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Contents

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SOIL COMPACTION: ITS CAUSES, EFFECT AND SOLUTION IN AGRICULTURE

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Abstract: In modern agriculture, most of the field operations from sowing to harvesting are done mechanically by using heavy agricultural machinery and equipments/implements. However, the loads from these heavy machineries may induce stresses exceeding soil strength causing soil compaction. Field preparation with large and heavier agricultural machinery induced hard pan/plough sole at the depth below the tilled zone of approximately 20 cm (sub-soil compaction). This is more serious problem because alleviating procedures such as sub-soiling or deep tillage is difficult and costly, over and above normal tillage. The magnitude of top as well as sub-soil compaction, however, depends on the type of tillage equipment, intensity of tillage, soil properties (texture, organic matter contents etc.) and the soil moisture content at the time of tillage.

Keywords: Soil compaction, Soil properties, Plant growth, Crop yields

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EXPLORATION AND CONSERVATION OF FOREST GENETIC RESOURCES

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Abstract: Increased use of forest resources and a shrinking forest land base threaten the sustainability of forest genetic resources and highlight the importance of conservation and sustainable management of these resources. Conservation of forest genetic resources could be defined as a set of activities and strategies that are being implemented with the aim of ensuring the continued existence, evolution and availability of these resources for present and future generations. As forest trees are normally the keystone species of forest ecosystems, their continued existence is essential for many floral and faunal associations of these ecosystems. Major opportunities for conservation of forest genetic resources include: use of molecular genetic markers and adaptive traits for developing conservation strategies; *in situ* conservation through natural reserves, protected areas, and sustainable forest management practices; *ex situ* conservation through germplasm banks, common garden archives, seed banks, DNA banks, and tissue culture and cryopreservation; incorporation of disease, pest, and stress tolerance traits and ecological restoration of rare or declining tree species. Forest genetic resource conservation and resource use should be considered complementary rather than contradictory to each other. Therefore, the aim of genetic resources management is to improve conditions for the continuous evolution of the species, which represents the defense mechanism of organisms in suppression the environmental changes.

Keywords: Forest genetic resources, In situ gene conservation, Ex situ gene conservation

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SALINE WATER IRRIGATION USING DRIP IRRIGATION

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Abstract: Good quality water is very limited constraint available on the earth for the agriculture production. With this limited resource, it is very impossible to get food security for world population. Saline water irrigation resources are very much available on the earth and can be used as irrigation. Without proper management, saline water irrigation built the salt in the agriculture field. Saline water irrigation with the use of drip irrigation system can be a solution for crop production. Cultivars of different varieties also gave a good response with saline water. Under shallow water condition, saline water irrigation with drip irrigation provide good soil environment and produce yield. Draught condition is very prevalent and occurs frequently from the previous decade and crop production is also stunted. Review is done from the previous research under various condition of saline water irrigation. Here, number of works done by researcher shows that even with saline water healthy yield of crop production can be obtained.

Keywords: Saline water, Drip irrigation, Crop production, Draught condition, Management practices

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IMPACT OF DIFFERENT IRRIGATION SYSTEMS AND PLANTING DATES ON NUMBERS OF DIFFERENT GRADES OF POTATO (*SOLANUM TUBEROSUM* L.)

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Abstract: Among different irrigation methods, micro-sprinkler irrigation method (I2) was significantly influence on number of tubers per m^2 in different grade i.e. up to 25g (4.37 & 4.09), >25-50g (4.76 & 5.04), >50-75g (6.02 & 4.73) and >75 g (12.84 & 14.46 g) Harvested at 75 DAP and 90 DAP, respectively, of potato over furrow irrigation method. whereas, among different dates of sowing, 15th October (D_4) had significant effects on potato growth metrics of potato i.e. up to 25g (5.78 & 5.36), >25-50g (5.41 & 5.43), >50-75g (7.20 & 5.39) and >75 g (18.91 & 20.27) Harvested at 75 DAP and 90 DAP, respectively, over rest of the other planting dates during 2017-19. Number of tubers per m^2 in different grade of potato crop variety (Kufri Lima) sown on 15 October and harvested at 90 DAP by micro-sprinkler irrigation system performed best under Hisar conditions.

Keywords: Potato, Micro-sprinkler, Furrow, Irrigation, Growth parameters

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PHYSIOLOGICAL STUDIES OF THE *ALTERNARIAALTERNATA* (FR.) KEISSLERCAUSING ALTERNARIA LEAF SPOT IN LEHSUA (*CORDIAMYXA* ROXB.)

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Abstract: Leaf spot infected leaves of lehsua were collected from Horticulture Farm, Asalpur, SKN College of Agriculture, Jobner (Jaipur). Pathogen was isolated, purified and identified with the Indian Type Culture Collection, No. 10,627.17 and confirmed as *Alternaria alternata* and its pathogenicity was proved. The symptoms of Alternaria leaf spot appeared 15 days of inoculation during pathogenicity. In field conditions it was cause considerable yield losses. Under *in- vitro* conditions the mycelial growth of *Alterrnaria alternata* was recorded maximum at 25 ^{0}C temperature, 100 per cent relative humidity and 6.5 pH. Potato Dextrose Agar medium supported best mycelial growth among the media under study.

Keywords: *Cordiamyxa*, Lehsua, Alternaria leaf spot, Pathogenecity, *In-Vitro* studies

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SALT AND WATER MOVEMENT IN DRIP-IRRIGATED TOMATO AND ONION UNDER FERTIGATION TREATMETS

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Abstract: Irrigated agriculture is an important part of agriculture and provides foods for humansas well as the feed to sustain animals. Irrigation plays a crucial role in agriculture. Management of water and fertilizers is of paramount importance for crop production. The present study was conducted to examine the effect of different nitrogen fertigation level on tomato and onion crop utilizing saline ($EC_{iw} \approx 2.5$ dSm^{-1}) water through drip irrigation. All the recommended nutrients and 1/3rd of nitrogen were applied before transplanting the tomato and onion, whereas, recommended dose of nitrogen, phosphorous and potash was applied before transplanting. Remaining dose of nitrogen was splited and applied at weekly interval through drip. Soil moisture and salinity in the soil profile of different treatment was recorded at fortnight interval. WUE and NUE was also evaluated on the basis of yield, amount of water and fertilizer applied. Moisture content in the soil profile increased with the increase in the salt concentration of irrigation water (EC) and a decrease in moisture content was with an increase in N fertigation level. In addition to it, accumulation of salt at dripper was less and the level of salt increased while moving away from the emitting source (dripper) which verified that drip system has the capability to draw the salts away from the dripper. Yield and WUE under good quality water irrigation with N-fertigation of 100 kg/ha and 125 kg/ha was statistically at par but significantly higher than that at N-fertigation of 75 kg/ha. The increased N-fertigation level beyond RDN did not significantly improved the tomato yield and WUE but reduced the NUE.

Keywords: Drip irrigation, Fertigation, NUE, Saline water, Tomato, Onion, WUE

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STUDY ON GENETIC DIVERGENCE FOR SEED YIELD AND ITS CONTRIBUTING CHARACTERS IN FABA BEAN (*VICIA FABA* L.) GENOTYPES UNDER SEMI-ARID CONDITION

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Abstract: The experimental material was consisted of 53 genotypes of faba bean, raised in RBD design with three replications during *rabi* 2019-20 at Research Farm of MAP Crop Section, Department of Genetics & Plant Breeding, CCS

HAU, Hisar. The results of analysis of variance indicated that the substantial genetic variability was present for seed yield and its contributing characters. The 53 genotypes were grouped into 6 clusters using Tocher's method. The maximum intra-cluster D^2 value was recorded for cluster IV, which suggested that the cluster IV had maximum genetic heterogeneity among the genotypes presented in this cluster, whereas, the maximum inter- cluster D^2 value was recorded between cluster V (HB-24) and VI(HB-01), which indicated that the genotypes present in these clusters had highest genetic diversity. Therefore, these genotypes could be utilized in breeding program for the development of high yielding and nutritionally superior genotypes.

Keywords: Faba bean, Genetic diversity, Genetic variability, Tocher's method

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PENDIMETHALIN EFFECTS ON WEED DYNAMICS, CROP GROWTH AND YIELD OF WHEAT

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Abstract: A field experiment conducted at Agricultural Research Farm, Division of Agronomy, BHU, Varanasi to evaluate the efficacy of herbicide to control of weeds in wheat crop. Weed flora of the experimental field was dominated by broad leaved weeds like *Solanum nigrum*, *Anagallis arvensis*, *Chenopodium album*, *Vicia sativa*, *Melilotus indicus*, *Rumex dentatus*, and *Medicago denticulatum*, narrow leaved weeds like *Cynodon dactylon*, *Phalaris minor* and sedges like *Cyperus rotundus*. In the experimental field weeds were controlled by pre-emergence application of herbicides *viz*., pendimethalin 30% EC @ 600 g ha^{-1}, pendimethalin 30% EC @ 900 g ha^{-1}, pendimethalin 30% EC @ 1200 g ha^{-1}, pendimethalin 30% EC @ 1500 g ha^{-1}, metribuzin 70% WP @ 210 g $ha^{-1}$and weed free (two hands weeding). All herbicidal treatment compares with Untreated Control (Weedy check). Among all herbicidal treatment pendimethalin 30% EC @ 1200 g ha^{-1} application is effective to control *Phalaris minor* with WCE was 89.21%. Metribuzin 70% WP @ 210 g ha^{-1} have efficacy to control broad-leaf weed effectively and some narrow leaf weed. The highest grain yield observed in hand weeding (5693 kg ha^{-1}) followed by herbicidal treatments, pendimethalin 30% EC @ 1200 g ha^{-1} (5078 kg ha^{-1}). The maximum grain yield, effective weed control was achieved by medium dose of pendimethalin (1200 g ha^{-1}).

Keywords: Weed, Pendimethalin, Grain yield, Wheat, Metribuzin

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BIOREMEDIATION OF CHROMIUM FROM CONTAMINATED SOIL: OPTIMIZATION OF ISOLATES UNDER LABORATORY CONDITIONS

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Abstract: Bacterial Strains were isolated and enriched from contaminated sites of Mohkampur and Partapur industrial area in Meerut, Uttar Pradesh at regular intervals for a period of 30 months between 2018 and 2021. The strains isolated showed high efficiency towards reduction of Chromium VI variety in aerobic as well as anaerobic conditions. During the course of experimentations several varying levels of BOD and COD of isolated were observed. It was also found that strains performed better in aerobic conditions in comparison to anaerobic environment. It is safely concluded that isolated strains proved to be a successful remedy in bioremediation of toxic Chromium VI from contaminated soils.

Keywords: Bioremediation, Reduction, Chromium, BOD, COD

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ANALYSIS OF GENETIC DIVERSITY IN LENTIL (*LENS CULINARIS* MEDIK.) GENOTYPES UNDER HUMID SOUTH-EASTERN PLAIN ZONE OF RAJASTHAN

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Abstract: Genetic divergence analysis in 155 genotypes of lentil (*Lens culinaris* Medik.) by applying Mahalanobis's D^2 statistics indicated the presence of wider genetic diversity among the material for 13 characters. The genotypes were grouped into twelve clusters by Tocher's method. Cluster V was the largest group of 34 genotypes, whereas cluster II was the second largest group consisting 29 genotypes grouped together. Cluster VI was the third largest cluster based on the genotypes (28 genotypes) followed by cluster IV (18 genotypes), cluster I (13 genotypes), cluster III (11 genotypes). Two clusters X and XII comprised of five genotypes each cluster and cluster VII and IX comprised of three genotypes in each cluster. The remaining cluster XI comprised four genotypes. Cluster VIII have only two genotypes indicating that this genotype is much more divergent than rest of the genotypes in the study. It was concluded that in general there was parallelism between genetic and geographic diversity. Cluster XI had higher mean values for most of the desirable characters like seed yield per plant (3.69) followed by harvest index (48.91), number of pods per plant (108.75), number of peduncles per plant (64.57), number of primary branches per plant (15.77). The genotypes accommodate under cluster XI were found desirable for seed yield per plant (3.69 g).

Keywords: Cluster, Genetic divergence, Lentil, Productivity

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EFFECT OF DIFFERENT WEED MANAGEMENT PRACTICES ON GROWTH PARAMETERS AND YIELD ATTRIBUTES OF GROUNDNUT (*ARACHIS HYPOGEA* L.)

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Abstract: A field experiment was conducted on groundnut (*Arachis hypogaea* L.) during *Kharif* season 2016 at College of Agriculture, SKRAU, Bikaner, Rajasthan (India). The experiment was laid out in a randomized block design with 12 treatments and replicated thrice. The soil was loamy sand, low in organic carbon (0.08%) and available N (78 kg/ha) and medium in available P (22 kg/ha) and available K (210 kg/ha) with pH 8.3. Maximum plant height, dry matter accumulation, number of nodules, pods, kernels and seed index were recorded with application of pendimethalin+imazethapyr (30+2) 800 g/ha (pre-emergence) followed by pendimethalin 1.0 kg/ha as PE, pendimethalin+imazethapyr (30 + 2) premix 800 g/ha (pre-plant incorporation-PPI), pendimethalin 1.0 kg/ha as (PPI), pendimethalin+imazethapyr (30 + 2) 800 g/ha (Dry), pendimethalin 1.0 kg/ha as (Dry), imazethapyr+imazamox (35:35) 70 g/ha as post-emergence spray (PoE) at 20 DAS (days after sowing), imazethapyr +imazamox (35:35) 50 g/ha at 20 DAS as PoE (at 3-4 leaf stage) and imazethapyr 70 g/ha as PoE at 20 DAS.

Keywords: Groundnut, Imazamox, Kharifseasion, Pendimethalin + Imazethapyr

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YIELD AND ECONOMICS OF URDBEAN (*VIGNA MUNGO* L. *HEPPER*) AS INFLUENCED BY FRONT LINE DEMONSTRATIONS IN BUDAUN DISTRICT OF UTTAR PRADESH

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Abstract: Front Line Demonstrations (FLDs) were conducted during *Kharif* seasons from 2011 to 2017 (07 years) at the farmers' fields of different villages of Budaun district of Uttar Pradesh by scientists of Krishi Vigyan Kendra, Ujhani (Budaun) under Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (U.P.). Total 128 front line demonstrations in 50 ha area were conducted to evaluate the effect of front-line demonstrations on yield and economics of urdbean crop. Results of FLDs indicated that the cultivation practices comprised under FLDs *viz.*, use of improved variety (PU-31), balanced application of fertilizers, line sowing, timely weed management and control of insect pests through fungicide & insecticide, produced on an average 910 kg/ha urdbean grain yield, which was 20.6 per cent higher compared to prevailing farmers practice (754 kg/ha). The extension gaps ranged from 86 to 220 kg/ha during the period of demonstration with average 157 kg/ha. The technology gap was maximum (619 kg/ha) in the year 2015 and minimum (336 kg/ha) in the years of 2013 with average value of 490 kg/ha. The data revealed that minimum technology index value 24.0 per cent was noticed in the year 2013 followed by 25.7 per cent in 2012 whereas, maximum value of technology index of 44.2 per cent in the year 2015. The FLDs recorded higher average gross returns (Rs. 41807/ha) and net return (Rs. 26369/ha) and B: C ratio (2.78) with slightly higher investment on cost of cultivation (Rs. 1339/ha) as compared to farmers' practice. It is observed that majority of the respondent farmers expressed high (52.34%) to the medium (31.25%) level of satisfaction regarding the performance of urdbean under demonstrations. Whereas, very few (16.41%) of respondents expressed lower level of satisfaction. The higher to medium level of satisfaction with respect to performance of demonstrated technology indicate stronger conviction, physical and mental involvement of in the frontline demonstration which in turn would lead to higher adoption.

Keywords: Client Satisfaction Index, Front line demonstration, Integrated crop management, Productivity, Profitability

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AN ANALYSIS OF EFFICIENCY OF WHATSAPP PLATFORM IN DISSEMINATION OF PULSES CULTIVATION TECHNOLOGIES

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Abstract: A study on analysis of Effectiveness of Whatsapp platform in dissemination of pulse production technologies was taken up at KVK, Thiruvarur as part of an FLD among 45 pulse farmers as Experimental group and 45 pulse farmers as control group. A pulses whatsapp group was created and the whatsapp were given to Experimental group continuously throughout the crop period. The results indicated that the Experimental group has been found to score high in all parameters than the control group which could be inferred as the whatsapp group was very effective. The mean knowledge gain is 35.80, mean adoption is 8.10, Mean Communication Efficiency Index is 7.48 among the farmers of the Experimental group which is far ahead of the control group. Further, the members of whatsapp group could save Rs. 2560 with mean yield of 8.7 quintals /ha and achieved an income of Rs. 43100/ha.

Keywords: Cultivation, Farmers, Mobile, Whatsapp platform

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FORAGING BEHAVIOR OF EUROPEAN HONEY BEE, *APIS MELLIFERA* (HYMENOPTERA-APIDAE) ON BROCCOLI (*BRASSICA OLERACEA* VAR. ITALICA) FLOWERS IN SURGUJA DISTRICT OF CHHATTISGARH, INDIA

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Abstract: A study was undertaken at Raj Mohini Devi College of Agriculture and Research station, Ambikapur (Chhattisgarh) substation of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) India. The foraging behavior of European honey bee, *Apis mellifera* was observed in Broccoli flowers during 11 January 2021- 15 February 2021. The maximum foraging activity of honey bee was observed third week of March 2021 (32.76 bees/5min/plant) followed by second week of March 2021 (25.38 bees/5min/plant) and fourth week of March 2021 (122.45 bees/5min/plant) however the lowest population was recorded during first week of April 2021 (6.61 bees/5min/plant). Similarly during the different hours of the day, the maximum population of honey bees were recorded at 10.00-11.00 AM (20.63 bees/5min/plant) followed by at 11.00AM-12.00PM (19.72 bees/5min/plant) and at 9.00-10.00AM (19.27 bees/5min/plant). However, the lowest population was recorded at 3.00-4.00PM (12.08 bees/5min/plant).

Keywords: Broccoli flowers, European honey bee, Foraging behavior

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EFFECT OF STECKLING SIZE AND PRUNING OF TERTIARY BRANCHES ON YIELD AND QUALITY OF CARROT SEED CROP CV. HISAR GAIRIC

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Abstract: An experiment was conducted during rabi season 2018-19 to evaluate the performance of carrot under different steckling size and pruning treatments. Medium size stecklings (4-5 cm in diameter) produced good quality and higher seed yield per plant (26.01 g) and per hectare (15.63 q/ha) as compared to large and small size stecklings. Significantly higher test weight, germination, and seed vigor were recorded with medium size stecklings as compared to small size stecklings. However, the medium and large size stecklings were comparable for germination of seed obtained from secondary and tertiary umbels. Pruning of tertiary branches did not affect seed yield per plant and per hectare significantly. However, test weight, germination percentage, and seed vigor were found higher under pruning treatment as compared to unpruned (control).

Keywords: Carrot, Germination, Steckling, Pruning, Test weight, Seed vigor

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AN ANALYSIS ON BIOREMEDIATION OF LEAD TOXICITY USING MICROBES

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Abstract: Metal toxicity is cruising the world insane, as rising lead levels in soil, water, and air are the second leading cause of various diseases. Lead is the most common element found in the environment, and it is a byproduct of both personal and industrial use. Bioremediation is a proposed solution to the problem. It is the result of a collision of science and technology that aids in the removal of heavy metals from the environment. The study aims to address the significance of the bioremediation process and different types of bioremediation processes helpful for removing lead from the soil, water, and air. It addresses the bacteria tolerance of lead toxicity and highlights the in vitro and in vivo process used for lead oxidation with the help of microorganisms. The researcher has a secondary method for gathering information about the methods used to reduce lead toxics using microorganisms, as well as highlighting the process of bioremediation to remove lead toxins from the environment. The data for this study will be gathered by searching for all relevant articles related to the research question. The secondary research employs the Interpretivism paradigm to develop the assumption based on previous similar findings. The micro-organism used in the Bioremediation process includes algae, yeast, bacteria, etc. All these are used up in the process in their natural process. The Bioremediation process uses mostly bacteria and fungi, yeast, and algae microbes are frequently used.

Keywords: Bioremediation, Lead toxics, Metal toxicity