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Content

RESEARCH ARTICLES

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EXTRACTION AND PURIFICATION OF CARBOXYLESTERASES FROM THE SEEDS OF *SAMANEA SAMAN*

Krupa S., Chandan J.*[1], Gnanesh R.[1], Lakshmikanth N.[1], Rahul[1] and Thejseh H.S.[1]

Department of Biochemistry, Jnanabharathi Campus, Bangalore University, Bangalore- 56
Jain University, J C Road, Bangalore.
Email: krupa.s@jainuniversity.ac.in

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Abstract: The enzyme carboxyl esterases was extracted from the *Samanea saman*seeds using different buffers at different pH. Highest activity was obtained with 33 mM phosphate buffer, pH 7.0. The enzyme assay was carried out using α-naphthyl acetate as substrate. The activity of carboxyl esteraseswas shown to have an optimal operating condition at pH 7.0 and a temperature of 50^{o}C. The thermo stability of the enzyme was in the range of 7^{o}C - 37^{o}Cwith the pH stability in the range of 4.0 – 8.0. The K_m and V_{max} values was determined as 0.157 mM and 1.785µM / minute. IC 50 of dicholorovas for *Samanea saman* esterase was found to be 2.23x10^{-10}M. Dicholorovas was found to be an irreversible inhibitor as the time of incubation increase, the percentage of activity decreases.

Keywords: Carboxylesterases, Samanea saman, Dicholorovas, α - naphthyl acetate

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DIVA-GIS ANALYSIS ON GEOGRAPHIC DIVERGENCE OF COWPEA GERMPLASM FOR RESISTANCE TO PULSE BEETLE, *CALLOSOBRUCHUS CHINENSIS* L.

L. Saravanan and N. Sivaraj*

ICAR-National Bureau of Plant Genetic Resources, Regional Station, Hyderabad 500030
Email: sivarajn@gmail.com

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Abstract: Twenty four cowpea genotypes collected from different regions of Andhra Pradesh, Odisha, Tamil Nadu and Telangana States were evaluated for their reaction against pulse beetle, *Callosobruchus chinensis.* Seed traits *viz*., seed length, seed width, test seed weight and insect biological parameters *viz*., number of eggs laid/20 seeds, number of adults emerged/20 seeds, percent adult emergence, mean developmental period, insect growth index and percent seed weight loss were used to assess the spatial distribution and diversity in the reaction of cowpea germplasm against *C. chinensis* using DIVA-GIS applications. Traits *viz*., percent adult emergence, growth index and number of eggs/ 20 seeds exhibited high variability as evidenced by high co-efficient of variation (CV) of 27.3%, 26.45% and 23.9% respectively. Moderately low CV values were observed for mean developmental period (0.83%) and number of adults emerged/20 seeds (4.74%). The study revealed that Adilabad district of Telangana and Srikakulam district of Andhra Pradesh were found highly diverse for all the traits including seed traits with high index values (1.433 – 2.000 for majority of the traits). The present findings would enable to identify the sources of resistance in cowpea germplasm geographically and spatially through grid maps.

Keywords: Cowpea, *Callosobruchus chinensis,* Cowpea resistance, DIVA-GIS, Geographical distribution

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CYTOGENETICAL AND MORPHO-ANATOMICAL STUDIES IN AN IMPROVED MULBERRY CULTIVAR G-2, AND ITS PARENTS (*MORUS* SPP.)

Sheelavathi A.V., Ravi Kumara R.* and Basavaiah

Department of Sericulture Science, Manasagangotri, University of Mysore, Mysuru -570 006

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Abstract: Mulberry (*Morus* spp.:Moraceae) breeding was programmed in a systematic way in India and progress was made in different aspects considering the overall needs of the sericulture industry. Mulberry varieties with higher levels of succulence and nutrition are suitable for healthy and robust chawki worms (young-age silkworms). The mulberry variety S-36 was recommended for chawki rearing. However, Victory-1 is the most exploited mulberry variety for chawki gardens. Further, a new mulberry variety, G-2 (Genotype-2), is being popularized currently for chawki rearing centers. The present study was conducted on the mulberry cultivar G-2 and its parents (*Morus multicaulis* Perr and S-34) for comparative studies with respect to cytological, morphological, and anatomical features. The results revealed that *Morus multicaulis*, S-34, and G-2 varieties are diploid in nature, with the chromosome number of 2n=28. Normal meiosis was observed in the male parent (S-34) of the G-2 variety. The morphometric traits of the hybrid variety, G-2, are exhibited in an intermediate nature between the two parents. The new combinations in the important yield-contributing parameters clearly indicated the improved vigor of this hybrid.

Keywords: Chawki worms, G-2, *Morus multicaulis* Perr, S-34

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EVALUATION OF BLACK PEPPER CULTIVARS OF MALNAD REGION OF KARNATAKA UNDER HILL ZONE FOR GROWTH, YIELD AND QUALITY

Mohankumar, G. P*[1], N.K. Hegde[1], Laxminarayan Hegde[1], Manukumar, H.R.[1]

[1]University of Horticultural Sciences, Bagalkote, Karnataka, 587104, India
Email: mohangp2794@yahoo.com

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Abstract: The aim of this study was to evaluate the suitable malnad black pepper cultivars for yield and quality attributes under hill zone of Karnataka. Ten cultivars of black pepper were maintained in the farmer's field with stable yielding stage of vine grown as mix crop with areca nut palms as standard. Among ten cultivars evaluated the check variety Panniyur-1 recorded significantly higher number of laterals per sq. m (87.87), weight of spike (18.72 g), number of spikes (63.56), higher content of essential oil (2.85 %) and oleoresin (7.78 %). However, higher number of spikes per 100 leaves at 2 m (59.15), dry weight of hundred berries (7.51 g), curing percentage (39.16), white pepper recovery (29.80 %) and bulk density (640.59 g/l) was recorded in Cv. Sigandini. Highest dry yield of black pepper was recorded in var. Panniyur-1 (4.09 kg/vine) followed by Cv. Sigandini (3.55 kg/vine) and Kurimale (3.14 kg/vine).

Keywords: Black pepper, Farmer field, Malnad region, Variety

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EFFECT OF DIFFERENT NITROGEN LEVELS ON GROWTH AND YIELD OFPOTATO (*SOLANUMTUBERSOUM* L.) VARIETIES IN NORTHERN PLAINS OF INDIA

Amit Verma[1], A.K. Bhatia[1], V.P.S. Panghal[1] and Monika*[1]

[1]Department of Vegetable Science, CCS Haryana Agricultural University, Hisar- 125004, Haryana, India
Email: khichimonika97@gmail.com

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Abstract: This experiment was conducted at Research Farm of the Department of Vegetable Science, CCS Haryana Agricultural University, Hisar during rabi season of 2019-20. The treatments comprising three potato varieties (KufriPukhraj, KufriGaurav, and AICRP-P-39) and four levels of nitrogen (0, 80, 160, and 240 kg/ha) were laid out in a randomized block design (factorial). The results revealed that among the various nitrogen levels, the nitrogen dose of 240 kg/ha gave superior results for various field parameters, viz., plant height at 60, 75, and 90 DAP, number of leaves per hill at harvest, leaf and stem weight per hill at harvest, the yield of tubers in different grades (up to 25, >25-50, >50-75, and >75g) per square meter and total tuber yield (q/ha), which were statistically at par with the nitrogen dose of 160 kg/ha. As far the variety is concerned, KufriPukhraj performed significantly better for all the recorded parameters. Hence, potato variety KufriPukhraj is recommended with the application of 160 kg nitrogen per hectare for cultivation in the northern plains of India.

Keywords: Growth, Nitrogen, Potato, Variety, Yield

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DIVERSITY OF POLLINATING BEES VISITING LITCHI FLOWERS (*LITCHI CHINENSIS* SONN.) AND IT'S CORRELATION WITH ABIOTIC PARAMETERS IN SURGUJA DISTRICT OF CHHATTISGARH, INDIA

G.P. Painkra* and Sachin Kumar Jaiswal

All India Coordinated Research Project on Honey Bees and Pollinators, IGKV, Department of Entomology, Raj Mohini Devi College of Agriculture and Research Station, Ambikapur-497001(Chhattisgarh) India.
Email: gppainkrarmd@gmail.com

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Abstract: Pollination is a vital step in a litchi production system, as both fruit yield and quality are dependent on the extent of cross pollination. The extent of crosspollination and enhanced fruit setting in litchi is significantly carried out by honey bees in the region. The present was undertaken at Raj Mohini Devi College of Agriculture and Research station, Ambikapur (Chhattisgarh) substation of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) India, during 27 February 2021-02April 2021. The foraging studies, reveal that five species of pollinators were recorded on Litchi (flowers of Litchi) during flowering period *i.e., Apis mellifera, Apis cerena indica, Apis florea, Apis dorsata* and stingless bee (*Tetragonula iridipennis*) etc. The European honey bee (*Apis mellifera*) has been found the most efficient pollinator (% visitation 35.24) of litchi followed by Rock bee (*Apis dorsata*) (% visitation 33.26).

Keywords: Abiotic parameter, Bee diversity, *Litchi chinensis*, Pollination, *Tetragonula iridipennis*

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GENETIC VARIABILITY AND CORRELATION ANALYSIS FOR SEED AND SEEDLING VIGOUR TRAITS IN PIGEON PEA [*CAJANUS CAJAN* (L.) MILLSP.] GENOTYPES

Oyi Perme, H.P. Chaturvedi* and M.B. Sharma

Department of Genetics and Plant Breeding, School of Agricultural Sciences & Rural Development, Nagaland University, Medziphema-797106 Nagaland
Email: hpchaturvedi68@gmail.com

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Abstract: The present investigation entitled 'Genetic variability for seed and seedling vigour traits in Pigeon pea [*Cajanus cajan* (L.) Millsp.] Genotypes' was conducted with twenty genotypes including two check varieties. The experiment was conducted during the month of May 2021, at the laboratory of Department of Genetics and Plant Breeding, NU: SASRD, Medziphema Campus, Nagaland. The main goal of the study was to assess the genetic information of twenty genotypes of Pigeon pea for seed and seedling vigour traits. The experiment was laid out in Completely Randomized Design (CRD) with three replications. Data were recorded on eleven characters. For all of the traits studied, the phenotypic coefficient of variation (PCV) was found to be larger than the genotypic coefficient of variation (GCV), indicating that their expression is influenced by environment to some extent. High heritability coupled with high genetic advance as percent of mean were observed for seedling vigour index II. The majority of the seedling traits had a positive and significant correlation with seedling vigour index I & II, implying the importance seedling traits in predicting seedling vigour. Germination percentage, root length at the 20th DAS, fresh shoot weight at the 20th DAS, fresh root weight at the 20th DAS, dry shoot weight at the 20th DAS, dry root weight at the 20th DAS, and seed vigour index I were all factors that contributed to seedling vigour and hence good plant stand. The study suggests that while screening of germplasm for seed and seedling characteristics germination percentage, shoot length at 20th DAS, root length at 20th DAS, dry shoot weight at 20th DAS, dry root weight at 20th DAS, seedling vigour index I and seedling vigour index II should be taken into consideration. The outcomes of this study led to the conclusion that the genotypes ICPH-2433, ICPL-88039, ICPL-11301, and PA-636 were found to be promising in terms of performance for seedling vigour traits.

Keywords: Correlation, Genetic variability, Genotypes, Pigeon pea, Traits

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EVALUATION OF GENOTYPES WITH DIFFERENT FERTILITY LEVELS UNDER TIMELY IRRIGATED SOWN CONDITIONS OF HISAR

Shweta*, Kautilya Choudhary and Nisha Kumari

College of Agriculture, CCS HAU, Hisar
Email: malik.shweta54@gmail.com

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Abstract: The experiment was conducted at Oilseeds Research Farm, CCS Haryana Agricultural University Hisar during rabi 2020-21 to evaluate promising Indian mustard genotypes under different fertility levels under timely irrigated sown conditions. The soil of experimental field was sandy loam in texture, with slightly alkaline in reaction (pH 8.0),low in organic carbon (0.34%), available N (162 kg/ha) were low, $P_2 0_5$ medium (12.3 kg/ha), and high in K_20 (330 kg/ha) and S (29 ppm). The experiment was laid in split-plot design with 7 genotypes (PDZ-12, PDZ-11, RCH-1, RH-749(ZC), PUSA MUSTARD 29, Kranti (NC) and PDZ 1) in main plots and three fertilizer levels (100% RDF: 80:30:20 kg NP_2O_5 and K_2O/ha, 125% RDF, 150% RDF) in sub plots with 3 replications. Maximum seed yield (2418 kg/ha) was obtained from the mustard genotypes RCH-1, which was significantly higher than the seed yield recorded in PDZ-11 and PDZ-1. RCH-1 was produced 27% and 11.67 % higher seed yield than PDZ -11 and PDZ-1, respectively. With addition of fertilizer, seed yield increased upto 125 % RDF, irrespective of genotypes. Mustard crop did not respond positively at 150 % RDF. Oil content was influenced significantly with mustard genotypes and fertility levels. Maximum oil yield was also produced by RCH-1 (943 kg/ha), being significantly at par with RH 749 and PM-29 and superior to rest of the genotypes. Variation due to interaction effect in mustard genotypes and fertility levels was not found to be significant.

Keywords: Genotypes, Fertility levels, Irrigated, Timely sown, Seed yield, Oil content

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EFFECT OF DIFFERENT MICRONUTRIENTSAPPLICATION ON GROWTH, YIELD AND QUALITY OF MOONG BEAN (*VIGNARADIATA* L.)

Satya Prakash Gupta[1]*, P.K. Singh[1], Vishal Singh[2], DeekshaTiwari[3], Om Chandrapandey[4] and Shikhar Verma[5]

[1]*SardarVallabhbhai Patel University of Agriculture & Technology, Meerut*
[2]*A.N.D. University of Agriculture and Technology, Kumarganj, Ayodhya*
[3]*G.B. Pant . University of Agriculture and Technology Pantnagar*
[4]*Integral institute of Agriculture science and technology Lucknow*
[5]*Chandra Shekhar Azad University of Agriculture &Technology Kanpur*

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Abstract: A field experiment was conducted at Crop Research Center, SardarVallabhbhai Patel University of Agriculture & Technology, Meerut, Uttar Pradesh, with a view to compare the production potential under different micronutrients application and also to find out the economic viability of this cultivar for soil quality. The treatments comprised of *Control*,RDF (20:40:20) kg ha^{-1},RDF + Zn @ 5 kg ha^{-1},RDF + B @ 2.5 kg ha^{-1},RDF+ Mo @ 1 kg ha^{-1},RDF + Zn @ 5 kg ha^{-1} + B @ 2.5 kg ha^{-1},RDF + Zn @ 5 kg ha^{-1}+ Mo @ 1 kg ha^{-1},RDF + B @ 2.5 kg ha^{-1}+ Mo @ 1 kg ha^{-1} and RDF + Zn @ 5 kg ha^{-1} + B @ 2.5 kg ha^{-1}+ Mo @ 1 kg ha^{-1}revealed that treatment T_9 (RDF + Zn @ 5 kg ha^{-1} + B @ 2.5 kg ha^{-1}+ Mo @ 1 kg ha^{-1}) and T_7(RDF + Zn @ 5 kg ha^{-1}+ Mo @ 1 kg ha^{-1}) exhibited significant influence on the growth, yield and quality of moong bean as compared to the application of RDF (20:40:20) kg ha^{-1}alone.Significant improvement in growth parameters *viz.* plant height, leaf area index, dry matter accumulation as well as crop growth rate, yield attributes and yields was recorded with the application of T_9 and T_7.Maximum protein content (25.0%) was found in T_9 which was on par with T_7, T_6, T_8,T_3& T_4.The maximum protein yield (325.0 kg ha^{-1}) was obtained in treatment T_9followed by T_7, and T_6.

Keywords: Growth, Moong bean, Quality, Protein, Yield

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EFFECT OF IRRIGATION INTERVALS AND MULCHES ON GROWTH AND YIELD OF CABBAGE

R.S. Meena, Santosh Kumar, Rahul Kumar, Sweta Singh and V.S. Meena

[1,3,4] College of Agriculture, Bhusawar (Weir) Bharatpur (SKNAU, Jobner)
[2]SMS Horticulture, KVK Aizal
[4] College of Agriculture, Bharatpur (SKNAU, Jobner)
Email: santosh.veg@gmail.com

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Abstract: A field experiment was conducted to study the effect of irrigation intervals and mulches on growth and yield of cabbage (*Brassica oleracea* var. capitata L.)" during Rabi season of 2021 at Horticulture Farm, Rajasthan Agricultural Research Institute, Durgapura, Jaipur. The experiment consisted of sixteen treatment combinations with four irrigation intervals (6, 9, 12 and 15 days) and four types of mulches (control, white polythene, black polythene and mustard straw) in randomized block design with three replications. The results of study clearly indicated that application of irrigation at 9 days interval as well as black polythene mulch significantly increased the growth parameters like (plant height, number of leaves, plant spread, leaf area and total chlorophyll content in leaves) and yield (head yield per plot, head yield per hectare) of cabbage. The interactive effect of irrigation at 9 days interval along with black polythene mulch was found statistically at par to application of irrigation at 12 days interval along with mustard straw mulch with respect to head yield kg/plot (11.33 kg/plot) and yield q/ha (349.63 q/ha).

Keywords: Growth attributes, Yield, Irrigation intervals, Mulches, Cabbage

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GROWTH AND PRODUCTIVITY OF MAIZE AS INFLUENCED BY INTEGRATED WEED MANAGEMENT PRACTICES

Gayatree Mishra*, Mahua Banerjee, Ganesh Chandra Malik and Duvvada Sarath Kumar

Department of Agronomy, PalliSiksh Bhavana, Visva-Bharati University,
Sriniketan, West Bengal, India
Email: gayatree.tt.mishra@gmail.com

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Abstract: A field experiment was conducted during *Kharif* 2018-19 and 2019-20 at Bagushala farmers field (odisha, India) to find out most efficientmethod of weed control in *kharif* maize. The treatments comprised of intercropping of maize + cowpea, maize + cowpea with pre-emergence application of pendimethalin @ 1 kg ha^{-1}, pre emergence application of atrazine @ 1 kg ha^{-1} either alone or with hand weeding at 30 days after sowing, pre emergence application of atrazine @ 0.5 kg + pendimethalin @ 0.5 kg ha^{-1} + hand weeding at 30 DAS, hand weeding at 15 DAS and hand weeding at 15 and 30 Das were compared with unweeded control.The results revealed that growth of maize in terms of plant height, leaf area index and crop growth rate were remarkably augmented in maize + cowpea + pendimethalin followed by atrazine + pendimethalin + hand weeding, atrazine + hand weeding and twice hand weeding treatments which were at par. The maximum maize grain yield of 63.25 q ha^{-1} and stover yield of 79.15 q ha^{-1} were recorded in atrazine + pendimethalin + hand weeding practice.

Keywords: Crop growth, Weed management, Intercropping, Herbicide, Grain yield

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EFFECT OF ZINC AND BORON ON VEGETATIVE GROWTH AND FLOWERING CHARACTERS OF TOMATO CV. NAMDHARI-4266 UNDER PROTECTED CONDITIONS

Arti[1], Rahat Ashraf[1]*, Raja Aadil Usman[2], Malik Umar Bashir[1] and Hashim Manzoor[1]

[1]*School of Agricultural Sciences and Technology, RIMT University Mandi Gobindgarh, Punjab 147301, India*
[2]*Sher e Kashmir university of agricultural sciences & technology of Kashmir Shalimar*
Email: rahatwani78@gmail.com

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Abstract: The experiment was carried at Agriculture Farm, School of Agricultural Sciences & Technology, RIMT University, Mandi Gobindgarh, Punjab, India 2021-22 in Rabi season. The experiment was conducted in Complete randomized design with three replications and Seven treatment combinations i.e. T_1 (control), T_2 (Zn@ 100ppm), T_3 (Zn @ 150ppm), T_4 (B @ 100ppm), T_5 (B @ 150ppm), T_6 (Zn @100 + B @ 100ppm) and T_7 (Zn @ 150 ppm + B @ 150ppm) under protected conditions The Maximum plant height (155.00 cm), stem diameter (2.86 cm), Number of branches/plant (21.66 cm), leaf length (9.88 cm), leaf width (8.10 cm), days to first flowering (43.77) and number of flowers/plant (51.19) were recorded in treatment (T_6) Zinc @ 100 ppm + Boron @ 100 ppm.

Keywords: Flowers, Growth, Boron, Tomato, Zinc