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Identification of Superior Parents and Hybrids from Diallel Crosses of Bread Wheat (*Triticum aestivum* L.)

**Muhammad Jurial Baloch*, Toufique Ahmed Rajper, Wajid Ali Jatoi
and Nasreen Fatima Veesar**

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(received August 9, 2012; revised February 9, 2013; accepted March 6, 2013)

Abstract. Five parents of bread wheat (*Triticum aestivum* L.) viz. TD-1, SKD-1, Marvi, Moomal and Mehran were crossed in a half diallel design; hence 10 F₁ hybrids were developed. Parents along with hybrids were evaluated for combining ability and heterosis for tillers/plant, spike length, spike density, grains/spike, grain yield/plant and seed index. The experiment was conducted in a randomized complete block design with four replications at Botanical Garden, Department of Plant Breeding & Genetics, Sindh Agriculture University, Tandojam, during 2010. The analysis of variance due to genotypes, parents, hybrids and parents vs. hybrids was significant for all the characters which revealed presence of significant amount of genetic variability in the material. The results also indicated significant differences among the parents for their general combining ability (GCA) and hybrids for specific combining ability (SCA) suggesting the importance of both additive and non-additive genes in the expression of traits studied. The greater magnitude of SCA variances over GCA were recorded for tillers/plant, grains/spike and grain yield/plant which indicated the importance of additive gene action while the involvement of non-additive genes was evident in the inheritance of spike length, spike density and seed index. Among the parents, generally TD-1, Mehran, Moomal and Marvi were the best general combiners for tillers/plant, spike length, spike density, grains/spike, grain yield/plant and seed index. Whereas, the hybrids like SKD-1 × Mehran, Marvi × Mehran, Marvi × Moomal and TD-1 × SKD-1 were the best specific combiners for majority of yield traits. Positive heterosis was expressed by the hybrid SKD-1 × Moomal for tillers per plant; TD-1 × Moomal for spike length; TD-1 × SKD-1 for grains per spike; Marvi × Mehran for spike density and Marvi × Moomal for seed index. The best parents and hybrids could be effectively utilized in hybridization and selection programmes and also for hybrid crop development, respectively.

Keywords: diallel analysis, combining ability, heterosis, wheat genotypes

Effect of Various Levels of N in Combination with FYM on the Growth and Establishment of Date Palm (Dhakki) Cultivar

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(received February 7, 2012; revised July 31, 2012; accepted August 5, 2012)

Abstract. This study was carried out during the year 2008-2009 at AZRI farm, D.I. Khan to investigate optimum dose of nitrogen (N) fertilizer and Farm Yard Manure (FYM kg/plant) for improving fruit bearing growth parameters of date palm cv. Dhakki. Four treatments consisted of (1) control (2) 0.5 kg N + 15 kg FYM (3) 1 kg N + 15 kg FYM (4) 1 kg N + 0 kg FYM/plant were applied. The results showed that 1 kg (N) + 15 kg FYM had number of fronds (38)/plant, plant spread (511.7 cm), plant girth (211.7 cm), frond length (253 cm), number of fruit (9.3)/stain, fruit weight (4.3 kg)/bunch and total fruit yield (26.58 kg)/plant at 5 year stage among all other treatments. However, the maximum values for these parameters including fruit yield (11.32 kg/tree) were recorded in control where no fertilizer or manure was applied.

Keywords: nitrogen; farm yard manure; growth parameters, fruit yield

Growth and Yield Characteristics of Chilli as Affected by Nitrogen in Presence and Absence of Phosphorus and Potassium

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(received October 18, 2011; revised October 9, 2012; accepted December 27, 2012)

Abstract. An effect of nitrogen (N) in presence and absence of phosphorus (P) and potassium (K) on growth and yield characteristics of chilli (*Capsicum annum* L.) was studied at Coastal Agricultural Research Station, Southern Zone Agricultural Research Centre, PARC, Karachi, during 2008-2009. The crop under investigation was fertilized with a total of six treatments i.e. 90-0-0, 90-60-75, 0-60-75, 120-0-0, 120-90-105 and 0-90-105 kg/ha of NPK. The analyses of data revealed that it was possible to harvest a satisfactory crop yield without addition of P or K, but it would not be possible to get desired crop yields without application of N, because an adverse effect on fruit yield was noted in absence of N. On the other hand stoppage of P and K did not show any economically adverse effects. However, combined application of NPK positively enhanced growth and yield characters. It was concluded that N in presence of P and K (120-90-105 kg/ha) proved best for better production of chilli var. Malir local under agro climatic conditions of Malir district, Sindh.

Keywords: chilli, growth, yield, fertilizer, nitrogen, phosphorus, potassium

Pharmacokinetic Modelling of Methotrexate from Routine Clinical Data in Patients with Acute Lymphoblastic Leukemia

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(received April 25, 2011; revised October 2, 2012; accepted November 26, 2012)

Abstract. Pharmacokinetic modelling was performed in NONMEM (version 6.1) using a dataset including 273 patients (aged 2 to 23 years) who received high-dose MTX (5 g/m² per course) in long-term treatment. Total 2582 methotrexate plasma concentrations were performed by fluorescence polarisation immunoassay (FPIA). A three compartment open model with elimination from the central compartment described the pharmacokinetics of methotrexate. The most important covariates affecting the disposition of methotrexate were age (age, year), body weight (BW, kg), and creatinine clearance (CLR, lh⁻¹). The final model with exponential disposition of MTX was clearance (CL, lh⁻¹) = (6.11 + WT*6.7310⁻²) + (1.0810⁻⁴* CLR) * EXP(1.9510⁻¹), (V, l) = 10,8+(AGE* 9.310⁻²) *EXP(9.110⁻¹), Q(lh⁻¹) = 2.0410⁻³ *WT. Pharmacokinetic parameters (%CV) in this study were CL, 8.72 lh⁻¹ (44 %); V1, 17.49 l (95%); V2, 6.048 l (56%); V3, 0.015 l (52%). The model predictions in the qualification group were found to have no bias and satisfactory precision

Keywords: population pharmacokinetics, methotrexate, acute lymphoblastic leukaemia, NONMEM

A Novel pH-Responsive Superabsorbent Hydrogel Based on Collagen for Ephedrine Controlled Release

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(received February 22, 2011; revised January 28, 2013; accepted March 7, 2013)

Abstract. A novel family of pH-responsive polymeric hydrogel based on collagen was prepared for controlled delivery of ephedrine. Acrylic monomers, acrylic acid (AA) and itaconic acid (IA) were simultaneously graft copolymerized onto collagen backbones by a free radical polymerization technique using ammonium persulphate (APS) as initiator and methylene bisacrylamide (MBA) as a crosslinker. Hydrogel formation was confirmed by FTIR spectroscopy. Thermogravimetric analysis showed the thermal stabilities of the hydrogels. Results from scanning electron microscopy (SEM) observation also showed a porous structure with smooth surface morphology of the hydrogel. Swelling profiles obtained indicated clearly that these hydrogels swell slightly in a simulated gastric fluid (SGF) and strongly in a simulated intestinal fluid (SIF). The model drug, ephedrine, was successfully loaded into the hydrogels and *in vitro* release studies were performed in SGF for the initial 122 min, followed by SIF until complete dissolution. The release of ephedrine was continued up to 215 min. The release mechanism of the hydrogels was also studied using the Ritger-Peppas model.

Keywords: collagen, hydrogel, acrylic acid, itaconic acid, ephedrine

Simultaneous Spectrophotometric Determination of Lycopene and Beta-Carotene Concentrations in Carotenoid Mixtures of the Extracts from Tomatoes, Papaya and Orange Juice

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(received February 2, 2012; revised June 26, 2012; accepted June 27, 2012)

Abstract. A simple and inexpensive spectrophotometric equation model for the simultaneous determination of lycopene and β -carotene concentrations in a mixture of carotenoids is proposed. Lycopene could be exclusively determined (with the relative accuracy of more than 95%) using the absorbance data at 502 nm. Because quantifying the β -carotene concentration in a carotenoid mixture using the sole absorbance at 450 nm is prone to error, an equation to determine the concentration of this compound from the absorbances data at two wavelengths was modeled. Using the modeled equations to re-check the molar absorptivity of lycopene at 472 nm, the value obtained was about 98% close to the value reported in literature. The relative accuracy of the predicted concentrations of two carotenoids using the modeled equations is a function of the ratio of these carotenoids in the samples.

Keywords: lycopene, β -carotene, spectrophotometry, absorptivities, tomato, papaya, orange, isoprene

Quantification and Detoxification of Aflatoxin in Food Items

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(received August 1, 2012; revised December 23, 2012; accepted January 24, 2013)

Abstract. The present study was conducted to quantify and detoxify the aflatoxins in food items. For this purpose, total 30 samples of food were collected. The samples were quantified using thin layer chromatography (TLC) for the presence of aflatoxin level in food items. Out of them aflatoxins were not found in 10 samples. Remaining 20 aflatoxins +ve samples were treated with various chemical solutions i.e. 0.1% HCl, 0.3% HCl, 0.5% HCl, 10% citric acid, 30% citric acid, 50% calcium hydroxide, 0.2 and 0.3% NaOCl, 96% ethanol and 99% acetone for detoxification. The aflatoxins were reduced to 55.1%, 90.9%, 28.08% and 80.0% in Super Sella rice, Super Basmati rice, Brown rice and White rice, respectively. The aflatoxin level was reduced in maize grain, damaged wheat, peanut, figs and dates upto 31.3 %, 64.3 %, 63.6%, 42.7% and 19.8%, respectively. Aflatoxins were detoxified in cereals Dal Chana, Dal Mash, Dal Masoor), turmeric (Haldi) and *Nigela* seeds (Kalwangi) upto 70.5%, 83.0%, 46.2%, 82.09% and 36.9%, respectively. Reduction of aflatoxins was carried out 39.7 %, 7.1 % 39.5% 82.0% and 62.0% in red chilli, makhana, corn flakes, desert (Kheer Mix) and pistachio. The significant results ($p=0.042$) of detoxification of aflatoxins in food items were obtained from present study.

Keywords: pepsin extraction, enzyme activity, stomach mucosa, buffalo

Statistical Modelling of a Facile Process for the Extraction of Crude Constituents of *Curcuma longa*

Bode Daramola

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(received February 25, 2012; revised November 12, 2012; accepted February 14, 2013)

Abstract. A preliminary study on a process for the extractions of crude constituents of *Curcuma longa* using statistical modelling is reported. The effects of three independent variables namely; solvent system (ethanol 1:0/water 0:1), temperature °C (30-70) and contact time (min) (5-30) were studied using the central composite rotatable design on the extraction of the crude constituents of the rhizome. Three characteristics of crude extracts, namely; total phenolic content, colourimetric index and relative total soluble solids as responses were studied. Equations for predicting the responses were developed and adequacy confirmed using analysis of variance and residual assessment. The empirical model could find usefulness as a base data for extraction of the crude constituent of *C. longa*.

Keywords: *Curcuma longa*, extraction process, phenolic content, dietary colourant, statistical modelling

Variation in Activity of Pepsin Extracted from Buffalo Stomach Mucosa

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(received May 18, 2011; revised November 7, 2012; accepted December 24, 2012)

Abstract. Pepsin was extracted from the buffalo's mucosa in an acidic medium by incubating at 40 °C for 48 h and dried in an air blanket at 50 °C. Conditions for the maximum yield of pepsin were optimized. Changes in pH, temperature and incubation time affect the yield of pepsin. It has been noted that the time of the year in which extractions were made under optimized conditions was an important factor which affected the yield as well as activity of pepsin. Studies showed that maximum yield 11.5% was in February 2009 and minimum 10.3% in May 2009. It was further studied that the activity of the pepsin extracted in February was higher i.e 110 U/mg as compared to the activity of the enzyme extracted during the month of May which was 102.6 U/mg. The purpose of the study was to consider the conditions of the slaughter houses to attain maximum yield of pepsin with maximum activity.

Keywords: pepsin extraction, enzyme activity, stomach mucosa, buffalo

Short Communication

Culture of Earthworm *Lampito mauritii* Kinberg, 1867 in Fish Pond Sludge and Cardboard

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(received March 30, 2012; revised December 4, 2012; accepted December 18, 2012)

Abstract. The earthworms, *Lampito mauritii* Kinberg, 1867 were treated with fish pond sludge (FPS) and card board (CB) mixture in different feedstock concentrations (5%, 10%, 15%, 20%, 25%, 50%, 75% & 100% FPS) for the period of 63 days in July-September, 2011. The parameters such as initial and final biomass, survival rate of earthworms were noted at constant moisture and pH level. Among the eight treatments; 15% FPS with 85% of CB was found most suitable for vermicomposting.

Keywords: earthworm, fish pond sludge, vermicomposting
