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Executive Editor

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Integrated Effects of Wheat Residue and Phosphorus Application on Rice Productivity and Soil Health under Salt Affected Soils

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(received December 29, 2014; revised September 10, 2015; accepted October 15, 2015)

Abstract. A field experiment was conducted to determine the effect of crop residue incorporation along with P application on rice production under salt affected soil having pH 8.57, ECe 5.65 (dS/m), SAR 17.38 (mmol/L)½ and available P (3.9 mg/kg). The study was carried out at MK Farm, Farooqabad, Sheikhupura, Pakistan during Kharif season in 2009. Treatments were arranged using randomised complete block design (RCBD) with three replications. The treatments were control (T_1), straw incorporation @ 5 tonnes/ha (T_2), T_2+20 kg/ P_2O_5/ha (T_3), T_2+40 kg/P_2O_5/ha (T_4) and T_2+60 kg/P_2O_5/ha (T_5). The highest grain yield (4.407 t/ha) was recorded in treatment receiving 5 tonnes wheat straw along with 40 kg P_2O_5/ha which is 14.6% more than control and the lowest grain yield (3.847 t/ha) was recorded in control. Maximum P (0.37%) and K (0.13%) contents of grain were recorded where wheat straw was applied @ 5 t/ha along with 40 and 60 kg P_2O_5/ha whereby P content of control was (0.3%). The residual P was 5.7 mg/kg where wheat straw was applied @ 5 t/ha along with 40 and 60 kg P_2O_5/ha. The residual P in control was 4.3 mg/kg. It can be concluded that incorporation of residue enhanced the availability of P, K and Ca to plant roots. Under saline-sodic/sodic conditions, plant can better cope with salinity in the presence of calcium and K availability.

Keywords: wheat residue, rice productivity, salt affected soils

Pak. j. sci. ind. res. Ser. B: biol. sci. 2015 **58** (3) 122-125

Effect of Integrated Nutrient Application on Growth and Yield of Maize

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Abstact. Comparative effect of organic and inorganic fertilizer on the growth and yield of maize variety Hicorn-984 was studied at agronomic research area of University of Agriculture, Faisalabad during the year 2005. The trial was laid out according to randomised complete block design in triplicate and plot size was 3 m × 6 m. There were six treatments comprising of various levels of organic and inorganic fertilizer in different combinations and a control. Combined application of organic and inorganic fertilizer differed significantly from control as well as from their sole application. Comparison of treatments showed that inorganic fertilizer application at the rate of 70-50-35 kg NPK/ha along with 5 t/ha poultry manure showed maximum plant growth parameters such as leaf area (1537 cm^2), plant height (195 cm), number of grains per cob (452) and thousand grain weight (234 g) which were at par with T_5 (70 -50-35 kg NPK/ha along with 8 t/ha FYM) but significantly higher than the treatments where organic manures and inorganic fertilizers were applied separately. Maximum grain yield (5.7 t/ha) and cost-benefit ratio (1.7) were achieved in the treatment T_6 (NPK at 70-50-35 kg/ha along with 5 t/ha poultry manure) while, minimum grain yield (2.3 t/ha) and cost benefit ratios (1.1) were recorded in control. Combined application of organic and inorganic fertilizer results in increase in yield and profitability to farmer as compared to their sole application.

Keywords: farm yard manure, inorganic fertilizers**,** maize, nitrogen, poultry manures, yield components

Pak. j. sci. ind. res. Ser. B: biol. sci. 2015 **58** (3) 126-131

Seasonal Variation in Foliage Quality of *Acacia modesta* Wall. Growing in Different Ecological Zones of Pothwar, Pakistan

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(received August 7, 2014; revised August 6, 2015; accepted August 28, 2015)

Abstract. In this study, the seasonal variability in nutritive value of foliage of *Acacia modesta* Wall. was evaluated. Leaves and twigs of *A. modesta* were collected from low, medium and high rainfall Pothwar regions of Pakistan i.e. Rawalpindi, Jhelum and Talagang during spring, summer and fall seasons. The forage samples were analysed for dry matter (DM), crude protein (CP), ether extract (EE), ash content (AC), crude fibre (CF), acid detergent fibre (ADF), neutral detergent fibre (NDF) and acid detergent lignin (ADL). Dry matter varied from 44.3 to 65.0% and was significantly higher during fall than spring and summer season at all three sites. Talagang site had the highest dry matter followed by Jhelum and Rawalpindi sites. The CP was in the range of 14.4-17.4%. The CP was in order of spring, summer and fall season. Rawalpindi and Jhelum had the highest CP (16.4%) followed by Talagang site (15.9%). Ash content and ether extract (EE) ranged from 5.8 to 10.4% and 1.1 to 3.2% in season and site interaction. Crude fibre (CF) value ranged from 19.9 to 27.6% and was significantly higher in fall than spring and summer. The highest CF (24.6%) was found at Rawalpindi followed by Jhelum (21.6%) and Talagang (22.1%). Seasonal variation in ADF and NDF ranged from 34.4 to 38.5% and 50.5 to 56.5%, respectively. The ADF and NDF were lower in summer season than in spring and fall seasons. ADF was the highest (36.4%) at Jhelum followed by Talagang (36.3%) and Rawalpindi site (35.9%). The ADL ranged from 9.8 to 13.4% and was higher in summer than in spring and fall seasons. Based on chemical composition, it was concluded that *A. modesta* foliage contained high nutritional values and can be fed to ruminants as supplement to low-quality feeds particularly during the dry season.

Keywords: seasonal variation, foliage quality, *Acacia modesta*, nutritive value

Pak. j. sci. ind. res. Ser. B: biol. sci. 2015 **58** (3) 132-139

Estimation of Heterosis and Combining Ability in F_1 Hybrids of Upland Cotton for Yield and Fibre Traits

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(received January 20, 2015; revised November 2, 2015; accepted November 10, 2015)

Abstract. The experimental research was conducted so as to determine the general combining ability (GCA) and specific combining ability (SCA) estimates and heterotic effects for seed cotton yield and fibre traits in 5 × 5 half diallel crosses of upland cotton (*Gossypium hirsutum* L.). The parental genotypes studied were; CRIS-134, IR-3701, IR-1524, FH-113 and MG-6. The characters such as bolls/plant, sympodial branches/plant, boll weight (g), plant height (cm), fibre length (mm), seed cotton yield/plant (g), seed index (g) and ginning outturn percentage were studied. The experiment was laid-out in a randomized complete block design with four replications at experimental field of the Department of Plant Breeding & Genetics, Sindh Agriculture University Tandojam, Pakistan during 2013. The results revealed that, parents and hybrids differed significantly for their mean performance regarding all the traits studied. The importance of heterotic effects was evident from the significance of parents vs. hybrids performance. The variances due to GCA and SCA were significant for all the traits except that GCA was non-significant for boll weight only whereas, SCA was non-significant for boll weight, seed index and ginning outturn %. The significance of GCA indicated the importance of additive genes advocating the traits while, the involvement of non-additive genes was evident from the significance of SCA variances. The GCA variances were greater than SCA for bolls per plant, plant height, seed cotton yield and lint % while, SCA variances were higher than GCA for sympodial branches/plant and fibre length. Parents IR-3701, FH-113 and MG-6 displayed higher positive GCA effects for bolls/plant, sympodial branches/plant, fibre length, seed cotton yield, seed index and ginning outturn%. The *per se* performance of these three parents was exactly reflected in their GCA effects and such happenings are exceptional. Such results suggested that, all three parents were good general combiners covering most of the traits studied and may be preferred for hybridization and selection programmes. The crosses like CRIS-134 × MG-6, IR-3701 × FH-113 and IR-3701 × MG-6 with higher estimates of SCA for almost all the traits also expressed higher heterotic effects, thus these hybrids with dominant and over dominant genes could be potential hybrids for the exploitation of heterosis in cotton.

Keywords: general combining ability, specific combining ability, heterosis, upland cotton

Pak. j. sci. ind. res. Ser. B: biol. sci. 2015 **58** (3) 140-146

Genetic Component Analysis for Yield and Morphological Traits in Pearl Millet (*Pennisetum glaucum* (L.) R. Br.) Genotypes

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(received April 30, 2014; revised July 16, 2014; accepted October 22, 2014)

Abstract. The main objectives of present investigation were to find out the extent of genetic variability, heritability (bs), component of variance and genetic advance for yield and yield related traits of pearl millet, *Pennisetum glaucum* (L.) R. Br. For this purpose twenty five (25) pearl millet (local and exotic) germplasm accessions were evaluated in a Randomized Complete Block Design having three replications at Arid Zone Research Institute, PARC, D.I. Khan, Pakistan during 2013. Highly significant ($P<0.01$) differences were observed for all the traits except days to maturity which was mere significant ($P<0.05$). A substantial amount of genetic variability among the genotypes revealed that accessions under studies belonged to diversified sources indicating the expediency of genotypes for future breeding of millet varieties. The line MS-3 proved its superiority through producing the highest grain yield of 132.70 g/plant. High genotypic (68.06) as well as phenotypic co-efficient of variation (71.50) were recorded for grain yield. Moderate to high heritability was recorded for number of leaves per plant (47.11), leaf area index (46.75), days to heading (69.34) and days to maturity (68.58). A very high heritability (89.54%) was recorded for 1000-grain weight and grain yield. The high heritability amalgamated with high genetic advance (171.04) as percent of mean was recorded for grain yield indicating the least environmental effect and presence of more additive gene effect leading to crop improvement through simple selection.

Keywords: pearl millet, genetic variability, heritability, genetic advance

Pak. j. sci. ind. res. Ser. B: biol. sci. 2015 **58** (3) 147-154

In-vitro Phytochemical and Antibacterial Activity of *Abies cilicica* subsp. *cilicica*

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(received March 4, 2015; revised June 18, 2015; accepted July 27, 2015)

Abstract. Leaf and flowering cones methanolic, ethanolic and acetonic extracts of *Abies cilicica* subsp. *cilicica* plant were screened for phytochemical and inhibitory effect against 8 bacterial isolates. Qualitative phytochemical assay revealed that, flowering cones acetone extract exhibited the most of bioactive compounds compared to the leaf extracts with all examined solvents. Antibacterial activity of *A. cilicica* subsp. *cilicica* was determined by measuring the zone inhibition diameter (ZIs), activity index (A.I) and minimum inhibitory concentrations (MICs) against 8 bacteria (S*taphylococcus aureus, Listeria monocytogenes, Bacillus cereus, Salmonella typhimurium, Escherichia coli*: O157, *Acinetobacter baumannii, Brucella abortus* and *Pseudomonas aeruginosa*) isolates. Overall, acetonic flowering cones extracts were more potent against all tested isolates compared to the leaf ones. The lowest MICs value was recorded to be 0.42, 0.52 and 1.04 µg/mL for acetone, methanol and ethanol flowering cones, respectively, against the same pathogen *A. baumannii*. Based upon the current investigation, *A. cilicica* spp. *cilicica* could be considered as a potential endemic source against bacterial isolates.

Keywords: *Abies cilicica*, antibacterial activity, phytochemical assay, flowering cones

Pak. j. sci. ind. res. Ser. B: biol. sci. 2015 **58** (3) 155-158

Physicochemical and Amino Acid Profiling of Cheddar, Mozzarella and Paneer Whey

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(received March 13, 2015; revised June 15, 2015; accepted June 28, 2015)

Abstract. The present study characterised locally available whey samples of cheddar, mozzarella and paneer for physicochemical and nutritional attributes. The results revealed that the cheddar whey exhibited pH (5.41±0.16), crude protein (0.83±0.03%), fat (0.25±0.01%), lactose (4.95±0.21%) and total solids (6.55±0.27%), slightly higher than those of mozzarella and paneer whey. On the other hand, the paneer whey showed acidity (0.30±0.01) and ash content (0.56±0.02), slightly higher than those of cheddar and mozzarella whey. Furthermore, the mozzarella whey revealed the total plate count values (3.17±0.09 × 10^4 cfu/mL), slightly higher than those of cheddar and paneer whey samples. The paneer whey contained the amount of calcium (25.02 ± 1.34), magnesium (4.88 ± 0.23), sodium (32.11 ± 1.37) and potassium (97.55 ± 3.54) slightly higher, when compared to those of cheddar and mozzarella whey. The cheddar whey possessed the highest amount of essential and non-essential amino acid contents, followed by mozzarella and paneer whey. Thus, cheddar whey exhibited the best physicochemical and nutritional profile among all the whey samples, so it can be used to prepare high quality novel and nutritious sports drink for sportsman.

Keywords: whey proteins, nutrition, cheese-whey, by-products, mozzarella whey

Pak. j. sci. ind. res. Ser. B: biol. sci. 2015 **58** (3) 159-164

Teratological Effects of Dimethoate on 12th Day Desi Chick Embryo (*Gallus gallus domesticus*)

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(received May 5, 2014; revised October 12, 2015; accepted October 30, 2015)

Abstract. Developmental toxicity of commercially used Dimethoate was assessed on 'desi' chick embryos (*Gallus gallus domesticus*). Five different concentrations (0, 0.3, 0.6, 0.9 and 1.2%) of this insecticide were administered as a single dose in ovo in a volume of 100 µL per egg on day "0" of incubation. Embryonic development and morphological malformations were evaluated on day 12th. Mortality rate increased with the insecticide concentration. Moreover, this insecticide induced teratological and morphological changes in all treated groups compared to untreated group.

Keywords: development toxicity, dimethoate, chick embryo, morphometric changes, mortality rate

Pak. j. sci. ind. res. Ser. B: biol. sci. 2015 **58** (3) 165-167

Short Communication

Estimation of Genetic Variability and Heritability (Broad sense) for Yield and Yield Components in Some *Brassica juncea* Genotypes

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(received October 24, 2014; revised June 12, 2015; accepted June 16, 2015)

Abstract. Broad sense heritability and genetic advance were estimated among ten mustard (*Brassica juncea* L.) genotypes for yield and yield contributing parameters in RCB design with three replications. Broad sense (BS) heritability estimates were higher (above 60%) for days to flowering, plant height, days to maturity, branches/plant and number of pods/plant. Moderate heritability values were observed for grain yield. The expected response to selection was higher (≥ 20%) for number of pods/plant and grain yield kg/ha and moderate values ranging from 10-20% for selection response was recorded for plant height. Days to flowering, days to maturity and number of branches/plant showed lower values (≤ 10%) for expected response to selection. The genotypes 022860, J-38 and 022862 have shown better results for most of the traits and could be used in focused future breeding programmes.

Keywords: *Brassica juncea*, heritability, genetic advance, phenotypic variance

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Review

Modification of Milk Fat

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(received December 18, 2014; revised August 19, 2015; accepted August 26, 2015)

Abstract. The potential health benefits associated with the intake of unsaturated fatty acids for the reduction of bad LDL cholesterol has been scientifically proven. Concentration of unsaturated fatty acids in milk and dairy products can be increased by many ways, however, many of the modification strategies do not have any significant impact on the reduction of cholesterol from milk and milk prodcuts. The concentration of unsaturated fatty acids in milk fat can also be decreased by dry fraction, interesterification, transeterification etc. Milk products with higher magnitude of unsaturated fatty acids may have significant influence on the reduction of serum cholesterol.

Keywords: fatty acid composition, cholesterol, interesterification, fractionation, milk fat