

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ABSTRACT

The dissipation pattern and accumulation of lambda-cyhalothrin and beta-cyfluthrin in the harvested tomato fruits were studied at All India Network Project (AINP) on Pesticide Residue Laboratory, College of Agriculture, Rajendranagar, Hyderabad. The initial deposit of lambda-cyhalothrin, beta-cyfluthrin (0.15 and 0.21 mg kg⁻¹) were observed to dissipate to 0.03 mg kg⁻¹ and Below Detected Level by 10th day after first spray, respectively; the half life values of these were 22.97 and 14.90 days, respectively. Accumulation pattern revealed that after third spray, maximum initial deposit was at 0.55 mg kg⁻¹ beta-cyfluthrin followed by lambda-cyhalothrin (0.53 mg kg⁻¹). The safety intervals of lambda-cyhalothrin was observed to be 4.8 and 5.2 days for first and third sprays, while it was 1.2 days at first and 4.8 days at third spray with beta-cyfluthrin.

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SOIL MOISTURE Vs. VERTICAL MOVEMENT OF LATE INSTAR WHITE GRUBS *LEUCOPHOLIS LEPIDOPHORA* BLANCHARD INFESTING ARECANUT

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ABSTRACT

Impact of soil moisture on the vertical upward movement of arecanut white grub, *Leucopholis lepidophora* (Blanchard) was evaluated in the soil profile in the dry season, between December and January 2013 and 2014, to standardize a methodology for its management with drainage/ flooding. Results indicate that the filling drainages with water by plugging two ends + flooding the field for eight days were the most effective. This will enable bringing the larvae to top layer of 15 cm depth (1.83 larvae/tree base and 2.00 larvae/tree base, respectively). However, in control, where no effort was made to increase the soil moisture, larvae were not found in top layer. Thus, it is suggested to increase the soil moisture by flooding for taking up any management activity during this part of year. This helps in reduction of white grub population, which otherwise remain deep in soil (>60 cm depth), feed roots and continue to cause damage. This can be used as an important strategy in integrated pest management of white grubs in areca nut gardens.

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PREDATORS AND PARASITOIDS OF RICE INSECT PESTS UNDER RICE ECOSYSTEMS OF MANIPUR VALLEY

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ABSTRACT

Field surveys on predators and parasitoids of rice ecosystem during *kharif* season (2012- 2014) in the four valley districts (Imphal East, Imphal West, Thoubal and Bishnupur) of Manipur were conducted. Altogether 33 species of predators belonging to 26 genera under 15 families of 5 orders and 15 species of parasitoids belonging to 5 families of Hymenoptera were listed. Among the predators, spider (*Pardosa pseudoannulata* Boes et. str. *Tetragnatha maxillosa* Thorell and *Oxyopes javanus* Thorell), damselflies (*Agriocnemis femina* Brauer, *Agriocnemis pygmaea* Rambur and *Ishnura aurora* Hagen), and dragonflies (*Orthetrum sabina* Drury and *Sympetrum* sp.) were found as dominant species. In case of parasitoids *Cotesia rufricus* Haliday and *Apanteles* sp. were found to be dominant in all the rice fields. One way ANOVA was done to evaluate the variation in the distribution of predators and parasitoids among the four study sites: among the predators, spider was found to be dominating (73.0) over other groups in Site 4 (Bishnupur District) whereas among the parasitoids, *Cotesia rufricus* (11.0) was dominating in Site 1 (Imphal East). The data revealed the significant variation in the distribution of predators and parasitoids ($p < 0.01$). It was also observed that spiders existed with maximum density in all the four sites (57.4- 73.0) while among the parasitoids, *Cotesia rufricus* was observed with maximum density (5.4- 11.0).

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ECOFRIENDLY MANAGEMENT OF BANANA LEAF AND FRUIT SCARRING BEETLE *BASILEPTA SUBCOSTATUM* JACOBY IN ASSAM

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ABSTRACT

Botanical (azadirachtin 0.15%), biocontrol agent (*Beauveria bassiana*, 1×10^7 conidia/ ml), chemical pesticide (carbaryl 0.3%), cultural practices (tilling and clean cultivation, bunch covering with plastic bag) and some combination of cultural and botanical treatments (tilling and clean cultivation+ azadirachtin 0.15%) and (azadirachtin 0.15% spray+ bunch covering) were evaluated against banana leaf and fruit scarring beetle *Basilepta subcostatum* Jacoby. Observations on beetle population, number of scars and fruit infestation (pulp-skin ratio, finger weight and yield) were compared. The best treatments in reducing the leaf injury and population were carbaryl 0.3% spray followed by azadirachtin 0.15% spray with bunch covering, tilling and clean cultivation with azadirachtin 0.15% spray, bunch covering with plastic bag, tilling and clean cultivation, azadirachtin 0.15% spray and *B. bassiana* suspension spray. Fruit infestation was observed to be the lowest in azadirachtin 0.15% spray with bunch covering treated plots. The highest yield of 45.16 t/ ha was obtained with azadirachtin 0.15% spray with bunch covering treated plots followed by tilling and clean cultivation with azadirachtin 0.15% spray, carbaryl 0.3% spray, bunch covering with polythene bag, tilling and clean cultivation, azadirachtin 0.15% spray, *B. bassiana* suspension spray, against yield of 34.71 t/ ha in the untreated control plots.

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POPULATION DYNAMICS OF MAJOR SUCKING PESTS OF HYBRID COTTON (*GOSSYPIUM HIRSUTUM*) IN WESTERN UNDULATING ZONE OF ODISHA

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ABSTRACT

The field experiment was conducted during *kharif* 2013-14 and 2014-15 in the research farm of the AICRP on Cotton under the Regional Research and Technology Transfer Station (OUAT), Bhawanipatna situated in the Western Undulating Agroclimatic Zone of Odisha to study the population dynamics of major sucking pests of hybrid cotton. During *kharif* 2013-14, the highest population of aphids (30.68 aphids/3 leaves), jassids (23.92/3 leaves), whitefly (2.04 whitefly/ 3 leaves) and thrips (5.9/ 3 leaves) were observed during 38th, 42nd, 44th and 37th standard week, respectively. During *kharif* 2014-15, the highest incidence of aphids (33.32/ 3 leaves), jassids (23.64/ 3 leaves), thrips (5.24/ 3 leaves) and whitefly (2.20/ 3 leaves) was noticed during 39th, 43rd, 38th and 45th standard week, respectively. The aphids population had significantly positive correlation with maximum temperature, minimum temperature and evening relative humidity and non-significantly positive correlation with morning relative humidity and rainfall during 2013-14. During 2014-15, there was significantly positive correlation with minimum temperature and non-significantly positive correlation with all other weather parameters. The jassids population showed non-significantly positive correlation with all weather factors during 2013-14 and 2014-15 except minimum temperature and rainfall during 2014-15 when it showed non-significantly negative correlation. During both the years whitefly population showed non-significantly positive correlation with all weather parameters except rainfall during 2013-14 and minimum temperature during 2014-15 when it showed non-significantly negative correlation. The thrips population was significantly and positively correlated during 2013-14 and non-significantly and positively correlated during 2014-15 with all the weather parameters.

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INFLUENCE OF SOME POLYGONACEOUS PLANTS ON BIOLOGY OF *GALERUCELLA PLACIDA* BALY (COLEOPTERA: CHRYSOMELIDAE)

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ABSTRACT

Biology of leaf beetle, *Galerucella placida* Baly was studied on eight polygonaceous plants, which indicated that body length and width of 1st- 3rd instar larvae was maximum on *Polygonum hydropiper* (L.) Spach. and minimum on *Polygonum perfoliatum* L. Pupal length and width was maximum (4.58 mm and 2.37 mm) on *P. hydropiper* (L.) Spach and minimum (4.10 mm and 2.05 mm) on *P. perfoliatum*. The maximum length and width of male (5.60 mm and 2.35 mm) and female (6.25 mm and 2.50 mm) was recorded on *P. hydropiper* and minimum (5.10 mm and 2.00 mm) for male and (5.50 mm and 2.15 mm) for female on *P. perfoliatum*. Similarly, shortest larval (13.12 days) and pupal duration (4.46 days), and highest fecundity (431.60 eggs/ female) were recorded on *P. hydropiper*. The maximum larval (17.25 days) and pupal duration (4.76 days), and lowest fecundity (163.00 eggs/ female) were observed with *P. perfoliatum*. These observations indicate the scope for use of *G. placida* as a biocontrol agent against *P. hydropiper*, since it was found the most suitable host plant in comparison to other polygonaceous plants.

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BIOLOGY OF ANAR BUTTERFLY, *DEUDORIX EPIJARBAS* INFESTING POMEGRANATE UNDER FIELD CONDITIONS

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ABSTRACT

Observations on the field biology of pomegranate fruit borer (*Deudorix epijarbas*) were made at the Central Institute of Temperate Horticulture (CITH), Srinagar during 2011-2012. These revealed that the pest was active from May to September. Emergence of butterflies from hibernating pupae commenced from 3rd week of May. After mating, adults laid pale green eggs on the flower buds, opened flowers and stems in the 3rd week of May. Soon after hatching, the newly emerged larvae started damaging the flower buds and flowers, before coming out for pupation in the soil in the 4th week of June. The butterflies (2nd generation) from these emerged in the 2nd week of July. The 3rd generation butterflies emerged in the 4th week of August. Pre-pupa of the last generation started pupating in the fallen leaves and in upper 5-7 cm layer of the soil. Hibernation starts from October to May-June at pupal stage in soil. Practically all the stages can be observed throughout May to September due to overlapping generations. The field biology studied for 2nd generation (July-August) revealed that the egg period varied from 6-7 days with a mean of 6.1 ± 0.31 days. There were five larval instars, with duration of 1st, 2nd, 3rd, 4th and 5th instar was 3.5 ± 0.52 , 4.1 ± 0.31 , 4.7 ± 0.48 , 5.2 ± 0.42 and 6.3 ± 0.48 days, respectively. The total larval, pre-pupal and pupal periods were 23.8 ± 0.40 days 2.3 ± 0.48 and 7.4 ± 0.42 days, respectively in this generation. The sexes exhibited difference in colour, males were brick red, while females were dull brown.

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BIOLOGY OF *MALLADA BONINENSIS* (OKAMATO) (NEUROPTERA: CHRYSOPIDAE) ON ARTIFICIAL DIETS

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ABSTRACT

In order to improve the adult artificial diets of *M. boninensis* (Okamoto) in a cost effective manner and to enhance longevity and fecundity an experiment was conducted during 2014. Three combinations of artificial diets (AD1, AD2, AD3) in combination with the standard diet (SD) were evaluated. Females survived for longer period on AD 2 and AD3 compared to others. Hatchability, larval survival and adult emergence were more on AD2 and AD3, which indicated the better suitability of the egg yolk based diet to the predator *M. boninensis*. Number of eggs laid by a single female *M. boninensis* was significantly influenced by the different artificial diets tested.

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REVIEW ON SPIDER SILK AND ITS APPLICATIONS

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ABSTRACT

Spider web is the strongest polymer bio-fiber used in making bullet proof clothing, light-weight clothing, rope, nets, seat belts, parachutes, biodegradable material and optical industry. While in agriculture spider web act as biological control agent and reduce plant damage by insect pests. At the same time in medical field it has applications as biodegradable carrier, artificial tendon or ligaments supports for weak blood vessels and making bandages and surgical threads. The regenerative potential of silk is used in repair of peripheral nerve injury. Spider silk is also used in drug delivery and human bone marrow stromal cell and ligament fibroblast responses on Rat Genome Database. Mixture of spider dust with different medicinal plant can cure various types of diseases while spider silk acts as wound healer, as it is anti-inflammatory, antibacterial and antimicrobial in nature. Spider webs have many beneficial applications to human hence, work on spider silk is essential.

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EFFICACY OF SOME NEW INSECTICIDES AGAINST AERIAL FORM OF THE APPLE WOOLY APHID, *ERIOSOMALANIGERUM* (HAUSMANN)

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ABSTRACT

The efficacy of four insecticides against the aerial form of apple wooly aphid, *Eriosoma lanigerum* (Hausmann) was evaluated during October- November 2014 and 2015 in apple orchards at Mashobra district Shimla of Himachal Pradesh. Fourteen days after the spray, chlorpyrifos (0.04%) exhibited maximum efficacy (0.05 aphid colonies/ twig) followed by flupyradifurone (0.04 and 0.03%), (1.67 and 2.18 aphid colonies/ twig), respectively. Flupyradifurone(0.02%), thiacloprid (0.01%) and imidacloprid (0.005%) were inferior comparatively. Of the three concentrations of flupyradifurone, the higher doses (0.04 and 0.03%) were found to be effective and found at par with chlorpyrifos. Except thiacloprid (0.01%) and imidacloprid (0.005%), all other treatments were quite effective in suppression of the aphid up to 21 days after spray. All the insecticides proved safe without any phytotoxic symptoms.

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BIOLOGY OF MELON FLY, *BACTROCERA CUCURBITAE* (COQUILLET) ON SPONGE GOURD

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ABSTRACT

Investigation was carried out on the biology of melon fly, *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae) on sponge gourd at Sardarkrushinagar during 2012. External features of all the stages were described, and morphometrics

measured. The duration of various stages was studied at 30.12 ± 0.95 °C and $68.12 \pm 11.98\%$ RH. The incubation period and egg hatching % was observed to be 1.40 days and 79.57%, respectively. The larvae (maggots) passed through three instars. The total larval, prepupal and pupal period was 5.03, 0.61 and 7.13 days, respectively. Maximum pupation took place in dry soil between 7.5-10 cm depth and 2.5-5 cm in wet soil. The adults failed to emerge from pupae buried at 34 cm depth. Sex ratio of male: female was 1: 0.93. The average pre-oviposition, oviposition and post-oviposition periods were observed to be 15.33, 2.34 and 4.51 days, respectively. The average fecundity was 178 eggs/ female. The average longevity of male and female was 27.53 and 33.60 days with total life period being 47.11 and 56.83 days, respectively.

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POPULATION DYNAMICS OF HOPPERS AND THRIPS ON MANGO

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ABSTRACT

Pest calendar of hoppers and thrips on mango in Gujarat when observed revealed that the mango hopper complex was observed throughout the year. Maximum populations were observed from flower initiation or panicle emergence to the stone-sized fruits stage. A population density of 8.46 hoppers/ panicle observed on 14th standard week (SW) coinciding with stone sized fruit stage was found positively influenced by maximum temperature, sunshine and evaporation. There existed a negative correlation with relative humidity (evening and average), wind velocity and rainfall. As regards thrips, maximum population on flower (43.33/ panicle) and foliage (29.46/ twig) was observed on 15th and 42nd SW coinciding with stone sized fruit and emergence of new flush stages, respectively. The thrips incidence was observed to be positively influenced by maximum temperature, sunshine, and negatively with minimum temperature, relative humidity, wind velocity and rainfall.

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CHECKLIST OF CRAMBIDAE (LEPIDOPTERA) FROM TAMIL NADU

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ABSTRACT

A checklist of Crambidae from Tamil Nadu with 188 species under 108 genera known from Tamil Nadu is given along with their distribution and current nomenclature.

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CHROMOSOMES OF *LIBELLAGO LINEATA LINEATA* (CHLOROCYPHIDAE: ODONATA)

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ABSTRACT

Linear characterization and course of meiosis in the zygopteran *Libellago lineata lineata* of (Chlorocyphidae) are described by conventional staining, C- banding, silver nitrate staining and sequence specific staining. There are two complements n=12 and n=13, without m chromosomes. Increase in chromosome number is due to the fragmentation of medium sized autosome pair. Dark terminal C-bands are present on 9 autosomal bivalents, while remaining 3 bivalents and X chromosome show less amount of C-heterochromatin; 10 autosomal bivalents show terminal NOR-bands; while X chromosome is NOR-negative. All the autosomes and X chromosome possess less intense DAPI and bright CMA3 signals, which indicate complement is rich in GC rich regions than AT rich regions.

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EFFECT OF NITROGEN FERTILIZERS AND WEATHER PARAMETERS ON THE INCIDENCE OF JASSID *AMRASCA BIGUTTULA BIGUTTULA* (ISHIDA) IN BT, NON-BT AND *DESI* COTTON

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ABSTRACT

The effect of nitrogen fertilizers on the incidence of jassids *Amrasca biguttula biguttula* Ishida in Bt, non-Bt and *desi* cotton cultivars was evaluated at the Entomological Research Farm, Department of Entomology, PAU, Ludhiana during 2014 and 2015. The incidence was observed throughout the cropping season and its peak was during July-August. Significantly higher incidence of nymphs was observed with higher dose of nitrogen (325 kg/ ha) as compared to of 162.5 and 250 kg/ ha. Among the cultivars, jassid population was significantly higher on non-Bt cotton cultivar, LH 2108 (3.65 nymphs/ 3 leaves) during 2014 and Bt cotton cultivars, RCH 773 (5.80 nymphs/ 3 leaves) during 2015 as compared to other cultivars, and the least population was observed with *desi* cotton cultivar, FDK 124 (1.86/ 3 leaves) during 2014 and FDK124 (1.70 / 3 leaves) during 2015. The correlation coefficients between population of jassid nymphs with weather parameters revealed significant positive relationship with maximum and minimum temperature, rainfall, evening relative humidity and evaporation. Thus it was observed that incidence of jassid increases with higher dose of nitrogenous fertilizer. *Desi* cotton cultivar FDK 124 has significantly lowest population of jassid nymphs over Bt and non-Bt cotton cultivars.

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TOMATO FRUIT BORER (*HELICOVERPA ARMIGERA*) MANAGEMENT WITH INSECTICIDES

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REACTION OF CHILLI ACCESSIONS TO MAJOR SUCKING PESTS AND FRUIT BORER

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REACTION OF BANANA CULTIVARS AGAINST BANANA PSEUDOSTEM BORER AND LEAF AND FRUIT SCARRING BEETLE

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IDENTIFICATION OF RESISTANT RICE GENOTYPES AGAINST BROWN PLANTHOPPER, *NILAPARVATA LUGENS* STAL (HOMOPTERA: DELPHACIDAE)

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EVALUATION OF TOXICITY OF INSECTICIDES AGAINST *MALLADA BONINENSIS* (OKAMATO)

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ULTRAVIOLET LIGHT PROTECTANTS AND PERSISTENCE OF ENTOMOPATHOGENIC FUNGUS, *BEAVERIA BASSIANA*

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