



## Effects of different levels of Farmax<sup>®</sup> nano fertilizer and foliar spraying time on growth and effective substance of German chamomile (*Matricaria recutita*)

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### Abstract

In this research, the effect of foliar spraying times and different levels of Farmax<sup>®</sup> nano fertilizer on morphological characteristic and dry and fresh flower yield, essential oil and chamazulene percentage of chamomile (*Matricaria recutita* L.) CV. Bodegold was studied. The experiment was factorial in the basic of randomized complete blocked design (RCBD) with eight treatment and four replications. The treatments included four amounts of nano fertilizer (0, 1, 3 and 5ml/l) as first factor and two foliar spraying times (tiller stage and 2 after weeks) as second factor. The results indicated that foliar spraying time had a significant effect on plant height, numbers of tiller, total fresh weight plant and dry flower yield. Different of levels Farmax<sup>®</sup> nano fertilizer had significant effect on majority characteristic. The interaction effect had significant effect on height plant and root and dry flower yield. So, maximum height plant (103.5cm) and dry flower yield (174.38g/m<sup>2</sup>) were obtained at 2 foliar spraying times and 3ml/l nano fertilizer concentration and maximum height root was obtained at one foliar spraying times and 5 ml/l nano fertilizer concentration, but 2 foliar spraying times and 3ml/l nano fertilizer concentration treatment to be increased on the most of the characteristic especially essential oil percent (0.753 weight percent) but do not have effect significant. The total results showed that 2 foliar spraying times and 3 ml/l nano fertilizer concentration was the best of treatment.

**Keywords:** *Matricaria recutita*, Bodegold, Farmax<sup>®</sup> Nano Fertilizer, Chamazulene.

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## Recycling of Casing Soil in The White Button Mushroom (*Agaricus bisporus*) production

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### Abstract

In this study, the recovery of casing soil consumed in the white button mushroom was investigated. Casing soil is used as a layer on compost (culture medium) to a diameter of 3-5 to stimulate fruiting on the white button mushroom (*Agaricus bisporus*). The expense of casing soil is about 30 percent of production costs. In the first step of this experiment, in order to separate casing soil from compost easily (at the end of production period), by distribution of a mesh with pores of 5 mm between compost and casing soil in the casing step, which we could separate and easily collect casing soil at the end. The most important altering factor between chemical and physical properties of recycling casing soil, is EC that was reduced by leaching process. An experiment was conducted based on split plot design with two factors and three replications. The main plots were treated with two levels of with and without a plastic mesh. Percentages of recycled soils in combination with fresh casing soil applied in sub plots. Subplot included 100%, 75%, 50%, 25% and 0% of recycled soil. Three traits included fruit yield, fruit average weight and fruit number were analyzed using SAS software. None of the traits showed significant differences. No significant difference was observed between with and without plastic mesh. Further more no difference was observed between different percentages of recycled soil mixed with fresh peat. It is thus concluded that using recycled casing soil in production of the white button mushroom is possible and profitable.

**Keywords:** Casing soil, Recycling casing soil, The white button mushroom

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## The Effect of Organic Manure and Super Absorbent on Physiological and Biochemical Characteristics of Potato (*Solanum tubersum*, cv Marfona)

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### Abstract

In order to investigate effect of organic manure and super absorbent on physiological and biochemical traits of potato (*Solanum tubersum*, cv Marfona), a split plot experiment was conducted as randomized complete block design with three replications at Research Farm, Agriculture College, University of Razi in 2010. Main factor included two levels of super absorbent A200 (0 and 70 Kg/ha,) and split plot included nine levels (0, chemical fertilizer (according to soil test), granule chicken manure (1000 kg/ ha), common chicken manure (12 ton/ha), soil mix (1000 kg/ha), cow manure (20 ton/ha), vermicompost (20 ton/ha), compost (20 ton/ha) and tea compost (soaking tubers and spraying at four times). Investigating physiological traits such as leaf chlorophyll index, chlorophyll florescence and stomata conductance showed that only leaf chlorophyll index was affected by superabsorbent ( $P < 0.01$ ) and organic manure ( $P < 0.05$ ), while stomata conductance was significant under its interaction effect at ( $P < 0.05$ ). Quality and biochemical traits show that phosphorous amount of tuber was significant in superabsorbent treatment in compare to control. Crude oil percentage, protein, fiber, starch, sugar, nitrogen, phosphorous and potassium content were not affected by organic manure. The highest amount of oil and fiber were obtained under compost and cow manure respectively. Sugar and nitrogen content were high under cow manure treatment. The highest amount of potassium and phosphorous content were belonging to chicken and Khakparvar manure respectively.

**Keywords:** Potato, Superabsorbent, Animal Manure, Vermicompost, Yield

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## Evaluation of Salicylic Acid and Calcium Chloride Effect on Shelf Life, Quality Properties and Antioxidant Activity of Peach Fruit cv. Amesden after Harvest

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### Abstract

In order to evaluate the effect of different concentrations of postharvest salicylic acid and calcium chloride on shelf life, quality characteristics and antioxidant activity of peach fruit cv. Amesden, an experiment was conducted as factorial based on randomized completely design with three replications. Fruits were harvested at the commercial ripening stage, and fruits were immersed in different concentrations of salicylic acid (1 and 2 mM), calcium chloride (1.5 and 3%), combined salicylic acid and calcium chloride (1-1.5, 1-3, 2-1.5 and 2-3), and distilled water (control) for 5 min, then fruits were packed in boxes with polyethylene cover and stored at 4°C with 80-85% relative humidity for 35 days. The changes in weight loss, fruit firmness, rot percentage; pH, total soluble solids, titratable acidity, ascorbic acid and antioxidant activity were estimated in 0 and 35 days during storage. The results showed that the weight loss, rot percentage, pH and total soluble solids significantly increased, while the fruit firmness, titratable acidity, ascorbic acid and antioxidant activity significantly decreased at the end of storage period. The salicylic acid and calcium chloride treatments significantly reduced the weight loss and maintained their firmness. In this condition, the highest of titratable acidity, ascorbic acid and antioxidant activity were observed in treatments of salicylic acid and calcium chloride, while the lowest of total soluble solids and rot percentage was showed in treatments of salicylic acid and calcium chloride than in the control treatment. Also, combined treatment (salicylic acid + calcium chloride) had an important effect in relative to each treatment separately. The data indicated that the use of salicylic acid and calcium chloride may be introduced as an effective and successful strategy in postharvest technology of the peach .

**Keywords:** Peach (*Prunus persica* L.), Storability, Fruit firmness, Ascorbic acid, Total soluble solid

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## The Effect of Pre and Postharvest Treatment of Salicylic Acid and Putrescine on Some Fruit Quality of Granny Smith Apple

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### Abstract

In present research the effects of four levels (0, 0.5, 1, 2 mM) of each of salicylic acid and putrescine treatments on the quality improvement of Granny Smith apple fruit were studied. Factorial experiment in randomized complete block with three replications on 16 trees, eighteen years in researcher station of agriculture university of Tehran was designed. For this purpose the trees were sprayed with the treatments solutions in three stages including; immediately after full bloom, 45 days after full bloom, and 116 days after full bloom (two weeks before harvesting). After harvesting, three or four fruits were assigned for each sample and immersion into the treatment solutions for 30 min, packed, and moved to  $1\pm 0.5^{\circ}$  C temperate and 85-90% relative humidity storage. Samples each 45 days in 5 stages exited from storage and evaluated for fruit weight loss, firmness, total soluble solids (TSS), treatable acidity (TA), (TSS/TA) and pH. The results showed, in to storage time fruit weight loss in treated fruits significantly ( $p<0.05$ ) were lesser than control fruits. And fruits firmness and treatable acidity in treated fruits significantly ( $p<0.05$ ) were more than control fruits. 1 and 2 mM concentration of acid salicylic and *putrescine* significantly ( $p<0.05$ ) have must firmness, and least weight loss than control fruits. Treatable acidity in treated fruits with 2 mM acid salicylic was more than control fruits. Putrescine was not effective on treatable acidity. Total soluble solid in treat fruits with 1 and 2 mM salicylic acid and *putrescine* in start of storage period significantly ( $p<0.05$ ) were lesser than control fruits whereas in end stage total soluble solid in treated fruit were more than control fruits. pH and flower index were not effected by treatment.

**Keywords:** Spray solution, Salicylic acid, Putrescence, Granny smith apple

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## Study on the Chemical Constituents and Antibacterial Activity of *Kelussia odoratissima* and *Teucrium polium* Essential Oils against Some Food Borne Pathogens

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### Abstract

In this research the essential oils (EOs) of *Kelussia odoratissima* and *Teucrium polium* were extracted by hydrodistillation. Extracted essential oils constituents were analyzed by gas chromatograph (GC) and GC/mass spectrometry and the essential oils constituents identified according to retention time and mass spectrum. Then minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of the essential oils against *Staphylococcus aureus*, *Bacillus cereus*, *Listeria monocytogenes*, *Escherichia coli* O157H7, *Salmonella enterica*, and *Pseudomonas aureogenosa* were determined by microdilution technique using ELISA reader. The results showed that there are differences between the essential oils constituents as the main constituents in *Kelussia odoratissima* were (Z)-ligustilide, (Z)-3-butylidene-phthalide, limonene+□□-phellandren B. The main constituents of *Teucrium polium* essential oils were β-caryophyllene, Germacrene D, γ-cadinene, (Z)- nerolidol, camphor, β-pinene, α- camphene, linalool, α-humulene. The MIC of *Kelussia odoratissima* EO was between 0.31 mg/ml (for *S. aureus*) to 2.5 mg/ml (for *Salmonella enterica*) but MIC of the *Teucrium polium* EO was between 0.16 mg/ml (for *S. aureus*) and 1.25 mg/ml (for *Salmonella enterica*). In conclusion, indigenous medicinal plants could be used for effective control of food borne pathogens as a complementary method that has less unfavorable effect on organoleptic attitudes of each products.

**Keywords:** *Kelussia odoratissima*, *Teucrium polium*, Antibacterial activity, Microdilution method

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## Influence of Different Methods of Zinc Sulphate Application (Soil drench, Injection and Spray) on Improvement of Qualitative and Quantitative Properties of Grapevine (*Vitis vinifera* cv. Askari)

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### Abstract

In order to investigate the effect of application methods of  $ZnSO_4$  on qualitative, quantitative and correction of zinc deficiency in grapevine, an experiment was conducted in completely randomized block design with 10 treatments and 4 replications. Treatments included control, trunk injection three levels 1.5, 3 and 5 g/l, spray in three levels 1.5, 3 and 5 g/l and soil application (Soil drench) in 75, 150 and 200 g/vine. Results showed that highest yield 17.81 and 16.39 kg/vine was obtained in soil application of 200 gr/vine and trunk injection in 1.5 g/l, respectively as compared to control with 7.27 kg/vine. Trunk injection in 3 g/l concentration increased the berry volume to 3.62 cm<sup>3</sup> as compared to control plant. All of treatments increased chlorophyll content as compared to control. Also, maximum zinc concentration in leaf was observed in vine's sprayed with 5 g/l with 127.43 mg/kg dry matter as compared to control with 17.5 mg/kg dry matter. So, the maximum yield was obtained in low concentration of  $ZnSO_4$ , but optimal concentration of zinc in leaf was observed in plant was sprayed with 1.5%  $ZnSO_4$ .

**Keywords:** Grapevine, Trunk Injection, Soil drench,  $ZnSO_4$ , Spry

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## The Effect of Sucrose and Salicylic acid on Longevity and Postharvest Quality in *Alstroemeria* (cv. Stratus) Cut Flower

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### Abstract

*Alstroemeria* flower is one of the most important cut flowers in the world. Some materials can increase longevity of cut flowers. The aim of this research was evaluating the effect of some chemical solutions on postharvest *Alstroemeria* (cv. Stratus) cut flowers. This experiment was conducted with two factors of sucrose at four concentrations, 0, 5, 10 and 15 g/l and salicylic acid (SA) at four concentrations, 0, 100, 200 and 400 mg/l with three replication and arranged in a completely randomized design. During experiment, longevity, chlorophyll content, solution uptake, relative water content (RWC), electrolyte leakage (EL) and leaf yellowing were evaluated. Analysis of variance showed that different levels of sucrose had significant effect only on electrolyte leakage of petal and chlorophyll content. The salicylic acid effect was significant at the one percent level on all traits except for electrolyte leakage of petal. The interactions between sucrose and SA on all traits at the five percent level had a significant effect. The results showed that treatment of 15 g/l sucrose had the highest chlorophyll content and the lowest electrolyte leakage of petal. The highest longevity, relative water content of leaf and petal, chlorophyll, solution uptake and the lowest electrolyte leakage of leaf and leaf yellowing were obtained from treatment with 400 mg/l of salicylic acid. Treated with 15 g/l sucrose plus 400 mg/l SA had highest longevity, solution uptake and the lowest electrolyte leakage of petal in compared to the control. Thus, using 400 mg/l SA to increase the longevity and quality of *Alstroemeria* (cv. Stratus) cut flowers is recommended.

**Keywords:** Sucrose, Salicylic acid, *Alstroemeria*, Longevity, Postharvest quality

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## Effect of Different Species of Mycorrhizal Fungi on Yield of Two Potatoes Cultivars under Controlled Conditions

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### Abstract

Potato is one of the most productive crops in agriculture and is a valuable food source in developing countries. Mycorrhizal fungi involve a symbiosis with most of crop roots and leads to improve the crops growth and yield. In order to investigate the effect of mycorrhiza fungi species on yield of potato cultivars a factorial experiment was arranged in a randomized complete block design with eight treatments (seven mycorrhiza fungi species and control treatment) on two potato cultivars, Agria and Fontane, in three repetitions. Results show that there is no significant difference in tuber yield and shoot P content in Agria and Fontane, but leaf area and shoot dry weight and total tubers weight in Fontane were higher than Agria. Control treatment and *A. longula* had the least and *G. mosseae*, *G. intraradices* and *G. versiform* had the highest tuber weights. Among fungi *G. mosseae* produced the highest tuber yield in both cultivars. Inoculation of root medium with *G. versiform* produced the highest average tubers weight compared to other treatments. Phosphorus content of treated plants with mycorrhiza was higher than control.

**Keywords:** Agria, Fontane, Mycorrhiza

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## Survey the Effects of Amino Acid, Folvic Acid and Steroid Components on Drought in Rain Fed Khalili Grape

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### Abstract

To survey the effects of nutritional and growth regulator components on adverse effects of recent consecutive droughts, an experiment was conducted on uniform grape trees (*Vitis vinifera* L. cv. 'Khalili') in Bavanat and Shiraz (Akbar-Abad) regions in 2010- 2011. Trial was arranged in a Randomized Complete Block Design (RCBD), with three replication and five trees per each plot. Experimental treatments consist of Farmer traditional condition (ctrl.), foliar application of 3% folvic acid, foliar application of fosnutren amino acid fertilizer contain (8.4% free proline), foliar application of brassinosteroid (0.4 mg.L<sup>-1</sup>), soil application of brassinosteroid (0.2 mg.L<sup>-1</sup>) and synchronize foliar application of 3% folvic acid, fosnutren amino acid fertilizer contain 8.4% free proline and brassinosteroid (0.4 mg.L<sup>-1</sup>) in developing period of growth cycle. The results obtained from the evaluation of drought resistance indices as photosynthesis efficiency, stomata conductance, transpiration rate, water use efficiency, relative water content, leaf proline concentration, soluble sugar, chlorophyll a, b and a/b ratio on full expansion leaf of vine illustrate the significant effect of foliar application of brassinosteroid as growth bio-promoter on the increasing of potential drought resistance and yield of Khalili grape trees. The highest yield in this experiment belong to synchronize foliar application of folvic acid, fosnutren amino acid fertilizer contain 8.4% free proline and brassinosteroid treatments in developing period of growth cycle and then respectively to foliar application of brassinosteroid, foliar application of fosnutren amino acid fertilizer contain 8.4% free proline, soil application of brassinosteroid and foliar application of folvic acid with 64.5, 46.2, 44.1, 39.8 and 20.3 percent yield increment in comparison with control.

**Keywords:** Amino acid fertilizer contains free proline, Brassinosteroid, Drought stress, Folvic acid, Khalili grapevine

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## The Effect of Different Concentrations of Se on Yield and Physiological Characteristics of Brussels Sprouts (*Brassica oleracea* var. Gemmifera)

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### Abstract

Selenium is a non metallic chemical element that affects plant growth and development and but it can due to the presence of antioxidant defense system as a matter of basic human and animal health has been identified. An experiment was conducted to study the effect of Se on physiological characteristics and yield of Brussels sprouts (*Brassica oleracea* var. Gemmifera) with six levels of Se (0, 2, 4, 8, 16 and 32 mg/l) from sodium selenate. The experiment was arranged in a completely randomized design with four replications under greenhouse conditions. The results showed that yield in terms of fresh weight of sprout was significantly ( $P \leq 0.01$ ) affected by Se concentration so that increasing Se concentration from 0 to 8 mg/l increased the yield and chlorophyll index, electrolyte leakage (EL) in leaves decreased then with increasing Se concentration decreased the yield and EL in young leaves increased. The highest yield was observed at 8 mg/l Se concentration that was 40% higher compared to the control treatment. With increase concentration of Se in the nutrient solution increased Se concentration and as follow old leaves > young leaves > sprouts. The results showed that Se can be added at the 8 mg/l to the nutrient solution for growing Brussels sprout.

**Keywords:** Nitrate, Electrolyte leakage, Chlorophyll, Hydroponics

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## Effect of Drought Stress on Morphological and Physiological Characteristics of Wheatgrass and Tall fescue

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### Abstract

In this study, the effect of drought stress on morphological and physiological characteristics of wheatgrass and tall fescue was investigated in a factorial-split plot in time arrangement based on a completely randomized design with three replications. After turf establishment, half pots were exposed to drought stress and the half other were completely irrigated. Based on the results tall fescue had higher color and lower percent leaf firing during first 10 days of drought stress, but after this period, the percent leaf firing in tall fescue increased, so that it had higher percent leaf firing and lower color than wheatgrass in the end of experiment. The results showed that under drought stress conditions was not observed the significant difference between two species in leaf relative water content. In wheatgrass, proline content of stressed plants was equal to control plants during first 10 days of drought stress but with prolonged stress treatment, the proline content increased significantly. Despite wheatgrass which had moderate rate for closed stomata percentage during stress period, tall fescue showed a great increased in this index and reached to 89.52% at the end of 20<sup>th</sup> day. Also in drought stress, the stomata density increased and stomata diameter decreased significantly. Therefore, based on the results in long drought stress, wheatgrass had higher drought resistance than tall fescue.

**Keywords:** Proline, Drought stress, Percent leaf firing, Stomata

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## Effect of Coating and Methyl Salicylate on Quality and Chilling Injury in Blood Oranges 'Moro' in During Cold Storage

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### Abstract

The effects of coating treatments (wax and plastic bags) combined with methyl salicylate on the fruit quality and chilling injury of Moro blood orange were studied during storage. Treated fruits were kept in storage for 80 days at 5 °C and 90-95% relative humidity. Some characteristics such as pulp and skin total phenolics, antioxidant capacity, total anthocyanin, lipid peroxidation, and the chilling injury index were assessed at 0, 20, 40, 60, 80 days after storage. Total phenolics in the skin and pulp were reduced during storage. Peel Total phenol of wax coating treatment with methyl salicylate (0.26 mg) had the lowest reduction after 80 days storage. Pulp total phenolic of fruits in pair plastic bag fruits (0.25 mg) had minimal changes during storage. Coating combined with methyl salicylate to retain moisture and delay the aging process reduced chilling injury. Generally, the amount of pulp total anthocyanins and antioxidant capacity increased during storage. The antioxidant capacity of the wax coating fruits, pair plastic bag fruits and pair plastic bag fruits combined with methyl salicylate was 42.98, 37.46 and 37.42, respectively. Wax combined with methyl salicylate (0.18 mM) and pair plastic bag fruits (0.17 mM) has the lowest lipid peroxidation during storage. Individual plastic bag with methyl salicylate (44.54%) had the least amount and methyl salicylate (77.41%) had most ion leakage. The best treatments were individual fruit packing combined with methyl salicylate and wax coating combined with methyl salicylate that reduced the incidence of fruit chilling injury to one percent. Ion leakage, lipid peroxidation and chilling injury increased during cold storage. Treated fruit with wax combined with methyl salicylate and individually and pair packed fruit combined with methyl salicylate had the best visual fruit quality. Combined treatments had more effects than individual treatments alone.

**Keywords:** MDA, Coating, Storage period, Antioxidant capacity, Total phenol, Chilling injury index

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## The Effect of PRD on Changes of Drought Stress Indices, Nutrition Antioxidant and Photosynthesis Activity of Tomato

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### Abstract

Decreasing irrigation via partial root zoon drying (PRD) save water and decreased production expenses. For comparing common irrigation and PRD on tomato cv. Falcato an experiment was designed in Massey University of New Zealand. Treatments were control (irrigation in a Field capacity in each irrigation to whole root zoon) and PRD (irrigation in a half of Field capacity in each irrigation to one side of root zoon). The results were shown that superoxide dismutase and peroxidase activity increased in PRD compare with control. Photosynthesis, mesophyll conductance, photosynthesis water efficiency, fresh and dry weight of root and shoot decreased in PRD. NACE (Nutrient Acquisition Efficiency) of leaf was the highest for Zn and Na and the lowest for P when PRD applied compare with control. Yield indices like MP increased significantly by 63% compare to first harvest. YSI (Yield Stability Index) increased by 46% in third harvest compare with second one. The TOL (Tolerance index) increased by 80% in last harvest compare with first one. GMP (Geometric Mean Productivity) in the second harvest increased by 62% compare to first one.

**Keywords:** Partial root drying, Superoxide dismutase, Peroxidase, Stress Susceptibility Index, Yield, Tomato

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## The Effect of Some Organic Matter on Growth Indicators of Pot Stock (*Matthiola incana* cv. Column Crimson)

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### Abstract

In order to a desirable growth, plants need fertile soil which has the availability of nutrient elements in it. Sometimes, in spite of having access to the nutrient elements, decrease yield, due to undesirable physical situation. Stock (*Matthiola incana* cv. Column Crimson) is one of the potting flower that its growth medium traditionally including HAWAR soil, basin sediment and untreated waste municipal. Due to decrease reach to mentioned soils, so that, it is necessary to replace a growth medium and surveying the effect of different organic matter in pot stock. Garden soil was used as main source of medium and as control. In this study, treatments including garden soil amendment by 4 and 8 % (w/w) of different organic matter (untreated waste municipal, beet pulp, leaf mold, and municipal compost). Another treatment was traditional growth medium. This research was performed in a randomized complete block design with four replications. Result showed that manure treatments on plant height, floret diameter, carbohydrate content had significant different ( $p < 0/01$ ) and florescence length ( $p < 0/05$ ). There are no significant difference on leaf area, chlorophyll and dry and fresh root weight. In general, 8% levels untreated waste municipal was the most suitable organic matter in order to alternate for traditional media.

**Keywords:** Untreated waste municipal, Beet pulp, Compost, Inflorescence

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## Application of Microsatellite Markers for Identification and Registration of Walnut Cultivars

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### Abstract

Due to the complex assessment of young walnut cultivars (*Juglansregia* L.) based on morphological traits, advance molecular tools have provided a new prospect for cultivar identification and DNA fingerprinting. In this study, specific molecular keys were identified for 5 Iranian walnut cultivars (*Juglansregia* L.) using 30 SSR markers. The results showed that 5 SSR markers produced polymorphic bands for studied Iranian walnut cultivars. SSR markers WP-376 and ABRII-WM-6 produced specific molecular keys in walnut cultivars K72, Z30, Z53 and Z60. Due to different genetic background, it was impossible to recommend the B21 and Z67 genotypes as mother's trees. The specific molecular keys were verified on 39 walnut mother's trees and the results were confirmed at two independent laboratories. The reported specific molecular keys can be used for identification of 5 Iranian walnut cultivars in juvenile period.

**Keywords:** Walnut, Microsatellite, Fingerprinting, Model based method, Clustering

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## Physiological Response of Pear (*Pyrus Communis* cv. Dargazi) to Salinity Stress Under *In vitro* Conditions

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### Abstract

This study was conducted to find out the influence of *in vitro* salinity on growth parameters shoot length, number of leaves, number of new buds, the chlorophyll, chlorosis and necrosis and absorption of sodium, chloride, potassium, nitrogen and phosphorus of pear (*Pyrus communis* cv. Dargazi) *in vitro* propagated shoots. The experiment was conducted as a complete randomized design with 5 salinity levels; (control), 40, 80, 120 and 160 mM of sodium chloride in 2013 at Zanzan University, Zanzan, Iran. Different mentioned parameters were assessed after 6 weeks of culture. Shoot length and leaf number per explant decreased and number of chlorotic and necrotic leaves increased with increasing salinity. Increasing salinity levels also decreased nitrogen and potassium content of plant tissues while their sodium and chloride contents increased. Phosphorus was not affected by salinity.

**Keywords:** Pear, Salinity, Growth, Nutrient uptake, *In vitro* conditions

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