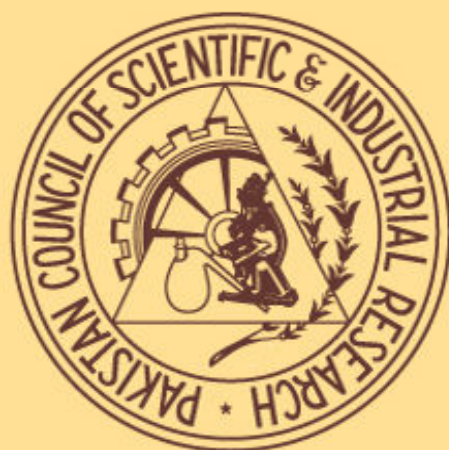


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Estimating Combining Ability of Yield and its Components in Upland Cotton Through Line $\times$ Tester Analysis

Muhammad Jurial Baloch^{a*}, Jameel Ahmed Solangi^a, Wajid Ali Jatol^b, Imdad Hussain Rind^a and Nasreen Fatima Veesar^a

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(received November 4, 2013; revised March 4, 2014; accepted March 10, 2014)

Abstract. Combining ability estimates are very important genetic attributes to cotton breeders in predicting improvement that could be envisaged from hybridisation and selection programmes. The crosses were attempted in a line $\times$ tester mating design, which involved five female and three testers, hence 15 F₁ hybrids were developed. The experiment was carried out in a randomised complete block design with four replications. The mean squares due to general combining ability (GCA) of lines and testers and specific combining ability (SCA) of lines $\times$ testers interactions were significant, for all the characters studied. The significance of GCA and SCA variances suggests that both additive and non-additive genes were controlling the characters, yet additive genes of female lines were predominant because their variances were generally, higher than GCA of testers and SCA of lines $\times$ testers. Among the lines, parents CIM-506, CRIS-134 and Sadori and from testers, Bt-cotton and Sindh-1 exhibited higher GCA effects hence proved to be the best general combiners for most of the traits studied. Results further suggested that these potential parents can reliably be used in hybridisation and selection programmes for extracting desirable plants from segregating populations. The F₁ hybrids like Sadori $\times$ Sindh-1, Chandi $\times$ Bt-cotton and Sadori $\times$ BH-160 were best specific combiners for earliness (bolls formation and opening at 90 and 120 days after planting), bolls per plant, boll weight, seed cotton yield per plant, lint % and staple length. The performance of F₁ hybrids *per se* was very well reflected in SCA effects, conferring the potentiality of F₁ hybrids.

Keywords: combining ability, hybridisation, genetic variability, upland cotton

Genetic Analysis of Yield and Yield Components in Diallel Cross of Maize (*Zea mays* L.) in F₂ Generation

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(received March 19, 2013; revised February 19, 2014; accepted February 25, 2014)

Abstract. Genetic analysis was carried out for six maize cultivars and their 30 F₂ crosses under agro-climatic conditions at Agricultural Research Institute of Dera Ismail Khan, Pakistan. The analysis of variance indicated highly significant differences among parents and their F₂ progeny for all the parameters. The genetic analysis revealed that the characters *viz*; kernels/ear, kernels rows/ear, kernels/row, ear length, 1000 grain weight and grain yield have shown additive type gene action. According to regression analysis, the non-significant deviation of the regression line from unit slope indicated the absence of non-allelic interaction, which was presented in all the characters.

Keywords: genetic analysis, yield components, maize, F₂ generation

Inheritance Pattern of Some Morphological Characters in Maize (*Zea mays* L.)

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(received March 14, 2013; revised November 28, 2013; accepted November 29, 2013)

Abstract. A 6x6 diallel cross experiment was conducted on F₁ generation of maize to explore the inheritance pattern of various morphological parameters at Agricultural Research Institute, Dera Ismail Khan, Pakistan, during 2004 and 2005. The analysis of variance indicated highly significant differences, among parental lines and their hybrids in F₁ generation *viz.*, days to maturity, plant height, ear height, leaves/plant, harvest index % and grain yield kg/ha. The Wr/Vr graph for all the characters under study, enunciated additive type of gene action with partial dominance involved in the phenotypic manifestation of the traits as regression line cuts the Wr axis above the origin. Additive type of gene action suggests that selection in early generation may be fruitful for these characters. For all characters studied the regression coefficient (b) differed significantly, from zero but not from unity, indicated the absence of non-allelic interaction, which was presented in all the characters.

Keywords: genetic analysis, inheritance pattern, analysis of variance, maize

Thrombolytic and Antimicrobial Activities of *Andrographis paniculata* – A Preliminary Investigation

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(received April 1, 2013; revised February 9, 2014; accepted February 11, 2014)

Abstract. An attempt has been made to investigate thrombolytic and antimicrobial activities of ethanolic extracts of *Andrographis paniculata* whole plant. Phytochemical constituents of *A. paniculata* were assessed by human erythrocyte and the results were compared with standard streptokinase (SK). Moreover, the plant extracts were compared with the antibiotic kanamycin to investigate antibacterial activity against several microorganisms. Glycosides, steroids, phenols, alkaloid and tannins were found in the ethanol extract of whole plant. Crude ethanol extract ($P < 0.05$) and soluble fraction of ethanol extract ($P < 0.05$) have shown thrombolytic properties. Crude ethanol extract, *n*-hexane soluble fractions and carbon tetrachloride soluble fraction of ethanol extract of the whole plant have shown antimicrobial activities against common gram positive and gram negative microorganisms. The results of current study justify thrombolytic and antimicrobial activities of *A. paniculata*.

Keywords: *Andrographis paniculata*, thrombolytic activity, antimicrobial activity

Identification of *Phytophthora* Species on Cocoa Pods and Pod Husks Using Three Culture Media

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(received December 30, 2012; revised March 20, 2014; accepted April 2, 2014)

Abstract. The objectives of this study were the development of three media from locally available materials for isolation of *Phytophthora* spp., from infected cocoa pods and pod husks samples and the identification of isolated *Phytophthora* spp., collected from four cocoa producing States in South-western part of Nigeria. The formulated media included tomato juice agar (TJA), cocoa beans agar (CBA) and cocoa pod and beans agar (CPBA). TJA supported the best pathogen growth followed by CBA and CPBA. Based on cultural and morphological characteristics, *P. palmivora* and *P. megakarya* were identified in infected cocoa pods and pod husks. These findings indicated an urgent need for strategies in the management of cocoa diseases in cocoa producing states in south-western Nigeria.

Keywords: cocoa pods, *Phytophthora* spp., *P. palmivora*, *P. megakarya*, pod rot, *P. tropicalis*, tomato juice agar

Screening for Crude Oil Degrading Bacteria in Liquid Organic Waste (Effluent Samples)

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(received September 3, 2013; revised December 9, 2013; accepted December 23, 2013)

Abstract. The screening for crude oil degrading bacteria in some liquid organic wastes (cassava mill effluents, rubber effluents and oil palm mill effluents) was carried out. Hydrocarbon utilising bacteria were isolated on mineral salt agar using vapour phase technique. The samples yielded 20 bacterial isolates from 13 different genera. Cassava mill effluent and rubber effluent had the highest number (7), while oil palm effluent had the least number (6) of bacterial isolates. The isolates that had the highest occurrence (occurring in all samples) were *Pseudomonas aeruginosa* and *Escherichia coli*. Of these 13 genera 9 were gram negative, while only 4 were gram positive. The total heterotrophic bacterial (THB) count and total hydrocarbon utilisers (THU) from all the effluent samples ranged from 3.0×10^4 to 6.0×10^7 cfu/mL and 2.3×10^2 to 4.2×10^3 cfu/mL, respectively. The counts of hydrocarbon utilisers were obviously lower than the heterotrophic counts, although the differences in counts were found to be statistically non-significant ($P > 0.05$). Rubber effluents and oil palm mill effluents had the highest number of hydrocarbon utilisers with three isolates each. The active hydrocarbon utilisers encountered in this study included *Serratia marscescens*, *Bacillus cereus*, *P. aeruginosa*, *Enterobacter aerogenes* and *Bacillus subtilis*. Presence of nutrients and crude oil degrading bacteria in these effluents suggests that these effluents can be used to enhance bioremediation through their use as biostimulation and bioaugmentation agents.

Keywords: hydrocarbon utilisers, bacterial isolates, effluents, crude oil, physicochemical properties

Evaluation of Growth Performance of Broiler Chicks Fed with Raw and Processed *Leucaena leucociphala* Seed

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(received May 15, 2013; revised January 7, 2014; accepted January 20, 2014)

Abstract. Forty-eight broiler chicks (day-old) were used in a 4 weeks feeding experiment to assess the growth response and the performance of broiler chicks fed raw *Leucaena leucociphala* seed meal (RLSM), roasted *L. leucociphala* seed meal (RoLSM) and steamed *L. leucociphala* seed meal (SLSM). The *L. leucociphala* seed, which serve as a source of protein were subjected to two treatments (roasting and steaming). Soybean based diet served as the control. There were four (4) experimental groups, each made up of four birds in three replicates allocated to the experimental diets. The results showed that the average final live weight, average weekly weight gain and average feed intake of birds fed with RoLSM performed better than birds fed with RLSM and SLSM. It was observed that the percentage organ to body weight of birds fed with the processed LSM were significantly ($P < 0.05$), higher as compared to the RLSM. A significant ($P < 0.05$) increase in the activity of aspartate transferase in the organs (heart, kidney and liver) of broilers fed with RoLSM was observed as compared to those fed with RLSM. The results showed a significant ($P < 0.05$), reduction in the activity of alanine transferase of organs of broilers chicks fed with processed *L. leucociphala* compared to the control. It is therefore, concluded that the processing techniques applied were able to improve the nutritional quality of *L. leucociphala* seed meal but relatively lower to the soybean based meal.

Keywords: growth performance, *Leucaena leucociphala*, transferase, broiler chicks

Acute Toxicity of Water Soluble Fraction of Crude Oil to the Early Life Stages of the African Catfish (*Clarias gariepinus*)

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(received December 28, 2012; revised September 23, 2013; accepted October 14, 2013)

Abstract. Acute toxicity bioassay of water soluble fraction of crude oil (Escravos blend), was conducted to evaluate the toxicity on the early life stages of the African catfish (*Clarias gariepinus*) under static bioassay conditions. Five concentrations of water soluble fraction (WSF) of the crude oil (0, 1.25, 2.5, 5, 10 and 20%) were constituted in glass aquaria (25 cm × 24 cm × 10 cm). Twenty laboratory-reared fry were introduced in triplicate in each of the test aquaria and exposure conducted for 96 h. The median lethal concentration (LC₅₀) and the 95% confidence interval was estimated using Trimmed Spearman-Kärber method. The physicochemical characteristic of the test media was also evaluated. The 96 h median lethal concentration (LC₅₀) at 95% confidence interval was estimated to give 2.84% (upper and lower confidence interval of 3.83% and 2.10%) of the water soluble fraction. There was no marked change in pH of the test media compared to the control. However, the dissolved oxygen content and the conductivity showed a concentration dependent decline in the test media when compared to the control. The fry were observed to be weak and swimming activities were reduced. It can be concluded from the study that the water soluble fraction of crude oil (Escravos blend) is toxic to early life stages of *C. gariepinus*.

Keywords: crude oil, *Clarias gariepinus*, water soluble fraction, toxicity

Assessment of Nickel and Chromium Concentrations in Black Kite (*Milvus migrans*) Tissues

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(received July 15, 2013; revised April 14, 2014; accepted April 22, 2014)

Abstract. A study was conducted to determine nickel (Ni) and total chromium (Cr) concentrations in liver and breast muscle of 24 black kites (*Milvus migrans*) collected from northern Punjab, Pakistan. The main objective of the study was to quantify residues of these metals and provide indirect information regarding the extent of contamination of their habitats. Overall average Ni and Cr were higher ($P < 0.001$) in breast muscle than liver. Correlation analysis indicated that Ni and Cr were significantly different ($P < 0.05$) in liver tissues in Kotla, whereas, all other combinations at both sites (Gujrat and Kotla) were non-significantly ($P > 0.05$) correlated.

Keywords: *Milvus migrans*, metal residues, avian predators, correlation analysis

Review

Use of Microalgae for the Control of Luminous Vibriosis in Tropical Shrimp Aquaculture

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(received April 21, 2014; revised June 23, 2014; accepted June 26, 2014)

Abstract. Outbreaks of luminous vibriosis in commercial shrimp ponds have been the major cause in the decline of shrimp production in most tropical countries. The causative agent of this disease is *Vibrio harveyi*, and is one of the many *Vibrio* species that affect Asian aquaculture. Efforts to prevent the occurrence of luminous vibriosis in shrimp ponds are largely based on the application of antibiotics in the ponds or inclusion of these compounds in the diets of the shrimp. However, indiscriminate use of these antimicrobial compounds results in more virulent and drug-resistant strains of the pathogen. The search for alternative strategies to control luminous vibriosis in the culture facilities led to the development of the so-called “green water” technology. This technology is an innovative technique in which the shrimp stock is cultured in water, where microalgae such as *Chlorella* sp., and other green microalgae grow abundantly. When this species of phytoplankton has abundant growth in the pond, the water assumes a green colouration, hence the term “green water”. This paper discusses the advances on the use of this “green water” technology to inhibit luminous vibriosis in tropical shrimp aquaculture.

Keywords: aquaculture, luminous vibriosis, microalgae, shrimp, *Vibrio harveyi*, green water
