

The allelopathic effects of aqueous extracts and decay durations of sunflower on germination and growth of dodder (*Cuscuta compestris* Yuncker.)

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Abstract

In order to evaluate the allelopathic potential of sunflower (*Helianthus annuus* L.) organs on germination and growth of dodder (*Cuscuta compestris* L.), series studies were conducted in three separate experiments; as factorial based on Completely Randomized Design (CRD) with three replications for each experiments. First experiment was conducted in petri dishes and consisted of sunflower organs at four levels (root, stem, leaf and total plant without inflorescence) and their aqueous extract concentrations at 11 levels (0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10%). Second experiment was conducted in pots and factors were include of sunflower organs at four levels (root, stem, leaf and total plant without inflorescence) and their aqueous extract concentrations at five levels (0, 2.5, 5, 7.5 and 10%). Third experiment was sunflower organs at four levels (root, stem, leaf and total plant without inflorescence) and decay durations at 8 levels (0, 15, 30, 45, 60, 75 and 90 days decay and control). In three experiments, dry weight and length of seedling, number of abnormal seedlings, percentage and rate of dodder germination were examined. Results of three experiments showed that leaf and stem in comparison with other sunflower organs had more allelopathic effects on mentioned traits of dodder. In addition, sunflower organs had more allelopathic effects on percentage and rate of germination and percentage and rate of emergence in compared with other studied traits.

Keywords: Emergence rate, Germination percentage, Germination rate, Parasitic weed

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Intercropping wheat (*Triticum aestivum* L.) with canola (*Brassica napus* L.) and their effects on yield, yield components, weed density and diversity

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Abstract

In order to evaluate the effects of yield and yield components and weed diversity and density in row intercropping for wheat and canola, a field experiment was conducted based on a complete randomized block design with three replications at the Agricultural Research Station of Ferdowsi University of Mashhad, Iran during two growing seasons of 2008-2009 and 2009-2010. Treatments included four patterns of row intercropping of wheat and canola (one row of wheat + one row of canola (1:1), two rows of wheat + two rows of canola (2:2), three rows of wheat + three rows of canola (3:3) and four rows of wheat + four rows of canola (4:4)) and their monoculture. Results indicated that the row intercropping patterns affected weed dry matter and Shannon index. The maximum and the minimum weed dry matter were observed in monoculture of wheat and 3:3 of wheat and canola, respectively. The highest and the lowest relative frequency were obtained for common Knotgrass (*Polygonum avicular* L.) and flixweed (*Descurainia sophia* L.) with 42.86 and 3.57, respectively. The maximum values of Shannon index were observed in monoculture as the highest and the lowest Shannon index were obtained in monoculture of wheat (with 0.86%) and 2:2 combinations of wheat and canola (with 0.66%). The highest biological yield and grain yield were obtained in monoculture and then 3:3 pattern of wheat (12894.47 and 4230.72 kg.ha⁻¹ for biological yield and grain yield, respectively) and canola (9231.07 and 3333.49 kg.ha⁻¹ for biological yield and grain yield, respectively). The highest amount of wheat and canola harvest index were observed in 1:1 and 4:4 patterns with 58.34 and 53%, respectively. Row intercropping of wheat with canola improved crop diversity and decreased number of weed species, density and population. In general, combination of three rows of wheat and three rows of canola was the most promising intercropping treatment.

Keywords: Harvest index, Relative frequency, Shannon index

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Effects of different amounts of nitrogen and plant density on yield, yield components and seed oil percentage of pumpkin (*Cucurbita pepo* L.)

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Abstract

In order to study the effects of different amounts of nitrogen and plant density on yield, yield components and seed oil percentage of Pumpkin (*Cucurbita pepo* L.) an experiment was conducted as split plot based on randomized complete block design with two factors and three replications at Agricultural Research Field Station of Ferdowsi University of Mashhad, Iran, during growing season 2010-2011, The main factor nitrogen fertilizer included three levels 150, 250 and 350 kg.ha⁻¹ and the subfactor plant density, included three levels 2.5, 1.25 and 0.62 plant.m⁻². Test results showed that nitrogen fertilizer had no significant effect on fruit yield and 1000-seed weight, but plant density had significant effect on Pumpkin yield. Between different densities 2.5 plant.m⁻² was significantly increased seed yield and fruit yield. The interaction results showed that 250 kg of nitrogen /ha in density 2.5 plant.m⁻² achieved the highest seed yield. Also the highest oil percentage and oil yield was in density 1.25 plant.m⁻². These results indicated that, the optimal amount of fertilizer was 250 kg of N/ha, which achieved the highest seed and oil yield in pumpkin. Plant density lower than 1 plant.m⁻² did not had significant effect on yield improvement.

Keywords: Fruit, Harvest index, Herbal Plant, Oil yield

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Study of competition ability of amaranth (*Amaranthus* spp.) and mung bean (*Vigna radiata* L.) in intercropping system by using competition indices

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Abstract

In order to study the competition ability of amaranth and mungbean in fodder intercropping system under different crop residue management, a field experiment was conducted at two seasons (first planting of wheat and then intercropping management) in Agricultural Faculty of Shahid Chamran University of Ahvaz during growing season of 2010-2011. The experimental design was split plot based on randomized complete block design with three replications. Three crop residue managements were in main plot and five planting ratios were in sub-plot. Eight indices of the competition abilities were measured. The results showed that the highest intercropping fodder yield (1347.6 g.m^{-2}) and LER (1.27) were obtained in residue incorporated and 50% planting ratio of each crop. Residue burning increased variation of CR, reduced RLO and RCI and also, had the highest RYL. In higher planting ratio, the aggressivity of amaranth was more than mung bean. In treatments with highest forage yield, amaranth and mungbean were dominant and non-dominant crops, respectively. In conclusion, amaranth was more influenced by residue management methods and planting ratios than mung bean and also, its competition ability had more variation in compared by mung bean.

Keywords: Aggressively, Forage yield, Land equivalent ratio, Relative crowding coefficient

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The effects of vermicompost and chemical fertilizers on yield and yield components of marshmallow (*Altheae officinalis* L.)

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Abstract

In order to investigate the effects of vermicompost and chemical fertilizers on growth characteristics, yield and yield components of marshmallow (*Altheaeofficinalis* L.), a field experiment was conducted as factorial layout based on a randomized complete block design with three replications at Faculty of Agriculture, Ferdowsi University of Mashhad, Iran, during growing season of 2012. Experimental treatments were designed based on 3 levels of vermicompost (0, 5 and 10 t ha⁻¹) and 5 levels of nitrogen fertilizer (0, 25, 50, 75 and 100% of 200 kg N ha⁻¹). Results indicated that applied vermicompost had significant effects on increasing leaf area, flower weight per plant and grain yield of marshmallow. Flower weight per plant and grain yield of marshmallow was increased by 2 to 3 times by applying vermicompost at 10 t. ha⁻¹, as compared to control treatment. In addition, nitrogen fertilizer had a significant effect on increasing flower weight per plant and grain, mucilage and oil yields of marshmallow. It seems that applying vermicompost can be suitable strategy in reducing the problems caused by excessive using of chemical fertilizers.

Keywords: Leaf area, Medicine plant, Mucilage yield, Nitrogen content, Oil yield, Vermicompost

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Evaluation of integrated impact of sulfur and *Thiobacillus* on qualitative and morphological characteristics of safflower (*Carthamustinctorius*L.)

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Abstract

Considering high alkalinity of Iranian soils and lack of availability of some nutrients in those conditions, sulfur consumption is one approach to increase the availability of insoluble nutrients especially in calcareous and alkaline soils. Effectiveness of sulfur depends on activity of sulfur oxidizing bacteria especially *Thiobacillus* genus (T). In order to study the qualitative yield and morphological characteristics of safflower (*Carthamustinctorius* L.), a field experiment was carried out as factorial layout based on a randomized complete block design with three replications at the Agricultural Research Station, College of Agriculture, Birjand University during growing season 2010-2011. Treatments were including four sulfur levels (0, 300, 400 and 500 kg.ha⁻¹) and four levels of *Thiobacillus* (0, 1, 2 and 3 kg.ha⁻¹ per 100 kg.ha⁻¹ organic sulfur). Studied traits were height and diameter of stems and qualitative characteristics of safflower such as protein and oil contents in seed and sulfur and phosphorus concentrations in leaf. Results showed that the effect of sulfur and biosulfur with *Thiobacillus* as a biofertilizer and their interaction effects were significant ($p \leq 0.01$) on oil and protein contents of seed, phosphorus and sulfur concentrations of leaf, and also on height and stem diameter of safflower. The highest seed protein content was observed in 500 kg.ha⁻¹ sulfur with 20.4% and the lowest was for control plots with 17.1%. The minimum oil content was recorded in control plots (18.7%) and the highest improvement compared to control was obtained in 500 kg.ha⁻¹ sulfur with 26%. The highest height and stem diameter of safflower were observed in 400 and 500 kg.ha⁻¹ sulfur with 3 kg.ha⁻¹ *Thiobacillus*. So, it seems that integrated application of sulfur with *Thiobacillus* inoculation is an ecological strategy for improving of qualitative and quantitative growth and producing of oil crops such as safflower.

Keywords: Biofertilizer, Nutrient availability, Oil crop, Oxidizing microorganisms

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Effect of different levels of environmental protection on plant species diversity

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Abstract

Considering the importance of biodiversity conservation and protection assessment activities, the present filed study was conducted with aim to compare vegetation diversity of two areas with different levels of protection including Ghorkhod protected area with seasonal grazing and Golestan National Park without grazing, during spring and summer of 2011. Four replications were selected in each area and a modified Whittaker plot with four spatial sampling scales was fitted. Results showed that mean species richness had significant differences between two studied areas. In addition, mean species richness trend between different sampling scales at two study areas were significantly different. Moreover, plant canopy cover also showed significant differences between the two studied areas which it was higher in Golestan National Park. However, comparing the evenness and diversity indices of Shannon, Simpson, Smith-Wilson and Camargo were not different in two studied areas. For a more detailed review, as well as understanding of the distribution of species, SHE analysis method was used at species and family levels. Based on the results of distribution pattern in both areas, the study was followed by a lognormal model. The proportion of the component of the species richness was greater than component of the evenness. Distribution pattern of plant families followed by log series and lognormal models, also the proportion of the components of the species richness and evenness on the diversity in families were almost similar. In general it can be said that the more protection level of Golestan National park were lead to greater protection of species diversity.

Keywords: National park, Protected area, Species richness, Utilizing intensity

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Evaluation of replacement intercropping of soybean (*Glycine max* L.) with sweet basil (*Ocimum basilicum* L.) and borage (*Borago officinalis* L.) under weed infestation

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Abstract

In order to evaluate intercropping of soybean (*Glycine max* L. cv. JK) with sweet basil (*Ocimum basilicum* L.) and borage (*Borago officinalis* L.) with weed interference, an experiment was performed in randomized complete block design with 12 treatments and three replications at a field located 10 km of Shirvan during year of 2011. The treatments were included 75% soybean: 25% sweet basil, 50% soybean: 50% sweet basil, 25% soybean: 75% sweet basil, 75% soybean: 25% borage, 50% soybean: 50% borage and 25% soybean: 75% borage under weed infestation, in addition sole cropping of plants under weed control and weed interference. Intercropped plants had more success in reduction of weed density and biomass compared to monoculture. Soybean50: sweet basil50, reduced the weed density by 47.95% and 52.9%, and reduced the weed biomass by 68.91% and 61.87% more than sweet basil and soybean pure stand, respectively. Investigation of dry matter accumulation showed that increasing of plant proportion in intercropping caused increasing of plant dry matter. The height of soybean and borage was increased in intercropping and weed interference, while the highest height of sweet basil was observed in monoculture at second harvest. Biological and economical yield of soybean in intercropping with sweet basil was higher than intercropping with borage. The highest harvest index was related to 50:50 soybean: sweet basil ratio. In this ratio, the harvest index increased 4.9% compared to soybean monoculture. Yield of sweet basil and borage decreased with increasing of soybean rows in intercropping. Based on area-time equivalent ratio, soybean 75% with sweet basil and borage 25% (based on borage seed yield) had 3% and 4% advantage compared to monoculture.

Keywords: Area-time equivalent ratio, Dry matter accumulation, Weeds control

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Date of planting and seeding rate effects on quantitative and qualitative characteristics of turnip in agro forestry compared to mono cropping systems

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Abstract

Agroforestry is one the aspects of sustainable agriculture in which multiple cropping of perennial trees in mixture with crops guarantees the environmental, economical and social sustainability in rural communities. High demands for forage in Northern provinces of Iran lead to agroforestry in citrus orchards as a potential mean for forage production through agroforestry systems. This research was conducted to determine the best planting date and seeding rate of turnip in agroforestry and mono cropping systems. The treatments were arranged as split factorial based on a completely randomized block design with three replications. The cropping systems (agroforestry and mono cropping) were assigned to the main plots and the factorial combinations of planting dates (March 10th, March 25th, and April 9th) and seeding rates (1, 2, and 4 kg seed ha⁻¹) were randomly assigned to the subplots. The results of the experiment showed that as the seeding rate increased to 4 kg.ha⁻¹, a significant increase (by 5%) in total forage production was observed in both cropping systems. A decreasing trend in forage production was observed in latter planting dates for both cropping systems; however, this decrement in mono cropping was more severe than agroforestry system. In later planting dates the water soluble carbohydrates and forage dry matter digestibility increased but ADF decreased. The results of this experiment indicated a great potential for forage production in citrus orchards of the northern provinces of the country through agroforestry systems.

Keywords: Forage quality, Tuber, Citrus orchards, Sustainable agriculture, Mazandaran

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Evaluation of some advanced wheat lines (F₇) in normal and drought stress conditions

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Abstract

For assessment of drought stress effects on agro characteristics of 30 lines and 6 wheat cultivars and for introducing of drought tolerant and susceptible ones one trial were established using split plot base of randomized complete block design with two replications, main plots were stress and non-stress condition and sub plots contain 30 lines and six wheat cultivars in the check trial, irrigation the farm was done with the normal regime, but in stress trial for germination of seeds and one irrigation in Isfand to the end of rooting the farm was irrigated. Within and end of growth season we measured some agronomic and morphological characters such as yield and its component, height, peduncle length, and etc. Responses of cultivars under stress and non-stress conditions were different, for example drought stress reduced yield. In spite of this general yield reducing, we found some line, such as 2, 29, 23 had relatively high yield (in tree levels). In order to final evaluate using Factor Analysis, Principal Component, Cluster Analysis. Factor Analysis indicated that four important factors accounted for about 80.245 and 79.624 percent of the total variation among traits in normal and drought stress conditions. With cluster analysis of 36 lines and cultivar using Ward procedure based on Euclidean distance were grouped in 4 distance cluster.

Keywords: Drought tolerance, Agro characteristics, Grain yield

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Investigation of quantitative and qualitative characteristics of green pea (*Lathyrus sativus* L.) and nutrified millet (*Pennisetum* sp.) forage in different cultivation patterns

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Abstract

One of the most effective ways to reach yield stability with low input is increasing diversity through utilizing intercrops in Agro-ecosystems. A field experiment based on a randomized complete block design with six treatments and three replications and two crops, green pea and nutrified millet, was carried out at Research Farm of Agriculture and Natural Resources of Kerman during growing season 2011-2012. The sole cultivation of green pea and millet, 25+75, 50+50, 75+50% of substitutional intercrops and mixed cultivation (50:50) of seeds on each row constituted the experimental treatments. Results showed that all the measured traits including dry forage yield, land equivalent ratio, acid detergent fiber, neutral detergent fiber, ash and crude protein were significantly affected by the experimental treatments. The highest dry forage yield was recorded for sole millet, 25% green pea+ 75% millet and 50+ 50 % treatment without significant difference other among them. The difference between sole crop of green pea with 75% green pea+ 25% millet was not significant for crude protein. Increasing green pea percentage in intercrop resulted in Neutral detergent fiber reduction. The highest value of LER obtained from 25% green pea+ 75% millet that had no significant difference with that of 50% green pea+ 50% millet. Based on the results of this experiment it could be concluded that the intercrop of 50% green pea+ 50% millet resulted in increase in the quality and quantity of forage yield.

Keywords: Ash, Crude protein, Land equivalent ratio, Planting ratio, Soluble fiber

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Effect of different levels of municipal solid waste compost and nitrogen on some grain elements concentration of sweet corn (*Zea mays L. saccharata*) and some soil properties under Marvdasht climatic conditions

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Abstract

This experiment was conducted in order to study the influence of different levels of municipal solid waste compost and nitrogen rate on grain quality of sweet corn (*Zea mays L. saccharata*) and some soil properties under Marvdasht conditions during growing season of 2008-2009. The experiment was arranged as split plots based on a randomized complete block design with two factors and three replications. Main plot included five levels of nitrogen fertilizer (100, 150, 200, 250 and 300 kg N.ha⁻¹) and sub plots included four levels of municipal solid waste compost (10, 20, 30 and 40 t.ha⁻¹). The Results showed that the highest fresh ear and grain yield resulted from application of 200 kg N.ha⁻¹ and 40 t.ha⁻¹ compost. The grain quality analysis showed that nitrogen had significant effect on grain nitrogen percent and had not significant effect on grain phosphorus and nitrogen content. Also, compost had significant effect on grain nitrogen and phosphorus percent but had no significant effect on grain potassium percent. Soil analysis results showed that effect of compost on organic matter, EC and pH and interactions between nitrogen and compost were significant only on soil nitrogen, potassium and phosphorus percent. Nitrogen had no significant effect only on soil nitrogen percent. Also, the results showed that optimum amount of grain nitrogen and phosphorus percent were gained by using 40 t.ha⁻¹ municipal solid waste compost and optimum amount of grain potassium percent was achieved by using 30 t.ha⁻¹ municipal solid waste compost. Application of 250 kg N.ha⁻¹ and 40 t.ha⁻¹ municipal solid waste compost consequences to optimum amount of soil nitrogen and potassium was gained and optimum amount of soil phosphorus was gained in 150 kg N.ha⁻¹ and 40 t.ha⁻¹ municipal solid waste compost treatments. In general, to achieve the optimum growth of this crop in similar soils, application of 250 kg N.ha⁻¹ and 40 t.ha⁻¹ municipal solid waste compost treatments could be recommended.

Keywords: Electrical conductivity, Organic matter, Phosphorus, Potassium

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Effect of water stress and harvesting stages on quantitative and qualitative yields of coriander (*Coriandrum sativum* L.)

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Abstract

In order to study the effect of drought stress and harvesting stages on quantitative and qualitative yields of Coriander (*Coriandrum sativum* L.) this experiment was conducted on split plot based on a randomized completely block design with 3 replications in Torbat-e Heydariyeh University, Iran, during growing season of 2010-2011. Treatments were drought stress (in three levels no stress: control and irrigation in 60 and 30 percentage of FC) as main plots and harvesting times (in 3 levels consist of: before flowering, flowering and after flowering) as sub plots. Results showed that drought stress and harvesting stages had significant affected on leaf number, height, number of stem, wet and dry weight of plant, SPAD, proline content, carbohydrate content, essential oil yield and percentage and components of essential oil of coriander. Increasing water stress decreased yield and its components while enhanced proline and carbohydrate contents. Maximum of essential oil and its main components (linalool, alpha pentene, gamma terpinene, geranial acetate and camphor) were in low stress that had significant difference with other stress treatments. Delaying in harvest enhanced yield and its components and essential oil percentage. Proline content had no significant difference between flowering and after flowering stages. Therefore, we can suggest low stress of water and harvest at after flowering stage to get maximum of yield.

Keywords: Essential oil, Growth stages, Mineral elements, Water deficit

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Evaluation of yield and agronomic traits of cumin (*Cuminum cyminum* L.) ecotypes in different sowing dates at Kerman region

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Abstract

In order to study the effects of different sowing dates on yield potential of cumin ecotypes and to appoint the best sowing dates of cumin at Kerman, the present experiment was performed base on RCBD with split plot arrangement and 3 replications during growing season of 2011-2012. Different sowing dates (25th December, 9th January, 24th January, 8th February and 23th February) as main plot, and different cumin ecotypes (Semnan, Fars, Yazd, Golestan, Khorasan Razavi, Khorasan Shomali, Khorasan Jonoubi, Isfahan and Kerman) were used as sub plot. Effects of sowing dates were significant on all traits except number of umbel per plant. Most of the measured characteristics such as 1000-seed weight, biological, seed and straw yields and harvest index were significant among the different ecotypes. The interaction effects of sowing dates and different ecotypes were also significant on all traits except 1000-seed weight. Change in rank interaction was seen for some of the traits. According to the results, Kerman ecotype in 23rd February showed significantly the best performance in yield than other ecotypes, so considering to better response of Kerman ecotype to Kerman region, further scientific study for introducing to the farmers can be recommended in South East of Iran.

Keywords: Medicinal plant, Planting date, Yield components

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Effects inoculation of mycorrhizae species and irrigation levels impacts on growth criteria, yield and water use efficiency of corn (*Zea mays* L.)

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Abstract

Water deficiency is one of the most important factors for limiting crop yield in arid and semiarid regions. Symbiosis with a variety of microorganisms in these regions is one of the modern ecological approaches for sustainable agriculture to reduce damages caused by environmental stresses. Symbiotic of arbuscular mycorrhizal fungi (AM) with the roots of crops has shown positive effects on agricultural systems. In order to study the effects of inoculation with two species of mycorrhizal fungi and irrigation levels on root growth criteria and water use efficiency of corn, an experiment was performed as split plots based on a complete randomized block design with three replications at the Agricultural Research Station, Ferdowsi University of Mashhad during growing season of 2008-2009. Treatments included two mycorrhizae inoculation (*Glomus mosseae* and *G. intraradices* and control) and four irrigation levels (25, 50, 75 and 100% of water requirement). Grain yield, root specific length, the percentage of root colonization and water use efficiency based on grain yield of corn were measured. The results showed that the effect of mycorrhizae inoculation was significant on ($p \leq 0.05$) root specific length, grain yield and water use efficiency of corn. Mycorrhizae species had no significant effect on root colonization percentage of corn. Different irrigation levels had significant effect on grain yield, special length root, the percentage of root colonization, and water use efficiency of corn ($p \leq 0.05$). Generally, the results showed that mycorrhizae inoculation in water deficiency conditions, can increase the uptake of water and nutrients by developing the root and increasing the absorbing surface. In this way, not only the plant tolerance against the water deficiency increases, but also more yield will be produced for a specific value of water, which means the water use efficiency increases. Furthermore, the use of water will be decreased.

Keywords: Grain yield, Percentage of colonization, Special length root

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Evaluation the effect of seed priming by salicylic acid on yield and yield components of wheat under drought stress conditions

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Abstract

To evaluate the response of wheat to drought stress and salicylic acid, this field experiment was carried out at the Experimental Farm of College of Agriculture, University of Shahid Bahonar Kerman, Iran in 2011-2012, in a split-plot arrangement using completely randomized block design with four replications. Main plot was irrigation (normal irrigation and cut off at flowering) and sub plot was salicylic acid (0, 0.1 and 0.5 mM). The results of analysis of variance showed that drought stress significantly reduced relative water content (35%), fertile spikes per m⁻² (10%), grain per spike (25%), 1000 grain weight (30%), grain yield (65%) and biological yield (40%). Results also showed that drought stress increased electrolyte leakage (55%) as well as proline content of flag leaf (60%). In contrast, salicylic acid significantly increased relative water content, grain yield, biological yield as well as proline content of flag leaf and also reduced electrolyte leakage. However, the effect of 0.5 mM was more pronounced. Therefore, it is concluded that seed treatment with salicylic acid may promote resistance of wheat under drought conditions via maintaining cellular membrane integrity and increasing proline content.

Keywords: Proline, Electrolyte leakage, Relative water content

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