

Research Paper

Effect of different levels of sodium nitroprusside on some morphological and physiological characteristics of three grapevine cultivars under drought stress conditions

Bahram Abedi¹, Mehdi Aran^{2*}, Ali Tehranifar¹, Mehdi Parsa³, Sohrab Davarpanah¹ and Ayoub Mazaraie⁴

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Abstract

This study was conducted in 2015 as a factorial based on randomized complete block design with four replications to assess the effects of sodium nitroprusside on reducing the drought damage on morphological and physiological parameters of three grapevine cultivars (Yaghooti, Askari and Bidane sefid). Water deficit treatments were applied at four levels including: full irrigation (100% FC), moderate stress (60% FC), severe stress (30% FC) and re-irrigation after severe stress treatment and foliar application of sodium nitroprusside (SNP) (at 0, 0.5 and 1 mM). Water stress decreased plant height, stem diameter, chlorophyll content, relative water content and membrane stability, whereas significantly enhanced total soluble sugars, carotenoids, proline content, guaiacol peroxidase, ascorbic peroxidase and catalase activities. Based on the responses of cultivars to different levels of drought stress, it can be concluded that Yaghooti seems to be a more resistant cultivar to water stress compared to Askari and Bidanese fid cultivars. Foliar applications of SNP significantly decreased the negative effects of water stress in grapevine cultivars and increased plant height, stem diameter, chlorophyll content, relative water content, membrane stability, total soluble sugars, carotenoids, proline content, guaiacol peroxidase, ascorbic peroxidase and catalase activity. Therefore, application of SNP (especially at 0.5 mM) can reduce adverse effects of drought stress and improve growth in grape cultivars.

Keywords: Antioxidant enzymes, Foliar application, Photosynthetic pigments, Proline

1- Assistant Professor, Professor and Ph. D. Student respectively, Department of Horticultural Science, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran

2- Professor, Department of Horticultural Science, Faculty of Agriculture, University of Zabol, Zabol, Iran

3- Associate Professor, Department of Agronomy, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran

4- Ph. D. Student, Department of Biotechnology, Faculty of Agriculture, University of Zabol, Zabol, Iran

* Corresponding author E-mail: mehdiaran@uoz.ac.ir

Research Paper

Effect of postharvest treatment with gamma-aminobutyric acid and salicylic acid on some biochemical characteristics of 'Shablon' plum

Behrouz Hemmatjou^{1*}, Mohammadreza Asghari² and Hamid Hassanpour³

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Abstract

Plums are highly perishable and deteriorate quickly during storage and shelf life. On the other hand the use of chemicals in postharvest technology of horticultural products is highly limited and it is necessary to introduce natural and safe methods to maintain the safety of food products. In this experiment, the effect of postharvest treatment with gamma aminobutyric acid (GABA) (at 0, 10 and 20 mM) and salicylic acid (at 0, 1 and 2 mM) during 16 and 34 days of storage at $1 \pm 0.5^{\circ}\text{C}$ with 85 to 95% RH on some biochemical indices of plum fruit was studied. The study was carried out as a factorial completely randomized design with four replications. Biochemical indices including catalase enzyme activity, phenylalanine ammonia-lyase (PAL) enzymes activity, total phenolics and total flavonoid content were measured after 16 and 34 days of cold storage plus 24 H at 25°C . Combination of GABA and salicylic acid significantly maintained fruit total phenolic and total flavonoid contents and enhanced PAL enzyme activity, and treatment with salicylic acid at 2 mM increased catalase enzyme activity in comparison to the control and other treatments. Overall, results revealed that the use of GABA and salicylic acid treatments can maintain the quality of "Shablon" plum fruit during cold storage.

Keywords: Antioxidant capacity, Catalase enzyme, PAL enzyme, Total flavonoid

1- Former M. Sc. Student, Department of Horticultural Science, Faculty of Agriculture, Urmia University, Urmia, Iran

2- Professor, Department of Horticultural Science, Faculty of Agriculture, Urmia University, Urmia, Iran

3- Associate Professor, Department of Horticultural Science, Faculty of Agriculture, Urmia University, Urmia, Iran

* Corresponding author E-mail: hemmatjo.b71@gmail.com

Research Paper

Evaluation of some morphological, biochemical and antioxidant properties of some mandarin cultivars**Azam Seyedi^{1*} and Sedigheh Afsharipour²**

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Abstract

In the present study, the biochemical and morphological differences of fruit in eight cultivars of mandarin (Orlando Tangelo, Wakiva, Dansi, Honey, Kara, Wilking, Farichid, and Ferement) were investigated. Also, antioxidant capacity and chlorophyll and carotenoid pigments of the juice were evaluated in six cultivars (Orlando Tangelo, Wakiva, Dansi, Honey, Kara and Wilking). The experiment was conducted in a completely randomized block design with three replications. The results showed that the different cultivars had significantly different characteristics. Wakiva cultivar had the highest content of vitamin C, antioxidant capacity, flavor index, pH, and skin thickness and lowest titrable acidity among other cultivars. The highest total soluble solids content belonged to Wheeling cultivar, which wasn't significantly different with Wakiva cultivar. Kara cultivar had the highest weight, diameter, length, and volume, while Ferement cultivar had the best shape index among other cultivars. In addition, Wakiva cultivar had the best nutritional quality due to higher vitamin C (117.04 mg ascorbic acid per 100 ml juice), antioxidant capacity (45.62%) and flavor index, and was the best for transportation and handling due to peel thickness. Vitamin C content in Wakiva was 82.46% more than Hani cultivar. Kara and Ferment cultivars, having larger and wider fruits, respectively, had better overall quality and were more marketable than other cultivars. Although Hani cultivar due to smallest fruits and lowest vitamin C had a lower marketability and edible quality, but due to having the highest carotenoid pigments, it had higher juice quality and may be recommended for processing in the juice industry.

Keywords: Carotenoid, Flavor index, Skin thickness, Total soluble solids, Vitamin C

1- Assistant Professor, Department of Horticultural Science, Faculty of Agriculture, University of Jiroft, Jiroft, Iran

2- B.Sc. Graduate, Department of Horticultural Science, Faculty of Agriculture, University of Jiroft, Jiroft, Iran

* Corresponding author E-mail: a.seiedi@ujiroft.ac.ir

Research Paper

Effect of climate change on the phenology of ‘Bidaneh Sefid’ table grape variety in West Azerbaijan province**Somayeh Hejabi^{1*}, Hamed Abasalinezhad Sheramin² and Hamed Doulati Baneh³**

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Abstract

Increasing temperature in recent years has led to changes in plants development cycle and the projections of Intergovernmental Panel on Climate Change (IPCC) implies significant increase of temperature by century 21. Table grape, as one of the most important crops in the world, is a greatly sensitive crop to temperature changes. Thus, assessing the response of grape phenology to temperature changes provides a suitable field for evaluating the varieties and adopting better decisions toward adaptation strategies for climate change. In this study, the phenological responses of the ‘Bidaneh Sefid’ grape variety to temperature increase under RCP8.5 scenario was assessed in West Azerbaijan province. The comparison of the phenological phases occurrence during two future periods of 2021-2050 and 2071-2100 with historical period of 1976-2005 reveals the decrease in the phenological intervals. Moreover, the growing season length in short and long term future will decrease about 10 and 40 days in comparison with the historical period. According to the differences of grape varieties in response to the temperature changes and also different affectability of diverse microclimates from global warming, assessing the simultaneous contribution of grape varieties and microclimates is recommended for the future studies in this province.

Keywords: Growing season, RCP8.5 scenario, Temperature increase

1- Assistant Professor, Department of Water Engineering, Faculty of Agriculture, Urmia University, Urmia, Iran

2- Meteorology Expert of Agricultural Meteorology Research Agency, Meteorological Administration of West Azerbaijan Province, Iran

3- Associate Professor, Horticulture Crops Research Department, Research and Education Center of Kurdistan, Agricultural and Natural Resources Research Center, AREEO, Sanandaj, Iran

* Corresponding author E-mail: s.hejabi@urmia.ac.ir

Research Paper

Evaluation of drought tolerance of some selected Mahaleb genotypes in greenhouse conditions

Allahverdy Rashidi¹, Ebrahim Ganji Moghadam^{2*}, Maryam Tatari³
and Mahbube Zamanipour⁴

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Abstract

Mahaleb is used as a rootstock for sweet cherries and sour cherries. In order to investigate the tolerance of different genotypes of Mahaleb to drought stress, a factorial experiment was conducted in a completely randomized design with three replications in the greenhouse of the Horticultural Research Center of Khorasan Razavi Agricultural and Natural Resources Research Center. The experimental factors consisted of 10 genotypes and 4 drought stress levels (25, 50, 75 and 100% of field capacity). Result showed that all Mahaleb genotypes were affected by drought, but their response to stress were different. With increasing drought stress, proline and soluble carbohydrates increased and its content varied in different genotypes, so that DM-135, DM-164 and DM-69 genotypes produced the highest amount of proline and soluble carbohydrates under stress conditions. With increasing drought stress, survival rate, height and number of leaves decreased and this decrease was related to genotype type. In general, DM-69, DM-164 and DM-135 genotypes were identified as the most resistant genotypes, due to the existence of drought tolerance mechanisms and DM-277 was the most sensitive genotype.

Key words: Drought stress, Proline, Soluble carbohydrates, Survival percentage

1- M.Sc. Student of Horticulture Science, Shirvan branch, Islamic Azad University, Shirvan, Iran

2- Associate Professor, Crop and Horticultural Science Research Department, Khorasan Razavi Agricultural and Natural Resources Research and Education Center, AREEO, Mashhad, Iran

3- Assistant professor, Department of Agriculture, Shirvan branch, Islamic Azad University, Shirvan, Iran

4- Assistant Professor, Department of Agriculture, Engineering and Technical Faculty, Velayat University, Iranshahr, Iran

* Corresponding author E-mail: eganji@hotmail.com

Research Paper

Effects of alternate bearing on some quantitative and qualitative parameters of olive fruit and oil**Hajar Rezaei Kallaj¹, Asghar Ebrahimzadeh^{2*}, Ali Soleimani³
and Lemia Vojodi Mehrbani⁴**

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Abstract

Alternate bearing is one of the most important physiological phenomenon that in addition to uneven production during different years, reduces the yield and quality of the olive. In this study, the effect of alternate bearing on some fruit and oil parameters was investigated. According to the results of this study, some of the olive fruit parameters including mean weight and mean fresh and dry weight of fruit, fruit length and diameter and fruit volume and quality parameters such as phenolics, anthocyanin, carotenoids and flavonoids contents are affected by alternate bearing. Considering the fact that olive is a dual purpose product, the qualitative parameters (free fatty acid (FFA), peroxide and spectrophotometric indices) of olive oil was also studied. The results showed that free fatty acid content was affected by alternate bearing and was higher in off years, but peroxide was not affected by alternate bearing.

Keywords: Alternative bearing, Anthocyanin, Free fatty acid, Fruit quality, Olive oil

1- Former M.Sc. Student, Department of Horticultural Sciences, University of Maragheh, Maragheh, Iran

2- Assistant Professor, Department of Horticultural Sciences, University of Maragheh, Maragheh, Iran

3- Associate Professor, Department of Horticultural Sciences, Zanjan University, Zanjan, Iran

4- Assistant Professor, Department of Agronomy and Medicinal plants, Azarbaijan Shahid Madani University, Tabriz, Iran

* Corresponding author Email: acebrahimzadeh@gmail.com

Research Paper

Effect of Guar gum and *Aloe vera* edible coatings on postharvest life of mango fruit (*Mangifera indica*)**Fariba Ebrahimi¹, Somayeh Rastegar^{2*} and Heidar Meftahizade³**

(Received: Jun. 26, 2019 - Accepted: Oct. 15, 2019)

Abstract

Mango (*Mangifera indica*) as the most important tropical fruits, has a high nutritional and economic value. As a climacteric fruit, the rate of its ripening process is high and the fruit has a short shelf life. This research was conducted to study the quality and nutritional properties of mangoes during storage at 12 °C in response to Guar gum and *Aloe vera* treatments. The treatments used in this study included 1% Guar gum, *A. vera* gel at 20%, and the combination of these two treatments. After 4 weeks of storage, various quantitative and qualitative characteristics of the fruits were evaluated. The lowest TSS and the highest flavor index were found in 20% *A. vera*. The highest level of firmness was observed in the fruits treated with *A. vera* and the highest amount of ascorbic acid and flavonoids were found in combination of Guar gum and *A. vera* treatments. Fruit coated with *Aloe vera* gel showed lower weight loss than the control fruit. Fruits treated with different coatings and control did not show significant differences in antioxidant activity and total phenol content. Fruit coated with *A. vera* gel fruits had more green peel than the control and other treatments. Based on the results, the use of these edible coatings can have an effective role in maintaining the nutritional value of mango fruit during storage.

Keywords: Coating, Mango, Organic, Postharvest, Tropical

1- Former M.Sc. Student, Department of Horticultural Science, College of Agriculture Hormozgan University, Hormozgan, Iran

2- Associate Professor, Department of Horticultural Science, College of Agriculture Hormozgan University, Hormozgan, Iran

3- Assistant Professor, Department of Horticultural Science, College of Agriculture Ardakan University, Ardakan, Iran

* Corresponding author E-mail: srastegar2008@gmail.com

Research Paper

Improvement of some quality parameters of ‘Golden Drop’ plum fruit by no-silica particles and calcium chloride foliar application**Yusuf Farrokhzad^{1*}, Yavar Sharafi², Seyed Jalal Tabatabai³ and Mehri Salimi⁴**

(Received: Aug. 8, 2019 - Accepted: Nov. 21, 2019)

Abstract

Postharvest losses of agricultural crops is high in Iran and it necessary to consider postharvest management. In order to investigate the effect of foliar application of calcium chloride and silica nanoparticles on of Golden Drop plum fruit quality attributes, a field study was conducted in the research orchard of Shahed University. The experiment was carried out as a completely randomized design with combination treatments of calcium chloride and silica nanoparticles with 4 replications. Treatments were included 4 levels of calcium chloride (0, 500, 1000, 2000 mg/L) and 3 levels of silica nanoparticles (0, 200, 400 mg/L). Control tress were sprayed with distilled water. The results showed that all combination treatments had a significant effect on fruit characteristics including fruit fresh weight, firmness, length and diameter, total soluble solids (TSS), Vitamin C, pH and titratable acidity (TA). Nano-silica at 200 mg/Lin combination with 1000 mg/L calcium chloride and nano-silica at 400 mg/L in combination with 1000 mg/L calcium chloride showed the highest effect on improving fruit qualities and morphological characteristics. It seems that foliar application of calcium chloride and silica nanoparticles can improve the quality attributes of plum fruits at harvest leading to enhanced postharvest life.

Keywords: Pre-harvest, Qualitative characteristics, Titratable acidity, Vitamin C

1- Ph.D. Student, Department of Horticultural Sciences, Tarbiat Modares University, Tehran, Iran

2- Associate Professor, Department of Horticultural Sciences, Shahed University, Tehran, Iran

3- Professor, Department of Horticultural Sciences, Shahed University, Tehran, Iran

4- M.Sc. Student, Department of Horticultural Sciences, Shahed University, Tehran, Iran

* Corresponding author E-mail: Farrokhzadyusuf@gmail.com

Research Paper

Effect of foliar spray with a fertilizer containing amino acids and seaweed extract on quality and yield components of 'Ahmad Aghaei' pistachio**Saber Torab Ahmadi¹, Bahram Abedy^{2*} and Seyed Farhad Saberli³**

(Received: Jun. 24, 2019 - Accepted: Nov. 2, 2019)

Abstract

Pistachio is one of the most important nut crops that has a special place among agricultural products. In recent years, the rate of yield production in Iran was less than that of global amounts, which the plant nutritional problems are of the most important reason for that. Present study was conducted to evaluate the effect of foliar spray with amino acids and seaweed extract on yield and quality of pistachios (cv Ahmad Aghaei). The experiment was carried out as a factorial randomized complete block design with three replications. Treatments was spraying with amino acids (aminosauren) and seaweed (*Ascophyllum nodosum*), both at three levels (0, 1 and 2 mg/L). Among the treatments, aminosuren had more positive effects on the yield of pistachio, than the algae extract of *Ascophyllum*. Different concentrations of amino acids and seaweed extracts showed significant effects on leaf area and pistachio yield compared with the control samples. Based on the results, combination treatment of aminosuren and seaweed at a concentration of 2 mg/L had the best effect on yield (4.58 kg/tree), leaf area (109/8 cm²) and nut weigh (18.8 ounces). Finally, according to the results of this study, the combined fertilizer containing amino acids and seaweed can play a significant role in improving the yield and quality attributes of pistachio.

Keywords: Aminosuren, Leaf area, Leaf iron, Owns, Spraying

1- M.Sc. Student, Department of Horticulture, Ferdowsi University of Mashhad, Mashhad, Iran

2- Assistant Professor, Department of Horticulture, Ferdowsi University of Mashhad, Mashhad, Iran

3- Assistant Professor, Department of Horticulture, Torbat-e Jam High Educational Complex, Torbat-e Jam, Iran

* Corresponding author E-mail: abedy@um.ac.ir

Research Paper

Effect of different culture medium types and benzyl adenine concentrations on Cornelian Cherry (*Cornus mas* L.) shoots proliferation rate**Navid Rezvanjoo¹, Alireza Ghanbari^{2*}, Mehdy Mohebodini³, Mousa Torabi-Giglou⁴,
Hamidreza Hydari⁵ and Roholla Haghjooyan⁶**

(Received: Dec. 22, 2019 - Accepted: Jan. 28, 2020)

Abstract

Cornelian cherry (*Cornus mas* L.) is one of the *Cornus* species members belonging to Cornaceae family. It is one of the native shrubs of the central and north-western parts of the Alborz Mountains in Iran. This study was conducted with the aim of establishment and proliferation of Cornelian cherry shoots with under invitro culture of lateral buds. For this purpose, two types of WPM and QL mediums and four levels of benzyl adenin (BA) (0, 0.5, 1 and 2 mg/L) with constant concentration of 0.5 mg/L of IAA for all replicates were used in a factorial experiment base on a completely randomized design with 5 replications. The highest proliferation indices, including number of shoots (4.79 for each sample), shoots length (1.41 cm) and number of nodes (32.5 for Each sample) was recorded at a concentration of 1 mg/L BA in QL medium. Also, the results of correlations between traits showed that all traits were positively and significantly correlated at $p \leq 5\%$ level. Considering the proliferation factors, the results showed a significant difference with the control group, and the positive and significant effect of benzyladenine and QL medium on the proliferation of cornelian cherry shoots is reported.

Keywords: Establishment, *In vitro* culture, Lateral bud, Plant growth regulator

1- M.Sc. Student, Department of Horticultural Sciences, University of Mohaghegh Ardabili, Ardabil, Iran

2, 3- Associate Professor, Department of Horticultural Sciences, University of Mohaghegh Ardabili, Ardabil, Iran

4- Assistant Professor, Department of Horticultural Sciences, University of Mohaghegh Ardabili, Ardabil, Iran

5- Ph.D. student, Department of Horticultural Sciences, University of Mohaghegh Ardabili, Ardabil, Iran

6- Assistant Professor, Department of Horticultural Research Institute, Karaj, Iran

* Corresponding author E-mail: ghanbari66@uma.ac.ir

Research Paper

Evaluation of some physio-chemical proprieties of eight local pomegranate cultivars grown in Najaf-Abad region of Isfahan

Rasoul Jalali Jalalabadi¹ and Hossein Ali Asadi-Gharneh^{2*}

(Received: Oct. 15, 2019 - Accepted: Jan. 13, 2020)

Abstract

Pomegranate (*Punica granatum* L.) is one of the oldest edible fruits with high variability and is native to Iran. This research was conducted to evaluate the morphological and biochemical characteristics of eight local pomegranate cultivars including Aliakbari, Gar, Post ghermez, Golabi, Sorahi, Mirzaei, Yazdani and Lopsorkhi grown in Najaf-Abad region of Isfahan. Pomegranate fruits were harvested at full maturity stage and the considered traits were measured according to standard methods. Among the studied cultivars, the Post ghermez cultivar had the highest 100 aril (45.2 g) fresh weight. The highest fruit peel thickness (4.71 mm) was measured in Gar cultivar. Aliakbari cultivar had the highest amount of total anthocyanin content (1.41 mg/100 g), total phenolic content (58.56 mg/100 g) and titratable acidity (1.06 mg/100 g). The highest phenotypic variation was seen in harvest index, and Lopsorkhi and Aliakbari cultivars had the highest and lowest values for this trait, respectively. Overall, Aliakbari and Sorahi cultivars due to the highest favorable traits can be introduced as the elite cultivars.

Keywords: Maturity index, Phenolic content, Total anthocyanin, Vitamin C

1- M.Sc. Student, Department of Horticulture, Faculty of Agriculture, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran

2- Assistant Professor, Department of Horticulture, Faculty of Agriculture, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran

* Corresponding author E-mail: h.asadi@khusif.ac.ir

Research Paper

Effect of drought stress on some morphophysiological traits of some Iranian and foreign commercial grape varieties**Hamed Doulati Baneh^{1*}, Jamal Ahmadali² and Mousa Rasouli³**

(Received: Nov. 13, 2019 - Accepted: Jan. 12, 2020)

Abstract

Drought is the most important abiotic stress limiting the agricultural crops growth and productivity. Grapevine (*Vitis vinifera*. L) tolerance to drought is higher than that of most of other trees, but there are many differences between grape varieties for drought tolerance. This study was carried out as a completely randomized design to evaluate the tolerance of some commercial grapevine cultivars imported from the other countries and several native grapes of West Azarbaijan province. One year old seedlings of studied cultivars (Rasha, Mam Braima, Yaghooti, Askari, Khalili sefid, Fakhri, Sayani, Rish baba, At ouzum, Black seedless, Superior, Flame seedless, Thompson seedless, Fiesta and Perlette) were cultivated in pots and subjected to drought treatments (35, 55 and 75 %). After a drought stress for three months, the morphological traits, such as stem fresh weight, root fresh weight, stem and root dry weight, leaf area and physiological characteristics such as chlorophyll content, RWC, leaf temperature were measured. The results of this study showed that there was a significant difference between the traits of studied grape cultivars under stress conditions. Fiesta and Block Seedless were very sensitive to drought condition, while the Khalili, Rasha, and Yaghooti cultivars were able to withstand the stress conditions. Among the imported cultivars, Perlette and Flame seedless showed a relatively good tolerance to drought stress.

Keywords: Adaptability, Drought stress, Grape, Leaf temperature, Rasha

1- Associate Professor, Horticulture Crop Research Department, Research and Education Center of Kurdistan Agricultural and Natural Resources Research Center, AREEO, Sanandaj, Iran

2- Assistant Professor, Agricultural Engineering Research Department, Urmia Agricultural and Natural Resources Research and Education Center, AREEO, Urmia, Iran

3- Associate Professor, Department of Horticultural Science and Landscape, Faculty of Agriculture, Malayer University, Malayer, Iran

* Corresponding author E-mail: ah_dolati@yahoo.com

Research Paper

Effect of fertilizing with potassium sulphate and iron chelate on nutrient uptake and vegetative traits of 'Red Delicious' apple

**Keyvan Jahanshahi Anboohi¹, Hanifeh Seyed Hajizadeh^{2*}, Arash Hemmati³,
Peyman Abbasi¹ and Sara Rezaie¹**

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Abstract

Fertilization is one of the most important management tools in horticulture playing an important role in nutrition of fruit trees in order to improve the yield and quality. A factorial randomized complete block design experiment with 3 replications was conducted to investigate the effects of potassium sulphate (0, 50, 100 and 150 g/tree) and iron chelate (0, 10, 20 and 30 ml/tree) during Red Delicious apple tree growth. Some traits including branch length, chlorophyll index, fruit length and width, fruit weight, fruits number, leaf area index and concentration of some nutrients in leaves were measured. The results showed that potassium sulfate and iron chelate improved all growth traits. Potassium sulfate and iron chelate showed a positive and significant increase in yield. With increase in concentration of potassium sulfate, the amount of phosphorus and potassium in leaves was increased, while iron chelate decreased the amount of phosphorus. The highest amount of magnesium was observed in the absence of potassium sulfate treatment and treatment with 30 cc of iron chelate. The highest amount of iron was observed in the case of treatment with 20 and 30 cc of iron chelate with no potassium sulphate application. Also, with the application of potassium sulfate fertilizer, the amount of calcium and copper in the leaves was decreased. Fertilization had no significant effect on the concentration of nitrogen, zinc and manganese in the leaves.

Keywords: Fertilizer placement, Iron chelate, Leaf nutrients, Potassium sulphate, Yield

1- M.Sc. Student, Department of Horticulture, Faculty of Agriculture, University of Maragheh, Maragheh, Iran

2- Associate Professor, Department of Horticulture, Faculty of Agriculture, University of Maragheh, Maragheh, Iran

3- Ph.D. Student, Department of Soil Sciences and Engineering, Faculty of Agriculture, University of Tabriz, Tabriz, Iran

* Corresponding author E-mail: hajizade@maragheh.ac.ir

Research Paper

Assessment, identification and ranking of the apple hybrids for the precocious, early and mid-ripening, and crop yield**Narjes Malaee¹, Hassan Hajnajari^{2*} and Seyed Ali Peyghambari³**

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Abstract

In order to produce mid and early-ripening apple varieties, 44 cross combinations were done between selected parents (years 2004-2005) among which 7000 full-sib and half-sib progenies were selected. The selection process at juvenile phase by use of morphological markers method resulted in 720 superior hybrids. Hybrid orchard was established in Meshkin-abad (located in Karaj, Iran) horticulture research station (year 2008). Finally, 566 trees were remained and left to grow. The present study was conducted to evaluate the flowering phenology, ripening time, precocity, flower density and fruiting habit of 566 first offspring of 6-7 year-old during 1392 and 1393. The percentage of fruit set was assessed in two stages by counting the number of fruiting branches and the number of fruits per tree. At the end of the growing season, 17 early and med ripening genotypes were identified. Fruit evaluation experiments including biochemical traits and pomological traits were performed according to D.U.S tests. For 17 selected hybrids, simple cluster analysis was performed in terms of all quantitative and qualitative traits and the degree of correlation of the traits was determined. Based on the results of cluster analysis by Ward method, all selected results were divided into 3 groups. A significant positive correlation was observed between fruit weight and fruit length and diameter and a significant negative correlation was observed between fruit weight and TSS and TA at the $p \leq 1\%$ level.

Keywords: Apple, Genetic improvement, Progeny evaluation, Early-ripening cultivars, Precociousness

1- B.Sc. Graduate, Department of Horticultural Science, Islamic Azad University, Science and Research Branch, Tehran, Iran

2- Research Associate, Research Institute of Temperate and Cold Fruits Research Institute, Horticultural Research Institute, Agricultural Education and Extension Research Organization, Tehran, Iran

3- Professor, Department of Agriculture and Plant Breeding, Faculty of Agricultural Sciences and Engineering, Campus of Agriculture and Natural Resources, University of Tehran, Tehran, Iran

* Corresponding author E-mail: hajnajarih@gmail.com