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Hybrid rice cultivation in Tarai region of Uttarakhand: An economic perspective of technology adoption

VIRENDRA SINGH and ANIL KUMAR

*Department of Agricultural Economics,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263 145 (U. S. Nagar, Uttarakhand)*

ABSTRACT

The use of modern technologies in Indian Agriculture to enhance productivity, profitability and quality improvement has been warranted since independence. Introduction of high yielding varieties of rice and wheat have outset the adoption of modern technology in Indian Agriculture, which was latter known as Green Revolution. Since then thousands of high yielding varieties / hybrids of different crops have been released. Hybrid rice, one of the viable and proven technologies has been considered as a new intervention to increase rice production for meeting burgeoning demand for staple food in India. Using farm survey data this paper examines comparative profitability of hybrid and non-hybrid rice cultivation. Results show that hybrid rice gives substantially higher yield as well as net return compared to non-hybrid rice, which leads to higher and sustainable growth of food grain production in the country. Therefore, it can be inferred that hybrid rice cultivation is not only profitable for farmers but also improves food security of the nation.

Socio-economic status of tribal farm households under different farming systems in the plain region of Uttarakhand, India

SHALINI RAGHAV and S. K. SRIVASTAVA¹

Department of Agricultural Economics, IAS, BHU, Varanasi,

¹*Department of Agricultural Economics,
College of Agriculture,*

*G. B. Pant University of Agriculture and Technology,
Pantnagar-263 145 (U.S. Nagar, Uttarakhand)*

ABSTRACT

The study was carried out in the plain region of Uttarakhand state of India. The data were collected through interview schedule from sixty tribal farmers of the study area for the agricultural year 2008-09. Simple descriptive statistical tools like average, per centage, etc.

were used to analyze the socio-economic status of tribes. Tribal farmers were found following 04 farming systems (FS) namely; Crop + Livestock, Crop only, Crop + Livestock + Orchard, and Livestock only. The results revealed that culture, traditions and festivals of tribal people were not very much different from the Hindus. Most of the tribal farmers belonged to the category of small and semi-medium size of the land holdings. Overall average size of tribal farm family was 7.16 and number of females was more than male member in each farming system. Educational status of sample tribal families showed that percentage of illiteracy was higher in female than the male family members across all the farming systems. Cropping pattern of the study area revealed that more than 90 per cent of the total cropped area was devoted to subsistence food crops. Agriculture was the main source of their income. There is scope to follow different crop rotations which may increase cropping intensity and returns thereof as all the operational area was irrigated on the tribal farms under different farming systems. Therefore, more concern towards agriculture is needed with the introduction of high value crops in the cropping patterns. Women led developmental activities be more fruitful in the study area. More emphasis need be given to the education of female members of the tribal families. Buffalo was found to be the most preferred livestock by the tribes across the farming systems as it shared about two third of total livestock population on their farms in the study area.

Evolving the suitable zones for plum production in Uttarakhand using remote sensing and GIS

JAYA DHAMI, SUMANA ROY and A.S. NAIN

*Department of Agrometeorology,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263 145 (U.S. Nagar, Uttarakhand)*

ABSTRACT

The Zones in the State of Uttarakhand have different climatic conditions, slope and height. The variations extended to even short distances, where the micro-climate changes due to interaction of these various factors. It is characterized by two types of climate, sharply differentiated in the plains and the mountainous regions. Horticultural crops especially fruit crops for which the Uttarakhand topography and agro-climate is well suited could be an ideal choice in achieving sustainability. Efficiency in the horticulture sector can be augmented effectively by using Information Technology such as remote sensing and GIS. Thematic layer of different weather parameters (temperature, precipitation) were generated by adding their attribute data in ARC-view GIS software. Soil attribute data from published soil map by NBSS&LUP, Nagpur were also added in it. Suitability model were developed in GIS using model builder module extension. All these parameters were added in this model and with the overlay function suitability classes were formulated. With these suitability classes Uttarakhand is divided into highly suitable, suitable, moderately suitable and unsuitable zones for Plum production. Result showed that the upper hilly and lower region (U.S. Nagar, Haridwar and some lower parts of Dehradun, Pauri-Garhwal and Nainital) of Uttarakhand is unsuitable for plum cultivation due to skeletal soils and adverse temperature, respectively. However, in general the middle parts of the state e.g. Pauri Garwal, Tehri Garwal, Dehradun, Almora etc. possess optimum soil and climatic conditions for Plum cultivation. The study has delineated the potential suitable areas for plum production in Uttarakhand.

Remote sensing as a tool for discrimination and accuracy assessment of Sugarcane crop

RAJEEV RANJAN, ANKITA JHA and A.S. NAIN

*Department of Agrometeorology,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263145 (U. S. Nagar, Uttarakhand)*

ABSTRACT

A field study has been carried out in the year 2008-2009 at Agricultural Farm, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand for discriminating sugarcane crop from other features/objects. Cloud free LANDSAT-ETM images of path 145 and Row 40 (Containing Pantnagar and the adjoining regions) for the year 2004 to 2009 were acquired from USGS (United States Geological Survey). ENVI-4.8 (ENvironment for Visualizing Images) software was used for pre processing of satellite images and analysis of the data. Spectral library, which is the spectral behaviour of different objects was generated during the first analysis and was used in the subsequent analysis. The year having maximum number of cloud free satellite images was selected and the field boundary of objective crop having good crop cover was digitized in order to generate the spectral library. NDVI was considered to represent the growth of crop. After making subset of Agricultural Farm, Pantnagar from LANDSAT image of Haldwani region, supervised classification technique was used to identify the sugarcane crop at Pantnagar. Ground truth data combined with visual interpretation obtained from LANDSAT image dated 8th November, 2008 were used as training sets for supervised classification. The training pixels were selected from different fields. A total numbers of four classes (Sugarcane, Fallow land, Built-up land, and Forest/Orchard) were identified for which separate RoIs (Region of Interests) were generated. The accuracy of the classification was determined by comparing the test set with the classification results to generate producers, user's and the overall accuracies. Post classification statistics was generated to find out pixels belonging to different categories. The overall accuracy obtained was 100%. The value of Kappa co-efficient (K=1) indicates perfect agreement between the training and classified classes.

Studies on nutrient uptake as influenced by different weed management practices and brown manuring at varying nitrogen levels in direct seeded aerobic rice

S. K. YADAV, D. K. SINGH and MANISHA RANI

*Department of Agronomy,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263145 (U. S. Nagar, Uttarakhand)*

ABSTRACT

Three nitrogen levels with four weed management agro techniques for direct seeded rice (DSR) were evaluated in DSR during wet season of 2009. The results showed that grain yield of rice and N, P and K uptake by rice crop and weeds increased significantly with successive increase in nitrogen up to 125 kg ha⁻¹. The interaction of nitrogen application @ 125 kg ha⁻¹ (N₁₂₅) with the application of pendimethalin @ 1 kg a.i ha⁻¹ + 2 hand weeding at 20 & 40

DAS of rice (W_3) resulted in significantly higher nitrogen and potassium uptake by grain (73.1 and 21.7 kg ha⁻¹, respectively), phosphorus uptake by straw (14.0 kg ha⁻¹) and total N, P and K uptake by crop (116.1, 34.4 kg ha⁻¹ and 48.8 kg ha⁻¹, respectively) than weedy check plot, which ultimately resulted in high grain yield (6.3 t ha⁻¹). This treatment also significantly reduced the density and dry weight of weeds and nutrient depletion by weeds. The brown manuring with *Sesbania* and cowpea (W_1 and W_2) also had positive responses in lowering weed populations and increasing yield in DSR.

Seed priming and foliar nutrition studies on growth, yield and quality of chickpea under subtropical *kandi* areas of low hills of Shivalik foothills of Jammu region

BRIJ NANDAN¹, B.S. JAMWAL, B.C. SHARMA, ANIL KUMAR and VIKAS GUPTA

*Pulses Research Sub Station,
Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu,
Samba – 184121.*

¹*Division of Agronomy,
SKUAST-J, FOA-Main Campus
Chatha, Jammu (J&K)-180009*

ABSTRACT

Field experiments were conducted during winter seasons of 2005-06 and 2006-07 to study the impact of seed priming and foliar nutrition on growth, yield and quality parameters of chickpea. The perusal of the results indicated that irrespective of seed priming, 2 per cent of urea sprays at flowering initiation and 10 days thereafter recorded highest seed yield of chickpea. Besides, seed priming significantly increased seed yield in all the treatments irrespective of water spray. Among the various treatments, seed yield was maximum in seed priming + 2 per cent urea spray at flowering initiation and 10 days thereafter followed by Urea spray 2 per cent at vegetative & flower initiation which was followed by Urea spray 2 per cent at flower initiation. Yield attributes and ancillary plant growth characters (plant height, days taken to maturity, seeds/pod and 100 seed weight) were also affected by seed priming and foliar application of urea at the same stage of crop. Higher protein content and protein yield was observed with similar set of treatments.

Evaluation of genetic variability for some of quantitative traits in grain cowpea (*Vigna unguiculata* (L) Walp.)

RAMESH PAL, M.K.NAUTIYAL, Y.V.SINGH¹ and C.L. SHARMA

*Department of Genetics and Plant Breeding,
¹Department of Vegetable Science,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263145(U.S.Nagar, Uttrakhand)*

ABSTRACT

Two hundred diverse genotypes along with 5 checks (IT205, IT1042, IT889-1, IT1111-1 & Pusa Komal) of cowpea were planted during *spring* 2011. The present investigation was carried out in Augmented Block Design to find out the suitable grain cowpea genotype for Wheat - Cowpea - Rice cropping pattern, to select suitable genotype for timely and late sown

conditions and estimate the genetic divergence among genotypes under investigation. Estimation of variability revealed sufficient variability among the genotypes of all the characters. High phenotypic coefficient of variation was recorded for grain yield per plot, followed by yield per hectare, number of clusters per plant, hundred grain weight, peduncle length, number of primary branches and pod length while low phenotypic coefficient of variation was observed for days to flower initiation, days to 50% flowering, days to pod maturity. Grain yield per plot, yield per hectare and hundred grain weight also showed high value of broad sense heritability and genetic advance. In the present investigation according to LSD based on the mean and significant superiority over the best check, 49 genotypes for different traits and 15 genotypes for early maturity were found out of 200 genotypes. Most promising breeding lines based on the adjusted mean performance of the germplasm three best genotypes were identified PL08S-2-7-2, PL08S-20-5-2 and PL08S-20-5-1 as good donors for earliness in maturity, three best genotypes i.e. PL08S-34-2-4, PL08S-34-2-3 and PL08S-34-2-1 for hundred grain weight and grain yield per hectare three genotypes i.e. PL08S-12-1-5, PL08S-32-1-1 and PL08S-60-18-2 were found to be effective donor.

Genetic variability, correlation and path coefficient analysis in Dolichos Bean (*Lablab purpureus* L.) genotypes

D. P. SHARMA, N. K. DEHARIYA and AKHILESH TIWARI¹

*Krishi Vigyan Kendra,
Jawaharlal Nehru Krishi Vishwa Vidyalyaya, Jabalpur-482004 (M.P.)*

¹*College of Agriculture,
Jawaharlal Nehru Krishi Vishwa Vidyalyaya, Jabalpur-482004 (M.P.)*

ABSTRACT

An experiment was conducted with 23 genotypes and 2 commercial varieties of Dolichos bean to find out the magnitude of the genetic variability, correlation and path coefficient analysis. A large variation was found for all the characters studied under the experiment. Genotype 10/DOLPVAR-6 exhibited maximum spikes/plant, number of pods/cluster, number of seeds/pod, 25 pods weight, pod length, pod width, 1000 seed weight, pod yield/plant, pod yield/plot and pod yield/ha. High level of phenotypic coefficient of variation, genotypic coefficient of variation, heritability with genetic advance for number of flowers/cluster, pod yield/plant, pod yield/plot and pod yield/ha could be improved through direct selection. The correlation studies indicated chances for upgrading Dolichos bean genotypes by simultaneous selection through spikes/plant, days taken to first flowering, days taken to 50% flowering, days taken to first pod harvest, 25 pods weight, pod length, pod width, pod girth and 1000-seed weight. Path coefficient analysis revealed that there is ample scope for the improvement of pod yield by selecting a genotype having higher pod weight, early flowering and pod harvesting, more pods/cluster, spikes/plant, long pod with more width and girth and having bold seed size.

Heterosis studies in soybean [*Glycine max* (L.)Merrill]

POOJA SAMANT, KAMENDRA SINGH, PUSHPENDRA and GUNJAN TIWARI

*Department of Genetics and Plant Breeding,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar- 263 145(U.S. Nagar, Uttarakhand)*

ABSTRACT

The present investigation during *Kharif*, 2009 comprised 48 genotypes (25 F1s and 23 parents including one check/ standard variety PS 1347) of soybean and the experiment was laid down in a Randomized Complete Block Design with two replications. The objective of the present study was to estimate the heterosis for yield and its components. The mean squares due to genotypes were significant for all characters. The heterosis in 25F1s was estimated for 16 yield and its contributing characters viz., days to flower initiation, days to fifty per cent flowering, days to maturity, plant height, basal pod height, number of nodes per plant, number of primary branches per plant, number of pods per plant, number of seeds per pod, hundred seed weight, harvest index, seed yield efficiency, dry matter weight per plant, oil content, protein content and grain yield per plant. High magnitude of heterosis was recorded in different F1s. The most promising crosses which were superior for seed yield and its components over their respective mid parent, better parent and standard parent were Doko x JS 335, Doko x JS 90 41, EC 389148 x PS 1092, JS 335 x JS 90-41, UPSM 534 x PS 1347, PK 515 x AGS 129, PK 1029 x PS 1241, PS 1241 x Doko, PS 1347 x MACS 450, PS 1347 x PS 1241 and PS 1368 x PS 1330. These F1s have been suggested to be utilized to get better segregant for yield and its components in advance generations. Whereas, thirteen cross combinations showed earliness for days to flower initiation, days to 50% flowering and days to maturity over their respective standard parent.

***In vitro* multiplication of strawberry (*Fragaria x ananassa* Duch.) cultivars Ofra and Chandler**

KRISHNA MADHAV RAI, R.K. GOYAL and A.K. GODARA

*Department of Horticulture,
College of Agriculture,
C.C.S. Haryana Agricultural University,
Hisar-125004 (Haryana)*

ABSTRACT

Shoot tip of strawberry gave rise to multiple shoots when cultured on MS medium supplemented with different concentration of kinetin and BAP with IAA and TDZ. The highest response of shoot multiplication was obtained in MS medium containing 2.0 mg/L kinetin + 0.5 mg/L IAA and 1.5 mg/L kinetin + 0.5 mg/L TDZ for Ofra and Chandler cultivar respectively. The regenerated shoots were rooted in MS basal medium with IBA, NAA and control (without growth regulator). The highest root length and number of roots was produced in MS medium containing 1.0 mg/L IBA. The plantlets, thus developed were hardened and successfully established in mixture of coco-pit, vermiculite and perlite in ratio of 3:1:1. The plants raised through this technique exhibited normal growth and fruit setting.

Changes during development in fruits of Karonda (*Carissa carandas* L.)

K. K. MISRA and RATNA RAI

*Department of Horticulture,
College of Agriculture,
G.B. Pant University of Agriculture and Technology,
Pantnagar-263145 (U.S. Nagar, Uttarakhand)*

ABSTRACT

The experiment was conducted during fruiting season of the year 2012. The experiment was conducted on twenty two years old bush of Karonda cv. Pant Manohar in completely randomized design using twenty fruits per treatment per replication. Fruit length and fruit diameter increased significantly upto 10th and 11th weeks after anthesis, respectively. Thereafter, the fruit length and diameter decreased. The mean fruit weight and volume were increased upto 11th weeks after anthesis and after that the mean fruit weight and volume decreased. T.S.S. and acidity of the fruits increased upto 8th weeks after anthesis and gradually decreased upto maturity. T.S.S.: acid ratio decreased significantly upto 9th week after anthesis and it increased significantly from 10th week after anthesis to 13th week after anthesis.

Genetic variability and correlation studies in snapdragon (*Antirrhinum majus* L)

JYOTI KUMARI , K.K. MISRA and RATNA RAI

*Department of Horticulture,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar -263 145 (U.S. Nagar Uttarakhand)*

ABSTRACT

Genetic variability and correlation coefficient analysis were carried out for fifty-two genotypes of snapdragon during 2005-2006. Maximum genotypic variation was found with number of seeds/pod while number of leaves/plant had maximum phenotypic variation. Plant height, number of spikes/plant of cut flower value and weight of seeds/pod recorded low heritability. High genetic advance was recorded in weight of seeds/spike while maximum genetic gain was observed in weight of seeds/plant. Positive and direct correlation of number of spikes/plant with number of branches, number of leaves and plant height revealed that spike yield can be increased by direct selection of these characters. Seed yield/plant was significantly and positively correlated with number of flowers/spike, number of spikes/plant and weight of seeds/spike.

Effect of foliar application of secondary and micronutrients on the yield of paddy in Tarai zone of Uttar Pradesh

A.K. KATIYAR and A.S. JAT

*Krishi Vigyan Kendra, Ujhani (Badaun),
Sardar Vallabhbhai Patel University of Agriculture and Technology
Meerut (UP)*

ABSTRACT

A field experiment was conducted in during kharif season of 2009 and 2010 to observe the effect of foliar applied nutrients on the yield of paddy and also at five farmers's fields in kharif, 2011 with two best contributing nutrients treatments for paddy production with paddy variety Pusa Basmati-1. One per cent sulphur and iron, 0.5 % zinc and manganese solutions were sprayed on standing crop at tillering and heading stage. The results revealed that significantly higher values of plant height (94.40 cm), number of panicles (258/m²), grain yield (33.02 q/ha) and straw yield (66.95 q/ha) were recorded with the foliar application of zinc sulphate as compared to control treatment. The second best treatment was iron application with 32.75 q/ha grain and 64.30 q/ha straw yield followed by sulphur (32.00 and 63.20 q/ha) and manganese (31.58 and 61.06 q/ha) along with lowest under control plot (31.11 and 60.18 q/ha), respectively. Similar trends was also observed at farmer's fields with maximum and significantly higher values of plant height (99.5 cm), panicle length (23.85 cm), grain (35.80 q/ ha) and straw yield (66.96 q/ ha) with the use of zinc sulphate as compared to control followed by iron application.

Evaluation of lentil germplasms Lines against wilt disease

ANKITA GARKOTI, VIJAY KUMAR, and H.S. TRIPATHI

*Department of Plant Pathology,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar -263145 (U. S. Nagar, Uttarakhand)*

ABSTRACT

Wilt of lentil, caused by *Fusarium oxysporum* f.sp. *lentis* is one of the most destructive disease of lentil. Various disease management strategies have been tried to reduce the disease incidence. The present work aimed at evaluating the lentil germplasms against wilt pathogen. During 2010-11, 59 lentil germplasm accessions were evaluated under sick plot to identify multiple sources of resistance against major diseases. A wide range of variation to disease reaction was observed among tested lentil genotypes. Majority of the accessions were susceptible to wilt, whereas three accessions, IPL 217, IPL 316 and IPL 101 were found resistant to wilt.

Biochemical characterization of the indigenous germplasm lines of Bittergourd (*Momordica charantia* L.)

ANAMIKA VERMA and D.K.SINGH

*Department of Vegetable Science,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar -263145 (U. S. Nagar, Uttarakhand)*

ABSTRACT

To accentuate the field study, biochemical characterization of 10 indigenous germplasm viz. PBIG-197/10, VNR-28, PBIG-478, PBIG-194, Local, PBIG-192, PBIG-187, PBIG-191 including one variety developed at Pantnagar i.e. Pant karela-1 and other developed at CSAU i.e. Kalyanpur Sona were subjected to seed protein analysis using SDS-PAGE. A total of 26 protein bands were resolved across all the genotypes where A2, A8, A10, B1, B2, B3, B4, B5, B6, C1, C2, C3, C6 and C8 were polymorphic and the remaining were monomorphic. All germplasm lines used in the study were differentiated on the basis of presence or absence of one or other band into eight different groups. Pair wise similarity index was found to range from 76.19% to 100%. Three genotypes namely, PBIG-197/10, VNR-28 and PBIG-478 represented group I whereas other groups consisted of single genotype in each on the basis of presence/ absence of various protein bands.

Effect of calcium on growth, yield, quality and storage of potato (*Solanum tuberosum* L.)

MUKESH KUMAR VERMA and MANOJ RAGHAV

*Department of Vegetable Science,
College of Agriculture,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263 145 (U.S. Nagar, Uttarakhand)*

ABSTRACT

An experiment was carried out during *rabi* season of 2011-12 to evaluate the effect of calcium on growth, yield, quality and storage of potato (*Solanum tuberosum* L.) The experiment was conducted in Randomized Block Design with three replications. The experiment consisted of seven treatments *viz.*, no application of calcium (control), application of 40 kg/ha calcium at planting, application of 20 kg/ha calcium at planting and 20 kg/ha at earthing up, application of 80 kg/ha calcium at planting, application of 40 kg/ha calcium at planting and 40 kg/ha at earthing up, application of 120 kg/ha calcium at planting, application of 60 kg/ha calcium at planting and 60 kg/ha at earthing up. The calcium was applied in the form of gypsum. The results showed that the applied calcium had positive impact on morphological parameters *i.e.* increase in emergence, plant height, number of leaves per hill, number of haulms per hill and was recorded maximum with application of 120 kg/ha calcium at planting. The tuber yield was significantly higher with application of 40 kg/ha calcium at planting and 40 kg/ha at earthing up. Calcium application increased the specific gravity and dry matter content of tubers and reduced the skin damage tuber at harvest, physiological weight loss and rotting of tuber at room storage.

Effect of integrated nutrient management on plant environment variables in custard apple cv. Arka Sahan

ASHEESH SHARMA, PRERAK BHATNAGAR, M.C. JAIN and J. P. SINGH¹

*Department of Fruit Science,
College of Horticulture and Forestry,
Maharana Pratap University of Agriculture and Technology,
Udaipur, Jhalawar-326023 (Raj.)*
¹*Directorate of Experiment Station,
G .B. Pant University of Agriculture and Technology,
Pantnagar-263 145 (U.S. Nagar, Uttarakhand)*

ABSTRACT

An experiment was conducted to know the effect of organic and inorganic fertilizers along with bio-fertilizers on plant environment variables of custard apple cv. Arka Sahan during 2010-11. The experiment consisted of different treatment combinations comprising recommended dose of fertilizers, vermicompost and biofertilizer (*Azotobacter*, PSB and VAM). Experimental findings revealed that different treatments of integrated nutrient sources significantly increased the plant parameters. Among these integrated nutrient management treatments, treatment T₁₀ comprising 50 % recommended dose of fertilizers + 50 % N through vermicompost and biofertilizers (*Azotobacter* 50 g + PSB 50 g + VAM 20 g) was found significantly superior over other treatments with respect to plant environment variables viz. Photosynthetic rate ($\mu\text{molm}^{-2}\text{s}^{-1}$), Transpiration rate ($\text{mmolm}^{-2}\text{s}^{-1}$), Stomatal conductance ($\text{mmolm}^{-2}\text{s}^{-1}$), Photosynthetic Active Radiation ($\text{mmolm}^{-2}\text{s}^{-1}$), Internal CO₂ Concentration (ppm), Vapour Pressure Deficit (mb), Leaf temperature (°C) and Relative Humidity(%) in custard apple cv. Arka Sahan.

Exploitation of heterosis for earliness and vegetative characters of ridge gourd [*Luffa acutangula* (Roxb.) L.]

MANGALDEEP SARKAR and D.K. SINGH

*Department of Vegetable Science,
College of Agriculture,
G .B. Pant University of Agriculture and Technology,
Pantnagar-263 145 (U.S. Nagar, Uttarakhand)*

ABSTRACT

Eight parental lines and 28 F₁ hybrids of ridge gourd obtained from half-diallel were studied to investigate the extent of heterosis for earliness and vegetative characters. Appreciable heterosis in desirable direction was found over better parent and check parent for the characters viz. days to first female flower, node number to first female flower, vine length (m), number of primary branches and days taken to Ist fruit harvesting. Crosses PCPGR 7256 X PRG 142, PRG 117 X PRG 142, PRG 117 X PRG 131, PRG 117 X PRG 132 and PRG 117 X PRG 120 were found promising for earliness. Crosses PCPGR 7256 X PRG 117, PCPGR 7256 X PRG 131 and PRG 132 X PRG 120 were recorded promising for vegetative traits.

Effect of *Trichoderma harzianum*, *Pseudomonas fluorescens* and salicylic acid on physiochemical characteristics of grains in *Rhizoctonia solani* challenged rice (*Oryza sativa*)

BHAVNA THAKUR, KIRAN¹ and GURDEEP BAINS

*Department of Plant Physiology,
College of Basic Sciences and Humanities,
G.B Pant University of Agriculture and Technology,
Pantnagar- 263145 (U.S Nagar, Uttarakhand)*
¹ *College of Agriculture,
Guru Kashi University,
Talwandi Sabo-151302 (Bathinda, Punjab)*

ABSTRACT

The present study was conducted to analyze physiochemical characteristics of grains in rice treated with *Trichoderma harzianum*, *Pseudomonas fluorescens* and salicylic acid. Rice (*Oryza sativa* L. cv. Pusa Basmati1 and Kalanamak 3119) plants treated with *Trichoderma harzianum*, *Pseudomonas fluorescens* and salicylic acid were subsequently challenged with *Rhizoctonia solani*, the rice sheath blight pathogen at three different growth stages viz. early vegetative stage, reproductive stage and maturity. Total seed protein content, seed protein profile and thousand grain weight were analyzed. The total seed protein and thousand grain weight increased in the treatments in which biocontrol agents or their consortium with salicylic acid was used.

Assessment of antioxidant activity, enzymes and total phenolic content in three medicinal plant species

SHAKULI KASHYAP and P.B. RAO

*Department of Biological Sciences,
College of Basic Sciences and Humanities,
G.B. Pant University of Agriculture and Technology,
Pantnagar- 263 145 (U.S.Nagar, Uttarakhand)*

ABSTRACT

Globally, there has been an increased interest to identify natural antioxidant compounds from different plant species which are pharmacologically potent and have low or no side effects. In this context, *Artemisia annua* L., *Eclipta alba* L. Hassk. and *Spilanthes acmella* Murr. belonged to the family Asteraceae were selected to determine antioxidant potential by using 2,2- diphenyl -1- picryl hydrazyl (DPPH), ferrous ion-chelating assay (FCA) and ferric reducing antioxidant power (FRAP); total phenolic content (TPC); and enzymatic antioxidants such as, superoxide dismutase (SOD), catalase (CAT) and peroxidase (POD). Among the extracts, *E. alba* showed comparatively higher values of DPPH and FCA activity with lower IC₅₀ value i.e., 71.43 µg /ml and 0.78 mg/ml, respectively followed by *A. annua* and *S. acmella*. The FRAP values (mg TE/mg DW) were comparatively higher in *E. alba* (17.20 ± 0.20) and lower in *S. acmella* (10.06 ± 0.08). Similar trend was observed for TPC and ranged from 2.58 to 8.50 µg GAE/mg DW. Significant and positive correlations were found between phenolic contents and antioxidant capacities (R² = 0.943 - 0.981). The results

also indicated presence of significant levels of enzymatic antioxidants (Unit/g tissue) viz., SOD - 35.11, 38.74 and 36.37; CAT - 516.66, 461.66 and 508.23; and POD - 1.77, 2.55 and 2.10, respectively in *A. annua*, *E. alba* and *S.acmella*. These findings suggest that all these species could be a potential source of natural antioxidant that could have great importance as therapeutic agent.

Isolation, screening and characterization of *Bacillus cereus* and *Enterobacter asburiae* isolated from rhizospheric soils of Uttarakhand for different plant growth promotion (PGP) activities: an invitro-study

M. S. ANWAR, V. R. S. RANA, V. PANDE

*Department of Biotechnology,
Bhimtal Campus, Kumaun University,
Nainital-263136 (Uttarakhand)*

ABSTRACT

Plant Growth Promoting (PGP) Rhizobacteria is beneficial bacteria that colonize plant roots and enhance plant growth by wide variety of mechanism like phosphate solubilisation, etc. The use of PGP rhizobacteria is steadily increased in agriculture and offers an attractive way to replace chemical fertilizers, pesticides, and supplements. The present work was designed to isolate and characterize the effective PGP rhizobacteria. For this purpose PW2a and BHMa were isolated and characterized on various parameters of PGP activity like phosphate solubilisation, IAA production, HCN production were performed. The results of enhanced phosphate solubilisation ($165\text{-}415\ \mu\text{gml}^{-1}$) upon 4 days of growth and IAA production ($1.5\text{-}7.5\ \mu\text{g/ml}$) upon 2 days of growth in the presence or absence tryptophan concentration were noticed. A remarkable change in colour from yellow to brown against the control in King's-B medium amended with 4.4g glycine, were suggests the positive result for HCN production. Consequently, the efficient strain PW₂a and BHMa were identified on the basis of 16s rRNA sequencing and confirmed as *Enterobacter asburiae* and *Bacillus cereus*, respectively. Therefore, the present study suggests that both the strains have effective PGP activity and would be extremely useful for plant growth promotion.

Investigation on fuel properties of cattle dung and pine needles briquettes

T. P. SINGH

*Department of Farm Machinery and Power Engineering,
College of Technology,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263145 (U S Nagar, Uttarakhand)*

ABSTRACT

Pine needles are available abundantly in the hills of Uttarakhand and have no use except for animal bedding. It is solely responsible for forest fire during the summer season resulting in irreparable loss of valuable forest wealth. With a view to utilize the pine needles and reducing the dependency on forest for fire wood, briquettes were formed using a die, through cold process, by using cattle dung and pine needles in various proportions and at different die pressures. The study of its fuel properties showed maximum increase in heat value by 64.06% and ash content by 2.46% by mixing pine needles into cattle dung by 40% at $110\ \text{kg/cm}^2$ die

pressure compared to pure cattle dung briquettes. The briquettes having more than 40% pine needle in it was not found stable. The die pressure was found to have influence over all the parameters considered for the study.

Fuel characteristics of blends of rice bran oil methyl ester and kerosene and its effect on engine performance

T. P. SINGH, SUMIT KUMAR and JAYANT SINGH

*Department of Farm Machinery and Power Engineering,
College of Technology,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263145(U S Nagar, Uttarakhand)*

ABSTRACT

The use of diesel engines, as prime source of power, is growing fast as a result the demand of fossil fuel has increased tremendously. The lesser production has put pressure on government to import the fossil fuel from oil producing countries to meet the domestic requirement. Biodiesel, from *Jatropha* and *Pongamia Pinnata*, a non-edible vegetable oil, has been tried as a substitute fuel for diesel engines. Rice bran oil and its methyl ester also have good potential as a fuel substitute. In this study, rice bran oil methyl ester was prepared by transesterification process and was blended with kerosene fuel. The fuel properties of pure rice bran oil methyl ester (B100K0) and its blend with kerosene fuel in 90:10 (B90K10), 80:20 (B80K20), 70:30 (B70K30) and 60:40 (B60K40) proportions, on v/v basis, was determined and also the engine performance including exhaust emission was studied. The studies on fuel properties revealed that kinematic viscosity, API gravity and gross heat of combustion of fuel blend, B60K40, was almost similar to diesel fuel. The engine was observed to produce almost equal power on all the fuel blends and its brake thermal efficiency was also observed higher. The brake specific fuel consumption was observed minimum for B80K20 fuel blend. It also resulted in maximum reduction of unburned HC emission where as minimum NO₂ emission was observed for fuel blend B60K40 at all the brake loads. The study reveals that kerosene can safely be mixed, up to 20%, in biodiesel (rice bran oil methyl ester) as a substitute to diesel fuel.

Assessment of performance time and rest periods between different activities related to raw brick making unit

KUMKUM PANDEY and ADITI VATS

*Department of Family Resource Management,
College of Home Science,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263145(U S Nagar, Uttarakhand)*

ABSTRACT

This study investigated the time spent in performing different activities in various awkward postures, resting period between different activities and resting period in different activities taken by brick factory workers in five brick making factories, concentrating on raw brick making activities. To fulfill the aim of study forty workers in which twenty males and twenty female workers were selected randomly and interview schedule was developed and workplace analysis has been accomplished by observing the employee as they were doing the

task. Results of interviews showed that total 45 min. 11 hrs. of time taken by the workers for doing all raw brick making activity and total 62 min. of resting period taken by the employees between different activities. When asked about the activities causing pain and discomfort it was reported that 100 per cent of the respondents complained pain in different raw brick making activities and they were not aware about the musculoskeletal problems. In conclusion the result of the study point out a number of important factors that must be addressed which include the workplace design necessitating frequent bending and twisting of the trunk, handling techniques, the way work is organized. Others problems such as inadequate breaks and high speed of work also need to be address.

Warning symbols on child care products: A safety measure

NEHA TRIPATHI, SEEMA KWATRA and NIRMAL KAUR

*Department of Family Resource Management,
College of Home Science,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263145(U. S. Nagar, Uttarakhand)*

ABSTRACT

Child care products should communicate safety information effectively and a warning should be comprised of a signal word to convey the gravity of the risk, an indication of the hazard, the possible consequences in terms of injuries and instructions as to how to avoid injuries. Effective warning should result in safe behaviour leading to reduction in number of accidents. Unfortunately the response rate to the warning is usually low, that is why the study was planned with the objectives to study the expectations of parents with regards to presentation of product information and development of warning symbols on the basis of estimation and comprehension test. The study was purposively carried out at Pantnagar on the sample size of 75 out of which 35 parents and 35 general population, using estimation and comprehension test. The results of estimation and comprehension test reveal that pictorial symbols with written test increase the level of comprehension.

Development of high protein biscuits from cowpea (*Vigna unguiculata*) flour

VANDANA¹, ARCHANA KUSHWAHA², and ANIL KUMAR³

¹*Department of Home and Food Sciences,
SAPKM, Kichha-263148 (U.S Nagar, Uttarakhand)*

²*Department of Foods and Nutrition,
College of Home Science,
G. B. Pant University of Agriculture and Technology,
Pantnagar-263145 (U S Nagar, Uttarakhand)*

³*Department of Plant Breeding and Genetics,
BAU, Sabour, (Bhagalpur), Bihar- 813210*

ABSTRACT

Cowpea (*Vigna unguiculata*) along with other legumes is recognized as an important source of protein. They are cooked plain, mixed with other foods or processed into formulated recipes. Biscuits can be easily fortified with protein rich flours to provide convenience food in order to supplement protein in the diet. An experiment was conducted to develop protein

rich biscuits of cowpea without impairing their acceptability. Refined wheat flour (RWF) was substituted with cowpea flour (CPF) at levels of 20, 40, 60 and 80% (L1, L2, L3 and L4) and control sample contained 100% RWF. Nutrient composition and sensory evaluation of biscuits containing various per centages of RWF and CPF were studied. Nutritive value determined by calculation method showed that biscuits with increasing levels of cowpea had higher protein, crude fibre, iron and calcium content compared with control biscuits. The results of sensory attributes revealed that cowpea biscuits containing 20% CPF secured the highest score for overall acceptability among other substitution levels.

Food and nutrient intakes of primary school children in Udham Singh Nagar District of Uttarakhand, Pantnagar: school meals vs. packed meals

NIDHI BUDHALAKOTI and KALPANA KULSHRESTHA

*Department of Foods and Nutrition,
College of Home Science,
G.B. Pant University of Agriculture and Technology,
Pantnagar- 263145 (U.S. Nagar, Uttarakhand)*

ABSTRACT

In this study six primary schools of Pantnagar were selected out of which three were government schools which provided mid-day meals and in three were private schools in which children brought packed lunches. Comparison between the nutrient intake and height and weight of the children consuming mid-day meals and packed lunches was made. The study was conducted for a period of three days in each school. Students were randomly selected with the help of attendance registers. Approximately equal number of girls and boys were selected (94 girls and 86 boys). Children age ranged from 6-11 years. Height and weight of the selected children was taken on the first day of study at each school. Participants were observed for three days at each school once at a meal time and the food items consumed were recorded. A predesigned proforma was used to collect information from the children regarding their food habits and other general information. Wastage was also observed and the weight estimated visually. Mean energy, protein, fat, calcium and iron intakes of children consuming school meals was significantly lower than the children consuming packed lunches. No significant difference in the mean carbohydrate intake and Vitamin C intake was found. The mean weight of the children consuming packed lunches (24.84 kg) was significantly higher than the mean weight of the children consuming mid-day meals (21.88 kg) although no significant difference was found among the heights of the children. The quality of food provided by the schools was good although the quantity was not up to the government standards. The reason for the insufficient quantity of food being provided by the schools may be due to the rising prices of the food commodities and also partly due to the miss-management caused by the school authorities. Proper food based nutrient standards need to be made for school meals as well as for packed lunches.

Livestock management activities in hill region of Uttarakhand

PRATIBHA SINGH and POONAM TEWARI

*Department of Home Science Extension,
College of Home Science,
G.B. Pant University of Agriculture and Technology,
Pantnagar – 263145 (U. S. Nagar, Uttarakhand)*

ABSTRACT

Livestock is an important source of economic activity in the agricultural sector contributing a major portion of GDP to India and improving socio-economic conditions for people in general and rural people in particular. Rural women play an important role in livestock management activities besides fulfilling their responsibility as home maker. The crucial role of women in agriculture and allied activities has however been grossly underestimated and undervalued. Hence, present study has been undertaken to study gender role differentiation in livestock sector. Study was conducted in 750 households of five selected districts of Uttarakhand. From the study it could be inferred that majority of livestock management activities in Uttarakhand hills were performed by women independently or jointly with their male counterparts and women were totally responsible for them. Women have more access to as well as control over majority of the livestock related resources.

Compositional variation in the quality of raw milk collected from different sources of milk supply in Baraut, Western U.P.

HAR CHARAN LAL GUPTA and DEVESH GUPTA

*Department of Dairy Science and Technology,
J.V. (P.G.) College, Baraut-250611 (U.P)*

Note: This is a short communication and as such, does not have an abstract. For details, see the print journal or contact the authors at above address.

Management rust (*Uromyces vicia fabae*) through animal products

VIJAY KUMAR, ANKITA GARKOTI and H.S. TRIPATHI

*Department of Plant Pathology,
College of Agriculture,
G.B. Pant University of Agriculture and Technology,
Pantnagar- 263 145 (U. S. Nagar Uttarakhand)*

Note: This is a short communication and as such, does not have an abstract. For details, see the print journal or contact the authors at above address.
