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SAMPLE ENTRY

001 Paul, P.R.C.; Xavier, F.; Leena, A. (College of Veterinary and Animal Sciences, Trissur (India), Department, of Livestock Production Management) Dairysoft: A computer programme for dairy farms. Indian Journal of Animal Sciences (India). (Mar 2006).v. 76(3) p. 260-262 KEYWORDS: DAIRY FARMS; COMPUTER SOFTWARE

To exploit the full potential of dairy sector, a computerizd record management system dairysoft was developed. Visual Basis 6.0 was used as front end while MSAccess 97 was utilized as back end for the software. The menu base dairysoft was provided with facilities for obtaining necessary reports along with separate data entry options.

1. Entry number
2. Author(s)
3. Title in English
4. Source
5. Keywords
6. Organisation where work was carried out

A50 Agricultural research

001. Vijayakumar Hallikery; Coconut Development Board, Regional Office, Banglore.. Nucleus Seed Garden, reliable source for planting materials - Success story. Indian Coconut Journal (India). (June2013) v.LVI(2) p.18 KEYWORDS: HYBRIDIZATION.

E10 Agricultural economics and policies

002. Gautum, Madhur; The World Bank, Washington (USA). AgricultureGlobal Practice. Agricultural subsidies: resurging interest in aperennial debate. Indian Journal of Agricultural Economics (India). (Jan-Mar 2015) v.70(1) p.83-105 KEYWORDS: AGRICULTURAL POLICIES. SUBSIDIES. FARM INPUTS. ECONOMICS.

E20 Organization, administration and management of agricultural enterprises or farms

003. Paray, M.A.; Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir (India). Zaki, F.A.; Sher-e-Kashmir Universityof Agricultural Sciences & Technology of Kashmir (India). Rangraze, M.A.; Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir (India). Effect of migratory bee-keeping in Apis mellifera on honey production and colony development in Kashmir. Indian Journal of Entomology (India). (June 2013) v.75(2)p.174-175 KEYWORDS: APIS MELLIFERA. HONEYCOMBS. JAMMU AND KASHMIR.

F03 Seed production

004. Singh, M. K.; Coconut Development Board (India). Criteria for producing quality planting material. Indian Coconut Journal (India). (June 2013) v.LVI(2) p.19-21 KEYWORDS: COCONUTS. SEEDLING PRODUCTION. QUALITY.

F30 Plant genetics and breeding

005. Basavara, G.; University of Horticulture Science. Banglore (India) Rao, Parthasarathy; International Crops Research Institue for the Semi-Arid Tropics, Hedrabad (India) Achoth, Lalith; KVAFSU, Banglore (India). Dept. Of Dairy Economics and Buisness Management Lagesh; International Crops Research Institue for the Semi-Arid Tropics, Hedrabad (India) Pokharkar, V.G.; Mahatmja Phule Krishi Vidyapeeth, Rahuri (India) Gupta, S.K.; International Crops Research Institue for the Semi-Arid Tropics, Hedrabad (India) Kumar, Ashok A.; International Crops Research Institue for the Semi-Arid Tropics, Hedrabad (India). Understanding trait preferences of farmers for post-rainy Sorghum and Pearl Millet in India-a conjoint analysis. Indian Journal Of Agricultural Economics (India). (Jan-Mar 2015) v.70(1) p.130-143 KEYWORDS: SORGHUM. PENNISETUM GLAUCUM. CROP MANAGEMENT. CHOICE OF SPECIES. INDIA.

A study was carried out on two important dryland crops, i.e., post-rainy season sorghum and pearl millet which are staples in Maharashtra, Kamataka, Rajasthan and Gujarat states of India. Both post-rainy (rabi) season sorghum and pearl millet

are mainly grown under low rainfall regimes as they are drought tolerant and are prized for grain quality and fodder. The present study is undertaken to quantify the varietal attributes preferred by the farmers for post-rainy sorghum and pearl millet using conjoint analysis technique. With this knowledge, researchers can focus on the most important features of seeds and design a variety that is most likely to gain acceptance of the target buyers. Further the utility attributes derived from the analysis are used to simulate preferences for new improved cultivars for both the crops that will identify the most preferred variety. The study would thus help in screening new improved cultivars of these crops for preferred attributes and overall preference.

F70 Plant taxonomy and geography

006. Kundu, Soumitra; Vivekananda Satabarshiki Mahavidyalaya. West Bengal (India). Agricultural growth in West Bengal (1949-50 to 2009-10): evidence from multiple trend break unit root test. Indian Journal of Agricultural Economics (India). (Jan-Mar 2015) v.70(1) p.115-129 KEYWORDS: AGRICULTURE. GROWTH. TRENDS. GROWTH RATE. WEST BENGAL.

Some researchers have found an acceleration in the growth of agricultural production in West Bengal from the beginning of the 1980s, while other researchers have criticised the methodologies and finings of these studies and concluded that no significant acceleration in the production of foodgrains have occurred in West Bengal in the 1980s. In the present study, using modem time series techniques allowing for endogenous structural breaks in the growth path of the series under considerations, we have found the evidence of a statistically significant acceleration in the growth rate of productions of foodgrains, rice and aman rice in the 1980s, which was caused by a significant increase in the growth rate of yield of aman rice from 1980-81. However, this increase in the agricultural growth in West Bengal was rather short lived as the growth rate of yield of aman rice declined significantly in the state from 1986-87, which leads to a subsequent decline in the growth rate of production offoodgrains in the state from 1987-88.

H10 Pests of plants

007. Rajna, S; Indian Agricultural Research Institute, New Delhi (India). Division of Entomology. Chander, Subhash; Indian Agricultural Research Institute, New Delhi (India). Division of Entomology. Predator diversity vis-á-vis pest incidence in rice ecosystem. Indian Journal of Entomology (India). (June 2013) v.75(2)p.103-108 KEYWORDS: PREDATORS. RICE. PEST CONTROL.

Abundance and diversity of predator species during different growth stages of rice crop in an untreated field was analysed through Simpson index, Shannon-Wiener index and Berger-Parker index. Fifteen species observed to predate upon rice pests during the crop season included nine spider species, one species each of mirid bug and rove beetle, and two carabid and coccinellid species each. Spiders were dominant during early crop stages, while mirid bug dominated during post-flowering period. Spider and mirid bug populations were positively correlated with planthopper population and these exhibited a sort of population regulatory

behaviour. Based both on species richness and equitability, Simpson index and Shannon-Wiener index found the predator community to be the most diverse between 39–51 days after transplanting (DAT) and the least diverse at 79 DAT. Dominance of any single species in the community, as revealed by Berger-Parker index, led to decline in community diversity.

008. Rawat, Nidhi; Dr. Y. S. Parmar University of Horticulture & Forestry, Nauni, Solan (India). Department of Entomology. chandelrpsahoo.co.in.Singh, Rajpal; Dr. Y. S. Parmar University of Horticulture & Forestry, Nauni, Solan (India). Department of Entomology. Sharma, P.L.; Dr. Y. S. Parmar University of Horticulture & Forestry, Nauni, Solan (India). Department of Entomology. Evaluation of some insecticides against the green peach aphid, Myzus persicae (sulzer) (hemiptera: Aphididae). Indian Journal of Entomology (India). (Jun 2013) v.75 (2) p.113-117 KEYWORDS: BIOPESTICIDES. CAPSICUM. MYZUS PERSICAE. NEEM EXTRACTS. VERTICILLIUM LECANII.
Laboratory bioassay of six synthetic chemical insecticides namely oxydemeton methyl, thiamethoxam, imidacloprid, acetamipirid, spiromesifen and chlorfenapyr, and one neem based insecticide, Neem Baan (1500 ppm), and one entomopathogenic fungus, Verticillium lecanii (Zimmerman) based formulation Biocatch (109 conidia/ml) was done against the green peach aphid, Myzus persicae (Sulzer) on capsicum. Among chemical insecticides, imidacloprid was the most toxic (LC50 8.87ppm) followed by acetamiprid (10.72 ppm), chlorfenapyr (12.98 ppm), thiamethoxam (48.75 ppm), spiromesifen (87.10 ppm) and oxydemeton methyl (338.02 ppm). The LC90 values obtained were 61.37, 81.28, 115.35, 239.88, 307.92 and 1281.78 ppm, for chlorfenapyr, acetamiprid, imidacloprid, thiamethoxam, spiromesifen and oxydemeton methyl, respectively. Biopesticides, Neem Baan and V. lecanii (Biocatch) resulted in dosage-dependent mortality with LC50 and LC90 values of 4.59 and 23.44 ppm, and 3.2×106 and 1.8×108 conidia/ml, respectively.

009. Rafi, Uzma; A.M.U., Aligarh (India). Department of Zoology, Section of Entomology. rafiuzmamail.com Usmani, M.K.; A.M.U., Aligarh (India). Department of Zoology, Section of Entomology. Kumar, Dipak; A.M.U., Aligarh (India). Department of Zoology, Section of Entomology. A.M.U., Aligarh (India). Department of Zoology, Section of Entomology.. Indian Journal of Entomology (India). (June 2013) v.75(2)p.118-123 KEYWORDS: ORTHOPTERA. BIODIVERSITY.
The study was carried out during October'10-September'11. Twentyfive species representing ninteen genera belonging to the family Acrididae were collected. Inferences of the diversity variation and population dynamics of grasshoppers belonging to family Acrididae (Orthoptera) were drawn. Data generated suggests a relationship between diversity and seasonal temperature. The species composition and population of grasshoppers was also found to differ among the localities of Aligarh.

010. Pashte, V; University of Agricultural Sciences, Bangalore (India). Department of Apiculture. Shylesha, A. N.; National Bureau of Agriculturally Important Insects, Bangalore (India). pashte.vrushalimail.com. Pollen and nectar foraging activity of honey bees in sesamum. Indian Journal of Entomology (India). (June 2013)

v.75(2)p.124-126 KEYWORDS: HONEY BEES. SESAMUM. POLLEN. BEE PLANTS. POLLINATORS.
Honey bees which are the dominant pollinators of sesamum when studied revealed that maximum foraging activity for nectar and pollen collection was observed during morning hours of the day in case of all three species (Apis cerana, A. dorsata and A. florea). The mean number of nectar foragers of A. cerana, A. dorsata and A. florea was 3.18, 1.99 and 2.08 bees/m2/5 min, respectively and pollen foragers of A. cerana, A. dorsata and A. florea was 3.06, 1.86 and 1.87 bees/m2/5 min, respectively; and nectar and pollen foragers was almost equal for three species. The bees spent more time while collecting pollen in sesamum flowers. A. florea spent more time for pollen and nectar collection (8.93 and 7.41 sec/flower, respectively) as compared to A. cerana (6.51 and 4.57 sec/flower, respectively) and A. dorsata (6.70 and 5.95 sec/flower, respectively).

011. Sardana, H.R.; National Centre for Integrated Pest Management, Pusa Campus, New Delhi (India). hrsardanaediffmail.comBhat, M. N.,; National Centre for Integrated Pest Management, Pusa Campus, New Delhi, Delhi (India). Sehgal, Mukesh; National Centre for Integrated Pest Management, Pusa Campus, New Delhi, Delhi (India). Evaluation and validation of non-chemical IPM and inm technology for bell pepper (Capsicum annum var. Frutescens L.) through farmers' participatory approach. Indian Journal of Entomology (India). (June 2013) v.75(2) p.127-131 KEYWORDS: INTEGRATED PEST MANAGEMENT. SWEET PEPPERS. ORGANIC AGRICULTURE.
Non-chemical IPM & INM technologies (Organic) along with IPM farm trials were carried out on bell pepper (Capsicum annum var. frutescens L.) in Daha, Karnal, Haryana during 2009–10 and 2010–11 in a Farmers’ Participatory mode. Farmers’ practices (FP) consisting entirely of pesticidal sprays were also included in trial. The non-chemical (organic) integrated nutrient and pest management technology which included application of FYM 20 tonnes/ha fortified with Trichoderma sp., seedling dip before transplanting in Pseudomonas fluroscens, soil application of neem cake 1.5 tonnes/ha in three split doses, erection of pheromone traps 15/ha for fruit borer, four sprays of HaNPV 250 LE/ha in the initial stages, need based sprays of neem for aphids in early stages of crop, application of spinosad and proclaim biopesticides for thrips and fruit borer, respectively, releases of Trichogramma sp 1.5 lakh/ha for fruit borer, collection, destruction and rouging out of borer damaged fruits and mosaic virus complex affected plants; though resulted in lower yields (172.5 & 138.0 q/ha) and so the lower CBR (1: 2.49 & 1: 2.32) in non-chemical (organic) trial than IPM-yield (205.0 & 180.0 q/ha); CBR (1: 3.78 & 1: 3.07) and Farmers’ Practices-yield (190 & 164.6 q/ha); CBR (1: 3.51 & 1: 2.85), but yielded clean & better quality produce as reflected by pesticide residue studies conducted separately. Therefore, the IPM technology used was not only directly environment friendly but also more sustainable vide increase in biodiversity (natural enemies, soil flora & fauna).

012. Singh, K. M.; Central Agricultural University, Pasighat, Arunachal Pradesh (India). College of Horticulture and Forestry. mamoentomail.com Singh, M. P.; Central Agricultural University, Imphal, Manipur (India). Kumawat, M. M; Central Agricultural University, Pasighat, Arunachal Pradesh (India). College of Horticulture and Forestry.

Riba, T.; Central Agricultural University, Pasighat, Arunachal Pradesh (India). College of Horticulture and Forestry. Entomophagy by the tribal communities of North East India. Indian Journal of Entomology (India). (June 2013) v.75(2)p.132-136 KEYWORDS: INSECTA. ENTOMOPHTHORA. HYMENOPTERA. HEMIPTERA. ORTHOPTERA. ODONATA. COLEOPTERA.

A survey was conducted to document the edible insects available at East Siang District, Arunachal Pradesh and Bishnupur District, Manipur, northeast India. East Siang district is predominated by the Adi tribe and Bishnupur district by the Meitei community. The two ethnic groups, viz. Adi and Meitei accept insects as their food. Most of the edible insects belong to the order Hymenoptera, Hemiptera, Orthoptera, Odonata and Coleoptera. Philosamia ricini is a commercialized insect species as food in Arunachal Pradesh. Based on their resources, Adis of East Siang accepted more terrestrial insects compared to Meiteis of Bishnupur. Meitei community of Bishnupur consumed more aquatic insects. One or the other species of insects are available in all the seasons, however, more species are available in the warm season. Most of the insects are consumed after processing. Some points to be considered for encouraging these edible insects as human food are also discussed.

013. Borkar, S. L.; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). College of Agriculture, Entomology Section. Sarode, S. V.; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). College of Agriculture, Entomology Section. Bisane, K. D.; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). College of Agriculture, Entomology Section. Persistent toxicity of botanicals and biopesticides against Helicoverpa armigera (hubner) in cotton. Indian Journal of Entomology (India). (June 2013) v.75 (2) p.154-156 KEYWORDS: TOXICITY. HELICOVERPA ARMIGERA. COTTON.

An experiment was carried out to test the persistent toxicity of Helicoverpa armigera (Hbn.) on cotton with botanicals and biopesicides in the Department of Entomology, Dr. P.D.K.V., Akola. The results revealed that the significantly higher mortalities were noticed during the first few days after application of treatments, which further declined as the days advanced. In laboratory, the treatments of NSE 5% followed by HaNPV, NSE 5% by spinosad 45 SC, azadirachtin 1500 ppm, a spinosad 45 SC, NSE 5% and HaNPV showed best performance by registering 76.38 to 100% larval mortality up to 5^{th} days. Based on the PT values, the toxicity and persistence, the botanicals followed by biopesticides like spinosad 45 SC or HaNPV 250 LE/ha performed better than botanicals and biopesticides solely.

014. Soujanya, P. Lakshmi; Directorate of Maize Research, Rajendranagar (India). Winter Nursery Centre. soujanyak.scientistmail.comSekhar, J.C.; Directorate of Maize Research, Rajendranagar (India). Winter Nursery Centre.Kumar P.; Directorate of Maize Research, Pusa Campus, New Delhi (India). Maize genotypes and resistance to rice weevil, sitophilus oryzae (coleoptera: Curculionidae) and angoumois grain moth, sitotroga cerealella (lepidoptera: Gelechidae). Indian Journal of Entomology (India). (June 2013) v.75(2)p.157-162 KEYWORDS: PESTS OF PLANTS. SITOPHILUS ORYZAE. SITOTROGA CEREALELLA. WEIGHT LOSSES.

Grains of eleven maize genotypes were evaluated for their resistance to rice weevil, Sitophilus oryzae (L.) and Angoumois grain moth, Sitotroga cerealella (Oliv.) by

‘No choice’ method under laboratory conditions (28±2°C and 60±5% RH). Adult emergence, seed damage, weight loss and susceptibility index were used as parameters. The results indicated that for S. oryzae, adult emergence seed damage and weight loss were low in Shaktiman1 (41, 12% and 0.29%) and RHM 2 (40, 17.00% and 0.73%), respectively. These data were higher in PEEHM 5 (228.00) followed by Shaktiman 2 (85.00). The genotypes when screened against S.cerealella showed highest adult emergence in VH 9 (63.00) followed by PEEHM 5 (58.50). Consequently the seed damage and weight loss were higher in PEEHM 5 (63.15, 14.27) and VH 9 (48.27, 10.13) while it was low in VH 4 (4.28, 2.74) followed by VH 5 (6.70, 2.86), respectively. The moderately susceptible genotypes were found to be Shaktiman 1 to S. oryzae while VH 4 and VH 5 to S. cerealella. However, none of the genotypes were found to be least susceptible to S. oryzae and S. cerealella. The correlations between adult emergence, seed damage, and weight loss and susceptibility index were significant and positive for both pests.

015. Khursheed, Sheikh; CSKHP Agricultural University, Palampur (India). Department of Entomology. sheikhentomail.com Raj, Desh; Central Institute of Temperate Horticulture, Old Air-Field, Rangreth, Srinagar (India). Efficacy of insecticides and biopesticides against hadda beetle, Henosepilachna vigintioctopunctata (fabricius) (coleoptera: Coccinellidae) on bitter gourd. Indian Journal of Entomology (India). (June 2013) v.75(2)p.163-166 KEYWORDS: EPILACHNA VIGINTIOCTOPUNCTATA. INSECTICIDES. BIOPESTICIDES.

Studies were undertaken to evaluate seven insecticides/biopesticides viz., chlorpyriphos 0.05, carbaryl 0.20, malathion 0.05, endosulfan 0.07, abamectin 0.0015, lambda-cyhalothrin 0.004 and azadirachtin 0.0045% against hadda beetle, Henosepilachna vigintioctopunctata on bitter gourd at Entomological Experimental Farm, CSKHPAU and farmer's field, Bara (Hamirpur). Lambda-cyhalothrin and carbaryl were found to be the most potent and remained effective throughout the observational period i.e. up to 15 days of application with mean reduction of 89.26 and 85.09 and 87.10 and 83.45% in pest population over untreated check.

016. Laxman P.; Kakatiya University, Warangal (India) Environmental Research Lab, Department of Zoology. peesarilaxmanahoo.co.in Samatha Ch; Kakatiya University, Warangal (India) Environmental Research Lab, Department of Zoology.. sammaiah_chahoo.com Sammaiah Ch; Kakatiya University, Warangal (India) Environmental Research Lab, Department of Zoology.. Sucking pests on Bt-and non Bt-cotton. Indian Journal of Entomology (India). (June 2013) v.75(2)p.167-169 KEYWORDS: PEST CONTROL. GOSSYPIUM HIRSUTUM.

017. Verma, Harish, Agricultural Research Station Durgapura, Jaipur (India). Department of Entomology. Singh, Swaroop.; Agricultural Research Station Durgapura, Jaipur (India). Department of Entomology. Ahuja, D.B; NCIPM L.B.S. Building, Pusa Complex, New Delhi (India). Fruit characterss of round gourd in relation to fruit fly, Bactrocera cucurbitae Coquillett. Indian Journal of Entomology (India). (June 2013) v.75(2)p.169-171 KEYWORDS: CITRULLUS LANATUS. BACTROCERA CUCURBITAE. PEST CONTROL.

018. Mehra, Keshav; Swami Keshwanand Rajasthan Agricultural University, Bikaner (India). College of Agriculture, Department of Entomology. keshav.mehra35mail.com. Population dynamics of thrips, thrips Tabaci lindeman (Thysanoptera: Thripidae) on garlic in an arid ecosystem. Indian Journal of Entomology (India). (June 2013) v.75(2)p.171-173 KEYWORDS: THYSANOPTERA. GARLIC. THRIPS TABACI. PEST CONTROL.

019. Chandra, Subhash.; Swami Keshwanand Rajasthan Agricultural University, Bikaner (India). College of Agriculture, Department of Entomology. mr.subhashentoediffmail.com Singh, Veer.. Swami Keshwanand Rajasthan Agricultural University, Bikaner (India). College of Agriculture, Department of Entomology. Nanda, U.S.; Swami Keshwanand Rajasthan Agricultural University, Bikaner (India). College of Agriculture, Department of Entomology. Varietal screening of chickpea against pod borer in hyper arid partial irrigated western plain zone of Rajasthan. Indian Journal of Entomology (India). (June 2013) v.75(2)p.175-177 KEYWORDS: CHICKPEAS. PEST INSECTS. HELICOVERPA ARMIGERA.

020. Yadav, Priyanka; A.N.D. College, Kanpur (India). Department of Zoology. Sultana, Naheed; C.S. Azad Univ. of Agri. & Tech., Kanpur (India). Department of Entomology. Relation between physical factors and grain loss due to Sitophilus oryzae in wheat. Indian Journal of Entomology (India). (June 2013) v.75(2)p.178-179 KEYWORDS: SITOPHILUS ORYZAE. PEST CONTROL. WHEATS.

021. Nagar, Rajender; Directorate of Rapeseed Mustard Research, Bharatpur (India). Crop Protetion Unit. Singh, Y.P.; Directorate of Rapeseed Mustard Research, Bharatpur (India). Crop Protetion Unit. Singh, Ram; Directorate of Rapeseed Mustard Research, Bharatpur (India). Crop Protetion Unit. Singh, S.P.; Directorate of Rapeseed Mustard Research, Bharatpur (India). Crop Protetion Unit. Biology, Seasonal Abundance and Management of Painted Bug (Bagrada Hilaris Burmeister) in Eastern Rajasthan. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.291-295 KEYWORDS: BIOLOGY. SEASONAL CROPPING. MANAGEMENT. HETEROPTERA. RAJASTHAN.
Laboratory studies on the biology of painted bug (Bagrada hilaris Burm.) revealed that the mean number of eggs laid by a female were 70.8 ± 6.1 on soaked mustard seeds. The average preoviposition period, incubation period, nymphal period and total developmental period was found as 6.2 ± 0.11 days, 3.6 ± 0.09,16.2 ± 0.57 days and 18.6 ± 0.36 days, respectively. Two peaks of painted bug population were observed i.e. first in 49th standard week (6.5 painted bug/meter row length) and 12th standard week (9.7 painted bug/plant). B. hilaris population was found positively significantly correlated with maximum temperature (r=0.420), evaporation (r=0.455) and wind speed (r=0.422) while negatively significantly correlated with relative humidity (r=-0.424). Malathion 50EC 500ml/500 litre of water was found most effective (84.40% mean reduction after 10 days of spray). The highest incremental cost benefit ratio of 1:11.7 was obtained in malathion 50 EC 500ml/500 litre of water followed by endosulfan 4% dust 10 kg/ha (1:11.1) and endosulfan 35 EC 500ml/500 litre of water (1:11.0).

022. Tyagi Kaomud; National Bureau of Agriculturally Important Insects. Karnataka (India) Kumar Vikas; National Bureau of Agriculturally Important Insects. Karnataka (India). A New Record of Pest Species Pseudodendrothrips Bhattii Kudô (Thysanoptera: Thripidae: Dendrothripinae) from India. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.296-297 KEYWORDS: SPECIES. THYSANOPTERA. THRIPIDAE. INDIA.
The mulberry thrips, Pseudodendrothrips bhattii Kudo, known as a pest of mulberry, is newly recorded from Karnataka. This species causes damage to mulberry plantations especially in summers.

023. Kirti Singh Jagbir; Punjabi University. Department of Zoology. Patiala (India). Kour Mandeep; Punjabi University. Department of Zoology. Patiala (India). Goyal Tarun; Punjabi University. Department of Zoology. Patiala (India). Studies on Internal Genitalic Structures of Two Indian Species of Genus Agathia Guenee (Lepidoptera: Geometridae: Geometrinae). Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.298-302 KEYWORDS: SPECIES. GENERA. LEPIDOPTERA. GEOMETRIDAE.
The internal genitalic attributes of two Indian species i.e., hilarata Guenee and lycaenaria (Kollar) of the genus Agathia Guenee studied and illustrated in detail.

024. Kirti Singh Jagbir; Punjabi University. Department of Zoology. Patiala (India). Kour Mandeep; Punjabi University. Department of Zoology. Patiala (India). Goyal Tarun; Punjabi University. Department of Zoology. Patiala (India). Reporting of Unusual Testes in Three Species of Subfamily Ennominae (Lepidoptera: Geometridae). Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.303-307 KEYWORDS: TESTES. SPECIES. LEPIDOPTERA. GEOMETRIDAE.
Three species i.e., Abraxas leopardina (Kollar), Abraxas sp. And Zamarada baliata Felder and Rogenhofer collected from different localities of Himachal Pradesh for studies on their internal genitalic attributes. A pair of testes observed in these i.e., unusual because only single testis is found in various taxa of this family.

025. Nath Vishwa; Indian Agricultural Research Institute. Division of Entomology. New Delhi (India). Singh, S.R.; Indian Agricultural Research Institute. Division of Entomology. New Delhi (India). Efficacy of Insecticides and Their Mixture for Management of Insect Pests of Brinjal. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.308-311 KEYWORDS: EFFICIENCY. INSECTICIDES. MANAGEMENT. PEST INSECTS. INSECTICIDES. AUBERGINES.
Efficacy of two dosages of insecticides viz., triazophos (350g and 700g a.i./ha) and deltamethrin (10g and 20g a.i./ha) and their registered mixture ‘Spark’(360g and 720g a.i./ha) were studied against insect pests of brinjal var. Pusa Purple Long. Three foliar sprays at fortnightly intervals were given. Studies revealed that all six treatments were effective against leafhopper and whitefly. However, lower dose were not as effective. As far as borer (Leucinodes orbonalis) is concerned, damage ranged from 8.44–21.35% which was 27.07% in untreated plots.

026. Prasad, J.V.; Indian Council of Agricultural Research. Central Tobacco Research Institute. Rajahmundry (India). Sreedher, U.; Indian Council of Agricultural Research. Central Tobacco Research Institute. Rajahmundry (India). Life Parameters of Tobacco

Caterpillar, Spodoptera Litura as Influenced by Transgenic (BT) Cotton Hybrids. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.312-316 KEYWORDS: TOBACCO. SPODOPTERA LITURA. TRANSGENICS. COTTON. HYBRIDS.
A study was conducted to understand the effect of Bt cotton hybrids with single (Cry 1 Ac) and double (Cry 1 Ac and Cry 2 Ab) genes on the life parameters of S.litura in comparison with non-Bt hybrids to understand the extent to which the hybrids support the growth and development of the pest. It was observed that the life parameters of the pest were significantly and negatively affected when the pest was reared on Bt Cotton hybrids with two toxin genes. The net reproductive rate of the pest was 159.22 on Mallika Bt II hybrid whereas it was 458.6 on Mallika Bt I and 704.14 on Mallika non-Bt hybrid. Mean generation time was much shorter on Mallika non-Bt (30.37 days) compared to Mallika Bt II hybrids (38.29 days). The intrinsic rate of increase of the pest was 0.13 on Mallika Bt II whereas it was 0.20 on Mallika Bt I and 0.21 females/female/day on Mallika non-Bt hybrids. The insect could double its numbers in 3.32 days on Mallika non-Bt hybrids whereas it took 3.53 days on Mallika Bt I and 5.23 days on Mallika Bt II. Though similar trend was observed with Tulasi hybrids too, the effect of toxins on the growth and development of the pest was on a higher side in Mallika hybrids compared to Tulasi hybrids. The study highlights the effect of single and double gene Bt cotton hybrids on the growth and development of S.litura and the implications for the buildup of resistance.

027. Pal Anamika; St. John's College. School of Entomology. Department of Zoology. Agra (India). Lal Dinesh; St. John's College. School of Entomology. Department of Zoology. Agra (India). Verma, R.A.; St. John's College. School of Entomology. Department of Zoology. Agra (India). St. John's College. School of Entomology. Department of Zoology. Agra (India). Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.317-320 KEYWORDS: GRAIN LEGUMES. CALLOSOBRUCHUS. CALLOSOBRUCHUS CHINENSIS. OIL CROPS. MUNG BEANS. VARIETIES.
Differential reaction of Callosobruchus chinensis L. in green gram varieties was investigated. Varieties with low protein and higher oil content were least susceptible whereas those with high protein content and low oil content varieties were highly susceptible. PUSA-9871 (24.38%), TM-9937 (22.50%), HUM-12 (22.50%) had higher protein content, coupled with oil content 0.82, 0.88, 0.92%, and these showed high susceptibility. Varieties with lower protein content and with higher oil content like PDM 96–261, PDM-199, SML-668 were moderately resistant. There was considerable reduction in protein content after C. chinensis feeding. The protein content of the varieties had highly significant positive relationship with fecundity, F1 progeny and index of susceptibility. Higher protein content in fresh seeds of the varieties led to more infestation while less oil content in healthy seeds varied from 0.82 to 1.43% being minimum in PUSA-9871 and maximum in PDM 96–261. Considerable reduction in oil content in the varieties of green gram was noticed after the infestation of C. chinensis. The oil content of healthy seeds had highly significant negative correlation with fecundity, F1 progeny and index of susceptibility.

028. Patra Chandra Gauranga; North Orissa University. P.G. Department. Baripada (India). High Temperature Induced Antioxidant Status in the Diapausing Pupae of Tasar Silkworm, Antheraea Mylitta Drury. Indian Journal of Entomology (India). (Dec 2011)

v.73 (4) p.321-324 KEYWORDS: HEAT. ANTIOXIDANTS. PUPAE. SILKWORMS. ANTHERAEA. ANTHERAEA MYLITTA.
Antioxidant levels in the haemolymph and fat bodies were studied in the diapausing pupae of tasar silkworm, Antheraea mylitta Drury exposed to high temperature (37° C) for a period of 15 days and compared with that of control (kept at 25°±3°C). Protein, ascorbic acid and glutathione content in the fat body and haemolymph tissues were found to increase due to high temperature. Reduction in lipid peroxidation (malondialdehyde =MDA content) in the fat body tissue showed a protective mechanism to limit the tissue oxidation. The results suggest that, high temperature induces antioxidant status of the pupae of tasar silkworm A. mylitta Drury.

029. Anil; CSK Himachal Pradesh Krishi Vishvavidyalaya. Department of Entomology. Palampur (India). Sharma, P.C. CSK Himachal Pradesh Krishi Vishvavidyalaya. Department of Entomology. Palampur (India). Evaluation of Insecticides against Brinjal Shoot and Fruit Borer Leucinodes Orbonalis Guenee. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.325-330 KEYWORDS: EVALUATION. INSECTICIDES. AUBERGINES. SHOOTS. FRUIT. LEUCINODES ORBONALIS.
The evaluation of field efficacy, economics and persistent toxicity of insecticides against Leucinodes orbonalis Guenee on brinjal were carried out during 2007 and 2008 at Palampur. Field efficacy showed that among the tested insecticides, the mean fruit infestation was minimum (18.79%) in emamectin benzoate followed by agrospray oil T (21.94%) and endosulfan (22.72%). On the basis of cost of protection, agrospray oil T showed highest (1:73.13) cost benefit ratio followed by lambda-cyhalothrin (1:44.41) and endosulfan (1:44.36). The highest (302.08) persistent toxicity value against neonate larvae was observed in emamectin benzoate followed by spinosad (264.58) and endosulfan (210.42). It was concluded that L. orbonalis can be effectively managed by the application of emamectin benzoate (0.002%) followed by agrospray oil T (0.02%) and endosulfan (0.05%).

030. Rai, A.K.; Rajendra Agricultural University. Department of Entomology. Bihar (India). Wakgari Mulatu; Rajendra Agricultural University. Department of Entomology. Bihar (India). Rajendra Agricultural University. Department of Entomology. Bihar (India). Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.331-337 KEYWORDS: WEATHER. BUSSEOLA FUSCA. LEPIDOPTERA. NOCTUIDAE. PREDATORS. OENOTHERA. COCCINELLIDAE. SORGHUM. ETHIOPIA.
An experiment was conducted at Haramaya University, Haramaya (Ethiopia) research field on sorghum crop to find out the infestation level of most common stem borer, Busseola fusca (Fuller) under the influence of predominant predator, Oenopia conglobatta (L.) (coccinellid) using correlation and multiple regression analyses. One peak of infestation was observed during second fortnight of September. After peak the infestation started to decrease continuously till second fortnight of November. Infestation showed increasing trend after second of fortnight November and continued till harvest. The peak average of O. conglobatta (L.) numbers was 13.06 at corresponding peak of infestation (33.35%). After a peak number of predator, it decreased continuously reaching to lowest number during second fortnight of November at corresponding infestation of zero per cent. The

correlation coefficients between weather factors and infestation were found significant except average maximum temperature but the significant correlation coefficients of O. conglobatta (L.) - predator were found with minimum temperature and sunshine hrs as positive and negative, respectively. The significant regression coefficients of O. conglobatta (L.) – predator was found as negative and positive with maximum and minimum temperature though negative with sunshine hrs. The coefficients of determination were 0.73 and 0.90 for infestation and Oenopia numbers, respectively along with significant regression equations.

031. Thiraviaraj, S.; Alagappa Govt. Arts College. Department of Zoology. Karaikudi (India). Malaikozhundan, B.; Alagappa Govt. Arts College. Department of Zoology. Karaikudi (India). Evaluation of Varieties of Pulses against Infestation by Cowpea Bruchid, Callosobruchus Maculatus (Fabricius). Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.346-348 KEYWORDS: EVALUATION. VARIETIES. GRAIN LEGUMES. INFESTATION. CALLOSOBRUCHUS. CALLOSOBRUCHUS MACULATUS.
Six varieties of pulses were tested for their resistance against Callosobruchus maculatus during September 2010 - June 2011. Cowpea varieties (CoCp7 and Co6) were identified as susceptible varieties with highest SIs of 12.18 and 11.51 respectively. The green gram (Km2 and VBN2) were identified as moderately resistant with SIs of 6.36 and 6.82, respectively. The varieties YBN3 and VBN4 (black gram) were identified as resistant with lowest SIs of 5.18 and 5.08 respectively.

032. Chitra, N.; Tamil Nadu Agricultural University. National Pulses Research Centre. Pudukkottai (India). Soundararajan, R.P.; Tamil Nadu Agricultural University. National Pulses Research Centre. Pudukkottai (India). Insect Diversity in Pigeonpea Ecosystem in Tamil Nadu. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.349-356 KEYWORDS: INSECTA. BIODIVERSITY. ECOSYSTEMS. TAMIL NADU.
Field surveys were carried out in the pigeonpea fields at National Pulses Research Centre, Vamban in Pudukkottai district of Tamil Nadu from May 2007 to April, 201 1. A total of 127 insect species under 113 genera. 59 families and 11 orders were observed in the pigeonpea ecosystem. Amongst the insect orders Coleoptera was the most diverse (31 species) followed by Hemiptera (27 species), Lepidoptera (19 species), Orthoptera (15 species), Hymenoptera (14 species), Odonata (7 species), Dictyoptera (6 species) and Diptera (4 species), Neuroptera (2 species), Ephemeroptera and Isoptera (1 species each). As per Schoenly and Zhang (1999), amongst the different functional groups, the diversity of the herbivores was the maximum (84 species), followed by the predators (23 species), omnivores (10 species), parasitoids (5 species), tourists (2 species) and the role undetermined (3 species).

033. Thangamathi, P.; K.N. Govt. Arts College for Women (Antonomous). Department of Zoology. Thanjavur (India). Ananth, S.; K.N. Govt. Arts College for Women (Antonomous). Department of Zoology. Thanjavur (India). Repellent Properties of Essential Oil of Arbuscular Mycorrhizal (AM) Ocimum Basilicum against Culex Quinquefasciatus Say (Diptera: Culicidae). Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.357-359 KEYWORDS: REPELLENTS. ESSENTIAL OIL CROPS.

MYCORRHIZAE. OCIMUM. OCIMUM BASILICUM. CULEX. CULEX QUINQUEFASCIATUS. DIPTERA. CULICIDAE.
The present study was undertaken to test the efficacy of Arbuscular mycorrhizal fungi treated Ocimum basilicum oil and compare its efficacy in relation to repellent activity against filarial mosquito Culex quinquefasciatus Say. Skin repellent test at 1.0, 2.0, 3.0, and 4.0 mg/cm2 concentration of O. basilicum oil gave 100% protection up to 15, 30, 60, and 120 min. The results clearly demonstrated that the repellent activity of AM fungi treated O. basilicum oil was higher than the AM fungi untreated O. basilicum oil and AM fungi treated O. basilicum oil served as a potential repellent agent against filarial vector C. quinquefasciatus Say.

034. Bhatnagar Ashok; Agricultural Research Station Rajasthan Agriculture University. Department of Entomology. Jaipur (India). Susceptibility of Eggs, Pupae and Adults of White Grub, Maladera Insanabilis (Brenske) to Entomopathogenic Nematode, Heterorhabditis Bacteriophora Poinar. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.360-364 KEYWORDS: EGGS. PUPAE. ADULTS. LARVAE. ENTOMOPHILIC NEMATODES. HETERORHABDITIS. HETERORHABDITIS BACTERIOPHORA.
To evaluate the susceptibility of life stages of white grub, Maladera insanabilis Brenske against entomopathogenic nematode, Heterorhabditis bacteriophora Poinar bioassays were done in soil as well as on filter paper. No nematode infection developed in eggs in soil as well as on filter paper, even when they were exposed on filter paper to nematodes for 24 h at a very high inoculation dose of 5000 IJs/90 eggs/arena of 50 mm dia. When exposed to nematodes in soil, adults of M. insanabilis were found more susceptible than pupaewith LD50 values of 16796.42 and 19896.60 IJs /100 g soil/insect, in adult and pupae respectively. The adults died earlier (LT50, 5.41 days) than pupae (LT50, 5.89 days). Similar trend was observed when insects were exposed on filter paper (LD50 values, 135.80 IJs/adult and 149.61 IJs/ pupa; LT50 values, 5.41 days for adults and 5.89 days for pupae).

035. Neog Pankaj; School of Agricultural Sciences and Rural Development Nagaland University. Department of Entomology. Medziphema (India). Singh, H.K.; School of Agricultural Sciences and Rural Development Nagaland University. Department of Entomology. Medziphema (India). Correlation of Seed Characters of Pulses with Host Suitability and Preference of Callosobruchus Chinensis (L.). Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.365-370 KEYWORDS: SEED. GRAIN LEGUMES. CALLOSOBRUCHUS. CALLOSOBRUCHUS CHINENSIS.
Correlation studies were carried out between physical characters of eleven different pulses viz., green gram, black gram, lentil, chickpea (deshi), chickpea (kabuli), french bean, pea, pigeon pea, cowpea, soybean and rice bean and oviposition by Callosobruchus chinensis (L.) in multiple and restricted choice conditions during 2005 - 2006. It was also studied to find out any possible relationship of both physical and chemical characters with the host suitability and preference of the pest. The seed characters such as 100 seed weight, seed coat thickness, colour and texture of seed coat were not related with the ovipositional preference and host suitability of the pest to different pulse seeds. However, the biochemical characters such as total soluble sugar, reducing sugar, non-reducing sugar and amylose fraction of starch had

a positive influence on host suitability (in terms of growth index) and preference (in terms of seed infestation) of C. chinensis. The starch, crude protein, free amino acid, crude oil and free fatty acid content were not significantly correlated with any of the developmental parameters of the pest.

036. Neog Pankaj; Nagaland University. School of Agricultural Sciences and Rural Development. Department of Entomology. Medziphema (India). Singh, H.K.; Nagaland University. School of Agricultural Sciences and Rural Development. Department of Entomology. Medziphema (India). Qualitative Deterioration in the Seeds in Storage Due to Callosobruchus Chinensis (L.). Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.371-377 KEYWORDS: DETERIORATION. SEEDS. STORAGE. CALLOSOBRUCHUS. CALLOSOBRUCHUS CHINENSIS.
Qualitative studies in the seeds of different pulses due to infestation by Callosobruchus chinensis (L.) after 60 and 90 days of storage revealed that the total soluble sugar, non reducing sugar, starch and crude fat content were decreased; while the moisture, reducing sugar, crude protein, free fatty acid and uric acid content were increased significantly in the infested seeds as compared to healthy ones. The corresponding increase or decrease of these biochemical contents was the highest in green gram and the lowest in soybean. The qualitative changes in the seeds of these pulses were directly related to the level of insect infestation.

037. Dar Yaqoob Mohd.; Central Sericultural Research and Training Institute. Central Silk Board. Jammu & Kashmir (India). Illai Irfan; Central Sericultural Research and Training Institute. Central Silk Board. Jammu & Kashmir (India). Agrawal, O.P.; Central Sericultural Research and Training Institute. Central Silk Board. Jammu & Kashmir (India). Mittal Vishal. Central Sericultural Research and Training Institute. Central Silk Board. Jammu & Kashmir (India). Ramegowda, G.K.; Central Sericultural Research and Training Institute. Central Silk Board. Jammu & Kashmir (India). Impact of Mite Infestation on Mulberry Leaf and Silkworm, Bombyx Mori L. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.378-381 KEYWORDS: ACARINA. INFESTATION. MORUS. SILKWORMS.
Silkworms were reared by feeding with mite infested and non infested (healthy) mulberry leaves of five different varieties (Goshoerami, KNG, TrlO, Ichinose, and Chinese white) during 2010. The effect of feeding with mite infested leaves on the commonly reared silkworm hybrid, SH6×NB4D2 was observed with respect to larval period, larval weight, cocoon weight, shell weight, shell ratio, filament length and denier. Healthy and mite infested leaves were analyzed for their biochemical composition viz., relative chlorophyll content, total carbohydrate and total protein. The larval period, larval weight, cocoon weight, shell weight, shell ratio, filament length and denier were higher on healthy leaves of all varieties as compared to mite infested leaves. Mulberry variety Goshoerami had higher values of total protein, carbohydrate and chlorophyll content index as compared to other varieties. The biochemical composition of healthy leaves was superior to that of mite attacked leaves. Results of t-test analysis show a significant difference in the larval and economic parameters of the silkworms fed on healthy and mite infested leaves separately.

038. Devi Hijam Shila; Orissa University of Agriculture and Technology. AICRP on Honeybees & Pollinators Department of Entomology. Bhubaneswar (India). Sontakke, B.K.; Orissa University of Agriculture and Technology. AICRP on Honeybees & Pollinators Department of Entomology. Bhubaneswar (India). Mohapatra L.N.; Orissa University of Agriculture and Technology. AICRP on Honeybees & Pollinators Department of Entomology. Bhubaneswar (India). Brood Rearing Activities of Apis Mellifera L. in Coastal Orissa. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.382-383 KEYWORDS: ANIMAL HUSBANDRY METHODS. APIS. APIS MELLIFERA. APIS MELLIFERA LIGUSTICA. ORISSA.

039. Gayathri M.; S.V Agricultural College. Department of Entomology. Tirupati (India). Prasad P.; S.V Agricultural College. Department of Entomology. Tirupati (India). Rajendra; S.V Agricultural College. Department of Entomology. Tirupati (India). Biochemical Changes in the Leaves of Mulberry Due to Tukra Disease Caused by Mealy Bug Maconelucoccus Hirsutus (Green). Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.383-385 KEYWORDS: BIOCHEMICAL REACTIONS. LEAVES. MORUS. PSEUDOCOCCIDAE. MACONELLICOCCUS.

040. Saini, Manpreet Kaur; Punjab Agricultural University, Ludhiana (India), Dept. of Entomology. mksainiau.edu Dhawan, Ashok K.; Punjab Agricultural University, Ludhiana (India), Dept. of Entomology. Variability of Ä-endotoxin expression in dual and single-toxin Cotton genotypes and on survival of Helicoverpa armigera (H¨¹b.) and Spodoptera litura (Fab.). Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 1-8 KEYWORDS: COTTON. HELICOVERPA ARMIGERA. SPODOPTERA LITURA.

Toxin expression of Cry1Ac and Cry2Ab was studied in plant parts of five Bollgard II (BG II) genotypes viz. MRC 7031, MRC 7017, RCH 134, Ankur Jassi and Tulsi 4, while toxin expression of Cry1Ac alone was studied in one Bollgard I (BG I) genotype RCH 134. The expression was quantified by using separate ELISA kits. For quantifying toxins in Bollgard II genotypes Cry1Ac/Ab and Cry2Ab kits were used and for Bollgard I genotype, only Cry1Ac/Ab kit was used. Mean % mortality of one-day-old larvae of Helicoverpa armigera and one-day-old, 3rd and 5th instar larvae of Spodoptera litura were observed on different plant parts of Bollgard II, Bollgard I and their respective non-Bt genotypes. Quantitative expression of both toxins was found to be variable amongst plant parts of genotypes at different sampling intervals. Expression of Cry1Ac was maximum in RCH 134 BG II followed by RCH 134 BG I, MRC 7031 BG II, MRC 7017 BG II, Ankur Jassi BG II and Tulsi 4 BG II, while, expression of Cry2Ab was maximum in BGII genotypes viz. RCH 134 followed by MRC 7031, MRC 7017, Ankur Jassi and Tulsi 4. Expression of Cry1Ac was maximum in leaves followed by squares and bolls, while the expression of Cry2Ab was maximum in squares followed by bolls and leaves. Among sampling intervals, expression of both toxins was maximum at 60 days after sowing (DAS) in leaves and squares but in bolls, it was maximum at 120 DAS. In the later stages of crop growth, although quantitative level of both toxins declined but expression did not decline below critical level of 1.9 ìg/g. Cry2Ab expressed 3 to 6 times more than Cry1Ac in Bollgard II genotypes. The moratlity of H. armigera and S. litura was maximum when larvae were fed with RCH 134 BG II. The mortality of H. armigera was maximum when it was fed with leaves while that of S.

litura was maximum on squares. The mortality of different instars of S. litura on RCH 134 BG I genotype was very less, which indicated that BG I genotype did not control S. litura.

041. Vivek, Shah; Indian Agricultural Research Institute, New Delhi (India), Div. of Entomology. vivek4256mail.com Paul, Bishwajeet; Indian Agricultural Research Institute, New Delhi (India), Div. of Entomology. Pandi, G. Guru Pirasanna; Indian Agricultural Research Institute, New Delhi (India), Div. of Entomology. Shankarganesh, K.; Indian Agricultural Research Institute, New Delhi (India), Div. of Entomology. Biology and predatory potential of green lacewing, Chrysoperla sp. (carnea-group) on different aphid species. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 9-12 KEYWORDS: APHIS. BIOLOGICAL CONTROL. CHRYSOPERLA. PREDATION.
Mean number of aphids consumed throughout the grub periods were 394.8±4.47 on Aphis craccivora, 332.6±3.68 on A. gossypii, 132.4±6.07 on Lipaphis erysimi and 260.4±4.092 on Rhophalosiphum maidis. Total developmental period was found least in case of A. craccivora (21.1 days) which was on par with general laboratory host i.e., Corcyra cephalonica (20.5 days),whereas developmental period was more on L. erysimi (24.2 days). Feeding preference of predator was found in the order of A. craccivora A. gossypii R. maidis L. erysimi. Fecundity was found to be significantly higher in case of C. cephalonica (789.6±9.88 eggs), while in case of A. craccivora 250.8±7.70 eggs. The present study concluded that, though all the parameters with respect to developmental period of Chrysoperla sp. (carnea-group) reared on A. craccivora were on par with C. cephalonica, except fecundity was found to be lower on A. craccivora.

042. Chakraborty, Kaushik; University of Gour Banga, Mokdumpur, Malda (India), Dept. of Zoology. kaushik_apdcollegeediffmail.com. Population dynamics of Orseolia oryzae (Wood-Mason) on Rice crop at Gangetic plains of West Bengal. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 13-16 KEYWORDS: ORSEOLIA ORYZAE. ORYZA SATIVA. POPULATION DYNAMICS.
Activity of Orseolia oryzae was seasonally allied and rice growth stage dependent. O. oryzae started to build up from 20 standard meteorological weeks (SMW), attained the peak of abundance at 34 SMW. The population, then subsumed gradually up to 39 SMW and then, abruptly attaining almost nil at 43 SMW. The correlation value revealed that the incidence of O. oryzae population and the number of silver shoot had positive and significant relation with maximum temperature, average temperature, maximum, minimum relative humidity, average relative humidity and rainfall. Non-significant and positive relation was noted with minimum temperature and average sunshine hrs. Relation between pest incidence and number of rainy days was insignificantly negative. Regression equation explained 91-9% variability and that was primarily due to rainfall.

043. Pandi, G. Guru Pirasanna; Indian Agricultural Research Institute, New Delhi (India), Div. of Entomology. guruagrimail.com Paul, Bishwajeet; Inaidn Agricultural Research Institute, New Delhi (India), Div. of Entomology. Shah, Vivek; Inaidn Agricultural Research Institute, New Delhi (India), Div. of Entomology. Shankarganesh, K.; Inaidn

Agricultural Research Institute, New Delhi (India), Div. of Entomology. Relative toxicity of insecticides against Coccinellid beetle, Cheilomenes sexmaculata (Fabricius). Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 17-20 KEYWORDS: MENOCHILUS SEXMACULATUS. TOXICITY.

Among the insecticides tested, acetamiprid showed high toxic to grubs of Cheilomenes sexmaculata, followed by thiamethoxam, imidacloprid, buprofezin and neembaan. Imidacloprid showed 14.8 times more toxic in comparison to buprofezin, whereas neembaan® produced less than 50% mortality irrespective of the concentration tested. Field recommended dose of imidacloprid 0.005% recorded 26, 32 and 36 % mortality at 24, 48, 72 hrs after treatment (HAT), respectively. However, field recommended dosage of acetamiprid 0.006 and thiamethoxam 0.005% caused almost 50% mortality. Whereas, buprofezin at recommended dose 0.013 % was considered to be safer, because it produced 10, 16, and 22 % mortality at 24, 48, and 72 HAT, respectively under laboratory conditions.

044. Kant, Krishna; NRC on Seed Spices, Tabiji, Ajmer (India). kkgupta3ediffmail.com Ramanujam, B.; NBAII, Bengaluru (India). Tyagi, S.K.; CIPHET, Ludhiana (India). Sharma, Y.K.; NRC on Seed Spices, Tabiji, Ajmer (India) Meena, S.S.; NRC on Seed Spices, Tabiji, Ajmer (India). Mishra, B.K.; NRC on Seed Spices, Tabiji, Ajmer (India). Vishal, M.K.; NRC on Seed Spices, Tabiji, Ajmer (India). Meena, S.R.; NRC on Seed Spices, Tabiji, Ajmer (India). Management of Fennel aphids (Hyadaphis coriandri Das) through biorational approaches. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 21-23 KEYWORDS: FOENICULUM VULGARE. SEED.

The results showed that among entomopathogens Metarhizium anisophilae reduced maximum population after first spray (32.3 aphids/floret) and Beauveria bassiana after second spray (8.1 aphids/floret). However, maximum yield was recorded in M. anisophilae application. All the botanicals gave good control of pest and significantly higher yield were more effective only after insecticidal check. Application of Sulphur compound of Karanj (Pongamia spp.) extract-1%, gave maximum aphids control (30.5,11.2 aphids/floret after 1st & 2nd spray) and yield of 12.5 q./ha. The application of entomopathogen in combination with neem oil showed no definite patterns of combined or synergistic effect than alone application.

045. Selvaraj, K.; CCS Haryana Agricultural University, Hisar (India), Dept. of Entomology. Kaushik, H.D.; CCS Haryana Agricultural University, Hisar (India), Dept. of Entomology. Entomopathogenicity of Beauveria bassiana (Balsamo) Vuillemin against Hyadaphis coriandri (Das). Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 24-26 KEYWORDS: HYADAPHIS. BEAUVERIA BASSIANA.

The studies revealed that, the cumulative corrected mortality (CCM) ranged from 22.8-45.5 % at 24 hrs and 58.4-90.9% on 7th DAT. The mortality in treated aphids increased with increase in conidial spore concentration. While, the LC50 and LT50 were found to be 1.7 X 106 spores/ml and 69.15- 147.82 hrs. respectively, with achieving 50 % mortality of H. coriandri at 69.15 hrs with dose of 1X 1010 spores/ml. Median lethal time (LT50) values were found to be inversely proportional to the spore concentration of Beauveria bassiana.

046. Gogoi, P.; Assam Agricultural University, Jorhat (India), Dept. of Entomology. Bora, D.K.; Assam Agricultural University, Jorhat (India), Dept. of Entomology. Bhattacharjee, B.; Assam Agricultural University, Jorhat (India), Dept. of Entomology. Borah, R.K.; Assam Agricultural University, Jorhat (India), Dept. of Entomology. Effect of plant extract and insecticides on immature stages of Trichogramma chilonis. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 27-29 KEYWORDS: JATROPHA CURCAS. PLANT EXTRACTS. TRICHOGRAMMA CHILONIS.
Among the treatments, Jatropha curcas oil at 25 % concentration applied at the egg stage was least toxic to T. chilonis in terms of fecundity (82.2%), adult emergence (77.5%), male longevity (3.99 days), female longevity (7.90 days) and developmental period (8.50 days), while quinalphos 25 EC was most toxic. The toxic effect of the treatments in terms of fecundity, % adult emergence, % female emergence, male, female longevity and developmental period were similar when applied at the larval stages of the parasitoids. However, among the treatments, J. curcas oil was safest, followed by nimbecidine while quinalphos was most toxic.

047. Patil, S.K.; Mahatma Phule Krishi Vidyapeeth, Rahuri (India), Dept. of Entomology. Evaluation of insecticides and natural products against Citrus leaf miner in Acid lime. Annals of Plant Protection Sciences (India). (Mar 2013) v.21 (1) p. 30-32 KEYWORDS: CITRUS AURANTIIFOLIA. PHYLLOCNISTIS CITRELLA.
The results revealed that two sprays of imidacloprid (0.005%) or thiodicarb (0.075%) or acephate (0.1125%) at 15 days interval just after initiation new flush was found to be most effective in reducing the citrus leaf miner infestation (14.9 to 18.8%) with significantly higher fruit yield (12.78 to 13.44 t/ha) and B:C ratio (1:2.21 to 1:2.64). Among the natural products, alternate spray of NSKE (5%) with thiamethoxam (0.0025%) was significantly superior in reduction of infestation (21.4%) and higher fruit yield (12.33 t/ha with B:C ratio of 1:1.94) as against NSKE 5% (11.48 t/ha with B:C ratio 1:1.45).

048. Bhagabati, B.; Assam Agricultural University, Jorhat (India). Dept. of Nematology. Deka, M.K.; Assam Agricultural University, Jorhat (India). Dept. of Entomology. Evaluation of management strategies against leaf and fruit Scarring beetle (Nodostema subcostatum) of Banana. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 33-36 KEYWORDS: MUSA. QUALITY.
Management strategies against (Nodostema subcostatum) showed that all the treatments significantly reduced the infestation of the pest and increased the yield and improved the quality. However, carbaryl 0.3% (20 ml poured into heart of plant) was found to be most effective in reducing the beetle population and increasing the yield of banana. Likewise, quinalphos 0.05% (20ml into heart of plant) also gave significant control of pest and enhancement of yield attributing parameters. The number of hands/ bunch and fingers/hand were also increased with all the different treatments than the untreated control. The bunch weight was also increased due to treatments as compared to untreated control. The quality parameters viz. titrable acidity(%),total soluble solid(%),total sugar(%),reducing sugar(%),non reducing sugar(%),sugar- acid ratio and pulp peel ratio increased due to reduction of pest infestation. The titrable acidity percentage was found to be highest(0.35%) in the treatment tilling and clean cultivation followed by 0.31% in quinalphos 0.05% . The

total soluble solid and total and reducing sugar all were drastically reduced due to infestation of the pest. However, these parameters increased significantly and quality of the fruit was improved.

049. Baskaran, R.K. Murali; Agricultural College and Research Institute, Madurai (India), Dept. of Agricultural Entomology. muralibaskaran2007ediffmail.com Rajavel, D.S.; Agricultural College and Research Institute, Madurai (India), Dept. of Agril. Entomology. Management of Lepidopteran pests of Groundnut through organic sources of nutrients. Annals of Plant Protection Sciences (India). (Mar 2013) v.21 (1) p. 37-41 KEYWORDS: ARACHIS HYPOGAEA. HELICOVERPA ARMIGERA. SPODOPTERA LITURA.

Groundnut plots receiving vermicompost (2 t/ha) + neem cake (250 kg/ha) + bio-fertilizers (2 kg/ha) + NPK (8.5:34:54 kg/ha) had significantly less incidence of lepidopteran pests, recording the overall mean leaf damage of 13.3% with a reduction from full dose of NPK of 49.6% for leafminer (Aproaerema modicella), 13.0% and a reduction of 41.4 % for tobacco caterpillar (Spodoptera litura) and 10.1% and a reduction of 43.8% for gram pod borer (Helicoverpa armigera) while it was 26.4, 22.2 and 18.0% in full dose of NPK. Yield in treatment was the highest of 1748 kg wet pods/ha while it was 1560 kg wet pods/ha in full dose of NPK and 987 kg wet pods/ha in untreated check.

050. Jyothi; University of Agricultural Science, Raichur (India), Dept. of Agril. Entomology. jyothipatil.42mail.com Ashoka, J.; University of Agricultural Science, Raichur (India), Dept. of Agril. Entomology. Bheemanna, M.; University of Agricultural Science, Raichur (India), Dept. of Agril. Entomology. Nagangouda, A.; University of Agricultural Science, Raichur (India), Dept. of Agril. Entomology. Sreenivas, A.G.; University of Agricultural Science, Raichur (India), Dept. of Agril. Entomology. Mekali, Jayashree; University of Agricultural Science, Raichur (India), Dept. of Agril. Entomology. Waiting period for insecticides and a botanical used in control of Mulberry Thrips. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 42-45 KEYWORDS: BOMBYX MORI.

The results revealed that waiting periods were different for different insecticides viz., nimbicidine (7 days), dichlorvos (9 days), fipronil(11 days), flupyradifurone and imidacloprid (15 days each), acetamiprid and thiamethoxam (21 days each), and spinosad (35 days). The residual toxicity of insecticides and a botanical on economic parameters of mulberry silkworm indicated that there was no deleterious effect of toxicants on silkworm growth and development as evidenced through non-significant differences in economic and survival parameters of mulberry silkworm.

051. Bandi, Sanjay; UAS, Krishinagar, Dharwad (India), Dept. of Agricultural Entomology Sivasubramanian, P.; Tamil Nadu Agricultural University, Coimbatore (India), Dept. of Agril. Entomology. Induced resistance in management of Thrips tabaci Lindeman in Onion by alteration in host nutrition. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 46-49 KEYWORDS: ORGANIC AMENDMENTS. THRIPS TABACI.

The biochemical constituents of onion plant as influenced by organic sources of nutrients were correlated with thrips population to understand the possible role of organic nutrients in creating the induced resistance. The pooled data on thrips

population revealed that application of combination of NPK, FYM, Azophos and neem cake recorded lowest thrips population (6.22 & 7.34 thrips / plant) in both the field trials. Application of organic nutrients and amendments significantly reduced the total chlorophyll and reducing sugar contents. The plants treated with NPK, FYM, Azophos and neem cake combination recorded higher total phenol (5.10 mg/g) and OD phenol (2.42 mg/g) contents compared to the plants receiving inorganic NPK alone. The incidence of thrips was positively correlated to total chlorophyll and reducing sugar content and negatively correlated to phenols and OD phenol content.

052. **052** Baskaran, R.K. Murali; Agricultural College and Research Institute (TNAU), Madurai (India), Dept. of Agril. Entomology. muralibaskaran2007ediffmail.com. Enhanced activity of Trichogramma chilonis and Chrysoperla carnea on eggs of Earias vittella and Helicoverpa armigera through Kairomonic activity of acetone extracts of Clusterbean. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 50-52 KEYWORDS: CHRYSOPERLA CARNEA. EARIAS VITTELLA. HELICOVERPA ARMIGERA. KAIROMONES. TRICHOGRAMMA CHILONIS.

Clusterbean, identified as cost effective intercrop in okra eco-system to manage lepidopteran pests (Earias vittella, Helicoverpa armigera) was selected to study the kairomone effect on the activity of Chrysoperla carnea and Trichogramma chilonis. Acetone extract of flowers of clusterbean (1% or 10,000 ppm) recorded the highest parasitization on the eggs of E. vittella (61.3%) by T. chilonis on 7th day after introduction of parasitioids when compared to control with acetone (10.3%). Acetone extract of clusterbean flowers was highly effective to enhance the predatory activity of C. carnea, recording 51.2% on eggs of E. vittella, 24 hrs. after introduction of the predator while it was 12.5% in control. Similarly acetone extract of flowers of clusterbean enhanced the parasitization/predation activity of T. chilonis and C. carnea on the eggs of H. armigera.

053. Bandyopadhyay, U.K.; Regional Sericultural Research Station,Kalimpong (India) Chatterjee, S.; Regional Sericultural Research Station, Kalimpong (India) Maji, C.; Regional Sericultural Research Station, Kalimpong (India) Bindroo, B.B.; Central Sericultural Research & Training Institute, Berhampore (India). ujjalcsbediffmail.com. Efficacy of plant oils against leaf webber (Glyphodes pyloalis Walker) on Mulberry (Morus alba L.) and biosafety to Silkworm. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 53-56 KEYWORDS: BOMBYX MORI. MORUS ALBA. NEEM EXTRACTS.

Compiled data revealed that Pongamia oil was very effective for reducing the pest population up to 15 days after spray followed by neem oil and agro spray oil. Bioassay of three pesticides on bivoltine silkworm race (SK6 x SK7) showed that mortality of silkworm was very low in case of neem oil followed by agro spray oil and pongamia oil after 15 days of spray. Bioassay revealed that feeding of 1% neem oil treated mulberry leaves resulted 93% ERR (Effective Rate of Rearing) and 19% S.R. (Shell ratio) which was on par with the control lots. Based on the economics and residual toxicity on silkworm, 1% neem oil (azadirachtin 1500 ppm) were found to be most effective for controlling leaf webber on mulberry.

054. Choudhury, Rummana A.; National Centre for Integrated Pest Management, L.B.S. Centre, I.A.R.I., New Delhi (India) Rizvi, P.Q.; Faculty of Agricultural Sciences, A.M.U, Aligarh (India), Dept. of Plant ProtectionAli, Arshad; Faculty of Agricultural Sciences, A.M.U, Aligarh (India), Dept. of Plant ProtectionAhmad, S. Kamran; Faculty of Life Sciences, AMU, Aligarh (India), Dept. of Zoology. Age Specific Life table of Helicoverpa armigera on Cicer arietinum under natural conditions. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 57-61 KEYWORDS: CICER ARIETINUM. HELICOVERPA ARMIGERA. LIFE TABLES.

Helicoverpa armigera completed its entire life cycle in 43 days and 47 days in both years of observation. Intermittent pauses in the age specific survivorship (lx) were also observed in both the generations' years. Nevertheless, life -expectancy showed a slow and steady decline from day one till the culmination of the generations. The females of H. armigera deposited their eggs within 9 days in 1st year and within 11 days in next year. Higher carrying capacity of 88.52 was witnessed in previous year as compared to 80.60 in succeeding generation. The potential fecundity was 363.99 eggs/female in 1st generation which was of low order as against 388.90 eggs/female in 2nd year. The accurate intrinsic rate of increase was of higher magnitude (0.1130 females/female/day) in 1st generation than that of (0.1064 females/female/day) 2nd year. Further, the finite and intrinsic rate of increase of population (1.1197, 0.1125 females/female/day and 8.26 x 1017/annum, respectively) were also found of high order in the 1st generation. The corresponding values for 2nd generations were witnessed as 1.1122, 0.1059 females/female/day and 7.30 x 1016/annum, respectively.

055. Mahalakshmi, M.Sesha; Regional Agricultural Research Station, Lam, Guntur (India). msmlaxmimail.com Prasad, N.V.V.S.D.; Regional Agricultural Research Station, Lam, Guntur (India). Seasonal expression of Cry 1 Ac toxin in different plant parts of two Bt Cotton hybrids. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 62-64 KEYWORDS: TOXINS. ELISA. HYBRIDS.

The studies were conducted to estimate the quantity of Cry 1 Ac protein in different parts from two transgenic Bt cotton hybrids, viz., MECH 12 Bt and RCH 2 Bt at different crop growth stages through Bt-Quant ELISA kit. The Cry 1 Ac toxin expression was found to be variable among the hybrids and also among the different plant parts over the plant age. The Cry 1 Ac toxin expression was highest in leaves followed by inter locular wall and seed when compared to flower buds, flowers and boll rind in both MECH 12 Bt and RCH 2 Bt hybrids. The toxin expression was highest at 60 DAS which declined gradually by 150 DAS in both MECH 12 Bt and RCH 2 Bt hybrids.

056. Rao, C.N.; National Research Centre for Citrus, Amravati Road, Nagpur (India). nandikesh70mail.comShivankar, V.J.; National Research Centre for Citrus, Amravati Road, Nagpur (India) Dhengre, V.N.; National Research Centre for Citrus, Amravati Road, Nagpur (India) Deole, Sandnya; National Research Centre for Citrus, Amravati Road, Nagpur (India). Evaluation of Mak All Season Horticulture Mineral Oil against Citrus thrips, Scirtothrips dorsalis Hood and rust mite, Phyllocoptruta oleivora (Ashm.). Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 65-67

KEYWORDS: HORTICULTURE. PHYLLOCOPTRUTA OLEIVORA. SCIRTOTHRIPS DORSALIS.

Per cent infestation of Nagpur mandarin fruits by citrus thrips was significantly less at dose 2.5% (6.2% -32.6% infested fruits) than 1.0 %, 0.5 % and 0.1% (11.2 – 65.6% infested fruits) but was on par with the doses 1.5 %, 2.0 % (7.5 – 10.0% infested fruits) during 2009 and 2.0 % (10.12-38.0% infested fruits) during 2010 and 2011. In case of rust mite, % infestation of Nagpur mandarin fruits was significantly less at dose 2.5% (8.1-14.8% infested fruits) than other treatments (20.0 - 55.8% infested fruits) but was on par with the dose 2.0 % (10.3-16.6% infested fruits). As citrus thrips and rust mites occurred together on citrus fruits, a spraying schedule using Mak All Season HMO 2.0% to simultaneously control both pests can now be developed based on the present investigation.

057. Sharma, Devinder; Sher-e-Kashmir University of Agriculture Sciences and Technology, Chatha, Jammu (India), Div. of Entomology Maqbool, Asifa; Sher-e-Kashmir University of Agriculture Sciences and Technology, Chatha, Jammu (India), Div. of EntomologyAhmad, Hafeez; Sher-e-Kashmir University of Agriculture Sciences and Technology, Chatha, Jammu (India), Div. of EntomologyJamwal, Vishav V.S.; Sher-e-Kashmir University of Agriculture Sciences and Technology, Chatha, Jammu (India), Div. of Entomology. Meteorological factors influencing insect pests of Tomato. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 68-71 KEYWORDS: PEST INSECTS. METEOROLOGICAL FACTORS. LYCOPERSICON ESCULENTUM.

The fruit borer population exhibited significant positive correlation with the temperature but positive and non-significant with sunshine hours. Relative humidity and rainfall had non-significant negative effect on borer population. Aphid population was positively but non significantly correlated with the maximum, minimum temperatures and sunshine hours and negative non-significantly with relative humidity and rainfall. Mealy bug population exhibited positive and significant correlation with the temperature and positive but non significant with rainfall and sunshine hours. The leaf miner population was positively but non significantly correlated with maximum temperature and sunshine hours. However, minimum temperature and rainfall had positive and significant effected on leaf miner population. Relative humidity was negatively correlated with leaf miner. The correlation studies between whitefly and abiotic factors showed positive correlation for temperature and sunshine hours, while the correlation was negative relative humidity and rainfall. The multiple linear regression analysis showed that all the weather parameters together were responsible for 96.3, 69.7, 97.1, 77.3 and 89.0 % (R2 value) of total variation of fruit borer, aphid, mealy bug, leaf miner and whitefly population, respectively.

058. Ahmad, M. Jamal; SKUAST-K, Shalimar Campus, Srinagar (India), Div. of Entomology. Khursheed, Iram; University of Kashmir, Hazrat Bal, Srinagar (India), Dept. of Zoology. Azim, M. Nayyar; University of Kashmir, Hazrat Bal, Srinagar (India), Dept. of Zoology. First record of Chalcids (Hymenoptera : Chalcidoidea) from Jammu & Kashmir, India. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 72-76 KEYWORDS: NEW SPECIES.

Thirteen chalcid species viz. Brachymeria alternipes, B. minuta, Antrocephalus vitatus, Anastatus banglorensis, Syrpophagus sp. indet., Anagyrus sp. indet. Ablerus sp. indet., Euplectrus coimbatorensis, Sympiesis sp.indet., Parasecodella sp. indet., Spalangia nigra, Macroglenes conjugens, Pachyneuron formosum under six families namely Chalcididae, Eupelmidae, Encyrtidae, Aphelinidae, Eulophidae and Pteromalidae are reported for the first time from Jammu and Kashmir. These parasitoids were collected through sweeping on grasses and also reared from different host insects. Brief diagnostic characters of each species are provided. Comparisons of Kashmir materials with published Indian taxa are also given wherever necessary.

059. Kumar, Archna; Amity University, Amity Institute of Biotechnology, Noida Campus (India). Verman, Abhilasha; Amity University, Amity Institute of Biotechnology, Noida Campus (India). Wadhwa, Nidhi; Amity University, Amity Institute of Biotechnology, Noida Campus (India). Barooah, Prajjalendra; Amity University, Amity Institute of Biotechnology, Noida Campus (India). Zayeem, Asfiya; Amity University, Amity Institute of Biotechnology, Noida Campus (India). Impact of synomones on foraging response of larval parasitoid, Bracon brevicornis. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 77-82 KEYWORDS: BRACON BREVICORNIS.

Y-tube olfactometer bioassays were carried out to elucidate the individual and associative learning behavioural response of larval parasitoid, Bracon brevicornis towards various concentrations of hexane extract of Azadirachta indica, Ocimum tenuiflorum, Cassia occidentalis, Cuscuta reflexa and Ricinus communis. Hexane extracts were subjected to gas liquid chromatography to determine the saturated hydrocarbon profile. Higher associative orientation response of B. brevicornis was recorded towards C. occidentalis and C. reflexa whereas individual response was maximum for C. occidentalis. Gas liquid chromatography of the extracts indicated the presence of eighteen hydrocarbons ranging from Heneicosane (C21) to Octatriacontane (C38). Preferred leaf extracts A. indica and C. occidentalis indicated higher presence of straight chain saturated hydrocarbons Dotriocontane (C32) and Tritriocontane (C33). Study revealed that preferred concentration of these extracts could be exploited to enhance the host searching efficacy of B. brevicornis in different field released during IPM programmes.

060. Gandhi, B. Kiran; University of Agricultural Sciences, Dharwad (India). bkg0530mail.com Shekharappa; University of Agricultural Sciences, Dharwad (India) Balikai, R.A.; University of Agricultural Sciences, Dharwad (India). Bio-efficacy of insecticides in management of Helicoverpa armigera (Hübner) in Kharif Sorghum. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 83-86 KEYWORDS: HELICOVERPA ARMIGERA. SORGHUM BICOLOR.

A field trial was carried out comprising of sorghum hybrid CSH-16 to evaluate the bioefficacy of spinosad 45SC (0.1ml/l), cypermethrin 10EC (0.5ml/l), novaluran 10 EC(1ml/l), azardirachtin 5% and Bacillus thringiensis (1ml/l) insecticides against earhead caterpillar Helicoverpa armigera in sorghum. spinosad 45SC (0.1ml/l), novaluran 10EC(1ml/l) and azardirachtin 5 % emerged as superior by recording 72.0, 66.0 and 63.0 % population reduction producing a grain loss of 43.46, 42.23 and 41.16 q/ha, respectively.

061. Devi, M. Bhubaneshwari; D.M. College of Science, Imphal (India), Laboratory of Entomology, P.G. Dept. of Zoology. Devi, N. Victoria; D.M. College of Science, Imphal (India), Laboratory of Entomology, P.G. Dept. of Zoology. Devi, S. Rita; I.A.R.I., Pusa, New Delhi (India), Div. of Entomology. Singh, P. Ranbir; D.M. College of Science, Imphal (India), Laboratory of Entomology, P.G. Dept. of Zoology. Biology and morphometric of Rice moth, Corcyra cephalonica. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 87-89 KEYWORDS: CORCYRA CEPHALONICA. ORYZA SATIVA.

The result of morphometric measurements revealed that the average length and breadth of egg were 0.42 and 0.31, respectively. The mean length and breadth of 1st, 2nd, 3rd, 4th, 5th and 6^{th} instars larvae were 2.72, 3.74, 5.63, 7.55, 9.20, 11.21 and 0.31, 0.39, 0.95, 11.16, 1.35, 1.59 mm, respectively. The average length of pupa was 4.05 and breadth was 1.10 mm. The average length and breadth of male and female were 10.75 and 12.24 mm, respectively.

062. Anita; CCS Haryana Agricultural University, Hisar (India), Dept. of Zoology Gulati, Rachna; CCS Haryana Agricultural University, Hisar (India), Dept. of Zoology. rgulatiau.ernet.in Kaushik, H.D.; CCS Haryana Agricultural University, Hisar (India), Entomology. Arvind; CCS Haryana Agricultural University, Hisar (India), Dept. of Zoology. Effect of Tyrophagus putrescentiae Schrank on weight loss in Stored Oats and Green gram. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 90-93 KEYWORDS: AVENA. TYROPHAGUS PUTRESCENTIAE. VIGNA RADIATA.

The weight loss was 0.8, 1.6 and 2.2% in oat grains and 1.2, 2.1 and 3.5% in oat flakes after 15, 30 and 45 days. The average Tyrophagus putrescentiae population was 70.93, 129.6, 198.4 in oat grains and 91.6, 175.53, 309.53 in oat flakes in these observation periods, respectively. Similarly, the weight loss was 0.73, 1.22 and 1.87% in green gram grains at 62.8, 104.73, 171.06 T. putrescentiae population after 15, 30 and 45 days. The average T. putrescentiae population was 79.4, 145.46 and 247.46 in green gram flakes causing 1.0, 1.7 and 2.7 % weight loss in these observation periods, respectively. In the present study, more loss in weight was witnessed in flakes compared to whole grains. In each case, significant positive correlation (90) was recorded between the two parameters viz., T. putrescentiae population and weight loss which suggested that with increase in mite number, there was a corresponding increase in the weight loss of grains/flakes during the study period.

063. Mekali, Jayashree; University of Agricultural Sciences, Raichur (India), Dept. of Agri. Entomology. jayamekalimail.com Naganagoud, A.; University of Agricultural Sciences, Raichur (India), Dept. of Agri. Entomology. Sreenivas, A.G.; University of Agricultural Sciences, Raichur (India), Dept. of Agri. Entomology. Udaykumar, Nidoni; University of Agricultural Sciences, Raichur (India), Dept. of Agri. Entomology. Somasekhar; University of Agricultural Sciences, Raichur (India), Dept. of Agri. Entomology. Jyothi; University of Agricultural Sciences, Raichur (India), Dept. of Agri. Entomology. Management of Sitophilus oryzae (L.) under modified atmospheric condition in Stored Sorghum. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 94-97 KEYWORDS: SITOPHILUS ORYZAE.

Incidence of Sitophilus oryzae under modified atmospheric (MA) condition in stored sorghum containing various concentrations of carbon dioxide (CO2), oxygen (O2) and nitrogen (N2) was studied. Adult emergence and mass loss (%) was recorded after exposure periods of 90, 135, 180, 225, 270 and 315 days. Fifteen and 20 % CO2 concentrations exposed up to 315 days and resulted in cent per cent mortality of insects. Further, there was no adult emergence with mass loss (%) was nil and also there was no loss in germination of grains.

064. Borah, R.K.; Assam Agricultural University, Jorhat (India), Dept. of Entomology Saikia, S.; Assam Agricultural University, Jorhat (India), Dept. of Entomology. Evaluation of different bait additives against Bandicota bengalensis in Rice fields. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 98-100 KEYWORDS: BANDICOTA BENGALENSIS.

The results indicated that groundnut oil mixed with broken rice recorded highest bait consumption of 12.44, 14.44 and 10.77 g/day at maximum tillering, panicle initiation and milky stage, respectively in boro rice whereas in sali rice, average daily bait consumption of 13.99, 14.88 and 12.44 g was recorded at maximum tillering, panicle initiation and milk stage, respectively. Interaction effect of bait additives and crop stage revealed highest bait consumption in groundnut oil + broken rice at panicle initiation stage (14.44 & 14.88 g/day) followed by groundnut oil + broken maize at panicle initiation stage (13.33 & 13.99 g/day) of both boro and sali rice, respectively.

065. Krishna, Hare; Central Institute of Temperate Horticulture, Regional Station Mukteshwar (India). Attri, B.L.; Central Institute of Temperate Horticulture, Regional Station Mukteshwar (India). Kumar, Akhilesh; Central Institute of Temperate Horticulture, Regional Station Mukteshwar (India). Maheshwari, S.K.; Central Institute for Arid Horticulture, Bikaner (India). Effect of salicylic acid, calcium and boron on gray mould rot (Botrytis cinerea Pers.:Fr.) of Strawberry. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 101-103 KEYWORDS: FRAGARIA. SALICYLIC ACIDS.

Treatment with mineral nutrients like calcium, boron and bio-regulator, salicylic acid was observed to delay fruit senescence and fungal decay of strawberry. Among the different postharvest treatments, application of salicylic acid 400 mgl-1 was found the most suitable in respect of increased soluble solid content and overall fruit quality and decreased fruit infection, followed by Ca-EDTA 1000mgl-1 and boric acid 0.2%. While the maximum fruit decay was noted in untreated control. Salicylic acid, a natural and safe phenolic compound, may be considered for its wide application in controlling postharvest losses of strawberry fruits.

066. Gangwar, Om Prakash; I.A.R.I., New Delhi (Delhi), Div. of Plant Pathology. gangwaropmail.com Sharma, Pratibha; I.A.R.I., New Delhi (Delhi), Div. of Plant Pathology. Effect of pesticides on Trichoderma harzianum and Pseudomonas fluorescens and its relationship with bacterial leaf blight of Rice. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 104-108 KEYWORDS: PSEUDOMONAS FLUORESCENS. TRICHODERMA HARZIANUM.

Sensitivity of bioagents was tested at different pesticidal concentrations, lower or higher that of recommended field dose revealed significantly high sensitivity towards

pesticides except streptocycline where non-significant (2.5%) radial growth inhibition was observed over control at maximum concentration (300 ppm). Th3 strain of T. harzianum was found compatible with carbendazim at 500 ppm. Streptocycline and malathion, at all concentrations, significantly restricted the population counts of P. fluorescens while other pesticides showed this activity at higher concentration than field doses. Antagonists were challenged by pathogen Xathomonas oryzae pv. oryzae suspension (0.1 OD620) and pesticides after 24 and 48 hrs later, respectively. It was highly significant negative correlation between antagonists population size and bacterial leaf blight disease intensity. A non-significant positive relationship was observed between disease intensity and % population reduction of T. harzianum due to pesticides application while it was negative for P. fluorescens.

067. Sharma, Lalan; National Bureau of Agriculturally Important Microorganisms, Kusmaur, Maunath Bhanjan (India). drsharmanbaimediffmail.com Sharma, K.K.; G.B. Pant University of Agriculture & Technology, Pantnagar (India), Dept. of Plant Pathology Sinha, A.P.; G.B. Pant University of Agriculture & Technology, Pantnagar (India), Dept. of Plant Pathology. Potential application of botanicals, essential oils and natural products against Sarocladium oryzae. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 109-113 KEYWORDS: ESSENTIAL OILS. ORYZA SATIVA.
Inhibition of radial growth varied significantly with different botanicals/essential oils/natural products, with their concentrations. Of the botanicals, neem at 50% concentration was found most effective in inhibiting radial growth (56.6%), and reduction severity in glass house (49.0%). Essential oils in which, maximum inhiition of radial growth (73.6%), and reduction in disease severity (23.0%) was recorded at 250 ppm with citronella oil. Maximum inhiition of radial growth (30.6%) was recorded with buffalo urine at 50.0% which was followed by cow urine (20.6%). Neem, citronella and cow urine was found superior to other treatments in field conditions giving reduction in disease severity 11.2, 10.1 and 1.3% increase in grain yield/plant, grain yield/plot, 1000-grains weight and reduction in chaffiness as compared to check.

068. Nagamani, P.; Krishi Vigyan Kendra, Reddy palli, Anatapur (India). Viswanath, K.; Regional Agricultural Research Station, Nandyal (India). Reddy, G. Nagarjuna; Regional Agricultural Research Station, Nandyal (India). Management of Sclerotium rolfsii causing collar rot in Chick pea. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 114-117 KEYWORDS: CICER ARIETINUM. CORTICIUM ROLFSII.
Among 12 Trichoderma isolates, TRI6 showed maximum % inhibition (82.1%) of eight fungicides, carbendazim was the most effective which inhibited pathogen by 96.2% and compatible with potential TRI6 (35.2% growth inhibition). Management of chick pea collar rot with bioagents, fungicides and oilseed cakes were evaluated against S. rolfsii in pot culture. Among the treatments, T9 recorded lowest disease incidence of 6.2 and this treatment also recorded maximum plant height 30.9 (cm), root length (8.9cm), maximum fresh weight of shoot (11.4g) and root (1.6 g) and maximum dry weight of shoot (0.3 g) and root (0.1 g).

069. Dutta, S.; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (India), Dept. of Plant Pathology. subrata_mithuahoo.co.in Barman, A. Roy; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (India), Dept. of Plant Pathology. Hembram, S.; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (India), Dept. of Plant Pathology. Kuiry, S.P.; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (India), Dept. of Plant Pathology. Ghosh, P.P.; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (India), Dept. of Plant Pathology. Chattopadhyay, Arup; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (India), Dept. of Plant Pathology. Integrated management of Rhizoctonia root rot of Pea. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 118-120 KEYWORDS: PISUM SATIVUM. RHIZOCTONIA SOLANI. ROOT ROTS.

In the present investigation, efforts were made on the evaluation of different chemicals and bioagents against Rhizoctonia root rot disease of pea under natural conditions. Seed treatment with carbendazim + two need based spray with validamycin (0.2%) was found to be the most effective against the disease contributing 61 % reduction over control. Seed treatment with carbendazim and soil application of green manure + neem cake + antagonist and seed treatment with carboxin + two need based spray with flusilazole (0.1%) showed 59.1% and 42.6% reduction in disease severity, respectively. The highest total yield (66.55 q.ha-1) of pea was recorded when seed treatment with carbendazim and soil application of green manure + neem cake + antagonist were applied. However, the lowest yield 49.25 q.ha-1 were obtained in control plot. Thus, it can be concluded that seed treatment with systemic fungicide and soil application of organic manure, neem cake and fungal antagonist was the most effective way to manage Rhizoctonia root rot disease of pea in the New Alluvial Region of West Bengal.

070. Anisurrahman; Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (India), Dept. of Plant Protection. Lal, Abhilasha A.; Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (India), Dept. of Plant Protection. Simon, Sobita; Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (India), Dept. of Plant Protection. Post harvest management of anthracnose rot of Mango (Mangifera indica L.). Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 121-124 KEYWORDS: GLOMERELLA CINGULATA. MANGIFERA INDICA.

In vitro analysis was carried out by taking carbendazim, thiophanate methyl, boric acid, sodium bicarbonate, neem leaf extract, jatropha leaf extract and paraffin wax was used against the pathogen. Carbendazim (0.05%) significantly inhibited the mycelia growth of the pathogen, both as pre- and post infection applications and maintained shelf life of mango up to 10-15 days at room temperature.

071. Singh, R.K.; Veer Kunwar Singh University, Arrah (India). rksingh05mail.com Dubey, S.R.; Veer Kunwar Singh University, Arrah (India) Srivastava, R.K.; N.D.U.A.T. Crop Research Station, Bahraich (India). Studies on seed mycoflora and seed treatment with bio-agents in Mesta. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 125-127 KEYWORDS: HIBISCUS CANNABINUS. SEED.

Laboratory studies revealed that all seed samples were infected with 16 fungal species belonging to 10 different genera. The efficacies of fungicide (carbedazim 50

WP) and biofungicides (Trichoderma viride, Aspergillus niger, Pseudomonas fluorescens, & Bacillus subtilis) were tested and found that T. viride was superior than other bio-agents and increased field emergence by 34% over control with a decrease of post emergence death by 73%.

072. Rajpur, S.S.; RVSKVV, Gwalior, M.P. (India), Dept. of Plant Pathology. Pandya, R.K.; RVSKVV, Gwalior, M.P. (India), Dept. of Plant Pathology. Panse, Raju; JNKVV, Jabalpur, M.P. (India), Dept. of Horticulture. rkpanse_jnkvvahoo.com. Management strategies for Pearl Millet Downy Mildew (Sclerospora graminicola). Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 128-130 KEYWORDS: OILSEED CAKES. PENNISETUM GLAUCUM. SCLEROSPORA GRAMINICOLA.
The effect of soil application of botanicals (i.e. cakes of neem, mustard, linseed and til, plant extracts of neem, datura, eucalyptus, parthenium and calotropis, butter milk & cow urine), the cow urine, butter milk, oil cakes and botanicals imparted a significant role on the control of downy mildew in pearl millet. Application of butter milk 5% (33.2%) was found most effective in respect of downy mildew control.

073. Kumar, L. Vengadesh; Annamalai University, Annamalai Nagar, Chidambaram (India), Dept. of Plant Pathology. kumarvengadeshahoo.co.in Balabaskar, P.; Annamalai University, Annamalai Nagar, Chidambaram (India), Dept. of Plant Pathology. Survey, isolation, characterization and pathogenicity of Xanthomonas oryzae pv. oryzae causing bacterial leaf blight disease in Rice. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 131-135 KEYWORDS: PATHOGENICITY. XANTHOMONAS ORYZAE.
The survey indicated that the disease incidence recorded in different locations varied with low to high level of incidence. Maximum disease incidence was recorded in Kathiramangalam (36.6%) followed by Pattavarthi (33.8%), Sembanarkoil (30.8%), Villiyanallur (28.8%), Thalaignayiru (26.1%) and Polagam (24.5%). Infected leaf samples when plated gave yellow, circular, smooth, convex and viscous bacterial colonies on Peptone Sucrose Agar medium. The biochemical tests revealed that all the 25 isolates (Xoo1, Xoo2- - - - Xoo25) gave similar results on gram staining (Gram negative), KOH test (positive), egg yolk reaction (negative), tetrazolium tolerance test (positive), oxidase test (negative) and starch hydrolysis (positive). Out of all the isolates Xoo21 collected from Kathiramangalam proved to be the most virulent as it recorded the maximum disease incidence (48.0%) and lesion length (23cm) followed by the isolate Xoo18, Xoo25 and Xoo6 in the decreasing order of merit.

074. Singh, Monika; Mewar University, Chittorgarh, Rajasthan (India), Dept. of Biotechnology. monika.best86mail.com Sharma, O.P.; NCIPM, IARI, Pusa Campus, New Delhi (India). Bhagat, Someshwar; NCIPM, IARI, Pusa Campus, New Delhi (India). Pandey, Neetu; Mewar University, Chittorgarh, Rajasthan (India), Dept. of Biotechnology. Effect of systemic fungicides, culture media, temperature and pH on growth of Sclerotinia sclerotiorum (Lib.) de Bary causing White mold of Chick pea. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 136-139 KEYWORDS: CICER ARIETINUM. SCLEROTINIA SCLEROTIORUM. CULTURE MEDIA.
Fungicides such as carbendazim, thiophanate methyl and captan showed the maximum radial growth inhibition at 100 and 200ppm (100%). The fungus was found

to grow best on sabouraud dextrose agar mediumand potato dextrose agar, potato dextrose broth. Sclerotia produced were black in colour, round to irregular and maximum sclerotia size measured was 4.0 x 4.1mm. Optimum temperature and pH for the growth of fungus were 25-30oC and pH 5.6-7.0, respectively.

075. Venkatesan, M.; Annand Agricultural Uiversity, B.A. College of Agriculture, Anand (India), Dept. of Nematology. Patel, B.A.; Annand Agricultural Uiversity, B.A. College of Agriculture, Anand (India), Dept. of Nematology. Use of botanicals for management of Meloidogyne incognita in Bitter gourd. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 140-142 KEYWORDS: MOMORDICA CHARANTIA. MELOIDOGYNE INCOGNITA.
The efficacy of different botanicals in varying doses for management of root-knot nematode, Meloidogyne incognita in bitter gourd indicated that Calotropis procera and Melia azedarach application proved to be more effective in improving plant growth characters redcuing root-knot index and final nematode population. Of the doses tested, higher dose of 1.5 % (w/w) was more effective than lower ones.

076. Khan, Mujeebur R.; Aligarh Muslim University, Aligarh (India), Dept. of Plant Protection. mrkhan777inahoo.co.in Rizvi, Tanveer Fatima; Aligarh Muslim University, Aligarh (India), Dept. of Plant Protection. Pathogenicity of Meloidogyne incognita on Spinach, Dill soa and Fenugreek, and effect of Trichoderma species. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 143-147 KEYWORDS: LEAF VEGETABLES. MELOIDOGYNE INCOGNITA. TRICHODERMA.
A study was undertaken to screen some important leafy vegetables viz., spinach, fenugreek and dill soa against Meloidogyne incognita (2000 J2/kg soil) to determine damage potential of the nematode and to evaluate effectiveness of three Trichoderma spp. viz., T. harzianum, T. virens and T. hamatum through seed and soil application against the nematode. All vegetables were found susceptible to M. incognita and order of susceptibility was spinach dill soa fenugreek. Seed or soil application of biocontrol agents suppressed the galling, egg mass production and soil population of M. incognita and improved the plant growth of the vegetables. Among Trichoderma spp., T. harzianum provided maximum control of the nematode and subsequent improvement in the plant growth. Soil and seed treatment with T. harzianum significantly suppressed the galling by 16-36% and improved the fresh shoot weight of dill soa (17 & 11%), spinach (18 & 10%) and fenugreek (20 & 12%) over control, respectively. The BCA treatment also caused decline in the soil population of M. incognita by 20-40% at two and four month stage, respectively. Next in effectiveness was T. hamatum and T. virens which suppressed the galling by 16-30 and 14-22% and improved the foliage production by 10-14 and 7-13%, respectively.

077. Umarao; Indian Agricultural Research Institute, New Delhi (India), Div. of Nematology. umaraoari.res.in Tyagi, Nidhi; Indian Agricultural Research Institute, New Delhi (India), Div. of Nematology. Sharma, Amita; Indian Agricultural Research Institute, New Delhi (India), Div. of Nematology. Kamaraju, Divya; Indian Agricultural Research Institute, New Delhi (India), Div. of Nematology Banakar, Prakash; Indian Agricultural Research Institute, New Delhi (India), Div. of Nematology. Rao, Sashi

Bhushan; Indian Agricultural Research Institute, New Delhi (India), Div. of Nematology. Soil less medium for culturing and multiplication of root knot and cyst nematodes for basic and applied studies. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 148-153 KEYWORDS: HETERODERA AVENAE. MELOIDOGYNE.
The present study demonstrated an approach to culture Meloidogyne incognita, M. graminicola and Heterodera avenae employing the growth pouches in a soil less medium. Comparison of multiplication of M. incognita between pouches and soil indicated that initial inoculum of 300 J2s could result in about 160 egg masses in the pouches as compared to about 50 egg masses in soil. This method can assist to overcome some of the problems of in vitro culturing of nematodes with a possibility to control the time and duration of nematode infection. This will be of immense value to unravel the various molecular and cellular events at exact time intervals of nematode parasitisation of their host plants. The information is very useful for designing modern nematode management options. The method described here could be used for screening the germpalsm/ cultivars for nematode resistance and also to evaluate the various biological and other agents for nematode management.

078. Singh, L. Michael; Assam Agricultural University, Jorhat (India), Dept. of Nematology. Mahanta, B.; Assam Agricultural University, Jorhat (India), Dept. of Nematology. Effect of carbosulfan, Glomus fasciculatum, Trichoderma harzianum and vermicompost alone and combination in management of Meloidogyne incognita on Green gram. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 154-156 KEYWORDS: GLOMUS FASCICULATUM. MELOIDOGYNE INCOGNITA. VIGNA RADIATA.
The results were found to be significantly different from control in respect of increasing growth parameters including significant reduction of final nematode population in soil. Maximum growth parameters viz.; plant height, fresh and dry weight of shoot and root were recorded in the treatment with combination of all the control agents (T. harzianum 2.5 kg/ha + G. fasciculatum 300 spores/m2 +carbosulfan ST 1.5% w/w + vermicompost 1.5 tonne/ha) followed by the treatment with integration of T. harzianum and G. fasciculatum. Maximum reduction in nematode population and maximum yield were obtained in the treatment, with integration of all the control options.

079. Askary, T.H.; Sher-e-Kashmir University of Agricultural Sciences and Technology, Main Campus, Srinagar (India), Div. of Entomology. tariq_askaryediffmail.com Waliullah, M.I.S.; Sher-e-Kashmir University of Agricultural Sciences and Technology, Main Campus, Srinagar (India), Div. of Entomology. Mir, M.M.; Sher-e-Kashmir University of Agricultural Sciences and Technology, Main Campus, Srinagar (India), Div. of Pomology. Banday, S.A.; Sher-e-Kashmir University of Agricultural Sciences and Technology, Main Campus, Shalimar, Srinagar (India), Div. of Pomology . Population dynamics of plant parasitic nematodes associated with Pome fruits. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 157-159 KEYWORDS: MALUS PUMILA. NEMATODA. PLANT NEMATODES. PYRUS COMMUNIS.
One hundred twenty soil samples were collected from the rhizosphere of two pome fruits viz., Malus domestica and Pyrus communis from three year old nurseries at

five different localities of Kashmir valley and processed to assess the biodiversity of plant parasitic nematodes at each locality. Eight species of plant parasitic nematodes viz., Pratylenchus penetrans, Paratylenchus spp., Meloidogyne hapla, Tylenchorhynchus indicus, Xiphinema basiri, Longidorus spp., Hoplolaimus spp. and Helicotylenchus indicus were encountered. The most common nematode species encountered from the rhizosphere of both the fruit crops were P. penetrans, X. basiri, Hoplolaimus spp. and H. indicus. Paratylenchus spp. and T. indicus were found in M. domestica only whereas M. hapla and Longidorus spp. were present in P. communis, P. penetrans was the most frequently encountered nematode of M. domestica. The absolute and relative frequency as well as absolute and relative density showsedthat it was abundant at Khalmula, Shuhama and Shalimar. The prominence value of P. penetrans in M. domestica was highest at Shuhama (507.5) and Shalimar (474.8) area but least at Gasoo (242.2). However, in case of P. communis, prominence value of P. penetrans was recorded highest at Shalimar (250.8) followed by Shuhama (229.8). The next frequently encountered nematode species was H. indicus and in M. domestica with high prominence value both in Shuhama and Shalimar (156) and least at Gasoo (96.6).

080. Pandey, Piyush Raman; Subject Matter Specialist, K.V.K. Geku, Arunachal Pradesh (India). Singh, Ghanshyam; N.D. University of Agriculture & Technology, Faizabad (India), Dept. of Agronomy. Weed management in transplanted Rice (Oryza sativa L.). Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 160-162 KEYWORDS: ORYZA SATIVA.

Significant higher plant height, number of shoot hill-1, leaf area index as well as dry matter accumulation was observed with the application of topstar 0.1 kg ha-1 than that recorded with the application of anilofos 0.5kg ha-1 and rest of the treatments. Significantly minimum weed population and weed dry weight recorded with the application of topstar .1 kg ha-1 followed by anilofos 0.5kg ha-1. Almost all the yield attributes were observed significantly higher with the application of topstar .1 kg ha-1 as compared to rest of the treatments. Weed management practices did not affect the test weight significantly. Highest grain and straw yield were recorded with the application of topstar 0.1 kg ha-1 followed by anilofos 0.5 kg ha-1 butachor 1.5kg ha-1, one hand weeding and weedy check, respectively.

081. Kumar, Mukesh; National Research Centre on Seed Spices, Tabiji, Ajmer (India). Gaur, V.K.; Swami Keshwanand Rajashan Agricultural University, College of Agriculture, Bikaner (India), Dept. of Plant Pathology. Kant Krishan; National Research Centre on Seed Spices, Tabiji, Ajmer (India). Evaluation of antagonists to Macrophomina phaseolina causing dry root rot in Moth bean. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 163-166 KEYWORDS: BACILLUS SUBTILIS. TRICHODERMA. VIGNA ACONITIFOLIA.

Three bio agents, Trichoderma harzianum, T. viride and T. atroviride, and one bacterium, Bacillus subtilis isolated from moth bean fields at Bikaner, were tested for their antagonistic activity against eigtht isolates of Marophomina phaseolina causing dry root rot of moth bean on Czapek’s dox medium. Inhibition of the mycelium growth of Marophomina phaseolina isolates by T. harzianum, T. viride, T.atroviride and B. subtilis varied from 61.1 to 70.1%, 58.6 to 66.6%, 52.0 to 63.1%

and 45.8 to 54.8%, respectively. Maximum growth inhibition was caused by T. harzianum. In a greenhouse study, these antagonists reduced root rot incidence in a susceptible moth bean cv. RMO- 225 up to 69.0, 65.0, 62.5 and 58.3%, respectively, as compared to control where 100 % mortality was observed. T. viride was most effective among the antagonists trial in minimizing the disease followed by T. harzianum, T. atroviride and Bacillus subtilis.

082. Rao, N. Srinivasa; A.P. Rice Research Institute and Regional Agricultural Research Station, Maruteru (India). raoentoahoo.co.in Kishore, M. Nanda; National Institute of Plant Health Management, Hyderbad (India), Div. of Vertebrate Pest Management. Baiting through PVC Pipe Bait Stations - A low cost baiting technique for Rodent control in Rice. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 167-171 KEYWORDS: BANDICOTA BENGALENSIS. BROMADIOLONE. ORYZA SATIVA. POLYVINYL CHLORIDE.
PVC pipe bait stations effectively delivered the bromadiolone 0.005% poison bait and bait consumption was relatively more from these bait stations. Bait consumption was high during August and September in kharif and January and February in rabi season, when the crop was in vegetative phase and it was decreased once the crop entered into reproductive phase. Rodent incidence and tiller damage was low in the fields received poison baits through PVC pipe bait stations. The bait was protected from rain and weathering and baiting through these bait stations against rodents found economical, eco-friendly and safe to non target organisms.

083. Gogoi, D.; Assam Agricultural University, Jorhat (India), Dept. of NematologyMahanta, B.; Assam Agricultural University, Jorhat (India), Dept. of Nematology. Comparative efficacy of Glomus fasciculatum, Trichoderma harzianum, carbofuran and carbendazim in management of Meloidogyne incognita and Rhizoctonia solani disease complex on French bean. Annals of Plant Protection Sciences (India). (Mar 2013) v.21(1) p. 172-175 KEYWORDS: GLOMUS FASCICULATUM. MELOIDOGYNE INCOGNITA. TRICHODERMA HARZIANUM.
The treatment with Trichoderma harzianum 1.25 kg/ha and carbofuran 1 kg a.i/ha was found to be effective in increasing plant growth parameters and yield of french bean. All the treatments significantly decreased final nematode population in soil except carbendazim 0.1%. The treatment with carbofuran 2 kg a.i/ha was found to be best in suppressing the final nematode population in soil. Maximum reduction in disease incidence was recorded in treatment with T. harzianum 1.25 kg/ha + carbofuran 1 kg a.i/ha.

084. Chaudhary, H.R; Maharana Pratap University of Agriculture and Technology, Udaipur (India). Baldev, Ram; Maharana Pratap University of Agriculture and Technology, Udaipur (India). Meghwa, H.P; Maharana Pratap University of Agriculture and Technology, Udaipur (India). Jadon, Chaman; Maharana Pratap University of Agriculture and Technology, Udaipur (India). Evaluation of Organic Modules against Insect Pests of Soybean. Indian Journal of Entomology (India). (Jun 2012) v.74(2) p. 163-166 KEYWORDS: SOYBEANS.
The field experiments were conducted at Agricultural Research Station, Ummedganj, Kota during kharif 2007 and 2008 to develop suitable organic module strategies on

soybean crop. Five organic modules along with some common practices/applications such as Deep summer ploughing + Seed treatment with Trichoderma viridae 6 g/ha + Installation of “T” shape bird perches + Spray of Azadirachtin 1500 ppm 2.50 1/ha at 15 days after sowing were evaluated for their efficacy against predominant insect pests e.g. green semilooper Chrysodeixis acuta Walker and girdle beetle Obereopsis brevis Swed. The organic module Ma (Plucking of infested plant parts + release of Trichogramma 1.0 lac/ha at 30 DAS + B.t. at 50 DAS) was found most effective against green semilooper and girdle beetle wherein minimum green semilooper and girdle beetle population (0.72 larvae/m and 1.66%), maximum seed yield (1160 kg/ha) and higher IBCR (4.54) was recorded. The next best module was M4 (Plucking of infested plant parts + two release of Trichogramma at 30 & 40 DAS + B.t. at 50 DAS) recorded 0.93 larvae/m row length of green semilooper population, 2.50% infestation of girdle beetle, 1122 kg/ha seed yield and IBCR (3.71).

085. David, B. Vasantharaj. drbvdavidmail.com Dubey, A.K.; Indian Agriculture Research Institute, New Delhi (India), Network project on insect biosystematics, Division of Entomology. Whitefly Fauna (Hemiptera: Aleyrodidae) of Myanmar. Indian Journal of Entomology (India). (Jun 2012) v.74(2) p.167-172 KEYWORDS: ALEYRODIDAE. ALEUROCANTHUS. ALEURODICUS. BEMISIA.
Twenty species of whiteflies were known from Myanmar up to now. During the course of a visit to Insein and Yangon in Myanmar in October 2011 the senior author collected whiteflies from these areas. The collections added 7 new records of whiteflies to our existing knowledge of Myanmar whitefly fauna. New records are: Aleurocanthus spiniferus (Quaintance), Bemisia breyniae (Singh), Dialeurolonga malleshwaramensis Sundararaj, Minutaleyrodes minuta (Singh), Dialeuropora decempuncta (Quaintance & Baker), Singhiella sp. and thesprialling whitefly Aleurodicus dispersus Russell.

086. Akhtar, Mir Samim; Indian Agricultural Research Institute, New Delhi (India). Network Project on Insect Biosystematics, Division of Entomology. Nitisha V; Indian Agricultural Research Institute, New Delhi (India). Network Project on Insect Biosystematics, Division of Entomology. Gaur, Asha; Indian Agricultural Research Institute, New Delhi (India). Network Project on Insect Biosystematics, Division of Entomology. Observations on the Biology and Male of Eucalyptus Gall Wasp Leptocybe Invasa Fisher and La Salle (Hymenoptera: Eulophidae. Indian Journal of Entomology (India). (Jun 2012) v.74(2)p. 173-175 KEYWORDS: BIOLOGY. EUCALYPTUS. EULOPHIDAE. HYMENOPTERA.
Leptocybe invasa Fisher and LaSalle (Hymenoptera: Eulophidae), forms typical bump-shaped galls on the leaf midribs, petioles and stems of new growth of several eucalyptus species. Heavy galling prevents further development of the infested growth. The paper also deals with the gall size variation of Aligarh and Delhi populations, gall development and immature stages of Leptocybe invasa, adult longevity and description of male from India.

087. Singh, C; Banaras Hindu University, Varanasi (India). Institute of Agricultural sciences, Department Entomology and Agricultural Zoology. chanchalsingh9mail.com Lal, M.N.; N.D.U.A & T, Faridabad (India). College of agriculture, Dept. of Entomology. Singh, P.S.; Banaras Hindu University, Varanasi (India) Institute of Agricultural sciences, Department Entomology and Agricultural Zoology. Occurrence of Insect Pests on Rapeseed, Brassica Rapa (Var. Yst-151) and its Association with Weather Variables in Eastern Uttar Pradesh. Indian Journal of Entomology (India). (Jun 2012) v.74(2) p.183-210 KEYWORDS: PEST INSECTS. RAPESEED. BRASSICA.

088. Mohapatra L.N.; Regional Research and Technology Transfer Station, Bhawanipatna (India). Sontakke B.K; College of Agriculture Odisha University of Agriculture and Technology, Bhubaneswar (India). All India Co-ordinated Research Project on Honey bees and Pollinators, Department of Entomology. Behavioural studies on pollinators in sesamum. Indian Journal of Entomology (India). (Jun 2012) v.74(2)p.189-192 KEYWORDS: SESAMUM. SESAMUM INDICUM. HONEY BEES.

089. Singh Swaroop; Swami Keshwanand Rajasthan Agricultural University, Durgapura, Jaipur (India). Department of Entomology, Agricultural Research station. Singh Swaroop; National Center for Integrated Pest Management, New Delhi (India). Efficacy of pyradalyl 10 EC against fruit borer, Helicoverpa armigera (Hub.) on chilli, (Capsicum annum L.). Indian Journal of Entomology (India). (Jun 2012) v.74(2)p.192-193 KEYWORDS: CAPSICUM ANNUUM. HELICOVERPA ARMIGERA. PEST CONTROL.

090. Patel D.D.; A. A. U., Anand (India). Department of Entomology Patel C. C.; A. A. U., Anand (India). Department of Entomology. Vaishnav P. R.; A. A. U., Anand (India). Department of Entomology. Kher H. R.; A. A. U., Anand (India). Department of Entomology. Evaluation of jute bags for the management of rice moth, Corcyra cephalonica (stainton) on sorghum. Indian Journal of Entomology (India). (Jun 2012) v.74(2)p.194-196 KEYWORDS: CORCYRA CEPHALONICA. RICE. SORGHUM.

091. Patel D.D.; Anand Agricultural University, Anand (India). Main Forage Research Station. Patel C. C.; Anand Agricultural University, Anand (India). Main Forage Research Station. Vaishnav P. R.; Anand Agricultural University, Anand (India). Main Forage Research Station. Kher H. R.; Anand Agricultural University, Anand (India). Main Forage Research Station. Management of lucerne thrips (Caliothrips indicus Bagnall) (Thysanoptera: Thripidae). Indian Journal of Entomology (India). (Jun 2012) v.74(2)p.196-198 KEYWORDS: MEDICAGO SATIVA. PEST INSECTS.

092. Bhatnagar Ashok; Agricultural Resarch Station, Durgapura, Jaipur (India). Department of Entomology. Singh Swaroop; Agricultural Resarch Station, Durgapura, Jaipur (India). Department of Entomology. Ahuja Desh Bandhu; NCIPM, LBS, Building, Pusa Campus, New Delhi (India). Field efficacy of neonicotinoid insecticides against white grub (Holotrichia consanguinea Blanch.) on groundnut. Indian Journal of Entomology (India). (June 2012) v.74(2)p.198-200 KEYWORDS: HOLOTRICHIA (COLEOPTERA). INSECTICIDES. SEED TREATMENT.

093. Kumar Manoj; College of Agriculture, Dumraon (India). Jaiswal Bibek Kumar; SMS (Plant protection), KVK, Bikramganj (India). Diurnal foraging pattern of insect visitors on coriander (Coriandrum sativum L.) Flowers. Indian Journal of Entomology (India). (June 2012) v.74(2)p.200-202 KEYWORDS: CORIANDRUM SATIVUM. INSECT DISEASES. PATHOGENS.

094. Singh Niranjan; National Centre for Integrated Pest Management, LBS Building, IARI, New Delhi (India). Sardana H.R; National Centre for Integrated Pest Management, LBS Building, IARI, New Delhi (India). Kumar S. Sathya; National Centre for Integrated Pest Management, LBS Building, IARI, New Delhi (India). Pest management information system (PMIS) for tomato: A database tool for IPM. Indian Journal of Entomology (India). (June 2012) v.74(2)p.202-204 KEYWORDS: INTEGRATED PEST MANAGEMENT. PEST CONTROL. TOMATOES.

095. Kaur Amandeep; Punjab Agricultural University, Ludhiana (India). Department of Entomology. Singh N.N; Banaras Hindu University, Varanasi (India). Department of Entomology and Agri Zoology. Kumar Mukesh; Banaras Hindu University, Varanasi (India). Department of Entomology and Agri Zoology. Evaluation of biopesticides and insecticides against egg parasitoid, Trichogramma brasiliensis ashmead. Indian Journal of Entomology (India). (June 2012) v.74(2)p.205-206 KEYWORDS: TRICHOGRAMMA BRASSICAE. BIOPESTICIDES. INSECTICIDES. EVALUATION.

096. Kaur Amandeep; Punjab Agricultural University, Ludhiana (India). Department of Entomology. Sharma Neha; Punjab Agricultural University, Ludhiana (India). Department of Entomology. Kaur Gurpreet; Punjab Agricultural University, Ludhiana (India). Department of Entomology. Dhawan A.K.; Punjab Agricultural University, Ludhiana (India) Department of Entomology. Relative efficacy of new insecticides against wheat aphid, Rhopalosiphum maidis (Fitch). Indian Journal of Entomology (India). (June 2012) v.74(2)p.206-208 KEYWORDS: RHOPALOSIPHUM MAIDIS. INSECTICIDES. TRITICUM AESTIVUM.

097. Singh P.S; Banaras Hindu University, Varanasi (India). Institute of Agricultural Sciences, Department of Entomology & Agricultural Zoology. pss_entoahoo.co.inSingh A.P; Banaras Hindu University, Varanasi (India). Institute of Agricultural Sciences, Department of Entomology & Agricultural Zoology. Rai S.N.; Banaras Hindu University, Varanasi (India). Institute of Agricultural Sciences, Department of Entomology & Agricultural Zoology. Effect of microbial and chemical insecticides on the mungbean pod and grain damage by pod infesting insect pests. Indian Journal of Entomology (India). (June 2012) v.74(2)p.208-213 KEYWORDS: INSECT CONTROL. CHEMICAL CONTROL. MICROBIAL ECOLOGY.

098. Nath M; Sibsagar College, Joysagar, Assam (India). Department of Zoology Rahman I; Sibsagar College, Joysagar, Assam (India). Department of Zoology. imdadur123ediffmail.com. Biology of bunch caterpillar, Andraca bipunctata walker- A major insect pest of tea in north-east India. Indian Journal of Entomology (India).

(Dec 2012) v.74(4)p.303-305 KEYWORDS: CAMELLIA SINENSIS. BIOLOGY. LARVAE. PEST INSECTS.
Certain aspects of the biology of Bunch caterpillar, Andraca bipunctata Walker feeding on tea Camellia sinensis was carried out in the laboratory. The incubation period was found to be 3.72±0.04 days with hatching of 71.50±1.89%. The average length and breadth of eggs were found to be 1.41±0.01 mm and 1.30±0.01 mm, respectively. The larvae pass through five instars with a total larval period of 34.14±1.96 days. Duration of pre-pupal and pupal phase was found 1.56±0.44 days and 31.70±4.03 days, respectively. The longevity of male and female was found 11.76±2.39 days and 13.17±3.40 days, respectively. The average duration of pre-oviposition, oviposition and post-oviposition periods were found to be 1.52±0.48, 3.78±1.22 and 6.02±2.84 days, respectively. The fecundity was found to be 400.20±36.34 per female and total life period was 61.18±0.88 days.

099. Randhawa H S; PAU, Punjab (India). Regional Research Station, Gurdaspur, Punjab. harpals_randhawaahoo.co.in. Susceptibility of sugarcane varieties to stalk borer, chilo auricilius dudgeon under different levels of nitrogen. Indian Journal of Entomology (India). (Dec 2012) v.74(4)p.306-309 KEYWORDS: CHILO AURICILIUS. SUGARCANE. NITROGEN.
A study on the susceptibility of promising sugarcane varieties to stalk borer, Chilo auricilius Dudgeon with different levels of nitrogen was conducted at PAU, Regional Research Station Gurdaspur during 2010–11 and 2011–12. The pooled data showed that variety CoJ 89 had significantly less (24.53%) incidence as compared to other two varieties i.e. CoH 119 (29.28%) and CoJ 85 (35.15%). The incidence increased from 3.70 to 69.63% with increase in nitrogen level from 0 to 90 kg N/ac. The highest cane yield was obtained from the CoH 119 variety at 60 kg N/ac.

0100. Choudhury Rummana A; Aligarh Muslim University, Aligarh (India). Department of Plant Protection. rc_entoagriediffmail.com Rizvi Parvez Qamar; Aligarh Muslim University, Aligarh (India). Department of Plant Protection. Satpute Niraj Sriram; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). Department of Entomology. Stage specific lifetable of Helicoverpa armigera (hubner) on chickpea. Indian Journal of Entomology (India). (Dec 2012) v.74(4)p.310-314 KEYWORDS: HELICOVERPA ARMIGERA. CHICKPEAS. LIFE TABLES.
Lifetable studies of Helicoverpa armigera (Hubner) carried out on chickpea under laboratory condition revealed that high mortality was observed at egg, 1st instar and pupal stages which indicated minimum survival fraction at these stages and maximum at 4th and 6^{th} larval instars. The potential fecundity, doubling time and net reproductive rate was recorded more in 2nd generation than that of 1st generation. The mean generation time ranged from 31.98 to 36.63 days. The intrinsic rate of increase was examined to be 0.1236 females/female/day, repetitively in both the generations. Moreover, the 1st generation recorded higher values for the finite, intrinsic and annual rate of increase of population in comparison to 2^{nd} generation.

0101. Santeshwari; Harish Chandra P.G. College, Varanasi (India). Department of Zoology. Santeshwari007ediffmail.com. The anatomy and histology of female reproductive organs of Gonocephalum brachyelytra (kaszab) (coleoptera: tenebrionidae. Indian Journal of Entomology (India). (Dec 2012) v.74(4)p.315-318 KEYWORDS: OVIPOSITION. VITELLOGENINS.

In Gonocephalum brachyelytra (Kaszab), a pair of about 3.64 mm long and white ovary is found. Each ovary is composed of 28 to 38 numbers of ovarioles. The ovarioles are clearly differentiated into terminal filament, germarium and vitellarium. The germarium possesses 4 to 5 developing oocytes and trpohocytes which provide nourishment to the developing oocytes. The vitellarium possesses developing oocyte, maturing oocyte and large yolky globules i.e. resorptive oocyte. Each ovariole shows release of oogonial cells after maturation. The yolky materials of oocyte are well developed. The troophocytes shows intercellular spaces. These intercellular spaces provide pathway for protein to enter into the cytoplasmic area, and into the nuclear region. It shows protein deposition and increase the process of mitosis and meosis. As a result active oviposition is observed.

0102. Vanitha K; Directorate of Cashew Research, Puttur, Karnataka (India). Division of Crop Protection. vanis102ahoo.co.in Karuppuchamy P; Tamil Nadu Agricultural University, Coimbatore (India). Department of Agricultural Entomology. Sivasubramanian P.; Tamil Nadu Agricultural University, Coimbatore (India). Department of Agricultural Entomology. Vanilla insect pests and their natural enemies. Indian Journal of Entomology (India). (Dec 2012) v74(4)p.319-322 KEYWORDS: VANILLA PLANIFOLIA. PEST INSECTS.

A survey was conducted at major vanilla growing areas of Tamil Nadu to record the pest status of vanilla and their natural enemies. Investigations were made mainly in the vanilleries of Coimbatore and Theni districts. Out of 60 farms surveyed during ten months, only nine farms had the incidence of pest attack. A total of twelve arthropods were recorded as pests of vanilla. Almost all parts of vanilla plant viz., stem, leaf, flower, bud, roots, pods etc were found to be attacked. Among the pests, white grubs were found to cause considerable damage followed by vanilla bug and shoot and leaf webber, while others were not at the economic level. Among the natural enemies, parasitoids like Euplectrus sp., Glyptapanteles sp., Aprostocetus sp., Chelonus sp., and Uropoda mites were found to be associated with vanilla pests.

0103. Dadmal, S.M.; Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). Department of Entomology, Network Project on Insect Biosystematics. Khadakkar, Suvarna S.; Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). Department of Entomology, Network Project on Insect Biosystematics. Ghuge, P. A.; Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). Department of Entomology, Network Project on Insect Biosystematics. Species diversity of leafhoppers and planthoppers in agroclimatic zones of Maharashtra. Indian Journal of Entomology. (June 2014) v.76(2)p. 92-96 KEYWORDS: PEST INSECTS. BIODIVERSITY. NEPHOTETTIX VIRESCENS.

The biodiversity of leafhoppers and planthoppers fauna under the family Cicadellidae and Delphacidae from four agroclimatic zones of Maharashtra viz. Western Vidarbha plains (Akola), Wet South Konkan (Karjat), Northern hills

Maharashtra (Dhule) and Moist Eastern Vidarbha hills (Gadchiroli) were studied during 2012-13. A total of 24 species were found under (15 cicadellids and 6 delphacids) 21 genera. These were recorded on different host plants collected manually and through light traps. Akola (Western Vidarbha Plain) had 95.62% cicadellids fauna with seven species and 4.37 % of delphacids with three species. Dhule (Northern hills Maharashtra) also had rich diversity comprising of (86.08%) cicadellids with seven species and delphacids (of 13.91%) with three species. Karjat (Wet South Konkan) emerged as hotspot for the cicadellids (49.09%) comprising of fourteen species and delphacids (50.90%) with four species. Gadchiroli (Moist Eastern Vidarbha hills) being the monocropping (rice) area had cicadellids (62.54%) with only two species and delphacids (37.46%) with dominance of Nilaparvata lugens.

0104. Gangwar, Raveesh K.; Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (India). Department of Entomology. raveeshgangwarahoo.com Singh, D.V.; Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (India). Department of Entomology. Bhatnagar, Anuj. CPRIC, Modipuram, Meerut (India). Sachan, S.K. Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (India). Department of Entomology.. Brinjal shoot and fruit borer management with insecticides. Indian Journal of Entomology. (June 2014) v.76(2)p.97-100 KEYWORDS: LEUCINODES ORBONALIS. INSECTICIDES.
A field trial was conducted to manage shoot and fruit borer, Leucinodes orbonalis Guenee of brinjal through novel insecticides at Crop Research Centre, Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram, Meerut, Uttar Pradesh. The efficacy of insecticides viz. spinosad 45 SC, novaluron 10 EC, carbosulfan 25 EC, bifenthrin 20 EC, profenofos 50 EC, thiomethoxem, cypermethrin 20 EC, and Bacillus thuringiensis 2.5 kg/ha revealed that all these were significantly superior. The most effective was spinosad followed by novaluron. Bacillus thuringiensis was found least effective but it was significantly superior over control. The maximum cost: benefit ratio 1: 8.50 was recorded in novaluron with increase in yield of 47.3 q/ha followed by carbosulfan with 1:7.34 cost benefit ratio.

0105. Swetaleena, T.; Kerala Agricultural University, Vellanikkara, Thrissur (India). Chellappan, Mani Kerala Agricultural University, Vellanikkara, Thrissur (India). Ranjith, M.T.; Kerala Agricultural University, Vellanikkara, Thrissur (India). Stress induced effects on protein and trehalose contents in Tribolium castaneum Herbst (Coleoptera: Tenebrionidae). Indian Journal of Entomology. (June 2014) v.76(2)p.101-106 KEYWORDS: PEST INSECTS. TREHALOSE.
Red flour beetle, Tribolium castaneum Herbst subjected to heat stress showed accumulation of heat shock protein (hsp) along with an insect sugar, trehalose. When the temperature increased from 35 to 450 C, with exposure time of 1, 2 and 4h, the total protein contents estimated were in the order of neonate adult pupa 5th instar grub. Whereas, at 50o C, 5th instar grub had the highest protein content followed by adult pupa and neonates at all exposure times. However at an exposure of 55 to 600 C, the total protein content estimated was in the order of adult pupa 5th instar grub neonates. In contrary when temperature increased from 35 to 600 C,

the trehalose content was more in adult followed by pupa, 5th instar grub and neonates.

0106. Shah, Mohd Abas; Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar (India). Division of Entomology. Khan, Akhtar Ali; Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar (India). Division of Entomology. Assessment of coccinellid biodiversity under pesticide pressure in horticulture ecosystems. Indian Journal of Entomology. (June 2014) v.76(2)p.107-116 KEYWORDS: PESTICIDE CROPS. HORTICULTURE. BIODIVERSITY.
The biodiversity of predaceous coccinellids was worked out in major fruit and vegetable growing belts of Kashmir valley during the cropping season of 2011. Two locations from each district, with both pesticide-treated and pesticide-free orchards of fruit crops viz., apple, pear and cherry and vegetable fields viz., kale, knolkhol, cabbage and cauliflower were sampled for adult coccinellids. The study revealed the presence of 17 and 15 species of predaceous coccinellids in fruit and vegetable ecosystems, respectively. Less intensively cultivated crops like pear, kale and knolkhol were found to be comparatively rich in ladybeetle diversity. Higher values of biodiversity indices were noted for fruit orchards as compared to those of vegetable fields. Coccinella septempunctata, Hippodamia variegata and Adalia teraspilota turned out to be the predominant species in fruit orchards in decreasing order while A. teraspilota was noted as the predominant species in vegetable ecosystems followed by H. variegata and C. septempunctata. Pesticide treated ecosystems were found to support less number of ladybeetle species. The sprayed orchards were found to have 14 species of as compared to 17 in unsprayed ones. Similarly, only 10 species were recovered from the sprayed vegetable fields as compared to 12 from unsprayed fields. The biodiversity indices indicated appreciable effect of pesticide application on the coccinellids assemblages.

0107. Shankar, M.; International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Patancheru, Hyderabad (India). Munghate, R.S.; International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Patancheru, Hyderabad (India). Babu, T. Ramesh; Acharya N.G. Ranga Agricultural University (ANGRAU), Rajendranagar, Hyderabad (India). Sridevi, D.; International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Patancheru, Hyderabad (India). Sharma, H.C.; International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Patancheru, Hyderabad (India). Population density and damage by pod borers, Helicoverpa armigera and Spodoptera exigua in a diverse array of chickpea genotypes under natural infestation in the field. Indian Journal of Entomology. (June 2014) v.76(2)p.117-127 KEYWORDS: HELICOVERPA ARMIGERA. SPODOPTERA EXIGUA. INSECTICIDES. PEST CONTROL.
Host plant resistance is one of the important components of resistance to insects, and hence, we evaluated a diverse array of chickpea genotypes for resistance to pod borers, Helicoverpa armigera and Spodoptera exigua under field conditions. Data were recorded on S. exigua egg masses and larvae, H. armigera eggs and larvae, plant damage at the vegetative, flowering and podding stages, and grain yield at crop harvest. During the vegetative stage, significantly lower numbers of H. armigera and S. exigua larvae were recorded on ICC 10393, ICCL 86111, ICC 12475 and RIL 20;

while leaf damage was significantly lower on ICC 12475, ICC 10393, ICCV 10, and RIL 25 as compared to that on ICC 3137. During the flowering stage, leaf damage was significantly lower on ICC 12475, RIL 20, RIL 25, ICC 10393, ICCL 86111, KAK 2, and ICCV 10 than on ICC 3137; of which the numbers of H. armigera larvae were significantly lower on ICCL 86111, RIL 20, ICC 10393, RIL 25 and ICC 12475 than on ICC 3137 in one or both sowings/seasons. During the podding stage, the H. armigera and/or S. exigua larval densities were significantly lower on ICC 12475, ICC 10393, RIL 25, ICCV 10, and RIL 20; of which ICC 10393, ICC 12475, RIL 20, ICCV 10 and RIL 25 suffered significantly lower leaf damage than ICC 3137 in one or both seasons. Pod damage was significantly lower on EC 583264, ICC 10393, ICC 12475, ICCL 86111, ICCV 10, RIL 20 and RIL 25 than in ICC 3137. The grain yield of these genotypes was also significantly greater than that of ICC 3137 one or both sowings/seasons, and these genotypes can be used for improving chickpea to pod borer resistance for sustainable crop production.

0108. Thomas, Asha; Indian Agricultural Research Institute, New Delhi (India). Division of Entomology. Kar, Anand; Devi Ahilya University, Indore (India). School of Life Science. Ramamurthy, V.V.; Indian Agricultural Research Institute, New Delhi (India). Division of Entomology. An analysis of leaf trichome density and its influence on the morphology of dorsal setae in the puparia of Bemisia tabaci (Hemiptera: Aleyrodidae) on a single cotton leaf. Indian Journal of Entomology. (June 2014) v.76(2)p.128-131 KEYWORDS: BEMISIA TABACI. COTTON.

Analyses of the variations in leaf trichome density and its influence on the morphological variations in the puparia of whitefly Bemisia tabaci revealed significant relationships as regards dorsal setae, even within a single leaf. Six definite 1cm2 areas of a single leaf analysed for trichome density revealed significant variations; areas of the leaf nearer to the petiole showed higher trichome density than areas away from the petiole and these were statistically significant (P= 0.0001). Of the 5 dorsal setae observed, seta on the cephalic region was the longest while the eighth abdominal one was the shortest; statistically significant variations in the length of all dorsal setae were observed except in the ones on the prothoracic region (DS2) and eighth abdominal segment (DS6). When relationship between trichome density and length of dorsal setae was investigated through correlation studies it was observed that length of dorsal setae is not significantly influenced by the trichome density except for the dorsal setae on the first and eighth abdominal segment.

0109. Kulkarni, U. S.; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). College of Agriculture, Section of Entomology. Aherkar, S.K.; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). College of Agriculture, Section of Entomology. Borkar, S. L.; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). College of Agriculture, Section of Entomology. Effect of some botanical extracts on larval growth and development of Spodoptera litura (F.). Indian Journal of Entomology. (June 2014) v.76(2)p.132-135 KEYWORDS: SPODOPTERA LITURA. AZADIRACHTA INDICA. BOTANICAL INSECTICIDES.

A laboratory experiment was conducted to know the effects ofaqueous extracts of five indigenous plant materials viz., orange (Citrus reticulata), subza (Ocimum

basilicum), neem (Azadirachta Indica), ginger (Zinziber officinella) and marigold (Tagetes errecta) on the larval growth and development of Spodoptera litura (F.). The highest reduction in larval weight was observed in case of neem seed kernel extract while the highest reduction in larval period was observed in case of subza leaf extract. Relatively low larval mortlities were recorded in case of plant extracts. However, the larval mortality percentages observed in case of triazophos 40 EC at half recommended dose and neem seed kernel extract 5% were found statistically at par with each other.

0110. Vishwakarma, Ramanuj; Bihar Agricultural University, Sabour, Noorsarai, Nalanda, Bihar (India). College of Horticulture, Department of Entomology. entoramanujmail.com Ghatak, Sibani Sankar. Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia (India). Department of Agricultural Entomology. Impact of foraging activity of pollinators including honeybees on seed yield of sunflower. Indian Journal of Entomology. (June 2014) v.76(2)p.136-141 KEYWORDS: APIS MELLIFERA. HELIANTHUS ANNUUS. INSECTA. FORAGING.
The experiments carried out at ‘Instructional Farm’ of Bidhan Chandra Krishi Viswavidyalaya at Jaguli, Nadia, West Bengal, India during rabi 2009–2010 identified the various species of insect pollinators including honeybees. Their peak visiting hours and effect of pollinating methods on seed yield of PAC-36, a variety of sunflower were also evaluated. Twenty major insect pollinators, belonging to 5 orders under 18 genera of 15 families were observed visiting sunflower capitulum. Among these, Apis was found to be the most dominant and A. mellifera L. was recorded to be most dominant pollinator followed by A. dorsata F. The foraging rate of insect pollinators/capitulum/hrs was observed to be highest during morning i.e. 0800-0900 h, more than 1.4 to 1.5 times as recorded at 1500–1600 h. The total number of filled seeds/capitulum, per cent of seed set/capitulum, weight of 1000-seeds (g) and yield (q/ha) were 618.51, 93.73, 79.67 and 57.20, respectively. These were significantly higher in bee pollination (T1) followed by hand pollination (T2). There was 221.07 and 259.65% increase in seed yield when the crop was pollinated by bees (T1), followed by 179.07 and 204.93% in hand pollination (HP) (T2), 144.50 and 183.57% in natural pollination (NP) (T3), as compared to self pollination (SP) (T4).

0111. Soundararajan, R.P.; Tamil Nadu Agricultural University, Coimbatore (India), Department of Agricultural Entomology. sound_insect73ediffmail.com Chitra, N.; Tamil Nadu Agricultural University, Coimbatore (India), Department of Agricultural Entomology. Field screening of black gram, Vigna Mungo L. germplasm for resistance against pod borer complex. Indian Journal of Entomology. (June 2014) v.76(2)p.142-148 KEYWORDS: URD. MARUCA VITRATA. HELICOVERPA ARMIGERA. PEST CONTROL.
Field screening was carried out during kharif and rabi 2012 with 51 black gram, Vigna mungo L. germplasm for resistance against pod borer complex. The incidence of spotted pod borer, Maruca vitrata (Geyer) was assessed at flowering stage based on webbed larva per plant. The damage in the pods were estimated in the harvested pods for borer pests viz., Maruca vitrata, gram pod borer, Helicoverpa armigera (Hubn.), blue butterfly, Lampides boeticus L., pod bug, Riptortus linearis (F.). The

cumulative damage was converted to Pest Score Index (PSI) for all the germplasm. The results revealed that population of spotted pod borer larva were more during kharif (0.33–4.67/plant) than rabi (0.10–1.33/plant). The PSI value indicated that none of the entry scored resistant. However, 16 entries were moderately resistant with PSI value of 3 during kharif. In rabi season 19 entries were recorded as moderately resistant and two entries as resistant with PSI 2. Nine germplasms viz., CBG 08–009, CBG 08–014, CBG 08–040, CBG 08–045, CBG 08–057, PLU 102, 5-16-7, PLS 364/42, KU 301 were scored as moderately resistant in both seasons.

0112. Hinde, Y.A.; J.N. Krishi Vishwa Vidyalaya, Jabalpur (India). Department of Agricultural Entomology. yuvraj_12331ediffmail.com Veda, O.P.; J.N. Krishi Vishwa Vidyalaya, Jabalpur (India). Department of Agricultural Entomology. Patel, I.S.; J.N. Krishi Vishwa Vidyalaya, Jabalpur (India). Department of Agricultural Entomology. A note on estimation of avoidable losses due to pod borer, Helicoverpa armigera (Hubner) in chickpea (Cicer arietinum). Indian Journal of Entomology. (June 2014) v.76(2)p.152 KEYWORDS: HELICOVERPA ARMIGERA. PEST CONTROL. CICER ARIETINUM.

0113. Patel, D.R.; NAU, Maktampur, Bharuch (India). College of Agriculture. Purohit, M.S.; N.M. College of Agricultural University, Navsari (India). Department of Entomology. Occurrence of aphids Melanaphis sacchari, on rabi sorghum. Indian Journal of Entomology. (June 2014) v.76(2)p.152-155 KEYWORDS: SORGHUM. PEST CONTROL.

0114. Singh, Rudra Pratap; N. D. University of Agriculture and Technology, Kumarganj, Faizabad (India). Department of Entomology. Mishra, Mukesh Kumar; N. D. University of Agriculture and Technology, Kumarganj, Faizabad (India). Department of Entomology. Ali, Shamdhad; N. D. University of Agriculture and Technology, Kumarganj, Faizabad (India). Department of Entomology. Evaluation of pigeonpea lines against lepidopterous pod borers. Indian Journal of Entomology. (June 2014) v.76(2)p.155-157 KEYWORDS: CAJANUS CAJAN. PEST CONTROL.

0115. Singh, R.P.; N. D. University of Agriculture & Technology, Kumarganj, Faizabad (India). Department of Entomology. rudra.agentomail.com Mishra, M.K.; N. D. University of Agriculture & Technology, Kumarganj, Faizabad (India). Department of Entomology. Singh, H.M.; N. D. University of Agriculture & Technology, Kumarganj, Faizabad (India). Department of Entomology. Population dynamics of tobacco caterpillar, Spodoptera litura (fabricius). Indian Journal of Entomology. (June 2014) v.76(2)p.158-159 KEYWORDS: SPODOPTERA LITURA. LARVAE.

0116. Rath, L.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). lkrath04ediffmail.com. Efficacy of cyazypyr on plant hoppers infesting rice. Indian Journal of Entomology. (June 2014) v.76(2)p.159-161 KEYWORDS: INSECTICIDES. NILAPARVATA LUGENS. RICE.

0117. Phad V.A.; College of Agriculture, Parbhani (India). Department of Entomology. Patil, R.R.; College of Agriculture, Parbhani (India). Department of Entomology. Estimation of avoidable fodder losses due to major pests in sorghum. Indian Journal of Entomology. (June 2014) v.76(2)p.162-165 KEYWORDS: SORGHUM. ATHERIGONA SOCCATA. PEST CONTROL.

0118. Chhayani, J. J.; Anand Agricultural University, Anand (India). B. A. College of Agriculture, Department of Entomology. Patel, C. C.; Anand Agricultural University, Anand (India). B. A. College of Agriculture, Department of Entomology. Foraging activities of honey bee on crops in Gujarat. Indian Journal of Entomology. (June 2014) v.76(2)p.165-166 KEYWORDS: HONEY BEES. FORAGING.

0119. Nathan, Lily Saroj; Ewing Christian College, Allahabad (India). Department of Zoology. Nathan, Risha Jasmine; Ewing Christian College, Allahabad (India). Department of Zoology. Effect of diflubenzuron on the mortality of Spilosoma obliqua. Indian Journal of Entomology. (June 2014) v.76(2)p.167-169 KEYWORDS: SPILOSOMA OBLIQUA. PEST CONTROL.

0120. Sreedevi, K.; Indian Agricultural Research Institute, New Delhi (India). Division of Entomology. kolla.sreedevimail.com Tyagi, Sakshi; Indian Agricultural Research Institute, New Delhi (India). Division of Entomology. Diagnostics in larvae of white grubs (Scarabaeidae: coleoptera) — important characters. Indian Journal of Entomology. (June 2014) v.76(2)p.169-172 KEYWORDS: COLEOPTERA. SCARABAEIDAE.

0121. Akthar, Nafisa; University of Kashmir, Srinagar (India). P.G. Deptt. of Zoology, Division of Entomology. THRIPS INFESTATION ON TULIPS AND SAFFRON IN KASHMIR. Indian Journal of Entomology. (June 2014) v.76(2)p.173 KEYWORDS: THYSANOPTERA. INSECT DISEASES. TULIPA.

0122. Kumar, Rajesh; Morabadi, Divyayan K.V.K., Ranchi (India). Mondal, P.; Visva-Bharati, Sriniketan, (India). Department of Plant Protection. Palli Siksha Bhavana (India). Chakravarty, M.K.; Kanke, Birsa Agricultural University, Department of Entomology, Ranchi (India). Evaluation of IPM modules against Helicoverpa armigera (Hübner). Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 244-248 KEYWORDS: HELICOVERPA ARMIGERA. INTEGRATED PEST MANAGEMENT.
Results revealed that mean larval population of Helicoverpa armigera was considerably low after insecticidal sprays in different modules and lowest population of the insect (2.59/MRL) was recorded in Module 6 (spinosad 0.5 ml/l of water as 1st spray and indoxacarb ml/l as 2nd spray) followed by Module 4 (indoxacarb .0 ml/l as 1st spray and triozophos .5 ml/l as 2nd spray) and Module 1 (spinosad 0.5 ml/l as 1st spray and triazophos .5 ml/l as 2nd spray) in 2009-2010. Similar results were also observed during 2010-2011. However, based on benefit-cost ratio, module 1 (1.57 & 1.70) proved more viable than module 6 (1.39 & 1.56) and module 4 (1.35 & 1.55) due to lower cultivation cost in both the seasons.

0123. Gupta, M.K.; Central Agricultural University, Meghalaya, (India). Department of Entomology, College of Agriculture. Chanu, Laishram Chitra; Central Agricultural University, Meghalaya, (India). Department of Entomology, College of Agriculture. Influence of temperatures on Life Table of Brevicoryne brassicae Linn.. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 249-252 KEYWORDS: BREVICORYNE BRASSICAE. LIFE TABLES. TEMPERATURE.
Influence of six sets of temperature viz; 10, 15, 20, 25 and 30oC on the life table of Brevicoryne brassicae was studied. The demographic parameters viz; Gross reproductive rate (GRR), Net reproductive rate (R€ É0+É), Innate capacity of increase (rm), Finite rate of increase (ë), and Weekly multiplication of population (s•rm)w were 49, 25.54, 0.252, 1.284 and 5.753, respectively which was maximum when the insect was reared at 25°C while it was minimum of 46, 5.28, 0.082, 1.085 and 1.770, respectively reared at 15°C. At 20C, the gross reproductive rate, net reproductive rate, innate capacity of increase, finite rate of increase and weekly multiplication was 47.0, 16.45, 0.174, 1.19 and 3.379, respectively. The effect of temperature was also profound on the mean length of generation (Tc) of B. brassicae. The mean length of generation (Tc) and doubling time were longest at 15°C (20.29 & 8.45, respectively) in comparison to 25°C which was 12.85 and 2.75, respectively.

0124. Chand, Hari; Rajendra Agricultural University, Department of Entomology, Sugarcane Research Institute, Pusa, Samastipur (India). harichandentomail.com Kumar, Anil; Rajendra Agricultural University, Department of Entomology, Sugarcane Research Institute, Pusa, Samastipur (India). Paswan, Sudhir; Rajendra Agricultural University, Department of Entomology, Sugarcane Research Institute, Pusa, Samastipur (India). Dwivedi, G.P.; Rajendra Agricultural University, Department of Entomology, Sugarcane Research Institute, Pusa, Samastipur (India). Estimation of damage intensity of Chilo tumidicostalis Hampson in Sugarcane during primary and secondary infestation. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 253-256 KEYWORDS: CHILO. SACCHARUM OFFICINARUM.
Damage intensity of Chilo tumidicostalis clearly indicated that highly significant difference on qualitative and quantitative parameters under investigation except sucrose content which was found statistically significant. Perusal of data revealed that the percentage of reduction in damage intensity levels were gradually increased when number of damaged internodes were increased except 8- damaged internodes which was even lower than those of 6-and 7-damaged internodes. This might be due to lesser number of effective larvae feeding on internodes at this damage intensity and/or physiological changes like better recoverability of damaged tissues at this growth stages.

0125. Singh, Amar; Narendra Deva University of Agriculture & Technology, Department of Entomology, Faizabad (India). singhamarentmail.com Ali, S.; Narendra Deva University of Agriculture & Technology, Department of Entomology, Faizabad (India). Gupta, P.K.; Narendra Deva University of Agriculture & Technology, Department of Entomology, Faizabad (India). Bio-efficacy of insecticides against Gram Pod Borer, Helicoverpa armigera (Hüb.) in Chick pea. Annals of Plant Protection Sciences (India).

(Sep 2014) v.22(2) p. 257-259 KEYWORDS: CICER ARIETINUM. HELICOVERPA ARMIGERA. INSECTICIDES.
The larval population of Helicoverpa armigera was regularly monitored and treatments were applied, as and when larval population reached Economic Threshold Level i.e. 03 larvae m-1 linear row length. All the treatments were effective in controlling H. armigera. Indoxacarb 14.5 SC 60 g.a.i. ha-1 was effective treatment for Helicoverpa management as this resulted higher grain yield and more return based on B: C ratio. HaNPV 400 LE was least effective treatment compared to other new insecticide molecules, but it was on par with a conventional insecticide, endosulfan 35 EC 350 g.a.i. ha-1 at all stages of management.

0126. Parthiban, P.; Agricultural College and Research Institute, (TNAU), Department of Agricultural Entomology, Madurai (India). Baskaran, R.K. Murali; Agricultural College and Research Institute, (TNAU), Department of Agricultural Entomology, Madurai (India). Thangavel, K.; Agricultural College and Research Institute, (TNAU), Department of Agricultural Entomology, Madurai (India). Acute toxicity of Emamectin benzoate 5 WG against Spodoptera litura (Fab.) of Cabbage. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 260-263 KEYWORDS: ACUTE TOXICITY. BENZOIC ACID. SPODOPTERA LITURA.
LC50 and LC90 of Emamectin 5 WG to Spodoptera litura through cabbage leaf disc technique were 0.0054 and 0.0286%, 0.0026 and 0.0135% and 0.0004 and 0.0081% on 12, 24 and 48 hrs. after treatment. Emamectin 5 WG and 5 SG were effective by recording low LT50 and LT90 values by recording 6.31 and 17.88 hrs (0.03%) and 6.82 and 20.19 hrs (0.035%) as against chlorantraniliprole 18.5 SC (18.09 & 81.62 hrs at 0.01%).

0127. Kumar, Sandeep; C. S. Azad Univ. of Agri. & Tech. Oilseed Section, Kanpur (India). Pal, Sundar; C. S. Azad Univ. of Agri. & Tech. Oilseed Section, Kanpur (India). Lal Gore; C. S. Azad Univ. of Agri. & Tech. Oilseed Section, Kanpur (India). Singh, D.K.; C. S. Azad Univ. of Agri. & Tech. Oilseed Section, Kanpur (India). Umrao, R.S.; C. S. Azad Univ. of Agri. & Tech. Oilseed Section, Kanpur (India). Bio-efficacy of insecticides and bio-pesticides against pod borer and jassids on Cowpea, Vigna uniguiculata (L.) Walp.. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 264-267 KEYWORDS: AMRASCA DEVASTANS. HELICOVERPA ARMIGERA. VIGNA UNGUICULATA CYLINDRICA.
All the treatments were most effective after first spray followed by second spray except Bt. var kurstaki against the pod borer only. The highest population reduction was recorded from imidacloprid 17.8SL 0.003% treated plots followed by fipronil 5 SL 0.01%, acetamiprid 20SP 0.004%, azadirachtin 1500ppm 0.15% and Bt. var kurstaki 1500ppm 0.1% against the jassid and pod borer in cowpea. The highest seed yield (1291.67 kg. ha-1) and cost benefit ratio (1: 10.37) was obtained from imidacloprid treatment.

0128. Sherzad, Atiquallah; Livestock and Irrigation, Jamaul Mena-Karte-e-sakhi, Ministry of Agriculture, Department of Agricultural Research Institute, Afganistan. Kumar, Ashwani; S.H.I.A.T.S., Department of Plant Protection, Allahabad, (India). Comparative efficacy of insecticides and Beauveria bassiana in management of

Helicoverpa armigera (Hübner). Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 268-271 KEYWORDS: BEAUVERIA BASSIANA. HELICOVERPA ARMIGERA. LYCOPERSICON ESCULENTUM.

Among chemical insecticides, spinosad 45% ES 0.40%, dichlorvos 76 EC 0.60% and imidacloprid 200 SL 4ml/litre concentration were found to be most effictive. Plots with these chemicals had fruit damage percentage viz. 0.53%, 1.00% and 1.04%, respectively. Spinosad 45% ES 0.40% was most efficacious. However, the efficacy of dichlorvos and imidacloprid were non-significant with each other. The treatments with biopesticides viz. Beauveria bassiana 4.16 g / lit were also effective resulting 1.5% fruit damage percentage compared with control plot (3.8%). Population of Helicoverpa armigera increased and reached its peak level of 3.8% / plant during 3rd week of March (standard week 11th). The highest fruit yield of 367.3 q/ha was registered in spinosad followed by B. bassiana 328.7 q/ha and low as 203.0 q/ha was recorded in untreated control. The best cost benefit ratio was obtained with spinosad 45% ES 0.04% (1:11.19) followed by B. bassiana (1:10.83), chlorpyriphos 20 EC 0.04 % (1:9.60), dichlorvos 76 EC (1:9.52), imidacloprid 200 SL 4ml/litre (1:7.38), cypermethrin 25 EC (1:7.08) and monocrotophos 36 SL 0.04% (1:6.91).

0129. Anuragi, Manoj Kumar; Brahmanand P.G. College, Rath, Hamipur (India). Namedev, Hari Prakash; Brahmanand P.G. College, Rath, Hamipur (India). Singh, Ram Subhag. Brahmanand P.G. College, Rath, Hamipur (India). Influence of nutrients and cropping sequence on incidence of insect pests in Mustard. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 272-274 KEYWORDS: ATHELIA. BRASSICA JUNCEA.

The cropping pattern and plant nutrients had significant influence on the population dynamics of Athalia proxima and Phytomyza atricornis. The minimum incidence of Athalia proxima was observed in fallow –mustard cropping system while, bajra – mustard and maize - mustard cropping system had minimum population of Phytomyza atricornis. The recommended dose of 150 kg. N, 75 kg P and 75 kg K/ha with 2 ton FYM, 40 kg sulpher/ha treated plot had lowest population of Athalia proxima. The nutritional combination i.e. 112.5,56.25,56.25 Kg .NPK /ha ,2 tone FYM /ha, 40 kg.sulphur /ha, 25 kg ZnSo4 /ha and 1 kg boron/ha had lowest incidence of Phytomyza atricornis.

0130. Aggarwal, Meenakshi; Aligarh Muslim University, Department of Plant Protection, Faculty of Agricultural Sciences, Aligarh (India). Haseeb, Masarrat; Aligarh Muslim University, Department of Plant Protection, Faculty of Agricultural Sciences, Aligarh (India). Manzoor, Uzma; Aligarh Muslim University, Department of Plant Protection, Faculty of Agricultural Sciences, Aligarh (India). Biology and seasonal incidence of aphid, Brevicoryne brassicae on Cabbage. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 275-277 KEYWORDS: BIOLOGY. BRASSICA OLERACEA. BREVICORYNE BRASSICAE.

Observations showed that a single female gave birth to 85.8±1.08 nymphs on an average within its life span. Nymphs developed through four instars and transformed into adults with an average of 8.3±0.83 days. Adult females (wingless) were dull green to grey coloured and covered with a whitish waxy powder. The average pre-natal, natal and post natal periods were recorded as 3.2±0.63, 16.1±4.09 and

10.7±1.16 days, respectively. The average female adult longevity was recorded as 25.6±4.60 days. The incidence of this aphid varied from 20 to 410/3 leaves / plant. The incidence was highest during 12th SW. These insects showed significantly negative correlation with maximum relative humidity while non-significant positive correlation was observed with maximum and minimum temperature.

0131. Thangavel, K.; Agricultural College and Research Institute, (TNAU), Department of Agril. Entomology, Madurai (India). Baskaran, R.K. Murali; Agricultural College and Research Institute, (TNAU), Department of Agril. Entomology, Madurai (India). Rani, W. Baby; Agricultural College and Research Institute, (TNAU), Department of Agril. Entomology, Madurai (India). Safety evaluation of Emamectin benzoate 5 WG against green lacewing, Chrysoperla zastrowi sillemi (Esben-Petersen). Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 278-282 KEYWORDS: CHRYSOPERLA. SAFETY.

The studies were conducted on the safety of emamectin benzoate 5 WG (EB) to eggs, larvae and adults of Chrysoperla zastrowi sillemi. The highest egg hatchability was recorded in EB 5 WG 5 (93.3%) and 6.25 g a.i/ha (91.0%), followed by EB 5 WG 7.5 (87.6%). At 48 hrs after treatment, the lowest larval mortality was recorded in EB 5 WG 5 (14.0%) and 6.25 g a.i. ha-1 (16.6%) in larval feeding method. In dry film method at 48 hrs, the lowest % mortality of 15.0 was recorded in EB 5 WG 5 followed by 18.3% at 6.25 g a.i. ha-1. Chlorantraniliprole 18.5 SC 30 g a.i. ha-1 registered the highest larval mortality (45.0%), while untreated check recorded no mortality. Adult longevity was the highest in untreated check (15.33 days), followed by EB 5 WG 5 (12.60 days) and 6.25 g a.i. ha-1 (11.33 days). Number of eggs laid/5 females was also greater in untreated check (368.33 eggs) when compared to EB 5 WG 5 (144.33 eggs) and 6.25 g a.i. ha-1 (138.00 eggs).

0132. Namdev, Hari Prakash; Brahmanand P.G. College, Department of Entomology, Rath, Hamirpur (India). Singh, Ram Subhag; Brahmanand P.G. College, Department of Entomology, Rath, Hamirpur (India). Anuragi, M.K.; Brahmanand P.G. College, Department of Entomology, Rath, Hamirpur (India). Chandramani; Brahmanand P.G. College, Department of Entomology, Rath, Hamirpur (India). Efficacy of indigenous oils on growth and development of Callosobruchus chinensis infesting Black gram. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 283-286 KEYWORDS: CALLOSOBRUCHUS CHINENSIS. PLANT OILS. VIGNA MUNGO.

A laboratory study was conducted to investigate the bioefficacy of indigenous oils i.e. ground nut, mustard, sunflower, mahua, linseed, neem, sesame, taramira, coconut and soybean against the pulse beetle, Callosobruchus chinensis on Vigna mungo. These oils were applied in two doses i.e. 2 ml and 3 ml/kg with three replications. The both doses of indigenous oils significantly reduced fecundity, emergence of F1 adults and enhanced developmental period. On which 3 ml /kg of indigenous oil were found most effective. The neem oil was noticed as effective grain protectant had maximum reduction in fecundity (89.1%), emergence of F1 adult (97.9%) and increase developmental period (14.4) at 3 ml/kg seed dose. It was followed by taramira oil and mustard oil which had 67.2 and 83.3%; 66.0 and 83.2% reduction in fecundity, 95.1 and 97.1%; 95.0 and 97.1%, reduction in adult

emergence and 11.1 and 13.3%, 10.9 and 13.6% increase in developmental period, respectively at 2 ml and 3 ml/kg seed of black gram.

0133. Chaitanya, T.; S.V. Agricultural College, Department of Entomology, IndiaSreedevi, K.; Indian Agricultural Research Institute, Division of Entomology, New Delhi (India). Krishna, T. Murali; Acharya N.G.Ranga Agricultural University, Tirupati (India). Regional Agricultural Research Station. Prasanthi, L.; S.V. Agricultural College, Department of Entomology, (India). Biology and population dynamics of Helicoverpa armigera (Hübner) in Cajanus cajan (L.) Millsp.. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 287-290 KEYWORDS: BIOLOGY. CAJANUS CAJAN. HELICOVERPA ARMIGERA.
Laboratory studies on biology of gram pod borer revealed that the mean longevity of the adult was 8.75 ± 0.52 days. There were five larval instars which took 22.4 ± 0.04 days to enter into pupal stage. Pupation took place on the sides of the Petri dish and the pupal period lasted for about 9.5 ± 0.45 days. The life cycle of Helicoverpa armigera was completed in 42.8 ± 1.46 days. Field studies carried out to observe the incidence of gram pod borer in three cultivars viz., LRG 41, TRG 22 and TRG 38 revealed that the infestation started in second fortnight of November and remained in the field till crop maturity. The peak activity in Tirupati region was observed during last week of December in all the three cultivars. Among the three cultivars, LRG 41 recorded the highest population (1.15 larvae/ plant) as compared to TRG-22 (1.07 larvae/ plant) and TRG-38 (0.56 larva/ plant).

0134. Singh, Rudra Pratap; C.C.S.P.G. College, Department of Entomology, Etawah (India). rudra.entonmail.com Pal Sundar; C.C.S.P.G. College, Department of Entomology, Heonra, Etawah (India). Insect pest diversity in Cauliflower, Brassica oleracea var. botrytis Linn.and its relation to Abiotic factors. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 291-295 KEYWORDS: BRASSICA OLERACEA.
The maximum population of Spodoptera litura was recorded 3.75 larvae/10 plants in 51st during second year at a temperature range of 5.0 -23.6oC and Relative humidity 68.8% were recorded. The maximum larvae of Plutella xylostella were noted in 50th SW during both the years at temperature range of 11.0-25.9oC and RH 64.4% in 2009-2010 and 7.3-24.0oC and RH 68.9% in 2010-2011. Pieris brassicae reached to its maximum in 5th SW at temperature range of 7.1-24.9oC and RH 64.7% during 2009-2010 and 6.0-23.7oC and 70.5% RH with a population range of 0.33-2.58/10 plants during 2010- 2011. Maximum population of Thysanoplusia orichalcea was recorded at which maximum temperature was 25.4oC and RH was 72.9%. All insect pests had negative correlation with minimum and maximum temperatures during both the years.

H20 Plant diseases

0135. Thind, T.S.; Punjab Agricultural University, Ludhiana (India). Dept. of Plant Pathology. Relevance of Fungicides in the present day crop protection and the way ahead. Journal of Mycology and Plant Pathology (India). (Mar 2015) v.45(1) p.4-12 KEYWORDS: FUNGICIDES. PLANT PROTECTION. METHODS. DEFENCE MECHANISMS.

0136. Nirmaladevi, D.; Bangalore University, Bangalore (India). Jnanabharathi Campus. Dept. of Microbiology & biotechnology. Ramesha, A.; Bangalore University, Bangalore (India). Jnanabharathi Campus. Dept. of Microbiology & biotechnology. Sunitha, V.H.; Karnataka State Women's University, Bijapur (India). Dept. of Bioinformatics. Babu, R.L.; Karnataka State Women's University, Bijapur (India). Dept. of Bioinformatics. Srinivas, C.; Bangalore University, Bangalore (India). Jnanabharathi Campus. Dept. of Microbiology & biotechnology. Antimicrobial and cytotoxic effects of the bioactive pigment Bikavarin produced by Fusarium oxysporum f. sp. lycopersici. Journal of Mycology and Plant Pathology (India). (Mar 2015) v.45(1) p.13-21 KEYWORDS: ANTIMICROBIAL PROPERTIES. TOXICITY. FUSARIUM OXYSPORUM. PIGMENTS.

Fusarium oxysporum strains are known to be prolific producers of metabolites with potential application. A violet pigmented strain of Fusarium oxysporum f. sp. lycopersici was isolated from rhizosphere soil of tomato plant. The biomass was grown in PDB and the intracellular pigment extracted. The identity of the compound was established by comprehensive analysis of the TLC and spectral data viz., UV-Visible absorption, LC-ESI-MS, FT-IR and IH_NMR. The pigment exhibited R, of 0.76, Amax at 605nm and the molecular ion peak at mlz 383.17 [M+H] + consistent to the molecular formula of C2oH1408 indicating that the compound was Bikaverin. The pigment exhibited antibacterial activity against human and seed borne plant partiogenic bacteria. The MIC and ICso values ranged between 5-1OJ.lg/ml and 10-50 ug/ml, respectively and it suppressed the growth of seed borne phytopathogenic Curvularia sp., Chaetomium sp. by 75 and 70%, respectively. In the cytotoxicity assay, the compound showed strong inhibitory effects on human lung carcinoma type II epithelial cells (A549), with ICso value of -13J.lg/ml.

0137. Prashad, Durga; Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan (India). Dept. of Plant Pathology. Shama, I.M.; Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan (India). Dept. of Plant Pathology. Dhiman, Sushil; CSK HPKV, Palampur (India). Dept. of Soil Science. Integrated management of Pink Canker (Corticium salmonicolor Berk. & Br.) in Apple. Journal of Mycology and Plant Pathology (India). (Mar 2015) v.45(1) p.22-29 KEYWORDS: CORTICIUM. APPLES. INTEGRATION. MANAGEMENT.

Combined efficacy of six in vitro effective fungicides, three plant oils, three botanicals, and five antagonists revealed that combination of Contaf + Brassica juncea var Cunefolia provided aximum wound recovery (92.94%) and callus formation followed by combination of Score + Brassica juncea var cunefolia (91.86%). However, integration of Contaf + Cow urine + Melia azedarach + Vitexnegundo + Artimisia roxburghiana +Juglans regia +Roylea elegans and Score + Cow urine + Melia azedarach + Vitex negundo + Artimisiarox burghiana + Juglans regia + Roylea elegans xhibited maximum wound recovery (87.17 and 85.81%), respectively. A combination of Contaf + Pseudomonas sp., significantly resulted maximum wound recovery (82.35%) in 2011 than in 2012 with wound recovery of 78.59 per cent followed by combination of Contaf + Trichoderma hamatum with 81.37 and 78.52 per cent wound recovery, respectively. Callusing of more than 10 mm was also found maximum in integration of Contaf + Pseudomonas sp. and

Contaf + Trichoderma hamatum. Combination of Avtar + Bacillus subtilis (BS,), Score + Bacillus subtilis (BS,), Contaf + Bacillus subtilis (BS,) and Score + Actinomycetes sp. provided 74.92, 73.11, 71.11 and 74.18 per cent wound recovery, respectively. Hence combined application of fungicides with plant oils, botanicals, and BCAs is an important substitute for integrated management of pink canker in apple.

0138. Thilagavathi, Rasu; Tamil Nadu Rice Research Institute, Aduthurai (India). Dept. of Plant Pathology. Nakkeeran, Sevugapperumal; Tamil Nadu Agricultural University, Coimbatore (India). Dept. of Plant Pathology. Raguchander, Thiruvengadam; Tamil Nadu Agricultural University, Coimbatore (India). Dept. of Plant Pathology. Samiyappan, Ramasamy; Tamil Nadu Agricultural University, Coimbatore (India). Dept. of Plant Pathology. Sodium Alginate entrapped biocontrol agents for the control of most virulent isolate of Sclerotium rolfsii. Journal of Mycology and Plant Pathology (India). (Mar 2015) v.45(1) p.30-39 KEYWORDS: SODIUM. ALGINATES. BIOLOGICAL CONTROL. CORTICIUM ROLFSII. SUGARBEET.
Most virulent isolate of Sclerotium rolfsii, SrSB3 was selected out of ten isolates based on its virulence on sugarbeet plants, tubers and leaf petioles. Among different isolates, SrSB3 caused wilting symptoms even at lesser population of sclerotia, recorded more lesion length on inoculated leaf petiole and more mycelial dia on inoculated tubers. Hence, SrSB3 was considered as a most virulent isolate and for which management practices were carried out. The sensitivity of sclerotia to culture filtrates of different bio-control agents was studied by poisoned food technique. Results clearly indicated the lethal effectiveness of different culture filtrates at different levels on sclerotia of S. rolfsii. The effective bio-control agents were entrapped inside the sodium alginate beads and tested individually and in-combination against the most virulent isolate of S. rolfsii (SrSB3) under pot culture and field conditions. The result from pot culture experiment revealed that next to chemical treatment, least root rot incidence (33.3 %) was observed for the combination treatment ofPfl + TTHI which was comparable with Pfl + EPC016 (36 %) as against control (83.3 %) and individual treatments. Similarly, minimum root rot incidence was observed for the same combination treatments than individual and control treatments under field conditions. The present study suggested that alginate beads based bio-formulations could control root rot of sugarbeet by the slow and continuous release of bio-control agents in to the soil in an eco-friendly manner.

0139. Saha, Poly; Bidhan Chandra Krishi Vishwavidyalaya, Nadia (India). Dept. of Plant Pathology. Das, Srikanta; Bidhan Chandra Krishi Vishwavidyalaya, Nadia (India). Dept. of Plant Pathology. Temporal and spatial epidemic development of early blight (Alternaria solani Ell. and Mart) in Tomato as a function of different fungicides treatment. Journal of Mycology and Plant Pathology (India). (Mar 2015) v.45(1) p.40-47 KEYWORDS: ALTERNARIA. FUNGICIDES. TOMATOES. DISEASE SURVEILLANCE.
The field experiment was conducted at university Instructional farm, Kalyani under Bidhan Chandra Krishi Viswavidyalaya in the year 2009-10 and 2010-11 to study the temporal and spatial spread of early blight (Altemaria solani Ell. and Mart.) on tomato under different chemical treatments to know the nature of progression of the disease in all fungicides treatment and also to evaluate the minimum apparent infection rate that restrict disease development at low leveL One susceptible tomato

variety ”Patharkuchi” (indeterminate type) was taken and natural epiphytotic condition was permitted. Disease severity recorded at 10 days interval and the infection rate (r or k) was calculated after logistic and gompertz transformation of the realized observed value of the disease severity (expressed as AUDPC). Among the six chemicals tested i.e., mancozeb, propiconazole, hexaconazole, carbendazim, cholothalonil and difenconazole, mancozeb showed minimum disease severity (AUDPC: 98.44 and 96.84) followed by hexaconazole (AUDPC: 98.69) and carbendazim (AUDPC: 97.68), respectively for the year 2009-10 and 2010-11. Maximum disease severity was observed in propiconazole treatment (AUDPC: 102.89 and 102.06) for both the two experimental years. Here, AUDPC is used to quantity the disease over different point of time and two growth models logistic and gompertz tested, through which disease progress curve move over time. Results revealed that the two models were not equally fit for depicting disease progress in every treatment but for linearization of area under disease progress curve (AUDPC) following the two models (logit and gompit) revealed that gompit fit better than logit for the spread of early blight disease severity over time and this was confirmed by the low standard error estimate (MSE) value of gompertz in all the treatments.

0140. Bunker, R.N.; Maharana Pratap University of Agriculture and Technology, Udaipur (India). Dept. of Plant Pathology. Thori, H.R.; Maharana Pratap University of Agriculture and Technology, Udaipur (India). Dept. of Plant Pathology. Rawal, P.; Maharana Pratap University of Agriculture and Technology, Udaipur (India). Dept. of Plant Pathology. Pathogenic and morphological variations in Fusarium isolates causing post flowering stalk rot of Maize. Journal of Mycology and Plant Pathology (India). (Mar 2015) v.45(1) p.48- 54 KEYWORDS: FUSARIUM. DEFENCE MECHANISMS. MAIZE.

Ten isolates of Fusarium were obtained from post flowering stalk rot infected plants collected from maize fields of Udaipur districts of Rajasthan. These were showing variable disease severity on different maize cultivars. Nine isolates belonged to Fusarium moniliforme, and one isolate from Kathar was confirmed as F. oxysporum. Among these three isolates of F. moniliforme and oneisolate of F. oxysporium exhibited considerable variations in cultural characteristics and size of micro and macro conidia. Isolates of F. moniliforme varied in colour from fluffy to submerged and white to dull white with slightly pinkish tinge growth and colony diameter ranged from (71.1-88.6 mm) on potato dextrose agar medium. The size of macroconidia and microconidia of F. moniliforme isolates were ranged from 2.6 x 25.5 to 3.7 x 34.1 urn and 2.5 x 7.2 to 2.8 x 8.5 urn respectively, while in F. oxysporum the size of macroconidia and microconidia was of 5.2 x 18.1 um and 3.6 x 24.7 urn respectively. Pathogenic variability among the isolates showed statistically significant (P 0.05) variations in disease severity for the host lines, isolates and also for the host line x isolates interactions. Inbred HKI 193-2-2 exhibited highly resistant (RR) reaction while HKI 164-7-4 ER-3 and Bio-9637 exhibited resistant (R) reaction against all the four isolates. Isolate from Udaipur (Fm-Ol) was most virulent and aggressive with highest mean disease score (5.0) across 35 maize inbreds evaluated. It would be desirable to evaluate and promote more new hybrids and inbreds

against several races of Fusarium prevalent in different regions for stable source ofPFSR management.

0141. Singh, Ram; CCS Haryana Agricultural University, Kaul (India). Rice Research Station. Sunder, S.; CCS Haryana Agricultural University, Kaul (India). Rice Research Station. Identification of sources of resistance to blast and false smut of Rice and their management with fungicides. Journal of Mycology and Plant Pathology (India). (Mar 2015) v.45(1) p.55-59 KEYWORDS: SMUTS. FUNGICIDES. RICE. DEFENCE MECHANISMS. FUNGICIDES.

0142. Mallaiah, B.; Agricultural University, Madurai (India). Agricultural College and Research Institute. Dept. of Plant Pathology. Muthamilan, M.; Agricultural University, Madurai (India). Agricultural College and Research Institute. Dept. of Plant Pathology. Sethuraman, K.; Agricultural University, Madurai (India). Agricultural College and Research Institute. Dept. of Plant Pathology. Chinnamuthu, C.R.; Agricultural University, Madurai (India). Agricultural College and Research Institute. Dept. of Agronomy. Survey and molecular identification of new Fusarium sp. Associated with Crossandra Wilt in India. Journal of Mycology and Plant Pathology (India). (Mar 2015) v.45(1) p.60-63 KEYWORDS: FUSARIUM. MOLECULAR GENETICS. WILTS. INDIA.

0143. Partap, Mahendra; Swami Keshwanand Rajasthan Agricultural University, Bikaner (India). College of Agriculture. Dept. of Plant Pathology. Solanki, V.A.; Navsari Agricultural University, Navsari (India). Dept. of Plant Pathology. Prasad, J.; Swami Keshwanand Rajasthan Agricultural University, Bikaner (India). College of Agriculture. Dept. of Plant Pathology. Nathawat, B.D.S.; Rajasthan Agricultural Research Intiture, Durgapura, Jaipur (India). Occurrence of black point disease of wheat associated with different varieties growing in Banaskantha district of Gujarat. Journal of Mycology and Plant Pathology (India). (Mar 2015) v.45(1) p.64-66 KEYWORDS: WHEATS. VARIETIES. DISEASE SURVEYS. GUJARAT.

0144. Justin, C; Tamil Nadu Agricultural University, Thirupathisaram (India). Agricultural Research Station. tnaugailceahoo.comLeo, Gailce; Tamil Nadu Agricultural University, Thirupathisaram (India). Agricultural Research Station. Preetha, G; TNAU, Thovalai (India). Floriculture Research Station. Seasonal incidence of rice yellow stem borer, Scirpophaga incertulas (walker) in Tamil Nadu. Indian Journal of Entomology (India). (June 2013) v.75(2) p.109-112 KEYWORDS: SCIRPOPHAGA INCERTULAS. PLANT DISEASES.

The seasonal incidence of rice yellow stem borer, Scirpophaga incertulas (Walker) was studied at the Agricultural Research Station, Tamil Nadu Agricultural University, Thirupathisaram, Kanyakumari district during 2008–09, 2009–10 and 2010–11. The results revealed that the infestation was found during August-September and December-February, reaching the peak in January-February, and without any infestation in other months. Studies on correlation with weather parameters showed a significant positive correlation with relative humidity and negative correlation with minimum temperature and rainfall.

0145. Varma, H.S; S.D. Agricultural University (India). C.P. College of Agriculture, Department of Agricultural Entomology. Patel, I.S.; S.D. Agricultural University (India). C.P. College of Agriculture, Department of Agricultural Entomology. Shinde, Y.A; S.D. Agricultural University (India). C.P. College of Agriculture, Department of Agricultural Entomology. Efficacy of certain insecticidal molecules against Antigastra catalaunalis (dup.) in sesamum. Indian Journal of Entomology (India). (June 2013) v.75(2)p.137-140 KEYWORDS: INSECTICIDES. ANTIGASTRA CATALAUNALIS. SESAMUM.

Among all tested insecticides, emamectin benzoate 0.001% recorded lowest flower damage and it was at par with Spark 0.036% and Polytrin 0.004%. Thiodicarb 0.15%, fenvalerate 0.01%, and cartap hydrochloride 0.1% were moderately effective. Similarly, capsule damage was significantly lowest in emamectin benzoate 0.001% but, it was at par with Spark 0.036% and Polytrin 0.004%. Thiodicarb 0.15%, fenvalerate 0.01%, and cartap hydrochloride 0.1% were moderately effective.

0146. Chakraborty, S; Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar (India). Department of Agricultual Entomology. Chaudhuri, N; Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar (India). Senapati, S. K.; Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar (India). Department of Agricultual Entomology. Screening of mung bean genotypes against leaf folder (Lamprosema indicata) in terai region of West Bengal. Indian Journal of Entomology (India). (June 2013) v.75(2)p.141-145 KEYWORDS: GENOTYPES. MUNG BEANS. SPOTS.

Screening of twenty four (24) genotypes of mung bean was carried out in pre-kharif and post-kharif seasons over two years i.e. 2003 and 2004 in terai region of West Bengal to evaluate resistance to leaf folder (Lamprosema indicata). The genotypes A-228(0.07–0.57), SLM-70(0.13–0.37), MLD-95-21 (0.07–0.53) and A-43 (0.10–0.43) in pre kharif season and A-33 (0.07–0.50), SLM-70 (0.10–0.57) in post kharif season were found less infested. The genotypes like Pusa-96-32 (0.47–1.43), PDM-84-143 (0.40–1.43) in pre-kharif season and Pusa-96-32 (0.37–0.90), PS-16(0.30–0.70), and NBM-100 (0.17–0.73) in post-kharif season were found susceptible. Phenol, OD phenol, K, P content and trichome in leaf surface had negative and N content had positive impact on infestation.

0147. Panduranga, G.S.; Acharya N.G. Ranga Agricultural University. College of Agriculture. Department of Entomology. Hyderabad (India). Vijayalakshmi, K.; Acharya N.G. Ranga Agricultural University. College of Agriculture. Department of Entomology. Hyderabad (India). Reddy. Loka K.; Acharya N.G. Ranga Agricultural University. College of Agriculture. Department of Entomology. Hyderabad (India). Rajashekara, H.; Acharya N.G. Ranga Agricultural University. College of Agriculture. Department of Entomology. Hyderabad (India).. Acharya N.G. Ranga Agricultural University. College of Agriculture. Department of Entomology. Hyderabad (India).. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.338-342 KEYWORDS: EVALUATION. GERMPLASM. INSECTICIDES. PESTICIDE RESISTANCE. BEMISIA. PLANT VIRUSES. DISEASE RESISTANCE.

Field screening of 22 mungbean entries for resistance against whitefly and mungbean yellow mosaic virus (MYMV) were carried out during 2009 – 2010 at College Farm, College of Agriculture, Rajendranagar, Hyderabad. Resistant check (ML

267) and KM 200 recorded low whitefly population of 1.33 and 1.55/5 plants, respectively, whereas the susceptible check (WGG 2) recorded high mean population of whiteflies (9.11/5 plants) followed by MGG 350 (7.66/5 plants) and UPM 99(6.77/5 plants). The mungbean yellow mosaic virus (MYMV) incidence ranged from 5.66 to 58.29%. The resistant check ML 267 (5.66%) followed by LGG 407 (11.87%) recorded less incidence while the susceptible check WGG 2 showed high incidence (58.29%). The mungbean entries were categorized based on their resistance reaction to mungbean yellow mosaic virus (MYMV) on 0–5 scale. None of the entries were found to be highly resistant and the resistant check ML 267 (5.66%) showed resistant reaction while 12 entries with 11.87 to 19.12% disease incidence were found moderately resistant. Other 5 entries with 20.48 – 26.73% MYMV disease were moderately susceptible and the susceptible check WGG 2 with 58.29% disease incidence was categorized as highly susceptible. The entry ML 267 which showed resistant reaction to mungbean yellow mosaic virus (MYMV) recorded highest yield of 1103 kg/ha. Among the 12 moderately resistant lines, 4 lines viz, LGG 407, MGG 356, KM 200 and NM 1 which recorded the yield ranging from 831 to 972 kg/ha were found to be the promising lines against MYMV.

0148. Smitha, M.S.; Kerala Agricultural University. College of Horticulture. Vellanikkara (India). Maicykutty; Kerala Agricultural University. College of Horticulture. Vellanikkara (India). Mathew, P.; Kerala Agricultural University. College of Horticulture. Vellanikkara (India). In Vitro Assays on the Influence of Selected Pesticides on the Growth Parameters of Entomopathogen, Hirsutella SP. Indian Journal of Entomology (India). (Dec 2011) v.73 (4) p.343-345 KEYWORDS: PESTICIDES. GROWTH. ENTOMOPHAGA. HIRSUTELLA.
In vitro assays on the compatibility of recommended doses of synthetic and botanical pesticides with the fungal pathogen Hirsutella sp., infecting root mealybug, Geococcus citrinus Kuwana revealed that, all pesticides affected the mycelial growth, of these phorate and botanicals had a lesser effect. Even 10 days after inoculation, cent per cent inhibition was exhibited by carbendazim and quinalphos. Carbaryl and chlorpyriphos recorded 53.17 and 51.64% inhibition respectively followed by dimethoate (34.17%). Per cent inhibition in botanicals was comparatively less (26.17% in econeem and 27.59% in pongamia oil). Only 13.13% inhibition in growth of the pathogen was observed in phorate and hence it can be considered as compatible with Hirsutella sp.

H60 Weeds

0149. Dubey, Megha; Jawaharlal Nehru Krishi Vishwavidhyalaya, Jabalpur (India). Department of Agronomy Gangwar, Suchi; Jawaharlal Nehru Krishi Vishwavidhyalaya, Jabalpur (India). Department of Agronomy. Management of weeds in irrigated groundnut (Arachis hypogaea L.) under satpura plateau and hill zone. Legume Research (India). (Aug 2013) v. 36(4) p.364-367 KEYWORDS: WEEDS. WEED CONTROL. CHLORIMURON. GROUNDNUTS. ARACHIS HYPOGAEA.
Field experiment was conducted during kharif (June-July), 2009–10 to study the management of monocot weeds in irrigated groundnut. The experiment was laid out

in randomized block design with 8 treatments with 3 replication. TG-24 variety of groundnut was used in the trial. Results of the experiment revealed that application of imazethapyr and chlorimuron (100+24 g ha-1) recorded maximum nodules plant-1,plant height, podsplant-1, pod yield, kernel yield, haulm yields followed by imazethapyr 300 g ha-1 and imazethapyr 200 g ha-1. Based on the data the highest pod yield 13.37 q ha-1 was recordedwith hand weeding at 20 and 40 DAS which was statistically at par with imazethapyr + chlorimuron (100+ 24 g ha-1) 12.70 q ha-1, combination of imazethapyr + chlorimuron fetched the highest net monetary return of Rs. 14312 ha-1 and B:C ratio of(1.8), which might be due to less cost of labour in this treatment.

0150. Shrivas, Aarti; Allahabad School of Agriculture, Allahabad (India). Department of Agronomy. Kaleem, Mohd. Allahabad School of Agriculture, Allahabad (India). Department of Agronomy. Singh, Suryendra; Allahabad School of Agriculture, Allahabad (India). Department of Agronomy. Chandrawanshi, Sandeep Kumar; Allahabad School of Agriculture, Allahabad (India). Department of Agronomy. Bio-efficacy of imazethapyr at various doeses in kharif groundnut (Arachis hypogaea L.) on sandy loam soil. Legume Research (India). (Aug 2013) v. 36(4) p.368-370 KEYWORDS: WEEDS. WEED CONTROL. GROUNDNUTS. ARACHIS HYPOGAEA. WEED CONTROL EQUIPMENT.

Field experiment was conducted during rainy (kharif season of 2010 to evaluate the bio-efficacy of herbicides in groundnut crop onsandy loam soil of Allahabad. The lowest weed density and bio mass were recorded with one hand weeding at 20 days after sowing (DAS) followed by application of oxyfluorfen 100 ml/ha as pre-emergence at (2 DAS). Among the herbicidal treatments the alone application of oxyfluorfen was found most effective in reducing the weed population and dry matter accumulation and gave highest net return (Rs 37575/ha) and the benefit-cost ratio (2.38).

0151. Sushilkumar; Directorate of Weed Science Research, Jabalpur (India). Aquatic weeds problems and management in India. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.118-138 KEYWORDS: WEEDS. WEED CONTROL. AQUATIC WEEDS. CHEMICAL CONTROL. INDIA.

Aquatic weeds are those unwanted vegetation which grow in water and hamper its use. Out of about 160 aquatic weeds, Eichhornia crrassipes, Ipomoea aquatica, Typha angustata, Ceratophyllum demersum, Salvinia molesta, Nelumbo nucifera, Alternanthera philoxeroides, Hydrilla verticillata, Vallisneria spiralis, Charaspp., Nitelia spp., Potamogeton spp. are of primary concern in India.Several irrigation and hydroelectric projects in the country like Nagarjuna Sagar project in Andhra Pradesh, Tungabhadra project in Karnataka and Kakki and Idikki reservoirs in Kerala are suffering with massive growth of aquatic weeds. Weeds enhance rates of evaporation many folds through evapotranspiration than that of open surface, thus cause great loss of water. Water hyacinth makes water unfit due to eutrophication and slows down the flow rate of waterbesides causing many health associated problems. Aquatic weeds can becontrolled by several methods like biological, chemical and physical.Each method has its benefits and drawbacks. There are several popularcontrol mechanisms for preventing the spread or eradication ofaquatic

weeds. Physical methods are suitable only for small scaleinfestation but when applied in large water bodies become ineffectivedue to high cost and regrowth. Chemical control has been practiced against aquatic weeds since long time in India but it is not prevalent. Control of small infestations with herbicides has often been very effective, but is heavily dependent on skilled operators who maintain longterm vigilance for appearance of regrowth orseedlings. In recent decades, there has been a significant increasein the level of nutrients dumped into water from industrial and domestic sources as well as from land where fertilizers are used orwhere clearance has caused an increase in run-off. Successful attempts have been made to control water hyacinth and water fern by use of exotic weevil Neochetina spp. and Cyrtobagaus salvinae in different parts India but for several other aquatic weeds, suitable bioagents are not available. Some species of herbivorous fishes (Tilapia spp. and Ctenopharyndon idella) have been utilized to control some submerged weed especially Hydrilla spp. with varying degree of success. This paper describes the aquatic weed problems inIndia and the efforts made so far for their management by various methods.

0152. Mandal, Devendra; Rajendra Prasad Agricultural University, Samastipur (India). Department of Agronomy Singh D.; Rajendra Prasad Agricultural University, Samastipur (India). Department. of Agronomy Kumar, Rakesh; Rajendra Prasad Agricultural University, Samastipur (India). Department of Agronomy. Kumari, Anupma; Rajendra Prasad Agricultural University, Samastipur (India). Department of Agronomy. Kumar, Vinod; Rajendra Prasad Agricultural University, Samastipur (India). Department of Agronomy. Effects on production potential and economics of direct seeded rice sowing dates and weed management techniques. Indian Journal of Weed Science (India). (Jul-Dec 2011) V.43(3&4) p.139-144 KEYWORDS: PLANT PROPAGATION. HERBICIDES. NUTRIENT UPTAKE. ECONOMICS. WEED CONTROL.
Plant height, tillers/m row length, leaf area index (LAI), crop growth rate (CGR), net assimilation rate (NAR) and dry matter accumulation in plants were significantly higher in plots gettingweed free environment closely followed by pre-emergence application of butachlor 1.5 kg/ha fb 1 HW. However, yield attributes i.e. panicles/m2 and fertile grains/panicle and finally yield were significantly higher in weed free check with butachlor fb 1 HW closely on its heel. Among the nutrient concentration, it was only P in straw which was very marginally higher in weed free check and butachlor fb 1 HW. However, sowing date of 22nd June showedsignificantly higher N, P and K uptake by grain and straw. Weed population and weed dry matter were significantly higher in 12th Julysown crop but least weed population, dry matter and good weed control efficiency were accounted with weed free check and butachlor fb 1 HWthough the nutrient concentration were affected significantly both due to sowing date and weed management practices. Nutrient uptake due to weed was higher in 12th July sowing date. Amongst the weed management methods, the nutrient uptake of weeds were least in weed free check followed by butacholar fb 1 HW and Sesbania broadcast fb2,4-D 0.5 kg/ha at 30 DAS. Similar results were also recorded in the case of gross return, net return and B:C ratio in case of 22 nd June.

0153. Singh, Rohitashav; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Shyam, Radhey; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Bhatnagar, Amit; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Singh, V. K.; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy Kumar, Jitendra; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Bio-efficacy of herbicides applied at the 2 to 4 leaf stage of weeds in sugarcane after second interculture. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.145-148 KEYWORDS: WEEDS. WEED CONTROL. CROPS. HERBICIDES. SUGARCANE.

A field experiment was conducted during 2006–2008 to find out suitable dose of velper K4 60 WP for the control of weeds in springplanted sugarcane. Weed population and weed dry weight were reducedsignificantly due to different weed control measures. Cane yieldincreased significantly with all the measures over weedy check andwas highest under weed free conditions (94.3 t/ha) though it was at par with hoeing at 30, 60 and 90 day after transplanting (DAT). Atrazine was the most effective herbicide reducing weed population and weed dry weight followed by Velpar. Weed growth in weedy plot caused 73.5% reduction in cane yield compared to weed free condition. Among herbicidal treatments, maximum cane yield of 82.4 t/ha was obtained in atrazine and no herbicide treatment was at par with this. Due to phytotoxicity reason Velpar K4 60 WP resulted in lower cane yield, though it effectively controlled the weeds.

0154. Singh, B.P.; Indian Institute of Natural Resins and Gums, Ranchi (India). Ghosal S.; Indian Institute of Natural Resins and Gums, Ranchi (India). Singh, A.K.; Indian Institute of Natural Resins and Gums, Ranchi (India). Effect of different herbicides on weeds and lac yield in bhalia plantation. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.149-152 KEYWORDS: GLYPHOSATE. WEEDS. WEED CONTROL. HERBICIDES. LAC.

Several herbicides were evaluated for their possibility of use in the lac production system under Flemingia semialata in the Research Farm of Indian Institute of Natural Resins and Gums, Ranchi. Among several herbicides evaluated, application of glyphosate at 1.0 kg/ha in Flemingia semialata (vernacularly called bhalia) plantation at 10 days prior to lac insect inoculation, resulted in significantreduction in weed density and dry weight with 88.6% weed control efficiency (WCE). Glyphosate was found safe to lac insect and superior to other tested herbicides and resulted in 38.8% higher sticklac yield over control. The weed free treatment (manual, weeding twice) recorded the highest sticklac yield (239.7 g/bush or 1918 kg/ha) but was uneconomical in comparison to herbicide treatments.

0155. Chhokar, R.S.; Directorate of Wheat Research, Karnal (India). Resource Management Unit. Sharma, R.K.; Directorate of Wheat Research, Karnal (India). Resource Management Unit. Chander, Subhash; Directorate of Wheat Research, Karnal (India). Resource Management Unit. Optimizing the surfactant dose for sulfosulfuron and ready mix combination of sulfosulfuron and carfentrazone against weeds in wheat.

Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.153-162 KEYWORDS: HERBICIDES. WEEDS. WEED CONTROL. WHEATS.

Field and pot studies were conducted to determine the efficacy of sulfosulfuron and ready mixture, sulfosulfuron + carfentrazone- 45(25+20) WDG at different surfactant doses against complex weed flora of wheat. The weed control, particularly the grass was significantly poor, when sulfosulfuron or its ready mix combination with carfentrazone was applied without surfactant compared with surfactant. The grass (Avena ludoviciana, Echinochoa crusgalli,Phalaris minor and Polypogon monspeliensis) weed control withsulfosulfuron or ready mixture (RM) of sulfosulfuron + carfentrazone- 45 WDG was similar at surfactant doses of 625, 750 and 1250 ml/haindicating the possibility of reducing the surfactant doses by 40–50% from the present recommendation of 1250 ml/ha in India. The optimum dose of RM, sulfosulfuron + carfentrazone was 45 (25+20) g/ha with 625–750 ml/ha surfactant. This combination was superior over sulfosulfuron, due to the control of Rumex dentatus, therebyincreased the wheat yield by 7.6% on an overall mean basis. The RM, sulfosulfuron + carfentrazone with surfactant was similar to ready mixtures, Total (sulfosulfuron 75 + metsulfuron 5)-80 WDG at 32(30+2) g/ha and Atlantis (mesosulfuron + iodosulfuron) at 14.4 (12+ 2.4) g/ha in controlling weeds and producing wheat yield. The carry over effect of sulfosulfuron involving treatments (sulfosulfuron, sulfosulfuron + metsulfuron, sulfosulfuron + carfentrazone) was observed on succeeding maize (Zea mays L.) crop. At 2X dose of sulfosulfuron + carfentrazone (50+40 g/ha), the reduction in maize biomass was 62.6–73.0% in comparison to weed free check.

0156. Mukundam, B.; ANGRAU, Rajendranagar (India). ARI, AICRP on STCR. Srividya, S.; ANGRAU, Rajendranagar (India). ARI, AICRP on STCR. Raja, V.; ANGRAU, Rajendranagar (India). ARI, AICRP on STCR. Productivity and economics of rice-zero till maize as influenced by weedmanagement practices in southern Telangana region of Andhra Pradesh. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.163-168 KEYWORDS: RICE. HERBICIDES. WEEDS. WEED CONTROL. ANDHRA PRADESH.

A field experiment was conducted on sandy clay loam soil of Andhra Pradesh during kharif and rabi seasonsics of rice-zero tillmaize cropping system. The results showed that the rejuvenation of rice stubbles in the sequence crop of rabi maize were more in early harvested than late harvested rice varieties and reverse was the trend in weed growth. Among herbicide treatments, use of paraquat as pre-emergence application for controlling rejuvenation of ricestubbles in zero-till maize was superior to pre-emergence application of atrazine and no-herbicide treatment. On the other hand pre-emergence application of atrazine was more effective in controlling first flush of weeds than paraquat and no-herbicidetreatment. Herbicide treatments, consequent to termination of ricestubble and weed competition, promoted plant growth, dry matter production, nutrient uptake, yield structure and yield of maize and consequently productivity and economics of the system as compared to no-herbicide treatment. Rice-zero till maize irrespective of the herbicide supplementation gave higher rice equivalent yield, netreturns and benefit of cost when compared to existing rice-pulse sequence. However, soil fertility status and microbial status of the rice-maize cropping system was no match to the existing

system of rice-pulse sequence and herbicide treatments did not exhibit any detrimental effect on microbial population. of 2006–07 and 2007–08 on the effect of weed management practices on the productivity and economy.

0157. Meena, D.S.; Maharana Pratap University of Agriculture & Technology, Kota (India). Agricultural Research Station. Ram, Baldev; Maharana Pratap University of Agriculture & Technology, Kota (India). Agricultural Research Station. Jadon, Chaman; Maharana Pratap University of Agriculture & Technology, Kota (India). Agricultural Research Station. Tetarwal, J. P.; Maharana Pratap University of Agriculture & Technology, Kota (India). Agricultural Research Station. Efficacy of imazethapyr on weed management in soybean. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.169-171 KEYWORDS: SOYBEANS. GLYCINE MAX. YIELDS. WEEDS. WEED CONTROL.

The experiment was conducted to evaluate the efficacy of post emergence applications of imazethapyr on weed control and soybean yield. The field was infested with grassy weeds (51.6%), broad leaf weeds (34.1%) and sedges (13.2%). Application of imazethapyr XL 10% SL at 150 g/ha as post emergence significantly reduced the density ofall grassy, broad leaf weeds sedges and their dry weight, andprovided maximum number of branches/plant, pods/plant, seeds/pod and seed yield as compared to weedy check and imazethapyr 10% at 50 g/ha. Infestation of weeds throughout the growth period caused 57.2% reduction in seed yield of soybean. Maximum seed yield (1075 kg/ha)and weed control efficiency of grasses (86.9%), broad leaf (88.4%) and sedges (73.0%) was obtained with 2 hand weeding at 20 and 40 days after sowing closely followed by imazethapyr XL 10% at 150 g/ha (957 kg/ha). Application of imazethapyr XL10% SLat 100 g/ha recorded significantly higher net return (Rs 14,237/ha) and B: C ratio (1.68) followed by imazethapyr XL 10% at 150 g/ha over weedy check and imazethapyr XL 10% at 50 g/ha.

0158. Nandan, Brij; SKUAST-Jammu, Jammu & Kashmir (India). Division of Agronomy.Sharma, B.C.; SKUAST-Jammu, Jammu & Kashmir (India). Division of Agronomy.Kumar, Anil; SKUAST-Jammu, Jammu & Kashmir (India). Division of Agronomy.Sharma, Vikas; SKUAST-Jammu, Jammu & Kashmir (India). Division of Agronomy. Efficacy of pre and post emergence herbicides on weed flora of urd bean under rainfed subtropical Shiwalik foothills of Jammu & Kashmir. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.172-174 KEYWORDS: WEEDS. WEED CONTROL.HERBICIDES. FLORA. RAINFED FARMING. JAMMU AND KASHMIR.

An experiment was conducted during rabi seasons of 2006 and 2007 at Pulses Research Sub-Station Samba, SKUAST-Jammu to study the efficacy of pre and post emergence herbicides in controlling weed flora of urd bean (Vigna mungo L.) under rainfed subtropical conditions of Jammu. The weed free treatment produced the highest seed yield and was at par with imazethapyr 250 ml/ha (post-emergence)after 15–20 days sowing. However, among the other treatments, pendimethalin (pre-emergence) 1.0 kg/ha fb 1 HW at 30 DAS was found superior in controlling the weed flora and increasing the seed yield. Unweeded check produced the lowest seed yield.

0159. Patra, A.K.; Orissa University of Agriculture & Technology, Chiplima (India). Regional Research & Technology Transfer Station. Halder, J.; Orissa University of Agriculture & Technology, Chiplima (India). Regional Research & Technology Transfer Station. Mishra, M.M.; Orissa University of Agriculture & Technology, Chiplima (India). Regional Research & Technology Transfer Station. Chemical weed control in transplanted rice in Hirakud command area of Orissa. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.175-177 KEYWORDS: TRANSPLANTERS. CHEMICALS. HERBICIDES. WEEDS. WEED CONTROL.
A field experiment was conducted to evaluate the efficiency of herbicide mixture of almix (metasulfuron methyl + chlorimuron ethyl) and butachlor to control both grassy and broad leaved weeds. Application of almix 0.004 kg/ha mixed with butachlor 0.938 kg/ha at three days after transplanting (DAT) was at par with hand-weeding twice at 20 and 40 DAT in controlling weeds and higher grain yield. This application increased the grain yield by 45.1% over the unweeded check. There was a negative linear relationship between weed dry weight and grain yield.

0160. Pathak, Aditi; Directorate of Weed Science Research, Adhartal (India). Kannan, C.; Directorate of Weed Science Research, Adhartal (India). Isolation and pathogenicity of some native fungal pathogens for the biological management of water hyacinth. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.178-180 KEYWORDS: PLANT DISEASES. EICHHORNIA CRASSIPES. BIOLOGICAL CONTROL. FUSARIUM OXYSPORUM. ALTERNARIA ALTERNATA. WEED CONTROL. WEEDS.
Water hyacinth (Eichhornia crassipes) is one of the most predominant, persistent and troublesome aquatic weeds. Periodical surveys of various water bodies in and around Jabalpur were undertaken with the objective to isolate and evaluate the indigenousstrains of fungal pathogens as myco-herbicides to manage water hyacinth. Three fungal pathogens, viz., Fusarium oxysporum, Curvularia lunata and Alternaria alternata were isolated. Efficacystudies of the pathogens were done by inoculating water hyacinthplants, either directly or after creating wounds. Artificial injury created in the plants by pin pricks before inoculation of thepathogens aided in the entry of the pathogens there by resulting in the better infection of the plants. Among the three pathogens, Fusarium oxysporum was found to be the best resulting in the killing of inoculated water hyacinth in about 15 days.

0161. Sireesha, A.; ANGRAU, Hyderabad (India). AICRP on weed control. Rao, P.C.; ANGRAU, Hyderabad (India). AICRP on weed control. Swapna, G.; ANGRAU, Hyderabad (India). AICRP on weed control. Ramalakshmi, Ch.S.; ANGRAU, Hyderabad (India). AICRP on weed control. Persistence of pendimethalin and oxyfluorfen at different temperature and moisturelevels in an alfisol and vertisol. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.181-187 KEYWORDS: SOIL SCIENCES. SOIL MANAGEMENT. HERBICIDES. RESIDUES. WEEDS. WEED CONTROL.
Persistence of pendimethalin and oxyfluorfen in an alfisol and vertisol was studied at three moisture levels (at saturation, Field Capacity and 50% Field Capacity) and at two temperature levels (10 ± 2° C and 27+ 2° C) for 137 days in the laboratory. Degradation of pendimethalin and oxyfluorfen was more rapid at high temperature and moisture levels. The disappearance curve/semi logarithmic plot followed first order kinetics with two distinct pathways, an initial faster rate followed by a slower

and more gradual disappearance. Half life values for pendimethalin varied from 35.45 to 108.28 in alfisol and from 28.28 to 91.84 in vertisol; for oxyfluorfen half life values varied from 97.60 to 192.50 in Alfisols and 90.05 to 147.44 in vertisols.

0162. Sarathambal, C.; Directorate of Weed Science Research, Maharajpur (India). Chourasiya, Anjana; Directorate of Weed Science Research, Maharajpur (India). Barman, K.K.; Directorate of Weed Science Research, Maharajpur (India). Screening for antipathogenicity of weeds. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.188-191 KEYWORDS: SOIL BIOLOGY. ANTIMICROBIALS. BIOLOGICAL CONTROL. WEED CONTROL. WEEDS.
A total of 11 weeds were collected and screened for their antimicrobial activity against plant and human pathogens. Antimicrobial compounds of weeds were extracted with three different solvent viz. methanol, chloroform and petroleum ether of varying polarity. The results revealed that the petroleum ether extract of Lucas aspera was most effective against the Fusarium oxysporum, Colletotricum falcatum and C. capsici. The methanol extract of Phyllanthus niruri was showing highest antimicrobial activity against the human pathogens such as Entrococcus coli, Bacillus subtilis,Bacillus licheniformis, Bacillus amylovorus. Similarly, chloroform extract of L. aspera recorded the highest inhibition zone against the Vibrio cholerae and Salmonella typhi. Among the 11 weeds, L. asperaand P. niruri were found having more antimicrobial activity against most of the selected plant and human pathogens.

0163. Singh, V.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Agronomy. Dixit, Vivek; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Agronomy. Singh, Rohitashav; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Agronomy. Barthwal, Ashutosh; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Dept. of Agronomy. Efficacy ofmechanical, cultural and chemical methods on weed suppression and yield of lentil. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.192-194 KEYWORDS: CONVENTIONAL TILLAGE. ZERO TILLAGE. WEED CONTROL. WEEDS. CULTURAL METHODS. LENTILS.
A field experiment was conducted during rabi season of 2007–08 and 2008–09 on the mollisols of Pantnagar (Uttrakhand). Twelve treatments consisted of two tillage practices (zero andconventional), two varieties (small seeded-Pant L-4 and bold seeded- Pant L-5) and three levels of weed management (weedy check, hand weeding, (HW) 30 DAS and pendimethalin 1 kg/ha as PRE) were set out in split plot design keeping tillage practices and variety in the main plot and weed management practices in sub plots with four replications. Results revealed that zero tillage recorded higher weeds density viz, Cyperus rotundus and total dry matter of weeds per unit area than that of conventional tillage. Weed density and dryweight remained unaffected under both the varieties. Hand weeding done at 30 DAS controlled the weeds more effectively than PRE application of pendimethalin 1 kg/ha. Conventional tillage out yielded zero tillage. Most of the yields attributing characters were higher in conventional tillage. Small seeded variety Pant L-4 gave significantly higher grain yield than that of bold seeded Pant L-5 during both the years. HW 30 DAS and PRE application of pendimethalin 1 kg/ha being on par

produced significantly more grain yield oflentil than weedy check during the first year at 30 DAS out yielded remaining weed management practices.

0164. Kumar, Suresh; CSK HPKV, Palampur (India). Forages and Grassland Management, Department of Agronomy. Angiras, N.N.; CSK HPKV, Palampur (India). Forages and Grassland Management, Department of Agronomy. Rana, S.S.; CSK HPKV, Palampu (India). Forages and Grassland Management, Department of Agronomy. Bio-efficacy of clodinafop-propargyl + metsulfuron methyl against complex weed flora in wheat. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.195-198 KEYWORDS: METSULFURON. SURFACTANTS. WEED CONTROL. WEEDS. FLORA. WHEATS.

Clodinafop 60 g/ha and metsulfuron methyl 4 g/ha + surfactant 0.02% alone, combinations of clodinafop and metsulfuron + surfactant at the similar and double dose and isoproturon + 2, 4-D were evaluated gainst complex weed flora in wheat during 2007–08 and 2008–09. Phalaris minor, Avena ludoviciana and Lolium temulentum were the major grassy weeds. Vicia sp., Anagallis arvensis and Lathyrus aphaca were among the broad-leaved weeds found growing in association with wheat crop. All the herbicidal treatments significantly reduced the dry weight of weeds. Tank mixture of clodinafop 60 g/ha +metsulfuron 4 g/ha and clodinafop 120 g/ha + metsulfuron 8 g/ha with and without 0.2% surfactant provided excellent control of weeds and produced significantly higher grain yield of wheat. Weeds caused 55.7% reduction in wheat grain yield.

0165. Dharumarajan, S.; NBSS & LUP, Regional Centre, Kolkata (India). Sankar, R.; PAJANCOA&RI, Karaikal (India). Arun, S.; TNAU, Coimbatore (India). Department of Soil science and Agricultural chemistry. Persistence and dissipation of pretilachlor in soil, plant and water of coastal rice ecosystem. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.199-202 KEYWORDS: RESIDUES. WEED CONTROL. WEEDS. RICE. COASTAL SOILS. COASTAL WATERS.

Field and laboratory experiments were conducted to study thepersistence and dissipation of pretilachlor in soil, straw and flood water. In soil, pretilachlor at 0.75 kg/ha dissipated to below detectable level (BDL) within 30 days after application (DAA) when applied along with green leaf manure, while in other treatments viz., pretilachlor at 0.75, 1.5 kg/ha alone and gypsum + pretilachlor at 1.5 kg/ha persisted up to 45 DAA (DAA). In the case of plant, pretilachlor at 0.75 kg/ha dissipated to below detectable limit at 30DAA, while 1.5 kg/ha persisted up to 60 DAA. Irrespective of the treatments, pretilachlor dissipated to below detectable limit at 10 DAA in flood water. The half-life of pretilachlor varied from 3.9–10.0, 3.48.5, 0.87–1.52 days for soil, rice plant and flood water, respectively.

0166. Dwivedi Sanjay K.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Agronomy. Shrivastava G. K.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Agronomy. Singh A. P.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Agronomy. Kolhe S.S.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Agronomy. Weed population, nitrogen removal by weeds and crop yield under maize + blackgram intercropping system in Chhattisgarh plains. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.203-210

KEYWORDS: WEED CONTROL. WEEDING. MAIZE. URD. INTERCROPPING. CROP MANAGEMENT. CROPPING SYSTEMS.

The experiment consisted of five planting geometry viz., sole maize, sole blackgram, maize + blackgram (1:1), maize + blackgram (2:1) and maize + blackgram (2:2) and four weed management practices viz., weedy check, hand weeding (HW) at 30 DAS, alachlor 2.0 kg/ha as pre emergence (PRE) and alachlor 1.5 kg/ha as PRE + HW at 40 DAS. These treatments were evaluated under split plot design with three replications. At harvest of maize (105 DAS), weed population and nitrogen removals of all species of weeds were significantly highest under sole maize. However, the highest nitrogen removal by weeds was recorded under weedy check by all the weed species, while the lowest removal of nitrogen was in alachlor 1.5 kg/ha + HW at 40 DAS. Among the planting geometry, the grain yield, productivity rating index (PRE), production efficiency (PE) and weed control efficiency (WCE) were highest under maize + blackgram (2:1) for maize, however weed smothering efficiency of maize was highest under maize + blackgram (1:1). The same parameters were highest under sole blackgram. At harvest stages of blackgram (75 DAS) and maize (105 DAS), dry weight of weeds was lowest with the application of alachlor 1.5 kg/ha + HW at 40 DAS. This treatment produced maximum grain yield, PRI and PE ofmaize and blackgram, along with higher WCE.

0167. Sushilkumar; Directorate of Weed Science Research, Maharajpur (India). Biological based chemical integration for early control of water hyacinth. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.211-214 KEYWORDS: EICHHORNIA CRASSIPES. AQUATIC WEEDS. INTEGRATED CONTROL. BIOLOGICAL CONTROL. WEED CONTROL. WEEDS. CHEMICAL CONTROL.

Water hyacinth (Eichhornia crassipes) is the most gregariously growing aquatic weed of India. An attempt was made to control water hyacinth from a village pond of about one hectare through integration of herbicides and bio-agents. One thousand bioagent weevils of Neochetina spp. were released as initial inoculation in the pond over an area of 3000 m2 for further population build up. Three herbicides namely 2,4-D (1.5 and 2.0 kg/ha), glyphosate (2.0 and 2.5 kg/ha) and paraquat (0.7 and 1.0 kg/ha) were applied in adjoining area after 15 days of bioagent inoculation in an area of 10 x30 m2 in three replicates for each dose. Population samples of water hyacinth and bioagent were taken after spray and release, respectively. On appearing new growth of water hyacinth in treated area, 15% of the total pond was again sprayed with the herbicides after 6 months. 2,4-D (2.0 kg/ha) proved the best herbicide to control water hyacinth(98.20%) followed by glyphosate 2.5 kg/ha (95.85%) and paraquat 1.0kg/ha (93.48%). After initial control, highest regrowth was recordedin paraquat treated replications followed by 2,4-D and glyphosate. Population sampling of bioagants revealed spread and increase in number of the weevil in the entire pond. Bioagents also invadedre-growth rapidly resulted after herbicide spray. Neochetina spp. adult population was found increased in the adjoining area treated with herbicides. After 9 months of biological and chemicalintegration, the first cycle of complete control was achieved. This early collapse of weed within a period of 9 month could be possibledue to integration of herbicide and bioagents which would otherwise have taken minimum 24–36 month by the bioagents alone. After some time, again water hyacienth population increased due to new germination from

buried seeds or from the left stolons of waterhyacinth. This second wave of water hyacinth was again collapsed in 21 months due to integration of one spray of herbicides after one month of regrowth.

0168. Tiwari, R.K.; JNKVV, Rewa (India). College of AgricultureKhan, I.M.; JNKVV, Rewa (India). College of Agriculture. Singh, Nirmala; KVK, Rewa (India) Jha, Amit; JNKVV, Jabalpur (India). College of Agriculture. Chemical weed control in wheat through on form demonstrations in Rewa district of Madhya Pradesh. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.215-216 KEYWORDS: CHEMICAL CONTROL. WEED CONTROL. WEEDS. WHEATS. MADHYA PRADESH.
A field experiment under on farm trials programme of KVK, was conducted in farmers field during rabi 2005–06 and 2006–07 on wheat (Tricitum aestivum L.) crop cv. GW-273 to evaluate the efficiency of two herbicide 2,4-D and isoproturon and their tank mixture. Phalaris minor among the monocot weeds and Lathyrus aphaca among dicot were the major weeds in the demonstration fields, Post emergenceapplication of 2,4-D 0.75 kg/ha + isoproturon 1.0 kg/ha at 25–30 days after sowing (DAS) gave maximum grain yield (3646 kg/ha) followed by the alone application of isoproturon 1.0 kg/ha at 25–30 DAS with gain yield (3222 kg/ha) and 2, 4-D 0.75 kg/ha at 25–30 DAS (2910 kg/ha).The application of 2,4-D + isoproturon increased the grain yield by 35.4% over control and 19% and 26.8% over individual application of 2,4-D and isoproturon, respectively. The application of 2,4-D + isoproturon also resulted higher weed control efficiency (80.4%).

0169. Dewangan, Devendra; IGKV, Raipur (India). Department of Agronomy. Singh, A.P.; IGKV, Raipur (India). Department of Agronomy. Nirala, H.; IGKV, Raipur (India). Department of Agronomy. Verma, M.; IGKV, Raipur (India). Department of Agronomy. Effect of different weed management practices on weed density and weed dry matter production in system of rice intensification (SRI). Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.217-221 KEYWORDS: HERBICIDES. WEED CONTROL. WEEDS. RICE. WEEDING. MECHANICAL METHODS.
The twelve different weed management practices were laid out in randomized block design with three replications. Rice variety & MTU-1010; was grown as a test crop. Rice was transplanted with a spacing of 20 x 20 cm and fertilized with 90, 60 and 40 kg/N, P and K/ha, respectively. At later period of growth,maximum panicle length, number of seeds/panicle, WCE, weed density, dry matter accumulation under post-emergence fb post-emergence application of fenoxaprop-p-ethy (60 g/ha)+ ethoxysulfuron (15 g/ha) favoured significant enhancement in seed yield which was at par with hand weeding. Application of postemergence fb post-emergence application of fenoxaprop-p-ethyl (60 g/ha) + ethoxysulfuron (15 g/ha) gave higher net return (Rs 3,4249.72/ha) and benefit: cost ratio (1.72).

0170. Jeyalakshmi, C.; J.N. College of Agriculture & Research Institute, Karaikal (India). Department of Plant Pathology. Doraisamy, Sabitha; Tamil Nadu Agricultural University, Coimbatore (India). Department of Plant Pathology. Valluvaparidasan, V.; Tamil Nadu Agricultural University, Coimbatore (India). Department of Plant Pathology. Occurrence of soil microbes under Parthenium weed in Tamil Nadu. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.222-223

KEYWORDS: SOIL BIOLOGY. PARTHENIUM. SOILMICROORGANISMS. WEED CONTROL. WEEDS.
A total of 13 microorganisms viz., Aspergillus niger, A. flavus, A. fumigatus, Chaetomium globosum, Corynespora cassicola, Curvularia lunata, Curvularia sp., Eurotium chavelari, Fusarium oxysporum, F. moniliforme, Monilia sp. Rhizopus stolonifer and Trichoderma harzianum was isolated from the Parthenium infested soils of Tamil Nadu with various degree of distribution. Among them, A. niger and R. stolonifer had 100% distribution followed by A. flavus, T. harzianum, C. lunata and F. moniliforme.

0171. Khankhane, P. J.; Directorate of Weed Science Research, Maharajpur (India). Varshney, Jay G.; Directorate of Weed ScienceResearch, Maharajpur (India). Lead and manganese accumulation by weeds at heavy metal contaminated sites in Jabalpur. Indian Journal of WeedScience (India). (Jul-Dec 2011) V. 43(3&4) p.224-225 KEYWORDS: HEAVY METALS. VETIVERIA. ARUNDO. DONAX. LEAD. MANGANESE. WEED CONTROL.
An investigation was carried out to identify the ability oflocally available weeds for metal removal at polluted soils along various roads in Jabalpur and adjoining areas. It was found that among weed species, the highest lead and manganese accumulation ratiowas observed in Vetiveria zizinoides (17.9, 6.38), Arundo donax (12.5, 6.06) Calotropis procera (5.35, 3.03) and S. indicus (2.73, 4.69). Thus, having higher metal extraction ability, weeds such as V. zizinoides and A. donax can be applied for phytoremediation of lead and manganes contaminated sites.

0172. Sharma, Shweta; Anand Agricultural University, Anand (India). B.A. College of Agriculture. Patel, B.D.; Anand Agricultural University, Anand (India). B.A. College of Agriculture. Weed management in okra grown in kharif season under middle Gujarat conditions. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.226-227 KEYWORDS: OKRAS. PENDIMETHALIN. WEED CONTROL. WEEDS. GUJARAT.
In experimental field, weed species Eleusine indica (87/m2) was the most dominant weed, while Digitaria sanguinialis was second in order (84/m2) followed by Dactyloctenium aegyptium, Phyllanthus niruri. Boerhavia repanda, Digera arvensis, Cyperus iria and Cyperus rotundus. Significantly higher number of fruit yield was recorded in pre-emergence application of pendimethalin 1000 g/ha fb hand weeding at 30 DAS which was at par with interculturing + hand weeding carried out at 30 and 60 DAS and post-emergence application of quizalofop-ethyl 75g/ha fb hand weeding at 30 DAS.

0173. Ayyadurai, P.; PJN College of Agriculture and Research Institute, Karikal (India). Department of Agronomy. Poonguzhalan, R.; PJN College of Agriculture and Research Institute, Karikal (India). Department of Agronomy. Critical period of crop-weed competition in zero-till cotton. Indian Journal of Weed Science (India). (Jul-Dec2011) V. 43(3&4) p.228-230 KEYWORDS: COTTON. WEEDS. WEED CONTROL. GOSSYPIUM.
A field study was carried out to determine the critical period of crop weed competition in cotton (Gossypium hirsutum. L.) duringthe summer season (Febuary to July) of 2007. Twelve treatmentsconsisting of weed free and weedy periods at 20,

40, 60, 80 and 100DAS and at harvest along with a weedy and weed free check were arranged in randomized block design with three replications. The predominant weed species in the experimental field were Echinochola colona, Leptochloa chinensis, Cyperus rotundus, Trianthema portulacastrum, Rotala densiflora, Eclipta alba and Phyllanthusmaderaspatensis. Seed cotton yield loss increased in the duration of competition and maximum loss (96.5%) occurred due to full season competition. Seed cotton yield increased significantly with the increase in initial duration of weed free condition upto 80 DAS.Beyond 80 DAS, seed cotton yield was reduced considerably due to lower boll setting percentage. Critical period of weed competition was found to be 20 to 60 days after sowing.

0174. Dhole, J.A.; Yeshwant Mahavidyalaya, Nanded (India). Departmentof Botany. Bodke, S. S.; Yeshwant Mahavidyalaya, Nanded (India). Department of Botany. Dhole, N.A.; Yeshwant Mahavidyalaya, Nanded (India). Department of Botany. Effect of aqueous leaf extract of Parthenium on seed germination and seedling emergence of some cultivated crops. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.231-232 KEYWORDS: PLANT PHYSIOLOGY. PLANT DEVELOPMENTAL STAGES. ALLELOPATHY. WEED CONTROL. WEEDS. GERMINATION. SEEDS. EMERGENCE.
Allelopathic effect of aqueous extract of Parthenium hysterophorus (L). were studied on seed germination and seedling emergence of some cultivated crops like Triticum aesticum (L)., Zeamays (L), Sorghum vulgare Pers., Gossipium hirsutum (L) and Glycine max (L). Seed germination of Z. mays was completely inhibited at 2% leaf extract of P. hysterophous and of T. aesticum. It gradually reduced the seed germination up to concentration of 10% while in Sorghum vulgare, it was inhibited at 6%. At 4% aqueous extract, the maximum inhibition occurred in Glycine max and G. hirsutum. The aqueous extract of Parthenium showed strong inhibitory effect on the growth of root and shoot development of crops except T. aesticum.

0175. Sangeetha, S.P.; Tamil Nadu Agricultural University, Coimbatore (India). Department of Agronomy. Balakrishnan, A.; Tamil Nadu Agricultural University, Coimbatore (India). Department of Agronomy. Priya, R. Sathya; Tamil Nadu Agricultural University, Coimbatore (India). Department of Agronomy. Maheswari, J.; Tamil Nadu Agricultural University, Coimbatore (India). Department of Agronomy. Nutrient depletion by weeds, yield and economics of drum seeded rice influenced by weed management. Indian Journal of Weed Science (India) . (Jul-Dec 2011) V. 43(3&4) p.233-235 KEYWORDS: RICE. GRAIN. YIELDS. WEED CONTROL. WEEDS. ECONOMICS.
Study revealed that drum seeding + green manure method of seedling establishment and pre-emergence application of pretilachlor + safener at the rate of 0.45 kg/ha on 5 days after sowing (DAS) fbhand weeding (HW) at 45 DAS registered lowest weed density, weed biomass, highest weed control efficiency (WCE), zero per cent weed index (WI), lowest depletion of NPK nutrient by weeds and highestgrain yield of crop and B: C ratio.

0176. Singh, Pratibha; G.B. Pant University of Agriculture andTechnology, Pantnagar (India). College of Basic Science and Humanities, Department of Plant Physiology. Guru, S.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Basic Science and Humanities, Department of Plant Physiology. Effect of rice straw incorporation on weed management and crop growth in rice. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.236-238 KEYWORDS: INCORPORATION. VIGNA UMBELLATA. RICESTRAW. WEED CONTROL. WEEDS.
Among the treatments, weedy and butachlor plots had higher population of weeds. Weed population was lower at all the doses of rice straw incorporated with the lowest in 500 g/m2 rice straw treatment. Data on weed dry weight recorded at 60 DAT revealed a significant decrease in all the plots where rice straw was incorporated as compared to weedy and butachlor treated plots. Grain yield was also higher at all the doses of rice straw incorporation while it was lowest (2658 kg/ha) in the weedy treatment (Table 3). Highest grain yield (3,925 kg/ha) was obtained, irrespective of cultivars, in the treatment with the highest rice straw incorporation (500 g/m2). A total of 17 compounds were recorded in the straw. Among these, four compounds could be identified after comparing with phenolic standards. These were gallic acid, phydroxy benzoic acid, ferulic acid and vanillic acid.

0177. Tiwari, R.K.; JNKVV College of Agricultural, Rewa (India). Dwivedi, B.S.; JNKVV College of Agricultural, Rewa (India). Deshmukh, G.; JNKVV College of Agricultural, Rewa (India). Pandey, A.K.; Krishi Vigyan Kendra. Jha, Amit; JNKVV, Jabalpur (India). College of Agriculture. Effect of weed control treatments on growth of little seed cannary grass and productivity of wheat. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.239-240 KEYWORDS: PHALARIS. WEED CONTROL. WEEDS. GRASSES. WHEATS.
The experiment was conducted in the fields of 10 farmers on farm trial' in adopted villages of Krishi Vigyan Kendra (KVK), Rewa. Population and dry matter accumulation of Phalaris minor were significantly reduced with post emergence application of sulfosulfuron (25 g/ha), mesosulfuron+ iodosulfuron (12+2.4 g/ha) and pinoxaden (50 g/ha) when compared with unweeded control during both the years of investigations. Significantly more grain yield was recorded in all herbicidal treatments as compared to unweeded control.

0178. Nandan, Brij; SKUAST-Jammu, Jammu and Kashmir (India). Division of Agronomy. Kumar, Anil; SKUAST-Jammu, Jammu and Kashmir (India). Division of Agronomy. Sharma, B.C.; SKUAST-Jammu, Jammu and Kashmir (India). Division of Agronomy. Sharma, Neetu; SKUAST-Jammu, Jammu and Kashmir (India). Division of Agronomy. Chemical and cultural methods for weed control of mung bean under limited moisture conditions of Kandi belt of Jammu. Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.241-242 KEYWORDS: MUNG BEANS. VIGNA RADIATA RADIATA. WEED CONTROL. WEEDS. CULTURAL METHODS.CHEMICAL CONTROL.
An experiment was conducted during kharif season of 2006 and2007 in Jammu to study the efficacy of pre and post emergence herbicides for controlling weeds of mung bean under limited moisture conditions of Kandi belt of Jammu. Hand weeding twice at 20 and 40DAS produced the highest average seed yield (697.8kg/ha) which

was at par with metolachlor (PE, 0.75kg/ha fb one hand weeding at 20 DAS) (691.6kg/ha). Among the other herbicidal treatments, pendimethalin (PE 1.0 kg/ha fb 1HW at 30 DAS) was superior in controlling weeds and increasing the seed yield.

0179. Deshmukh, Ghanshyam; JNKVV, Shahdol (India). KVK. Tiwari, R.K.; College of Agriculture, Rewa (India). Impact of weeders for weed management in system of rice intensification (SRI). Indian Journal of Weed Science (India). (Jul-Dec 2011) V. 43(3&4) p.243-244 KEYWORDS: WEED CONTROL EQUIPMENT. WEEDS. WEED CONTROL. VIGNA UMBELLATA. TRANSPLANTING.
The study was undertaken in Shahdol District of Madhya Pradesh to determine the impact of different types of weeder in SRI. Twenty SRI trained farmers, were selected for practicing SRI trained before Jawahar paddy plant marker for line marking at equi-distance among plant to plant and row to row in the grids of 25 x 25 cms and cono weeder, rotary weeder and twin wheel hoe for weeding. It was observed that average productivity was 555 kg/ha as compared to farmers practice 275 kg/ha. Cono weeder and rotary weeder were found suitable for weeding in wet condition and twin wheel hoe in dry condition of SRI fields.

0180. Singh, V. Pratap; G.B. Pant University of Agriculture &Technology, Pantnagar (India). Guru, S.K.; G.B. Pant University ofAgriculture & Technology, Pantnagar (India). Kumar, A.; G.B. PantUniversity of Agriculture & Technology, Pantnagar (India). Banga, Akshita; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Tripathi, Neeta; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Bioefficacy of tembotrione against mixed weed complex in maize. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.1-5 KEYWORDS: WEED CONTROL. WEEDS. HERBICIDES. MAIZE. ZEA MAYS. FLORA. YIELDS.
A field experiment was conducted at the Norman E. Borlaug CropResearch Center, Pantnagar, during the rainy seasons of 2009 and 2010to evaluate the efficacy of tembotrione (42% SC), a new post- emergence herbicide against mixed flora in maize as well as its residual effect on growth and yield of the succeeding mustard crop.The experimental field was highly infested with Echinochloa colona, Digitaria sanguinalis and Cyperus rotundus. Post emergence application of tembotrione 120 g/ha along with surfactant was found most effective to control the grassy as well as non-grassy weeds ascompared to other herbicidal treatments either applied as pre or post emergence. This treatment also recorded highest grain yield during both the years which was at par with a lower dose (110 g/ha + surfactant) or even pre emergence application of the herbicide. Addition of surfactant (1000 ml/ha) increased the kernel yield significantly and reduced the density of weeds effectively as compared to the application of tembotrione without surfactant. No residual effects were observed on the growth and yield of succeeding mustard crop.

0181. Mishra, J.S.; Directorate of Weed Science Research, Jabalpur (India). Management of dodder in lucerne and Egyptian clover. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.6-10 KEYWORDS: WEED CONTROL. WEEDS. TRIFOLIUM ALEXANDRINUM. CUSCUTA. HERBICIDES. LUCERNE. PENDIMETHALIN.
Field dodder (Cuscuta campestris), the most damaging annual obligate stem parasite is a serious problem in forage legumes Lucerne (Medicago sativa L.) and Egyptian

clover (Trifolium alexandrinum L.). Studies were conducted to investigate the interference of C. campestris densities in lucerne and the efficacy of herbicides for its control in lucerne and Egyptian clover. Even at Cuscuta densityof 0.25 plants/m2 (1 plant/4m2) caused detrimental effect on lucerneseed yield (85.5–95.3% loss). A high dose of pendimethalin (1000 g/ha) applied pre-emergence reduced Cuscuta emergence but wasphytotoxic to lucerne as compared to lower doses and application at14 days after sowing (DAS). Application of imazethapyr 100 g/ha andpendimethalin 750 g/ha at 14 DAS significantly improved green fodderyield of lucerne but failed to control Cuscuta infestation at reproductive stage resulting in poor seed yield. Method of seeding did not influence the population and green fodder yield of Egyptianclover and Cuscuta emergence. Post- emergence (at 14 DAS) applicationof pendimethalin 500–750 g/ha effectively controlled Cuscutacampestris in Egyptian clover and produced the maximum green fodderand seed yields.

0182. Kumar, Suresh; CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur (India). Forages and Grassland Management, Department of Agronomy. Rana, S.S.; CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur (India). Forages and Grassland Management, Department of Agronomy. Chander, Navell; CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur (India). Forages and Grassland Management, Department of Agronomy. Angiras, N.N.; CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur (India). Forages and Grassland Management, Department of Agronomy. Management of hardy weeds in maize under mid-hill conditions of Himachal Pradesh. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.11-17 KEYWORDS: WEED CONTROL. WEEDS. ATRAZINE. HERBICIDES. MAIZE. ZEA MAYS. PENDIMETHALIN.

Twelve treatments involving tank-mix combinations of atrazine and pendimethalin as pre-emergence followed by (fb) post emergenceapplication of 2,4-D and metsulfuron methyl along with hand weeding twice (20 and 40 DAS) and untreated check were tested in maize during 2009 and 2010 at Palampur. Echinochloa colona, Panicum dichotomiflorum, Cyperus iria, Commelina benghalensis, Ageratum conyzoides, Digitaria sanguinalis and Polygonum alatum were the dominant weeds. Pendimethalin 1.50 kg/ha, atrazine fb atrazine 0.75 kg/ha, atrazine 0.75/1.0 + pendimethalin 0.75/0.50 fb metsulfuron methyl 4 g/ha effectively controlled Echinochloa colona. Atrazine fb atrazine brought about significant reduction in the count of Panicum dichotomiflorum up to 60 DAS. Pendimethalin fb atrazine, atrazine 1.0 + pendimethalin 0.50 fb 2, 4-D 0.75 kg/ha and hand weeding twice effectively reduced the population of Commelina up to 60 DAS. Pendimethalin/atrazine fb atrazine and atrazine + pendimethalin fb 2,4-D/metsulfuron-methyl controlled Ageratum conyzoides up to 60 DAS. Pendimethalin/atrazine fb atrazine, atrazine + pendimethalin fb metsulfuron-methyl/2, 4-D and pendimethalin significantly reduced total weed dry weight. Atrazine 1.0 + pendimethalin 0.50 kg/ha (post) and atrazine 0.75 + pendimethalin 0.75 kg/ha fb 2, 4-D gave significantly higher grain yield and net returns. Weeds reduced maize grain yield by 50.3%.

0183. Kunti; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Horticulture. Sharma, Gaurav; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Horticulture. Singh, A.P.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Agronomy. Weed management practices on growth and yield of winter season brinjal under Chhattisgarh plain conditions. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.18-20KEYWORDS: WEED CONTROL. WEEDS. ECONOMICS. WEEDING. HERBICIDES. SOLANUM MELONGENA. SOLANUM. AUBERGINES. YIELDS.

The present investigation was conducted to evaluate the effect of weed management practices on weeds as well as crop growth and yield parameters of brinjal along with the economics of weedmanagement during winter season of 2009–10 at the Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Raipur. It was observed that the weed Parthenium hysterophorus dominated theexperimental field. All the weed management treatments significantly reduced the dry matter of weeds and increased fruit yield of the crop significantly over unweeded check. Among the treatments, pendimethalin (Extra) (0.64 kg/ha) pre-transplanting + one hand weeding at 40 DAT + pendimethalin (Extra) (0.64 kg/ha) at 45 DAT as postemergence resulted in better performance followed bypendimethalin (1.0 kg/ha) pre-transplanting + one hand weeding at 45 DAT with respect to growth and yield parameters due to effective weed management in brinjal. Maximum benefit: cost ratio was also obtainedwith pendimethalin (extra) (0.64 kg/ha) pretransplanting + one hand weeding at 40 DAT + pendimethalin (Extra) (0.64 kg/ha) at 45 DAT.

0184. Soni, Monika; Jawaharlal Nehru Krishi Vishwavidhyalay, Jabalpur (India). Department of Agronomy. Upadhyay, V.B.; Jawaharlal Nehru Krishi Vishwavidhyalay, Jabalpur (India). Department of Agronomy. Singh, Poonam; Jawaharlal Nehru Krishi Vishwavidhyalay, Jabalpur (India). Department of Agronomy. Weed dynamics and production efficiency of rice-based cropping system. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.21-25 KEYWORDS: WEED CONTROL. WEEDS. DIVERSIFICATION. INTENSIFICATION. RICE. CROPPING SYSTEMS.

Field experiments were conducted during 2007–08 and 2008–09 to study weed dynamics and production efficiency under diversified and intensified rice based cropping systems in Kymore Plateau and Satpura Hills Zone of Madhya Pradesh. Among the all 12 rice based cropping systems under Kharif, in rice Echinochloa crusgalli was the most dominating weed contributing 32.8% of total weed intensity at most critical period (25 DAT) while Monochoria vaginalis at harvest stage (18.8%). During Rabi, relative density of weeds varied between different crops. In early (30.2 to 43.3%) and at harvest stage (10.1 to 46.8%) Medicago denticulata was found to be more serious weed almost in all Rabi crops grown under different cropping systems but in onion and garlic Portulaca oleracea having higher intensity at harvest stage (45.2%). The Portulaca spp. predominantly infested to all summer crops at early (41.5 to 54.6%) and harvest stage (37.2 to 44.1%). In rice varieties the weed intensity and biomass ranged from 229.0 to 254.2/m2 and 1.0 to 1.15 t/ha under different crop systems respectively. During Rabi, weed intensity was higher in vegetable pea (207.3/m2) and weed biomass was higher berseem (0.71 t/ha). During summer season, the weed intensity was maximum (156.4/m2) in okra which resulted into the

highest weed biomass production (0.67 t/ha). Both rice and wheat crops grown under rice–wheat system require largequantity of irrigation water which is favourable to build up a typical weed infestation problem. All diversified and intensified cropping systems significantly led to record higher production efficiency (83.13kg/ha/day to 57.05kg/ha/day) beneficial to minimize the serious challenges posed by the weeds as compared to both existing cropping systems viz., rice-wheat (45.63kg/ha/day) and rice-chickpea (39.49kg/ha/day).

0185. Dwivedi, Sanjay K.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Agronomy. Shrivastava, G.K.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Agronomy. Singh, A.P.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Agronomy. Lakpale, R.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Department of Agronomy. Weeds andcrop productivity of maize + blackgram intercropping system in Chhattisgarh plains. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.26-29 KEYWORDS: WEED CONTROL. WEEDS. INTERCROPPING. MAIZE. URD. CROP MANAGEMENT. CROPPING SYSTEMS.

Field experiments were conducted to study the effect on weedsand crop yield under maize + blackgram intercropping system at Raipur during 2004 and 2005. Treatments consisted of five planting geometryviz., sole maize, sole blackgram, maize + blackgram (1:1), maize + blackgram (2:1) and maize + blackgram (2:2) and four weed management practices viz., weedy check, hand weeding (HW) at 30 DAS, alachlor 2.0 kg/ha as pre-emergence and alachlor 1.5 kg/ha as pre-emergence + HW at 40 DAS. Grain yield, productivity rating index (PRI), production efficiency (PE) and weed-control efficiency (WCE) were the highest under maize + blackgram (2:1) for maize. However, weed smothering efficiency of maize was highest under maize + blackgram (1:1). At harvest of blackgram (75 DAS) and maize (105 DAS), the dry weight of weeds were the lowest with alachlor 1.5 kg/ha + HW at 40 DAS. This treatment produced maximum grain yield, PRI and PE of maize and blackgram.

0186. Walia, U.S.; Punjab Agricultural Univerisity, Ludhiana (India). Department of Agronomy. Walia, S.S.; Punjab Agricultural Univerisity, Ludhiana (India). Department of Agronomy. Sidhu, Amandeep Singh; Punjab Agricultural Univerisity, Ludhiana (India). Department of Agronomy Nayyar, Shelly; Punjab Agricultural Univerisity, Ludhiana (India). Department of Agronomy. Bioefficacy of pre-and post-emergence herbicides in direct-seeded rice in Central Punjab. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.30-33 KEYWORDS: WEED CONTROL. WEEDS. DIRECT SOWING. RICE. HERBICIDES. SOWING. YIELDS.

Field experiments were conducted during Kharif season of 2007 and 2008 at Punjab Agricultural University, Ludhiana to evolvesuitable combination of pre and post-emergence herbicides foreffective weed management in direct-seeded rice under unpuddled conditions. Results indicated that during 2007, integration of post-emergence application (30 Days after sowing) of bispyribac (25 and 30 g/ha) or azimsulfuron (20 g/ha) with pre-emergence application of pendimethalin 0.75 kg/ha, pretilachlor 0.5 kg/ha and thiobencarb1.25 kg/ha provided effective control of weeds and produced significantly higher grain yields than unweeded (control) treatment. During 2008 also, integration of pre-emergence application

ofpendimethalin 0.75 kg/ha or oxadiargyl 0.90 g/ha with post-emergence application of bispyribac 25 kg/ha, azimsulfuron 20 g/ha and 2,4-D 0.5 kg/ha resulted in significant reduction in dry matter of weedsand increased grain yield as compared to alone application of pendimethalin 0.75 kg/ha. Pre-emergence application of flufenacet 80g/ha and early post-emergence application of penoxsulam 30 and 35/g ha were found ineffective for controlling weeds.

0187. Anitha, S.; Kerala Agricultural University, Mannuthy (India). Agricultural Research Station. Mathew, Jose; KAU, Madakkathara (India). Cashew Research Station. Abraham, C.T.; Kerala Agricultural University, Vellanikkara (India). College of Horticulture. Concurrent growing of green manure with wet-seeded rice for cost-effective weed management. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.34-37 KEYWORDS: WEED CONTROL. WEEDS. 2,4-D. METSULFURON. RICE. CROP MANAGEMENT. CROPPING SYSTEMS.

Field experiments were conducted during 2004–06 at Agricultural Research Station, Mannuthy, Thrissur, Kerala to find out the effect of concurrent growing of dhaincha (Sesbania aculeata) and its methods of incorporation on weed management in wet seeded rice. Sowing of rice and dhaincha was done in alternate rows using the rice-cum-greenmanure seeder. Treatments consisted of incorporation of dhaincha at 20 and 30 days after sowing (DAS) by using cono weeder, spraying 2,4-D 1.0 kg/ha, and metsulfuronmethyl 5.0 g/ha. Two levels of N (100 and 75% of recommended dose of 90 kg N/ha) were superimposed. Rice alone with 5 t/ha FYM and recommended dose of 90-45-45 kg N-P-K/ha was taken as control. Concurrent growing of dhaincha and itsincorporation at 30 DAS resulted in a weed suppression of 70% with an yield enhancement to the tune of 0.840 t/ha and increasedprofitability of 12520/ha).Application of 2,4–D resulted in maximum reduction of weeds without any adverse effect on rice. Nitrogen at different levels had no significant influence of weed incidence.

0188. Sharma, B.C.; SKUAST-J, Jammu (India), Division of Agronomy. Kumar, Anil; SKUAST-J, Jammu (India), Division of Agronomy. Gupta,S.K.; SKUAST- J, Jammu (India), Division of Agroforestry. Management strategies for rehabilitation of Lantana infested forest pastures in Shivalik foothills of Jammu & Kashmir. Indian Journal of Weed Science (India). (Jan-Mar 2012) v.44(1) p.38-42 KEYWORDS: WEED CONTROL. WEEDS.CONOMICS. FOREST REHABILITATION. GLYPHOSATE. LANTANA CAMARA. MANUAL OPERATION. PERENNIALS.

A study on rejuvenation of wild sage (Lantana camara L.) infested forest pastures in Shivalik foot-hills of Jammu & Kashmir was conducted from April 2006 to December 2008. The study included manual cuttings of Lantana bushes; manual cuttings followed by application of 1% glyphosate on its regenerated growth of 30 cm in height; and manual grubbings. These were followed by either no plantation of grasses, planting either of hybrid napier and Setaria cuttings. Results of the study revealed that the fresh bio-mass ofLantana bushes recorded a sizeable reduction ranging from 66 to 99%under different treatments over its initial average fresh bio-mass value of 28 kg/25 m2. Likewise, a significant reduction in the number of Lantana bushes per unit area to the extent of 67–99% over itsinitial average value of 6 bushes/25 m2 was also recorded withgrubbing and the herbicide applied

treatments. Application of glyphosate 30 cmregenerated growth of Lantana bushes and grubbingtreatments followed by planting either of hybrid napier and Setaria were found equally effective in rehabilitation of Lantana infested forest pastures as both of these grasses provided good soil cover and recorded higher forage yields under these treatments i.e. hybridnapier 1.81 to 2.07 t/ha and Setaria 0.98 to1.02 t/ha. These two treatments were also found significantly superior to the repeatedLantana cutting treatments and decreased fresh Lantana bio-mass by94.20 to 99.03% over its initial bio-mass value.However, betweenthese two most effective treatments i.e. the management of Lantana bushes with the application of glyphosate followed by planting ofeither hybrid napier and Setaria grasses were found economically superior, with a net saving of rupees 6,640/ha, over the grubbings of Lantana followed by planting either of these grasses.

0189. Babu, M.B.B. Prasad; Directorate of Weed Science Research, Jabalpur (India). Impact of varying densities of jungle rice on rice productivity. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.43-45 KEYWORDS: WEED CONTROL. WEEDS. CROPS. PLANT COMPETITION. ECHINOCHLOA COLONA. RICE. ORYZA.
In order to assess the impact of varying densities of jungle rice (Echinochloa colona) on rice, a field experiment was conductedat Directorate of Weed Science Research, Jabalpur farm in Kharif 2005 and 2006. With increasing population density of E. colona from 50 to400 plants/m2, there was a significant reduction in LAI, biomassproduction as well as grain yield of rice due to competition fromweed plants for growth factors like light, nutrients and space etc.The reduction in dry matter was to the tune of 32% with a E. colona density of 400 plants/m2 as compared to pure rice crop. Though thechlorophyll content of rice decreased with increasing density of E.colona but it maintained a higher chlorophyll content than E. colona.The increasing densities of E. colona significantly decreased various yield attributes of rice with the effect being more drastic oneffective tillers/m2. The reduction in grain yield varied from 48 to86% as the density of E. colona increased from 50 to 400 plants/m2.

0190. Revathi, P.; Acharya N.G. Ranga Agricultural University, Rajendranagar (India). College of Agriculture, Department of Agronomy. Devi, K.B. Suneetha; Acharya N.G. Ranga Agricultural University, Rajendranagar (India). College of Agriculture, Department of Agronomy. Madhavi, M.; Acharya N.G. Ranga Agricultural University, Rajendranagar (India). College of Agriculture, Department of Agronomy. Effect of integrated weed management practices on weed dynamics andweed control efficiency in lucerne. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.46-49 KEYWORDS: WEED CONTROL. WEEDS. CUSCUTA. PENDIMETHALIN. LUCERNE.
A field experiment was conducted to study the effect of integrated weed management practices on forage quality in Lucerne (Medicago sativa L.) during 2008–09. The treatments consisted of salt (10%) treatment to seeds of lucerne + hand weeding at 30 DAS and after each cut, salt (10%) treatment to seeds + imazethapyr 75 g/haat 12 DAS, salt (10%) treatment to seeds + pendimethalin 0.5 kg/ha at12 DAS, stale seed bed + hand weeding at 30 DAS, pendimethalin 0.5 kg and 0.75 kg/ha as PE, imazethapyr 75 g and 100 g/ha at 12 DAS, pureseed of lucerne + hand weeding at 30 DAS and after each cut, hand weeding at 30 DAS and after each

cut (farmers practice), weedy check and weed free check. experiment was laid in RBD with threereplications. The results indicated that the density and dry weight of weeds (excluding cuscuta) were significantly lower with weed free check. Higher weed control efficiency and green fodder yield oflucerne at each cut and total was significantly higher with application of imazethapyr 75 g/ha at 12 DAS and was at par withselection of pure seed + hand weeding at 30 DAS and after each cut.Cuscuta control efficiency was maximum with application ofpendimethalin and imazethapyr and their combination with salt treatment (10%) to seed and selection of pure seed of lucerne +hand weeding at 30 DAS and after each cut.

0191. Ramachandra, C.; UAS, Mandya (India). ZARS, VC Farm. Shivakumar, N.; UAS, Mandya (India). ZARS, VC Farm. Rajanna, M.P.; UAS, Mandya (India). ZARS, VC Farm. Kalyanamurthy, K.N.; UAS, Mandya (India). ZARS, VC Farm. Effect of age of seedlings and weed management under SRI on yield of rice. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.50-52 KEYWORDS: WEED CONTROL. WEEDS. SEEDLINGS. WEEDING. YIELDS.
Planting of 10 or 15 days old seedlings did not differedsignificantly on grain yield of rice. Among weed management practices SRI method of planting with four times cono-weeding at 10 days interval starting from 10 days after transplanting recorded significantly higher grain yield (6003 kg/ha) and was found effective in weed control. However, pre-emergence application of butachlor + one hand weeding at 20 DAT was equally effective alternative weed control in SRI method of cultivation.

0192. Babu, M.B.B. Prasad; Directorate of Weed Science Research, Jabalpur (India). Jain, VIkas; Directorate of Weed Science Research, Jabalpur (India). Effects of nitrogen on competition between wheat and grassy weeds. Indian Journal of Weed Science (India). (Jan-Mar2012) v. 44(1) p.53-57 KEYWORDS: WEED CONTROL. WEEDS. AVENASTERILIS. WHEATS. FERTILIZERS.
Field experiments were conducted in microplots to study theeffect of N supply on competition between wheat and two prominentgrassy weeds viz., Phalaris minor and Avena ludoviciana. Six treatments comprising three species combinations (wheat monoculture, weed monoculture, wheat and weed mixture in equal proportions) andtwo levels of N fertilization (20 and 120 kg/ha) were studied in afactorial randomized block design with four replications. Resultsrevealed that total dry weight of wheat was significantly lower inmixture than in monoculture. Wheat was more competitive than P. minorat high N, but less competitive at low N. A. ludoviciana, was morecompetitive than crop at both N levels. Wheat reduced photosynthesisof weeds to a greater extent as compared to pure weed population. A.ludoviciana exhibited higher values of Pn as compared to P. minor atboth N levels in both stand (monoculture and mixture) types. Leafarea index and leaf chlorophyll content of both wheat and weed wereat par in mixture at high N and in monoculture at low N, indicating ahigher competitiveness (for nitrogen) of A. ludoviciana.

0193. Prameela, P.; Kerala Agricultural University, Vellanikkara (India). College of Horticulture. Menon, Meera V.; Kerala Agricultural University, Vellanikkara (India). College of Horticulture. John, P.S.; Kerala Agricultural University, Vellanikkara (India). College of Horticulture. Abraham, C.T.; Kerala Agricultural University, Vellanikkara

(India). College of Horticulture. Evaluation of pre-emergence herbicides for cost-effective weed control in tapioca. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.58-59 KEYWORDS: WEED CONTROL. WEEDS. CHEMICAL CONTROL. HERBICIDES. TAPIOCA.

0194. Arora, Asha; College of Agriculture, Gwalior (India). R.V.S.K.V.V. Leaching behaviour of pendimethelin in sandy-clay loam soil of northern Madhya Pradesh. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.60-61 KEYWORDS: WEED CONTROL. WEEDS.BIOASSAYS. LEACHING. PENDIMETHALIN. POLYVINYL CHLORIDE.

0195. Singh, Mayank; VBS Purvanchal University, Jaunpur (India). T.D.P.G. College, Department of Botany. Singh, O.P.; VBS Purvanchal University, Jaunpur (India). T.D.P.G. College, Department of Botany. Singh, M.P.; VBS Purvanchal University, Jaunpur (India). T.D.P.G.College, Department of Botany. Floristic composition of weeds inmixed winter crop on Gujar lake's margins in Uttar Pradesh. IndianJournal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.62-64KEYWORDS: WEED CONTROL. WEEDS. CROPS. PLANT ECOLOGY. FLORA.

0196. Pradhan, Adikant; S.G. College of Agriculture & ResearchStation, Jagdalpur (India) Rajput, A.S.; S.G. College of Agriculture & Research Station, Jagdalpur (India). Thakur, A.; S.G. College of Agriculture & Research Station, Jagdalpur (India). Predominant weed flora of cropped and non-cropped fields of Bastar in Chhattisgarh. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1)p.65-67 KEYWORDS: WEED CONTROL. WEEDS. FLORA.

0197. Mishra, J.S.; Directorate of Sorghum Research, Rajendranagar (India). Rao, S.S.; Directorate of Sorghum Research, Rajendranagar (India). Dixit, Anil; Directorate of Sorghum Research, Rajendranagar (India). Evaluation of new herbicides for weed control and cropsafety in rainy season sorghum. Indian Journal of Weed Science (India). (Jan-Mar 2012) v. 44(1) p.71-72 KEYWORDS: WEED CONTROL.WEEDS. CHEMICAL CONTROL. HERBICIDES. SORGHUM.

0198. Murthy, K.V. Ramana; S.V. Agricultural College, Tirupati (India). Department of Agronomy. Reddy, D.S.; S.V. AgriculturalCollege, Tirupati (India). Department of Agronomy. Reddy, G.Prabhakara; S.V. Agricultural College, Tirupati (India). Departmentof Agronomy. Integrated weed management practices for rice underaerobic culture. Indian Journal of Weed Science (India). (Apr-Jun2012) v. 44(2) p.70-76 KEYWORDS: WEED CONTROL. WEEDS. RICE. BENSULFURON. CHEMICAL CONTROL. AEROBIOSIS.

A field experiment was conducted to study the effect of irrigation and weed management practices of rice under aerobicculture, laid in split plot design. Among the irrigation schedules, IW/CPE ratio of 1.2 produced significantly higher stature of yieldattributes, viz., total number of panicles/m2, total number ofgrains/panicle and number of filled grains/panicle and grain and straw yield were distinctly superior to other two irrigationschedules. At all the stages, with exception at 20 DAS, the lowest of density of weeds and their corresponding dry weight was recorded with hand weeding at 20 and 40 DAS, which were comparable with oxadiargyl0.07 kg/ha

supplemented with HW at 40 DAS for density of grasses, triasulfuron 0.006 kg/ha supplemented with HW at 40 DAS for density of broad leaved weeds and bensulfuron methyl 0.06 kg/ha supplementedwith HW at 40 DAS for density of sedges. The highest density of these entire weed categories was recorded with unweeded check. The studyrevealed that rice can be successfully grown under aerobic culture in north coastal zone of Andhra Pradesh, with pre-emergence applicationof oxadiargyl 0.07 kg/ha supplemented with HW at 40 DAS for higher productivity.

0199. Shweta, B.; University of Agricultural Sciences, Bangalore (India). GKVK, Department of Crop physiology. Manjunatha, S.B.; University of Agricultural Sciences, Bangalore (India). GKVK, Department of Crop physiology. Devendra, R.; University of Agricultural Sciences, Bangalore (India). GKVK, Department of Soil Science and Agriculture Chemistry. Channabasavegowda, R.; University of Agricultural Sciences, Bangalore (India). GKVK, Department of SoilScience and Agriculture Chemistry. Effect of density and dose ofherbicide on entry, translocation and root exudates in water hyacinth. Indian Journal of Weed Science (India). (Apr-Jun 2012) v. 44(2)p.77-80 KEYWORDS: WEED CONTROL. WEEDS. AQUATIC WEEDS. CHEMICALCONTROL. DOSAGE. EICHHORNIA CRASSIPES. HERBICIDES.
Spraying of foliar herbicide to control water hyacinth may leadto mortality of the fish by root exudation of herbicide or accidentaldrift of herbicide. To overcome herbicide-divalent cations complexformation in hard water at improper pH, increasing herbicide dosageper drop, either by increase of dosage or by reduce the spray volume, was one of the techniques. Using radioactive 14C-glyphosate and 14C-2,4-D, effect of dosage on herbicide retained on the cuticle as dried out residue, distribution with in plant system and moved out as root exudates was assessed. Twice the recommended concentration (2x) of herbicide per drop and drop density per fed spot significantlyincreased the dried residue on the cuticle 67 to 91 and 68 to 79%over total activity recovered compared to x dose for glyphosate and2,4-D, respectively. 2,4-D (2x) significantly increased the amount ofherbicide cuticle loading and mobility within cuticle but differences in translocation to different parts was not significant except in root (2x had lower activity than x). Similarly, significant difference between 2x and x for glyphosate was observed for cuticle loading and root exudates. At 2x dosage, root exudates of both herbicides were more after 8 days. Half-life in pond water was around 5 days for both herbicides compared to normal water 7 and 11days ofglyphosate and 2,4-D respectively. The chances of hherbicide toxicity to fishes were unlikely by foliar applied herbicides.

0200. Singh, Rohitashav; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Shyam, Radhey; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Singh, V.K.; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Kumar, Jitendra; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Yadav, Sompal Singh; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Rathi, S.K.; G.B. Pant University of Agriculture & Technology, Pantnagar (India). Department of Agronomy. Evaluation of bioefficacy of clodinafop-propargyl +

metsulfuron-methyl against weeds in wheat. Indian Journal of WeedScience (India). (Apr- Jun 2012) v. 44(2) p.81-83 KEYWORDS: WEED CONTROL. WEEDS. METSULFURON. WHEATS. TRITICUM.
A field experiment was conducted at Pantnagar during winter season 2005–06 and 2006–07 to study effect of rates of herbicide mixture clodinafop-propargyl 15% + metsulfuron-methyl 1% (UPH-206) for control of mixed weed flora in wheat (Triticum aestivum L.).Grassy weeds such as Phalaris minor, Avena fatua and broad-leavedweeds, viz., Chenopodium album, Melilotus spp., Medicago denticulata,Vicia sativa, Rumex spp., Anagallis arvensis, Coronopus didymus, Lathyrus aphaca and Polygonum plebejum were effectively controlled byapplication of UPH- 206 500 g product/ha. The highest grain yield (4.17 t/ha) of wheat was also obtained with the post-emergence application of UPH-206 500 g product/ha being at par with UPH-206 400g product/ha, and hand weeding at 35 and 55 DAS, but significantlyhigher than sulfosulfuron, clodinafop and isoproturon at recommendedrates. No residual effect of UPH 206 at any of doses tested was obtained on succeeding crops of blackgram and maize.

0201. Rao, P.C.; ANGRU, Rajendranagar (India). College of Agriculture. Lakshmi, Ch. S. Rama; ANGRU, Rajendranagar (India). College of Agriculture. Madhavi, M.; ANGRU, Rajendranagar (India). College ofAgriculture. Swapna, G.; ANGRU, Rajendranagar (India). College of Agriculture. Sireesha, A.; ANGRU, Rajendranagar (India). College of Agriculture. Butachlor dissipation in rice grown soil and its residues in grain. Indian Journal of Weed Science (India). (Apr-Jun 2012) v. 44(2) p.84-87 KEYWORDS: WEED CONTROL. WEEDS. RESIDUES. RICE. SEASONS.
A field experiment was conducted in an Alfisol to study the degradation of butachlor and its residues in paddy grain during Rabi and Kharif seasons of 2007–08 at College Farm, College of Agriculture, and Rajendranagar. Butachlor dissipated with half life varying from 12.5 to 21.5 days when applied at the rate of 1.0 and2.0 kg/ha under with and without organic manures conditions. The observed half life values were lower for lower dose of appliedherbicide as compared to higher dose and the field half life of butachlor was more under without organic manures as compared to organic manures applied plots. Residues of butachlor in field soil were analysed by using gas chromatograph and 100% dissipation ofbutachlor was observed at the time of harvest of crop. Very lowlevels of residues were detected in rice grain below the maximumresidue limit of 0.5 mg/kg. Therefore, application of butachlor in paddy for weed management can be considered safe from the point of consumption of grain.

0202. Kalhapure, A.H.; Mahatma Phule Krishi Vidyapeeth, Rahuri (India). Department of Agronomy. Shete, B.T.; Mahatma Phule Krishi Vidyapeeth, Rahuri (India). Department of Agronomy. Integrated weed management in onion. Indian Journal of Weed Science (India). (Apr-Jun 2012) v. 44(2) p.88-91 KEYWORDS: WEED CONTROL. WEEDS. OXYFLUORFEN. PENDIMETHALIN. SOYBEANS. ONIONS.
A field experiment was carried out for two consecutive yearsduring Kharif seasons of 2010 and 2011 to find out practically convenient and economically feasible weed management practice in onion at breeder seed production farm in Mahatma Phule Krishi Vidyapeeth, Rahuri. Different combinations of hand weeding withapplication of Pendimethalin 1.0 kg/ha (pre-planting) and oxyfluorfen 0.250 kg/ha (post-

emergence) were used in onion variety Baswant-780'. Weed free check treatment (three hand weeding at 20, 40 and 60 DAS) recorded significantly lowest weed density, dry weight of weed and higher weed control efficiency. Allthe growth attributes of onion viz., plant height, neck thickness, and bulb weight and bulb diameter were recorded maximum in weed free. This treatment also recorded highest bulb yield and gross monetary return per hectare, however maximum B:C ratio was observed in treatment pendimethalin 1.0 kg/ha (PP)+ Oxyfluorfen 0.250 kg/ha (POE)+ One hand wedding at 40 DAS.

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0203. Singh, Gajendra; Doon Univ., Dehradun, Uttrakhand (India). Agricultural mechanisation development in India. Indian Journal of Agricultural Economics (India). (Jan-Mar 2015) v.70(1) p.64-82 KEYWORDS: AGRICULTURE. MECHANIZATION. DEVELOPMENT PLANS. FARM EQUIPMENT.

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