INHERITANCE OF SOME AGRONOMIC CHARACTERS AND RUSTS RESISTANCE IN FIFTEEN F_2 WHEAT POPULATIONS

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ABSTRACT. Six parents, i.e. Gemmeiza 9, Sids 12, Misr 1, Misr 2, Sids 1 and Sham 4, were used and evaluated with corresponding 15 F_2 crosses. The parents in each cross were significantly different for most of these characters, revealing the different genetic background of the parents involved. The phenotypic variances in the F_2 crosses were differed significantly from the environmental variances in the corresponding parents in most cases. The parents Gemmeiza 9, Sids 12, Misr 1, Misr 2 were resistant for leaf rust and Gemmeiza 9, Sids 12 and Sids 1 were resistant to stem rust. Among the crosses, three crosses, i.e. Misr 2 x Sids 1, Misr 1 x Sids 1 and Gemmeiza 9 x Sids 1 gave the highest grain yield. The means of F_2 hybrids were higher than the means of the parents for most studied characters. The ranges of the F_2 values went out the ranges of the two parents in most cases, exhibiting transgressive segregation. Most characters showed moderate to high values of broad sense heritabilities. The studied plants in the F_2's crosses segregated and gave ratios fitted the ratios 9:7, 9:7, 3:1, 1:3, 13:3 and 3:13 for leaf rust and 9:7, 7: 9, 3:1, 1:3, 3:13 and 1:15 for stem rust with insignificant χ^2 values, indicating that the resistant parents for leaf and stem rusts had one or two genes and were complimentary dominance, recessive or independent in their expressions. Based on the resistance to leaf and stem rusts, suitable plant height (90-110 cm) and grain yield higher than the highest parent, 8-17 plants were selected from seven crosses.

Keywords: genetic inheritance; agronomic performance; rusts tolerance; *Triticum aestivum*.

IMPACT OF ZINC UPTAKE ON MORPHOLOGY, PHYSIOLOGY AND YIELD ATTRIBUTES OF WHEAT IN PAKISTAN

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ABSTRACT. A pot experiment was conducted in the Old Botanical Garden, University of Agriculture Faisalabad, to assess the effect of zinc uptake on morphological, physiological and yield attributes of wheat (*Triticum aestivum* L.). Two varieties of wheat, *i.e.* W-141 and W-142, procured from Ayub Agricultural Research Institute (AARI), Faisalabad, Pakistan, were used during this study. The soil used during experiment was field soil from university fields having sandy loam texture. The experiment was laid out in a completely randomized design (CRD) with five treatments and four replicates. Different treatments of zinc were applied on different intervals. After 25 and 35 days of germination, the plants were subjected to three levels of $ZnSO_4$ (0, 400 mgL^{-1}, 600 mgL^{-1}). During the experiment, the harvests were taken after 10 days of intervals for morphological and physiological analysis. After the maturity of plants, final harvest was taken and yield attributes were recorded. Data of various morphological, physiological and yield attributes were statistically analyzed. The results showed that zinc toxicity had adverse effects on the wheat varieties. The variety W-141 was a little bit tolerant to zinc toxicity, as per shown by the results, as compared to W-142, which suffered by the toxicity of zinc. It was also revealed by the results that zinc affects the morphological, physiological and yield attributes of wheat when applied in toxic concentration.

Keywords: foliar applied; toxicity; harvests; adverse effects.

FIELD SCREENING OF EUROPEAN *AVENA* GENETIC RESOURCES COLLECTIONS

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ABSTRACT. Oat is a crop with an important European history and tradition. The high value of oat in human nutrition, which is unique among cereals, is widely recognized and confirmed by health claims issued in various countries. It is based on a high content and quality of proteins, considerable content of fat with high proportion of polyunsaturated fatty acids, high contents of dietary fiber, especially the soluble, highly viscous mixed linked (1->3)(1->4)-ß-D-glucans, which hypo-cholesterolemic effects, minerals and antioxidants, especially tocopherols, tocotrienols and avenanthramides. The main goal of this paper is on characterization and evaluation of accessions from European *ex situ* collections for different traits, which are important for the quality of oats in human nutrition. All field experiments carried out in experimental field of Suceava Genebank, during 2014-2016. Field screening of genetic material was performed by using several IPGRI descriptors: days to heading; growth habit; lodging at immature and mature stages; shape of panicle; lemma color; length of panicle; panicle numbers/m^2; plant height; productivity; (g/m^2); seed weight (g) and test weight (kg/hl). A wide variability was observed for all used descriptors, and some genotypes potentially interesting for breeding programs were identified (landraces and obsolete cultivars).

Keywords: landraces; obsolete cultivars; test weight; seed weight; *Avena* accessions.

REZUMAT. Screeningul în câmp al colecţiei de resurse genetice europene de *Avena*. Ovăzul este o cultură cu o importantă istorie şi tradiţie în Europa. Valoarea ridicată a ovăzului în nutriţia umană, ce-l face unic printre cereale, este puternic recunoscută şi confirmată de rezultatele obţinute în diferite studii de sănătate realizate în multe ţări. Aceste afirmaţii se bazează pe conţinutul ridicat de proteine şi pe calitatea acestora, conţinut ridicat de grăsimi ce sunt bogate în acizi graşi nesaturaţi, solubili, cu vâscozitate ridicată (1->3)(1->4)-ß-D-glucani, cu efect hipocolesterolemic, minerale şi antioxidanţi, în special tocoferoli, tocotrienoli şi avenatramide. Principalul scop al acestei lucrări este de caracterizare şi evaluare a probelor provenite din colecţia europeană *ex situ* pentru diferite însuşiri, ce sunt importante pentru determinarea calităţii ovăzului în vederea folosirii în consumul uman. Toate experimentele s-au realizat în câmpul experimental al Băncii de Gene Suceava, perioada 2014-2016. Screeningul în câmp al materialului genetic s-a realizat prin utilizarea unor descriptori IPGRI: nr. zile până la înflorire, tipul de creştere, rezistenţa la cădere, la coacerea în lapte şi la maturitate, forma paniculului, culoarea paleei inferioare, lungimea paniculului, numărul de panicule/m^2, înălţimea plantei, productivitatea (g/m^2), MMB (g) şi greutatea hectolitrică (kg/hl). S-a observat o mare variabilitate la toţi descriptorii utilizaţi, evidenţiindu-se anumite genotipuri (populaţii locale, forme sălbatice), ca fiind surse importante pentru ameliorarea ovăzului cultivat.

Cuvinte cheie: populaţii locale; cultivare vechi; masa a 1000 de boabe; greutate hectolitrică; probe de *Avena*.

RELATIONSHIP OF BACTERIAL LEAF BLIGHT DISEASE OF COTTON WITH DIFFERENT WEATHER PARAMETERS UNDER SOUTH GUJARAT CONDITION OF INDIA

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ABSTRACT. Cotton is a soft, fluffy staple fiber that grows in a boll, around the seeds of the cotton plants of the genus *Gossypium* in the family Malvaceae. Bacterial blight of cotton, also know as angular leaf spot, boll rot, and black leg, is a potentially destructive bacterial disease of cotton production. The disease caused by *Xanthomonas campestris* pv. *malvacearum* (Smith) Dye (synonyms *Xanthomonas malvacearum* (E.F. Sm) Dowson) is one of the most important and serious disease in cotton crop. Main objective of present research is to study the progress of the bacterial blight disease of cotton (BLB), caused by *Xanthomonas campestris* pv. *malvacearum* (Smith) Dye, with relation to the environmental parameters. This is a common disease affecting the growth, development and yield of cotton. A field trial was conducted to determine the influence of environmental factors, *viz.* rainfall periods, temperature, sun shine hours and humidity on the development of disease. Bacterial blight disease was recorded with its appearance and subsequently at weekly interval till it prevailed on G. Cot. Hy.12 (Non Bt). The incidence of bacterial blight disease (BLB) was noticed during 28 to 49^{th} standard week with the maximum disease intensity in third week of September (23.5% PDI). None of the abiotic factors had significant influence on bacterial blight disease progress and development.

Keywords: bacterial leaf blight; *Xanthomonas campestris* pv. *malvacearum*; environmental parameters; correlation.

STABILITY ANALYSES OF FIBRES YIELD OF KENAF USING MULTIPLE BIOMETRICAL MODELS

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ABSTRACT. Multiple models have been used to examine stability in many crops, but little of such exits for kenaf. Relationship of stability estimates of various models reveals the importance of one or more estimates for reliable predictions of cultivar behaviour and stability. This study evaluated 33 kenaf genotypes across six location for core and bast fibre yield stability using four models. Kenaf were grown in a four row plot, 5 m each, at 0.2 m within row and 0.5 m between rows in the trial laid out in randomized complete block design with three replications. Twenty plants were randomly harvested per plot at 12 weeks after planting and processed to fibres. Dry core fibre weight (CFW) and bast fibre weight (BFW) were taken. Data collected were pooled across locations and subjected to analysis of variance. Genotypes stability were estimated using Finlay-Wilkinson, Wricke's ecovalence (*Wi*), Kang's rank sum and superiority index models. Correlations among the weights and stability models were performed. Significant differences existed in the genotypes (G) ($p< 0.01$), environments (E) and G×E for CFW and BFW. Partitioning the G×E showed that genotypes linear response and deviation from the mean were significant for CFW and BFW. Significant and positive correlation existed between Finlay-Wilkinson and Kang's rank sum (0.570^{***}), *Wi* (0.615^{***}) and superiority index (0.582^{***}) for CFW. Significant correlations also existed between the efficacy of Kang's rank sum and *Wi* (0.569^{***}), and with superiority index (0.779^{***}). Kang's rank sum correlated with Finlay-Wilkinson (0.345^{**}), while *Wi* model had correlation with

Finlay-Wilkinson (0.538**) and Kang's rank sum (0.318**) for the BFW. All the models correlated with one another. Any of the models is sufficient to select stable genotypes in kenaf fibre yield breeding programmes.

Keywords: kenaf; bast fibres; core fibres; genotype × environment; parametric stability.

PROMISING ANTIFUNGAL POTENTIAL OF SELECTIVE BOTANICAL EXTRACTS, FUNGICIDES AND *TRICHODERMA* ISOLATES AGAINST *ALTERNARIA SOLANI*

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ABSTRACT. *In vitro* antifungal potential of *Trichoderma* isolates, selective botanical extracts and fungicides against *A. solani* was evaluated. *Trichoderma* isolates, i.e. *T. harzianum*, *T. viride* and *T. hamatum*, were tested for their antifungal effect by dual culture technique at 48, 96, 144 and 172 hrs. *T. hamatum* produced the highest inhibition of *A. solani in vitro*, followed by *T. hazianum* and *T. viride* after 172 hrs. Methanolic leaf extracts of *Elettaria cardamomum, Syzygium aromaticum, Curcuma longa* and root extract of *Parthenium hysterophorus* showed up to 100% inhibition of *A. solani*, compared to control, while methanolic stem and leaf extracts of *P. hysterophorus* produced up to 90% inhibition of the pathogen. *In vitro*, six different systemic fungicides Triger 25% EC (Tebuconazole), Solex (Carbendazim 40% + Triadimefon 10%), Dew (Difenoconazole), Amistor Top SC (Azoxystrobin + Difenoconazole), Corel 25% EC (Difenoconazole), Reflex (Difenoconazole + Propiconazole) were tested against *A. solani* at 5, 10 and 15 ppm concentrations after 48, 96, 144 and 172 hrs. Corel and reflex at all concentrations produced best growth inhibition of *A. solani*. The inhibition was maximum by all fungicides at 15 ppm after 172 hrs. All fungicides had a promising inhibitory effect on *A. solani,* except Solex. It can be concluded from the present investigation that a combination of these strategies can be used in integrated disease management of *A. solani* on potato.

Keywords: *Trichoderma harzianum*, *T. viride*, *T. hamatum*, *Parthenium hysterophorus*, *Elettaria cardamomum, Syzygium aromaticum.*

EFFECT OF NITROGEN FERTILIZATION AND BIOSTIMULATIVE COMPOUNDS ON ONION PRODUCTIVITY

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ABSTRACT. Two field experiments were carried out to investigate the optimum nitrogen rate (80, 100 and 120 kg N fed.$^{-1}$; Fed = 0.38 ha) and stimulative compounds, *i.e.* foliar spraying with water, as control, *Azotobacter* spp. and *Azospirilium* spp., yeast, compost tea and humic acid on vegetative growth, yield, quality, as well as storability of bulb yield of onion (*Allium cepa* L.) under North Delta conditions. The results showed that the vegetative growth was positive influenced, also yield its components, quality and storability of onion were related to the medium rate of nitrogen (100 kg N fed.$^{-1}$). Furthermore, foliar spraying with humic acid at the rate of 1 kg fed.$^{-1}$ led to a significant increment in the most of vegetative growth characteristics, as well as total bulb yield and its components, bulb quality and storability of

onion. Both of 100 kg N fed.$^{-1}$ and spraying humic acid at the rate of 1 kg fed.$^{-1}$ significantly increased most vegetative growth characteristics, total and marketable bulbs yield fed.$^{-1}$, bulb quality and storability of onion. So, this study concluded that onion farmers at North Delta of Egypt should fertilize onions with nitrogen at the rate of 100 kg N fed.$^{-1}$ with spraying humic acid at the rate of 1 kg fed.$^{-1}$ to achieve the highest economic yield.

Keywords: yield; bulb quality; yeast; compost tea; humic acid.

CHANGES IN GERMINATION AND SEEDLING GROWTH OF DIFFERENT CULTIVARS OF CUMIN TO DROUGHT STRESS

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ABSTRACT. Cumin (*Cuminum cyminum* L.) is one the most appropriate choice for investing in dry and semi dry areas. In order to analyse influence of drought stress on germination and seedling growth of two masses of cumin, an experiment was conducted in seed technology laboratory of Faculty of Agriculture of Islamic Azad University of Isfahan, in 2016. In this experiment, polyethylene glycol (PEG 6000) at six levels (0, -0.144, -0.18, -0.216 and -0.288 MP) and NaCl at six levels (0, 4, 5, 6, 7, and 8 ds/m) and distilled water as control were applied to investigate the influence of dryness and salinity stresses on seed germination and seedling growth of two cultivars of cumin plant masses gathered from Mashhad-e-Ardahal and Kerman, then fulfilled in two separate factorial trials, on the basis of randomized design with four replications. Cultivar had significant influence on germination percentage, germination uniformity, radicle length, plumule length, fresh radicle weight, dry radicle weight, fresh and dry plumule weight. Drought stress impact on all treatments, except germination uniformity, fresh radicle weight and dry radicle weight was meaningful, but, just radicle length, plumule length, fresh plumule weight and dry plumule weight significantly affected by interaction between cultivar and drought stress. The rate of germination, germination percentage, as well as seedling growth and establishment were considerably lowered with the rise of stress levels using PEG. Control treatment had obtained the highest germination percentage, mean time of germination, radicle and plumule length, fresh plumule weight and seed stamina index. Taking all traits into account, this experiment found that Mashhad-e-Ardahal was most tolerant hybrid to water stress conditions.

Keywords: dry area; seed technology; polyethylene glycol; NaCl; radicle.

A SCIENTIFIC NOTE ON THE EVOLUTIONARY RELATIONSHIPS BETWEEN HONEY BEES AND THEIR ENEMIES

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ABSTRACT. Honey bees are used in intensive way in agriculture due to their vital role in pollination of crops. Moreover, there are many valuable products from the bee colonies. Unfortunately, there are many enemies to honey bees. These enemies belong to various taxonomic ranks, including birds, insects and mites. Serious damages can be caused to honey bee colonies by these enemies. The sophisticated evolutionary relationships between honey bees and their enemies are not well investigated. In this study, phylogenetic trees between honey bees and their enemies were constructed based on the mtDNA and the COX1. The

constructed trees reflected the evolutionary relationships according to behavior and taxonomical characters based on mtDNA and COX1, respectively. Predators, cavity-nesting bees, and parasites were separated than each other based on the first 1000 bases of the mtDNA. Insects were separated than mites and birds, in line with the classification of each organism based on the COX1.

Keywords: phylogeny; honey bees; hornets; Varroa; wax moths.

MARKETING MARGINS OF SELECTED STAKEHOLDERS IN THE SUPPLY CHAIN OF DATES IN SOUTH PUNJAB, PAKISTAN

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ABSTRACT. Date is one of the major cash fruits in Pakistan. Presently Pakistan stands at sixth position in dates producing countries. Date occupies third position after citrus and mango in terms of fruit area and production. The present study was conducted to explore the current margins of various stakeholders involved in the existing marketing system of dates in two leading districts of South Punjab district, as Dera Ghazi Khan and Muzaffar Garh. A sample of 40 farmers, 30 commission agents, 30 wholesalers, 30 retailers and 30 consumers was selected randomly. Pre-tested questionnaires were used to collect the data from selected respondents through personal interviews. Private sector is dominant in all major marketing activities. The market intermediaries in date marketing system involve commission agent, wholesaler and retailer. Different intermediaries were taking different margins according to form of dates and locality. In Dera Ghazi khan, commission agent was getting 13.55%, wholesaler 11.71% and retailer, 18.09% margins of marketing chain for fresh date and share of growers in consumer price was 56.09%. Commission agent was taking 14.13%, wholesaler, 10.67% and retailer 17.2%; margin of marketing chain for fresh date and share of growers in consumer price was 58% in Muzaffar Garh. The price of date is much high due to long chain of marketing system. In order to reduce the wholesale and retail prices, government should take measures to establish date marketing centers and supply chain management training programs for the date growers.

Keywords: fresh dates; marketing system; retail prices; marketing centers.