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Effect of different irrigation regimes and zeolit super absorbent on the yield and yield components of forage sorghum (*Sorghum bicolor L.*)

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Abstract

In order to investigate the effects of different irrigation regimes and zeolit on the yield, yield components and relative leaf water content of sorghum, a field experiment was conducted in split plot in time and space based on randomized complete block design with three replicates in research station of Shahid Bahonar University of Kerman in 2011. Irrigation regimes (100, 80, 60 and 40% of field capacity) and different amounts of zeolite (control, 150 and 300 kg ha⁻¹) were arranged as main and sub plots, respectively. Irrigation regimes showed significant effect on all traits (fresh weight, dry mater, height, relative water content etc.) except stem node number. Meantime, all the traits except stem height, relative water content and the crop growth rate at the first and fourth stage of sampling affected by super absorbent so that the highest amount of the measured traits were recorded for 300 kg ha⁻¹ super absorbent. Interaction effect of the irrigation water × SAP × harvest was significant for fresh weight. The highest FW in second harvest belonged to I₁₀₀ × 300 kg ha⁻¹ SAP. At the end, it can be concluded that application of 300 kg ha⁻¹ super absorbent in irrigation levels lower than field capacity will result in 20% increase in yield.

Keywords: crop growth rate, drought stress, relative water content, sorghum, Zeolit.



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Effect of propagation systems, cutting position and IBA concentrations on rooting of malling merton (106, 111) cuttings

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Abstract

Using apple clonal rootstocks is necessary for improving crop efficiency in apple orchards. After grafting of apple cultivars on malling rootstocks, the extra parts of the rootstock was used as stem cuttings. Apical, middle and basal parts of these shoots were used as cuttings. Two propagation conditions, greenhouse and nursery and three concentrations of Indole-3- Butyric acid (IBA) on rooting, callus production, root number and root length of two apple rootstocks (MM106, MM111). Some cuttings were placed upside down. The results showed that there were significant differences among the different treatments of cultural system, cutting position, type of rootstock and IBA concentration. The percentage of rooting in nursery propagation system with inverted cuttings (28.77%) have significant difference with greenhouse system (22.19%) and MM106 with 38.82% rooting had a significant difference to MM111 with 12.4% rooting. The highest rooting percentage (38.82%) was obtained at 2500 mg/l of IBA.

Keywords: auxin, asexual propagation, culture conditions, callusing, nursery.



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Safflower growth analysis using regression modeling

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Abstract

Growth analysis is a valuable method in the quantitative analysis of crop growth, development and crop production. In order to evaluate effects of nitrogen rates and plant density on physiological growth indices of safflower, an experiment was conducted at Khorramabad, Lorestan province in 2008. The experiment was carried out as split plot in basis of randomized complete block design with four replications. Three nitrogen application rates were as main plots (N_1 =control, N_2 =75 and N_3 =150 kg/ha net nitrogen) and plant density was as sub plots in 3 levels (D_1 =40, D_2 =50 and D_3 =60 plant/m²). The growth degree day index was used to examine more closely fitting growth curves using non-linear regression models. Appropriate model was selected for each growth index. The results showed that application of nitrogen led to increasing of growth indexes including leaf area, total dry matter and crop growth rate. But, net assimilation rate was reduced. Growth indexes such as, leaf area, total dry matter, did not change with increasing plant density, due to branching of safflower. However, crop growth and net assimilation rate were reduced in plants. Overall, the results show that applied nitrogen has a more positive effect on safflower growth index compared to density changes.

Keywords: leaf area, nitrogen, non-linear regression, physiologic growth index, plant density.



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Effect of different ammonium to total nitrogen ratios on vegetative growth and flowering of pot plants of poinsettia (*Euphorbia pulcherrima*)

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Abstract

Poinsettia (*Euphorbia pulcherrima*) is a potted plant, which its colorful bracts appear in short days. In this experiment, effect of different ammonium to total nitrogen ratios on quantitative and qualitative traits of poinsettia was studied. The experiment was conducted as a complete randomized design with three replicates. The plants were irrigated with water containing of different ammonium to total nitrogen ratios of 0, 0.05, 0.1 and 0.16. At the end of experiment, vegetative traits, fresh and dry weight of shoot and root, chlorophyll index and mineral elements concentration were assessed. Overall study results revealed that quality and quantity characteristics of poinsettia were significantly affected by various ammoniums to total nitrogen ratios. So that, the maximum bract area and leaf area achieved for the ratio 0.05 meq/l and the minimum achieved for the ratio 0.16 meq/l. Bract productions in plants delayed and its longevity decreased by ratios higher than 0.05 meq/l. In addition, effect of treatments on fresh and dry weight of bract, leaf, stem, and root and leaf nitrogen level was significant. According to the results, adjustment of ammonium to total nitrogen in the nutrient solution with ratio of 0.05 meq/l likely makes improving in the production characteristics of poinsettia.

Keywords: ammonium, bract, chlorophyll, cyathium, nitrate.



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Comparison between the potential of sewage sludge and municipal solid waste compost on enrichment of soil with some micronutrients

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Abstract

To compare potential of two organic materials including sewage sludge (SS) and municipal solid waste compost (MSW) on micronutrients entry to soil, a research was conducted as split-plot arrangement based on randomized complete block design with three replications in research field of Sari Agricultural University. Main-plot (fertilizer treatments) included 20 and 40 ton/ha SS, 20 and 40 ton/ha SS + 50% chemical fertilizer (CF), 20 and 40 ton/ha MSW, 20 and 40 ton/ha MSW + 1/2 CF, CF and control. Sub-plot (years of application) comprised 3 treatments (1, 2 and 3 times of application). Results showed that both fertilizer treatments and application period treatments enhanced accumulation of micronutrients in soil significantly so that SS treatments had more influence compared to MSW treatments. The highest total and available Fe and Zn, total Mn and Cu were obtained in SS treatments. While, the most available Mn and available Cu was observed in 3 continuous years application of enriched 40 ton MSW and 20 ton MSW with CF, respectively.

Keywords: compost, micro nutrients, sewage sludge, soil, years of application.



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Comparison of seven types of medium in three compactness levels on qualitative characteristics of spring lawn

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Abstract

One of the most important factors in lawn establishment is the culture bed. In the present work, we evaluated the effect of some culture beds (1-leaf mold (LM), 2-rice husk (RH), 3-manure, 4-spent mushroom compost (SMC), 5-mixture of LM, RH and SMC (M 1), 6-mixture of LM, RH and M (M 2), with the ratio of 1:1:1 for both mixtures, along with 7-control treatment in three compactness levels (roll with 36, 56 and 76 kg weights) on some growth factors of sport lawn during spring. Therefore, an experiment carried out during 2008-9 in the research farm of Gorgan University of Agricultural Science and Natural Resources in strip plots design with three replications. According to obtained results, the interactions of fertilizer and compactness treatments for some of the measured traits were significant. The highest and the lowest chlorophyll content and plant height in all three compactness levels were observed in M2 and control treatments, respectively. Furthermore, in all three compactness levels, the highest dry matter devoted to control treatment and the lowest one was observed in M2 and manure treatment. In case of lawn coverage rate, density and greenness, the interaction of fertilizer and compactness treatments was insignificant and SMC and M2 showed the highest coverage rate and greenness respectively. In conclusion, organic materials have to be considered as one of the important factors as a result of their structural effect on soil physicochemical and biological features.

Keywords: appearance characteristics cover rate, density, organic fertilizer, roller.



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Evaluation some almond genotypes under Karaj condition

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Abstract

This research was conducted to study some vegetative and reproductive traits as well as qualitative and quantitative characteristics and their correlation in 80 almond genotypes. Qualitative traits were studied according to gulcan descriptor. Quantitative traits were analyzed as completely randomized design (CRD), with 12 replications. The results showed that genotypes had significant difference in fruit, nut, kernel weight and kernel to nut weight ratio. No169 genotype was very late blooming and had large size and moderate quality fruits. Fruit, nut and kernel weight in this genotype were 12.50, 4.75 and 1.28, respectively. Kernel of this genotype was sweet with low shriveling, which are important of consumer acceptance. The traits correlation showed that fruit, nut and kernel weight and size, had significant positive correlation together. Also, kernel taste had significant negative correlation with pubescence, shriveling and color intensity of kernel. Results of cluster analysis showed that, in Euclidean distance of 25, all genotypes were divided into two main branches. With decrease in the Euclidean distance from 25 to 5, the genotypes were divided into eight main subclusters. Cluster analysis revealed that the traits of tree high and growth vigor, fruit, nut and kernel size and shell softness and hardness were the main characteristics separating the genotypes.

Keywords: almond, cluster analysis, correlation, qualitative traits, quantitative traits.



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Optimization of *in vitro* culture in Tetra, Nemaguard and GF677 clonal rootstocks

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Abstract

According to problems caused by application of non-uniform seedling rootstocks in stone fruit trees orchards, the use of uniform and consistent rootstocks with these trees is essential. For determination of the best culture medium, explants of apical and lateral buds of Tetra, Nemaguard and GF677 rootstocks were prepared. Explants were placed in modified MS, WPM and Knop media each containing 0.6 mg/l BAP and 0.01mg/l NAA in mid-Spring and after disinfection. This research was carried out as factorial experiment in a completely randomized design with four replicates and four observations per each replication. Tetra, GF677 and Nemaguard rootstocks produced the highest of plantlet number respectively. Nemaguard rootstock did not show any proliferation in Knop medium and Nemaguard explants showed chlorosis on this medium. This medium caused chlorosis in produced plantlets of Tetra explants. Explants of every three rootstocks were produced the highest plantlet number and length in MS modified medium. Therefore, combinations of plant growth regulators were evaluated in this medium. Three different combinations were evaluated. Among different combinations of plant growth regulators (0.8 and 1 mg/l BAP and 0.1 and 0.5 mg/l NAA), the highest plantlet number and length were produced in MS medium containing 0.6mg/l BAP and 0.01mg/l NAA. Increase of plant growth regulators concentrations led to vitrification and callus production in GF677 rootstock. The highest root number and rooting percent were achieved in modified MS medium containing 1 mg/l NAA and explants of Tetra rootstock produced the highest root number and length.

Keywords: culture medium, plant growth regulators, proliferation, rooting, stone fruit rootstocks.



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Nitrogen use efficiency, yield and some agronomic characteristics of maize under on-farm seed priming and times of nitrogen application

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Abstract

To investigate the effect of on-farm seed priming and different times of nitrogen fertilizer application on maize Sc 704, an experiment was conducted at Agricultural Research Station, Asadabad- Iran, in 2011 as a factorial in randomized complete block design with three replicates. The first factor was on-farm seed priming in 3 levels (prime with tap water, prime with zinc solution and no primed). The second factor was nitrogen application in 5 levels (without nitrogen application, all nitrogen applied at planting time, 2 stages application, 3 stages application and 4 stages application). Results showed that, grain nitrogen content was highest in zinc solution priming and 4 stages nitrogen application (1.6%). Maximum grain yield was achieved by triple nitrogen stages application and zinc solution priming combination (10796 kg/ha) that increased about 77% to no-primed and no-nitrogen treatment. In this experiment, seed priming and splitting of nitrogen application time caused decrease in the harvest index. Priming increased agronomic nitrogen efficiency, partial factor productivity of nitrogen and recovery efficiency of grain nitrogen 32.7, 19.6, 30% compare with no-primed treat respectively and triple stages nitrogen application increased these indexes 117.6, 23.6, 450% respectively in compare with one stage application of nitrogen fertilizer.

Keywords: agronomic nitrogen efficiency, Maize Sc 704, on-farm seed priming, partial factor productivity, recovery efficiency of grain nitrogen.



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Comparison of yield and yield components of pinto bean promising lines in three regions of the Isfahan province

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Abstract

Pulses crops with nitrogen fixation ability have a special place in the crop rotation. In order to compare the agronomic characteristics of five promising lines of pinto beans with Sadri and local Khomein cultivars as control a study was conducted at 2011- 2012 cropping seasons, in three cities of Fereidoonshahr, Dehaghane and Semirom in Isfahan Province. Randomized complete block design with four replications was used for the study. In Fereidoonshahr area, yields of KS21191, E9, and E10 hopeful lines were respectively, 3035, 3412 and 3455 kg ha⁻¹, without significantly different from Sadri control cultivar, but were respectively 37, 21.8 and 20.3% less than Khomein local varieties. In Dehaghane area, yields of all hopeful lines were significantly less than both control cultivars. In Semirom region, hopeful lines of E9 and E10, respectively, with yields of 2900 and 2720 kg ha⁻¹ had equivalent yield with two control varieties. Number of pods per plant and seeds per pod were the two major components that explain a significant part of the difference between the genotypes. Trend of harvest index change were similar in the two regions Dehaghane and Fereidoonshahr and Khomein local cultivars, respectively with 42.8 and 38.8 HI percent, had the highest HI values. In Semirom region, harvest index for Sadri and Khomein cultivars and lines E9 and E10, were 37.1, 36.8, 35.8 and 36.5 percent respectively. According to the results of this study, yield of E9 and E10 lines, in both Fereidoonshahr and Semirom regions, and yield of KS21191 line, only in Fereidoonshahr can be equal with the yield of control cultivar. The promising lines of this study were not appropriate for the Semirom area.

Keywords: biological yield, cultivar, grain weight, harvest index, number pods per plant.



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Evaluation of effects of bio-fertilizers on some physiological and biochemical traits in soybean under water deficit condition

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Abstract

To evaluate the effect of bio-fertilizers on physiological traits in soybean under water deficit condition, a greenhouse experiment was conducted in 2011, at faculty of Agriculture, Tarbiat Modares University, using a factorial design based on RCBD with three replications. The experimental treatments were different irrigation regimes including non-stress (40% water depletion), moderate stress (60% water depletion) and severe stress (80% water depletion) and four methods for application of mixed of *Azotobacter* and *Azosperillum* on plant or seed. Results showed that the highest yield and yield components were observed in non-stress and spraying of bacteria on leaf + seed inoculation conditions. The highest catalase enzyme activity was observed in moderate stress and seed inoculation + spraying of bacteria on leaf condition. In addition, the highest proline content was showed in severe stress and non-bacterial inoculation and was three times more than the minimum treatment. The results generally indicated that using bio-fertilizer in moderate stress can reduce the destructive effects of stress and decrease of yield, but severe stress led to increase of cost of production and could not effect on increasing of yield significantly.

Keywords: antioxidant enzymes, bio-fertilizer, grain yield, soybean, water deficit condition.



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Effects of salinity and temperature on germination of Hyssop (*Hyssopus officinalis*)

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Abstract

In order to study the effects of salinity stress (made by sodium chloride and calcium chloride) and temperature interaction on germination characteristics of *hyssopus officinalis*, an experiment was conducted on factorial basis and in a completely randomized design with three replication at laboratory of Khorasan Razavi Agricultural and Natural Resource Research Center in 2010. In this experiment, different osmotic potentials (0, -3, -6 and -9 bar) and also different temperatures (20, 25, 30 and 35 centigrade degree) were used. In this research, the percentage and rate of germination, the length of radicle and plumule, length ratio of radicle and plumule and seed vigor characteristics has been measured. The results showed a very significant effect of salt levels, osmotic potential and temperature on the above characteristics. The mean comparison for percentage and rate of germination characteristics showed that calcium chloride with 63% and 7.11 respectively had a significant difference with sodium chloride with 50% and 1.70. The highest percent and rate of germination were seen in -3 bar osmotic potential made by calcium chloride in 25 centigrade degree. The highest length of radicle and vigor was in -3 bar osmotic potential made by calcium chloride in 20 centigrade degree. The highest length of plumule was seen in both sodium chloride and calcium chloride in 0 bar (control) osmotic potential and 30 centigrade degree. Generally while the osmotic potential increases and temperature goes up to 30 centigrade degree all the characteristics in sodium chloride and calcium chloride had a remarkable reduction. Also increment of high temperatures had more harmful effects in NaCl than CaCl₂. Study the Hyssop plant response to different levels of salinity and temperature on germination stage, it will assist farmers in establishment and desirable production.

Keywords: CaCl₂, germination stage, NaCl, salt stress, temperature.



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Effect of benzyladenine and eliminate of winter irrigation on tree and nut characteristics of pistachio cv. Kalleh Ghoochi

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Abstract

To investigate the effect of benzyladenine and eliminate of irrigation in winter on vegetative growth parameters and chemical composition of tree and nut quantitative characteristics of pistachio trees cv. Kalleh-Ghoochi, an experiment was done in 2010 to 2012 years. In this study, the effect of two irrigation regimes includes irrigation and non-irrigation in winter combined with three levels of benzyladenine (0, 20 and 40 mg L⁻¹) was investigated. The experiment design was randomized complete block design with three replications. The data obtained from both experiment analyzed as the combined analysis. Irrigation treatment was done as similar as common irrigation program in orchard, and in non-irrigation treatment, there wasn't irrigation from January to April in both years. Application of benzyladenine treatment was done at inflorescence buds swollen time. The results showed, 40 mg L⁻¹ benzyladenine had the most effective on vegetative growth of trees compared with the other treatments. Also benzyladenine treatments compared with the control had significant increase in the ecophysiological parameters; leaves biochemical compounds contents, leaves nutrient elements concentration and caused reducing in percentage of early splitting fruit and bud abscission significantly. Also, results showed that elimination of irrigation in winter had no significant effect on the mentioned parameters. Thus, based on the results of this study it seems that elimination of winter irrigation doesn't have any effect on vegetative growth and development of pistachio tree, but application of BA in late winter has positive effects.

Keywords: bud abscission, chlorophyll florecance, early split, soluble sugar, total proteins.



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Evaluation of germination traits and mechanical damage to soybean seed during processing, under standard germination, electrical conductivity and accelerated aging tests

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Abstract

To evaluate the germination traits and mechanical damage of soybean seed during processing stages, an experiment was conducted in a factorial experiment based on completely randomized design with 18 treatments at Mazandaran province (Sari) in 2009-10. The experiment factors included different seed processing stages (before cleaning, after elevator, after pre cleaning, after cleaning, after drying and after packaging) and three cultivars ('Telar', 'Sari' and 'Line 033'). Results showed that cultivar 033 had the highest germination percentage (83.5%), germination percentage after accelerated aging (71.6%) and seedling vigor index (12.76) and lowest electrical conductivity ($41.73\mu\text{Scm}^{-1}\text{gr}^{-1}$) and it was noticed that 'Telar' cultivar had the highest cracked seed percentage (10.38). Effect of different seed processing steps was significant on all traits. So that, the lowest germination percentage (78.36%), highest rate of broken seed percentage (16.72%) and highest cracked seed percentage (13.55%) was obtained after elevator step. Interaction effect of cultivar \times different processing steps were not significant on all traits, but means comparison showed that the highest (86.9%) was obtained in 033 cultivar after drying step and lowest (77.8%) germination percentage was attained from 'Telar' cultivar after elevator.

Keywords: broken seed, germination percentage, mean germination time, seed coat and seed vigor.



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Effect of planting date and final irrigation on cotton yield at Garmsar condition

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Abstract

To determine the best planting date and irrigation schedule in a cotton field (*Gossypium hirsutum* var. Varamin) in Garmsar region an experiment was conducted in 2011. The experimental design was split plot based on randomized complete block with three replications. Three irrigation termination dates (2011 Sep 11th, 2011 Sep 21st and 2011 Oct 2nd) arranged in main plots as main factor and three planting dates (2011 May 10th, 2011 May 25th and 2011 Jun 9th) located in sub plots. During the growth season, phonological events such as germination, date of flowering, date of boll formation, boll opening, maturity and after harvest attributes such as plant tall, number of boll per plant and weight of boll were recorded. The result showed that effect of planting date on seed cotton yield, plant/m², boll per plant and plants height was significant but boll weight was not affected significantly by this treatment. First planting date and first irrigation termination date with 7729 kg/ha of seed cotton yield is the best treatment. Because of stable environmental conditions in years of experiment, the effect of these treatments on studied treatments is not significant. Totally, two first planting dates has the higher yield than third and first date of irrigation termination is the best because of decreasing the number of irrigation.

Keywords: boll number, boll weight, number of plant, plant tall, production.