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CHANGES IN SOIL PROPERTIES AND CARBON SEQUESTRATION POTENTIAL UNDER INTENSIVE AGRICULTURE AND AGROFORESTRY

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Abstract: Agroforestry has been recognized as a means to reduce CO₂ emissions as well as enhancing carbon sinks although the rice-wheat cropping system increases the green house gases level. Agroforestry is a large sink of carbon and its role in carbon cycles is well recognized. The article reviews the impact of different land use systems on properties such as EC, pH and the carbon sequestration potential of soils. Agroforestry provides a unique opportunity to combine the twin objectives for capturing atmospheric CO₂ to ameliorate environment and, improving the soil nutrient status as well. Soil organic carbon has been recorded abundantly in agroforestry systems than other land use systems. The emphasis of land use systems that led to higher carbon content than other cropping systems can help to achieve net gains in carbon in soils specifically and, significant increases in carbon storage can be achieved by moving from lower biomass land uses.

Keywords: Land-use systems, Agroforestry, Soil properties, Carbon sequestration potential

REDUCING HYDROLOGIC RISK IN *KHARIF* RICE FROM CARRYOVER EFFECT OF RAINFALL: A REVIEW

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Abstract: In agriculture, the primary production systems face the risk of failure. Therefore, a more in depth analysis is needed by incorporating useful plant and soil properties in for reducing water stress in *kharif* rice. The approach to determine effective rainfall in watershed could be more focused on the inter-relationship amongst plant, soil and climatic factors, considering the sensitivity of different plants to varying levels of water availability due to water transfer within watershed. Similarly, the assessment of water availability *vis-a-vis* growth risks could be done more realistically through water balance study. The best recommendation is suggested to reducing hydrological risk.

Keywords: Hydrologic risk, Rainfall, Water balance studies, Effective rainfall

CHARACTER ASSOCIATION ANALYSIS IN YIELD AND YIELD COMPONENTS IN BREAD WHEAT (*TRITICUM AESTIVUM* L.) GENOTYPES

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Abstract: A study was undertaken to estimate correlation and path coefficient analysis of yield and yield contributing traits in 50 wheat cultivars grown in Randomized Block Design with three replications during *rabi* season 2013-14. The grain yield per plant has significant and positive correlations both at genotypic and phenotypic levels with biological yield per plant, grain weight per main spike, 1000 grain weight and number of grains per main spike. The path coefficient analysis revealed high and positive direct effects of the number of effective tillers per plant, number of grains per main spike, 1000 grain weight, biological yield per plant and harvest index on grain yield per plant. Thus, these traits are to be considered as the most important yield contributors and due emphasis should be given while attempting yield improvement in wheat.

Keywords: Characters, Correlation, Direct & indirect effects, Grain yield

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SITE SPECIFIC NUTRIENT MANAGEMENT AND NUTRIENT REMOVAL BY BASMATI RICE AND PHYSICO-CHEMICAL PROPERTIES OF SOIL

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Abstract: The present investigation was carried out at Crop Research Centre, Chirori of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut (U.P.) with eleven different treatments viz; T₁(Recommended NPK), T₂ (Recommended NP), T₃ (Recommended NK), T₄ (Recommended PK), T₅ (Recommended NPK+ wheat residue @ 5 ton ha⁻¹), T₆ (Recommended NPK + FYM @ 10 ton ha⁻¹), T₇ (SSNM 100 : 60 : 60: 25 : 30 : 5 i.e. N P K Zn S B), T₈ (SSNM-P), T₉ (SSNM-K), T₁₀ (SSNM-K+ wheat residue @ 5 ton ha⁻¹) and T₁₁ (SSNM + wheat residue @ 5 ton ha⁻¹) in three replications and in Randomized Block Design. The rice variety Pusa basmati 1509 was grown and nutrient uptake and soil properties as influenced by different treatments were assessed. Results obtained from the study revealed that with the use of balanced inorganic fertilizer alone or in combination with organic fertilizer, physical properties of soil due to improvement in OC gkg⁻¹ through more biomass addition in the soil. Significant reduction in BD was noticed where more biomass was added into the soil. Treatments having integration of sources/ nutrients (T₆, T₇ and T₁₁) distinctly showed the improvement in OC %, availability of N, P, K, S, Zn, B, Fe and led to better soil environment over T₄. Uptake of N, P, K, S, Zn, B and Fe by rice under different treatments was also found to be significantly higher than T₄. The grain yield of rice was significantly higher in combined use of organic & inorganic fertilizer treated plot than only inorganic one. However, no significant variation was observed in the grain yield where N, P, K + wheat residue, N, P, K + FYM and SSNM package + wheat residue treated plots.

Keywords: Basmati rice, Nutrient removal, Physico-chemical properties of soil

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CARBON AND NITROGEN MINERALIZATION IN SOILS AMENDED WITH MANURES AND FERTILIZERS FROM NINETEEN YEARS: A LABORATORY INCUBATION STUDY

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Abstract: Long-term manure application can alter a soil's ability to sequester nutrients and mineralize C and N. However, knowledge about the decomposition and mineralization of C and N from long-term addition of organic materials in soils is lacking. Therefore, a laboratory incubation study was carried out to evaluate the C and N mineralization in a soil to which three organic manures (15 Mg FYM or 5 Mg poultry manure or 7.5 Mg pressmud per ha⁻¹) and chemical fertilizers were applied alone or in combination. The results revealed that C mineralization rate was found to be increased with application of organic manures and amount of CO₂ evolved was further increased when organic manures were applied in combination with

chemical fertilizers. Application of FYM, poultry manure and pressmud along with recommended dose of N and half of P increased the amount of CO₂ evolved by 18.1, 1.7 and 14.0 %, respectively, over application of recommended dose of N and P fertilizers. After 60 days of incubation, the highest (1868.0 mg kg⁻¹) and lowest (1055.4 mg kg⁻¹) amount of CO₂ was evolved in treatment FYM₁₅N₁₅₀ and N₇₅P₃₀, respectively. Among the organic manures, amount of CO₂ released followed the order: FYM>pressmud>poultry manure. Carbon mineralization increased with the progress of incubation and rate of increase was higher at initial stages and decreased gradually. Application of FYM₁₅, poultry manure₅, pressmud_{7.5} along with recommended dose of N and half of recommended P increased nitrogen mineralization potential by 2.08, 3.22 and 12.69 % over application of recommended dose of NP fertilizers, respectively. Among the organic manures, higher N mineralization potential was observed with application of pressmud as compared to FYM or poultry manure. Application of FYM and poultry manure alone reported lower N mineralization potential as compared to recommended dose of N and P fertilizers.

Keywords: Organic manures, Fertilizers, N mineralization, CO₂ evolution

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HETEROSIS AND COMBINING ABILITY IN LATE MATURING QPM HYBRIDS IN MAIZE (*ZEA MAYS* L.)

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Abstract: Fifteen maize inbred were crossed as lines to three testers(HKI-193-1, CLQRCYQ-40-3-1 and HO6R-6136-68-1-1-6) in Line X Tester mating design to generate 45 F₁ crosses. The sixty seven genotypes including 45 F₁ hybrids along with their 18 parents and 4 checks were evaluated for five qualitative traits namely starch content, oil content, protein content, tryptophan content and lysine content in Randomized Block Design to estimate the General Combining Ability (GCA), Specific Combining Ability (SCA) and Heterosis of F₁ crosses. In the Line x Tester analysis, significant variability was observed among the genotypes for five traits. The hybrids L₃ x T₃ and L₅ x T₃ exhibited maximum mean values for oil content and hybrid L₁₀ x T₁ exhibited maximum mean values for starch content. The maximum mean value for protein content was depicted by hybrid L₆ x T₂, whereas hybrid L₁₀ x T₃ exhibited maximum mean value for tryptophan content. The hybrid L₇ x T₃ exhibited maximum mean values for lysine content.

Keywords: Combining ability, Grain yield, Heterosis, Quality protein maize

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PULP COCENTRATION AND STORAGE CONDITIONS AFFECT LEVEL OF ASCORBIC ACID AND ORGANOLEPTIC PROPERTIES OF GUAVA NECTAR

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Abstract: An experiment was carried out during the year 2015-16 in Post Harvest Technology Laboratory, Section of Horticulture, College of Agriculture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola. Experiment was conducted by using Lalit cv. of Guava under FCRD statistical design having two factors viz. Factor A and factor B. Factor A consists of five different pulp concentrations viz. 14% guava pulp, 16% guava pulp, 18% guava pulp, 20% guava pulp, 22% guava pulp and factor B consists of storage conditions viz. refrigerated and ambient conditions. Guava nectar prepared from 18% pulp concentration showed minimum changes in ascorbic acid and organoleptic properties viz. colour, taste, flavour and overall acceptability under both refrigerated and ambient storage condition.

Keywords: Guava, Nectar, Pulp concentration, Ascorbic acid, Organoleptic quality

INFLUENCE OF SPACING AND NUTRIENT LEVEL ON NUTRIENT UPTAKE AND ENERGETIC OF HIGH ZINC LINE OF RICE (*ORYZA SATIVA* L.)

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Abstract: An field experiment was carried out to at Research cum Instructional farm, I.G.K.V., Raipur, during *kharif* season of 2013. The experiment comprised three spacing viz., 10cm x 10cm, 15cm x 10cm and 20cm x 10cm and three levels of nutrient viz., 50%, 100% and 150% RDF. The experiment was laid out in factorial randomized block design with four replications to evaluate the effect of planting geometry and nutrient levels on nutrient uptake and energetic of high zinc line of rice. Result indicated that the highest nitrogen, phosphorus and potassium uptake, energy input, energy output, net energy output and energy output: input ratio was obtained under 20cm x 10cm spacing. As regards different nutrient levels, application of 150 per cent RDF recorded higher values of nitrogen, phosphorus and potassium uptake, total energy output and net energy output. Whereas, the highest energy input and energy output: input ratio was observed under 50 per cent RDF.

Keywords : Spacing , Nutrient levels, Nutrient uptake, Energetic high zinc rice

EFFECT OF GROUND WATER QUALITY ON SOIL SALINITY AND CHEMICAL COMPOSITION OF MUSTARD CROP OF GHARSANA TEHSIL, DISTRICT SRIGANGANAGAR, RAJASTHAN

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Abstract: The survey of ground water quality on soil salinity and chemical composition of mustard crop of Gharsana tehsil, district Sriganganagar, Rajasthan” was undertaken to assess the quality of ground water and its effect on physico-chemical properties of soils and chemical composition of mustard. Forty ground irrigation water samples along with their corresponding forty surface (0-15 cm depths) soil and mustard plant samples were collected from different villages of Gharsana tehsil. The quality of irrigation water were analyzed for physico-chemical characteristics such as pH, EC_{iw} , SAR, RSC and potential salinity and it was found that majority of ground waters of the study area are not suitable for irrigation purposes. The effects of quality of irrigation water on the soil salinity were determined. The results showed that all irrigated fields have high salt concentration as indicated by pH_2 , EC_2 and SAR_2 values of soil samples. Saline water increased the soil salt. Thus, the salts accumulation in soil was closely related to the salt concentration of irrigation water, and there was a progressive and significant increase in soil salinity values as the potential salinity of irrigation water increases. Use of high EC_{iw} (8.60 dS/m), pH (9.69), SAR_{iw} (18.61), RSC_{iw} (12.30 me/L) and potential salinity (71.61 me/L) of ground water decreased the per cent K^+ and Mg^{+2} content in mustard plant leaves due to relative dominance of Na^+ ion resulting increased Na^+ and Ca^{+2} content.

Keywords: Ground water quality, Salinity, Correlation, Mustard

INFLUENCE OF WATERLOGGING, SALINITY AND THEIR INTERACTION ON BIOMASS AND YIELD AND ITS ATTRIBUTES OF PIGEONPEA (*CAJANUS CAJANS* L. MILLSP.) GENOTYPES

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Abstract: The Influence of waterlogging, salinity and their interaction on biomass and yield and its attributes was studied in four pigeonpea genotypes (ICPH-2431, PARAS, UPAS-120, H09-33). Plants were raised in polythene bags filled with half kg soil + FYM manure mixture. Waterlogging, salinity and waterlogging + salinity treatments were given for 8 and 12 days and observations were recorded 1 and 8 days after removal from treatment in 20 and 40 day old plants. A significant decline in percent survival, biomass, seed yield and seed test weight was observed with waterlogging and combined treatment of waterlogging and salinity. Alone salinity resulted in no decline in percent survival and comparatively less decline in biomass, seed yield and seed test weight. All the stresses were found more deleterious when given at later stages. ICPH 2431 performed best among all the genotypes in terms of percent survival, biomass, seed yield and seed test weight.

Keywords: Waterlogging, Salinity, Pigeonpea, Biomass, Seed yield

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EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON NUTRIENT CONTENT AND YIELD OF WHEAT UNDER RICE-WHEAT CROPPING SYSTEM

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Abstract : A field experiment was conducted during rabi 2013-14 and 2014-15 to assess the effect of combined application of fertilizer, manure and biofertilizer on yield and nutrient content in wheat. The results revealed that the treatments significantly affected grain and straw yields, as well as grain protein content. The highest values of previous traits were obtained from treatment T10 (100 % NPK + S₄₀+ Zn₅ + Fe₁₀+ FYM + BGA). Also, this treatment gave the maximum grain yield, nutrient protein content compared with the other treatments. Thus the integrated plant nutrient supply system improved the crop yield and produce quality grain as well as improve soil fertility and environment pollution.

Keywords: IPNM, Manure, Biofertilizer, Grain quality, Nutrient management

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HEAVY METALS CONCENTRATION IN DUST ACCUMULATED ON LEAVES OF CERTAIN PLANT SPECIES GROWN ALONGSIDE NATIONAL HIGHWAY- 22, INDIA

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Abstract: Heavy metals contamination in plants due to air pollution is one of the major issues to be faced throughout the world and requires attention because heavy metals above their normal ranges are extremely threatened to both plant and animal life. Now a day's increase in vehicular traffic on highways is a major threat to air quality as the pollution released from vehicles consisting high concentrations of heavy metals which seriously affects the nearby vegetation. As biomonitoring with plants is low-cost and valuable method for knowing the effect of different air and environment pollutants so the present study was carried to estimate levels of heavy metals in dust accumulated on leaves of selected plant species from Parwanoo to Solan on National Highway-22 falling in Solan district of Himachal Pradesh. The four species namely *Grewia optiva*, *Toona ciliata*, *Melia azedarach* and *Woodfordia floribunda* of uniform size, age, spread and common in occurrence on both sides of the highway were selected for the study. Concentrations of heavy metals (As, Cd, Cr, Cu, Mn, Ni, Pb and Zn) were estimate in dust accumulated on leaves of selected plants and compare them with their normal permissible limit prescribed for soil. The dust accumulated on leaves had heavy metals, Cu (29.15 mg kg⁻¹) and Zn (1219.92 mg kg⁻¹) above permissible limit of the soil. The study provided a reliable method for screening heavy metals concentration in dust deposited on leaves of plants nearby roads where the air-shed is contaminated by a variety of pollutants due to vehicular emissions.

Keywords: National highway-22, Leaf dust, Heavy Metals, Solan

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SELECTION PARAMETERS OF CHILLI (*CAPSICUM ANNUUM* L.) GENOTYPES FOR YIELD AND RELATED TRAITS

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Abstract: Fifteen genotypes of chilli were evaluated in RBD with three replications was conducted at Vegetable Research Farm, Department of Horticulture, Allahabad School of Agriculture Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed to-be-University), Allahabad during the Rabi season of 2014-2015 to study the selection parameters of chilli genotypes for yield and related traits. Altogether fifteen genotypes of chilli laid out in Randomized Block Design (RBD) with three replication. All these fifteen chilli genotypes showed significant variation in characters viz., average fruit weight (g), number of seeds per fruits, weight of Seeds /fruits (mg), number of fruits /plant, Fruit yield per plant (g), yield per hectare (q), yield of dry green chilli (q ha⁻¹), fruit set percent, estimation of ascorbic acid (mg/100g), estimation of capsaicin (°Brix). The mean of the different traits for 15 genotypes of Chilli (*Capsicum annum* L.) with three replications treatment details viz. LCA-334(C), KA-2(C), 12CHIV AR-1, 12CHIV AR-2, 12CHIV AR-3, 12CHIV AR-4, 12CHIV AR-5, 12CHIV AR-6, 12CHIV AR-8, IIHR- 2006, ACS- 08-09, HC- 50, KASHI ANMOL, HC- 68 and G4 (Local) were tried in Randomized Block Design (RBD). On the basis of fifteen genotypes studied, for different characters genotype KA-2(C) (22.01q) was found superior in terms of fruit yield per hectare followed by 12CHIV AR-2 (17.72q) and LCA-334(C) (13.37q). The genotype 12 CHIV AR-5 recorded significantly for average fruit weight (4.65 (g)) and Weight of Seeds/fruits (mg) (249.08). However, the genotype 12CHIV AR-4 showed the maximum number of seeds per fruits (46.22). The highest Number of fruits/plant was noticed in genotype 12CHIV AR-8 (116.03) and maximum yield per hectare (q) recorded in genotype KA-2(C) (621.98 q) while, maximum ascorbic acid content (mg/100g) was noticed in genotype 12 CHIVAR-6 and highest capsaicin (°Brix) content was observed in LCA-334(C).

Keywords: Chilli (*Capsicum annum* L.), Evaluation, Genotypes, Yield

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SAFETY OF NOVEL INSECTICIDES TO NATURAL ENEMIES IN BASMATI RICE ECOSYSTEM OF WESTERN UTTAR PRADESH

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Abstract: Field experiments were conducted during *Kharif* 2014 and 2015 at crop research centre, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, U.P., India to evaluate the effect of various novel chemical insecticidal treatments on natural enemies. Altogether, 11 treatments including 9 novel insecticides, viz. (T1) indoxacarb 14.5% SC @ 500 ml, (T2) fipronil 5% SC @ 1000 ml, (T3) novaluron 10% EC @ 600 ml, (T4) cartap hydrochloride 50 % SP @ 1.0 Kg, (T5) cartap hydrochloride 4 GR @ 18 Kg, (T6) spinosad 45 % SC @ 220 ml, (T7) flubendiamide 39.35 % SC @ 75 ml, (T8) chlorantraniliprole 18.5 % SC @ 150 ml and (T9) chlorantraniliprole 0.4 % GR @ 10 Kg besides insecticidal check (T11) chlorpyrifos 50% + cypermethrin 5% EC @ 1200 ml and (T11) untreated control. The results showed that the overall mean population of Spiders was found to be more in the untreated check (2.33 and 3.24/hill) followed by chlorantraniliprole 0.4 % GR (1.85 and 2.09/ hill) in the first and second foliar application. The overall mean population of predators was high in the untreated check (1.94 and 2.90/ hill), followed by chlorantraniliprole 0.4 % GR (1.62 and 2.17/ hill) over the other treatments.

Keywords: Basmati rice, Ecosystem, Insecticides, Uttar Pradesh

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EFFECT OF FODDER BASED INTERCROPPING SYSTEMS ON YIELD AND QUALITY

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Abstract: A field experiment was conducted at the Instructional Farm of Agronomy, Maharana Pratap University of Agriculture and Technology, Udaipur to evaluate the performance of sole as well intercropping of cereals (sorghum, maize and pearl millet) and legumes (cowpea and cluster bean) system. The results shows that in sole cropping system sole sorghum recorded significantly higher green fodder yield of main crop than other sole and intercropping treatments in different row ratios. Among intercropping treatments, sorghum + cowpea in 2:1 ratio outperformed in green fodder yield of main crop but variations were at par with sorghum + cluster bean in 2:1 row ratio.

Keywords: Cropping system, Maize, Sorghum, Fodder

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SCREENING OF POWDERY MILDEW TOLERANCE IN LINSEED (*LINUM USITATISIMUM* L.)

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Abstract: A set of one hundred fifty linseed germplasm accessions were evaluated for powdery mildew tolerance which was taken from AICRP on Linseed, Department of Genetics and Plant Breeding IGKV, Raipur (C.G.) during *Rabi* 2014-15 and 2015-16. In India and Chhattisgarh it has been observed that major limiting factors for higher production is powdery mildew. Particularly in Chhattisgarh the yield losses due to powdery mildew may be more than 60% when the disease is severe. Powdery mildew is the major cause in the linseed production during *utera* cultivation, It lows yield about 40%. The assessment of the disease per plant was obtained by observing the intensity of lesions present on the leaves. Keeping in this

view, disease screening studies were made to understand the development of powdery mildew diseases. So, we need a high yielding linseed variety for late sown conditions with resistance to powdery mildew. With this objective, field screening of linseed genotypes for resistance to powdery mildew was initiated. Powdery mildew score ranged from 0 (free) to 5 (highly susceptible), 21 genotypes found highly resistant, 44 genotypes showed resistant, 47 genotypes comes under moderately resistant, 20 genotypes shows susceptible and only 8 genotypes showed highly susceptible. Despite being high susceptible, some test entries produced good yield and showed tolerance to powdery mildew disease. Highly resistant genotype could be utilized as donar parent for powdery mildew resistance breeding programme.

Keywords: ALA, Germplasm, Linseed, Powdery mildew, SDG