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Study of root system relationship with water relations in Rapeseed under drought stress conditions

H. Jabbari[1], N.A. Khosh kholgh Sima[2], GH. Abbas Akbari[3], I. Alahdadi[3], A.H. Shirani rad[4] and A. Hamed[5]*

1. Research Assistant Professor, Department of Oil Seed Research, Seed and Plant Improvement Institute, Karaj, Iran.
2. Assistant Professor, Agricultural Biotechnology Research Institute of Iran (ABRII), Karaj, Iran.
3. Associate Professor, Department of Agronomy and Plant Breeding, College of Aboureyhan, University of Tehran, Tehran, Iran.
4. Research Professor, Department of Oil Seed Research, Seed and Plant Improvement Institute, Karaj, Iran.
5. M.Sc. of Agronomy, Department of Agronomy and Plant Breeding, College of Aboureyhan, University of Tehran, Tehran, Iran.

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Abstract

In order to study of root system relationship with water relations in Rapeseed under drought stress conditions, a pot experiment was carried out in greenhouse at Agricultural Biotechnology Research Institute of Iran (Karaj) in 2012. Five winter Rapeseed genotypes were evaluated under four irrigation treatments, using a factorial experiment based on randomized complete block design. The results indicated that response of genotypes to irrigation treatments was different for stomata conductivity, SPAD value, root length and diameter, morphologic characteristics, yield and yield components. In control, Cooper produced the highest grain yield that due to higher silique number per plant, whereas, 'Opera' had the maximum grain yield under drought stress treatments. This subject was due to higher root depth and diameter in 'Opera' and on the basis of these characters, the high leaf area duration, stomata conductivity, silique number and grain number was observed in 'Opera'. In conclusion, these results showed that role of root morphologic characteristics in Rapeseed adaptation to drought tolerance is powerful and an effective root system with last stomata conductivity, more leaf area duration and high silique number were more important for yield maintenance of Rapeseed under drought stress conditions.

Keywords: Drought stress, Grain yield, Rapeseed, Root characteristics, Stomata conductivity

Corresponding Author: ghakbari@ut.ac.ir

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Effects of Arbuscular Mycorrhizal Fungus (AMF) on antioxidant enzyme activities in salt-stressed wheat

O. Younesi[1] and A. Moradi[2]*

1. Ph.D. in Crop Physiology, Department of Agronomy and Plant Breeding, Faculty of Agricultural Science and Engineering, College of Agriculture and Natural Resources, University of Tehran
2. Assistant Professor, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Yasuj University

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Abstract

This study investigated the influence of inoculation with an arbuscular mycorrhizal fungus (AMF), *Glomus mosseae* (Nicol & Gerd.) on growth and antioxidant enzyme activities (SOD, CAT, GUPX) in shoots and roots of wheat (*Triticum aestivum* L.) affected by three different levels of salt stress. The experiment was arranged as a factorial in Randomized Complete Block Design (RCBD) with three replications. Experimental treatments including: three levels of salinity stress (0 (control), 60 and 120 µm) and two levels of inoculation (inoculation and non inoculation). Salinity decreased wheat growth, regardless of the mycorrhizal treatment and the salt stress level. The plants inoculated with AMF had significantly greater shoot biomass than the control plants at all salinity levels. However, the results pointed out that salinity had inhibitory effects on mycorrhizal infection. The highest mycorrhizal infection was observed in the control plants. Increasing salinity stress raised significantly the antioxidant enzyme activities, including those of total SOD, GUPX and CAT, of wheat compared to their respective non-stressed controls. The AMF induced a higher increase in these antioxidant enzymes in response to severe salinity. Inoculation with AMF could serve as a useful tool for alleviating salinity stress in salt-sensitive plants. However, Analysis of variance indicated that there was not significant interaction between salt and mycorrhizal inoculation on SOD and CAT of roots. Also, there was not significant interaction between salt and mycorrhizal inoculation on GUPX in both shoots and roots.

Keywords: Arbuscular Mycorrhizal Fungi, CAT, DUPX, Salinity, SOD, Wheat.

Corresponding Author: amoradi@yu.ac.ir

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Evaluation of the effects of hand and chemical thinnings on some quantitative and qualitative traits in the fruits of the seedless barberry

Fereshteh Kamiab[1*], *Ali Abedini*[2] *and Masud Khezri*[3]

1. Assistant Professor, Department of Horticulture, Islamic Azad University, Rafsanjan Branch, Rafsanjan, Iran
2. *M.Sc. Student, Department of Horticulture, Shahid Bahonar University of Kerman, Kerman, Iran*
3. Assistant Professor, Horticultural Research Institute, Shahid Bahonar University of Kerman, Kerman, Iran

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Abstract

Generally, fruit trees should produce sufficient yield annually through their economic life. Fruit trees usually produce flowers over their ability of productivity. If all of the flowers are converted to fruit, the tree will be weak and poor smaller fruit will be produced and it may cause alternate bearing. Thus some flowers must be removed by hand, mechanically or chemically. In this study, the effects of hand thinning (10, 20 and 40 percent cluster elimination) and foliar treatment of Naphthalene Acetic Acid (5, 10, 20 and 40 mg/l) and ethephon (25, 50, 100 and 200 mg/l) on fruit thinning rate and on some quantitative and qualitative characters of seedless barberry fruit were investigated as a completely randomized block design in research garden of Birjand University in 2014. The results indicated that Naphthalene acetic acid and Ethephon application caused effective fruit thinning. The highest rate of thinning was observed in Naphthalene acetic acid (10 mg/l) and ethephon (50 mg/l) treatments. These treatments also increased the yield rate in comparison to control. Hand thinning, Naphthalene Acetic Acid and Ethephon application increased the length, diameter and volume of fruit, fresh weight (100 berry), dry weight (100 berry), anthocyanins, ascorbic acid, total soluble solids, total soluble solids to acid ratio. Thus both chemical treatments are suitable and ethephon (50 mg/l) is the best treatment.

Keywords: Ethephon, Fruit size, Naphthalene acetic acid, quality, Yield.

Corresponding Author: f.kamiab56@gmail.com

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Effects of scion properties on success and survival of walnut epicotyl grafting

Ahmad Raoufi[1], Kourosh Vahdati[2], Soheil Karimi[3], Mahmoud Reza Roozban[3], Vazgen Grigorian[4]*

1 . Graduated M.Sc. Student, Department of Horticulture, College of Aburaihan, University of Tehran, Pakdasht, Tehran, Iran.
2. Professor, Department of Horticulture, College of Aburaihan, University of Tehran, Pakdasht, Tehran, Iran.
3. Assistant Professor, Department of Horticulture, College of Aburaihan, University of Tehran, Pakdasht, Tehran, Iran.
4. Professor, Department of Horticulture, Faculty of Agricultural Sciences, Tabriz University, Tabriz, Iran.

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Abstract

This study was conducted to evaluate the effects of scion properties (number of buds on scion, presence of terminal bud on scion, and scion diameter and length) on success of epicotyl grafting and early growth of grafted walnut 'Chandler' at the college of Aburaihan of University of Tehran, during 2013-14. Grafting success, survival of the grafted trees, callus quality, shoot length and leaf number per tree were measured 150 days after grafting. No significant differences were found between scions containing terminal bud or lateral buds. The highest callus quality, grafting success (83.4 percent) and survival rate (72.8 percent) were obtained by using double bud scions. Using scions with 3-6 mm diameter significantly increased grafting success (73.4 percent) and survival rate (61.1 percent) of the grafted trees. The highest survival rate (56.1 percent) was found in trees grafted with 7-12 cm scions. The highest leaf numbers were found in the trees grafted with double bud scions, and 7-12 cm scions (9.1 and 8.6 leaves, respectively). The longest shoots were observed in trees grafted with scions containing two bud, and 3-6 mm diameter and 7-12 cm length (9.1, 12.7 and 12.2 cm, respectively). In conclusion, using scions containing two buds, with 3-6 mm diameter and 7-12 cm length were suggested to improve success of epicotyl grafting and quality of the grafted walnut 'Chandler' trees.

Keywords: Callus quality, Early growth, Grafting success, *Juglans regia* L., Scion buds, Scion length.

Corresponding Author: skarimi@ut.ac.ir

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Canola physiological, growth and yield response to boron application affected by heat stress due to late planting dates

Mohammad Reza Moradi-Telavat[1] , Zohreh Kazemi[2] and Seyyed Ataollah Siadat[3]*

1. Assistant Professor, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Ramin Agriculture and Natural Resources University of Khouzesan, Ahvaz, Iran
2. M.Sc. Student, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Ramin Agriculture and Natural Resources University of Khouzesan, Ahvaz, Iran
3. Professor, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Ramin Agriculture and Natural Resources University of Khouzesan, Ahvaz, Iran

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Abstract

A field experiment was carried out to study the yield and physiological responses of rapeseed (*Brassica napus* L.) to boron application and high temperature stress due to late planting, in Ramin Agriculture and Natural Resources University of Khuzestan at 2013-2014. The experimental design was a split plots design in RCBD with four replications. Planting dates (18 November, 3 December, 17 December and 30 December) were placed in main plots and boron application treatments (control, 10 kg $B.ha^{-1}$ incorporated with soil, boron spraying at 8 leaf stage and budding stages) were placed in sub plots. Planting date had significant effect on relative water content (RWC), cell membrane stability, peroxidase enzyme activity, leaf area index (LAI), canopy's temperature, grain yield and dry matter. In addition, boron application had significant effect on LAI, peroxidase enzyme activity and yield. Late planting caused to decrease the grain yield and dry matter related to increased canopy's temperature at flowering stages. Delayed planting from 18 November to 30 December, result in decreased grain yield about 60.5 percent. Boron application incorporated with soil caused to increased grain yield about 23 percent in comparison to control. High temperature stress due to late planting caused to decreased RWC, cell membrane stability and LAI in flowering stage. Generally, highest grain yield (4579.7 $kg.ha^{-1}$) was obtained from planting at 18 November and 10 kg $boron.ha^{-1}$ incorporated with soil, and lowest grain yield was obtained from planting at 30 December and without boron application.

Keywords: Cell membrane stability, Flowering, Foliar application, Peroxidase, RWC

Corresponding Author: moraditelavat@ramin.ac.ir

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Effect of foliar application of iron, zinc and manganese on yield and yield components of fenugreek

Peyman Mohammadzadeh Toutounchi[1], *Reza Amirnia*[2*]

1. M.Sc. of Agronomy, Department of Agronomy, Faculty of Agriculture, Urmia University, Urmia, Iran.
2. Assistant Professor, Department of Agronomy, Faculty of Agriculture, Urmia University, Urmia, Iran

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Abstract

In order to investigate effect of foliar application of some micronutrients on the yield and yield components of fenugreek (*Trigonella foenum-graecum* L.), an experiment was conducted based on randomized complete block design with eight treatments and three replications at the Research Farm of West Azarbaijan Agricultural and Natural Resources Research Station in 2012. Treatments were control, iron, zinc, manganese, iron + zinc, iron + manganese, zinc + manganese and iron + zinc + manganese. These elements were supplied from iron sulfate, zinc sulfate and manganese sulfate and were sprayed 3 mg lit^{-1} concentration. The results showed that there was a statistically significant difference between spraying of micronutrients and control. Maximum plant height (40.68 cm), number of lateral branches (6.76), number of pod per plant (25.73), number of grain per pod (15.36), 1000-grain weight (14.99 gr) and grain yield (857.62 $kg.ha^{-1}$) were related to spraying of iron + zinc + manganese. It is concluded that foliar application of iron + zinc + manganese improves growth and yield characteristics of fenugreek.

Keywords: Fenugreek, Foliar application, Micronutrient, Morphological traits, Yield.

Corresponding Author: r.amirnia@urmia.ac.ir

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Effect of 1-Methylcyclopropene (1-MCP) and Ethylene on physiological characteristics and antioxidant activities of cut carnation cv. 'Grand Slam'

Azam Ranjbar[1], *Noorollah Ahmadi*[2*]

1. M.Sc. Former Student, Department of Horticultural Sciences, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran
2. Assistant Professor, Department of Horticultural Sciences, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran

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Abstract

This research was conducted to evaluate the effects of 1-MCP and ethylene on extending the display quality and increasing vase life of cut carnation flowers in a completely randomized design with three replications at the laboratory of the postharvest physiology, Tarbiat Modares University in 2014. First, cut flowers were treated with 0, 0.5, 1 and 1.5 µl l^{-1} of 1-MCP for 24 h and then exposed to 1 µl l^{-1} ethylene for 16 h. The results showed that 1-MCP had significant effect on the physiological and biochemical characteristics and the activity of antioxidant enzymes. Maximum of vase life and the amount of chlorophyll and anthocyanin were revealed in samples treated with 1 µl l^{-1} 1-MCP. Also, the highest peroxidase enzyme activity was observed in treatment of 1 µl l^{-1} 1-MCP which had significant difference with other treatments. The highest and lowest catalase and superoxide dismutase activities were found in 1.5 µl l^{-1} 1-MCP and control, respectively. In conclusion, 1-MCP treatment resulted in extending vase life and increasing activity of antioxidant enzymes in cut carnation cv. 'Grand Slam' by suppression of ethylene action.

Keywords: Chlorophyll, Peroxidase, Senescence, Superoxide dismutase, Vase solution

Corresponding Author: ahmadin@modares.ac.ir

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Evaluation of topworking methods and times in Persian walnut trees in West Azerbaijan conditions

Saber Sadeghpour[1], Lotfali Naseri[2] , Morteza Nobahar[3], Reza Rezaee[4] and Roghayeh Najafzadeh[5]*

1. M.Sc., Department of Horticultural Science, Faculty of Agriculture, Urmia University, Urmia, Iran
2. Associate Professor, Department of Horticultural Science, Faculty of Agriculture, Urmia University, Urmia, Iran
3. M.Sc., Agricultural School of Shahid Esmailee, Naghadeh, Iran
4. Asistant Professor, Horticulture Section, Agricultural and Natural Resources Research Center of West Azerbaijan, Urmia, Iran
5. Asistant Professor, Department of Horticultural Science, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran

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Abstract

Walnut is one of the most important nut crops in Iran. In order to achieve an appropriate and economical production of old seedling orchards of this product, the only fastest and most cost-effective possible option for improving seedling trees is graft operation through top-working using the new improved cultivars in the world. This study was conducted as a factorial experiment in a Randomized Complete Blocks Design under West Azerbaijan conditions, with the aims of determine the best time for grafting during April and May 2011-2012 season and doing a modified side grafting method and compare it with the bark grafting. For this purpose, two superior 'Pedro' and 'Chandler' walnut cultivars were used as scions to achieve a high percentage of graft take. The results showed that the highest percent of graft-take was related to the modified side grafting method with the highest rates of graft survival (97.32 percent) and final graft-take (83.93 percent), that was better than bark grafting in in top-working of walnut trees. Also, regarding the grafting time, the highest percent of graft-take was obtained from May with the highest rates of graft survival (98.95 percent) and final graft-take (89.49 percent), that was higher than April.

Keywords: Bark grafting, Graft-take, Modified side grafting, Top-working, Walnut

Corresponding Author: lnaseri@chmail.ir

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The effect of different concentrations of methyl jasmonate on the activity of antioxidant enzymes and total protein in basil

Ebrahim Brouki Milan[1], Leyla Hassni[1], Babak Abdollahi Mandoulakani[2], Reza Darvishzadeh[2], Fatemeh Kheradmand[3], Abbas Hassani[4]*

1. M.Sc. Student, Department of Plant Breeding and Biotechnology, Faculty of Agriculture, Urmia University
2. Associate Professor, Department of Plant Breeding and Biotechnology, Faculty of Agriculture, Urmia University
3. Assistant Professor, Department of Clinical Biochemistry, Urmia University of Medicinal Sciences
4. Associate Professor, Department of Horticulture, Faculty of Agriculture, Urmia University

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Abstract

A completely randomized design (CRD) with three replications was conducted at greenhouse of Urmia University in 2013 to study the effect of different methyl jasmonate concentrations (0, 0.1 and 0.5 mM) on the activity of enzymes polyphenol oxidase, phenylalanine ammonia lyase, catalase, ascorbate peroxidase, guaiacol peroxidase and total protein content in basil. Activity of the enzymes and total protein content was measured at flowering stage 0, 24, 48 and 72 hours after foliar application of methyl jasmonate. Analysis of data was carried out in a split plot in time design which methyl jasmonate concentrations and sampling times were considered as main and sub-plots, respectively. The results of the investigation showed the maximum activity of phenylalanine ammonia lyase and guaiacol peroxidase at concentrations of 0.5 and 0.1 mM, respectively, 48 and 72 hours after spraying. The effect of methyl jasmonate on the activity of polyphenol oxidase, catalase, ascorbate peroxidase and total protein content was significant ($P\leq0.01$). The most activity of the catalase, ascorbate peroxidase and total protein obtained in a concentration of 0.5 mM methyl jasmonate. Significant differences were observed among sampling times after methyl jasmonate spraying for catalase activity which increased 48 and 72 hours after spraying ($P\leq0.05$). Therefore, methyl jasmonate spraying with a concentration of 0.5 mM could increase the activity of the antioxidant enzymes and total protein in basil.

Keywords: Ascorbate peroxidase, Catalase, Complete Flowering, Phenylalanine ammonia lyase, Guaiacol peroxidase, Basil

Corresponding Author: b.abdollahi@urmia.ac.ir

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Some grape (*Vitis vinifera* L. cv. Rasheh) compositional changes under different slope and altitude

Salar Darabi[1], Nasser Ghaderi[2*], Ario Emamifar[3]

1. Graduated M.Sc. Student, Department of Horticultural Sciences, Agricultural Faculty, University of Kurdistan, Sanandej, Iran
2 Assistant Professor, Department of Horticultural Sciences, Agricultural Faculty, University of Kurdistan, Sanandej, Iran
3 Assistant Professor, Department of Horticultural Sciences, Agricultural Faculty, University of Kurdistan, Sanandej, Iran

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Abstract

Rashe grape cultivar grows in Kurdistan province in rain fed conditions. Microclimate conditions have a great effect on grape berry quality. Information about changes in grape berry composition in the relation to climate changes is limited. In order to measure the effects of slope and altitude on some grape berry chemical composition, a study was conducted on grape cv. 'Rasheh' in University of Kurdistan during 2012 and 2013. A randomized complete block design with four treatments (northern and southern slope, low and high altitude) and three replications was used. In this study, amount of carotenoids, anthocyanin, antioxidant capacity, total soluble carbohydrates, tannin and total phenol in grape berry were analyzed. Results showed that southern slope at high altitude increased amount of anthocyanin, antioxidant capacity, phenol and total soluble carbohydrates. Maximum values in the concentration of carotenoid and tannin in grape berry obtained in the northern slope and lower altitude. Berries from Northern slope and lower altitude were found to have a significantly lower anthocyanin and total soluble carbohydrates compared to other treatments. Based on these results, it can be concluded that the planting in the southern slope and higher altitude will help to grape growers for improve the qualitative characteristics of the grape berries.

Keywords: Anthocyanin, Antioxidant capacity, Carotenoid, Climate conditions, Phenol.

Corresponding Author: n.ghaderi@uok.ac.ir

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Evaluation of some floraland fruit production characteristics among four Iranian summer squash landraces and their comparison with F_1 commercial cultivar

Rahim Barzegar[1*]

1. Assistant Professor, Department of Horticulture, Faculty of Agriculture, University of Shahrekord, Shahrekord, Iran

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Abstract

Landraces are a valuable source of genetic diversity for varietal improvement. Despite, Iran is the fifth squash and pumpkin producer, but no available information exists about the diversity of summer squash landraces. In order to evaluation of floral and fruit production characteristics among four Iranian summer squash and a check cultivar of F1 hybrid 'Asma', an experiment was conducted in a randomized complete block design (RCBD) with three replications. Each plot had four tagged sample plants of one accession. The results were demonstrated significantly substantial differences for number of node, node position to first female, number of female flower, female/male flower, number of harvested fruit from main stem, number of lateral branch/plant, number of harvested fruit from branches/plant and total harvested fruit/plant traits in studied accessions. Number of female flower ranged from a minimum of 8 to a maximum of 18. It was resulting to a broad variability in number of harvested fruit from main stem (5.2-12). There was a significant difference between Iranian landraces and check cultivar for floral and fruit production characteristics. Growth habit and number of female flower were two main factors that influenced fruit production/plant variability.

Keywords: Accession, Diversity genotypic, Female flower, Heritability, Squash

Corresponding Author: Barzegar@agr.sku.ac.ir

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The effect of water deficit and different levels of cattle manure, chemical fertilizers and their combination on yield and some agro-morphological characteristics of Moldavian balm medicinal plant

A. Badalzadeh[1], M. Rafieiolhossaini[2], A. Danesh Shahraki[2], M. Ghobadinia[3]*

1. M.Sc. Graduate Student of Agronomy, Department of Agronomy, Faculty of Agriculture, University of Shahrekord
2. Assistant Professor, Department of Agronomy, Faculty of Agriculture, University of Shahrekord.
3. Assistant Professor, Department of Irrigation, Faculty of Agriculture, University of Shahrekord

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Abstract

In order to evaluate the effect of water deficit and different fertilizer levels on yield and some agro-morphological characteristics of Moldavian balm, a split plot experiment was conducted in a randomized complete block design with three replications at the research farm of Shahrekord University during 2013-2014 growing season. Main factor was three levels of irrigation regimes including: 100 (control), 75 and 50 percent of water requirement while 6 levels of manure application including: 1) no amended fertilizer (control), 2) 25 percent urea + 75 percent cattle manure, 3) 50 percent urea + 50 percent cattle manure, 4) 75 percent urea + 25 percent cattle manure, 5) 100 percent urea and 6) 100 percent cattle manure, were used as subplot. The maximum plant height and number of flowering branch was observed for 100 percent urea and the maximum flowering branch dry yield was related to 50 percent urea + 50 percent cattle manure. The maximum plant height and number of flowering branch was achieved from 100 percent plant water requirement. The maximum leaf, shoot dry weight and dry matter yield was related to 50 percent urea + 50 percent cattle manure with 100 percent plant water requirement. In total, in order to obtain the maximum dry matter yield, application of 50 percent urea with 50 percent of cattle manure and full irrigation is recommended.

Keywords: agro-morphological characteristics, fertilizer, Moldavian balm, sustainable agriculture, water deficit

Corresponding Author: rafiei@agr.sku.ac.ir

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Evalutaion the effect of water stress on fruit quality and quantity of some Iranian melons

Hadi Lotfi[1], Taher Barzegar[2], Vali Rabiei[3], Zahra Ghahremani[4] Jafar Nikbakht[5]*

1. M.Sc. Student, Department of Horticultural Sciences, Faculty of Agriculture, University of Zanjan, Zanjan, Iiran
2. Assistant Professor, Department of Horticultural Sciences, Faculty of Agriculture, University of Zanjan, Zanjan, Iiran
3. Associate Professor, Department of Horticultural Sciences, Faculty of Agriculture, University of Zanjan, Zanjan, Iran
4. Assistant Professor, Department of Horticultural Sciences, Faculty of Agriculture, University of Zanjan, Zanjan, Iran
5. Associate Professor, Department of Water Engineering, Faculty of Agriculture, University of Zanjan, Zanjan, Iran

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Abstract

In order to evaluate the effect of water stress on fruit quality and quantity of some Iranian melons, the experiment was set out in a split plot design with three replicates in research filed of University of Zanjan in 2014. Treatments consisted arrangement of three Irrigation levels (starting irrigation at 100, 66 and 33 ETc) and 11 genotypes of Iranian melons (’Khatouni‘, ’Kali‘, ’Orshang‘, ’Mouri‘, ’Mozi‘, ’Zarde-Paeize‘, ’Shirazi‘, ’Shiardar‘, ’Ezmir‘, ’Eyvan-e-key‘ and ’Suski-e-Sabz‘). Results showed that irrigation had a significant effect on flesh firmness, fruit length and width, thickness of skin, pH, total soluble solids (TSS) content, fruit weight and yield ratio. The water stress significantly increased TSS and reduced flesh firmness. The lowest values of yield (13761 kg/ha), fruit weight (1363.7 gr), fruit width (12.97 cm), and the highest skin thickness (4.63 mm) and pH (6.28) was obtained in the sever water stress (start point of 33 ETc). Melon accessions showed significant differences in studied traits. The highest values of fruit length (31.6 cm), flesh firmness (2.9 kg/cm^{-2}), yield (49698 kg/ha) and fruit weight (3223 gr) was obtained under 100 ETc irrigation in ’Khatouni‘ , ’Zard-e- Paeizeh‘ and ’Eyvan-e-key‘, respectively. Also, the highest TSS was obtained in ’Shirazi‘ under 33 ETc irrigation. According to the results, ’Eyvan-e-key‘ and ’Mozi‘, respectively were sensitive and tolerance accession to the water stress with highest (72.27 Percent) and lowest (43.4 Percent) reduction of yield under 33 percent ETc irrigation compared normal irrigation.

Keywords: DPPH scavenging, *Malus*, physiochemical characteristics, red flesh apple, total phenol content.

Corresponding Author: Flesh firmness, Fruit length, Melon, Total soluble solids content, Yield

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Effect of nitrogen and plant density on silage yield and quality of Maize c.v MV500 as second crop

Narges Dolatmand Shahri[1] and Iraj Tahmasebi[2],*

1. Graduate M.Sc. Student, Department of Agronomy and Plant Breeding, College of Agriculture, Kurdistan University, Sanandaj, Iran
2. Assitant Professor, Department of Agronomy and Plant Breeding, College of Agriculture, Kurdistan University, Sanandaj, Iran

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Abstract

A field experiment was conducted in order to study the effect of nitrogen fertilizer and plant density on yield and quality of Maize (*Zea mays* L.) cultivar, MV500 silage as second crop. This study was conducted in Agricultural Research Station of Kurdistan University during 2012 growing season. The experiment was laid out as split plot based on randomized complete block design with three replications. The main factor was three levels of nitrogen (115, 184 and 253 kg N. ha^{-1}). Four plant densities (8, 10, 12 and 14 plants.m^{-2}) assigned to subplots. The results showed that as nitrogen rate increased forage yield, and crude protein content increased but NDF and ADF percentage decreased. However, ash percentage did not change by nitrogen rate. Increasing in nitrogen rate more than 184Kg N/ha had no significant effect on forage yield, protein content and NDF. Although, forage yield increased and both protein content and NDF decreased as plant density increased but ADF and Ash percentage did not affect by plant density. In conclusion, nitrogen rate more than 184 Kg N/ha and plant density more than 12 pl.m^{-2} had no effects on forage yield and quality. Therefore, in order to avoid environmental pollutions and reduce production costs, more nitrogen rates and plant populations not recommended.

Keywords: ADF, Ash, Crude Protein, NDF, Silage

Corresponding Author: irajtahmasebi@yahoo.com

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Evaluation the effect of morphological and physiological characteristics of stem on lodging in 12 genotypes of rice

Faraji, F.[1], Esfahani, M.[2], Alizadeh, M. R.[3] and Alami, A.[4]*

1. Ph.D. Student in Agronomy, Department of Agronomy and Plant Breeding, Faculty of Agricultural Sciences, University of Guilan, Rasht – Iran
2. Professor, Department of Agronomy and Plant Breeding, Faculty of Agricultural Sciences, University of Guilan, Rasht – Iran
3. Associate Professor, Department of Engieering, Rice Research Institute of Iran, Rasht-Iran
4. Assistant Professor, Department of Agronomy and Plant Breeding, Faculty of Agricultural Sciences, University of Guilan, Rasht - Iran

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Abstract

In order to evaluate the morphological characteristics and lodging related traits and carbohydrate content of culm and carbohydrate remobilization in traditional and improved rice cultivars, a field experiment was laid out in randomized complete block design with three replications at Rice Research Institute of Iran (Rasht) in 2012 and 2013. Rice genotypes included three native rice cultivars (Hashemi, Sangjo and Alikazemi) and six improved (Kadous, Gohar, Khazar, Sepidrood, Deylam and Dorfak) and three promising lines (831, 841 and 416). On the basis of this results, the greatest amount of breaking resistance were observed in third and fourth internods of Khazar. Furthermore, significant positive correlation were observed between average diameter of internode, fresh weight/length of internode and unsoluble carbohydrate content of culm in anthesis and maturity stages with breaking resistance of third and forth internods. Also, significant positive correlation was observed between number of parenchyma cells and unsoluble carbohydrate content of culm in anthesis and maturity stages. On the other hand, there was significant negative correlation between carbohydrate remobilization and breaking resistance of third and forth internods. Principal component analysis classified plant characteristics to two groups. The first factor was named as lodgigng resistance factor and included 71.01 percent of total variation. The second factor with 19.74 percent of total variation was named as morphological lodging sensitivity factor. According to the results of this experiment, it seems that average diameter, thikness and weight/length of internode, have major roles in rice plant resistance to lodging.

Keywords: Carbohydrate, Lodging, Remobilization, Rice, Sink strength index

Corresponding Author: esfahani@guilan.ac.ir

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The Effect of Putrescine and Spermine on Drought Tolerance of Almond and Peach

Somayeh Amraee[1], Ahmad Ershadi[2], Tahmineh Robati[3]*

1. Former M.Sc. Student, Department of Horticultural Science, Faculty of Agriculture, Bu-Ali Sina University, Hamedan, Iran
2. Associate Professor, Department of Horticultural Science, Faculty of Agriculture, Bu-Ali Sina University, Hamedan, Iran
3. B.Sc. Student, Department of Horticultural Science, Faculty of Agriculture, Bu-Ali Sina University, Hamedan, Iran

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Abstract

This study was performed to investigate the effect of Putrescine and Spermine on some physiological and biochemical characteristics and antioxidant enzymes activity of peach (*Prunus persica* cv. Alberta) and almond (*Prunus dulcis* cv. Rabi) seedlings under water deficit. The first factor was water regime at two levels (80% or 50% of soil available water), and the second factor was polyamine treatments (putrescine 0.1, putrescine 1, spermine 0.1, spermine 1 mM and control). Water deficit led to increased electrolyte leakage percentage in peach leaves, compared to almond. Under water deficit, polyamines reduced electrolyte leakage in both plants, Spermine was more effective than Putrescine under water deficit. Leaf contents of soluble carbohydrates, proline and soluble proteins in almond more increased as compared to peach. Spermine more effectively increased concentration of osmoregulants, compared to Putrescine. Under water deficit, the activities of catalase, guaiacol peroxidase and ascorbate peroxidase enzymes increased in both plants, higher enzyme activity was found in almond leaves in comparison with peach. The maximum antioxidant enzyme activity was found following spermine treatments. Application of spermine and putrescine increased drought tolerance in almond and peach through reducing the electrolyte leakage, increasing compatibility osmolytes and antioxidant enzyme activity.

Keywords: Antioxidant enzymes; electrolyte leakage; osmotic regulators; polyamines, water shortage.

Corresponding Author: ershadi@basu.ac.ir

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Evaluation of bulblet production capacity of vegetative cuttings of *Lilium* oriental hybrid cv. 'Star Gazer'

Azizollah Khandan-Mirkohi [1], Naghmeh Alizadeh Kordestani[2]*

1. Assistant Professor, Department of Horticulture Sciences, College of Agriculture and Natural Resources, University of Tehran, Karaj, Iran
2. Former M.Sc. Student, Department of Horticulture Sciences, College of Agriculture and Natural Resources, University of Tehran, Karaj, Iran

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Abstract

In this research, possibility of bulblet production from different cuttings including leaf, leaf-bud and leafy-stem of *Lilium* oriental hybrid cv. 'Star Gazer' evaluated under different levels of Indole-3-butyric acid (IBA) with 0, 250, 500, 750 and 1000 mg per liter (ppm). The cuttings were taken from stems which grown from cold treated bulbs in early October. A factorial experiment was done in Department of Horticulture Sciences, University College of Agriculture and Natural Resources, University of Tehran in 2014-2015, based on Randomized complete blocks design with three replications and nine cuttings per replicate. The results showed that rooting percentage and leaf number decreased on leaf cuttings by increasing auxin concentration, while these traits increased on leaf-bud and leafy stem cuttings. In contrast to the results in the rooting and leaf number traits, number of bulblets rose in leaf cuttings from 14 in control to 21, in leaf-bud cuttings from three to 20 and in leafy stem cuttings from one to 16 in IBA levels of 250, 500 and 750 ppm, respectively. Exceeding IBA concentration had reverse effect on bulblet number, correspondingly. Even so, leaf number and rooting percentage declined on leaf cuttings by application of IBA, but it was useful for production of more bulblets on leaf, leaf-bud and leafy-stem cuttings in IBA levels of 250, 500 and 750 ppm, respectively.

Keywords: Auxin concentration, Cut flower, Growth, Lily, Medium, Peat, Rooting

Corresponding Author: khandan.mirkohi@ut.ac.ir

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Evaluation of Salicylic acid and spermidine on reduce drought stress injuries of one-year-old *Maclura pomifera* seedlings

Alireza Khaleghi[1], Rohangiz Naderi[2], Alireza Salami[3], Mesbah Babalar[4], iman Roohollahi[5], Gholamreza Khaleghi[6]*

1. Assistant Professor, Department of Horticultural Sciences, Faculty of Agriculture and Natural Resources, Arak University, Arak, Iran
2. Professor, Department of Horticultural Sciences, College of Agriculture and Natural Resources, University of Tehran, Karaj, Iran
3. Assistant Professor, Department of Horticultural Sciences, College of Agriculture and Natural Resources, University of Tehran, Karaj, Iran
4. Professor, Department of Horticultural Sciences, College of Agriculture and Natural Resources, University of Tehran, Karaj, Iran
5. Assistant Professor, Department of Horticultural Sciences, Faculty of Agriculture, Shahed University, Tehran, Iran
6. Former M.Sc. Student, Department of Water Engineering, Faculty of Agriculture and Natural Resources, Arak University, Arak, Iran

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Abstract

Drought is one of the most important environmental factors which limit the growth of woody plants. Iran is located in arid and semi-arid area therefore the growth and cultivation of ornamental trees and shrubs were limited. For this purpose, effect of foliar-applied salicylic acid and/or spermidine (0, 100, 500 and 1000 µmol) on reduce drought stress injuries of one-year seedlings of Osage orange (*Maclura pomifera*) was examined at the Horticultural Research Station, University of Tehran, in 2013. This study was conducted as a factorial based on completely randomized design with three replications. First, PGRs were foliar-applied for two consecutive days in during the early morning and the late afternoon and then plants were droughted by withholding water for 10 days. The damaging effects of drought on membrane leakage were reversed by low concentrations of salicylic acid and/or spermidine. Also, salicylic acid and spermidin at a concentration of 100 µmol stimulated catalase and superoxide dismutase activity, enhanced proline and chlorophyll content and maintained photochemical efficiency of chlorophyll under drought stress. But Spermidine and salicylic acid at high concentrations were ineffective and/or inhibitors. Finally, our results showed that 100 µmol salicylic acid and/or spermidine maybe the best concentration for increasing of drought tolerance in young seedling, especially during transplanting and planting in permanent location.

Keywords: Catalase, Drought stress, Foliar spray, Osage orange, Superoxide dismutase.

Corresponding Author: Khaleghi979@gmail.com

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Evaluation of growth responses of two olive cultivars under salinity stress

*Mohsen Seilsepour[1], Ahmad Golchin[*2], Mahmoud Reza Roozban[3]*

1. Ph.D. Student of Soil Fertility and Chemistry, Department of Soil Science, Faculty of Agriculture, University of Zanjan, Zanjan, Iran
2. Professor, Department of Soil Science, Faculty of Agriculture, University of Zanjan, Zanjan, Iran
3. Assistant Professor, Department of Horticulture, College of Aburaihan, University of Tehran, Pakdasht, Iran

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Abstract

A greengouse experiment was conducted to evaluation of salinity stress on growth parameters of two olive cultivars during 2013-2014 at Agricultural and Natural Resources Research Center of Tehran. In the experiment, effects of five levels of irrigation water salinity including 0, 4, 8, 12 and 16 $dS.m^{-1}$ were evaluated on 'Zard' and 'Mission' olive cultivars under soilless culture. Data showed that salinity had significant effects on all growth parameters in both olive cultivars. Leaf dry weight, shoot and root dry weight, leaf chlorophyll index, shoot and root tolerance index, shoot and internodes length, leaf area, leaf number and leaf relative water content were affected by salinity and significantly decreased. These reductions were more in 'Zard' comparing to 'Mission'. Shoot dry weight, leaf dry weight and root dry weight were decreased 80, 80 and 69 percent, respectively at 16 $dS.m^{-1}$ salinity treatments with compare to control. Leaf sodium (Na^+) concentration and rate of sodium to potassium (K^+) in leaf were increased and leaf potassium concentration was decreased by salinity. Increase of Na^+ and decrease of K^+ were more in 'Zard' comparing to 'Mission'. Also, leaf and shoot dry weight were affected by concentration of Na^+, K^+ and Na^+: K^+ in leaf and there were a significant correlation among these parameters with leaf and shoot dry weight. Results indicated that 'Mission' variety were more salt tolerance than 'Zard'.

Keywords: Olive, Salt stress, Sodium to Potassium ratio, Vegetative growth

Corresponding Author: agolchin2011@yahoo.com

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Physiological responses of two basil cultivars to foliar application of salicylic acid under salinity stress

S. Taheri[1], T. Barzegar[2], V. Rabiei[3], H. Rabi Angorani[3]*

1. M.Sc. Student, Department of Horticultural Sciences, Faculty of Agriculture, University of Zanjan, Zanjan, Iran
2. Assistant Professor, Department of Horticultural Sciences, Faculty of Agriculture, University of Zanjan, Zanjan, Iran
3. Associate Professor, Department of Horticultural Sciences, Faculty of Agriculture, University of Zanjan, Zanjan, Iran
4. PH.D. Student, Department of Horticultural Sciences, Faculty of Agriculture, University of Tabriz, Tabriz, Iran

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Abstract

Salinity is one of the most important environmental stresses that affect plant growth. In order to study the effect of Salicylic Acid (SA) on some physiological characteristics of basil under salinity conditions, the experiment was set out as a factorial design in the base of RCBD with three replications. Treatments consisted of four NaCl salinity levels (0, 50, 100, 150 mM), salicylic acid at three levels (0, 0.25, 0.5 mM) and two cultivars of basil (purple and green). Results showed that salinity significantly decreased amount of chlorophyll, carotenoid and leaf relative water content. Application of SA increased amounts of chlorophyll, carotenoid and leaf relative water content. The amount of proline, stomatal resistance and electrolyte leakage in leaves increased significantly under salinity condition and decreased with treatment of salicylic acid. The highest amount of chlorophyll b (0.617 mg/g FW^{-1}) and the minimum electrolyte leakage (30.4 percent) was observed with application of 0.5 mM SA under of 0 mM NaCl concentration in green and purple basil cultivars, respectively. Also, the maximum content of proline (11.4 µg/g FW^{-1}) and the lowest rate of stomatal resistance (7.8 s/cm^{-2}) were obtained under 150 mM NaCl in purple and green basil cultivars, respectively. According to the results, application of salicylic acid can be proposed to improve plant growth under salinity conditions.

Keywords: Chlorophyll, Electrolyte leakage, Proline, Stomatal resistance, Treatment.

Corresponding Author: Tbarzega@znu.ac.ir