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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

A01 Agriculture - General aspects

204. Unnikrishnan Nair, G.S.; Kerala State Biodiversity Board (India). Our great green umbrellas. Indian Coconut Journal (India). (May 2013) v.LVI(1) p.35-37 KEYWORDS: CARBON. GREENHOUSE EFFECT.

A50 Agricultural research

205. Muralidharan, K.; Coconut Development Board, Kochi (India). Reshmi, D.S; Coconut Development Board, Kochi (India). Harnessing the Green fuel: Prospects for Coconut Oil as Bio-diesel. Indian Coconut Journal (India). (Mar 2013) v.LV(11) p.10-13 KEYWORDS: COCONUT OIL. BIOFUELS.

206. Sree Kumar Poduval; Coconut Development Board, Vazhakulam (India). Technology for conversion of diesel engine to run on cocodiesel. Indian Coconut Journal (India). (Mar 2013) v.LV(11) p.19-22 KEYWORDS: COCONUT OIL. BIOFUELS.

207. Deepthi Nair, S; Coconut Development Board, Kochi (India). Coconut oil as bio fuel - Getting equipped to meet the demand. Indian Coconut Journal (India). (Mar 2013) v.LV(11) p.23-24 KEYWORDS: COCONUT OIL. BIOFUELS.

208. Vijayan, R.; Coconut Development Board, Kochi (India). Coconut oil as a substitute for diesel. Indian Coconut Journal (India). (Mar 2013) v.LV(11) p.27-28 KEYWORDS: COCONUT OIL. BIOFUELS.

209. Sasi Kumar, C.; Coconut Development Board, Kochi (India). Power generation from coconut oil in Tamil Nadu. Indian Coconut Journal(India). (Mar 2013) v.LV(11) p.29-30 KEYWORDS: COCONUT OIL. BIOFUELS.

210. Jayaprakash Naik, B.; Kerala Agricultural University (India) Suresh, P.R; College of Agriculture, Padnekkad (India) Meera Manjusha;Kerala Agricultural University, Pilicode(India). RARS Balachandran, P.V; Kerala Agricultural University, Mannuthy (India) Madhusubramonian; Kerala Agricultural University, Thrissur(India), College of Horticulture Balakrishnan, P.C.; Kerala Agricultural University (India). 'Keraamritham'- a health drink from coconut inflorescence sap. Indian Coconut Journal (India). (May 2013) v.LVI(1) p.9-10 KEYWORDS: COCONUTS. PRODUCTS.

211. Hali, R.. Bio Beverage - Coco Neera. Indian Coconut Journal (India). (May 2013) v.LVI(1) p.17-19 KEYWORDS: COCONUTS. PRODUCTION.

212. Anitha karun; Central Plantation Crops Research Institute, Kasaragod (India) Rajesh, M. K.; Central Plantation Crops Research Institute, Kasaragod (India). Production of coconut planting material through plumule culture. Indian Coconut Journal (India). (June 2013) v.LVI(2) p.22-25 KEYWORDS: COCONUTS. EXPLANTS.

213. Sasikumar, C.; Coconut Development Board, Kochi (India). Realising higher returns though hybridization. Indian Coconut Journal (India). (June 2013) v.LVI(2) p.31-32 KEYWORDS: HYBRIDIZATION. SEEDLINGS.

214. Leena, S.; Central Plantation Crops Research Institute, Kasaragod (India)Manojkumar, T.S.; Central Plantation Crops Research Institute, Kasaragod (India). Women conquer yet another

bastion. Indian Coconut Journal (India). (June 2013) v.LVI(2) p.27-28 KEYWORDS: COCONUTS. HYBRIDIZATION.

215. Hebbar, K. B.; Central Plantation Crops Research Institute, Kasaragod (India). Sheena, T.L; Central Plantation Crops Research Institute, Kasaragod (India)Shwetha Kumari, K; Central Plantation Crops Research Institute, Kasaragod (India) Padmanabhan, S; Central Plantation Crops Research Institute, Kasaragod (India) Balasimha, D.; Central Plantation Crops Research Institute, Kasaragod (India) Mukesh Kumar; Central Plantation Crops Research Institute, Kasaragod (India) George V Thomas; Central Plantation Crops Research Institute, Kasaragod (India). Response of coconut seedlings to elevated CO_2 and high temperature in drought and high nutrient conditions. Journal of Plantation Crops. (Aug2013) v.41(2)p.118-122 KEYWORDS: CLIMATIC CHANGE. COCONUTS. CARBONDIOXIDE ENRICHMENT. PHOTOSYNTHESIS. EFFICIENCY. WATER USE.

The interaction effect of climate change variables elevated CO_2 and elevated temperature (ET) with drought and nutrients on growth and development of coconut seedlings was studied in an open top chamber (OTC) at Central Plantation Crops Research Institute (CPCRI), Kasaragod. Seedlings were exposed to ambient (normal CO_2 and temperature), elevated CO_2 (550 and 700 ppm), ET (3°C above ambient) and ET + elevated CO_2 (550 ppm CO_2+ 3 °C). In each OTC, a set of seedlings were subjected to drought (50% FC) and another set was maintained at 150 per cent recommended dose of fertilizer (RDF). Seedlings in elevated CO_2 treatments accumulated significantly higher biomass. It was 1.13 and 1.98 kg seedling-1 with 550 and 700ppm CO_2 respectively as against 1.10 in ambient treatment. It was the least in ET treatment (0.91). The stomatal conductance (gs) and transpiration (Tr) of plants grown under elevated CO_2 was reduced without affecting the photosynthesis. As a consequence, the whole plant WUE of coconut seedlings grown under elevated CO_2 was high both under control and drought condition. The WUE significantly reduced both in high temperature and drought stressed plants. Elevated CO_2 to certain extent compensated for water stress and high temperature induced reduction in growth of coconut.

216. Sushamakumari, S.; Rubber Research Institute of India, Kottayam (India). Sneha Joseph; Rubber Research Institute of India, Kottayam (India)Sobha, S.; Rubber Research Institute of India, Kottayam (India) Rekha, K.; Rubber Research Institute of India, Kottayam (India) Jayashree, R.; Rubber Research Institute of India, Kottayam (India) Leda Pavithran; Rubber Research Institute of India, Kottayam (India). Effect of nurse culture on inducing division of isolated pollen protoplasts of Hevea brasiliensis. Journal of Plantation Crops. (Aug2013) v.41(2)p.123-129 KEYWORDS: HEVEA BRASILIENSIS.

Haploids are of great relevance in crop improvement of Hevea, a highly heterozygous tree species with a long breeding cycle. The isolation and culture of pollen protoplasts may be a viable proposition for raising haploid plants/ homozygous lines in Hevea. The present work envisages the development of a method for the isolation and culture of pollen protoplasts of Hevea. Effect of different nurse cultures on the development of cultured protoplasts has been studied. Intact pollen grains were isolated from mature male flowers of Hevea prior to opening. Viable protoplasts in high yield could be isolated from these pollen grains when exposed to a mixture of 0.5 per cent cellulase and 0.05 per cent pectolyase in the presence of the osmotic stabilizers 0.6 M mannitol and 0.3 Msorbitol. These protoplasts were partially purified and cultured in the nutrient medium with three different nurse cultures namely embryogenic calli from Hevea, tobacco and carrot. Division of the cultured protoplasts leading to the formation of a few micro-colonies was observed in the medium containing 0.8 mg l-12, 4-D and 0.5 mg l-1 BA and enriched with Hevea nurse culture. Cultures with micro-colonies are dark incubated for further development. This is the

first report of division of pollen protoplasts and micro-colony formation in Hevea brasiliensis.

217. Maheswarappa, H.P.; Central Plantation Crop Research Institute,Kasaragod (India), Crop Production. Dhanapal, R.; Sugarcane Breeding Institute,Coimbatore (India) Subramanian, P.; Central Plantation Crop Research Institute,Kasaragod (India), Crop ProductionPalaniswami, C; Central Plantation Crop Research Institute,Kasaragod (India), Crop Production.Evaluation of coconut based high density multi-species cropping system under organic and integrated nutrient management. Journal of Plantation Crops. (Aug2013) v.41(2)p.130-135 KEYWORDS: COCONUTS. CROPPING SYSTEMS.

A field experiment on evaluation of coconut based high density multi-species cropping system under organic and integrated nutrient management was initiated during 2007 in coconut based cropping system at Central Plantation Crops ResearchInstitute, Kasaragod. Three treatments viz., T1: 2/3rd of recommended NPK fertilizer + recycling biomass (vermicompost), T2: 1/3rd of recommended NPK fertilizer +recycling biomass (vermicompost) + bio-fertiliser + green manuring + vermiwash and T3: Fully organic with recycling biomass (vermicompost)+ bio-fertiliser + green manuring + vermiwash + husk burial +mulching coconut basin were replicated seven times in RBD. The crops involved in the system were coconut, black pepper, pineapple, banana,clove, annual crops like, turmeric, ginger and vegetable crops (brinjal, pumpkin, and elephant foot yam), sweet corn and baby corn were grown in the space available during different seasons.Irrigation was provided through sprinkler system at IW/CPE=1.0. Average of five years (2007 to 2012) data on coconut yield indicated non significant difference among the treatments and it ranged between 145 to 155 nuts palm-1year-1. Black pepper yield also did not differ significantly among the treatments and ranged from 1.7 to 1.8 kg vine-1 , and banana (Njalipoovan variety) yield ranged from 6.0 to 7.2kg bunch-1 and Grand naine variety yield also did not differ significantly among the treatments and it ranged from 13.7kg to 15.5kg bunch-1. The copra and oil content of coconut did not differ significantly among the treatments and it ranged from 159.5 to 164.6g nut-1 and from 65.7 to 65.8 per cent respectively.Economics of the system indicated higher net return in T3 treatment.

218. Siby Mathew; UPASI Tea Research Foundation, Vandiperiyar, Idukki, Kerala. (India) Regional Centre. Raj Kumar, R.; UPASI Tea Research Foundation, Valparai (India) Marichamy,M.; UPASI Tea Research Foundation, Vandiperiyar, Idukki, Kerala.(India) Regional Centre Shanmugapriyan, R; UPASI Tea Research Foundation, Vandiperiyar, Idukki, Kerala. (India) Regional Centre. Impact of continuous mechanical harvesting on the carbohydrate dynamics and architectural characteristics of tea plants. Journal of Plantation Crops. (Aug2013) v.41(2)p.136-141 KEYWORDS: CARBOHYDRATES. MECHANIZATION.

Tea is a labour intensive plantation crop and management of crop husbandry practices has become difficult due to the scarcity of labour. In order to improve the labour productivity and to attain positive cost benefits ratio, management of tea estates are forced to adopt mechanization as a routine cultural operation. In the present study, carbohydrate dynamics and bush architecture of machine harvested fields are studied in comparison to integrated shear harvested fields. Continuous mechanization registered relatively lower levels of phytomass. Recovery from pruning was delayed in the mechanically harvested fields. Yield and yield attributes were significantly higher in the integrated shear harvested fields compared to mechanical harvesting. Carbohydrate dynamics of both the fields indicated low level of total carbohydrate, starch and reducing sugars in the root. Replenishment of carbohydrate showed a similar pattern in both the fields. No major variation was observed between the treatments for photosynthetic carbon dioxide assimilation rate and pigment concentration. Leaf constituents like polyphenols,catechins and amino acids of crop shoots

did not show major variations. Soil biota was less in the mechanically harvested fields. The data generated from this experiment will lead to advanced research on mechanization and to develop suitable agro-technologies.

219. Palanna, K.B.; University of Agriculture Science,(GKVK) Konehally,Tiptur (India), Agriculture Research Station. Boraiah, B.; University of Agriculture Sciences(B),(GKVK), Arsikere (India), Agriculture Research Station Nagaraj, M. S.; University of Agriculture Sciences(B), (GKVK), Hassan (India), College of AgricultureThyagaraj, N.E.; University of Agriculture Sciences(B), (GKVK),Hassan (India),College of Agriculture Ramaswamy, G.R; Zonal Agricultural Research Station, Hiriyur(India). Effect of bio-control agents and botanicals on in vitro growth and development of Ganoderma applanatum. Journal of Plantation Crops. (Aug2013) v.41(2) p.151-156 KEYWORDS: COCONUTS.

Efficacy of bio-control agents and botanicals against Ganoderma applanatum, a fungi causing basal stem rot of coconut was studied at Agricultural Research Station, Arsikere during the year 2008-09. Among the 17 bio-control agents screened, native *Trichoderma* sp. (V2) recorded minimum radial growth of 1.72 cm by exerting 81 per cent reduction over control, which was followed by *Trichoderma* sp. (12a)by accounting 2.30 cm radial growth with 74 per cent reduction over control. Among the six bio-control agents, tested for biomass production, native *Trichoderma* sp. (B4) recorded maximum biomass(0.76 g) followed by *Trichoderma* sp. (C4) which accounted for 0.7 g 100 ml-1 potato dextrose broth. Among 10 botanicals tested, only Glyricidia was found to be inhibitory against G. applanatum, by recording radial growth of 5.4 cm as against 9.0 cm in control.

220. Senthilkumar, P; UPASI Tea Research Institute,Valaparai (India),Plant Physiology and Biotechnology division Mandal, A.K.A.; VIT University,Vellore (India), School of Biosciences and Technology. Cloning and characterization of metallothionein like protein cDNA in tea using RACE. Journal of Plantation Crops. (Aug2013) v.41(2)p.157-162 KEYWORDS: CAMELLIA SINENSIS. PESTALOTIOPSIS.

Metallothionein (MT) like protein have important role in biotic and abiotic stress tolerance in plants. It also plays vital role in controlling intracellular redox potential and activation of oxygen detoxification in plants after pathogen invasion .In the present study, full length gene encoding MT was amplified using rapid amplification of cDNA ends (RACE reaction and sequenced (GenBank Acc.No. JN315623). Sequence analysis revealed presence of 276 bp open reading frame with coding capacity of 92 amino acids, flanked by 262bp and 166 bp and untranslated regions (UTR respectively. Theoretical pi and molecular weight of the analysed sequence was 5.37 and 9.5 kDa respectively. Phylogenetic analysis of MT with other plant species was discussed.

221. Gitali Das.; Rubber Research Institute of India, Regional Research Station, Guwahati(India). GopalChandra Mondal; Rubber Research Institute of India,Regional Research Station, Guwahati (India) Dhurjati Chaudhuri; Rubber Research Institute of India,Regional Research Station, Guwahati (India). Adaptability of prospective mother trees of Hevea to the cold climate of Sub-Himalayan West Bengal and Assam. Journal of Plantation Crops. (Aug2013) v.41(2)p.163-171 KEYWORDS: COLD. GROWTH.

Ortet selection in rubber from polycross mother trees grown in stress prone areas is one of the mandate for developing new generation rubber clones for the non-traditional regions. Aiming at this, experiments were laid out at two Regional Research Stations of Sub-Himalayan range of North Eastern India, viz. Nagrakata in Jalpaiguri district of West Bengal and Sarutari in Kamrup district of Assam. The weather of both the stations was different from each other especially on the basis of temperature (Tmax and Tmin) and total annual rainfall. Effect of such variations in weather condition had reflected on growth and yield performance

of the seedlings. The collective mean yield of trees showing yield above the average block yield every years over eleven years (category I) was much lower at Nagrakata (44.84 g tree-1 tap-1) than Sarutari (53.29 g tree-1 tap-1) but it was opposite in category II where the trees showed above average yield for ten years over eleven years. In view of the yield performance at Nagrakata, the mother tree NGK 203 was the top ranker (69.79 g tree-1 tap-1) followed by NGK 47 (55.40 g tree-1 tap-1) with low CV (37.11% and 35.33% respectively) and appreciable winter yield contribution (53.92% and 52.17% respectively); at Sarutari, it was GWH 245 (86.74g tree-1 tap-1) followed by GWH 286 (81.14g tree-1tap-1) with CV of 55.01 per cent and 40.35 per cent, respectively and winter yield contribution of 48.33 per cent and 43.61 per cent, respectively. Study on adaptation of potential mother trees to two different weather conditions was compared.

222. Murugesan, P.; Directorate of Oil Palm Research, Trivandrum (India). Regional Station Shareef, M; Directorate of Oil Palm Research, Trivandrum (India). Regional Station.Haseela, H.; Directorate of Oil Palm Research, Trivandrum (India). Regional Station.Mathur, R.K; Directorate of Oil Palm Research, Pedavegi, Andhra Pradesh. Seed quality and germination in selected hybrids of oil palm (Elaeis guineensis, Jacq.). Journal of Plantation Crops. (Aug2013) v.41(2)p.172-176 KEYWORDS: GERMINATION. OIL PALMS. SEED SIZE.

Different indigenous oil palm hybrids were evaluated with an objective to assess their quality and to develop seed quality standards in commercial seed production centers. Majority of the indigenous hybrids had large proportion of small seeds and their percentage of distribution varied according to the hybrids. The different hybrid combinations recorded coefficient of variation of 11.70, 11.28 and 15.35 for seed weight, shell weight and kernel weight, respectively. Large seed group in all the crosses had high seed weight, shell weight, shell thickness and kernel weight. Though shell thickness had significant differences among crosses and size groups, the coefficient of variation recorded (6.38%) was low compared to other characteristics. Selected hybrids had low average kernel weight of 1.63, 1.05 and 0.74 g for large,medium and small seeds, respectively. In this study, high and low germination percentage was recorded in all the categories of seed groups irrespective of their sizes. All the seed physical parameters studied were positively correlated which are highly significant.

223. Prabhakara Rao, G; Rubber Research Institute of India, Kottayam (India). Saji, T.Abraham; Rubber Research Institute of India, Kottayam (India) Reghu, C. P.; Rubber Research Institute of India, Kottayam (India). Evaluation of Brazilian wild Hevea germplasm in India for cold tolerance: Variability and character associations in juvenile growth phase. Journal of Plantation Crops. (Aug2013) v.41(2)p.177-181 KEYWORDS: COLD TOLERANCE. HEVEA BRASILIENSIS.

Natural rubber (Hevea brasiliensis), cultivation has been extended to non-traditional regions due to limited scope of further expansion in traditional rubber growing areas in India. These areas are often confronted with various abiotic stresses especially temperature extremes. A set of 18 wild accessions, two popular clones along with two control clones RRIM 600 and Haiken 1, were evaluated in the juvenile growth phase at the Regional Experiment Station of the Rubber Research Institute of India, Nagrakata, West Bengal, a sub-Himalayan cold prone region of India. The genotypes exhibited highly significant clonal differences (P0.01) for all the eight quantitative traits. During the pre-winter period, the number of leaves per plant ranged from 14.2 (AC 3074) to 47.6 (MT 2229). In the post winter period maximum leaves per plant was recorded in MT 900(29.27) comparable to the control clone Haiken 1 (28.20), while the accession AC 3293 recorded very high loss in leaves. An increase in number of whorls per plant during winter period was noted in MT 1020 as compared to Haiken 1 (0.80). Increment of plant height during winter ranged from 6.53 cm (AC 3293) to 45.01 cm (MT 1020) as compared to the control clone Haiken 1 (40.73 cm). Girth ranged from

5.36 cm (AC 3293) to 11.53 cm (MT 915) while the control clone Haiken 1 recorded a girth of 10.50 cm. Girth was significantly correlated with the other growth traits. Based on rank sum values, the accessions were ranked for overall performance and the top 20 percent of the potential accessions showing early growth vigour were identified. These can be used for the development of cold tolerant clones.

224. Pariari, A; Bidhan Chandra Krishi Viswavidyalaya, West Bengal (India). Regional Research Station.. Singh, L.S.; Bidhan Chandra Krishi Viswavidyalaya, West Bengal (India). Regional Research Station.Poduval, M; Bidhan Chandra Krishi Viswavidyalaya, West Bengal (India). Regional Research Station.Khan, S; Bidhan Chandra Krishi Viswavidyalaya, West Bengal (India). Regional Research Station.. Effect of plant bio-regulators (PBRs) on qualitative traits of apple and nut of cashew var. Jhargram-1. Journal of Plantation Crops. (Aug2013) v.41(2)p.182-185 KEYWORDS: QUALITY.

A field experiment was conducted to study the effect of plant bio-regulators on qualitative traits of apple and nut in cashew var. Jhargram-1. The application of NAA 200 ppm twice at flowering and fruit-set significantly increased the size and weight of cashew apple, juice recovery (66.17 %), ascorbic acid content (3.67 mgml-1), and titrable acidity (0.45 %). Double spraying with IAA 200ppm recorded the maximum size of nut and kernel while, carbohydrate,starch, sugar and protein content of cashew kernel were found highest with NAA 200 ppm sprayed twice.

225. Anithakumari, P.; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station. Labour availability in coconut cultivation and impact on technology adoption as perceived by coconut farmers. Journal of Plantation Crops. (Aug2013) v.41(2)p.186-190 KEYWORDS: COCONUTS. MANPOWER.

Labour is an important resource for sustainable farming.Coconut, a perennial tree crop, requires skilled and unskilled labour components for adoption of scientific management practices. The study indicated that both hired and family labour were utilised in seedling planting and management, whereas family labour was prominently utilised in case of chemical fertiliser application and basin management with green manure. Hired labour was critical in basin opening, organic manure application, plant protection and harvesting.Most of the technologies adopted were irregular in nature which was indicated due to escalating input costs and declining output price. Majority of the respondents (76.32%) adopted keramithra for de-husking coconuts. Farmers who adopted mechanisation in land preparation opined 60-75 per cent reduction in expenditure compared to manual labour. Seventy eight per cent of respondents recorded scarcity in labour availability. The responses of the farming community towards the high wage rate and scarcity were discontinuation of milch animals in coconut homesteads, reduction in number of regular harvests, untimely harvests of coconut, reduction in intercropping, irregularity in basin opening and cultural practices, low level of organic manure application etc.Mechanization in coconut cultivation among small/marginal holders is meagre and needs impetus from supporting agencies. The constraints and suggestions of the farmers were also documented.

226. Prasannakumari, P.; Rubber Research Institute of India, Kottayam (India). Jessy, M.D.; Rubber Research Institute of India, Kottayam (India) Sherin George.; Rubber Research Institute of India, Kottayam (India) Sankar Meti; Rubber Research Institute of India, Kottayam (India). Assessment of nitrogen utilization from urea applied in rubber seedling nursery using 15 N tracer technique. Journal of Plantation Crops. (Aug2013) v.41(2)p.191-195 KEYWORDS: RUBBER. UREA.

Nitrogen uptake from urea applied to rubber seedlings in the nursery was evaluated using 15 N tracer methodology, in micro-plots established in the field. Effect of varying rates

of N on growth, and the relative contribution of soil N and fertilizer N towards total N uptake were studied. Influence of rate of N application on growth of seedlings was observed up to three months, and after six months, growth of plants was comparable for all the four N levels. The efficiency of N absorption by the plant, expressed as percentage N utilization ranged from 13.62 per cent at 125 kg N ha-1 to 5.84 percent at 500kg N ha-1. The 15N balance sheet averaged over the four levels of N shows that about 9.27 per cent of applied N was taken up by rubber seedlings, about 8.78 per cent remained in 0-60cm depth of soil and about 81.95 per cent was unaccounted N.

227. Jibu Thomas; School of Biotechnology and Health Sciences, Karunya University,Coimbatore (India). Raj Kumar,R; UPASI Tea Research Foundation, Valparai (India) Mandal, A.K.A.;VIT University, Vellore (India)Muraleedharan, N; Tea Research Association, Jorhat (India). Tocklai Experimental Station. Impact of continuous mechanical harvesting on leaf leatheriness and possible alleviation measures. Journal of Plantation Crops. (Aug2013) v.41(2)p.196-201 KEYWORDS: MECHANIZATION. CAMELLIA SINENSIS.

Mechanization in plucking has become imperative to improve the profitability and efficiency in tea industry. Continuous shear harvesting of tea shoots creates a stress on plant thereby changing the texture of the crop shoots termed as leaf leatheriness. Objective of the study was to generate data on the formation of leaf leatheriness due to continuous shear harvesting and to propose the remedial measures. A factorial block design experiment was conducted with a;Chinery clone UPASI-9. Results indicated that continuous shear harvesting for a period of six months resulted in the accumulation of total wax content when compared to the hand plucked crop shoots which contributed to the leatheriness of crop shoots. Significant increase in the banji content in the harvest was also noticed due to continuous shear harvesting.Foliar applied chemicals influenced the reduction in banji shoots in the shear harvested treatments. Among the foliar applied treatments, reduction in the total wax content in the continuously shear harvested plots was obtained by the foliar application of KNO_3(2%) + Urea (1%) followed by KNO_3 (2%) and $Ca(NO_3)2$(2%) when compared with control. Study concluded that foliar application of KNO3 (2%) alone or in combination with Urea (1%) is beneficial in alleviating the leaf leatheriness caused due to continuous shear harvesting without deterioration of quality characteristics with aprophylactic effect to improve the yield of tea plants.

228. Shalini, D.; UPASI Tea Research Foundation, Valparai (India).Raj Kumar, R; UPASI Tea Research Foundation, Valparai (India). Changes in biochemical constituents and defense related enzymes in response to red spider mite incidence in tea. Journal of Plantation Crops. (Aug2013) v.41(2)p.202-208 KEYWORDS: ENZYMES. CAMELLIA SINENSIS.

In recent years, red spider mite (RSM), Oligonychus coffeae (Nietner) menace challenged the crop productivity in tea. Though the reports on bush physiology are available, a compressive data on changes in biochemical constituents including enzymes is lacking.Crop shoots were collected from the field grown tea plants (UPASI-3 &UPASI-10) and segregated into healthy, moderately infested (~4 mites leaf–1) and severely infested (4 mites leaf–1). The crop shoots were used for determining the biochemical constituents and quality. Stress-related enzymes such as catalase, superoxide dismutase,glutathione reductase and ascorbate peroxidase were also analysed. Irrespective of the RSM damage, UPASI-3 significantly recorded higher amount of polyphenols, catechins, amino acids, reducing sugars and carotenoids. UPASI-10 possessed higher amount of total chlorophylls than that of UPASI-3. Irrespective of the clones, polyphenols, catechins, and pigments linearly decreased with severity of RSM infestation while reducing sugars and hydrogen peroxide linearly increased. Irrespective of the RSM damage, crop shoots of UPASI-10 contained significantly lower amount of quality parameters and stress-related enzymes, except polyphenol oxidase.

Though quality related enzymes enhanced due to RSM attack initially and declined when the RSM infestation was severe. All the stress related enzymes progressively increased with the increasing degree of RSM damage. Interactions between activities of enzymes and clones with respect to RSM damage were elucidated.

229. Veeraputhran, S; Rubber Research Institute of India, Kottayam (India). Siju, T; Rubber Research Institute of India, Kottayam (India) Joby Joseph; Rubber Research Institute of India, Kottayam (India)Tharian George, K; Rubber Research Institute of India, Kottayam (India). Adoption of RRII 400 series rubber clones by rubber small growers. Journal of Plantation Crops. (Aug2013) v.41(2)p.209-213 KEYWORDS: RUBBER. REPLANTING.

The paper examines the response of small growers to the recommendation of multi-clonal planting in the context of release of RRII 400 series clones for commercial cultivation, since 2005. The data pertaining to 56080.6 ha under 130658 RPD permits, which availed subsidy from the Rubber Board during the seven year period from 2004 to 2010, were gathered from 26 Regional Offices of the Rubber Board located in the traditional rubber growing regions. The study revealed that the adoption had been characterised by the mono-clonal status (95.1%) of RRII 105 till the year 2004. However, the share of RRII 105 declined to 55.7 per cent in 2010. Conversely, share of RRII 400series clones increased from 1.0 per cent in 2004 to 28 per cent in 2010 in the total planted area. But trends in adoption of new clones did not exhibit a consistent pattern across size-classes and regions during the post-release phase. It is in sharp contrast to the experience of RRII 105 since its release in 1980. Adoption of multi-clonal planting was only 2.6 per cent in 2004 which increased to more than 15 per cent in 2010. Multi-clonal planting was positively associated with the size of holdings during the period under review. But the strength of this relationship has been dependent on region-specific factors. Therefore, the study brings out the need for evolving a long term policy of region-specific clone recommendations based on life-cycle commercial yield performance.

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319. Viswan, T.S.; Coconut Producer Company Limited, Alapuzha (India). Karappuram Coconut Producer Company to launch four coconut products. Indian Coconut Journal (India). (Sep 2013) v.LVI(5) p.24-25 KEYWORDS: PRODUCER COOPERATIVES. FARMERS. COCONUTS. PRODUCTS.

320. Jayanath, R.; Coconut Development Board, Kochi (India). Kaipuzha Coconut Producer Company for the renaissance of coconut farmers. Indian Coconut Journal (India). (Sep 2013) v.LVI(5) p.26-27 KEYWORDS: PRODUCER COOPERATIVES. FARMERS. COCONUTS.

321. Aravazhi, E.; Coconut Development Board, Hyderabad. State Centre. A journey of a thousand steps begins with a step. Indian Coconut Journal (India). (Sep 2013) v.LVI(5) p.30 KEYWORDS: FARMERS ASSOCIATIONS. COCONUTS.

322. Johar Khan; Chicacole Coconut Farmers Producer Company Limited, Andhra Pradesh (India). Unity is strength. Indian Coconut Journal (India). (Sep 2013) v.LVI(5) p.31 KEYWORDS: COCONUTS. PRODUCER COOPERATIVES. FARMERS.

323. Vijayakumar Hallikery; Coconut Development Board, Regional Office, Banglore.. Vision accomplished-Kalpatharu Coconut Producer's Company. Indian Coconut Journal (India). (Sep 2013) v.LVI(5) p.32 KEYWORDS: PRODUCER COOPERATIVES. FARMERS. COCONUTS.

324. Remany Gopalakrishnan; Coconut Development Board, Kochi (India). Why Collaboration with Academic and Research Institutions?. Indian Coconut Journal (India). (Nov 2013) v.LVI(7) p.6-12 KEYWORDS: COCONUT OIL. HEALTH. HUMAN DISEASES. PRODUCTS.

325. Muralidharan, K.Resmi, D.S.. Teaming up for innovation, technologies and research: CDB's association with Academic and Research Institutions.. Indian Coconut Journal (India). (Oct 2013) v.LVI(7) p.13-15 KEYWORDS: INNOVATION. TECHNOLOGY. RESEARCH.

326. Minu Sagar; IRMA (Institute of Rural Management Anand), Gujarat (India) Madhujith, N.; IRMA (Institute of Rural Management Anand), Gujarat (India) Chandrabhanu Kakoty; IRMA (Institute of Rural Management Anand), Gujarat (India) Rohit Meshram; IRMA (Institute of Rural Management, Anand, Gujarat (India). IRMA associates with CDB. Indian Coconut Journal (India). (Nov 2013) v.LVI(7) p.22 KEYWORDS: STUDENTS.

327. Deepthi Nair, S.; Coconut Development Board, Kochi (India). Addressing the felt need of coconut farmers. Indian Coconut Journal (India). (Nov 2013) v.LVI(7) p.24-25 KEYWORDS: COCONUTS. FARMERS. ORGANIZATIONS.

328. Deepthi Nair; Coconut Development Board, Kochi (India). Its time we use our coconuts wisely. Indian Coconut Journal (India). (Jan2014) v. LVI(9) p. 6-10 KEYWORDS: COCONUT WATER. CYTOKININS. MARKETING.

329. Thamban, C.; Central Plantation Crops Research Institute, Kasaragod (India) Jayasekhar, S.; Central Plantation Crops Research Institute, Kasaragod (India) Chandran, K.P.; Central Plantation Crops Research Institute, Kasaragod (India) Muralidharan, K.; Central Plantation Crops Research Institute, Kasaragod (India). Evolving tendetr coconut sector in Kerala: Need for upgradation in the value chain. Indian Coconut Journal (India). (Jan 2014) v. LVI(9) p. 16-21 KEYWORDS: COCONUT WATER.

E70 Trade, marketing and distribution

330. Remany Gopalakrishnan; Coconut Development Board, Kochi (India). Global coconut scenario - India Forges Ahead. Indian Coconut Journal (India). (Feb 2013) v.LV(10)p.4-13 KEYWORDS: COCONUTS. INDIA. CONSUMPTION. MARKETING.

331. Sasikumar, C.; Coconut Development Board, Kochi (India). Tamilnadu excels in coconut cultivation. Indian Coconut Journal (India). (Feb 2013) v.LV(10) p.19-22 KEYWORDS: COCONUTS. MARKETING.

332. Deepthi Nair, S; Coconut Development Board, Kochi (India). A kick start in implementing Innovative Marketing Strategy. Indian Coconut Journal (India). (Jan 2013) v.LV(9) p.40 KEYWORDS: COCONUTS. PRODUCTS. PROCESSING.

333. Antony, K.G.; Kerala Agricultural Development Society, Thodupuzha (India). Awakening of a Greener Spirit- the KADS model. Indian Coconut Journal (India). (Feb 2013) v.LV(10) p.49-51 KEYWORDS:COCONUTS.

334. Kumaravel, S; Coconut Development Board, MDIC, DelhiSingh, G.R.; Coconut Development Board, MDIC, DelhiJayakumar, S; Coconut Development Board, MDIC, Delhi. Doon, a boon for coconut marketing. Indian Coconut Journal (India). (Feb 2013) v.LV(10) p.52-55 KEYWORDS:COCONUTS. PRODUCTS. MARKETING.

335. Ramanathan, A.V.; Coconut Development Board, Kochi (India). Coconut Oil industry sees the brighter side. Indian Coconut Journal (India). (Feb 2013) v.LV(10) p.56-57 KEYWORDS: COCONUT OIL. MARKETING.

336. Remany Gopalakrishnan; Coconut Development Board, Kochi (India). 2012-13- An year of accomplishments and triumphs. Indian Coconut Journal (India). (Apr 2013) v.LVI(1) p.4-10 KEYWORDS: COCONUTS. PRODUCTS. MARKETING TECHNIQUES.

337. Deepthi Nair, S; Coconut Development Board, Kochi (India). Reaching out to the consumer with innovative marketing strategies. Indian Coconut Journal (India). (Apr 2013) v.LVI(1) p.11-13 KEYWORDS:COCONUTS. PRODUCTS. MARKETING TECHNIQUES.

338. Deepthi, R.; Coconut Development Board, Kochi (India). Production and distribution of planting materials- A thrust area of Board. Indian Coconut Journal (India). (Apr 2013) v.LVI(1) p.32 KEYWORDS: PRODUCTION. ECONOMIC DISTRIBUTION.

339. Jayashree, A.; Coconut Development Board, Kochi (India). Focus on commercialisation of technologies to capitalise the opportunities for neera. Indian Coconut Journal (India). (May 2013) v.LVI(1)p.27-29,31 KEYWORDS: COCONUTS. MARKETING. TECHNOLOGY.

340. Sree Kumar Poduval; Coconut Development Board, Kochi (India). Minimally processed tender coconut - a natural form of packing. Indian Coconut Journal (India). (June 2013) v.LVI(2) p.29-30 KEYWORDS: PROCESSING. PACKAGING. MARKETING. SALES.

E71 International trade

341. Ramanathan, A.V.; Coconut Development Board, Kochi (India). Retrsopective and prospective plans of Export Promotion Council. Indian Coconut Journal (India). (Apr 2013) v.LVI(1) p.33-35 KEYWORDS:PRODUCTS. EXPORTS. IMPORTS. COCONUT OIL.

F03 Seed production

342. Chinnaraj, B.; Coconut Development Board, Kochi (India). Production and distribution of quality planting materials of coconut from DSP farms. Indian Coconut Journal (India). (Jan 2013) v.LV(9)p.21-23 KEYWORDS: COCONUTS. SEEDLINGS.

343. Mridula, K.; Coconut Development Board, Kochi (India). Intervention of farmer collectives in seedling production. Indian Coconut Journal (India). (June 2013) v.LVI(2) p.26 KEYWORDS: COCONUTS. SEEDLING PRODUCTION.

F04 Fertilizing

344. Chandra Mohanan, R.; Central Plantation Crops Research Institute, Kasaragod (India). Prabha, K.Peter; Central Plantation Crops Research Institute, Kasaragod (India) Sharadraj, K.M; Central Plantation Crops Research Institute,Kasaragod (India). Production technology of coir pith cake formulation of *Trichoderma harzianum*. Journal of Plantation Crops. (Aug2013) v.41(2)p.214-218 KEYWORDS: TRICHODERMA. BIOLOGICAL CONTROL.

Low cost formulations and delivery system are necessary for wide adoption of bio-control of plant diseases using microbial antagonists. Though several plantation crops wastes/by-products including coir pith are used for multiplication of *Trichoderma* species, no attempt has been made so far to develop a low cost commercial product with long shelf life and high population of antagonist. A technology has been developed to prepare a commercial product viz., *Trichoderma* coir pith cake (TCPC) using maida flour and *Trichoderma harzianum* biomass. It has been found that dried TCPC packed in polythene bags can be stored at room temperature (26-30 °C) for 10 months with high level of *T.harzianum* population. Through a simple activation process of moistening the dried TCPC and incubating under room temperature for 2days, luxurious growth of *Trichoderma* covering the entire product was obtained and thus the population could be increased to a very high level. Mean *T. harzianum p*opulation in dry TCPC after 10 months of storage was found to be 5.0x106 CFU g–1 which has increased to14.4x106 CFU g-1 on activation. Though the population after one year could be increased from 1.6x106 CFU g-1 in dry TCPC to 5.2x106 in activated, it is ideal to recommend a shelf life period of 10 months while commercializing the product. The new, simple and low cost technology developed, thus, clearly indicates that coir pith, a waste from coconut industry can be made into value added and environment friendly commercial product for management of plant diseases. Several such products can be commercially prepared for different microbial bioagents following this production technology.

F08 Cropping patterns and systems

345. Sugata Ghose; Coconut Development Board, Kochi (India). 'Bongaigoan model' of convergence in coconut based farming system. Indian Coconut Journal (India). (Jan 2013) v.LV(9) p.24-25 KEYWORDS: COCONUTS. FARMING SYSTEMS.

346. Jnanadevan, R.; Directorate of Cashew and Cocoa Development,Kochi (India). Interplanting tender coconut varieties for better returns. Indian Coconut Journal (India). (Jan 2014) v. LVI9) p. 22-24 KEYWORDS: MIXED CROPPING. INTERCROPPING. COCONUT WATER.

F63 Plant physiology - Reproduction

347. Regi, J.Thomas; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.. Joseph rajkumar, A; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.. Flowering and pollination biology in coconut. Journal of Plantation Crops. (Aug2013) v.41(2)p.109-117 KEYWORDS: COCOS NUCIFERA.

Coconut is a seed propagated crop and knowledge on its flowering and pollination biology will be of significance for optimizing the pollination techniques and also to design efficient conservation strategies in gene banks. Coconut palm is monoecious, with inflorescence bearing both staminate and pistillate flowers. The male flowers are the first to open, beginning at the top of each spikelet and proceeding towards the base. The male phase is followed by female phase and in tall varieties there is a gap between these two phases within the same inflorescence. Although both wind and insects bring about pollination, insect pollination is more predominant. Strategies for employing honey bee colonies in coconut plantations and seed gardens for enhancing pollination and fruit set are discussed. Future lines of work with regard to pollination biology aiming increasing fruit set in coconut seed gardens are also pointed out.

H10 Pests of plants

348. Asha, A.M.; University of Agricultural Sciences, Department of Seed Science and Technology, Dharwad- 5800 05, IndiaKurdikeri, M.B.;University of Agricultural Sciences, Department of Seed Science and Technology, Dharwad- 5800 05, IndiaVinodkumar, S.B.; I.A.R.I.,Division of Seed Science and Technology, NewDelhi-110 012, India.Sunitha, H.M.; University of Agricultural Sciences, Department of Seed Science and Technology, Dharwad- 580005, India Hipparagi, Yegappa; University of Agricultural Sciences, Department of Seed Science and Technology, Dharwad- 5800 05, India Sushma, P.P.; University of Agricultural Sciences, Department of Seed Science and Technology, Dharwad- 5800 05, IndiaNemappa, L.;University of Agricultural Sciences, Department of Seed Science and Technology, Dharwad-580005, IndiaShivakumar, H.; University of Agricultural Sciences, Department of Seed Science and Technology,Dharwad- 580005, India. Influence of plant products and containers on insect damage of Maize hybrid seeds during storage. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 296-299 KEYWORDS: PLANT PRODUCTS. SITOPHILUS ZEAMAIS. STORAGE CONTAINERS. ZEAMAYS.

Maize seeds were treated with neem, castor, pongamia, tulsi leaf, mandarin peel, sweet flag, arappu leaf, parthenium leaf powder,wood ash, thiram and control, stored in cloth bag, polythene bag (700guage) and vacuum packaging under ambient conditions. The maize seeds recorded highest insect damage at the end of 14 months of storage irrespective of containers and treatments. Among the seed treatments, seed treated with thiram recorded lowest seed damage by insect up to 14 months of storage while highest seed damage (%) recorded in control compared to other seed treatments at the end of storage period. Whereas seeds stored in vacuum package were absolutely free from insect attack at the end of the storage period followed by polythene bag.

349. Raju, G. Shalil; R.A.K, College of Agriculture, Department of Entomology (R.V.S.K.V.V.), Sehore-466001, India. Khandwe, Nanda; R.A.K, College of Agriculture, Department of Entomology (R.V.S.K.V.V.), Sehore-466001, India. Biology of Gesonia gemma (Swinhoe) on Soybean. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 300-302 KEYWORDS: BIOLOGY. GLYCINE MAX.

A female laid eggs from 149 to 247 (Av. 182 ± 36.97) on the upper surface of the leaves. Most of the eggs were deposited near midrib and basal part of the leaves. There

were 5 larval instars, differing in colouration. Fully grown larvae measured 18.0–22.0 mm in length and 2.0–2.5 mm in width.Prolegs were present on 4th, 5 th, 6th and last abdominal segment. The duration of the egg, larval and pupal periods was 2-3, 9-17 and 7-8 days, respectively. The total duration from egg to adult emergence was completed in 18-28 days. The size of the pupa was 8-9 mm in length and 1.9 to 2.1 mm in width. Female pupa was comparatively long in size than male. Medium sized moth measuring 6.0-8.0 mm body length 15.0-17.0 mm wing expand. The longevity of adult male and female was 3 to 6 and 2 to 8 days,respectively.

350. Krishna, K. Venata; College of Agriculture (MAU, Parbani), Department of Agri. Entomology, Latur, India. Studies on pollinator fauna of Sunflower (Helianthus annuus L.) and their relative abundance. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 303-305 KEYWORDS: APIS. HELIANTHUS ANNUUS. POLLINATORS.

Among the total pollinators, Apis. mellifera was predominant and constituted 28.2% followed by A. florea 21.5%, A. indica 18.9%, A.dorsata 13.8%, Trigona sp. 9.5%, and others 8.3%, respectively. The intensity of A. mellifera, A. indica, A. dorsata and A. florea were reached at its peak at 10.00- 12.00 hrs, the intensity of Trigona sp.reached its peak at 08.00-09.00 hrs and others were found at their peak activity at 09.00-11.00 hrs. When bee intensity in cages, in open pollination, in sugar syrup spray and cinnamon spray was compared, the activity of six framed A. mellifera colony was highest as compared to other treatments. Intensity of one colony A. florae and four framed A. indica were differing significantly.

351. Raju, G. Shali; R.A.K, College of Agriculture, Department of Entomology (R.V.S.K.V.V.), Sehore-466 001, India.Khandwe, Nanda; R.A.K, College of Agriculture,Department of Entomology (R.V.S.K.V.V.), Sehore-466001, IndiaNema,K.K.; R.A.K, College of Agriculture, Department of Entomology (R.V.S.K.V.V.), Sehore-466001, India. Seasonal incidence, biology and behaviour of green semilooper, Chrysodeixis acuta (Walker) on Soybean.. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 306-309 KEYWORDS: BIOLOGY. CHRYSODEIXIS. GLYCINE MAX.

The appearance of the green semilooper was first observed during last week of July, 2012 recording 1 to 2 larvae/mrl with an average of 0.9 larva/mrl. The population of the pest finally disappeared from the field during first week of October; 2012. A female laid 65 to 100eggs singly (Av. 84.6 ± 11.86) on the dorsal surface of leaves mostly near midrib. Freshly laid eggs were round, whitish in colour and measured 0.5 to 0.6 mm in diameter. Six larval instars were observed. Newly hatched larvae were pale white in colour which turned to green in later instars. The larvae moulted five times and passed through six larval instars. Larval and pupal periods lasted for 15-21 and 7-10 days, respectively. The total life cycle period varied from 24-34 days.

352. Krishna, K. Venata; College of Agriculture, Department of Agril. Entomology, MAU, Parbani, Latur, India. Foraging behaviour of species of honey bees in Sunflower (Helianthus annuus L.). Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 310-312 KEYWORDS: APIS. FORAGING. HELIANTHUS ANNUUS.

The peak foraging activity of all pollinators was found at 8^{th} and 15^{th} day after 10% flowering was observed. Apis mellifera was proved efficient forager because of its long working duration followed by A. florea, A. indica and Trigona irridipenis, respectively. A. mellifera visited more number of flowers for nectar foraging, whereas in case of pollen foraging, maximum number of flowers were visited by Trigona sp. followed by A. mellifera, A.dorsata, A. florea, and A. indica, respectively. It means that honey bees spent less time for

foraging pollen than nectar. Number of honey bees in bee hive per minute was found to be highest in A. mellifera.

353. Navatha, L.; (Acharya N. G. Ranga Agricultural University), Department of Entomology, Tirupati. A. P., IndiaSreedevi, K.; Indian Agricultural Research Institute, Division of Entomology, New Delhi –110012, Naidu, M.V.S.; (Acharya N. G.Ranga Agricultural University), S. V. Agricultural college, Department of Soil Science and Agril. Chemistry, Tirupati, A.P. India . Foraging ecology of insect pollinators in Safflower (Carthamus tinctorius L.) ecosystem. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 313-316 KEYWORDS: CARTHAMUS TINCTORIUS. FORAGING.

The abundant insect pollinators viz., Trigona sp., Camponotus compressus and Halictus sp. were monitored for their foraging behaviour in safflower ecosystem. The initiation of foraging activity of C. compressus was earlier (06.00 hrs) as compared to Trigona sp.and Halictus sp. (08.00 hrs). The peak activity of all the three floral visitors was recorded at 10.00 hrs. and the cessation of activity was recorded between 16.00 hrs and 18.00 hrs. Trigona sp. visited maximum number of heads followed by Halictus sp. and C.compressus. The foraging speed of Halictus was higher than Trigona and C. compressus.

354. Biradar, A.P.; UAS, Dharwad RAS, Bijapur, IndiaNadaf, A.M.;Horticultural Res. Station, Department of Agril. Entomology, Tidagundi - 586119, Bijapur, Uni. of Horti. Sciences, Bagalkot, Karnataka, India. Bio efficacy of Bifenazate 240 SC (Floramite) against mites on Grape, Vitis vinifera. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 317-319 KEYWORDS: TETRANYCHUS URTICAE. VITIS VINIFERA.

There was a significant reduction of mite population in bifenazate 240 SC 0.50 ml/l (Floramite) (0.30 mites / 3 leaves) which was followed by propargite 57 EC 1.50 ml/l (0.30 mites / leaves) and bifenazate 240 SC 1.0 ml/l (1.7 mites / 3 leaves) and dicofol 25 EC 2.00 ml/l (1.70 mites / 3 leaves). However, all these treatments were significantly superior over untreated control. The pooled analysis of two year data indicated that there was a significant reduction of mites population in bifenazate (0.7 mites / 3 leaves), propergite(0.7 mites / 3 leaves) and abamectin (0.7 mites / 3 leaves) over other treatments. The similar trend of superiority of treatments was recorded after second spray. Significantly highest yield of grape fruits was recorded in bifenazate (15.40 kg / plant) and abamectin as compared to rest of the treatments.

355. Lal, Jayanti; R.A.K, College of Agriculture, Department of Entomology (R. V. S. K. V. V.), Sehore-466 001, India.Raju, G. Shali; R.A.K, College of Agriculture,Department of Entomology (R. V. S. K. V. V.), Sehore-466001, India Khandwe, Nanda; R.A.K, College of Agriculture, Department of Entomology (R. V. S. K. V. V.), Sehore-466001, India. Studies on seasonal incidence, nature of damage and assessment of losses caused by Girdle beetle on Glycine max. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 320-323 KEYWORDS: GLYCINE MAX. SEASONAL CROPPING.

Highest frequency of girdles was observed on stem (24%), petiole(21%), petiolet (13%) and branch (10%) during 2nd week of September. Similar trend of distribution of infestation continued up to 3rd week of September. However, there was an increase in frequency of girdling on branches (18%) in last week of September. This may be attributed to the succulence of branches in comparison to stem. Intergirdle length of 12.8 to 14.7mm was recorded in different period of observations. Maximum inter girdle length (14.7mm) was recorded in 1st week of September with maximum distance of egg hole (3.20mm)from proximal girdle. Girdle formation by the adult female resulted in significant reduction in number of pods, number of seeds and seed weight. Losses caused by girdle beetle were also influenced by crop stage and different infestation levels. Up to 10% infestation level by

girdle beetle did not seem to have much yield reduction at all the crop stages but the crop between 37 and 44days after germination appeared to be most vulnerable to girdle beetle infestation. The severe yield reduction (40.0%) was observed in infested plant by girdle beetle in last week of August followed by first and second week of September i.e. 37.6 and 32.3%, respectively. The plants infested during September 4th week and October 1st week did not show more yield reduction.

356. Sukumar, S.; S.H.I.A.T.S., Department of Entomology, Allahabad– 211 007, IndiaLyall, Hemant; S.H.I.A.T.S., Department of Entomology, Allahabad – 211 007, IndiaNaik, Ramesh N.; S.H.I.A.T.S., Department of Entomology, Allahabad – 211 007, India. Management of Gram pod borer, Helicoverpa armigera by chemicals and botanicals. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p.324-326 KEYWORDS: CICER ARIETINUM. HELICOVERPA ARMIGERA. MANAGEMENT.

Among the treatments, indoxacarb 14.5 SC found superior over all the treatments after first and second sprays and neem oil found superior over other plant products. Minimum pod damage of 13.7% and highest pod yield of 1745kg/ha was registered in indoxacarb. Thus, highest cost benefit ratio was also recorded in indoxacarb (1:2.34) followed by chlorpyriphos (1:1.77), profenophos (1:1.51), neem oil (1:1.32), NSKE (1:1.07), Pongamia leaf extract (1:0.49) proved to be least effective treatment.

357. Singh, D.K.; C.S.A.U.A.&T., Section of Oilseed, Kanpur-208002, Pal, Sundar; C.S.A.U.A.&T.,Section of Oilseed, Kanpur-208002, India Dwivedi, R.K.;C.S.A.U.A.&T., Section of Oilseed, Kanpur-208002, IndiaSingh, Anjani Kumar; C.S.A.U.A.&T., Section of Oilseed, Kanpur-208002, India. Bio-intensive pest management of Mustard Aphid, Lipaphis erysimi Kalt.. Annals of Plant Protection Sciences (India). (Sep2014) v.22(2) p. 327-331 KEYWORDS: BRASSICA. INTEGRATED PEST MANAGEMENT. LIPAPHIS ERYSIMI.

Results revealed that all the treatments were significantly superior over the control. Out of these, dimethoate 1ml lit-1 was found most compatible with Pochonia lecanii 108 CS ml-1 was significantly superior for aphid population decrease followed by dimethoate 1ml lit-1 followed by Coccinella septempunctata 5000beetles ha-1 and it was recorded as 14.50 (85.5%), 10.65 (89.3%) and 4.35 (95.6%) aphids plant-1 at 3, 7 and 10 DAS, respectively. The highest increase yield (925.0 kg ha-1) was recorded from treated with dimethoate 1ml lit-1 followed by P. lecanii 108 CS ml-1 over the control, and the maximum cost benefit ratio (1:37.43) was recorded in dimethoate followed by Coccinella septempunctata.

358. Lal, Gore; C. S. Azad Univ. of Agri. & Tech., Oilseed Section, Kanpur-208 002, India. Pal, Sundar; C. S. Azad Univ. of Agri. & Tech., Oilseed Section, Kanpur-208002, IndiaSingh,D.K.; C. S. Azad Univ. of Agri. & Tech., Oilseed Section, Kanpur-208002, IndiaSingh, Anjani Kumar; C. S. Azad Univ. of Agri. & Tech.,Oilseed Section, Kanpur-208002, IndiaDwivedi, R.K.; C. S. Azad Univ. of Agri. & Tech., Oilseed Section, Kanpur-208002, India. Seasonal occurrence of insect pests on Mustard and its correlation with abiotic factors. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 332-334 KEYWORDS: SEASONAL CROPPING.

The peak population of Lipaphis erysimi was recorded from February to March, there was negative non-significant correlation with temperatures and sunshine whereas positive non-significant correlation with R.H. and rainfall but positive with temperature were recorded. The maximum population of sawfly was negative correlation with temperature and R.H. Population of Coccinella septumpunctata was recorded positively significantly correlation with temperature and sunshine hours and negative correlation noted with R.H. and rainfall.

359. Dhawan, A.K.; Punjab Agricultural University, Department of Entomology, Ludhiana-141004, IndiaSharma, Neha; Punjab Agricultural University, Department of Entomology, Ludhiana-141004, India. Comparative diversity of transgenic Bt and non –transgenic Cotton against insect pests. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 335-338 KEYWORDS: COTTON. GOSSYPIUM HIRSUTUM.

The overall diversity index of arthropod fauna was higher in non-Bt (1.93) followed by RCH 134 BG-I (1.86) plots .This diversity in RCH 134 BG-I and non-Bt was due to greater evenness indices (0.894-0.808). In Mansa, the arthropod diversity was maximum in non-Bt plots (1.73) followed by BG-II (0.86) and BG-II while the dominance parameter was prominent in vegetative phase of the cotton crop in BG-I (0.56).

360. Barakzai, Abdul Wakil; University of Nangarhar, Lyall Hemant; S.H.I.A.T.S, Department of Entomology, Allahabad – 211007, India. Efficacy of botanical insecticides in management of Okra shoot and fruit borer, Earias vittella (Fab.). Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 339-341 KEYWORDS: ABELMOSCHUS ESCULENTUS. EARIAS VITTELLA. MANAGEMENT.

The treatment with combined cypermethrin 25 EC (0.0625%) + neemoil (1%) was found most effective, the fruit damage was 4.3%, with highest cost benefit ratio 1:3.31, and yield 98.07 q/ha.The treatment with chemical insecticide of chlorpyriphos was effective, the fruit damage was 5.7%.The treatments with botanical insecticides viz. neemoil 1%, datura leaf extract 10%, garlic bulb extract 3% and greenchilli extract 1% were also effective, resulting 6.6%, 8.6%, 9.0% and 10.5% fruit damage, compared with control plot 22.0%. Amongthe botanical insecticides, neem oil 1% gave highest CBR 1:2.59 and yield 80.43 q/ha, so neem oil 1% was found best botanical treatment against Earias vittella as it is eco-friendly, no residual effect and not caused hazardous effect to environment, also it could be an important tool in IPM programme.

361. Bhardwaj, Tulsi; I.A.R.I., Division of Agricultural Extension, New Delhi -110012, India. Sharma, J.P.;I.A.R.I., Division of Agricultural Extension, New Delhi -110012,India. Validation of IPM Technologies: Problems and Practices. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 342-344 KEYWORDS: INTEGRATED PEST MANAGEMENT.

The study was carried out to identify the impediments to IPM technology that are being faced by farmers. It was found that non-availability of multiple resistant varieties, lack of economic threshold, difficult to know ETL, high cost of labour and unawareness were the topmost problems to IPM technology faced by the agri-workers while adopting IPM technology. The maximum number (19) of problems observed by farmers were in the category of biological deterrents. While least number (6) was recorded in the category of technical deterrents. However, the interactive and socioeconomic category had a moderate number of impediments.

362. Nayanakantha, N.M. Chamil; Dartonfield, Agalawatta, Rubber Research Institute of Sri Lanka, Sri LankaRawat, Sandya; Indian Agricultural Research Institute, National Research Centre on Plant Biotechnology, New Delhi, 110012, IndiaAli, Sajad; Indian Agricultural Research Institute, National Research Centre on Plant Biotechnology, New Delhi, 110012, IndiaGrover, Anita; Indian Agricultural Research Institute, National Research Centre on Plant Biotechnology, New Delhi, 110012, India. alpha-Tubulin: A more suitable internal control than Bita-Actin in reverse transcription-PCR analysis of Brassica juncea, Sinapis alba and Camelina sativa under different experimental conditions. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 345-351KEYWORDS: BRASSICA JUNCEA. CAMELINA SATIVA. SINAPIS ALBA.

The elucidation of gene expression patterns leads to a better understanding of responses to biotic or abiotic stimuli. Semi-quantitative RT-PCR analysis, a technique for expression analysis of genes, depends on the stability of the internal control gene (s) used for the comparison of the band intensity in agarose gels. In the present study, two frequently used housekeeping genes,viz., â-actin and á-tubulin, were evaluated for their expression stability in *B. juncea* and its wild allies namely Sinapis alba and Camelina sativa under three experimental conditions viz., Alternaria brassicae challenge, salicylic or jasmonic acid treatment. Results revealed that á-tubulin was more suitable housekeeping gene than â-actin for all three plant species under all three experimental conditions. Expression of â-actin changed especially under defense inducer experimental conditions with all three plant species.

363. Jeevan, B.; Indian Agricultural Research Institute, Division of Plant Pathology, New Delhi-110012, India. Jagadeesh, E.; University of Agricultural Sciences, GKVK, Department of Plant Pathology, Bangalore-560065, IndiaKumar, H.D. Vinay;University of Agricultural Sciences, Department of Plant Pathology, Raichur-584102, IndiaSingh, Kartar; Indian Agricultural Research Institute, Division of Plant Pathology, New Delhi-110012, India. Molecular detection of begomovirus causing French bean (Phaseolus vulgaris L.) yellow mosaic disease. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 352-354 KEYWORDS: BEMISIA TABACI. PCR.

French bean yellow mosaic virus is a whitefly (Bemisia tabaci) transmitted by begomovirus causing a serious disease of french bean in southern India. The typical symptoms of present isolate showed brilliant yellow or golden yellow colour on leaves which may be partially or completely yellow. The importance of this disease has promoted a great need for rapid identification of yellow mosaic virus infecting french bean. Polymerase chain reaction (PCR) is the most sensitive approach to detect a minute amount of viral nucleic acid. In this study, geminivirus specific primers were employed to detect yellow mosaic virus infecting french bean by PCR based approach. One primer pair amplified yellow mosaic virus DNA fragment of coat protein gene was used a PCR amplified fragment of about 1 KB was obtained. This approach was highly useful for an early detection of french bean yellow mosaicvirus.

364. Shaista Rahman; Bidhan Chandra Krishi Viswavidyalaya, Department of Plant Pathology, Faculty of Agriculture, Mohanpur, Nadia - 741252, IndiaJayanta Tarafdar; Bidhan Chandra KrishiViswavidyalaya, Department of Plant Pathology, Faculty of Agriculture, Mohanpur, Nadia - 741252, India Santosh Kumar; Bihar Agricultural University, Department of Plant Pathology, Sabour, Bhagalpur-813210, India. Amarendra Kumar; Bihar Agricultural University, Department of Plant Pathology, Sabour, Bhagalpur-813210, India. Effect of amalgerol and tebuconazole on tikka leaf spot and rust of Groundnut. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 355-357 KEYWORDS: ARACHIS HYPOGAEA. MYCOSPHAERELLA ARACHIDIS. PUCCINIA.

The results revealed that combination of tebuconazole 25EC +amalgerol 500ml and 2000ml/ha exhibited the best to control the diseases as well as improved groundnut crop health. Two applications of tebuconazole 25EC + amalgerol 500ml and 2000ml/ha gave very effective control of tikka leaf spot and rust and where terminal PDI was 06.1 and 09.1, respectively. Amalgerol regulating the disease incidence was environmentally safe and economically beneficial. Results also indicated that amalgerol in combination with tebuconazole offered resistance to the invasion of disease causing pathogen.

365. Mahendra Partap; Swami Keshwanand Rajasthan Agricultural University, Department of Plant Pathology, College of Agriculture,Bikaner - 334 006, India. V.A. Solanki; Navsari Agricultural

University, Department of Plant Pathology, Navsari -396450, India B.D.S. Nathawat; Swami Keshwanand Rajasthan Agricultural University, Department of Plant Pathology, College of Agriculture, Bikaner -334006, India Jagdish Prasad; Swami Keshwanand Rajasthan Agricultural University, Department of Plant Pathology,College of Agriculture, Bikaner - 334006, India. Antifungal efficacy of bio-agents, botanicals and fungicides for inhibition of Alternaria alternata (Fr.) Keissler causing Black point of Wheat. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 358-362 KEYWORDS: ALTERNARIA ALTERNATA. TRITICUM AESTIVUM.

Biological studies on interaction effect of known antagonists carried out by dual culture method, showed strong antagonistic effect of *Trichoderma viride* (S.K. Nagar) (77.7%) and *T. harzianum* (S.K. Nagar) (68.8%) to Alternaria alternata in vitro. The phyto-extracts screened in vitro by poisoned food technique against A. alternate revealed that neem (61.0%), Damaru (60.7%), tulsi (59.38%), mint(59.3%) and kadvi mahendi (54.6%) leaves showed maximum average %inhibition of growth and sporulation. Invitro screening of fungicides thiram was proved most effective and inhibiting cent percent growth of A. alternata even at 1500ppm concentration. Next effective fungicides in order were mancozeb (2000ppm), mancozeb(1500ppm), chlorothalonil (2000ppm) and carbendazim (1000ppm).

366. Kumar, Sunil; R.A.U., Department of Plant Pathology, Bihar,Pusa, Samastipur - 842125, India. Upadhyay, J.P.;R.A.U., Department of Plant Pathology, Bihar, Pusa, Samastipur - 842125, IndiaKumar, B.; R.A.U., Department of Plant Pathology, Bihar,Pusa, Samastipur - 842125, IndiaPatel, A.K.; R.A.U., Department of Plant Pathology, Bihar, Pusa, Samastipur - 842125, IndiaKumar Sanjeev; R.A.U., Department of SMC Application, FB & H. Bihar, Pusa, Samastipur - 842125, IndiaSingh, Monika; Indian Agricultural Research Institute, National Centre for Integrated Pest Management, New Delhi-110012, India. Analysis of factors responsible for incidence of Pigeon pea wilt (Fusariun udum Butler). Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 363-367 KEYWORDS: CAJANUS CAJAN. FUSARIUM. SOIL TYPES.

Effect of soil types on wilt incidence revealed maximum incidence of 74.7% in loam soil and least in clay soil (49.5%).Similarly soil pH on disease indicated maximum wilt incidence (51.5%) at soil pH5 followed by pH7. Correlation coefficient between wilt incidence and pH of the soil indicated that incidence was negatively (-0.960*) and significantly correlated with soil pH. Significantly maximum population of F. udum (4.83 x 103 cfu/g soil) was recorded in 1st July and 16th July sowing at upper (0-15) soil strata followed by the subsequent date of sowing on same depth of soil strata. At crop harvest stage, maximum population of F. udum 15.17 x 103 cfu/g soil in 1st July sowing at upper soil strata (0-15 cm). The minimum population of F. udum was recorded in 16th August sowing at 31-45 cm soil strata. Sowing of pigeon pea in first fortnight recorded maximum wilt incidence 89.5 % in 1st July sowing which was on par with 16th July sowing (86.8 %) and significantly higher than August sowing.

367. Khan, Mujeebur Rahman; Aligarh Muslim University, Department of Plant Protection, Aligarh -202002, Rizvi, Hina; Aligarh Muslim University, Department of PlantProtection, Aligarh -202 002, IndiaAnsari, Rizwan Ali; Aligarh Muslim University, Department of Plant Protection, Aligarh -202002, IndiaSafiuddin; Aligarh Muslim University, Department of Botany, Aligarh - 202002, India. Biochemical reaction of Tagetes spp. cultivars to *Rhizoctonia solani*. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 368-373 KEYWORDS: BIOCHEMICAL REACTIONS. RHIZOCTONIA SOLANI. TAGETES.

Host reaction of three marigold cultivars of Tagetes spp. viz.,Tagetes erecta cv. Yellow Dwarf, T. erecta cv. Hazara and T. patula cv. Jafri was evaluated against two inocula of Rhizoctonia solani (2& 4g colonized sorghum seeds/kg soil). The cv. Jafri and Yellow Dwarf were found susceptible to the fungus and showed stunted growth, leaf yellowing and web

like blighting, especially at 4 g inoculum level. Roots of infected plants showed rotting in the form of browning of lateral roots and also the main root. The cv. Jafri was found highly susceptible with a root-rot severity of 1.2 and 2.8 (0-5 scale) and exhibited 6-27% and 8-32% decrease in the plant growth variables at 2 and 4g inocula of the fungus, respectively. The cv. Hazara expressed resistance to the fungus with 0.7 root-rot index without a significant decrease in the plant growth and chlorophyll pigments at 4 g inoculum level. The differential reaction of Tagetes cultivars was found correlated with salicylic acid (SA) and phenol contents(PC) of leaves. The two important biochemicals were synthesized by Tagetes spp. in significantly greater concentrations in response of the infection by R. solani. Moreover, the concentration of SA and PC was greatest in cv. Hazara that expressed resistance to R. solani, and lowest in cv. Jafri which was found highly susceptible to the fungus. Chlorophyll contents of leaves also showed negative relationship with root-rot index.

368. Singh, H.V.; Indian Grassland and Fodder Research Institute,Gwalior Road, Jhansi - 284003, India. Satyapriya; Indian Grassland and Fodder Research Institute, Gwalior Road, Jhansi - 284003, India. Evaluation of genotypes, cultural practices and growing location on Phytophthora fruit rot and yield of Tomato in participatory approach. Annals of Plant Protection Sciences(India). (Sep 2014) v.22(2) p. 374-377 KEYWORDS: CULTURAL METHODS. PHYTOPHTHORA. LYCOPERSICON ESCULENTUM.

Performance of tomato varieties and cultural practices at different climatic variable locations were evaluated for most devastating tomato disease phytophthora fruit rot in farmer participatory approach in district Poonch of Jammu. It was observed that among four tomato varieties DRT-1 gave significantly higher fruit yield (451q/ha) with minimum disease at foliar stage (PDI 8.1) and fruit rot % (6.5). Punjab Keshri showed maximum disease (PDI 68.2 and 23.6% fruit rot) with yield of 238.5 q/ha. Among cultural practices, staking markedly reduced disease development at both foliar (PDI 21.0) and fruit rot (13.8%) with mean higher fruit yield (390.34 q/ha). Higher mean fruit yield 376.16 q/ha was recorded at mid hill location while lower fruit rot incidence (12.6%) at temperate location.

369. Pandey, Shailja; D.D.U. Gorakhpur University, Department of Botany, Gorakhpur - 273009, IndiaSingh, Pooja; D.D.U. Gorakhpur University, Department of Botany, Gorakhpur - 273009, India.. Post-harvest storage fungi of Almonds (Prunus amygdalus Batsch.) and its sensitivity against Plant volatiles. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p.378-381 KEYWORDS: FUNGAL DISEASES. LIPPIA. PRUNUS DULCIS.

Major post-harvest deteriorating fungi isolated from stored seeds of almonds were *Aspergillus flavus, A. niger, Fusarium nivale, Mucor mucedo and Penicillium expansum*. *A.flavus* and *A.niger* had higher % incidence than other isolated fungi. Twenty essential oils were screened against *A.flavus* and *A.niger*. Out of which, oil of Lippia alba showed absolute fungitoxicity at 40 ìl/ml against both the test fungi. Study revealed that L. alba oil can be harnessed as effective preservative of almonds during storage.

370. Nathawat, B.D.S.; Rajasthan Agricultural Research Institute, Division of Plant Pathology, Durgapura (Jaipur), India Partap, Mahendra; Swami Keshwanand RajasthanAgricultural University, Bikaner - 334006, India. Evaluation of fungicides, botanical and *Trichoderma spp.* against collar rot of Groundnut (Arachis hypogaea L.) caused by *Aspergillus niger* van Tiegham.. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. KEYWORDS: ASPERGILLUS NIGER. TRICHODERMA.

All the fungicides at different concentrations were found significantly inhibitory to the fungal growth as compared to control.The cent per cent growth inhibition was recorded in tabuconazole and propiconazole at 100 to 1000ppm). The next effective fungicides was carbendazim (500, 750 & 1000ppm), difenconazole (750 & 1000ppm), combination product

of carbendazim + mancozeb and captan (1500, 2000& 2500ppm) which were also inhibited cent per cent growth of fungus. *Trichoderma harzianum* (Navsari) showed strong antagonistic effect, followed by *T. viride* (S.K. Nagar). The phyto-extracts screened in vitro by poisoned food technique against *A. niger* revealed that neem leaves showed maximum growth inhibition of fungus followed by parthenium, neem seed, barmasi and ardusi leaves.

371. Dushyant; S. K. Rajasthan Agricultural University, Department of Plant Pathology, Bikaner - 334006, Rajasthan, IndiaKhatri, N.K.;S. K. Rajasthan Agricultural University, Department of Plant Pathology, Bikaner -334006, Rajasthan, India. Prasad, Jagdish; S. K. Rajasthan Agricultural University, Department of Plant Pathology, Bikaner -334006, Rajasthan, IndiaMaheshwari, S.K.; Central Institute for Arid Horticulture, Bikaner- 334006, India. Morphological and physiological variation among isolates of Alternaria solani causing early Blight of Tomato. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 386-389 KEYWORDS: ALTERNARIA SOLANI. LYCOPERSICON ESCULENTUM.

All the isolates were found to be pathogenic and isolate Bikaner recorded maximum growth (89.33mm) followed by Sriganganagar (85.67mm). Among the carbon sources tested, glucose supported maximum dry mycelial weight 488.66mg in Bikaner isolate. The nitrogen sources, asparagine supported maximum dry mycelial weight 402.00 and 397.00mg in Bikaner and Sriganganagar isolates. Maximum mycelial growth of isolate Bikaner was observed at pH value 6.5 with mycelial growth of 88.33 mm. Maximum mycelial growth of isolate Bikaner (89.33 mm) was observed at 25°C.

372. Kumar, Ashish; J.N.K.V.V., College of Agriculture, Department of Plant Pathology, Rewa, M.P. 486001, India. Management of anthracnose disease of Mango by pre and post harvest treatments. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 390-394 KEYWORDS: GLOMERELLA CINGULATA. MANGIFERA INDICA.

Pooled analysis of two years data indicated that three foliar sprays with carbendazim + mancozeb (0.2%) at 10 days interval starting from initiation of disease symptom was found most effective in controlling the foliar anthracnose of mango, followed by other treatments viz., tricyclazole (0.1 %) and carbendazim (0.1%) which were also found effective. For post harvest anthracnose management, one spray of thiophanate methyl (0.1%) 15 days prior to harvest and then hot water treatment supplemented with thiophanate methyl was found most effective. It was also observed that shelf life of fruits was decreased by 2 or 3 days after post harvest treatments of hot water or hot water supplemented with fungicide.

373. Kumar, Santosh; Bihar Agricultural University, Department of Plant Pathology, Sabour-813210, Bihar, India.Chand, Gireesh; Bihar Agricultural University, Department of Plant Pathology, Sabour-813210, Bihar, India Tripathi, H.S.; G. B. Pant Univ. of Agri. Tech., College of Agriculture, Department of Plant Pathology, Pantnagar- 263145, IndiaKumar, Amarandra; Bihar Agricultural University, Department of Plant Pathology, Sabour-813210, Bihar, India. Assessment of yield loss and evaluation of Urdbean genotypes against Web blight. Annals of Plant Protection Sciences(India). (Sep 2014) v.22(2) p. 395-397 KEYWORDS: GENOTYPES. RHIZOCTONIA SOLANI. VIGNA MUNGO. YIELDS.

Results revealed that with the increased levels of web blight severity, the corresponding yield decreased significantly. Per plant reduction in seed yield varied from 24.2 to 60.4% under resistant (grade 1) to highly susceptible (grade 9) in comparison to healthy control. On an average 35.6% reduction in seed yield were assessed on moderate level of susceptibility (grade 5) over healthy control. Out of 45 genotypes evaluated against web blight. IPU 8-18, KU 99-19, IPU7-19, VBG 04- 008, OBG 31, IPU 94-1and IPU 05-13 showed highly resistant reaction with disease score 1. The genotypes viz., CU-5, SB25-19 IVT,

NDU 9-15, UH 4-06, Pant U 30, M 1-1, KUG 222, UL 416, UL417, KKB 20055 and UH 04-65showed moderately resistant reaction with disease score 3.

374. Kumar, Sunil; N.D. Univ. of Agri. & Tech., Department of Plant Pathology, Kumarganj, Faizabad-224229, India. Singh, R.B.; N.D. Univ. of Agri. & Tech., Department of Plant Pathology, Kumarganj, Faizabad-224229, IndiaShakywar, R.C.; College of Horticulture & Forestry, Department of Plant Pathology, C.A.U.,Pasighat, India. Epidemiological studies on Alternaria blight of Brassica campestris L. var. Yellow sarson Prain caused by Alternariaspp.. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2)p. 398-402 KEYWORDS: ALTERNARIA BRASSICAE. BRASSICA. EPIDEMIOLOGY.

Earliest disease initiation was noted on entry NDYS 2018 which proved most susceptible with AUDPCs of 224.47, 318.77, 231.77 and 246.32, 325.06, 230.33 in respective years and different date of sowing. NDYS 119 was least susceptible which showed lowest AUDPCs of 155.06, 243.94, 186.49 and 185.29, 248.31, 198.13 in respective years and different date of sowing. Average higher AUDPCs of 214.00 287.22 and 214.50 in respective date of sowing was recorded in second year over 184.34 in 20 October, 279.04 in 30 October and 215.17 in 10 November sown crop in first year, proved most favourable for Alternaria blight development. Average highest PDI of 67.4 and 72.4% during first and second year, respectively were recorded in second date of sowing as compared to first and third date of sowing. The maximum disease development was recorded in first week of February during both the year and it was favoured by mean minimum/maximum temperature (8.60-9.900C & 4.60-9.900C/21.40-25.200C & 22.60-23.100C) and minimum/maximum relative humidity (51.5-70.5% & 42.4-44.4%/87.2-92.7% and 86.2-92.4%), respectively during both the years. Disease intensities of all the test entries had significant positive correlation with minimum temperature during both the years. Similar positive correlation was also recorded with maximum temperature for all the entries excepting YST 151, NDYS 115-1 and NDYS 132-2. Disease intensities of all the test entries and their mean except NDYS 123, NDYS 116-1 and NDYS 119 had significant negative correlation with minimum and maximum relative humidity during both the years.

375. Chand, Ramesh; N.D. University of Agriculture & Technology, Department of Nematology, Kumarganj, Faizabad - 224229, IndiaPandey, V.P.; N.D. University of Agriculture & Technology,Department of Vegetable Science, Kumarganj, Faizabad - 224229, India. Narendra Turmeric-3: A new multiple disease resistant and high yield variety of Curcuma longa L.. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 403-405 KEYWORDS: CURCUMA LONGA. MULTIPLE LANDUSE.

On the basis of its growth performance under field conditions. Narendra Turmeric-3 (NDH-9) as a superior variety over national checks Rajendra Sonia and Prabha with 4.0-6.0% curcumin, 10-12%oleoresin, 2.9-3.5% essential oil, 2.0-2.5% leaf oil, 23-26% drymatter, 325-350 q/ha. fresh rhizome yield, 9.11-19.57% yield increase over national check, 15-20 q/ha. seed rate, 215-225 days crop maturity (medium maturity), good size and colour of fingers, 8.0-8.5pH adaptability, good powder making property, orange deep yellow colour, higher aroma, moderately resistant to leaf blotch, leaf spot and Meloidogyne incognita race-1.

376. Sharma, R.K.; Indian Agricultural Research Institute, Division of Plant Pathology, New Delhi - 110012, India. Kamil, Deeba; Indian Agricultural Research Institute, Division of Plant Pathology, New Delhi -110012, India. Yield enhancement of different species of Oyster Mushroom (Pleurotus spp.) by animal waste products. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 406-409 KEYWORDS: PLEUROTUS. YIELDS.

Studies were conducted to see the effect of addition of nutriwash and coelomoic fluids in the substrate on yield of different species of Pleurotus mushroom. Very encouraging

results were obtained in repeated trials. Period of spawn run and pin head initiation was found to be reduced in P. sajor-caju with 1% coelomic fluid treatment, however P. cornucopiae and P. opuntiae did not show any effect on spawn run and pin heads initiation period. The data also revealed that the addition of coelomic fluid and nutriwash 1 and 5 %,respectively in the wheat straw significantly increased the yield of (Pleurotus florida, P. sajor-caju, P. cornucopiae & P. opuntiae) in the range of 11.7 to 18.4% in different species of oyster mushroom in comparison to control.

377. Pervez, Rashid; Indian Institute of Spices Research, Division of Crop Protection Kozhikode (Kerala) 673012 – India. Devasahayam, S.; Indian Institute of Spices Research, Division of Crop Protection Kozhikode (Kerala) 673012 –IndiaEapen, Santhosh J.; Indian Institute of Spices Research, Division of Crop Protection Kozhikode (Kerala) 673012 – India. Effect of temperatures on infectivity of Entomopathogenic Nematodes. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p.410-413 KEYWORDS: TEMPERATURE. ENTOMOPHILIC NEMATODES.

The infectivity of eight native isolates of EPNs,Heterorhabditis sp. (IISR-EPN 01), Steinernema sp. (IISR-EPN 02), S.ramanai (IISR-EPN 03), S. carpocapsae (IISR-EPN 06), Oscheius spp.(IISREPN 04, 05 & 08) and O. gingeri (IISR-EPN 07) were tested against lepidopteran insect pest, Galleria mellonella larva and multiplication into host at different temperatures viz., 20, 25, 30 and 35^{o}C. The temperature significantly affected the pathogenicity and multiplication ability of all tested EPNs. Among the test temperature, maximum mortality of larvae was found at 30^{o}C followed by 25^{o}C, whereas the least mortality of insects was recorded at 20 and 35 ^{o}C. Maximum number of infective juveniles of EPNs were multiplied at 30 ^{o}C, followed by 25 ^{o}C, whereas, minimum multiplication was recorded at 35 ^{o}C. However, no multiplication of EPNs was recorded at 20 ^{o}C. Therefore, the optimal temperature for infection and multiplication of EPNs was 30°C.

378. Sharma, Dilli Ram; Institute of Agriculture and Animal Science, Tribhuvan University, Rampur, Chitwan, Nepal;. Thapa, Resham Bahadur; Institute of Agriculture and Animal Science, Tribhuvan University, Rampur, Chitwan, Nepal;Manandhar, Hira Kaji; Director, Planning and Coordination, Nepal Agricultural Research Council (NARC), Singhadurbar Plaza, Kathmandu, NepalShrestha Sundar Man; Institute of Agriculture and Animal Science, Tribhuvan University, Rampur, Chitwan, Nepal;Pradhan, Shree Baba; Entomologist, Kathmandu, Nepal. A case study on attitude of Vegetable growing farmers towards pesticides use in Nepal. Annals of Plant Protection Sciences (India). (Sep 2014) v.22(2) p. 414-417 KEYWORDS: PESTICIDES. VEGETABLES.

The study revealed that 95.3% of farmers used chemical pesticides in their vegetable crops. Majority of farmers (55%) stored pesticides outside the house, while 44% stored inside their houses (living room, open space, under the staircase etc.) and 1.5% even stored in bed room. Fifty-six % of the farmers expressed their view that application of pesticides caused pollution of water and air, while large number of farmers (74.5%) believed that pesticide application was harmful to the health of farm workers. Fifty-four %farmers did not follow waiting period at all after application of pesticides, whereas, 25.5% of the farmers, harvested vegetables the next day after spraying. Majority of farmers (51%) mainly depended on pesticide dealers for advice, followed by public extension system(32%), fellow farmers/friends (31.5%) and News/FM (15.5%). The farmers were quite aware of the harmful effects of pesticides, but they were not translating this awareness into their own safety practices. Therefore, there is a need of policy for strengthening trainings, extension services and various awareness programmes.

379. Mohanta, Swatilekha; College of Agriculture, OUAT, Department of Nematology, Bhubaneswar-751003, India. Swain, P.K.; College of Agriculture, OUAT, Department of Nematology, Bhubaneswar-751003, India. Integrated management of Meloidogyne incognita infecting Turmeric. Annals of Plant Protection Sciences(India). (Sep 2014) v.22(2) p. 418-421 KEYWORDS: CURCUMA LONGA. MELOIDOGYNE INCOGNITA.

Application of individual and combined management modules decreased root-knot index, population of nematode in soil and root including increase in various growth parameters as well as yield. Among the individual management modules, carbofuran 1.5 kg a.i / ha was the effective management module which enhanced plant growth, yield and reduced disease development. Although significant increase in growth, yield and disease development was recorded in T9 (*Bacillus subtilis* 5 lit / ha + soil solarization), T10 (crustacean exoskeleton 0.75 t / ha + soil solarization), T11 (carbofuran 0.75 kg a.i / ha +B. subtilis 5 lit / ha) and T12 (sesame oil cake 0.75 t / ha + soilsolarization), T11 was found to be the most important cost effective management module with a B : C ratio of 2.8 : 1.

380. Chandrika Mohan; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.Josephrajkumar, A.; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.. Understanding damage symptoms and management of coconut pests. Indian Coconut Journal (India). (July 2013) v.LVI(3) p.10-15KEYWORDS: COCONUTS. PEST CONTROL. SYMPTOMS.

381. Jnanadevan, R.; Directorate of Cashewnut and Cocoa Development, Kochi(India). Organic ways to manage coconut pest and diseases. Indian Coconut Journal (India). (July 2013) v.LVI(3) p.22-25 KEYWORDS: COCONUTS. PESTS.

382. Kesavan Subaharan; Central Plantation Crops Research Institute, Kasaragod (India)Vibina Venugopal; Central Plantation Crops Research Institute, Kasaragod (India)Raveendran, P.; Central Plantation Crops Research Institute, Kasaragod (India). Semiochemicals in management of coconut rhinoceros beetle and red palm weevil. Indian Coconut Journal (India). (July 2013) v.LVI(3) p.26-28,31 KEYWORDS: COCONUTS. PESTS.

383. Bhanu, K.R.M.; PCI, Bangalore (India), Bio-Control Research LaboratoriesChandrasekharaiah; PCI, Bangalore (India), Bio-Control Research Laboratories. Pheromone technology: An ecofriendly approach for coconut pest management. Indian Coconut Journal (India). (July2013) v.LVI(3) p.29-31 KEYWORDS: PHEROMONE TRAPS. RHYNCHOPHORUS FERRUGINEUS. ORYCTES RHINOCEROS.

384. Vijayakumar Hallikkery; Coconut Development Board, Regional Office, Banglore.. Parasite breeding laboratory of CDB. Indian Coconut Journal (India). (July 2013) v.LVI(3) p.35-36,38 KEYWORDS: PARASITES.

H10 Pests of plants

385. Muralidharan, K.; Coconut Development Board, Kochi (India)Resmi, D.S; Coconut Development Board, Kochi (India). Research initiatives under Technology Mission on Coconut. Indian Coconut Journal (India). (July 2013) v.LVI(3) p.4-9 KEYWORDS: TECHNOLOGY. COCONUTS. RESEARCH PROJECTS. PEST INSECTS.

H20 Plant diseases

386. Vinayaka Hegde; Central Plantation Crops Research Institute, Kasaragod (India)Prathibha, V.H.; Central Plantation Crops Research Institute, Kasaragod (India). Integrated disease management in coconut. Indian Coconut Journal (India). (July 2013) v.LVI(3) p.16-21 KEYWORDS: COCONUTS. SYMPTOMS.

387. Regi, J.Thomas; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.Shareefa, M.; Central Plantation Crops Research Institute, Kayamkulam (India). Regional Station.Nair, R.V.; Central Plantation Crops Research Institute, Kayamkulam(India). Regional Station.. Varieties resistant to root (wilt)disease of coconut. Indian Coconut Journal (India). (July 2013) v.LVI(3) p.32-34 KEYWORDS: COCONUTS.

388. Vinoth Thomas.; Rubber Research Institute of India, Kottayam(India). Pramod, S; Sardar Patel University,Gujarat (India), Department of BiosciencesRao, K.S; Sardar Patel University,Gujarat (India), Department of Biosciences. Structural modification of phloic rays in Hevea brasiliensis with reference to tapping panel dryness and stimulation. Journal of Plantation Crops. (Aug2013) v.41(2)p.142-150 KEYWORDS: ETHEPHON. HEVEA BRASILIENSIS.

Hevea brasiliensis, the prime source of natural rubber, when tapped intensively showed the symptoms of gradual cessation of latex flow from the tapping wound and this phenomenon is termed as tapping panel dryness (TPD), leading to a number of structural deformations in the bark tissues. The unproductive bark thus formed due to TPD is subjected to ethephon stimulation resume latex flow for a period. The study was initiated to trace the structural modifications occurred in phloic rays as an alternative route for translocation under necessity. The dimension of phloic rays also showed significant variation in TPD trees in comparison with both healthy stimulated trees. A decrease in length and an increase in width of phloic rays were evident in TPD affected trees over healthy trees. Average height of ray (µm) in the bark of healthy, TPD affected, unaffected zone above the TPD affected area and TPD panel under ethephon was 495,259, 416 and 285 respectively. In healthy trees, 57 per cent of the rays fall in the stratified height class of 300-500 µm but in TPD trees, 78 per cent of the phloic rays is having a height less than 300 µm. The average width of the ray measured 56.81 and 74.25 µmrespectively for healthy and TPD trees. In healthy trees 61 per cent of the ray falls under width strata of 40-60 µm and in TPD trees 68 per cent is in the 60-80 and 24 per cent in 80-100 µm width strata. For the production of latex from unproductive bark of TPD tree on stimulation, adequate nourishments is being mobilized to the site of action by strengthening radial transport system in the affected area.

N02 Farm layout

389. Lunghar Obed; Coconut Development Board, AssamRandhir Sinha; Resources Centre for Sustainable Development, Guwahati (India)Sugata Ghose; Coconut Development Board, Kochi (India). Laying out of demonstration plots in Khetri, Assam. Indian Coconut Journal (India).(Feb 2013) v.LV(10) p.40-41 KEYWORDS: COCONUTS. MIXED FARMING.

N20 Agricultural machinery and equipment

390. C-DAC develops early detector of red palm weevil infestation. Indian Coconut Journal (India). (Nov 2013) v.LVI(7) p.27 KEYWORDS: TECHNOLOGY.

P05 Energy resources and management

391. Remany Gopalakrishnan; Coconut Development Board, Kochi (India). Can Energy be Cultivated?. Indian Coconut Journal (India). (Mar2013) v.LV(11) p.14-18 KEYWORDS: COCONUT OIL. BIOFUELS.

392. Vasantha Kumar, V.C.; Coconut Development Board, Kochi (India).Coconut Oil -Source of Energy that can be cultivated. Indian Coconut Journal (India). (Mar 2013) v.LV(11) p.25-26 KEYWORDS: COCONUT OIL. BIOFUELS.

P33 Soil chemistry and physics

393. Muraleedharan, K.K; IMT Technologies Ltd. Pune(India)Verma, D.P; IMT Technologies Ltd. Pune (India) Ujwala Ranade-MalviNandini, G.M Kumar, G.JShruthi, M.SSmitha, RSowmya, R; IMT Technologies Ltd. Pune (India). A different approach to soil analysis: Indicative studies. Journal of Plantation Crops. (Aug2013) v.41(2)p.219-226 KEYWORDS: PH. SOIL ANALYSIS.

Soil analysis is a tool that has been employed with the primary goal of providing recommendations for soil rectification,crop productivity and for soil health management. Time tested methods like ammonium acetate extraction and diethylene triamine penta acetic acid (DTPA) are commonly used for analysis of bioavailable nutrients. However, there are some limitations to these methods as both extraction fluids are buffered to neutral or near-neutral pH. Hence extracted nutrients represent a potential or ideal-case fertility status of soil instead of an;actual; field status. In the;Regular methods;,we are overlooking the role of pH, the master variable, in determining the availability of nutrients. Hence, in;Modified methods;, the extraction fluid is buffered to actual soil pH. Results obtained with over 150random samples representing a range of pH, have indicated a difference in values between regular and modified extraction methods. The modified methods (MM) of ammonium acetate and DTPA extraction adjusted to soil pH were found to be better than regular method (RM) for estimation of calcium, magnesium with ammonium acetate and iron and manganese with DTPA in alkaline soils above pH 8.0. For a complete picture of soil health, productivity and fertility, microbiological and enzymatic analysis of soils were included in the present study. Soil solution equivalent medium (SSE) was found to be the appropriate culture medium for microbial counts. A linear relationship was found between urease activity and available nitrogen of soil.

Q01 Food science and technology

394. Siddarameswara Swamy, G.M.; CDB RO,Bangalore(India). Coconut Neera production and processing in Karnataka. Indian Coconut Journal (India). (Jan2013) v.LV(9)p.31-33 KEYWORDS: COCONUTS. PRODUCTION. MARKETING.

395. Gopala Krishna, A.G.; Central Food Technological Research Institute, Mysore (India)Bhatnagar, A.S.; Central Food Technological Research Institute, Mysore (India)Prasanth Kumar, P.K.; Central Food Technological Research Institute, Mysore (India)Indira, T.N.; Central Food Technological Research Institute, Mysore (India)Subramanian, R.; Central Food Technological Research Institute, Mysore (India) Indiramma, A.R.; Central Food Technological Research Institute, Mysore (India). Technology for cheaper and healthier coconut oil blends. Indian Coconut Journal (India). (Mar 2013) v.LV(11) p.41-42 KEYWORDS: COCONUT OIL. HEALTH FOODS.

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Q04 Food composition

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