

WATER STRESS EFFECT ON WHEAT AT DIFFERENT MECHANICAL SEEDING SYSTEMS

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ABSTRACT. Judicial water use, as well as improving water use efficiency in agriculture is new challenge. Conservation tillage, as well as mechanical seeding system, offers various benefits over intensive tillage system. Considering this, the study was conducted to find out the water requirements and appropriate deficit irrigation schedule of wheat on different seeding system. This study consisted of following irrigation treatments, like I_1 = Irrigation at CRI stage, I_2 = Irrigation at CRI and vegetative stages, I_3 = Irrigation at CRI and grain filling stages and I_4 = Irrigation at CRI, vegetative and grain filling stages on four mechanical seeding methods, like T_1 = Bed planting, T_2 = PTOS, T_3 = Strip tillage, and T_4 = Zero tillage and laid out in a split plot design with three replications. From the result based on the grain yield and water productivity, bed planting (T_1) and three levels of irrigation (I_4) was found as the best combination for wheat cultivation. Besides, at water scarcity area bed planting (T_1), with two irrigation I_2 (CRI and vegetative) was the suitable reduce irrigation scheduling for wheat cultivation. In different seeding methods, bed planting was increased yield about 10.58%, followed by PTOS and yield was identical in PTOS and ST. Comparatively, lowest yield was observed in zero. In irrigation treatment, three irrigations (I_4) was observed, the best scheduling for wheat on all seeding system and yield was increased 11.98% in I_4 , followed by I_2 and lowest yield was found in I_1 . The result also revealed that the soil moisture contribution was decreased with increased applied water, as well as number of irrigation.

Keywords: conservation agriculture; conservation tillage; bed planting; water productivity.

ASSESSMENT OF COMBINED EFFECT OF HUMAN FECES COMPOST AND SINGLE SUPERPHOSPHATE ON THE BEHAVIOUR OF WHEAT PRODUCTION

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ABSTRACT. Application of organic fertilizers in improving soil fertility has become a major factor that has enabled the world to feed billions of people. However, the required quantities of organic material are enormous, so it becomes necessary to combine different types of fertilizers to feed plants. The effectiveness of human feces compost (HC) alone, as well as in combination with single super phosphate (SSP), was evaluated in the present study. A field experiment was conducted at farmer field located in district Swabi (Pakistan). A total of eight possible treatments combination were arranged in randomized complete block design (RCBD), replicated four times. Two levels of human feces compost (HC), including control (HC0: control and HC1: 7.5 t ha⁻¹) and four levels of P, as single superphosphate (SSP), including control (P0: control, P1:40 kg ha⁻¹, P2: 60 kg ha⁻¹ and P3: 90 kg ha⁻¹) were utilized in the experiment. Results revealed that among all the treatments, combined application of SSP at 60 kg ha⁻¹ along with 7.5t ha⁻¹ HC significantly improved the growth, as well as the yield parameters of wheat crop. These results allow saving a half of usually made mineral fertilizer dose for the cultivation of wheat crop. Combined use of HC and SSP were strongly recommended for obtaining maximum wheat yield in the prevailing soil and environmental conditions.

Keywords: phosphorous; Swabi; calcareous soil; wheat.

EVALUATION OF DIFFERENT STRATEGIES FOR INDUCTION OF CHILLING TOLERANCE IN SPRING MAIZE USING MORINGA LEAF EXTRACTS

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ABSTRACT. Spring maize is highly sensitive to low temperatures during the early development of seedlings and to high temperatures during its reproductive stage. Different strategies are being used to minimize the adverse effects of temperature extremes. Therefore, a field experiment was conducted to enhance the performance of spring hybrid maize by seed priming (3% MLE) and transplanting 20 and 30-day-old seedlings. Seed priming with moringa leaf extract (MLE) significantly enhanced stand establishment in both direct sowing and in transplanting, as indicated by the higher emergence percentage, emergence index, and lower time taken to start of emergence and mean emergence time. Minimum days from sowing to tasseling and silking were found in MLE primed 20-day-old seedlings grown in a nursery. However, all the agronomic parameters increased considerably with MLE priming of 20-day-old seedlings. Thus, MLE priming reduced chilling damage by improving stand establishment, whereas transplanting 20-day-old seedlings further enhanced the agronomic traits, yield, and quality of maize. However, the performance of maize plants from 30-day-old transplanted seedling and direct sowing was substandard.

Keywords: nursery raising; early plantation; transplantation; direct sowing.

RESEARCHES OF THE INFLUENCE OF NITRATE CONTENTS ON MAIN MORPHOLOGICAL TRAITS OF MAIZE PLANTS

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ABSTRACT. Nitrogen is an important element required for plant growth and development. It is a key component in many biological compounds that play a major role in photosynthetic activity and crop yield capacity. Variation in nitrogen availability can affect plant development and productivity in maize. One of the ways of soil pollution through agricultural technology is over-fertilization and, in particular, the administration of high doses of nitrogen fertilizers. Excess of nitrogen fertilizers, as well as their empirical application, have negative effects on harvest quality. Excessive use of fertilizers with nitrogen, produces of ion nitric accumulation in the soil (temporary) and in plants, which disturbs the balance of photosynthesis, causes the appearance of necrosis and burns on leaves, severe intoxication and even death by asphyxiation phenomena and cyanosis at ruminants, children and old people. The main aim of this study was to determine the effect of different nitrogen levels and different type of fertilizers on nitrates levels in maize leaves and on morphological traits of maize plants. Field experiments were conducted in two growing seasons (2017 and 2018) with five nitrogen levels (80 kg/ha, 120 kg/ha, 160 kg/ha, 200 kg/ha and 240 kg/ha) and two type of nitrogen fertilizers (ammonium nitrate and urea).

Keywords: ammonium nitrate; urea; maize; chemical fertilizers.

INTEGRATED DISEASES MANAGEMENT (IDM) MODULES FOR THE MANAGEMENT OF COTTON DISEASES IN NATURAL CONDITION UNDER SOUTH GUJARAT REGION OF INDIA

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ABSTRACT. Cotton is a vital commercial crop in the world and plays an important role for fibre, fuel and edible oil in the community and to industry. Cotton is a white fibrous agricultural product that has a wide variety of uses, from textile production, to creating paper, to producing oil and food products. Cotton is grown all around the globe, and is traded internationally as well. The cotton diseases scenario has shown a continuous change during the past 64 years. Several diseases have been reported for the cotton crop. The use of IDM strategy is gaining momentum now a days, but in developing countries it often lacks the enabling environment for its successful implementation. Cotton crop is affected by various diseases caused by organisms, such as fungi, bacteria and viruses that grow on and within the plant tissues. In this experiment, total seven modules including the control was tested in this experiment from which, module 6 (6.50% PDI), followed by module 5 (8.50% PDI) significantly recorded minimum bacterial leaf blight infection in comparison to the module 7, *i.e.* control (18.50% PDI) in RCH 2 BG II hybrid. For Alternaria leaf spot disease, module 6 (2.50 % PDI) were recorded significantly minimum Alternaria leaf spot disease in RCH 2 BG II hybrid, as compared to the control (10.50 % PDI), followed by module 5 (4.50 % PDI) and module 4 (5.50 % PDI).

Keywords: cotton; Integrated Disease Management; biocontrol; modules.

SEED GERMINATION AND RADICLE ESTABLISHMENT RELATED TO TYPE AND LEVEL OF SALT IN COMMON BEAN (*PHASEOLUS VULGARIS* L. VAR. *DJEDIDA*)

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ABSTRACT. Saline soils contain multiple types of salt, each of them may exert a different effect on seed germination and seedling growth. The aim of this study is to assess the effects of five types of salt on the seed germination and radicle establishment of common bean (*Phaseolus vulgaris* L. var. *Djedida*). The experiment was set out as a factorial experiment based on completely randomized design with four replications of ten seeds for the seed germination and twelve replicates for the seedling growth. We used five kinds of salts (NaCl, Na₂SO₄, CaCl₂, CaCO₃ and KCl) with concentrations of 0, 100, 200 and 300 mM. Seeds were incubated in Petri dishes at 25°C, in the dark, for 10 days. The results of analysis of variance indicated that the effects of salt types and concentrations, and their interaction effect were significant in all measured traits ($P < 0.01$). However, no significance effect was found on secondary roots number and seedlings dry biomass with CaCO₃ treatment solution. According to the results, the inhibitory effects of the five salt types differed significantly. Indeed, germination of common bean seeds by various salts were in the order of NaCl > KCl > CaCO₃ > Na₂SO₄ > CaCl₂. However, the taproot length, the number of secondary roots and the seedlings dry weight by various salts were

in the order of $\text{CaCO}_3 > \text{KCl} > \text{NaCl} > \text{CaCl}_2 > \text{Na}_2\text{SO}_4$. The effect of salt concentration was also obvious. The reduction in dry biomass of cotyledons is proportional to germination rates and to the development of seedlings in dry biomass and in size. Seeds of *P. vulgaris* var. *Djedida* were able to germinate under all concentrations of the various types of salt. The lowest final germination percentage (FGP) was obtained under 300 mM of all salts recording the following values: CaCO_3 - 60%, NaCl - 60%, KCl - 52.5%, Na_2SO_4 - 50% and CaCl_2 - 27.5%. During germination stage, the radicle emergence would be controlled by the environment osmolarity, while the later growth of the seedling would be limited by the reserve mobilization.

Keywords: agriculture; Fabaceae; local adaptation; osmotic stress; salt tolerance.

SALINITY STRESS TOLERANCE OF THREE COWPEA CULTIVARS IN A SOUTHERN GUINEA SAVANNAH ECOLOGICAL ZONE OF NIGERIA

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ABSTRACT. To combat the problem of food scarcity and insecurity in areas affected by salinity, crop varieties that are tolerant to the stressful conditions should be selected and used. Therefore, this study was carried out to investigate and know the effects of salinity stress on growth and yield of three cowpea cultivars to select the best salinity tolerant cultivar for optimum production. To achieve this, separate experiments were concurrently carried out on ITIOK-298-15, IFE BROWN and SAMPEA 11 cowpea cultivars in the glass house of the Faculty of Agriculture, University of Ilorin, Nigeria. The salinity levels tested in each of the cultivars were 0mM (the control), 50mM, 100mM and 200mM sodium chloride (NaCl). The imposition of salinity was for a period of two weeks at maturity because this stage is the most sensitive stage to any environmental stress in crop environments. The experiments were laid out in randomized complete block design (RCBD) with four replications. Data collection was centered on root length, plant height, number of leaves, leaf area, dry weight, final yield, chlorophyll content of leaves, crude protein and crude fat contents. It was found that 200mM NaCl decreased final yield by 51% in ITIOK-298-15, 73% in IFE BROWN and 100% in SAMPEA-11, compared with the control. Furthermore, 100mM NaCl reduced crude protein contents of the leaves by 6% in ITIOK-298-15, 10% in IFE BROWN and 17% in SAMPEA-11, compared to the control. From the above results, ITIOK-298-15 was the most tolerant cultivar while SAMPEA-11 was the most susceptible cultivar to salinity stress. It is, therefore, recommended (subject to further confirmation) that ITIOK-298-15 cultivar, which is the most promising cultivar of the three cultivars experimented, be used in cowpea production in saline environments of the Southern Guinea savannah ecological areas of Nigeria.

Keywords: salinity stress; cowpea cultivars; cowpea yield; cowpea quality.

EVALUATE GERMINATION AND SEEDLING GROWTH OF THREE CULTIVARS OF FENNEL UNDER DIATOMITE AND SOIL MANAGEMENT

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ABSTRACT. Fennel is a plant belonging to the *Apiacea (Umbelliferae)* family, and used by humans for a long time for medicinal purposes. In order to evaluate the influence of different materials on germination and seedling growth of three cultivars of fennel, an experiment was conducted in 2018. The cultivars of fennel were Isfahan, Yazd, and Shiraz in main plots, and three materials including 100% soil, 50% diatomite + 50% soil, and 100% diatomite in subplots, were analyzed in a split plot experiment based on a randomized complete block design (CRBD) with three replications. The highest total germination percentage, coefficient of velocity of germination, epicotile length, fresh epicotile weight and dry epicotile weight was related to Isfahan. The maximum speed of germination, mean germination time, fresh length and dry leaf weight was achieved in Shiraz cultivar. The higher values of total germination percentage, speed of germination and mean germination time were related to 100% soil, while application of 50% of soil + 50% of diatomite had obtained the maximum values of radicle length, epicotile length, fresh epicotile weight, dry leaf weight and dry epicotile weight. The maximum values of coefficient of velocity of germination and fresh leaf weight was achieved in application of 100% diatomite. It seems that application of 50% soil + 50% diatomite and Isfahan and Shiraz cultivars have a great potential of seed germination of seedling growth.

Keywords: : mean germination time; fresh epicotiles; germination percentage.

HEAT REQUIREMENT OF POMEGRANATE FRUIT: A CASE STUDY ON SHISHE-KAB CULTIVAR

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ABSTRACT. The aim of this study was to determine growing degree day (GDD) for pomegranate fruit Shishe-Kab cultivar and study the phenological stages of fruit from bloom to harvest. A completely randomized block design was carried out on the research orchard of the Faculty of Agriculture, University of Birjand, 2017. During the May to October, the diameter and length of the fruits and calyx were recorded using the non-destructive method by a digital caliper on the tree. Next fruit samples were randomly taken from the trees to determine fresh and dry weight. Furthermore, by using the metrological data, the thermal requirement based on the growth degree day (GDD) has been determined from April until harvest day. The effective heat requirement for Shishe-Kab cultivar that was calculated from blooming to reach maturity was 2560.95. The highest cumulative temperature was recorded in the commercial harvest date. By receiving this degree day, fruit reached the highest fresh and dry weight, length and also diameter at the end of growing season. The results indicated that all fruit characteristics significantly increased from the first recording day till the end, except the ratio of fruit length to diameter. A slight decrease in growth rate was presented in fruit diameter and

length, which was concomitant with their seed hardening. Results showed that calyx diameter and length of pomegranate fruit has a slow continues liner growth pattern, fruit length and diameter exhibited a double sigmoid growth curve, while the fresh and dry weight followed a single sigmoidal curve. By determining the fruit growth pattern under climatic conditions, it is possible to determine the length of growing season and the critical stages of growth for proper management in the garden.

Keywords: fruit growth curve; growing degree day; non-destructive method; phonological stages; temperature.

DOES CONCOCTION OF ORGANIC AND INORGANIC FERTILIZATION HAVE POTENTIAL TO ENHANCE WHEAT YIELD?

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ABSTRACT Soil fertility and maximum crop production can only be achieved through proper fertilization. Proper and balanced fertilization have a considerably positive effect on plant growth and yield. Due to continuous use of chemical fertilizers, the organic matter and nutrient content of the soil decreased gradually. Therefore, in modern era, agriculture scientists are now engaged to establish an agricultural system, which can not only lower the production cost, but also conserve the natural resources. Soil, as a source of nutrients, must be protected from various kinds of external factors, especially from the addition of fertilizers in excessive rates. Any degradation in the quality of soil can significantly produce many undesirable changes in the environment and also reduces the overall crop yield. So, the concoction of organic and inorganic fertilization is an alternative and most effective method for sustainable and cost-effective management for maximum crop production, without effecting the environment. The Integrated Nutrient Management provides an excellent opportunity not only for sustainability of the soil, but also enhances the overall crop productivity. The present review study was carried out with the main aim to evaluate the role of combined application of organic and inorganic fertilizers on wheat crop production. The outcome of the study concluded that combined application of both organic and inorganic fertilizers significantly improve the wheat crop production, as compared with the sole application of either organic or inorganic fertilizers.

Keywords: wheat; fertilizers; integrated nutrient management; NPK.