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Contents

RESEARCH ARTICLES

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UNDERSTORY DYNAMICS IN DIFFERENT SITES OF SARGUJA FOREST DIVISION (CHHATTISGARH), INDIA

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Abstract: The rapid growth and development in urban area through industrialization leads rapid socio-economic deviations throughout the world, especially in Asian region which exert substantial impact over agricultural, forestry and other inter-related ecosystems. The increasing population also intensifies the global wood demand and these scenarios were more drastic in the developing countries due to demand and supply gap. These gaps can be overcome through the application of plantation forestry. In this connection we studied five vegetation stands (i.e., Teak, Sal, Mangium, Eucalyptus and Bamboo) of the Sarguja forest division in Chhattisgarh, India to assess the understory vegetation stratum, associated floral diversity and litter biomass through stratified random sampling technique. Total 6 herb species distributed into 4 families and 9 shrub species of 8 families were recorded across the sites. The total density of herb ranged from 72000-244000 individual ha^{-1} across the site being highest under teak plantation and lowest under bamboo stand. The shrub density ragned from 50-640 individual ha^{-1} in different sites being highest under teak stand and least in bamboo stand. The Shannon index for herb layer was lowest under bamboo stand and higher under mangium stand. In case of shrub the lowest value of Shannon index was recorded for sal stand and highest under both mangium and eucalyptus stand. The total forest floor biomass varied from 0.86-3.01 t/ha being lowest in bamboo stand and highest under sal stand. The information related to understory vegetation and its dynamics is essential towards management of vegetation stand.

Keywords: Herb, Diversity, Forest floor biomass, Plantation, Shrub

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EFFECTS OF ORGANIC, INORGANIC AND BIO-FERTILIZERS ON THE GROWTH OF MAIZE UNDER SUBABUL (*LEUCAENA LEUCOCEPHALA*) BASED AGROFORESTRY SYSTEM

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Abstract: A field trail was carried out at the research farm of College of Foresrty, SHUATS, Prayagraj. The experimental site situated at an altitude of 90 M above the MSL at 25^0.57' N latitude and 81^0 51' E longitude. The experiment comprised of nine treatments replicated thrice. The maximum germination percentage (94.27%), plant height (72.10 cm) at 30DAS, 176.37 cm at 60 DAS and 183.67 cm at 90 DAS, number of cob/plant(1.22), ear length (17.90 cm), number of rows/cob (13.78), number of grains/cob (369.33), test weight (216.93), grain yield (q/ha) (38.50), stover yield (69.29) and harvest index (35.73) were recorded in T_8 (A Chroococcum+ Phosphate Solubilizing Bacteria+Vermicompost (3t/ha) maximize the maize growth and yield under subabul trees. Therefore, it may be concluded that A Chroococcum+ Phosphate Solubilizing Bacteria+Vermicompost (3t/ha), can be recommended for growing maize under subabul based agroforestry system for obtaining better growth and yield.

Keywords: Agroforestry, Bio fertilizer, Manure, Subabul

FLORISTIC COMPOSITION AND DIVERSITY IN THE FOREST FRAGMENTS OF DRY AND MOIST TROPICAL FOREST

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Abstract: The stand attributes in terms of structure and diversity across the forest fragments by forest types have been poorly investigated previously. Therefore, in the present investigation stand attributes i.e., floristic composition, structure and diversity of vegetation growing into two different forest types viz., dry tropical forest (DTF) and moist tropical forest (MTF) of the Chhattisgarh, India is examined. By using field data, collected through random sampling techniques from forest fragmented landscape in the dry and moist forests of Chhattisgarh, India, we were able to visualize the effects and influence on tropical forests. We observed changes in species composition, stand structure and diversity of concerned forest types. The most diverse families were Leguminosae (10), Anacardiaceae (7), Euphorbiaceae (4), Combretaceae (3), Myrtaceae (3), Rhamnaceae (3), Rubiaceae (2) and Rutaceae (2). In the present study a total of 8120 trees ha^{-1} in all the forest sites representing 50 species and 23 families were encountered. The total density of trees varied from 390-2130 trees ha^{-1}, being highest in DTF I while least in MTF II. The diversity indices values reflected that Shannon index recorded for various forest fragments ranged from 2.39-3.62, equitability from 0.75-1.25, species richness from 2.65-6.61, beta diversity from 6.02-20.0 and concentration of dominance from 0.12-1.0, respectively. The present reports highlights the sites conditions for phytosociological attributes at stand levels, which may enriched the information towards sustainable strategies, plan and management of these resource in addition to conservation priority.

Keywords: Biomass, C stock, Diversity, Forest fragments, Structure, Tropical forest

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PERFORMANCE OF OSMO-PROTECTANTS AND ANTIOXIDANTS IN AMELIORATION OF TERMINAL HEAT STRESS IN WHEAT (*TRITICUM AESTIVUM* L.)

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Abstract: Terminal heat stress causes significant yield reduction in wheat (*Triticum aestivum* L.) due to rise in temperature. The present study on the performance of osmo-protectants and antioxidants on three wheat varieties was conducted at the experimental area of Department of Plant Breeding and Genetics, PAU, Ludhiana. Two foliar sprays of osmo-protectants (Salicylic acid, KNO_3 and $ZnSO_4.7H_2O$) and antioxidants (Ascorbic acid and arginine) excluding water were done at anthesis stage and ten days after anthesis stage. The data revealed that concentration of salicylic acid (75 μgml^{-1}) had non-significant effect on wheat yield. KNO_3 and salicylic acid gave better yield as compared to all other treatments. Ascorbic acid and arginine proved significant in all the three varieties. It may be interpreted that osmo-protectants and antioxidants can neutralize heat stress. WH 1105 gave 7.7 percent higher yield than PBW 621 and 10.6 percent than PBW 550 in response to osmo-protectants and antioxidants application.

Keywords: Antioxidants, Osmo-protectants, Terminal Heat Stress, Yield, Wheat

IMPACT OF INTEGRATED NUTRIENT MANAGEMENT ON QUALITY SEEDLING PRODUCTION IN *FLEMINGIA SEMIALATA* ROXB

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Abstract: In this experiment thirteen treatments involving different organic, inorganic, bio-fertilizer and their combinations were assessed on seedling growth. Application of Arbuscular mycorrhiza (AM) (10 g) + Phosphate solubilising bacteria (PSB) (5 g) + NPK (Sampurna 19:19:19- 2g/seedling) (T13) to soil media containing red soil, sand and FYM in 2:1:1 ratio increased the plant growth attributes viz., plant height, collar diameter and number of branches and number of leaves by 41.62, 44.09, 44.23 and 39.17 per cent respectively after 150 days of transplanting compared to control. The extent of increase in seedling height due to treatment (T13) in *F. Semialata* was found to be 51.13, 68.14, 78.13, 83.79 and 87.26 per cent over initial plant height at 30, 60, 90, 120 and 150 days after transplanting respectively. The increase in collar diameter due to treatment (T13) in *F. Semialata* was found to be 58.47, 73.36, 80.63, 83.38 and 85.65 per cent over initial collar diameter at 30, 60, 90, 120 and 150 days after transplanting respectively. Higher number of number of leaves per plant noticed in treatment (T13) was 50.98, 60.38, 68.54, 69.40 and 69.62 per cent over initial number of leaves per plant at 30, 60, 90, 120 and 150 days after transplanting respectively. Significantly higher fresh weight and dry weight were obtained in *Flemingia semialata* by application of (T13) AM (10 g) + PSB (5 g) + NPK (Sampurna 19:19:19- 2g/seedling). Overall, the treatment (T13) constituting AM (10 g) + PSB (5 g) + NPK (19:19:19- 2 g/seedling) gave highest growth parameters as compared to other treatments. So it can be recommended as best treatment for integrated nutrient management for quality seedling production.

Keywords: Organic, Inorganic, Biofertilizer, Plant height, Weight

PATTERN OF PRICES AND MARKET INTEGRATION OF MAJOR PULSE CROPS IN GUJARAT

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Abstract: The study has analyzed price and arrivals pattern and market integration of major pulse crops i.e. gram and tur in Gujarat state. The secondary data on monthly wholesale prices and arrivals were collected from the website of agmarknet.gov.in of selected regulated markets for last ten years (2007 to 2016). The study has indicated that the inter-year price analysis shows upward trend of annual price indices and there was a significant increase in the price of gram and tur in all the selected markets with positive and statistically significant compound growth rate during the study period. The intra-year price analysis revealed that the general pattern of seasonal variations in prices were found with increased the prices in off season and decreased in main season all most in all the selected markets in both the crops. The pattern of arrivals shows that the quantity of arrival was more in off season in the selected markets. This may be due to that the stockiest released their stocks with the commencement of new season. The results of market integration exposed that there was positive and significant correlation was found for each market pairs that means the wholesale prices of gram and tur was integrated in all the selected markets. Thus, it can be inferred from the above results that the prices increased in one market, it leads to increase the prices in other markets.

Keywords: Gram, Tur, Price behavior, Wholesale prices, Arrivals, Seasonal price indices, Market integration

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DIVERGENCE STUDIES IN INDIAN CLUSTER BEAN (*CYAMOPSIS TETRAGONOLOBA* L. TAUB.) FOR DEVELOPING VARIETY FOR VEGETABLE PURPOSE

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Abstract: In a quest for developing improved vegetable type guar, the available germplasm at ICAR- Indian Institute of Horticultural Research, Bangalore collected from different parts of the country were evaluated. Narrow genetic base of the crop due to its self-pollinated nature is a hindrance in getting variability in natural pollination. But, hybridization based on genetic distance is a potential tool to get transgressive segregants. Therefore, this study was formulated to estimate the divergence present in the population and based on their genetic distance the genotypes were classified into 4 different clusters. Inter cluster distance was found maximum between cluster II and IV followed by between cluster I and III and cluster I and II. As the objective is to develop vegetable guar, hybridization between genotypes of cluster I (vegetable guar) and distant genotypes with the desirable trait from different cluster will be advantageous. Direct selection for traits like yield per plant and plant height in cluster I was done to identify the potential parents due to their maximum contribution toward divergence. Based on their genetic distance with desirable genotypes of other clusters which have the supplementary traits missing in cluster I, 11 crosses has been identified which has the potential to bring worthwhile improvement in vegetable guar.

Keywords: Cluster bean, Divergence, Diversity, SAS, Vegetable guar

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PRICE BEHAVIOUR AND CO-INTEGRATION OF GREEN GRAM IN GUJARAT

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Abstract: The secondary and time series data on monthly wholesale prices and arrivals of green gram were collected from the website of agmarknet.gov.in of selected regulated markets for last ten years (2007 to 2016). The results evident that the inter-year price analysis shows upward trend of annual price indices and there was a significant increase in the price of green gram in all the selected markets with positive and statistically significant compound growth rate during the study period. The intra-year price analysis revealed that the general pattern of seasonal variations in prices were found with increased the prices in off season and decreased in main season all most in all the selected markets. By using Augmented Dickey Fuller Test, Johansen test and causality test was examined. The results of the study indicated that therefore ADF test at the first diffirence were significant so the null hypothesis was rejected about the presence of unit root. Thus three series were integrated of the order (I). The price series of all markets were stationary at their levels themselves. Trace statistic and maximum Eigen value test revealed that Gujarat Green Gram markets were found to be integrated with 3 co- integrating equations. All the market pairs exhibited bi-directional causality and prices were transmitted vice versa i.e., mutual influence was exterted by the market on each other.

Keywords: Green gram, Price behaviour, Wholesale prices, Causality test

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INVESTIGATION ON QUALITY OF COIR WASTES BIOCHAR FOR SOIL AMENDMENT AND SOIL CARBON SEQUESTRATION APPLICATIONS

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Abstract: In this paper, coir wastes biochar was prepared from coirwaste biomass at low temperatures (400-450°C) and the quality of the biochar was tested with reference to the International Biochar Initiative (IBI) criteria for soil amendment and soil carbon sequestration applications. The coir wastes biochar had mass yield (20.02%), H/C_{org} (0.48), O/C (0.59), pH (7.28) and EC (0.09 dS cm^{-1}). Carbon (%) of the coir waste biochar was found to be increased from 34.52% to 44.98%. The nitrogen (%) and sulphur (%) was found to be low in the coirwastes biochar compared to the raw biomass, indicating that it would produce less NOx and SOx emissions during combustion. The total organic carbon (%) was notably increased from 18% to 52% and follows class 2 biochars (≥30<60%) based on the criteria given by IBI. It is observed from the results that the thermo-chemically converted coir wastes biochar had greater potential and stability to sequester organic carbon in the soil because H/C_{org} of the biochar was found to be <0.70 and all other characteristics were in the threshold criteria as declared by IBI.

Keywords: Coir wastes biomass, Biochar, Organic carbon, Stability, IBI criteria

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PHYSICAL CHARACTERISTICS AND CHEMICAL CONSTITUENTS IN CRUDE PLANTS METHANOLIC EXTRACT OF SELECTED MEDICINAL PLANTS BASED ON LITERATURE AND TRADITIONAL KNOWLEDGE

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Abstract: Eucalyptus globules yielded highest in case of leaves extract, while in case of fruit extract Annona squamosa yield highest and in case of seed extract Butea frondosa yield was highest. Phytochemical evaluation showed that Ailenthus excels (leaves) extract was positive for alkaloids, flavonoids, tannins, phenolic compounds and triterpenoids, while in Calotropis procera (leaves) methanolic extract alkaloids, flavonoids and tannins were identified and in case of Chenopodium album (seeds) alkaloids, saponins, glycosides, fixed oils and tannins were present.

Keywords: Phytochemical, Medicinal plants, Alkaloids, Flavonoids, Tannins, Phenolic compounds, Triterpenoids