CORRELATION AND FACTOR ANALYSIS OF GRAIN YIELD AND SOME IMPORTANT COMPONENT CHARACTERS IN SPRING BREAD WHEAT GENOTYPES

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ABSTRACT. In order to evaluate several agro-morphological traits in 21 spring bread wheat genotypes, an experiment based on randomized complete block design with three replications was carried out in two locations during three years (2008-2011).The traits including grain yield(GY), biological yield (BY), spike weight (SW), grain weight per spike(GWS), harvest index (HI), spike length (SL), spikelet per spike (SPS), number of grain per spike (NGS), number of spike per square meter (SPM), 1000-grain weight (GW), plant height (PH), stem straw weight (SSW), spike straw weight (SRW) were evaluated. The result of combined analysis of variance revealed that years, genotypes and their interaction effects were significant for all the traits. Location had significant difference for all the traits except SL and SPS. GY was significant correlated with BY (0.72**), SW (0.75**), GWS (0.69**), NGS (0.59**), SSW (0.62**) and SRW (0.66**). Factor analysis was used for understanding the data structure and trait relations. The factor analysis divided the thirteen traits into three factors. The cumulative variation for these factors was 0.76 and also it's portions for factor one to three were 0.59, 0.16 and 0.06, respectively. In the first factor, the traits including GY, BY, SW, GWS, SPS, NGS and SSW had high factor loadings. The traits compromise HI, SSW and SRW had high factor loadings in second factor and also SPM, GW and PH had high values of factor loadings in third factor. The genotypes including Morvarid, N-80-19 and N-85-14 had high mean values of grain yield. The genotypes had high genetic coefficient variation for SRW, BY, SW and GY, therefore the efficiency of selection of the genotypes for improving these traits will be high.

Key words: Factor analysis; Morphological traits; Grain yield.

BORON NUTRITION UNDER INTERMITTENT FLOODING AND DRYING CONDITION SEEMS SUSTAINABLE NUTRIENT MANAGEMENT TECHNIQUE IN RICE

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ABSTRACT. Water saving rice cultivation is emerging technique to couple with irrigation water shortage due to climate change all over the world. Major issue in these techniques is to compromise yield and quality fatalities because of higher unfilled grain due to nutrients deficiency. Boron fertilization seems to be big management technique to improve rice agriculture due to having imperative role in pollen viability. Thus, a field experiment was conducted to see the impact of boron fertilization both with basal and foliar application methods in water saving rice cultivation systems. Boron, with basal (3 kg borax/acre) and foliar (2% boron) was applied at different growth stages in rice crop grown under various rice cultivation systems; flooded rice, intermittent flooding and drying and aerobic rice. Boron fertilization both with basal and foliar application technique resulted in improved crop performance in all cultivation systems. Rice plants recorded highest yield, yield attributing parameters like productive tillers, panicle length and grain weight with boron fertilization. Quality parameters like sterile kernels, abortive kernels, opaque kernels were significantly reduced with boron fertilization in all rice cultivation systems. Furthermore, normal kernels

were enhanced with basal and foliar application of boron nutrition. Likewise, maximum water use efficiency was recorded in foliar application of boron at panicle stage under intermittent flooding and drying condition. Foliar application of boron nutrition at panicle initiation stage was found to be most appropriate in water saving rice cultivation systems.

Key words: Boron; growth; Quality; Rice; Yield.

EVALUATION OF INNOVATIVE COTTON GENOTYPES AGAINST INSECT PEST PREVALENCE, FIBER TRAIT, ECONOMIC YIELD AND VIRUS INCIDENCE IN PAKISTAN

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ABSTRACT. Cotton (*Gossypium hirsutum*) is known as important commodity globally. The experiment was conducted at Cotton Research Station, Multan, Punjab-Pakistan, to evaluate resistance of nine innovative cotton cultivars against insect pest complex were used along with their fiber traits, economic yield and virus incidence. Population of jassid, whitefly and thrips was recorded by using leaf turn method, bollworms by counting whole fruiting parts (buds, flowers and bolls), virus by counting healthy and virus effected plants per plot, yield of seed cotton was determined by hand harvesting method, while qualitative fiber properties were measured through HVI spectrum-1 (high volume instrumentation) method. Cotton genotype NIAB-Bt-2 is resistant to jassid, whitefly and thrips with maximum GOT, staple length. In case of bollworms, all genotypes are resistant to spotted and american bollworm, except FH-142 and MNH-988. No genotype is resistant to pink bollworm in leftover bolls. Best yield performance was recorded on FH-142 (2041.54 kg/ha) with minimum CLCuV incidence. Further our research should recognize the share of one pest species on the yield and fiber quality of cotton by managing other pest species to define better management strategies. Our studies concluded that the genotype NIAB-Bt-2 has less insect attack i.e., sucking pest as well as bollworms, virus and other fiber characteristics like GOT, staple length as compared with other cotton genotypes should be recommended for general cultivation and being a resistant germplasm it should be included in breeding program for the development of new cotton strains.

Key words: Whitefly; Jassid; Thrips; Bollworm; Yield; CLCuV; Fiber traits.

EFFECTS OF SOWING DATE ON SOME AGRONOMIC CHARACTERISTICS AND ALKALOID CONTENT OF DATURA STRAMONIUM IN SEMI-ARID CONDITIONS

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ABSTRACT. Alkaloids of diferent plant, including many *Solanaceae* species, constitute important natural sources for variety of pharmaceutical products. The amounts of various secondary plant products are strongly dependent on the growing conditions and agronomical applications such as planting date, fertilization, irrigation etc. The aim of this was to study the effects of sowing date on some agronomic characteristics and total alkaloid content of thorn apple (*Datura stramonium*), investigated in the environmental conditions from Dicle University, Agricultural Faculty, Field Crops Department experimental area, during 2010 and 2011 growing years. In the research, plant height, stem diameter, number of branches per plant, number of capsule per plant, capsule width, capsule length, 1000-seed weight, fresh herb yield,

herba yield, seed yield and total alkaloid content were examined. At the end of the study, in the trial of thorn apple with sowing dates, according to two years mean, seed yield, fresh herb yield, dry herb yield and total alkaloid yield were changed between 335 kg ha^{-1} and 704 kg ha^{-1}, 5933 and 20537 kg ha^{-1}, 1613 kg ha^{-1} and 4800 kg ha^{-1}, and 0.270% and 0.391%, respectively. The effect of sowing date was found significant on the investigated characteristics, when sowing delayed, agronomic characteristics were also decreased. The highest values related with seed yield, fresh and dry herbage of thorn apple were obtained sowing of 01 Apr. Moreover, thorn apple plant showed morphogenetic variation when compared leaf and seed alkaloid contents.

Key words: Thorn apple; Seed yield; Herb yield; Secondary metabolite.

EFFECT OF DIFFERENT NITROGEN SOURCES ON VEGETATIVE TRAITS, GRAIN YIELD AND ESSENTIAL OIL YIELD OF CORIANDER (*CORIANDRUM SATIVUM)*

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ABSTRACT. Coriander (*Coriandrum sativum*) is one of the medicinal plants that its essential oil yield has abundance medicinal and food value. One of the main concepts in the production of medicinal plants is to increase of yield by biofertilizers. In order to evaluate the separate and combined effect of nitrogen and biofertilizer Nitroxin (mixture of bacteria *Azotobacter* and *Azospirillum*) fertilizer on vegetative traits, grain yield and essential oil yield of coriander, an experiment was conducted as a factorial in a randomized complete block design (RCBD) with three replications in the field research of Islamic Azad University, Jiroft, Iran. The experiment factors were consisted of three levels of nitrogen (0, 75 and 150 kg·ha^{-1}) and three levels of Nitroxin biofertilizer (0, 2 and 4 L·ha^{-1}). The results showed that application of 150 kg·ha^{-1} N significantly increased height and stem diameter, number of lateral branches and shoot dry weight, compared with control and application of 75 kg·ha^{-1} N. Nitroxin biofertilizer significantly improved vegetative traits of coriander when compared with control, so that application of 4 L·ha^{-1} of Nitroxin caused increase the mean of traits compared to control. In the most evaluated growth traits, the highest means were obtained with combining of 150 kg·ha^{-1} N with 4 L·ha^{-1} of Nitroxin. Application of 150 kg·ha^{-1} N increased the number of umbels per plant, 1000 seeds weigh, seed yield and essential oil yield, 29.9, 33.0, 72.9, 40.7, 147.4 and 177.1 percent, compared with the control, respectively. In the presence of Nitroxin, yield and yield component and essential oil yield of coriander increased significantly. Maximum average of these traits obtained when 4 L·ha^{-1} of Nitroxin was applied. Integrated of nitrogen and Nitroxin increased yield and yield component and essential oil yield significantly, when compare with application separately of them. So that the maximum mean of these traits obtained with combined application of 150 kg·ha^{-1} nitrogen and 4 L·ha^{-1} of Nitroxin. The results of this research was showed that application Nitroxin biofertilizer have an important role in increase of quantity and quality yield of coriander medicinal plant and can be used as an alternative of nitrogen fertilizer in sustainable agriculture.

Key words: Azospirillum; Azotobacter; Essential oil; Grain yield; Nitrogen.

EFFECT OF MYCORRHIZAL INOCULATION ON GROWTH, NITROGEN FIXATION AND NUTRIENT UPTAKE IN ALFALFA (*MEDICAGO SATIVA)* UNDER SALT STRESS

A. MORADI

ABSTRACT. Most legumes in natural conditions form a symbiosis with arbuscular mycorrhizal (AM) fungi. AM fungi in saline soils have been reported to improve salinity tolerance and growth in plants. In the present study, interaction between mycorrhizal fungus, *Glomus mosseae*, and salinity stress in relation to plant growth, nitrogen fixation, and nutrient accumulation was evaluated in alfalfa (*Medicago sativa*). Two alfalfa cultivars (Bami and Yazdi) were compared under different levels of salinity with and without mycorrhizal inoculations. Salt stress resulted in a noticeable decline in shoot and root dry matter accumulation, resulting in a decline in the shoot to root ratio (SRR) in all plants. However, Bami was found to be more tolerant to salinity than Yazdi. Inoculated plants exhibited better growth and biomass accumulation under stressed as well as unstressed conditions. Mycorrhizal colonization (MC) was reduced with increasing salinity levels, but the mycorrhizal dependency (MD) increased, which was more evident in Yazdi. Nodulation was completely inhibited under salt stress conditions for both non - AM inoculated alfalfa varieties. Nodulation only occurred in inoculated plants. Nitrogenase activity was reduced with increasing salt concentrations. AM inoculated plants had considerably higher nodule numbers, dry weights, and nitrogenase activity under nonsaline environments. Bami had a comparatively lower Na^+ concentration and higher K^+ and Ca^{2+} concentrations than Yazdi. Although nitrogen (N) and phosphorus (P) contents declined with increasing salinity, Bami had higher levels of N and P, as compared with Yazdi. Plants inoculated with *Glomus mosseae* had better plant growth and nitrogen fixation under salt stress.

Key words: Alfalfa; *Glomus mosseae*; Growth; Nitrogenase; Nodulation; Nutrients.

EFFECTS OF SALICYLIC ACID ELICITOR AND POTASSIUM FERTILIZER AS FOLIAR SPRAY ON CANOLA PRODUCTION IN THE RECLAIMED LAND IN ISMAILIA GOVERNORATE, EGYPT

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ABSTRACT. A field experiment was conducted at the farm of Faculty of Agriculture, Suez Canal University, Ismailia Governorate, Egypt, during 2013/'14 and 2014/'15 seasons, to determine the effects of salicylic acid elicitor (SA) and potassium fertilizer (K) as foliar spray on canola production in the reclaimed land. Canola plants were sprayed with three rates of K and SA separately and together. The concentrations of SA with a surfactant triton 0.1% and concentrations of K sprayed after 30 days of sowing by one week interval for three times using hydraulic sprayer. Results indicated that K and SA provided good nutrition and resistance for pathogens, enhanced plant height (cm), number of branches/ plant, fruiting zone (cm), seed yield/ plant (g), seed yield/ fed and oil percentage of canola cultivar (Serw 4) in the reclaimed land. K and SA separately or in combination at the rate of (6.0 cm^{-1} + 300 mg^{-1} SA) provided the best nutrition for enhancing resistance of plants against biotic and a biotic factors, consequently, enhancing vegetative growth and yield production during seasons of study 2013/'14 and 2014/'15.

Key words: Salicylic acid; Potassium fertilizer; Foliar spray; Canola production.

BIOCONTROL OF TOMATO *FUSARIUM* WILT BY *TRICHODERMA* SPECIES UNDER *IN VITRO* AND *IN VIVO* CONDITIONS

H. BARARI

ABSTRACT. *Trichoderma* spp. have long been used as biological control agents against plant fungal diseases, but the mechanisms by which the fungi confer protection are not well understood. Our goal in this study was to isolate species of *Trichoderma*, that exhibit high levels of biocontrol efficacy from natural environments and to investigate the mechanisms by which these strains confer plant protection. In this study, efficacy of the native isolates of *Trichoderma* species to promote the growth and yield parameters of tomato and to manage *Fusarium* wilt disease under *in vitro* and *in vivo* conditions were investigated. The dominant pathogen, which causes *Fusarium* wilt of tomato, was isolated and identified as *Fusarium oxysporum* f. sp. *lycopersici* (FOL). Twenty eight native *Trichoderma* antagonists were isolated from healthy tomato rhizosphere soil in different geographical regions of Mazandaran province, Iran. Under *in vitro* conditions, the results revealed that *Trichoderma harzianum*, isolate N-8, was found to inhibit effectively the radial mycelial growth of the pathogen (by 68.22%). Under greenhouse conditions, the application of *T. harzianum* (N-8) exhibited the least disease incidence (by 14.75%). Also, tomato plants treated with *T. harzianum* (N-8) isolate showed a significant stimulatory effect on plant height (by 70.13 cm) and the dry weight (by 265.42 g) of tomato plants, in comparison to untreated control (54.6 cm and 195.5 g). Therefore, the antagonist *T. harzianum* (N-8) is chosen to be the most promising bio-control agent for *F. oxysporum* f. sp. *lycopersici*. On the base of present study, the biocontrol agents of plant diseases might be exploited for sustainable disease management programs to save environmental risk.

Key words: Biological control; Fungi antagonist; *Fusarium* wilt; *Lycopersicon esculentum*.

EFFECT OF GIBBERELLIC AND SALICYLIC ACIDS PRE-SOAKING ON SEED GERMINATION ATTRIBUTES OF CUCUMBER (*CUCUMIS SATIVUS* L.) UNDER INDUCED SALT STRESS

A. A. AL SAHIL

ABSTRACT. Saline stress is one of the most deleterious abiotic stress determining a considerable reduction in agricultural production. Seed germination is the primitive plant growth stage and considered as vulnerable to saline stress. However, the exogenous application of natural plant growth regulators has been reported as one of the mitigation strategies. A Petri dish experiment under controlled conditions was conducted at King Saud University. The aim was to quantify the negative impact of induced saline stress (NaCl) on seed germination attributes and role of gibberellic acid (GA3) and salicylic acid (SA) to reduce the inhibitory effect of saline stress on cucumber (*Cucumis sativus* L.) seeds. The treatments consist of two sets as: seed pre-soaking solution and NaCl stress. Five pre-soaking solutions were prepared as: H_2O (control), GA3 (100 ppm), GA3 (200 ppm), SA (0.5 ppm) and SA (1.0 ppm). While saline stress was imposed by NaCl at three levels such as: no stress (distilled water, control), mild stress (NaCl, 50 mM) and higher stress (NaCl, 100 mM). Results depicted that NaCl

induced stress has significantly affected the all studied germinations attributes. The maximum NaCl stress (100 mM) stood highest in inhibiting seed germination percentage, seedling length, and seedling fresh and dry weights, followed by mild stress and control, respectively. Seed pre-soaking treatments were recorded non-significant for seedling length, fresh and dry weights while significant for germination percentage and number of seeds germinated over period of time. The interaction between seed pre-soaking treatments and induced saline stress was recorded significant. Overall, GA3 at the rate of 100 ppm solution performed a contributory role to mitigate the negative effect of saline stress.

Key words: Seed pre-soaking; NaCl stress; Inhibition; Germination percentage.

THE EFFECT OF INTRAVENOUS BUTAPHOSPHAN, B12 AND C VITAMINS ON METRITIS, MASTITIS PREVALENCE AND REPRODUCTIVE PERFORMANCE OF DAIRY CATTLE

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ABSTRACT. Three groups of Holstein Friesian cows were used to test the effect of two intravenous solutions on metritis, mastitis prevalence and reproductive performance. The first solution containing 3000 mg Butaphosphan (100 mg/ml) and 1.5 mg B12 Vitamin (0.05 mg/ml) was administered to BB12 group in the first 3 days after parturition and the second solution containing 3000 mg Butaphosphan (100 mg/ml), 1.5 mg B12 Vitamin (0.05 mg/ml) and 7 g of C vitamin (0.1 g/ml) was administered to BB12C group in the same period. The control group (C) didn't receive any intravenous solution. The Tukey-Krammer multiple comparison tests were used to compare the results. The prevalence of clinical metritis, puerperal metritis and clinical mastitis was lower in the BB12C group ($p< 0.05$), compared to BB12 and C groups. Regarding the prevalence of metritis and mastitis no differences was observed in the BB12 group, compared with the C group ($p>0.05$). However, no difference was observed in the prevalence of the clinical endometritis ($p>0.05$) for the all three groups of cows. Also, the BB12C group registered the best calving to first insemination interval and calving to conception interval ($p< 0.05$). In conclusion, the intravenous cocktail containing Butaphosphan, B12 and C Vitamin can reduce the prevalence of some uterus and udder infection in the first 7 days after parturition in dairy cows.

Key words: Dairy cow; Catosal; C Vitamin; Metritis; Mastitis.

REZUMAT. Efectul administrării intravenoase a butafosfanului, vitaminelor B12 si C asupra prevalenţei mastitelor, metritelor şi a performanţelor de reproducere la vacile pentru lapte. În acest studiu au fost folosite trei grupuri de vaci pentru lapte Holstein Friză pentru a testa efectul a două soluţii cu administrare intravenoasă asupra prevalenţei endometritelor, mastitelor şi a performanţelor de reproducere. Prima soluţie, compusă din 3000 mg butafosfan (100 mg/ml) şi 1,5 mg vitamina B12 (0,05 mg/ml), a fost administrată grupului 1 de vaci (grupul BB12) în primele 3 zile după parturiţie, iar a doua soluţie, compusă din 3000 mg butafosfan (100 mg/ml), 1,5 mg vitamina B12 (0,05 mg/ml) şi 7 g vitamina C (0,1 g/ml), a fost administrată grupului 2 (grupul BB12 C) în aceeaşi perioadă (în primele 3 zile după parturiţie). Grupului 3 (grupul C), denumit şi grup de control, nu i s-a administrat nicio soluţie pe cale intravenoasă. Testul Tukey Krammer pentru comparaţii multiple a fost utilizat în scopul de a testa efectul soluţiilor utilizate. Prevalenţa metritelor clinice, metritelor puerperale şi mastitelor clinice a fost mai mică la grupul BB12C ($p<0.05$), în comparaţie cu grupurile BB12 şi C. În ceea ce priveşte prevalenţa metritelor şi mastitelor la grupul BB12, comparativ

cu grupul C, nu au fost observate diferenţe semnificative (p>0.05). Prevalenţa endometritelor clinice a prezentat valori asemănătoare statistic (p>0.05) la toate cele trei grupuri de vaci. Cele mai bune intervale fătare – prima inseminare şi fătare – concepţie au fost obţinute la grupul BB12C (p<0.05). În concluzie, administrarea intravenoasă în primele 3 zile post-partum a soluţiei formată din butafosfan, vitaminele B12 şi C la vaci poate reduce prevalenţa anumitor infecţii uterine şi mamare în primele 7 zile post-partum.

Cuvinte cheie: vaci pentru lapte; Catosal; vitamina C; metrite; mastite.