Review

Neem products: An eco-friendly solution for sustainable agriculture

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ABSTRACT

The neem tree (*Azadirachta indica*) is inimitable among the plant kingdom in terms of myriads of chemical compounds present in its various parts. Early part of 19th century witnessed beginning of scientific research on neem and its different parts. The prior studies were limited to making of crude extracts and investigating biological properties. In the year 1968, the principle molecule-azadirachtin was characterized, which lead to profound interest by academia and scientific community on this plant. These resulted in isolation and characterization of 116 chemical entities from neem tree. The scientific investigations also reconfirm over twenty eight different classes of biological properties. Today majority of the manufacturers in various parts of the world directly use different parts of neem tree or its extracts or active concentrate in preparation of the commercial products. At a time, when the agricultural community is concerned about the rising costs of pesticides, lack of new leads from synthetic and combinatorial chemistry, maximum utilization of the pesticide applications of neem will play a major role as a strategy for sustainable agriculture. The neem extracts marketed over the world are generally of three categories, i.e., crude neem extracts, active extract concentrates (up to 20% azadirachtin) and high pure technical concentrates (greater than 40% azadirachtin). The formulations are mostly derived from neem oil with few based on active extracts. NEEMAZAL® is a unique neem seed kernel extract concentrate having superior pest control properties by goodness of its highest azadirachtin content. It contains about 51.7 per cent of azadirachtins besides other bio-active limonoids. The product developed more than a decade ago, now stands world-over as the most recommended active bio-pesticide and as an ideal eco-friendly organic input for cultivation of agricultural and horticultural crops. NEEMAZAL® formulations have been evaluated for the control of insect and mite pests devastating to variety of vegetable, field and plantation crops and produce. The product is reported to have superior systemic property and hence, used widely for effective and continual control of chewing and sucking insect and mite pests. In many field trials the effectiveness of NEEMAZAL® formulations was found to be comparative to synthetic pesticides due to which it has been identified as a stand alone product for protecting crops. Presently, NEEMAZAL® formulations are Global brands with registrations in more than 36 countries, representing five continents. Further, no re-entry (NOEL) or post harvest interval restrictions (PHI) are imposed in these countries for NEEMAZAL® formulations and it is popular as an ideal fit for the organic and sustainable agriculture.

Key words: *Azadirachta indica*, neem, eco-friendly solution, agriculture.

Organic Farming

Impact of composted coir pith and other organic sources on physico-chemical and physical properties and yield of groundnut

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ABSTRACT

A field experiment was conducted in theri soil at village Puchikadu district Thuthukudi, Tamil Nadu, South India to evaluate the effect of different organic amendments and its combinations on various physico-chemical and physical properties and yield of groundnut. The results revealed that the composted coir pith had positive impact on all the soil properties. The groundnut yield was highest (3135 kg ha^{-1}) in the treatment composted coir pith (CP) + tank silt applied @ 12.5 t ha^{-1}. The next effective treatment was CP (12.5 t ha^{-1}) with yield of 3065 kg ha^{-1}.

Key words: Composted coir pith, organic amendment, physical properties, reclamation.

Optimization of cultural and nutritional conditions for accumulation of poly-β-hydroxybutyrate in *Aulosira fertilissima*

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ABSTRACT

Poly-β-hydroxybutyrate (PHB) accumulation in the nitrogen fixing (unicellular) cyanobacterium, *Aulosira fertilissima*, was studied under various cultural and nutritional conditions. Under controlled condition, cells harvested at the stationary phase of growth depicted maximum accumulation of PHB, i.e., 5.4 per cent (w/w of dry cells) as compared to lag (4.8%) or logarithmic (3.7%) phases of cultures. A temperature range of 28–32 °C and pH 8.5 were better for PHB accumulation. Cells cultivated under regular light–dark cycles accumulated more PHB (5.4%) than those grown under continuous illumination (3.6%). Nitrogen and phosphorus starvation stimulated PHB accumulation up to 8.5 and 7 per cent (dry cells), respectively. *Aulosira* cells pre-grown in glucose (0.1%) supplemented BG-11 medium, when subjected to P-defciency in presence of acetate (0.4%), PHB accumulation was boosted up to 13 per cent (dry cells), the value almost 4-fold higher with respect to photoautotrophic condition. The PHB extracted from *A. fertilissima* was comparable with the commercial PHB, thus may be advocated for its potential application in various fields.

Keywords: Χαρβον σουρχεσ, Ν ανδ Π δεφιχιενχψ, Πολψ–β-hydroxybutyrate, *Aulosira fertilissima.*

Satisfaction of the farmers regarding organic farm practices of Hoshiarpur, Punjab

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ABSTRACT

The 2-years study revealed that the farmers (n=60) who had shifted to organic farming were middle aged (51.7%), graduate (45%) and had 2-4 years of experience in organic cultivation (55%). The level of satisfaction in farmers using bio-fertilizers was high in case of: wheat (44.9%), paddy (40.4%), sunflower (45%), maize (58%), sugarcane (50%) and vegetables (46.8%). A high level of satisfaction was also recorded in case of different crops, i.e., wheat (57.7%), paddy (35.9%), sunflower (37.5%), maize (44.7%), sugarcane (42.9%) and vegetables (50%), when vermicompost was used. In addition, the respondents used other organic inputs like composted FYM, bio-pesticides, poultry manure, biogas slurry, growth promoters, pest repellents, parasitic predators and green

manure. Most of the conventional crops of the region were farmed under organic cultivation and the minimum area was with vegetables (0.80-3.20 ha) and maximum with wheat (2.00-8.00 ha) and the range of yield obtained was comparable to traditional and prevalent practices. The respondents were for the promotion of organic farming and favoured its encouragement.

Keywords: Organic farming, vermicompost, survey, farmers satisfaction.

Assessment of botanicals fermented in cow urine alone and along with panchagavya against brinjal shoot and fruit borer*

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ABSTRACT

Field investigations on botanicals fermented in cow urine (Cu) alone and in combination with panchagavya (PG) against brinjal shoot and fruit borer, *Leucinodes orbonalis* (Guenee) revealed that shoot infestation could be minimized with Cu fermented lantana leaves (17.35%) and Cu fermented hyptis leaves (17.66%) as compared to untreated control (20.90%), while, in combination with PG (3%), karanj leaves fermented in Cu (10%) showed the minimum shoot infestation (16.22%). The test organics were however, found ineffective in restricting the fruit damage caused by the borer species. However, from the point of the marketable fruit yield (135.5 -141.7 q ha^{-1}) and benefit cost ratio (38.20:1 - 42.68:1), treatments like Cu fermented karanj leaves (10%) and Cu fermented neem leaves (10%) were considered ideal. The above organics could substantiate the loss caused by the shoot and fruit borer in brinjal, possibly through compensation of plant growth.

Key words: Shoot and fruit borer, panchagavya, botanicals, cow urine, benefit cost ratio.

Comparative studies in batch and fed batch production of lactic acid by utilization of hydrolyzed potato starch

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ABSTRACT

The present studies consists of lactic acid production through the batch and fed batch fermentation methods utilizing hydrolyzed potato starch and pure strains of *Lactobacilli*, i.e., *Lactobacillus delbreuckii* (NCIM2025), *L. pentosus* (NCIM 2912), *Lactobacillus* sp. (NCIM 2734), *Lactobacillus* sp. (NCIM2084) and co-culture of first two strains. The above fermentation methods required , 1.55g l^{-1} cell dry weight (inoculum) with 60, 80, 100, 120 and 140 g l^{-1} doses of initial soluble potato starch. The potato starch was acid hydrolyzed and the neutralized hydrolyzate were applied as carbon source in production media with NaOH neutralizer (2%) at 36^0C having initial pH of 6.5 for 108 hours at 180 rpm. In batch and fed batch fermentations, the co-culture provided the highest lactic acid production of 94.10 g l^{-1} and 120.08 g l^{-1}, followed by that of *L. delbreuckii*, 87.86 g l^{-1} and 109.27 g l^{-1} at 120 g l^{-1} and 140 g l^{-1} potato starch input. The 140 g l^{-1} starch input resulted in maximum lactic acid production in fed batch fermentation, while the same dose was inhibitory in batch fermentation. The present experiment highlights the potential advantages of the co-culture over pure culture and fed batch production over the batch one, in terms of maximum lactic acid production and operating without inhibition at high potato starch input of 140 g l^{-1}.

Keywords: Batch, co-culture, fed batch, fermentation, *Lactobacillus*.

Impact of organic manure and bio-agents/botanicals on major crops in Uttarakhand hills

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ABSTRACT

It is revealed from the results that the regular use of organic practices such as organic composts, local strains of prophylactic bio-agents and ITKs were found to improve the soil health in terms of soil inhabiting beneficial micro- fauna as well as availability of nutrients. The available nutrients in the organic field treated by different types of compost improved rapidly except soil pH. The per cent increase in available nutrients (N, P, K, OC, Ca & Mg) in the soil ranged from 0.48-0.98, 0.18-0.27, 0.38-0.58, 9.32-11.76, 0.40-1.30 (ppm) and 0.30-0.96 (ppm) after three year regular addition of organic compost. The disease causing organisms and disease incidence in different crops showed a decreasing trend in the organic field. However, the disease incidence mostly depends on several abiotic factors yet the local strains of bio-agents, which acclimatized in the local ecological niches and ITK were proved quite effective in reducing disease incidence. The per cent reduction in rice blast (basmati rice) ranged in between 17.18-62.64, early blight of tomato between 18.61-69.78 and angular leaf spot of French bean between 25.39-66.67. It has also been observed that the regular addition of organic composts (vermi, NADEP, biodynamic & EM) increases certain beneficial soil inhabiting fauna such as earthworm and collembolan, helpful in regeneration of soil quality. The earthworm population varied from 6.85-8.35 and collembolan from 102.91-132.53 25 m^{-2}. The mortality in larval population of different insect pests causing losses to the mountain crops were also observed during the course of study by using ITKs. The per cent larval mortality in cabbage butterfly ranged in between 46.95-68.98 and in grain amaranth leaf webber between 29.22-84.29.

Key words: Organic practices, soil health, amaranth, cabbage, paddy, diseases, insect pests.

Phosphorus solubilizing capabilities of microorganisms isolated from grapevine rhizosphere and non-rhizosphere soil

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ABSTRACT

Twelve fungal isolates, eleven *Aspergillus niger* and one *Pencillium* sp., obtained from rhizosphere and non-rhizosphere soil of Thompson Seedless grapevines raised on two popular rootstocks, Dogridge and 110R, were evaluated for their phosphorus (P) solubilizing abilities. The pH of the medium was brought down to 2.64 - 3.44 from 7.0 as a result of inoculation with fungal isolates and the P solubilization from calcium triphosphate ranged from 124.7 - 178.7 ppm (62.5 - 71.47 % solubilisation of added P) in different isolates. The *Aspergillus niger* isolates were more efficient P solubilizers than the *Penicillium* species. Eight bacterial isolates from rhizosphere of Thompson Seedless vines grafted on rootstocks, Dogridge, 110R, 1103P, 99R and St. George were also evaluated for their P solubilizing capabilities. Different bacterial isolates solubilized P content from 33.33 - 78.67 ppm (13.3 - 31.47% of added P) from calcium triphosphate. Inoculation with bacterial isolates also decreased the pH of the media which ranged from 5.02 - 6.48 in different isolates. A significant negative correlation was observed between the pH of the

filtrate and amount of solubilized P content by different bacterial and fungal isolates. All the fungal as well as bacterial isolates could solubilize P at 3000 ppm NaCl salinity. Fungi were more efficient in solubilizing P than bacterial isolates.

Keywords: Phosphorus solubilizing microorganisms, salinity, grapes.

Entomology

Seed yield loss in linseed due to bud fly (*Dasyneura lini* Barnes) under Ranchi conditions

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ABSTRACT

Experiments were conducted at the Research Farm of Birsa Agricultural University, Ranchi far two consecutive years under protected and unprotected conditions to determine the seed yield loss in linseed by the pest, bud fly. Results revealed substantial variations in the budfly infestation (BFI) between protected (8.58%) and unprotected (42.31%) crop, which resulted in yield loss upto 34.10 per cent (3.56 q ha^{-1}). This yield-loss caused by budfly could be avoided by four spraying of Imidacloprid (0.003%) at 20 days interval, starting from bud initiation stage.

Key words : Linseed, *Dasyneura lini*, yield, loss, determination, NMR, BCR.

Population dynamics of mustard aphid (*Lipaphis erysimi* Kalt.) in late sown Indian mustard (*Brassica Juncea* L. Czern & Coss) in relation to weather factors under north Bihar conditions

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ABSTRACT

The population build up of the mustard aphid (*Lipaphis erysismi* Kalt.) started in the last week of January synchronizing with the flowering and sliqua formation stages of the crop. Although the aphid population varied greatly during the two crop seasons, the mean aphid population $plant^{-1}$ was 7.0 with the rise in temperature and fall in relative humidity. The population gradually increased to attain peak (152.5 aphids $plant^{-1}$) in the last week of February when the average maximum and minimum temperatures, morning and evening relative humidity and rainfall were 26.0° and 10.8°C, 91.0 and 44.5 per cent and nil, respectively. Further increase in temperature and decrease in relative humidity caused a dicline in the pest-population in the first week of March and almost abruptly reached to minimum level in the following weeks and disappeared with the crop gaining physiological maturity. The correlation studies established that rise in temperature and declining relative humidity during the period favoured pest activity. The co-efficient of determination factor (R^2) values revealed that all the three biotic factors prevailing during or one or two weeks prior to the pest activity, jointly accounted for 17.02 per cent fluctuation in mustard aphid population.

Key word: Mustard cv. RAURD 1002, aphid population, weather parameters, control module.

Association between intensity of budfly (*Dasyneura lini* Barnes) incidence and linseed seed yield

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ABSTRACT

Field experiments were conducted to determine the relation between the incidence of budfly (*Dasyneura lini* Barnes) and linseed seed yield to visualize the quantitative significance of this serious insect pest for 2 consecutive years. The results revealed the negative relationship between budfly infestation and linseed seed yield. Variation in the seed yield of linseed, ranged from 5.70 to 10.77 q ha^{-1}, because of different levels of budfly infestation. Quantitative loss in the seed yield due to different levels of bud damage (6.04 - 40.88%) varied from 13.81 to 46.70 per cent. It emanates from the result that the linseed could be protected from bud fly with 6 sprays of cypermethrin (0.005%) applied at weekly intervals and may enhance seed yield upto 71.60 per cent.

Key words : *Linum usitatissimum, Dasyneura lini*, pest intensity, yield –loss.

Evaluation of neem products for management of insect pests of okra

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ABSTRACT

Field experiments were conducted to find out the effect of soil application of oiled neem cake (NC) and sprays of 1% neem soap (NS) and 4% neem seed powder extract (NSPE) on the okra fruit borer (*Earias vitella* F.) and leaf hopper (*Amrasca biguttula biguttula* Ishida) during two seasons of 2006 and one of 2007. The effect of these treatments on the incidence of petiole maggot (*Melanagromyza hibisci* Spencer), a minor pest of okra was also studied during *Rabi*, 2006. The borer incidence ranged between 13.12 to 26.61 per cent and the hopper between 12.93 to 92.33 per five plants in control plots during the study period. The sprays of NSPE, NS and soil applications of NC significantly reduced the borer and hopper incidence in all the three seasons. However, soil application of NC when combined with sprays of NS and NSPE was consistently more effective in reducing the borer and leaf hopper than soil application of NC or foliar spray, given as solo treatment. These treatments also significantly reduced the okra petiole maggot during *Rabi,* 2006. The yield obtained in these treatments were also at par with the yield obtained in the plots sprayed with Indoxacarb either alone or in combination with NC. Hence, it is concluded that soil application of neem cake supplemented with sprays of NS or NSPE can be used as alternatives to the use of synthetic insecticides in the management of fruit borer, leaf hopper and petiole maggot in okra. However, it is emphasized that quality of neem cake is very important and hence, freshly prepared NC (about 8% oil) should be used to get best results.

Keywords: Neem products, Indoxacarb, okra fruit borer, leaf hopper, petiole maggot, management.

Eco-friendly management of safflower aphid (*Uroleucon compositae* T.) through botanicals*

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ABSTRACT

Field experiments were conducted with seven treatments including control for the management of safflower aphid (*Uroleucon compositae* T.) during post rainy season for five years (2005-06 to 2009-10). The spray with dimethoate (0.03 %) was most effective in suppressing aphid infestation and producing maximum seed yield (1000 kg ha^{-1}) followed by goneem @ 5 ml $liter^{-1}$ (712 kg ha^{-1}), seed treatment with thiamethoxam @ 5 g kg^{-1} (680 kg ha^{-1}) and dashparni (601 kg ha^{-1}). The treatments goneem, thiamethoxam seed treatment and dashparni were at par with each other. The other formulations were relatively less effective against safflower aphid and producing less seed yields.

Key words: Eco-friendly management, safflower, aphid, botanicals.

Efficacy and economics of insecticides against shoot and fruit borer of brinjal

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ABSTRACT

Experiments were carried out on brinjal (cv. Mukta Keshi) at Agricultural Research Farm, Department of Entomology and Agricultural Zoology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi to evaluate the bio-efficacy of thiodicarb 75 WP against shoot and fruit borer of brinjal (*Leucinodes orbonalis* Guen.) for 2 consecutive years. Thiodicarb 75 WP was applied @ 375, 625 and 1000 g ha^{-1} as foliar sprays. Monocrotophos 36 SL (1250 ml ha^{-1}) and Endosulfan 35 EC (1500 ml ha^{-1}) the standard recommendation along with untreated check were also used for comparison. The results revealed that the thiodicarb 75 WP (625 & 1000 g ha^{-1}) was highly effective for control of shoot and fruit borer of brinjal (*Leucinodes orbonalis* Guen.) as foliar spray resulting in higher yield (90.35 & 208.95 q ha^{-1}) and net monetary returns of Rs. 50,236 and Rs. 62,290 ha^{-1}.

Key words : Brinjal, *Leucinodes orbonalis,* insecticides, yield, net profit.

Estimation of economic threshold and economic injury levels of bud fly (*Dasyneura lini* Barnes) of linseed grown under Ranchi region

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ABSTRACT

Field experiments were conducted on linseed (cv. Neelum) during 2004-05 and 2005-06 to establish relationship between levels of bud infestation and seed yield. The results revealed that the mean economic injury level (EIL) of linseed bud fly (*Dasyneura lini* Barnes) was 4.53 per cent, while economic threshold level (ETL) was 4.41 per cent. The correlation between levels of budfly infestation (BFI%) and seed yield of linseed was significantly negative with r = - 0.9807** and b = - 4.48** in the agro-climatic conditions of Ranchi, when linseed crop was protected with foliar sprays of Imidacloprid (0.003%).

Key words : *Dasyneura lini*, EIL, ETL, linseed.

Evaluation of different pulses for life-fecundity tables of *Callosobruchus chinensis* Linn.

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ABSTRACT

The net reproductive rate (R_0) of *Callosobruchus chinensis* was 42.15, 37.47, 27.15 and 31.66 females per female per generation on gram, pea, soybean and black gram, respectively. The mean length of generation (T) was maximum (39.00 days) on pea and minimum (38.57 days) on gram. On the basis of r_m values the descending order of food grains for *C. chinensis* was gram (0.097), pea (0.092), black gram (0.089) and soybean (0.085). The finite rate of increase in numbers (λ) was 1.25, 1.24, 1.22 and 1.23 females per female per day on gram, pea, soybean and black gram. The distribution of egg stage in the stable age-distribution was 45.62, 45.25, 43.35 and 44.78 per cent on gram, pea, soybean and black gram, respectively. The corresponding values for larval-pupal distribution were 52.67, 52.91, 54.21 and 53.11 per cent.

Key words: Life-fecundity, *Callosobruchus chinensis*, gram, pea, soybean, black gram.

Survey and collection of some indigenous species of coccinellids in rapeseed-mustard and their population dynamics at some locations of Uttar Pradesh

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ABSTRACT

In the present scenario, aphids are considered as a notorious pest of different agricultural and horticultural crops in India. During winter, it causes an extensive loss to rapeseed-mustard crop. Indian farmers are mostly relying on many chemical insecticides for its management, which are not only harmful to man and beneficial insects but also pollute the environment. To preserve the beneficial insects, present investigations has been designed to survey 3 districts of Uttar Pradesh to collect the indigenous species of coccinellids and study their population dynamics. Results revealed the variation in the population index of different coccinellid species with change in time and place. Among different indigenous species of ladybeetles, *Coccinella septempunctata* was found dominating species at all the experimental site. The highest index of *C. septempunctata* was recorded as 5.67 at Farah in district Mathura during April, 2009 and March, 2010 and also the same at Sikandra of district Agra during April, 2009. Similarly, the maximum population index was (4.43) for *C. transversalis* at Farah in district Mathura during March, 2010. On the other hand, *Menochilus sexmaculatus* attained highest index of 4.00 at Tundla in district Firozabad and also at Mathura during April, 2009. This variation in the population index of ladybeetles could be attributed to the deviation in aphid population, environmental factors and plant characteristics.

Key words: Aphids, ladybeetles, mustard, population, survey.

Influence of antagonestic microorganisms on root rot of green gram caused by *Macrophomina phaseolina* (Tassi) Goid

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ABSTRACT

Field studies were made to control root rot of green gram, *Vigna radiata* (variety SML-264) caused by *Macrophomina phaseolina* through three isolates of suppressive bacteria, *Bacillus subtillis* (BS-12, BS-17 & BK-1) two isolates of *Rhizobium* (AKR-1 & M-10); *Pseudomonas fluorescens*. Results revealed that *Rhizobium* M-10 and *P. fluorescens* showed 76.65 per cent inhibition of the growth of *M. phaseolina* in dual culture technique *in vitro,* while. *In vivo Bacillus subtilis* (isolate BK-1) treated crops showed 37.02 per cent mortality compared to 67.28 per cent in inoculated control crops when applied as seed soaking along with soil drenching. However, when *P. fluorescens* was applied as seed soaking in field condition, disease control was 74.96 per cent. Nitrogen fixation of green gram was maximum in case of *Rhizobium* treated plants. Inoculated control plants showed minimum grain yield which was lower by (-) 41.60 per cent as compared to uninoculated control and (-) 45.87 per cent lower than *Rhizobium* (isolate AKR-1) treated plants. Antagonists treated plants showed good average root length, shoot length, dry weight, nitrogen fixation and yield.

Key words : Green gram, root rot, *M. phaseolina,* suppressive microorganisms.

Biological control of angular leaf spot in french bean caused by *Phaeoisariopsis riseola* in Uttarakhand hills

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ABSTRACT

The effect of seed treatment and foliar spray of antagonists (solo and combined) on angular leaf spot disease of French bean was studied under field condition during 2007-2008. Seed treatment with *Trichoderma harzianum* (8 g kg^{-1}) and its single foliar spray (10 g l^{-1}) showed minimum disease incidence with infected seedling and leaves of 10.00 and 7.56 per cent, reseptively. The green pod yield was also maximum (98.4 q ha^{-1}) in the same treatment. The seed treatment along with their foliar sprays with other antagonists also reduced the disease incidence and increased the yield of green pods in comparision to foliar sprays alone.

Key words: Biological control, angular leaf spot, French bean, *Tricoderma*, *Pseudomonas*.

Efficacy of copperised neem leaves extractives against wood decaying fungi

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ABSTRACT

Neem possesses marked anti-microbial and insecticidal properties. Copper complexes were prepared with hot water extract and methanol extract of neem leaves. Forty eight hours reflux yielded 22 and 34.24 per cent complexation of Cu (II) in copper hot water neem leaves extract complex and copper methanol neem leaves extract complex, respectively. In petri plate bioassay, 50 ppm of complex caused up to 98 per cent growth retardation of brown and white rots fungi. Hardwood and softwood blocks exposed to white and brown rots at 1.5 per cent concentration of copper-methanol neem leaves extract complex exhibited only 8 to11 per cent weight loss as compared to control (46%), whereas copper-hot water neem leaves extract complex revealed 8 to 16 per cent weight loss.

Key words: Brown rot, copper complex, hardwood, neem, softwood, white rot.

Inhibitory effect of some neem products and fungicides on mycelial growth of *Fusarium moniliformae* Sheld. the causal pathogen of bakanae disease of rice

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ABSTRACT

The investigations were under taken on inhibitory effect of fungicides (carbendazim & carbendazim + mancozeb) and neem products (nimbicidine, neemachron & neemarin) on radial growth of *Fusarium moniliformae* sheld, the fungus causing bakanae disease in rice. Results revealed that carbendazim and carbendazin + mancozeb had 100 per cent inhibition of mycelial growth at 0.01, 0.02 and 0.03 per cent concentrations. Among the neem products used, neemachron (3%) registered the maximum inhibition of mycelial growth (54.81%), while neemarin (1%) had the least (24.07%).

Keywords : Fungicides, *Fusarium moniliformae,* inhibition, mycelial growth, neem products.

Review

Biodegradable and sustainable textile fibers: Soybean protein fiber

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ABSTRACT

As we enter 21st century, technical advances are dramatically influencing the world of fibers, fabrics and textiles. Today, technology can provide us with fabrics that imitate and actually improve upon nature's best fibers. As with increasing concerns regarding the effect of textile industry on the environment, more and more textile researchers, producers and manufacturers are looking to biodegradable and sustainable fibers as an effective way of reducing the impact of textiles industries on the environment. Soybean protein fiber has filled up a blank in textile material development of our country.

Key words: Protein fibres, soybean raw material, fibre features, fibre production.

Short Communications

Influence of neem seed kernel extract with different additives, synthetics and bio-pesticide on yield of soybean

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Key words: Soybean, yield, benefit cost ratio, NSKE, sandovit.

Field screening of *Brassica* germplasms for resistance against mustard aphid, *Lipaphis erysimi* Kalt. under north Bihar conditions

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Key words : *Lipaphis erysimi* (Kalt.), *Brassica* germplasm.

Screening of different pulses for biology of *Callosobruchus chinensis* Linn.

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Key words: Biology, *Callosobruchus chinensis*, gram, pea, soybean, black gram.