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Study of morphological characteristics of Iranian red-fleshed apples vs. some Iranian landraces and commercial cultivars

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Abstract

Study of morphological traits of red fleshed apples is a critical step to improve the quality and commercializing of them. In order to study genetic diversity of Iranian red fleshed apples, a total of 17 morphological characteristics were assessed for eight genotypes of red- fleshed ('Haji Qermez', 'Gousht Qermez', 'Shahroud-10', 'Arous Gousht Qermz', 'B.9', 'Qazvin 1, 2, 3') and 12 Iranian and foreign commercial cultivars ('Shafei', 'Golab Kohanz', 'Jonathan', 'Golden Delicious', 'Granny Smith', 'Soltani Shabestar', 'Fuji', 'Red Delicious', 'Heydar Zadeh', 'Golab Sahneh', 'Gala', and 'Shafi Abadi'). Dendrogram resulting cluster analysis of the data classified all genotypes into 7 groups. All Iranian and foreign cultivars were located in distinct groups. The results showed that Iranian red fleshed apples were different in their flesh color. This research can be very useful for introducing theses cultivars to market or using in breeding programs.

Keywords: anthocyanin, apple, genetic variation, morphological traits, red flesh apple.



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Effect of deficit irrigation and different levels of nitrogen fertilizer on some quantitative and qualitative properties of lemon balm (*Melissa officinalis*)

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Abstract

To investigate the effects of deficit irrigation and different levels of nitrogen fertilizer on some quantitative and qualitative properties of Melissa, a pot experiment was conducted for one year (2011) in Mazandaran province. Experiment was carried out as a factorial based on randomized complete block design with three replications. Irrigation treatments (25, 52 and 75 percent field capacity, FC) and nitrogen fertilizer (0 and 2.5 percent ammonium nitrate) were allocated to main and sub-plots, respectively. The results showed that the effect of different levels of deficit irrigation were significant on quantitative and qualitative properties of Melissa. Fertilizer treatments were significant on dry weight, leaf area, shoot number and fresh weight, percent citronellal, caryophyllene oxide percent, geranial and neral percent. Interaction of treatments was significant only on leaf number, dry weight of shoot, fresh weight of plant and geranial percent. Results showed that maximum plant height, leaf area, number of stems, number of leaves and dry and fresh weight was obtained in 75 percent FC treatment. Percent of citronellal, caryophyllene oxide, geranial and neral with 6.14 percent, 11.61 percent, 20.09 percent and 17.38 percent, respectively, had a maximum amounts in 75 percent FC treatment. Also, application of nitrogen fertilizer caused 5.33 and 9.15 percent reduction of citronellal and caryophyllene oxide respectively and increased geranial and neral percent by 17.64 and 15.56, respectively.

Keywords: deficit irrigation, lemon balm, Mazandaran, nitrogen fertilizer, qualitative and quality characteristics.



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Identification of traits related to drought tolerance in barley (*Hordeum vulgare L*) genotypes originated from arid climates of Iran

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Abstract

To evaluate the effects of water deficit stress in barley germplasm collection of National Gene Bank of Iran, 25 genotypes collected from arid and semi arid provinces of Iran and 3 sample cultivars were studied in two environments including: non-stressed and water deficit stress. Agronomical, phenological and morphological traits were measured. Stress indices were calculated to determine tolerant genotypes. Based on correlation coefficients, STI were better indicator of drought stress tolerance than the other indices. Based on STI, morphotypes number 16, 24, 25 and 26 shown better stress tolerance potential than the other morphotypes. Stepwise regression between stress tolerance index (STI) and quantitative traits indicates the important role of leaf area and specific leaf area of flag leaf under drought stress condition, in acclimation to drought conditions. It is also concluded that the 100 grain weight is the only trait under normal condition which shows a close relation with stress tolerance index.

Keywords: barley, drought stress, germplasm, index, tolerance.



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Evaluation of row spacing and microelements spraying on yield and some morphological traits of peppermint (*Mentha piperita* L.)

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Abstract

In order to evaluate row spacing and microelements spraying on yield and some morphological traits of peppermint, a split plot experiment was conducted based on randomized complete block design with four replications in Sari Agricultural Sciences and Natural Resources University during 2010-2011. Three levels of row spacing (50×10 , 50×20 and 50×30 cm) and two levels of microelements (no spraying and spraying) were evaluated on peppermint at two harvesting time. The results showed that the first harvesting had significant effect on plant height, oil yield and dry matter. Maximum oil yield (19.1 lit.ha^{-1}) and dry matter ($1121.3 \text{ kg.ha}^{-1}$) was obtained in the first harvesting time. Microelements had significant effect on wet matter ($3321.3 \text{ kg.ha}^{-1}$), dry matter (987.7 kg.ha^{-1}) and oil yield ($19.63 \text{ lit.ha}^{-1}$). Maximum dry matter ($1015.5 \text{ kg.ha}^{-1}$) and oil yield ($20.31 \text{ lit.ha}^{-1}$) was obtained in (50×20 cm) row spacing with spraying. 50×20 cm row spacing with spraying recommended, because of maximum oil yield in peppermint.

Keywords: dry matter, essential oil yield, microelements, peppermint, row spacing.



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Response of bread wheat genotypes with different flowering habits to sowing date in Isfahan

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Abstract

In order to assess the impact of different sowing dates on yield and yield components of wheat genotypes with different growth habits, a two years study (2007-2009) using a split plot in randomized complete block design with three replications was conducted in Kabootarabad Agricultural Research Station of Isfahan. Three sowing dates of 12 Oct., 1 Nov., and 21 Nov. were main plots and 15 genotypes of wheat were subplots. The average grain yield in three planting dates was 8495, 9156 and 6749 kg ha⁻¹, respectively. At all planting dates, the maximum and minimum grain yield belonged to spring and winter types and the grain yield of winter, facultative and spring groups were 7519, 8267 and 8614 kg ha⁻¹, respectively. At 1 Nov. five spring genotypes M-81-13, Bahar, Pishtaz, Kavir and Marvdasht and facultative cultivar Alvand produced the highest grain yield by an average of 10433, 10146, 10040, 9843, 9822 and 9813 kg/ha and therefore can be recommended for planting in temperate regions of the province. Spikes per m² and grain weight were the most important yield components that were reduced in response to late planting. Based on the results, 1 Nov. can be recommended as the best planting date for the region.

Keywords: grain yield and components, growth habit, sowing date, wheat, 1000 Kernel weight.



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Effect of boron, zinc and sulfur elements on grain yield and fatty acid composition of rapeseed (*Brassica napus* L.)

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Abstract

In order to investigate the effects of boron, zinc and sulfur on yield and fatty acid composition of rapeseed (Hyola 401 cultivar), an experiment was conducted in Rasht province in 2011. A field experiment with completely randomized block design was performed with eight treatments in three replications. Maximum grain yield ($4157.6 \text{ kg ha}^{-1}$) and grain oil ($1770.2 \text{ kg ha}^{-1}$) was obtained from S+B+Zn treatments. The highest and lowest grain oil was obtained from S+B+Zn (42.58) and control (38.37), respectively. The maximum oleic acid (234.8 mg g^{-1}) and linolenic acid (26.68 mg g^{-1}) and linoleic acid (55.98 mg g^{-1}) were obtained from B+Zn+S treatments. Maximum stearic and palmitic acid were obtained from control and S+Zn treatments which was 6.5 and 15.53 mg g^{-1} , respectively. Regarding to the results, fatty acids composition of rapeseed are influenced by nutrient and since quality of edible oils depends on unsaturated fatty acids, especially linoleic and linolenic acids and these acids are essential fatty acids for the human body that must be supplied through diet. Therefore this research showed that we are not only able to increase oil yield with can also increase oil quality with increasing fatty acid composition.

Keywords: grain oil, grain yield, linolenic acid, microelement, oleic acid.



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Assessment of morpho-physiological characteristics in common and wild barley cultivars under dehydration condition

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Abstract

In order to study the reaction of barley genotypes to drought, an experiment was conducted in a factorial design based on CRD for two wild ecotypes and four crop genotypes of barley in greenhouse. In this study, the barley genotypes and wild ecotypes as the first factor and irrigation treatment with three levels include 70 percent of water holding capacity of soil, 30 and 10 percent as the second factor were considered as treatments. Analysis of growth and other morphological characteristics such as tillers, plant height and leaf number and leaf area per plant and some physiological characteristics including the relative water content, leaf chlorophyll content, osmotic potential, osmotic adjustment, stomatal conductance, canopy temperature in each three treatments were measured. Analysis of variance showed that the effect of drought on all traits and differences between genotypes were significant. Results of correlation revealed that there is a significant and direct relationship between relative water content with osmotic potential and percentage of dried material. Path analysis identified that osmotic potential had the most direct effect on died material. The 41-1 and Morocco genotypes showed greater sensitivity than other genotypes to the applied stress.

Keywords: drought, growth, *H. Spontaneum*, morphology, water potential.



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Effect of row spacing in competition of cotton with velvetleaf on crop growth

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Abstract

To evaluate the competition effect of velvetleaf on cotton, an experiment was conducted in a completely randomized block design with split plot arrangement of treatments with three replications at Experimental Station of Gorgan University of Agricultural Sciences and Natural Resources during 2011 growing season. The treatments were three row spacing (20, 40 and 80cm) of cotton (as main plot) and five densities (0 (control), 1, 3, 5 and 12 plant per m⁻²) of velvetleaf (as subplot). The highest cotton height (129.4 cm) was obtained in 80 cm cotton row spacing and weed free condition. Also, maximum cotton dry matter (863.8 g m⁻²) and leaf area index (9.04) was achieved in the plot of 20cm cotton row spacing and weed free condition. Results indicated that row spacing had no significant effect on cotton yield under weed free condition. The highest yield (4986.73 kg ha⁻¹) was obtained in 40 cm cotton row spacing and weed free condition. However, results showed that in ultra narrow row, increasing the plant density lead to increase of the crop ability to resource using in compared with weed and have produced sustainable yield in competition with over weed density in compared with conventional row.

Keywords: dry matter, leaf area index, plant height, ultra narrow row, weed.



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The Effect of different fertilization systems on nutritative and qualitative characteristics medicine forage (Case study: alfalfa (*Medicago sativa* L.) and fennel (*Foeniculum vulgare* L.))

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Abstract

To study the effect of different fertilization systems on forage quality and secondary metabolites of medicinal forage in additive intercropping of alfalfa and fennel an experiment was conducted as split plot based on randomized complete block design with three replications at College of Agriculture, Shahed University in Tehran, 2011. The main plots were allocated to different levels biofertilizer and chemical fertilizer phosphorus in four levels viz. 1. Control (no fertilizer), 2. Biofertilizer (Nitroxin, biophosphorous fertilizer 2), 3. Integrated fertilizer (bio fertilizers+ 50 percent chemical fertilizer), 4. Chemical fertilizer (triple super phosphate). The subplots were allocated to different combinations of 1. Sole alfalfa, 2. Sole fennel, 3. 100 percent alfalfa+ 50 percent fennel, 4. 100 percent alfalfa+ 100 percent fennel. Results showed that the highest amount of crude protein was obtained in alfalfa+ 50 percent fennel at control treatment and the highest dry matter digestibility in sole alfalfa at integrated fertilizing system. The lowest percentage of essential oil was obtained in alfalfa+ 50 percent fennel at integrated fertilizing system.

Keywords: alfalfa, fennel, forage quality, intercropping, secondary metabolites.



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Effect of salicylic acid on the proline, soluble sugars and ion leakage in two apricot cultivars under cold stress

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Abstract

In order to study the effect of different concentrations of salicylic acid in two commercial apricot cultivars of Shahrood namely 'Shahrood 41' and 'Jaffari', under cold stress, a factorial experiment was conducted in a randomized complete block design with three replications in 2012 at the Agricultural Research Center of Shahrood city. The test had four factors including: SA with three levels (0.625, 0.125, 0.25mM), three stages of phenological growth (dormancy, swelling and flowering) and four temperature (four, zero, -2 and -4 degree centigrade) and two apricot cultivars ('Shahrood 41' and 'Jaffari') and measured traits were proline and soluble sugars. 'Jaffari' cultivar had the highest amount of soluble sugars at -4 degree centigrade in bud swelling stage and the maximum rate of proline belonged to 0.25mM of SA in the same cultivar, -4 degree centigrade and bud swelling stage. Ion leakage at different temperatures and different phenological growth stages were significantly different at five percent level. 'Jaffari' with lower ion leakage at -4 degree and higher proline content than 'Shahrood 41' had higher resistance to frost.

Keywords: apricot, cold stress, cultivar, proline, salicylic acid.



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Study of seed inoculation with *Azotobacter* and *Pseudomonas* and nitrogen application timing on yield, fertilizer use efficiency and grain filling rate of sunflower (*Helianthus annuus* L.)

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Abstract

In order to study of nitrogen application time and seed inoculation with plant growth promoting rhizobacteria on yield, fertilizer use efficiency and grain filling rate of sunflower, a factorial experiment was conducted based on randomized complete block design with three replications in research farm of Islamic Azad University, Ardabil branch in 2011. The first factor was time of nitrogen application in three levels, (1/3 at 4-6 leaf stage, 1/3 at budding stage, 1/3 at flowering stage), (1/2 at 4-6 leaf stage, 1/2 at budding stage), (1/4 at 4-6 leaf stage, 1/2 at budding stage, 1/4 at flowering stage) as N₁, N₂ and N₃ respectively and the second factor was seed inoculation with plant growth promoting rhizobacteria in four levels containing (without inoculation as control, seed inoculation with *Azotobacter chroococcum* strain 5, *Pseudomonas putida* strain 9, *Pseudomonas putida* strain 41). The results showed that maximum of grain weight, grain filling period, grain and biological yield, 1000 grain weight, number of grain per head, plant height, head and stem diameter were obtained in nitrogen application as N₂×seed inoculation with *Azotobacter*. Maximum of nitrogen use efficiency was recorded at nitrogen application as N₂×seed inoculation with *Azotobacter* and minimum of it was obtained in nitrogen application as N₁× no seed inoculation. It seems that in order to increasing of grain yield, fertilizer use efficiency and grain filling rate, can be suggested that should be applied nitrogen application time as N₂×seed inoculation with *Azotobacter*.

Keywords: nitrogen, PGPR, seed Inoculation, sunflower, yield.



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Effect of different levels of nitrogen in nutrient solution on the qualitative and quantitative traits of geranium (*Pelargonium hortorum* cv. Bulles eye)

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Abstract

To evaluate the effect of limited application of nitrogen (N) on the height control of geranium (*Pelargonium hortorum*) and improving its quality performance, an experiment was conducted based on a complete randomized block design with three replications in the greenhouse environment through the years 2011-2012. Geranium seedlings were cultivated in the pots filled with peat-based substrate (peat, 80 vol. percent + sandy loam field soil 20 vol. percent). For the limited application of N, four different nutrient solutions with the same macro and micro elements, except N levels of 2.5, two, 1.5 and one mM were applied. The rate of ammonium to nitrate nitrogen for all treatments was kept as 20 to 80 percent. The traits such as plant height, number and length of shoots, number of florescence and number of flowers in the florescence, pedicle length and leaf number, leaf area, chlorophyll, antocianins, fresh and dry weight of shoot and root were measured at the end of the experiment. Limitation of N application from 2.5 mM to 1.5 mM in the nutrient solution, although reduced the length of shoot, but did not affect negatively the quality of plants. Farther decreasing of N level to 1 mM, negatively influenced the all quality and quantity parameters of the plant and may not be introduced for production of geranium.

Keywords: chlorophyll, flowering, limitation of nutrient, nutrition Solution, peat.



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Effect of Kaolin spray on physicochemical parameters and fatty acids composition of olive oil cv. Zard under Fasa city climatic conditions

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Abstract

The effect of Kaolin on fruit and oil of olive cv. 'Zard' was evaluated in a commercial orchard in Fasa city, Fars Province. Mature olive trees cv. 'Zard' were sprayed with 0, 3 and 6% kaolin after 60 days, 60 and 90 days and 60, 90, 120 days after full bloom. Results showed that kaolin concentration and spraying time had not significant effects on physicochemical parameters but they had significant effects on free fatty acids composition. linoleic acid (14.49 percent) and linolenic acid (1.02%) were lowest in the third level of spraying time. Amount of oleic acid, monounsaturated fatty acids to polyunsaturated fatty acids, oleic acid to linoleic acid were higher in oil extracted from trees treated with 3 or 6% kaolin than the untreated trees. Also, oleic acid to linoleic acid (4.65%), monounsaturated fatty acids to polyunsaturated fatty acids (4.2%) were the highest in 6% kaolin with thrice spraying treatment (6% kaolin × thrice spraying) while linolenic acid, palmitic acid, linoleic acid were the lowest in 6% kaolin × thrice spraying. Therefore this study showed fatty acids composition was improved by kaolin spraying.

Keywords: linoleic acid, linolenic acid, monounsaturated fatty acids, oleic acid, palmitic acid, polyunsaturated fatty acids.



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Effect of salicylic acid on quantitative and qualitative traits of German chamomile (*Matricaria chamomilla*) ecotypes

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Abstract

German chamomile (*Matricaria chamomilla*) is one of the most important industrial medicinal plant. In this experiment the effects of foliar application of salicylic acid in different levels (0, 10^{-2} , 10^{-4} , 10^{-6}) were investigated on the floral traits and essential oil content of three ecotypes (Italian, Tehran, Zabol) of German chamomile. The results showed that maximum percentage of essential oil (1.5 weight percent) was obtained from Zabol ecotype as sprayed with 10^{-4} M of salicylic acid and Maximum oil yield (0.085 gr per pot) was obtained from Italy ecotype in which treated with 10^{-2} M salicylic acid. Among the identified sesquiterpenes of essential oil, Chamazulene, E- β Farenene and α -Bisabolol oxide A were significantly varied based on the experimental treatments. The highest amount of Chamazulene (3.789 percent) was recorded in Italian ecotype in which treated with 10^{-2} M salicylic acid, and the same ecotype produced highest amount of farenene (2.264 percent) when treated with 10^{-2} M Salicylic acid. The application of salicylic acid in concentrations of 10^{-4} and 10^{-6} M increased the α -Bisabolol oxide A (respectively, 70.907 and 73.482 percent) Compare with control. Generally, contrary to essential oil yield component, only the essential oil yield and its constituent were affected by salicylic acid application and the responses of experimental ecotypes was varied.

Keywords: α -Bisabolol oxide A, Chamazulene, ecotype, essential oil, salicylic acid.



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Effect of intercropping different ratios on yield of soybean, sweet basil and borage

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Abstract

In order to assess soybean, sweet basil and borage yield intercropping system, an experiment was conducted based on randomized complete blocks design with 9 treatments and three replicates in 2011. Treatments were consisted of replacement ratios of 75: 25, 50: 50, 25: 75 soybean: sweet basil and borage and pure culture of each plant. The results showed that the first pod in 75: 25 soybean: borage and sole cropping of soybean observed to be positioned at upper height than other treatments. The node number of stem was more in intercropping treatments than sole crop. In intercropping treatments, the pod number per plant except 25: 75 soybean: borage and seed number per plant except 25: 75 and 50: 50 soybean: borage was higher than sole crop. Seed yield and biological yield was decreased by increasing sweet basil and borage proportions in intercrop except 75: 25 soybean: sweet basil. The seed yield and dry weight of plant of intercropping was higher than pure culture of soybean. Yield of sweet basil in both growth period and also seed yield of borage was decreased through increasing soybean presence. Area-time equivalent ratio indicated 9, 11 and 14 percent advantages of the 75: 25 soybean and sweet basil and borage ratio and 50: 50 soybean and borage compared to monoculture, respectively.

Keywords: area-time equivalent ratio, medicinal plant, replacement proportions, sweet basil harvesting, seed yield of borage.