



Effect of Plant Density and Planting Pattern on Yield and Yield Components of Iranian Ox-Tongue (*Echium amoenum* Fisch. & Mey.) in Guilan Province

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Abstract

To study the effect of plant density and planting pattern on Iranian ox-tongue, an experiment carried out with two factors: planting pattern (square and rectangular pattern) and plant density (2, 4, 6, 8 plant m⁻²) in a factorial test performed based on RCBD in 3 replications during 2009-2010 in Latmahalleh Eshkevarat village in Guilan province, Iran. Characteristics that measured included: dry flowers yield, plant dry-weight, number of inflorescence per plant, number of flower per inflorescence, plant height and flower length. The results indicated that effect of plant density on dry flowers yield, plant dry weight, number of inflorescence per plant, number of flower per inflorescence and flower length ($P < 0.01$) and on plant height ($P < 0.05$) was significant. Planting pattern and interaction of plant density and planting pattern were not significant on the measured characteristics. The highest dry flower yield per unit area obtained in density of 6 plants m⁻² (791.2 kg ha⁻¹), while planting pattern did not significance affect on dry flower yield. Also, the highest dry flower weight of single plant, plant dry weight, number of inflorescence per plant, number of flower per inflorescence, flower length and plant height obtained in density of 2 plants m⁻².

Keywords: Medicinal plant, Iranian ox-tongue, Dry flower yield, Inflorescence, Plant height, Length of flower

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Possibility of Tissue Culture in *Pseudohandelia umbellifera* (Boiss.) Tzvel

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Abstract

Pseudohandelia Tzvel. belongs to the Asteraceae family with only one species. It is endemic to Khorasan Province in Iran. Having partially big and beautiful inflorescences make it a proper choice in urban green space especially in case of mass culture. In this research, to investigate possibility of micro propagation of this plant two separate experiments were designed. To obtain non contaminated explants, seeds were cultured in MS media in February 2009. After about two months a few healthy plants as stock plants for use in later stages produced through subculture. In the first stage, to evaluate amount of callus production, a factorial experiment based on a randomized complete design with two factors conducted. The first factor was 12 different hormone levels (including BAP, IAA, KN and 2,4-D with different concentrations) and second factor was explants type (including leaf, apical and lateral buds as a explants) making 36 treatments in total. In the second stage to induce stem on produced callus a randomized complete design with 34 treatments (including mentioned hormonal treatments, base MS media and different explants) was used. At the end the callus with stems were transplanted to a MS media containing IBA for root production. The results of the first experiment showed callusogenesis response to above hormonal treatments was seen in this plant with the exception of 2,4-D. Significant difference among the means of hormonal treatments for fresh weight of induced callus was observed. The result of the second experiment showed limited treatment could produce stem and most of treatments just produce callus. Also those samples that produced stem, a few could produce root in MS media.

Keywords: Ornamental, Native Plants, *Pseudohandelia umbellifera*, Tissue Culture, Explant

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Evaluation the Efficiency of Scar Marker SCC8 in Identifying Grape Seedless Cultivars and Progenies

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Abstract

Seedlessness is the most important trait in table grape and raisin industry which has attracted breeders from long ago. Breeding grapes by traditional methods result in low number of seedless progenies and their selection requires long time. Therefore, marker-assisted selection (MAS) can overcome the selection difficulty and would decrease high cost of progeny maintenance for several years. In this study, SCC8 marker was employed to evaluate its efficiency in early discrimination of seedless progenies as well as the status of *sdI* gene in seedless and seeded important Iranian grape cultivars. To do so, 11 progenies which were realized as seedless by panel test, were evaluated Scar marker Scc8. According to the results, Scar marker Scc8 could identify 10 of them as homozygous seedless and just one as homozygous seeded. This marker could also identified 'Muscat of Hamburg', 'Dastechin', 'Shahani', 'Sahebi', 'Khalili', 'Alibaba', 'Qhezel Ozum', 'Dizmari' and 'Shirazi Qermez' as homozygous seeded cultivars whereas 'Atabake', 'Shahroudi' and 'Toloqi' were found to be heterozygous seeded ones. It can be concluded that Scar marker SCC8 could discriminate seedless progenies as well as cultivars and their *sdI* gene status correctly in most cases (87.5%).

Keywords: Grape breeding, Seedlessness, Scar marker, Early discrimination of seedless progeny

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Study of Some Fruit Index of Golab Apple Ecotypes in Khorasan Razavi Province

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Abstract

Cross pollination in some of apples cultivar exists; also Iran is near the origin of apple trees so, large genetic diversity can be seen between Iranian cultivar. Also very famous apple cultivar is known in Iran for special flavor and taste. The name of this cultivar is Golab. This research was studied in the years 2010 and 2011 in Khorasan Razavi Province on Golab apple ecotypes to evaluate characteristics of Golab apples in Khorasan region, providing keywords for Identification, collect valuable ecotypes, preventing extinction and also use in apple breeding. Ecotypes were including: Golab Torbat Heidariyeh, Golab Sabz Pishras, Golab Kermanshah, Golab Kohanz, Golab Bahareh Shoghan. 31 qualitative and quantitative traits about fruit characteristics in a completely randomized design with 10 replicates to valuate these ecotypes were investigated. Average comparison showed that the greatest variability between cultivars was at the traits like: fruit weight, fruit firmness, fruit skin thickness, pH and TSS. The correlation results showed that the most significant positive correlation exists between fruit weight and stylar end width (0.92 ± 0.06), fruit tail and fruit weight (0.87 ± 0.07), Length to width ratio of fruit with fruit weight (0.85 ± 0.08).

Keywords: *Malus domestica*, Genetic variation, Traits correlation, Qualitative traits, Quantitative traits

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Postharvest Effect of Salicylic Acid, Chitosan and Storage Time on Some Quality and Quantity Attributes of Fresh Harvested Selva Strawberry Fruit

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Abstract

The effect of different concentration of salicylic acid (0, 1 and 2 mmolL⁻¹) and chitosan (0, 0.5 and 1 percent) on postharvest life and quality of Selva strawberry fruit during storage at 2.5±0.5°C with 85-95% RH for 7 and 14 days was studied. Decay incidence, marketability, total soluble solids, total acidity, vitamin C content and total antioxidant activity were evaluated during storage. chitosan 1% significantly decreased decay incidence and maintained fruit marketability. 1mmolL⁻¹ of salicylic acid in combination with 1% chitosan significantly retained fruit soluble solids, vitamin C content and total antioxidant activity and was more effective on total antioxidant activity during first week of cold storage. 1 and 2 mmolL⁻¹ salicylic acid retained total acidity.

Keywords: Chitosan, Strawberry, Salicylic acid, Storage life, Total antioxidant activity

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Effect of Pruning and Nutrition on some Quantitative and Qualitative Characteristics of Pomegranate (*Punica granatum* L. cv. Robab)

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Abstract

Pomegranate is one of the major horticultural crops in Iran, but studies about this product; especially its pruning is very little. Therefore this study was carried out to assess the effect of pruning and nutrition on pomegranate cultivar “Robab” in Qaemieh, Fars province during 2008-2009. This research was conducted factorial experiment based on randomized complete block design (RCBD) with 5 pruning treatments (P1, P2, P3, P4, P5) and 3 levels of NPK (0, 250 and 500 gr per tree). Our results showed that yield, juice volume, fruit and aril weight had negative correlation with pruning severity, but had positive correlation with NPK fertilization rate, as trees with P3 pruning treatment receiving fertilizer had Yield, juice volume, fruit and aril weight more than other treatments. Fruit skin thickness had negative and positive correlation with nutrition and pruning rate, respectively. Nutrition had no significant effect on total soluble solid (TSS), while all pruning treatments increased fruit total soluble solids. Pruning reduced the amount of citric acid. Also, there was direct relationship between titratable acidity (TA) and ascorbic acid with nutrition.

Keywords: Pomegranate, Qaemieh, NPK fertilizer, Total soluble solid (TSS), Aril weight

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Effect of Humic Acid and silver nanoparticles Treatments on Extending Vase Life of Cut *Polianthes Tuberosa* L. cv Single Flowers

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Abstract

Tuberose flower (*Polianthes tuberosa* L.) is an important commercial cut flower in the world, however the short vase life is one of its major problems. So, an experiment was carried out by using five different levels of humic acid (HA) mixed with sucrose and seven different levels of silver nanoparticles (SNP) mixed with sucrose in vase solution on tuberose cut flowers cv. "Single". The results indicated that there were significant differences between treatments. The decline of fresh weight in flowers treated with 25, 50 and 75 mg L⁻¹ HA was fewer compared to other levels. Also, the effect of HA on vase life and water uptake index was significantly higher in 25 mg L⁻¹ HA (2.25 days more than control). SNP treatments increased the water uptake, fresh weight, total protein and declined lipid peroxidation amount compared to the control flowers. The results also showed that flowers which were treated with 1 mg L⁻¹ SNP had 2.87 days vase life more than the control flowers. To sum up it can be demonstrated that suitable levels of HA and SNP improved better morphological and physiological properties and eventually increases the vase life of cut tuberose flowers.

Keywords: Humic acid, Lipid peroxidation, Silver nanoparticles, Tuberose flower, Vase life

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Investigation of Self-incompatibility and Determinate One of the Best Pollinizer for Isfahan Commercial Quince

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Abstract

In order to determinate the self-incompatibility and the most suitable pollinizer for Esfahan commercial quince cultivar, the effects of four different pollinizer treatments ((KM1, PK2, Kvd2, NB4), as self pollination and open pollination) on fruit set and quantitative and qualitative characteristics of commercial quince fruits of Isfahan were studied in a randomized complete block design with 4 replications in quince orchards of Felavarjan region during 3 years. The results of fruit set percentage showed that the mean comparison test had a significant difference between different pollination treatments, except (KVD2, NB4). The maximum fruit set percentage was 23.42 which were related to KM1 genotype, and the minimum percentage was 8.4 which were related to the self pollinated treatment. The mean comparison of self pollinated treatments on fruit weight had a significant difference between KM1 and other treatments. The investigation of quality and quantity characteristics of fruit results showed that there was a significant difference between the Total Soluble Solids (TSS) and firmness. The KM1 genotype (Isfahan sour quince) with 80% of overlap flowering period with 23.42 % of fruit set during three years is chosen and introduced as the best pollinizer for the Isfahan quince cultivar.

Keywords: Genotype, Pollination, Self-Compatibility, Quantitative and Qualitative Characteristics, Quince.

Effect of Different Levels of Biological Fertilizers and Mushroom Compost on Flower Yield and Characteristics of Saffron Corms (*Crocus sativus* L.) in an Organic Farming System

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Abstract

In recent years the use of organic and biological modifier as an environmental friendly replacement for chemical fertilizers has been used more. In order to study the effect of different levels of biological fertilizers and mushroom compost on flower yield and characteristics of saffron corms (*Crocus sativus* L.), a split plot experiment based on RCBD design with three replications was conducted in 2009-2011 growing season in research farm of Ferdowsi University of Mashhad, Iran. Plant growth promoting rhizobacteria (use and non-use of Nitroxin) and spent mushroom compost levels (SMC) (0, 20, 40, 60, 80, 100 t ha⁻¹) were considered as the main and sub factors. The results showed that Nitroxin had positive effect on all studied traits, for example the use of Nitroxin increased number of buds per corm by 12 percent compared to the control. Based on the results, levels of 20, 60, 80 and 100 t ha⁻¹ of mushroom compost increased the total weight of corm without scale by 48, 24, 30 and 29 percent respectively compared to the control. Interaction effect of plant growth promoting rhizobacteria and different levels mushroom compost was significant on flower yield, so that in condition of use and non-use of Nitroxin, levels of 60 and 100 t ha⁻¹ mushroom compost were better than other treatments. According to the results, Nitroxin in combine with 40, 60 and 80 t ha⁻¹ mushroom compost increased stigma yield 77, 66 and 30 percent, compared to the same levels in condition of non-use of Nitroxin. In general, the results showed that it seems use of biological fertilizers and appropriate amount of mushroom compost in addition to the maintaining stability of agroecosystems, can improve quantitative and qualitative characteristics of saffron.

Keywords: Nitroxin, Organic modifier, Stigma yield, Weight of corm without scale

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The Response of Growth Charechteristic *Cucurbita pepo* var. *Rada* to Colored Mulch and Plant Spacing

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Abstract

Plastic mulches have been used in vegetable production in the most parts of the world. In order to evaluate the performance of the colored plastic mulch and different plant density on *Cucurbita pepo* var. *Rada*, an experiment was conducted in Agriculture Faculty of Ferdowsi University of Mashhad during the cultural seasons at 2010. The experiment was arranged in factorial experiment based on randomized complete design with four replications. Treatments were mulch at three levels (blue, red and without mulch) and plant spacing at two levels (120×30 and 120×40 cm). The results indicated that reducing the planting distance (120×30 cm) significantly increased the fruit weight and yield. The highest numbers of harvest and fruit yield were found in the red mulch treatment. The fruit yield per plant was 5/36, 3/57 and 2/69 kg in the red, blue mulch and control, respectively.

Keywords: Vegetable, Fruit quality, Fruit yield, Soil temperature

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Effect of Ethanol and Methanol on Some Quantity and Quality Parameters of Cut Carnation (*Dianthus caryophyllus* cv. 'Sensi') Flower

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Abstract

This research was carried out in order to evaluate the influence of different concentrations of ethanol and methanol (0, 4, 6 and 12%) and two pulse treatments (12 and 24 hour) on longevity of cut standard-carnation (Sensi cultivar) in a factorial based on randomized completely design with three replications, at Tehran University, Aboreyhan Pardis, horticulture department, during 2010. The results showed that the effect of alcohol treatments and interaction effect of alcohols and pulse on vase life were significant (at what level????), whereas solution uptake and relative fresh weight were not affected by mentioned treatments. The highest (17.33 day) and lowest (11 day) amount of carnation vase life were obtained by ethanol 12% at pulse of 12 hours and control treatments, respectively. Ethanol 6% at pulse of 24 hours, ethanol 12% and methanol 6% at pulse of 12 hours were more effective in increasing the longevity of carnation than other pulse, while in other treatments, no significant differences were observed between the pulse times. Moreover, the highest of ethylene production obtained by control, while ethanol 4% and 6% at pulse of 24 hours, ethanol and methanol 12% at pulse of 12 hours and methanol 6% at both time of pulse markedly decreased the production of ethylene and lead to significantly increase in vase life. The relative extension of flowers and relative fresh weight had a positive correlation with vase life, while solution uptake had non correlation or negative correlation with other treats.

Keywords: Ethanol, Methanol, Carnation, Vase life, Ethylene

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Comparison of Putrescine Application and Heat Treatment on Storage Quality of "Shahmiveh" and "Spadona" Pears

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Abstract

Pears are among the most important fruits in all the temperate regions in about 50 countries of the world. "Shahmiveh" and "Spadona" pears, sprayed at three stages at harvest with different concentrations putrescine (0, 0.5, 1 and 2 mM) and post harvest dipping at the same concentrations putrescine and also dip into heat treatment (40 and 50 °C and control). Fruits were stored at 0±1 °C for 5 month. The factorial experiment was conducted using a completely randomized design of three replications. During the storage period, Sampling were carried out every three weeks and some of the qualitative and quantitative traits such as surface color, weight loss, firmness, pH, titrable acidity, total soluble solids, flavor index and vitamin C were measured. Results showed in Shahmiveh ratio to Spadona cultivar was upper firmness, pH and flavor index. Hue angle, lightness, weight loss, TA and TSS in Spadona cultivar was higher than Shahmiveh cultivar. 1 and 2 mM putrescine treatments showed maximum firmness and minimum pH, TSS and flavor index in both cultivars. Heat treatment at 40 and 50 °C respectively in Shahmiveh and Spadona increased TSS and fruit flavor index. In total, Spadona with suitable quality and quantity properties for the purpose of marketing and keeping in store is better than Shahmiveh.

Keywords: Pear, Putrescine, Heat treatment, Storage life, Postharvest

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Comparison of Antioxidant Properties Among Twenty-One Iranian Native Parsley Masses In Ahvaz Conditions

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Abstract

In order to study, non-enzymatic antioxidants level of carotenoid and ascorbic acid in parsley leaves of twenty-one masses were compared between the first and second harvest. Also for evaluation of enzymatic-antioxidant activity, catalase and peroxidase activity in leaves of two twenty-one masses were measured at the end of vegetative growth. In each replication, one gram of fresh mixed leaf tissue of all samples was selected to measure the above mentioned parameters based on standard methods. , The data were analyzed in a randomized complete block design by SAS software. Results showed that the highest and lowest levels of carotenoids in the first harvest were 7.54 and 2.00 mg/100 g in Bushehr 149 and Lorestan 69 masses, respectively. The maximum and minimum levels of vitamin C in the first harvest were 0.733 and 0.039 mg/100g in Lorestan 153 and western Azarbaijan 51 masses, respectively. The highest and lowest peroxidase activity were found 3.25 and 0.11 micromole of hydrogen peroxide per minute in central mass 46 and control region (native Ahwazi) respectively. The highest and lowest catalase activity were related 0.645 and 0.006 micromole of hydrogen peroxide per minute to Eastern Azerbaijan 62 and Central 45. According to results of this study, Lorestan 153, Lorestan 69, and Hamadan 49 masses could be introduced as the best masses of antioxidant activity.

Keywords: Carotenoids, Peroxidase, Catalase, Ascorbic acid

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Amelioration of Drought Stress Damages by 5-aminolevulinic acid Application in Sweet Pepper Plants (*Capsicum annuum* L. Cv. Red Bell Pepper)

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Abstract

Drought, with negative impacts on plant growth and development, is a major abiotic stress. In order to decrease drought stress injuries and recognize red peppers tolerance physiology against drought stress in greenhouse conditions, an experiment with three levels of drought stress (irrigation at 100, 60 and 30% of field capacity) and four concentrations of 5-aminolevulinic acid ((ALA; 0, 0.25, 0.5, and 1 mM) with four replications in an experimental was 3×4 factorial experiments in a randomized completely design was conducted in greenhouse of Agricultural Faculty of Ilam University. In the end of experiments, parameters such as ascorbate peroxidase activity, total antioxidant activity, malondialdehyde content, ascorbic acid, relative water content, plant height and number of lateral buds was evaluated. The results showed that with increasing drought stress severity the growth parameters decreased significantly but ascorbate peroxidase activities, total antioxidant capacity, malondialdehyde and ascorbic acid content increased. Foliar application of AHA reduced malondialdehyde content and improved other evaluated traits. ALA protected cell membranes by reducing malondialdehyde content and lipid peroxidation. In addition, ALA with increasing ascorbate peroxidase activity, total antioxidant capacity and ascorbic acid contents in plants improved physiological traits and drought stress resistance.

Keywords: Ascorbat peroxidase, Malondialdehyde, Antioxidant capacity, Relative water content

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Effect of Harvest Time and Storage on Moro Blood Orange Fruit Quality (*Citrus sinensis* cv. Moro)

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Abstract

The different factors such as harvest time, product handling, temperature and storage duration can be influenced on the different properties of citrus fruits and has considerable economic consequences. Therefore a factorial experiment based on completely randomized design with 3 replications was performed to evaluate the effects of harvest times (start of color change, 50% of color change and full color change of fruits), storage period (0, 25, 50 and 75 days) at 7°C on total soluble solids, titrable acidity, ascorbic acid, total phenol content, flavonoid, antioxidant capacity, anthocyanin and activity of L-phenylalanin ammonia-lyase. The results showed that the harvest times and storage period had significant effect on the measured properties. So that the after 75 days of storage, peak phenylalanin ammonia-lyase activity and total flavonoid observed concomitantly with the accumulation of anthocyanin in ripe blood orange fruit but decreased antioxidant capacity and total phenol after 25 days of storage. Also, the highest vitamin C content and total soluble solids were measured in full ripening of fruits before storing and decreased after 75 days storage. So, according to changes in all of measured characteristics, the appropriate time of harvesting of Moro blood orange was the stage of commercial maturity of fruits.

Keywords: Blood orange, Harvest time, Vitamin C, Antioxidant capacity, L-phenylalanin ammonia-lyase activity, Storage

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Improvement of Growth Characteristics, Yield and Postharvest Quality of Pot Marigold (*Calendula officinalis* 'Crysantha') by Foliar Application of Humic Acid

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Abstract

To study the effect of foliar application of humic acid (HA) on morpho-physiological traits, nutrients uptake and postharvest vase life of cut pot marigold flower, an experiment was conducted with five levels of HA (0, 250, 500, 750 and 1000 ppm) based on the completely randomized design with three replications. Based on the results, in compared with control, leaf number, leaf area, total phenol content and aerial and root dry weight were significantly affected by HA. Accordingly, the highest flower number in compare with control plants was observed in 250 and 500 ppm concentrations. Also, foliar application of HA showed a significant effect on phosphorous and calcium uptake ($P < 0.05$). Flower vase life as the most important factor of postharvest quality, under foliar application of HA (250 ppm) was about 1.5 times higher than control plants. Results indicated a positive correlation between calcium absorption and flower vase life under HA foliar application. The results of the present study led to conclusion that, foliar application of pot marigold cut flower 'Crysantha' with HA despite higher cut flower production, led to increasing of postharvest vase life.

Keywords: Humic acid, Integrated plant nutrient system, Photosynthetic capacity, Vase life, Nutrient elements

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Effect of Gibberellic acid and Girdling on Fruit Characteristics of Grape 'Askari' Cultivar

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Abstract

This study was designed to investigate the effect of different concentrations of gibberellic acid and girdling to accelerate the ripening of fruit and size and improve the qualitative and quantitative characteristics of Askari grapes. This experiment was carried out in kashmar region on 2012 as factorial in a complete randomized block design with two treatments in five levels and four replications. In this experiment, the effect of gibberellic acid at two weeks after flowering, and the concentrations of 0, 50, 100, 150 and 200 ppm and girdling include control, 2 weeks before flowering and 2, 4 and 6 weeks after flowering were performed in 4 replications. Results showed that the highest yield was related to concentration of 50 ppm (19.59 kg) and the lowest yield at concentration of 200 ppm (2.223 kg). In the girdling treatment, two weeks after flowering had the greatest effect on yield (40.38 kg) and control had the lowest effect (19.78 kg). Gibberellin and girdling treatments increased the pH compare to control and the highest pH was obtained in gibberellin treatments with 200 ppm (3.85 percent) and in girdling treatment with four weeks after flowering (3.575 percent) respectively, while the lowest pH related to control (3.2 percent). Also the highest content of titratable acidity in gibberellin and girdling treatment was 200 ppm with mean of 0/913 percent and 4 weeks after flowering (0/842 percent) and lowest TSS belong to control (0/6107 percent). The highest TSS contents belong to 150 ppm gibberellin treatment and in girdling treatment related to 4 weeks after flowering and lowest content belong to control (14/75 percent).based on the results of this study we can recommended gibberellin and girdling treatments in order to enhance the qualitative and quantity features of grape cv. Askari. The girdling treatment four weeks after flowering had the greatest impact on the quality and Two weeks after flowering had the greatest impact in terms of quantity.

Keywords: Askari, GA₃, Girdling, Grape, Yeild

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