IMPACT OF DIFFERENT IRRIGATION MANAGEMENTS ON SOIL WATER CONSUMPTION, GRAIN YIELD, SEED PROTEIN, PHOSPHORUS AND POTASSIUM OF WINTER WHEAT

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ABSTRACT. To evaluate soil water consumption, changes in quantity and quality of winter wheat seed and forage under different irrigation treatments, an experiment was conducted in Beijing, China, in the 2012-2013. Irrigation treatments were (I1): irrigation before sowing, (I2): irrigation before sowing + before freezing; (I3): irrigation before sowing + before freezing + irrigation in the beginning of erecting stage + irrigation at flowering stage; (I4): irrigation before sowing + irrigation before freezing + irrigation at the booting stage + irrigation at flowering stage. The laid out of experiment was randomized complete block design, repeated six times. The effect of irrigation on total biological yield, grain yield and harvest index is significant. The highest mean soil water consumption in Oct., Nov., Dec., Jan., Feb., Mar., Apr. and May was obtained for lysimeter 10 (I2), lysimeter 10 (I2), lysimeter 6 (I2), lysimeter 10 (I2), lysimeter 10 (I2), lysimeter 10 (I2), lysimeter 11 (I3), and lysimeter 10 (I2), respectively. The results from the study indicate that irrigation winter wheat throughout the booting stage and flowering stage increased grain yield, harvest index, potassium percentage, ash percentage of forage wheat at flowering stage, seed and forage protein percentage. Evapotranspiration trends increased steadily, especially in last three months, in which the lysimeter fields were covered by winter wheat completely.

Keywords: weighing lysimeter; irrigation; soil water consumption; wheat; quality.

THE EFFECT OF PRIMING ON GERMINATION AND GROWTH INDICES IN CHAMRAN WHEAT VARIETY IN NORTH OF KHUZESTAN PROVINCE, IRAN

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ABSTRACT. In order to study the plant growth regulator, using salicylic acid (SA) on germination and growth indices for laboratory research in crop year 2014-2015, which was conducted at the research center Safiabad-Dezful, Khuzestan province. The treatments included four levels of priming with salicylic acid {control (distilled water), 0.7, 1.2, 1.7 mM} in a completely randomized design in three replications. The results showed that the control treatment reduced the decrease in germination time. The highest percentage of germination and related characteristics of the control (distilled water) was obtained. Seed vigor and seedling vigor index were reduced in high concentrations of salicylic acid. The germination percentage of an average daily germination, seed vigor and seedling vigor index had a positive and significant correlation with the daily germination rate showed a significant negative correlation. The results of comparison of treatments showed that the treatment concentration of 0.7 mM salicylic acid highest (22.3 days) and control (distilled water) lowest (0.3 day) had mean germination time. Effects of priming showed the highest mean daily germination (15.44) related to the control and the lowest (2.97) related to the concentration of 7.1 mM salicylic acid. Also, the results showed that the 1.7 mM salicylic acid treatment had the highest number of germinated seeds per day (0.3880) and control treatment had the least number of germinated seeds per day (0.6467). The highest vigor index was observed in control treatment with seedling length of (8.15 cm) and the lowest vigor index was observed in 1.7 mM salicylic acid

treatment with seedling length of (1.54 cm). The highest seedling vigor index was observed in control treatment (33.58) and the lowest seedling vigor index was observed in 1.7 mM salicylic acid treatment (17.20). The coefficient velocity germination rate in control treatment was highest (3) and in the 1.7 mM salicylic acid treatment was lowest (0.15). The correlation coefficient between vigor index and seedling vigor index has the highest value (98%). There was a positive correlation between germination percentage and mean daily germination and there was a negative correlation between germination percentage and daily germination speed.

Keywords: growth regulator; salicylic acid; seed vigor; daily germination; laboratory research.

ORGANIC MATTER, PROTEIN PERCENTAGE, YIELD, COMPETITION AND ECONOMICS OF OAT-SOYBEAN AND OAT-GROUNDNUT INTERCROPPING SYSTEMS IN NORTHERN CHINA

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ABSTRACT. Intercropping is one of the most important and sustaibale cropping practice in agro-ecosystems. The study was conducted under field conditions in the arid Horqine sandy land in Baicheng District, Jilin Province, Northern China in 2011. A randomized complete block design with four replications was used. Treatments comprised different mono cropping and intercropping patterns, TO: sole cropping of oat, TOS-O: oat in the intercropping of oat and soybean, TOG-O: oat in the intercropping of oat and groundnut, TS: sole cropping of soybean, TOS-S: soybean in intercropping of oat and soybean, TG: sole cropping of groundnut, TOG-G: groundnut in the intercropping of oat and groundnut. In intercropping patterns, oat in oat-groundnut had obtained the highest dry matter in all stages. The highest value of protein percentage and organic matter in heading stage, grain filling stage, and grain dough stage was achieved in groundnut in oat-groundnut intercropping. The maximum value of protein percentage and organic matter in booting stage and ripening stage was related to soybean in oat-soybean intercropping. The results of this study clearly indicate that intercropping oat and groundnut affects the growth rate of the individual species in mixtures as well as the dry matter yield and nitrogen accumulation. The highest seed yield was obtained for mono-cropping of soybean, followed by mono-cropping of groundnut and oat. Oat seed yield intercropping of oat and groundnut, and intercropping of oat and soybean were 1208.00 kg/ha, and 832.3 kg/ha, respectively. The highest grain yield was obtained when soybean was grown together with oat, where the higher yield of intercrop is due to the better usage of nutrient, water and light. LER in all intercropping patterns were higher than 1. LER in intercropping of soybean and oat, and intercropping of groundnut and oat were 1.41, and 1.30, respectively. With these LER values, 29.07% and 23.07% of land were, respectively, saved in intercropping of soybean and oat, and intercropping of groundnut and oat, respectively, which could be used for other agricultural purposes. In both intercropping of soybean and oat, and intercropping of groundnut and oat, CI were less than 1, which means that both these two intercropping patterns have positive effects.

Keywords: organic matter; soybean; groundnut; oat; intercropping.

EVALUATION OF DIFFERENT FUNGICIDES AGAINST *ASPERGILUS FLAVUS* AND THEIR COMPARATIVE EFFICACY UPON GERMINATION OF INFECTED RICE SEEDS

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ABSTRACT. *Aspergilus flavus* is the most common seed born fungus that deteriorates the seed quality and minimizes the export value of the rice all over the world. Fungicides are the most successful and commonly used way to manage any fungi but more use of fungicides have resulted evolution in the seed born fungi so efforts are required off and on to stay ahead of the fungal races. Keeping in view, the present research work was conducted to evaluate different fungicides against *A. flavus* and their comparative efficacy upon the infected rice seeds. Experiment was laid out in completely randomize design with varying concentrations of fungicides (20, 40, 60 and 80 ppm) under laboratory conditions. Statistical results shown significant reduction in mycelial growth and improved the seed germination as well. The results were significantly better when the fungicides were used at 80 ppm, as compared to low concentrations. Regarding mycelial growth, Kumulus-DF and Cabrio-Top were comparative to each other, followed by Trimiltox-Forte, Cordate and Copper oxychloride, while for the other attribute of infected grain germination Kumulus-DF proven better in comparison with Trimiltox-forte and Cabrio-Top, followed by Cordate and Copper oxychloride.

Keywords: Kumulus-DF; Cabrio-Top; Trimiltox-Forte; Cordate; Copper oxychloride.

EFFECTIVENESS OF AQUEOUS LEAF EXTRACT OF *PEPEROMIA PELLUCIDA* AND *TERMINALIA CATAPPA* IN THE MANAGEMENT OF CYST NEMATODE (*HETERODERA SACCHARI)* ON SELECTED RICE VARIETIES

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ABSTRACT. Experiments were conducted at the teaching and research farm of Faculty of Agriculture, University of Ilorin, Nigeria to determine the effect of aqueous extract of *Peperomia pelliucida* and *Terminalia catappa* on the management of cyst nematode, *Heterodera sacchari* on some selected rice varieties. A screenhouse preliminary study was first carried out in December, 2014 to assess the pathogenicity of *H. sacchari* on ten varieties of rice from which five varieties were selected for field trials. The five selected rice varieties were grown on soil inoculated with cysts of *H. sacchari*. The field experiment was a 5x3 factorial type fitted into a randomized complete block design (RCBD). Soil nematode population, physiochemical soil analysis and phytochemical screening of the tests plants were carried out. Treatment application of aqueous leaf extract were conducted at the 2nd and 7th weeks after transplanting. Data were collected on the plant height, shoot, root weights, yield and soil nematode population. All numerical data were subjected to analysis of variance (Anova) using GENSTAT statistical package 12th edition and where significant differences were observed, means were separated using fisher's protected LSD. Results from the study revealed that treatment combination of *P. pellucida* and *T. catappa* singly with FARO 60, FARO 61, and NERICA 8 performed significantly higher (p>0.05) than the other rice varieties for most of the growth and yield parameter measured. Significant differences occurred between shoot, root, and yield weight of treated plants and their control counterparts. There was no significant difference between the two plant extracts used with respect to parameters measured. Treated plants performed significantly higher than the control. Based on the results of the study, paddy

farmers experiencing *H. sacchari* infestation are encouraged to treat the field with *P. pellucida* and or *T. catappa*, especially when planting FARO 60, FARO 61, and NERICA 8 as these combinations promise to give higher yield.

Keywords: *Peperomia peliucida*; *Terminalia catappa*; rice varieties; significant; pathogenicity; susceptible.

INFLUENCE OF SEED INVIGORATION TECHNIQUES ON GERMINATION AND SEEDLING VIGOR OF MAIZE (*ZEA MAYS* L.)

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ABSTRACT. The objective of this study was to assess the comparative efficiency of different priming techniques on germination and early seedling growth of maize cultivars. Laboratory experiments were conducted to examine the efficacy of different seed invigoration treatments on seed germination and vigor traits of three maize hybrids, Pioneer 3025, Pioneer 70 and Baber at Agronomy research laboratory, University of Agriculture, Peshawar, Pakistan. The experiment was laid in completely randomized design (CRD) and was replicated thrice. The treatments included control treatment (T_1) unsoaked/dry seed, (T_2) hydropriming with distilled water for 24 hrs, (T_3) halo priming treatments with NaCl (3% solution) for 24 hrs, (T_4) osmopriming with PEG-6000 for 24 hrs and (T_5), hormonal priming with GA_3 for 24 hrs. The results showed that seed invigoration treatment with gibberellic acid (GA_3) PEG-6000 and hydropriming with distilled water for 24 hrs gave higher germination, decreased days to 50% germination, increased shoot length, root length, seedling fresh and dry weight, as compared to halo priming with NaCl and control treatment. It is concluded that seed invigoration with GA_3, osmopriming with PEG-6000 and hydropriming with distilled water for 24 hrs serve as an appropriate treatment for accelerating the emergence and growth parameters of maize hybrid. Pioneer 3025 showed its superiority over other cultivars in all the studied parameters.

Keywords: priming; seed germination; seedling growth; vigor; maize.

FOLIAR APPLICATION OF SODIUM MOLYBDATE ENHANCED NITROGEN UPTAKE AND TRANSLOCATION IN SOYBEAN PLANTS BY IMPROVING NODULATION PROCESS UNDER SALT STRESS

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ABSTRACT. Soil salinity with different harmful effects on plant growth and productivity is one of the main reasons in diminishing biological nitrogen fixation and nitrogen assimilation in legume plants. Molybdate has a key role on nitrogen metabolism of plants and can be has a beneficial effect on it. Thus, this experiment was conducted to evaluate the effects of sodium molybdate spraying (0.2 and 0.4% solutions in water) on nodulation, nitrogen uptake and translocation in soybean plants under different levels of salt stress (0, 5 and 10 dS m^{-1} NaCl, respectively). Salinity reduced the nodulation, root and shoot growth and special flavonoids content in roots, which are have a key role in nodulation includes, daidzein, genistein, coumestrol and glycitein, also diminished nitrogenase, glutamine synthetase (GS), glutamate dehydrogenase (GDH), glutamine oxoglutarate aminotransferase (GOGAT) and nitrate reductase (NR) activities in nodes, nitrogen content of nodes, roots and leaves, nitrogen uptake and translocation by soybean plants. Under salt stress and non-saline condition, sodium

molybdate treatments improved the nodulation by increasing flavonoids content of roots, also these treatments enhanced the plant growth and nitrogenase, GS, GDH, GOGAT and NR activities of nodes. Furthermore, nitrogen content of nodes, roots and leaves, nitrogen uptake and translocation by soybean plants improved by sodium molybdate applications. Both of the sodium molybdate doses, exposed the similar effects on improving nodulation and nitrogen metabolism of soybean.

Keywords: flavonoids; nitrogen metabolism; nodulation; salinity; sodium molybdate.

IMPACT OF SOWING INTERVAL ON THE YIELD AND YIELD CONTRIBUTING TRAITS OF SESAME (*SESAMUM INDICUM* L.) UNDER THE TROPICAL CIRCUMSTANCE

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ABSTRACT. The experiment was conducted to study the impact of sowing interval on the yield and yield contributing traits of sesame (*Sesamum indicum* L.), under the tropical circumstance, during 2016, at the research area present near Faculty of Agriculture, Lasbela University of Agriculture, Water and Marine Science, Uthal, Balochistan. Experimental treatments were comprising three varieties of sesame, SV_1 (TS-5), SV_2 (TH-6) and SV_3 (4002), and cultivated under different three sowing dates, at 15 days interval: S_1 = 1st sowing (15 March 2016), S_2 = 2nd sowing (1st April 2016) and S_3 =3rd sowing (15 April 2016). The results of various observations, i.e. plant height at maturity (cm), 1000-seed weight (g), seed mass (t ha^{-1}), yield index (%) rooting depth (cm) and root weight per plant was found to be significant both for the all the sowing dates and sesame genotypes. Non significant finding was observed in traits of biological yield per plant (g) and root-shoot ratio. Whereas interaction among all the treatment factors was non-significant. Maximum yield and yields contributing parameters was observed in S_3 = 3rd sowing (15 April 2016) and sesame genotype SV_1 (TS-5), followed by SV_2 (TH-6), while minimum yield was noted in S_3 = 3rd sowing (15 April 2016) and SV_3 (4002) sesame genotypes. On the basis of the coastal agroclimatic condition of district Lasbela, it was concluded that maximum yield production was achieved from the sesame variety (TS-5), as compared to other two sesame (TH-6 and 4002) varieties. Sowing date of sesame at 15th April 2016 was more productive, as compared to the other sowing interval. Coastal climatic condition is feasible for sesame cultivation, especially for the sesame variety (TS-5).

Keywords: seedmass; sowing dates; sesame cultivars; tropical environment.

IMPACT OF GLYCINE BETAINE ON SALINITY TOLERANCE OF STEVIA (*STEVIA REBAUDIANA* BERTONI) UNDER *IN VITRO* CONDITION

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ABSTRACT. Stevia (*Stevia rebaudiana* Bertoni), with great potential as a natural sweeteners source, has a high content of sweeteners, which are up to 150 times sweeter than sugar, but virtually with no calories. Stevia also suitable to be cultivated in semiarid climates and coastal areas, which are characterized by the low quality of the irrigation water. Soil salinity occupies

a prominent place among the soil problems that threaten the sustainability of agriculture over a vast area in the world. Glycine betaine is an osmoprotectant, that plays an important role and accumulates rapidly in many plants during salinity or drought stress. In order to evaluation of glycine betaine amending effects on salinity stress in stevia under *in vitro* condition, a factorial experiment was conducted in 2015. Four NaCl levels, including 0, 50, 75 and 100 mM, along with 0, 1, 12.5, 25 and 50 mM of glycine betaine concentrations were used in Murashige and Skoog (MS) medium. The results showed that salinity levels had significant reduction effects on plant height, root length, shoot fresh weight, number of leaf, total chlorophyll, rebaudioside A and stevioside of the stevia genotype. Due to increasing of glycine betaine, levels all the traits were increased. Owing to amending effect of glycine betaine, its high concentrations made less hazarding effects of salinity on the researched traits. The highest mean value of rebaudioside A (10.62rt) and stevioside (23.38rt) determined at 50 mM of glycine betaine with 0 mM of NaCl concentration.

Keywords: factorial experiment; osmoprotectant; stevioside; stress; sweeter.

COMPARATIVE EVALUATION OF BIOCHEMICAL PARAMETERS DURING URINARY INFECTION IN MALTESE AND BELGIAN SHEPHERD DOGS

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ABSTRACT. Urinary tract infections can be uncomfortable, painful and even dangerous for most dog breeds. Clinical signs are often nonspecific and insufficient for diagnosis. Urinalysis in combination with biochemical parameters and urine culture is the best combination of clinical findings for diagnosis of urinary tract infections. The incidence of urinary tract infections in dogs population is growing and 27% of dogs develop an urinary tract infection through their life. Urinary infections occur more often in the elderly than in younger dogs. More than 70% of all urinary tract infections are infections with one bacterial species. Biochemical profile is important aspect for diagnosis establishment, but due to the nature of action infection by different agents may be considered as individual case. The main aim of this research was to analyse biochemical parameters of Maltese and Belgian Shepherd (Malinois) dog breed, who were affected by urinary tract infections. Urea concentration was elevated in Malinois, while urea, phosphates, albumins and alkaline phosphatase activity were elevated in Maltese dogs. Statistical analysis showed differences in concentrations of urea, creatinine, phosphates, so as alanine aminotransferase, alkaline phosphatase and amylase activity between compared breeds during acute urinary infections. Maltese dogs are less resistant to bacterias, that causes urinary tract infections, and have lower chance to maintain homeostasis of biochemical parameters in blood during urinary bacterial infections, in comparison to Maltese dogs.

Keywords: alkaline phosphatase; canine; phosphates; urea; urinary disease.