

Determination of chilling and heat requirements of grape cuttings and changes in carbohydrates and hormones during chilling period

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ABSTRACT

This research was carried out to determine the chilling and heat requirements of grapevine cultivars (Rotabi, Siah Shiraz and Yaguti) and carbohydrate and hormones changes in chilled cuttings. Uniform cuttings of above mentioned cultivars were harvested when leaves were abscised in autumn, and then transferred to refrigerator (2°C). Cuttings were subjected to 0 (unchilled control), 100, 200, 300, 400, 500 chilling hours, then cuttings were put in distilled water at room temperature and continues light conditions. Results indicated that the highest bud break percent of 'Siah Shiraz', 'Rotaby' and 'Yaguti' were obtained from 500, 400 and 400 h respectively. The shortest time (29d) to 50% bud break of 'Siah Shiraz' was in 500 h (29 d), in 'Rotabi' and 'Yaguti' were in 400 h (20 and 16d) chilling. Rate of starch content in all cultivars were decreased when chilling exposed hours increased, while soluble carbohydrate content in cuttings increased with increasing chilling hours. Also, with increasing chilling exposed hours, GA, Cytokinin and Auxin contents increased whereas ABA decreased. In conclusion, chilling requirement of 'Yaguti', 'Rotabi' and 'Siah Shiraz' cultivars were 400, 400, 500 hours and heat requirements were 4320, 5472 and 8064 GDH, respectively.

Keywords: chilling requirement, soluble carbohydrate, starch, *Vitis vinifera*.

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Evaluation of drought resistance and turf quality in some selected Tall fescue collected from different places of IRAN

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ABSTRACT

In order to identify low maintenance turfgrass, turf quality of selected entries of germination stage under drought stress were evaluated by Digital Image Analysis methods in the field conditions. The first greenhouse study examined the interaction of four different levels of soil water contents (40, 60, 80 % and 100% field capacity) on 14 *Festuca arundinacea* entries. We determined the effects of low soil moisture (80%, 60% and 40 % field capacity) on the emergence and early establishment using 14 wild *F. arundinacea* populations collected from various regions of Iran and two commercial turf cultivars. Based on results, the highest final emergence (100%) was exhibited by Isfahan accession, at 40% FC, but it was 6.7% in Quchan accession. Finally, in the last experiment, turfgrass quality and coverage in selected entry of second experiment were evaluated in the field for one year. Gonabad entry showed very good turfgrass coverage at first evaluation after mowing. However, Isfahan accession showed the best turfgrass coverage in the end of experiment. Cultivar Barvado showed the highest turf colour index. These results suggest that collected entries from Iran specifically Isfahan and Brojen entries could be used for plant breeding programs and improvement of low maintenance turfgrass in Iran.

Keywords: digital image processing, drought stress, emergence, turfgrass quality.

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Effects of foliar applications of nitrogen, boron and zinc on auxin contents, fruit set and fruit drop in orange (*Citrus sinensis*) cv. *Thompson Navel*

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ABSTRACT

In order to investigate the effect of nitrogen, boron and zinc on auxin content and fruit set in Thompson navel orange, a factorial experiment based on complete randomized block design with 12 treatments and 3 replications was conducted. Experimental treatments included: urea at three levels (0, 3 and 6 gr/L), boric acid at two levels (0 and 0.5 gr/L) and zinc sulfate at two levels (0 and 3 gr/L). The number of flower, initial fruit set, fruit-set after the June drop and the final fruit set were measured. The length and diameter of fruit and the auxin content in the abscission zone were measured. Nutrient application had a significant effect on increasing the number of flowers, percentage of initial fruit set and yield. The lowest rate of initial and final fruit drop was obtained in combined treatments, using of urea at concentration of 6 gr/L and zinc sulfate with concentration of 3 gr/L. The highest percentage of fruit set after the June drop and amount of auxin were obtained in the combined treatments of zinc sulfate (3 gr/L) plus boric acid at 0.5 gr/L which had significant positive effect on yield increment.

Keywords: citrus, final fruit set, june drop, nutrients.

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Quantitative expression analysis of CBF1 and CBF4 genes under cold stress treatments in grape cultivars “Khalili-Danedar”, “Shahroodi” in comparison with *Vitis Riparia*

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ABSTRACT

With regard to its economic importance of grapevine, study on different aspects of factors that induce hardiness to the unexpected early-season and late-season cold seems to be essential. Some of the transcription factors are essential for synthesis of proteins that are important for cold adaptation. In the present study, differences in the expression patterns of two CBF1 and CBF4 transcription factors were evaluated under cold stress conditions in the “Khalili-Danedar”, “Shahroodi” and “Riparia”. Results showed that expression of CBF1 was increased at early minutes of cold stress and “Riparia” showed higher expression compared with two other genotypes. Also the least expression was recorded for “Shahroodi” after 24 h of cold treatment. Regarding CBF4, increase in the expression was started one hour after cold treatment and similar to the CBF1, the highest expression was recorded for “Riparia”. Results of expression patterns of these two genes in “Riparia” grape showed that expression of CBF4 was about 10 fold of CBF1.

Keywords: CBF1, CBF4, cold stress, gene expression, grape, transcription factors.

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Effect of pre-harvest application of polyamines on quality and shelf life of kiwifruit cv. Hayward

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ABSTRACT

Softening and microbial activity are the most common problems of kiwifruit during storage. In order to improve these problems, pre-harvest treatments of putrescine and spermidine were studied on shelf life of kiwifruit cv. Hayward. Foliar spraying of different concentrations of putrescine (0, 1 and 2 mM) and spermidine (0, 1 and 2 mM) has been done at 40 and 20 days before harvest. Different characteristics were analyzed at 0 (before storage), 11 and 14 weeks after storage. Fruits were harvested at commercial maturity (TSS=6.2 Brix) and stored at $1.5\pm 1^{\circ}\text{C}$ and $90\pm 5\%$ relative humidity for 14 weeks. Results showed that the highest fruit firmness (3.09 kg) corresponded to concentration of 2 mM of putrescine and spermidine and the lowest value was observed (2.16 kg) in control. The lowest amount of microbial activity, malondialdehyde and weight loss was related to treated fruits. Antioxidant activity, phenolic compound and total chlorophyll were affected by the treatments and highest value belonged to different levels of putrescine and spermidine. Polyamine treatments delayed changes of various color indices, Vitamin C, total soluble solids, total acid and pH. In general, the exogenous putrescine and spermidine delayed softening and reduced microbial activity during storage.

Keywords: antioxidant activity, firmness, kiwifruit, microbial activity, softening.

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Effect of iron and nitrogen application on quantitative and qualitative characteristics of apple “cv. Fuji”

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ABSTRACT

Effect of three different levels of Fe-EDDHA foliar application and soil application of nitrogen on some quantitative and qualitative characteristics of apple (cv. Fuji) grafted on Maling-9 was evaluated. This experiment carried out at the experimental field of Tehran University, in 2013. The factorial experiment was carried out as randomized completely block design (RCBD) with three replications. Results showed that iron application separately increased total phenolic content and dry matter (%) but had no significant effect on other physiochemical parameters. Nitrogen application separately increased fruit firmness, total phenolic content, dry matter, fruit length, peel yellowness and decreased ascorbic acid and peel blush. Interaction effect of iron and nitrogen on the fruit firmness, total phenolic content, ascorbic acid, dry matter, yield, fruit height and peel color parameters like a, b was significant. It can be concluded that, nitrogen application at 60 mg/kg in each tree was suitable for improving the quality indexes for this cultivar but three doses of iron in this study were dilute for improving the quality indexes of the fruit.

Keywords: apple, fe-eddha, fuji, leaf nutrition, nitrogen.

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Evaluation of growth characteristics and nutrient concentration in four almond (*Prunus dulcis*) genotypes budded on GF₆₇₇ rootstock under salinity stress

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ABSTRACT

Scion-rootstock combination and level of salinity affect growth characteristics and concentration of nutrition elements of almond leaves and roots. In this research, effects of salinity stress were investigated on growth characteristics and nutrient concentration of almond leaves and roots by completely Randomized Design (CRD), with two factors, genotype and water salinity with three replications. Studied Genotypes were 'Non Pareil', 'A₂₀₀', 'Mamayi', '1-25' which budded on GF₆₇₇ and 'GF677' (non- budded as control) and water salinity consisted of 0, 1.2, 2.4, 3.6 and 4.8 g/l of natural salt. Results showed that with increasing of salinity levels, scion height, scion diameter, number of produced leaves and percentage of green leaves had been reduced, but percentage of necrotic leaves and percentage of downfall leaves were increased. Also, in all studied genotypes, the highest percentage of Na⁺, Cl⁻, Na⁺ to K⁺ ratio, Na⁺ to Ca⁺⁺ ratio, Na⁺ to Mg⁺⁺ ratio, Na⁺ to P ratio and the lowest percentage of Ca⁺⁺, Mg⁺⁺, P and concentration of Cu⁺⁺ in leaves and roots and the lowest concentrations of Fe⁺⁺ in roots were observed in treatment irrigated with 9.8 ds/m of NaCl. In all levels of salinity, genotype '1-25' had the lowest percentage of Na⁺, Cl⁻, Na⁺ to K⁺ ratio, Na⁺ to Ca⁺⁺ ratio, Na⁺ to Mg⁺⁺ ratio and Na⁺ to P ratio. In comparison to other genotypes, this genotype could tolerate the harmful effects of Na⁺ in salinity of 7.3 ds/m by increasing the percentage of K⁺ (1.19%), concentration of Cu⁺⁺ (9.56 ppm), Fe⁺⁺ (27.48 ppm) and Zn⁺⁺ (66.80 ppm). Overall, '1-25' and 'Mamayi' were recognized as the most tolerant and sensitive cultivars to salinity stress, respectively.

Keywords: almond, GF₆₇₇, macronutrients, 'Mamayi', Micronutrients, salinity stress, '1-25'.

The effects of biological silver nanoparticles on bacterial growth in preservative solutions and increasing vase life of rose cut flowers "White Naomi"

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ABSTRACT

In this research, synthesized silver nanoparticles by using saffron petals extracts were applied on inhibition of bacteria growth in preservative solution for extending vase life of rose cut flowers "White Naomi", in three separate experiments. In the first experiment effects of different ratios of silver nanoparticles and saffron petals extract (1:20, 1:5, and 1:2) were investigated on growth inhibition of five important preservative solution's infecting bacteria including *Bacillus subtilis*, *Bacillus cereu*, *Acinetobacter*, *Pseudomonads fluorescens* and *Pseudomonas aeruginosa* in completely randomized design with factorial arrangement. Results showed that applied concentrations had significant effect on growth of gram positive bacteria. Saffron petals extract didn't have any antibacterial effects in comparison with synthesized silver nanoparticles. 1:5 and 1:20 ratios showed the highest inhibition of bacterial growth in gram positive ones. In the second and third experiments effects of different concentrations of silver nanoparticles products were evaluated on vase life, relative fresh weight and relative solution uptake of rose cut flowers by two permanent and pulsing methods. Results showed that, low ratios of silver nanoparticles particularly 1:20 significantly increased vase life approximately two times in comparison to control due to increasing relative fresh weight.

Keywords: bacterial contamination, nanoparticles, nanotechnology, solution uptake, vase life.

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Effects of jasmonic acid and arbuscular mycorrhiza on growth and ecophysiological parameters of pistachio seedlings under drought stress

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ABSTRACT

Drought is the most common environmental stresses that affect plant growth. To study the combined effects of arbuscular mycorrhizal fungi (*Glomus intratadices*) and Jasmonic acid on growth and ecophysiological characteristics of pistachio seedlings cv. Qazvini under drought stress, a greenhouse experiment was conducted in a completely randomized design with three replications. Experimental factors were including mycorrhizal and non-mycorrhizal, spraying of Jasmonic acid (0, 50 and 100 μ M) and drought stress (irrigation intervals of 1, 3, 6 and 10 days), in the weighting method according to field capacity. Results showed that after 70 days of drought stress, growth parameters of seedlings significantly decreased with increasing drought. Ecophysiological characteristics of pistachio seedlings such as photosynthetic pigments content, Fv/Fm and the performance index (PI) were also affected by drought. Mycorrhizal plants were less affected by stress and mycorrhizal symbiosis led to a significant improvement of parameters compared with control. Jasmonic acid application reduced stem height, leaf dry weight, chlorophyll a and total chlorophyll content and increased root system volume.

Keywords: chlorophyll fluorescence, drought, growth regulator, photosynthetic pigments, pistachio.

Effect of Trinexapac-ethyl and Traffic stress on morphological and physiological traits of tall fescue cultivar Rebel

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ABSTRACT

Application of growth retardants such as trinexapac-ethyl has become popular in turf grass management. The principle goal to apply these substances is to reduce lawn vertical growth, prevent inflorescence development and increasing biotic and abiotic tolerance. The aim of the present research was to investigate the effect of different trinexapac-ethyl levels (0, 0.25 and 0.5 Kg/h) and traffic stress on morphological and physiological traits of tall fescue cultivar Rebel. Experiment was carried out as a factorial based on completely randomized design in three replicates. Results showed that trinexapac-ethyl and traffic significantly decreased height, dry and fresh weight. Growth reduction in 0.25 and 0.5 Kg/h of trinexapac-ethyl was about 18.84 and 22.06%, respectively. Trinexapac-ethyl application led to increase density, tillering and chlorophyll, amount while traffic treatment reduced relative chlorophyll amount, density and tillering, significantly. Its application at concentration of 0.5 Kg/h increased tillering about 36% and traffic stress reduced it about 17.2%. Results also indicated that, trinexapac-ethyl and traffic treatment increased shoots soluble carbohydrates, significantly, whereas this substance did not affect root soluble carbohydrates in comparison to traffic. Trinexapac-ethyl increased tall fescue traffic stress resistance by increasing relative water content and decreasing electrolyte leakage in traffic stress conditions.

Keywords: *Festuca arundinace*, growth rate, traffic stress, trinexapac-ethyl.

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Effect of foliar application of naphthalene acetic acid and plant thinning on growth, yield and fruit quality of melon (*Cucumis melo* cv. Khatooni)

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ABSTRACT

In order to study the effects of foliar application of NAA and plant thinning on growth, yield and fruit quality of melon genotype Khatooni, the experiment was conducted in a randomized complete block design with three replications at Research field of Faculty of Agriculture, University of Zanzan. Treatments consisted of foliar application of NAA at three levels (25, 50 and 100 mg.L⁻¹ at 4-6 true leaf and fruit set stages), pruning (pruning against nonpruning) and plant thinning. Treatment with NAA increased the total soluble solids content of fruit. An obvious gradient of TSS was detected, ascending from pedicel to umbilicus part of mesocarp. The maximum leaf area, fruit width and mesocarpe thickness was observed in NAA (100 mg.L⁻¹ at fruit set stage). NAA caused a significant decrease in time to ripening. Among the treatments, the highest number of fruits per plant and total yield was recorded by using NAA (50 mg.L⁻¹ at 4-6 leaf stage). Also maximum mean fruit weight and marketable yield was obtained in plant thinning treatment. According to the results, foliar application of NAA (100 mg.L⁻¹ at fruit set stage) can be proposed instead of plant thinning practice that require too much time and labor for the farmers.

Keywords: flesh firmness, fruit set, melon, total soluble solid, yield.

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Effect of kaolin on tree physiology, superficial sunburn and fruit quantitative and qualitative characteristics of two commercial apple cultivars

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ABSTRACT

This study was carried out to examine the effects of kaolin spray for reducing the adverse effects of high radiation and temperature, especially on fruit sunburn in apple. Treatments were four concentrations of kaolin (0, 2, 4, and 6%) and two important and commercial apple cultivars in Fars province; 'Golden Delicious' and 'Starking Delicious'. Trees physiological parameters, fruit sunburn and fruit quantitative and qualitative characteristics were measured. Results showed that as kaolin concentration increase, net photosynthesis was increased and leaf temperature and transpiration were decreased in both cultivars. Incensement of kaolin concentration lead to reduced sunburn symptoms in both cultivars but 'Starking Delicious' showed more sunburn than 'Golden Delicious. Kaolin treatments (with no differences among them) improved almost all of fruit quantitative parameters in comparison to control. Among fruit qualitative characteristics, kaolin treatments increased dry mater and background color and reduced russeting and water core incidence. Kaolin spray didn't have any significant effect on fruit firmness, total soluble solids, acidity and surface color. Regarding mentioned results, it could be concluded that kaolin spray can be a useful approach to reduce adverse effects of high irradiation and temperature in apple orchards.

Keywords: apple, fruit quality, kaolin, sunburn, tree physiology.

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Control of postharvest green mold using sodium bicarbonate in Jaffa and Blood orange varieties

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ABSTRACT

Among the healthy compounds such as sodium bicarbonate, potassium bicarbonate, vegetable oils, and biocontrol yeasts including heat treatments, as well as a good alternative to chemical pesticides are considered hazardous. In this study, the effect of different levels of sodium bicarbonate treatment (0, 500 and 1000 mg/l and combination 1500 mg/l sodium bicarbonate with hot water 53 °C) were investigated on wound healing in oranges, c.v Jaffa and Sanguinella of Golestan local, inoculated with a suspension of *Penicillium digitatum*. The treated fruits were stored at eight degrees Celsius and relative humidity 85±5%. Variables such as weight loss, firmness, TSS, acidity, maturity index, decay rate were measured once per two weeks in six steps. The ANOVA results showed that acidity value, maturity index, decay rate were significantly influenced by variety and storage duration. Also, the amounts of weight loss and decay rate were significantly affected by period of storage and concentrations. In both variety of oranges, Jaffa and Sanguinella, the appropriate result was found in combination treatment, using 1500 mg/l sodium bicarbonate and hot water immersion at 53 °C for three minutes.

Keywords: decay, orange, *penicillium digitatum*, shelf-life, sodium bicarbonate.

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Morphological diversities of some population of *Eremostachys laciniata* Bunge.

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ABSTRACT

The genus *Eremostachys* (Lamiaceae), consists of about 60 species which 15 species of *Eremostachys* grow wildly in the North-West of Iran. The rhizomes and roots of *E. laciniata* have traditionally been used as a local analgesic and for the treatment of rheumatic diseases and pain in the feet. This experiment was conducted in the North-West of Iran in 2012-2013, to evaluate morphological diversity. The samples were taken from 15 regions. Thirty traits including plant height, inflorescence height, root length, root fresh and dry weight was measured. Simple correlation analysis showed the existence of significant correlations among root yield and tuberous root length ($r=0.62$), main root length ($r=0.53$), tuberous root number ($r=0.57$) at $P\leq 0.05$ level and tuberous root diameter ($r=0.85$) at $P\leq 0.01$ level. ANOVA showed that populations in 27 of 30 traits had significant differences. Factor analysis via PCA explained over 75.5% of the variation related to main effective characters. Populations of *E. laciniata* separated into four groups by cluster analysis using Ward method. Results showed that three populations i.e. Marand, Hyderabad and Till had high quantities in most of the traits and can be used in breeding and production programs.

Keywords: cluster analysis, correlation, diversity, *Eremostachys laciniata*, morphological characteristics.

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The effect of drought stress on some morphological and physicochemical characteristics of three cultivars of basil (*Ocimum basilicum* L.)

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ABSTRACT

This research was conducted to assay the effect of different levels of irrigation on morphological and physicochemical characteristics of three cultivars of basil (*Ocimum basilicum* L.), in Ferdowsi University of Mashhad, 2012. The pot experiment was performed as a factorial based on randomized complete design with four replications. The factors included three commercial cultivars of basil (Comin Hoja Larga, Rubi, Genoes) and three levels of drought stress (100, 75, 50% FC). The results showed that cultivars had significant effect on plant height, dry and fresh weight and oil content. Also different levels of drought stress had significant effect on the number of branches, fresh weight and oil content. Studied cultivars showed different physiological response to drought stress. As cultivar Comin Hoja Larga could well tolerate 50% FC three weeks before harvesting time. High chlorophyll b content (0.51 mg/g fresh weight) was observed in severe stress (50% FC). In order to product maximum oil content (0.75), severe stress (50% FC) in same condition is recommended.

Keywords: drought stress, dry weight, morphological characteristics, physiological parameters.