



Yield Responses of Black Cumin (*Nigella sativa* L.) to Intercropping with Chickpea (*Cicer arietinum* L.) and Bean (*Phaseoluse vulgaris* L.)

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Received:05-09-2008

Accepted:09-12-2009

Abstract

In order to study the effects of intercropping on yield of black cumin in intercropping with chickpea and bean, an experiment was conducted in a complete randomized block design with four replications. Crops were planted as pure stands and intercrops in three arrangements: A) alternating rows of a field crop and a medicinal plant, B) two rows of field crops and one row of medicinal plant, C) alternating double rows of field crops and medicinal plants. Results showed that land equivalent ratio was more than 1 in all treatment indicating seed yield of the plants were higher in pure stands compared to intercrops but the advantages of the intercropping compared to sole cropping. Black cumin performed best in alternating rows of a field crop and a medicinal plant and alternating double rows of field crops and medicinal plants treatments and the highest partial land equivalent ratio was also related to black seed in these treatments.

Keywords: Land equivalent ratio, Row intercropping, Seed yield

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Effects of Field Conditions on Emergence of Oilseed Rape Seed lots Grown in Khorasan Province

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Received:06-11-2010

Accepted:11-01-2014

Abstract

Nineteen irrigated farms of canola from six cities of Khorasan selected to assess the seedling emergence one month after sowing in 2009. Soil texture of each farm determined using the Hydrometer method. The results showed that weather conditions of sowing areas had no significant effect on emergence of oilseed rape. With increasing the temperature (within the range of 19.5 to 21.5 °C) emergence percentage was not increased significantly. Rainfall also caused no significant effect on seedling emergence. The percentage of emergence in machine-sowing and hand-sowing were 38.4% and 28%, respectively. Soils with loam silt, silt clay loam and loam texture had emergence of 27.2%, 31.2% and 47% respectively. It seems soil texture plays a great roll on the emergence of oilseed rape with epigeal seedlings.

Keywords: Canola Seedling establishment, Climate conditions, Emergence, Seed bed, Soil texture

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Evaluation of Some Physiological Characteristics and Antioxidants Activity in *Kochia (Kochia scoparia)* in Different of Salinity Levels and Growth Stages

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Received:30-01-2011

Accepted:01-01-2012

Abstract

Soil salinity threat for agricultural ecosystems in many parts of Iran, and negatively affects crop production. In order to examine salinity tolerance of *Kochia* a series of experiments were conducted in CRD with four replications, seven levels of salinity (0, 10, 20, 30, 40, 50 and 60 dS.m⁻¹), two growth stages (planting and early seedling) and interval irrigation. Result showed that decrease of root dry weight, root volume, membrane stability index were more increased at planting than early seedling stages. Relative water content was increased with increasing salinity levels in all experiments except at interval irrigation. Proline and osmotic potential increased with increasing salinity levels. Catalase, glutathione reductase, DPPH - radical scavenging activities and total phenol were higher with more increased at planting than early seedling. Sodium concentration and sodium to potassium ratio in shoot and root increased with increasing salinity levels. Generally, despite application of high levels of salinity stress *kochia* was able to survive and tolerate these levels of salinity.

Keywords: Antioxidant, Osmotic potential, Proline

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Fertilizer Management Effects on Summer Savory (*Satureja hortensis* L.) Production as a Medicinal Plant in Mashhad Condition

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Received: 05-04-2011

Accepted: 14-06-2011

Abstract

In order to study the effect of fertilizer management on summer savory production, a field experiment was conducted at the Agricultural Research Station, College of Agriculture, Ferdowsi University of Mashhad, Iran during growing season of 2009. A randomized complete block design with three replications was used. Treatments included: 1) Nitroxin biofertilizer 2) Phosphate solubilizing bacteria 3) vermicompost 4) Nitroxin biofertilizer + Phosphate solubilizing bacteria 5) vermicompost + Nitroxin biofertilizer 6) Phosphate solubilizing bacteria + vermicompost 7) vermicompost + Nitroxin biofertilizer + Phosphate solubilizing bacteria 8) chemical fertilizer (Nitrogen+ Phosphate) and 9) control. Because of having two cuts during the experiment, collected data was analyzed as a split plot design in time which cuts allocated as sub plots and fertilizer treatments allocated as main plots. Results showed that different cuts had no significantly effect on all measured traits. Also inoculation of summer savory seeds with biofertilizers treatments had significant effects ($P \leq 0.05$) on all measured traits except number of stem lateral branches per plant, percent of browse with flower and percent of essential oil. The combination of Nitroxin biofertilizer + phosphate solubilizing bacteria and control treatments had the highest (51 cm) and the lowest (39 cm) plant height, respectively. It seems that using biofertilizers alone or combined with other organic fertilizers will improve qualitative and quantitative characteristic of summer savory.

Keywords: Biological yield, Essential oil content, Organic fertilizer, Nitrogen, Nitroxin

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Evaluate the Effect of Different Intercropping Arrangements of Cumin (*Cuminum cyminum* L.) and Chickpea (*Cicer arietinum* L.) on Quantity and Quality Characterastis of Species

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Received:11-08-2011

Accepted:24-02-2013

Abstract

In order to evaluate the effect of different intercropping arrangements of cumin and chickpea on seed yield and quality criteria of cumin an experiment was conducted in Agricultural Research Station of Ferdowsi University of Mashhad in 2010 growing season. An experiment was conducted as split plot on the basis of complete randomized block design with three replicatons. The main plot included arrangement lines at 2 level, D1 1:1 (Chikpea:Cumin) and D2 1:2 (Chickpea: Cumin) and subplot included different densities at 6 level, P1:(100%Cumin), P2: (50%Cumin+50%Chickpea), P3:(60%Cumin+40%Chickpea), P4: (80%Cumin+20%Chickpea), P5: (100%Cumin+20Chickpea), P6:(100%Chickpea).The results showed that between different intercropping treatments, seed yield, biological yield and harvest index in treatment D1P2: (50%Cumin+50%Chickpea) was suitable. The Highest percentage of nitrogen was obtained from treatment D2P4. Was not observed any significant effect on seed essential oil. Between intercropping treatments, highest essential oil yield was obtained treatment D2P2. The highest Land Equivalent Ratio (1.23), was obtained in treatment D2P2: (50%Cumin+50%Chickpea) and the lowest (0.90) in treatment D1P4: (80%Cumin+20%Chickpea) intercropping.

Keywords: Essential oil yield, Harvest index, LER, Percentage nitrogen, Seed yield

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The Effect of Nitrogen Rate on Extinction Coefficient and Radiation Use Efficiency in Wheat (*Triticum aestivum* L.) Genotypes.

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Received: 23-08-2011

Accepted: 08-12-2013

Abstract:

In order to investigate the effects of different levels of nitrogen rate on extinction coefficient and radiation use efficiency of genotypes wheat cultivars, an experiment was conducted on Araghi Mahalleh (Gorgan) research farm during 2009. The experiment was carried out using randomized complete block with four replications. Nitrogen rates were arranged in four levels (0, 90, 180, 270 kg ha⁻¹) and wheat cultivars included; Tajan, Falat and N81-18. The result showed that nitrogen rate and cultivar do not effect on the extinction coefficient, but they effect on radiation use efficiency. In such a way that maximum amount of radiation use efficiency is for N81-18 cultivar on nitrogen rate of 90 kg ha⁻¹. As increase in fertilization level, leaf area index and dry material increased too. But this increase was grater in fertilization level of 90 kg ha⁻¹ compared with 180 kg ha⁻¹.

Keywords: Cultivar, Extinction Coefficient, Nitrogen Fertilizer, Radiation Use Efficiency, Wheat,

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The Effect of Salinity on Seed Germination and Seedling Growth of Four Medicinal Plant Species

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Received:06-09-2011

Accepted:15-02-2014

Abstract

To study the effect of salinity stress on seed germination and seedling growth of four medicinal plants, *Nigella sativa* L., *Cannabis sativa* L., *Trigonella foenum graecum* and *Cynara scolymus* L. an experiment was conducted in the botany laboratory of Islamic Azad University, Birjand branch. A completely randomized design (CRD) with 3 replications was used as separately for each species. Treatments were consisted of six salinity (NaCl) concentrations (0, 4, 8, 12, 16 and 20 dS m⁻¹). The measured traits were root, shoot and seedling length, dry and fresh weight of seedling, germination rate and percent, seed vigor index, seedling water content and root/shoot ratio. Salinity stress reduced significantly shoot, root and seedling length of the species. Increasing of salinity stress declined dry and fresh weight of *Trigonella foenum* and *Nigella sativa* L. and dry weight of *Cannabis sativa* L.. Seedling water content and root/shoot ratio of *Nigella sativa* L. increased in salinity treatments. Increasing of salinity stress declined germination rate and percent in *Nigella sativa* L., but in other species (*Cannabis sativa* L., *Trigonella foenum graecum* and *Cynara scolymus*) only germination rate decreased. *Trigonella foenum graecum* germinated completely (%100) in all salinity treatments. Increasing of salinity until 16 dS m⁻¹ reduced seed germination of *Nigella sativa*. Seed germination of *Nigella sativa* did not occurred in the highest salinity stress (20 dS m⁻¹). Totally the results showed that in the germination stage, *Trigonella foenum graecum* and *Cannabis sativa* were relatively tolerate to salinity stress but *Nigella sativa* L. was the most sensitive one.

Keywords: Germination, Medicinal Plant, Salinity, Seedling Growth

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Growth Promotion, Increase of Iron, Potassium and Cell Wall Components following Silicon Application in Rice under Iron Deficiency

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Received:27-09-2011

Accepted:23-10-2013

Abstract

Iron deficiency is one of the most important stress reducing crop growth and yields. Silicon is also an essential element in most grasses including rice that may reduces biotic and abiotic stresses. In present study, the interactions of silicon and iron nutrition were studied in rice (*Oryza sativa* L. cv. Tarem). The plants cultivated in greenhouse under iron treatments of 0, 2 and 10 mg l⁻¹ as a Fe-EDTA (first factor) and silicon treatments of 0 and 1.5 mM sodium silicate (second factor). The experimental design was completely randomized blocks as a factorial experiment. The plants were harvested after 5 weeks. Iron deficiency resulted in reduction of dry mater and height of plants. In addition, cellulose content in shoots and lignin and soluble proteins in roots and shoots decreased, however, potassium content in roots increased due to iron deficiency. On the contrary, silicon application caused significant increase in dry mater and height of plants. Besides, iron and potassium contents increased in iron deficient plants following silicon application. Also, cellulose, lignin, and soluble proteins in roots and shoots and phenolic compounds in shoots enhanced in silicon fed plants. The results indicated that silicon nutrition could ameliorate harmful effects of iron deficiency by increase of iron and potassium contents and increment of cell wall components and phenolic compounds.

Keywords: Cell wall components, Iron, Lignin, Phenolics, Rice, Silicon,

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Effect of Integrated Weed Management (Chemical and Mechanical) on Grain Yield of Corn Hybrid S.C 700 under Shoushtar Conditions

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Received:11-10-2011

Accepted:01-02-2014

Abstract

In order to study the effects of mechanical and chemical methods of weed control in corn hybrid S.C700, a field experiment was conducted during 2009-2010. The experiment was a randomized complete block with four replications. Treatments were consisted of eleven combinations of mechanical (using cultivator) and chemical control with Ultim (Nicosulfuron+Rimsulfuron), Lumax (Mesotrione+S-metolachlor+Terbuthylazine) and Atrazin (Gesaprim) plus Lasso (Alachlor). Treatment included: Lumax+once cultivation, once cultivation, Atrazin plus Lasso+once cultivation, Ultim+once cultivation, Lumax+twice cultivation, twice cultivation, Atrazin plus Lasso+twice cultivation, Ultim+ twice cultivation, Lumax, Atrazin plus Lasso, Ultim and two control treatments, consisted un-weeded and complete control of weeds. Herbicides were used about 28 days after emergence. Results indicated that the highest weed control (after complete control weeds) was in treatment with two times application of cultivator plus Ultim herbicide. Treatments with two and one time application of cultivator plus Ultim herbicide and two times application of cultivator plus Lumax herbicide had not significant differences. In these treatments, grain yield increased other than free control of weeds respectively, 60.7%, 56.2% and 54.9%. Higher grain yield in these treatments was due to higher number kernels per ear and thousand kernel weight. Although the highest grain yield was in treatment with two times application of cultivator plus Ultim herbicide, but, because of probable increase of make mechanical damage on crop in time of frequent use of practice specially on extended areas, use of one times application of cultivator+Ultim herbicide was recommended. One and two times application of cultivator plus Ultim herbicide had not significant differences.

Keywords: Cultivation, Ultima, Lumax

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Effect of Irrigation Intervals and Planting Date on Agronomic Characteristics of Degen and Drfi (*Securiger securidaca* L.) in Birjand Region

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Received: 11-12-2011

Accepted: 08-01-2014

Abstract

Degen & Drfi is a plant that has medicinal and nutritional importance. Degen & Drfi and countless of plants in this genus had application for medicinal uses such as weight loss and diabetes control. Its seeds also contain protein and lipids as well as some starchy foods are consumed. In order to investigate the effect of irrigation regime and planting date on agronomic characteristics of Degen & Drfi a field experiment carried out in region of Kahi, Birjand, south Khorasan, Iran, 2010. The experiment was conducted in split plot design in a randomized complete block with four replications. Irrigation regime, including: six, twelve and eighteen days' intervals as main factors and planting Date at four levels (20, 25, 30 April, and 5 May) were devoted to sub-plots. Analysis of variance showed that irrigation regime for all treatment, had more significant influence on trait including plant height, number of pods per plant, seeds per pod, biomass, grain yield and harvest index, and had significant influence the yield of flowers per plant and weight seed. The highest amounts of each trait were gained from 12 days interval irrigation. The effect of planting date was significant all treatment for all traits except 1000-seed weight. Planting in 20 April had highest values of characteristics. Interaction between irrigation and planting date were significant for number of stems, flowers and pods per plant, biomass, harvest index and grain yield at 1% and plant height at 5% level. The highest seed yield was obtained from irrigation in 12 days interval and planting in the 20 April. Results showed that irrigation in 12 days interval and planting especially in late April are the best treatment for Degen & Drfi production.

Keywords: Agronomic characteristics, Degen & Drfi, Irrigation interval, Planting date

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Evaluation of Wheat Residual Effects in Rotation on Emergence, Leaf Area, and Yield Components of Corn (*Zea mays* L.) Cultivars

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Received: 17-01-2012

Accepted: 03-11-2013

Abstract

This research was carried out as a factorial based on a randomized complete block design with four replications at greenhouse conditions. First factor was corn cultivars (D.C370, S.C647 and S.C704) and second factor included 3 levels of residual plant (without residual, root residual, root and shoot residual of wheat). The results showed that percent and mean emergence time, leaf area, biologic and kernel yield, number of kernels per ear, number of kernels per row and ear length was influenced of wheat residual, and maximum positive effects on mentioned traits, obtained at root and shoot residual of wheat. 100-kernel weight and plant height of cultivars showed significant difference. Effect of residual plant on biologic yield, kernel yield, number of kernels per ear, number of kernels per row of S.C704 wasn't significant, but other hybrids showed significant difference to residual wheat. 100-kernel weight, row number per ear, ear length and plant height of D.C370 was less than other hybrids, significantly.

Keywords: Blend Residual, Emergence Time, Yield

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Evolution of Grain Yield and its Components Relationships in Bread Wheat Genotypes under Full Irrigation and Terminal Water Stress Conditions Using Multivariate Statistical Analysis

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Received: 09-04-2012

Accepted: 18-01-2014

Abstract

To study relationships between effective traits on wheat grain yield, the varieties Zarrin and Alvand, and some promising lines i.e. C-81-4, C-81-10, C-81-14 and C-82-12 were investigated at three sowing dates including 10 October, 1 November and 21 November. The experiment was carried out using strip plot in RCBD with three replications under two different water conditions including full-irrigation and terminal water stress at Miyandoab Agricultural Research Station in 2005-06 and 2006-07 cropping seasons. The results showed that under both full irrigation and terminal water stress conditions, grain yield had positive and significant correlation with days to heading, days to maturity, plant height, number of spikes/m² and 1000 grain weight. Stepwise regression analysis revealed that 83 percent of yield variation under non-stressed conditions could be determined by days to maturity and number of spikes/m² ($R^2 = 83\%$) whereas these traits explained 87% of yield variation under stress conditions ($R^2 = 87\%$). Path analysis indicated that number of spikes/m² and days to maturity had the greatest positive direct and indirect effect on grain yield, under both conditions. The results of factor analysis under non-stressed condition showed that three factors explained 77% of total variation; these factors were called grain yield components, grain characteristics and plant phenology. Under non-stressed condition two factors (that were called grain yield and phenology, and plant morphology) explained 88% of total variation. Cluster analysis through ward method, classified days to maturity and number of spikes/m² in the same cluster where the grain yield was put under both conditions. It was concluded that under different sowing dates, selection based on days to maturity and number spikes/m² could indirectly led to higher yield under both normal and water stress conditions.

Keywords: Bread wheat, Grain yield, Multivariate analysis, Relationship between traits, Water stress

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The Effects of Zinc and Iron Oxide Nano-Particles on The Growth and Ion Content of Two Corn Cultivars in Different Soil Salinity

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Received:08-12-2012

Accepted:02-02-2014

Abstract

This study was conducted in order to evaluate the effects of foliar application of nano-particles and ordinary bulk materials of zinc and iron oxide was studied in two corn genotypes (S.C 704 and seed mass) in different soil salinity (0,75,150 mM NaCl). The experiment was arranged as factorial in a randomized complete block design with four replications. The results showed that in saline condition Leaf area, shoot and root dry matter, photochemical efficiency, the concentration of K, Fe and Zn in shoot decreased and that of Na and the Na/K ratio increased under saline condition. The interactions of salinity and genotype were significant on leaf area, shoot and root dry matter, Na/K ratio and photochemical efficiency. The application of nano-particles of iron and zinc oxide increased shoot dry matter to a greater degree as compared with ordinary bulk materials. Under saline condition, the application of iron oxide in the form of nano-particles had higher effect on iron uptake by corn plants. However, with an increase in salinity level the superiority of nano form decreased. The application of Nano-particles of iron and zinc as compared to ordinary bulk materials was more effective in alleviating the negative effects of salt stress on the accumulation of zinc in tested plants. This was not evidence in terms of iron accumulation. The results from this experiment showed that the application of nano-particles of iron and zinc promoted plant growth to a greater degree in comparison to ordinary materials of these nutrients. However, the application of nano particles had no advantage in alleviating the effects of salinity on plant growth.

Keywords: Corn, Foliar application, Iron oxide, Nano particles, Salinity, Zinc oxide

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Evaluating of Physiological Indices of Weed Species at Different Density on Corn (*Zea mays* L.) Growth

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Received: 26-02-2013

Accepted: 18-01-2014

Abstract

Crop density is one of the usage tools in sustainable agriculture to carry out integrated weed management. Weed species response varied according to diversity and density of species in agricultural ecosystems. This study was conducted in research field of Ferdowsi University of Mashhad, Iran. Four levels of corn densities (5, 6, 7 and 9 plant m⁻²) and four levels of species diversity were used including complete control, broad leaved control (corn and narrow leaves), grass control (corn and broad leaves) and without control (corn, broadleaves and grass weeds) by weeding. All species sampling were done at five stages from 42 days after planting up to the end of growth period. Crop growth rate, total dry matter of weed (TDMw) and total dry matter of corn (TDMc) were measured. Results showed that TDMc was minimum at 9 and 5 plant m⁻² in the early growth period, while it was highest at 9 plant m⁻² by the end of the growth period. Also, TDMc increased with increasing density in the weed free control, but (TDMc) decreased about 46% in compare with complete control. The same trends were observed for CGR. It was found that broad leaves weeds were more effective than narrow leaves (causing 60 and 34% lower CGR reduction, respectively) on corn growth.

Keywords: Competition, Density, Dry Matter, Growth Rate, Weeds

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Evaluation of Effect of Chemical and Organic Fertilizers on Growth Characteristics, Yield and Yield components of three Sesame Ecotypes (*Sesamum indicum* L.)

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Received: 05-03-2013

Accepted: 18-09-2013

Abstract

Using organic fertilizers is cause increase soil fertility, improving crop growth and production. For this purpose a greenhouse experiment was carried out in factorial arrangement based on a completely randomized design with three replications during 2011 year. First factor included: three sesame ecotype (MSC3, MSC6, MSC7) and second factor was 6 fertilizer treatments that included: Incorporation manure and chemical fertilizer (216 g manure and 1 gram chemical fertilizer NPK), Chemical fertilizer (2 g NPK), Vermicompost (192 g), Manure (228 g), Compost Sulfur granules (192 g) per vase and Control (without any manure or fertilizer). Results indicated that different manure treatments had significant effect on morphological and yield components traits, as the most number and length branch per plant was obtained from incorporation manure and chemical fertilizer treatment. Applying incorporation manure and chemical fertilizer treatment had the most biomass in MSC3 ecotype that in comparison of control treatment was increased almost 73 percent. Consuming incorporation manure and chemical fertilizer treatment in MSC3 ecotype was also obtained the most capsule per plant (21.2), number seed per capsule (54.4), 100-seed weight (0.257 g) and seed per plant with (1.95 g). The least seed weight per plant with 0.450 g was observed in MSC7 ecotype from application of control treatment. Response of three sesame ecotype (MSC3, MSC6, MSC7) to applied vermin-compost manure was similar; as the amount of seed weight per plant was increased more than 1 g per plant in all these ecotypes and in others fertilizer treatments was not observed this trend. There was significant positive correlation between seed weight per plant and number of capsule per plant ($r=0.83^{**}$), height ($r=0.68^{**}$) and biomass ($r=0.51^{**}$). The results showed that incorporation manure and chemical fertilizer was improved on growth and yield characteristics of sesame plant.

Keywords: Compost granules sulfur, Manure, Vermicompost

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The Study of Transplanting Date on Growth Analyses and Forage Yield of Maize (*Zea mays* L.) under Mashhad Conditions

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Received: 15-03-2013

Accepted: 13-04-2014

Abstract

Transplanting was assessed in order to prolong growth season and also to reduce water consumption in forage maize production. Two and three weeks seedlings produced in a greenhouse before transplanting in the field alongside seed sowing in three different dates (6 and 21 June and 6 July) in summer 2012 in the Farm of Faculty of Agriculture, Ferdowsi University of Mashhad, Iran. growth analyses (LAI, CGR, RGR, and NAR) fresh and dry forage yield determined. Three weeks seedlings in the first date of sowing had the highest LAI = 5.4 and CGR = 37.2 g m⁻² day⁻¹, Fresh and dry forage of 66.536 and 21.640 to/ha respectively.

Keywords: Direct seeding, Fresh and dry forage yield, Transplanting

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Effect of NaCl Salinity on Germination and Seedling Growth of 12 Wheat (*Triticum aestivum* L.) Cultivars

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Received: 02-11-2012

Accepted: 18-01-2014

Abstract

Recognition of cultivars that are salt tolerance is one of main targets for planting in salinity soil. In order to evaluate the effects of salt stress on germination and seedling growth of wheat, a factorial experiment based on completely randomized design with 4 replications was conducted at Research Laboratory of the Faculty of Agriculture, Birjand University. Treatments included four levels of salinity (0, 4, 8 and 12 ds/m) and 12 wheat cultivars. Results showed that salt stress caused significant decrease in germination percentage, germination rate, root and shoot length and also root and shoot dry weight, but increasing salt stress, increased root/shoot ratio. Cultivars germination responses were different. Roshan Back Cross, Kavir and Roshan cultivars had highest percentage and rate germination. Since percentage and rate of germination are the most important characters of germination, therefore Roshan Back Cross, Kavir and Roshan are the best cultivars for planting in salinity soil.

Keywords: Wheat cultivars, Salt stress, Percentage germination, Rate germination

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