



## Effect of Gibberelic Acid on Flowering Delay Apricot (cv. Asgarabad)

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### Abstract

The goal of this experiment was to save apricot flowers from late spring frost damage. This experiment was conducted during 2007-2008 to examine the effect of application of different concentrations of gibberellic acid in two forms pure (GA<sub>3</sub>) and impure (Berelex) at (0, 50, 100, 200, 300 mgL<sup>-1</sup>) at 23 August and 23 September to delay flowering in apricot Asgarabad cultivar. A factorial experiment with two factors (time and concentration of spray) was conducted in layout of randomized complete blocks design (RCBD) with 3 replications. Results showed that the effect of both of pure and impure gibberellic acid on delaying flowering were significant. According to the results, 50 mgL<sup>-1</sup> of gibberellic acid applied at 23 September was the best treatment which delayed full bloom about 7 days. Application of Gibberellic acid increased fruit set, but reduced fruit weight. Effect of time and concentration of GA<sub>3</sub> spray was significant on TSS so that in treatments delaying flowering, the TSS of fruits decreased.

**Keywords:** plant growth regulators, Late blooming, Fruit quality, Apricot

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## Effect of Paclobutrazol and Cycocel on Vegetative Growth and Flowering of Rudbeckia

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### Abstract

Growth retardants are new chemical organic compounds that increase period of flowering, leave chlorophyll, lateral shoot number, flower number and decrease vegetative growth. They also increase dry, cold and heat tolerance. Paclobutrazol and Cycocel are examples of these compounds. This study was conducted to evaluate the effect of Paclobutrazol and Cycocel on some quantitative and qualitative traits of Rudbeckia. Plants transplanted at Horticulture Department Farm, College of Agriculture, Isfahan University of Technology. The experiment was conducted based on randomized completed block design with 3 replications. Traits were studied included height, leaf and flower number, lateral shoot number, flower diameter, lateral shoot length, leave chlorophyll, the period of flowering, root fresh and dry weight, leaf area, root number, diameter and length, root and shoot carbohydrate. Results showed that Paclobutrazol 30 ppm reduced leaf number. Cycocel 2000 ppm produced the most leave chlorophyll, the period of the flowering and root diameter. Paclobutrazol 5 ppm and Cycocel 500 ppm reduced flower number. All treatments except Cycocel 500 ppm significantly reduced leaf area. There were no significant difference between treatments related to height, lateral shoot number, lateral shoot length, flower diameter, root fresh and dry weight and root and shoot carbohydrate.

**Keywords:** Rudbeckia, Paclobutrazol, Cycocel, Vegetative growth, Flowering

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## Study the Effect of High Level of CO<sub>2</sub> Concentrations on Anatomical and Morphological Traits in Marigold (*Tagets tenuifolia*)

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### Abstract

Marigold is one of the most important ornamental plants, cultured as cut flower and edge plants. In this study anatomical and morphological traits, and also earliness of marigold transplants were examined. Treatments were 350 $\mu\text{mol mol}^{-1}$  (as control), 700, 1050 and 1400 $\mu\text{mol mol}^{-1}$  CO<sub>2</sub>. The experiment conducted as a randomized complete block design (RCBD) with 3 replications. Studied traits were diameter of stem, number of leaves, high of stem, chlorophyll rate, stomatal density, epidermal cell density, stomatal index, stomatal length and width, stomatal size, guard cell length and width, leaf area, total and air dried weight. Results showed that all traits were affected by high level of CO<sub>2</sub>, but CO<sub>2</sub> at 700 $\mu\text{mol mol}^{-1}$  had the highest effects on the traits. The mean of stem diameter (69%) and plant height (2 folds) increased in compared to control at 700 $\mu\text{mol mol}^{-1}$ . The leaves number, stomatal density, epidermal cells, length and size of stomatal, length of cell guard, total of leaf area and dried weight of plants increased at the highest level of CO<sub>2</sub>. The flowering of plants accelerated about 15 – 20 days, than that of control at 700 $\mu\text{mol mol}^{-1}$  CO<sub>2</sub>.

**Keywords:** Marigold, CO<sub>2</sub>, Anatomical and morphological traits, Flowering

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## A Study of the Effect of Seed Sowing Design and Depth on Seedling Emergence and Viability in Order to Domestication Nowruzak (*Salvia leriifolia* Benth.)

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### Abstract

Nowruzak (*Salvia leriifolia*) of Lamiaceae family has a good capability for domestication in Khorasan's natural habitats. In order to investigate the effect of sowing design and depth in seedling emergence and permanence, a split plot experiment based on a randomized complete block design was performed with three replications. Results indicated sowing design in all three parameters, sowing depth in number of days for emerging were significantly different ( $p < 0.01$ ), Sowing design  $\times$  depth was significantly different in percent emergence ( $p < 0.01$ ) and seedling permanence ( $p < 0.05$ ). The most emergence percentage (28%) was in plot sowing and 1 cm sowing depth. More sowing depth increased the number of days to emergence, and the most percentage of viability (68.7%) was in plot sowing and 1.5 cm sowing depth.

**Keywords:** Nowruzak, Seed, Germination, Permanence, Salvia

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## Investigation the Effect of Compost, Vermicompost, Cow and Sheep Manures on Yield, Yield Components and Essence Percentage of Cumin (*Cuminum cyminum*)

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### Abstract

Cumin is one the most important medicinal plant in Iran. A field experiment was conducted in order to evaluate the effect of compost (30t/ha), Vermicompost (10t/ha), cow manure (30t/ha) and sheep manure (20t/ha) and control (no fertilizer) on yield and yield components of Cumin. The experiment was performed in the research farm of Faculty of Agriculture, Ferdowsi University of Mashhad during the growing season of 2007. A randomized complete block design with 5 treatments and 3 replications was used. Results showed that treatments had a significant effect on grain yield and biological yield, number of umbers per plant, number of seed per umber, number of seed per plant and plant height. The treatments had no significant effect on HI (Harvest index) and 1000 seed weight. The highest and the lowest seed yield, biological yield and plant height were obtained in Vermicompost and control, respectively. The present study showed that organic fertilizers and animal manures can enhanced the yield and its components in Cumin.

**Keywords:** Medicinal plant, Organic fertilizers, Animal manure, Vermicompost

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## Effect of Humic Acid Growth and Nutrient Uptake of Lettuce Using NFT System

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### Abstract

Beneficial effects of humic substances on plant growth have been recognized by many researchers. A greenhouse experiment was conducted with humic acid (0, 20 and 50 mg/l) on lettuce cultivars 'Lollorossa' and 'Javelina' using completely randomized design at university of Guilan. Results showed that humic acid affected ( $P < 5\%$ ) leaf number, height and nutrient uptake as well as Ca, P and Mg in both cultivars. No differences were found on 'Lollorossa' in term of weight, leaf number and ascorbic acid. 'Javelina' cultivar showed an increased width, diameter and total soluble solid. Based on the results of this experiment an amount of 50 mg/l humic acid could be recommend for 'Lollorossa' and 'Javelina'.

**Key words:** *Lactuca sativa*, Humic Acid, cultivars, growth, yield

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## Evaluating Two Methods of *Poa pratensis* cv. Barimpala Root in Effect of Plant Growth Regulators and Irrigation Treatments

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### Abstract

Several root measuring methods have been developed until now but there is no single method of root measurement applicable for all situations. This study was conducted to evaluate the effects of a single trinexapac-ethyl (TE) and paclobutrazol application on Kentucky bluegrass root growth under three irrigation treatments. Evaluating of root length density (RLD), root surface area (RS) and average root diameter were measured using two methods: Newman and Bohm method, and leaf area meter model (Delta-T-Scan Image Analysis System). The experiment was a split-plot factorial based on randomized complete block design (RCBD) with three replications. Irrigation treatment had no effect on root length density. Paclobutrazol reduced root length density in the second method but had no significant effect on the first. The results of two methods are different and both of them are acceptable in certain situation. In order to reliable study on root, we ought to find the acceptable method performance with due attention to the root characteristic and the type of factor that we evaluate. Finally with high density of roots in turf grass the second method is recommended.

**Keywords:** Root, Plant growth regulators, Irrigation treatment, *Poa pratensis*

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## Determination of Time and Method for Grafting of Mango "Langra" in Roudan in Hormozgan

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### Abstract

Among the propagation methods of mango, grafting is the most common method, but growers do not have enough knowledge about the suitable time and grafting methods of this fruit tree. This problem is the most important factor in production of grafted mango plants. This experiment was conducted in a randomized complete block design with factorial arrangement and 10 replications. Factors included the time of grafting with levels of (4 and 19 April, 5 May, 6 and 21 August, 6 and 21 September, 7 and 22 October and 15 November) and two grafting methods (vener side graft and cleft graft). Rootstocks were seedling and scions taken from a single plant of mango cv. "Langra". Results showed that the best time for grafting was 4 April with 100 percent and cleft graft with 85 percent success was better than whip grafting. After 60 days from each grafting times, plants that grafted in 4 and 19 April had higher growth. In general, it could be concluded that in Roudan city grafting with cleft method on 4-19 April is suitable for propagation of mango.

**Key words:** Mango, Grafting, Grafting time, Grafting method

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## Assessment of the Frost Resistance in Some Olive Cultivars Using Visual Injuries and Chlorophyll Fluorescence

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Received: 1-9-2009

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### Abstract

Planting of olive (*Olea europaea* L.) tree due to salt and drought tolerance and ever green habit increasingly is considered in urban landscape in recent years. The low resistance to cold has been a major problem in using this tree in temperate and cold zones. So, determination of frost resistance cultivars is one of the important measures for use of this tree in urban landscape. To evaluate frost resistance of 15 olive cultivars and to compare the visual assessment and chlorophyll fluorescence methods, a factorial experiment was carried out using 7-year-old olive trees which were planted in randomized complete block design with 3 replications. In visual method, frost damage of winters 2007 and 2008 to plants (percentage of drying by scoring and percentage of leaf abscission) were measured. Results of this experiment showed that 'Amphisis' followed by 'Gorgan' and 'Shengeh' were tolerant and 'Kroneiki' and 'Rashid' were sensitive cultivars to low temperatures. In method of chlorophyll fluorescence, in July 2008 leave samples of each cultivar was gradually incubated in 0, -5, -10, -15 and -20 °C for one hour at least. Then Fv/Fm value of each sample was measured with fluorescence spectrometer. Results indicated that 0 and -5 °C had no damage on samples and all cultivars tolerated these temperatures (Fv/Fm > 0.83). When temperature reduced to -10 and -15 °C the stress on plants increased and 'Rashid' showed the lowest Fv/Fm (0.243 and 0.001 respectively) and was the most frost sensitive. Decreasing temperature to -20 °C had no further significant effect on reduction of Fv/Fm index and showed no difference between cultivars. Based on this method, 'Shengeh', 'Gorgan' and 'Amphisis' were tolerant cultivars and 'Rashid', 'Spain', 'Manzanilla' and 'Kroneiki' were sensitive cultivars to low temperatures which confirmed the results of visual assessment.

**Keywords:** Chlorophyll fluorescence, Frost resistance, Olive, Visual assessment

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## Effects of TDZ and Kinetin on Regeneration and Proliferation of *Gerbera hybrida* cv. Red Explosion

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### Abstract

Gerbera is one of the most demanded plants in commercial cut flowers plants. Optimizing the micro-propagation of new cultivars is therefore important. In this research "Red Explosion" cultivar was used and Capitola (as explants) were directed to a modified solid Murashigue and Skoog medium with four concentration of TDZ (0.25, 0.50, 0.75 and 1.00 mgL<sup>-1</sup>) for regeneration. Three concentration of kinetin (4, 6 and 8 mgL<sup>-1</sup>) were applied and plantlets were transferred to free hormone medium for rooting. Number of new leaves produced, and fresh mass accumulation of cultured plantlets were used to determine the growth rate at 20 and 40 days after culture. Results showed that maximum shoot regeneration was occurred in 0.75 and 1.0 mgL<sup>-1</sup>TDZ. In proliferation stage first 20 days maximum increase in fresh weight in 6 mgL<sup>-1</sup> kinetin and in second 20 days after culture in medium contained 4mgL<sup>-1</sup> kinetin were observed. The highest number of new leaves was produced on the medium containing 6 mgL<sup>-1</sup> kinetin and 87% of plantlets rooted after one month.

**Key words:** Gerbera, Tissue culture, Thidiazuron, Kinetin

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## Evaluation of Some Physicochemical Characteristics of Six Iranian Pomegranate (*Punica granatum* L.) Cultivars Fruit at Ripening Stage

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### Abstract

Pomegranate (*Punica granatum* L.) is an important Iranian-native fruit, and many of its varieties are cultivated. This research was conducted to evaluate some of the major physical and chemical properties of six pomegranate cultivars at ripening stage in a Completely Randomized Design with 4 replications. The investigated traits were fruit fresh weight, fruit volume, peel thickness, peel percentage, aril percentage, fruit juice percentage, seed percentage, peel moisture, juice moisture and seed moisture as physical features and vitamin C, reducing sugar, anthocyanin, pH, titrable acidity, total soluble solids and flavor index as the chemical characteristics. The results indicated that Shahvar and Faroogh had the highest (346.6 g) and lowest (220.8 g) fruit weight, respectively. The highest (42.1%) and the lowest (24.5%) peel percentage were observed in Rabbab and Faroogh, respectively. The highest and the lowest aril percentage were recorded in cultivars Faroogh and Rabbab (75.5% and 57.9%), respectively. The results also showed that the highest content of reducing sugar was obtained in Faroogh (27.8 g.100 ml<sup>-1</sup> juice) and the lowest one (17.9 g.100 ml<sup>-1</sup> juice) in Rabbab. The highest (27.7 mg.100 ml<sup>-1</sup> juice) and the lowest (7.9 mg.100 ml<sup>-1</sup> juice) amount of anthocyanin were detected in Aghaie and Shahvar, respectively. The Shirinbihaste had the highest (15.1 mg.100 ml<sup>-1</sup> juice) and Aghaie had the lowest (8.7 mg.100 ml<sup>-1</sup> juice) vitamin C content. According to the results, Faroogh cultivar has more considerable advantages than the other evaluated cultivars. This cultivar is therefore recommend to be used as either for export and internal consumption or as processed forms in fruit juice factories.

**Keywords:** Pomegranate, Physical and chemical characteristics, Anthocyanin

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## Effect of Gibberellic Acid on Vegetative Growth of Olive (*Olea europaea* L.) Saplings

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### Abstract

This research was conducted to evaluate the effect of gibberellic acid (GA<sub>3</sub>) (0.250, 500 and 750 mg L<sup>-1</sup>) on vegetative growth of olive sapling (*Olea europaea* L) in 2004-05 at Shahid Chamran University of Ahvaz. The experiment was a completely randomized design with 4 replications. Parameters measured were: shoot height, inter-node length, leaf and root area, fresh and dry weight of shoot, root and leaf. The results showed that GA<sub>3</sub> significantly increased root length (157 cm), fresh and dry weight of leaf (15.30 and 6.61g respectively), fresh and dry weight of shoot (31.62 and 17.85 g respectively) and fresh and dry weight of root (15.04 and 6.34 g respectively) compared to control. The highest concentration of GA<sub>3</sub> had the highest effect on vegetative growth.

**Keywords:** Gibberellic Acid, Vegetative growth, Sapling, olive

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## Effect of Applying of Sulfur Along with Thiobacillus Inoculant and Manure on Leaf Nutrient Contents and Vegetative Growth Characteristics in Date Palm ‘Barhee’

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### Abstract

Date palm, *Phoenix dactylifera*, is one of the most important horticultural crops in Iran. The most soils in Iran, especially those cultivated with palm, are calcareous with high pH. The high pH of soil causes reduction of nutrient elements absorption. Findings of researches show that application of elemental sulfur along with *Thiobacillus* bacteria in soil, due to sulfur oxidation, reduce local pH in rizosphere area and consequently increase nutrient element availability for plant. In order to study the effect of application of sulfur along with *Thiobacillus* inoculants and manure on leaf nutrient contents of leaf and vegetative growth characteristics in Date Palm ‘Barhee’ an experiment was carried out using randomized completed block design with four treatments and four replications (each replication consisted of two date palm seedlings) during three years in Ahvaz (Khuzestan Province). The treatments were: T1= Control, which consisted of application of 40 kg manure based on general recommendation for each tree, T2 = T1 + application elemental sulfur as 10 % of manure + *Thiobacillus* inoculants, T3 = T1 + application elemental sulfur as 20 % of manure + *Thiobacillus* inoculants and T4 = T1 + application elemental sulfur as 30 % of manure + *Thiobacillus* inoculants. The results showed that application of elemental sulfur along with *Thiobacillus* inoculants and manure was improved plant ability to uptake mineral nutrients such as P, K, Zn and Mn as comparison with the control treatment of soil. Improving plant mineral nutrients caused increasing vegetative growth characteristics such as number and length of leaf, number and length of leaflet, height of Date palm seedlings. Treatment 2, including: application of 40 kg manure, 4 kg elemental sulfur and *Thiobacillus* inoculants in soil at planting time, due to least application of sulfur as comparison with the other treatments of sulfur application and the highest leaf nutrient contents and vegetative growth characteristics of Date palm seedlings was the best treatment and for application is recommended.

**Keywords:** Date palm, Elemental sulfur, *Thiobacillus* inoculant, Vegetative growth

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## Optimization of Tissue Culture and Gene Transfer in Lettuce (*Lactuca sativa* L.)

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### Abstract

Lettuce (*Lactuca sativa* L.) is a major leafy vegetable and belongs to the Asteraceae family (Compositae). The genetic manipulation of lettuce requires a reliable and efficient regeneration method. Since lettuce is a suitable bioreactor for production of recombinant proteins especially edible vaccines. This study was conducted to identify an appropriate method for lettuce gene transformation. At first, the effects of explants age and seven different combinations of plant growth regulators on callus induction and direct shoot regeneration of lettuce were examined. The experiment was factorial based on a completely randomized design. The sensitivity of lettuce cotyledons to hygromycin was assayed by culturing the cotyledons without co-cultivation with *Agrobacterium tumefaciens* on selection medium containing different concentrations of hygromycin. For gene transformation, *Agrobacterium tumefaciens* (LBA4404 with pCAMBIA1304) was used and transgenic plants were analyzed with PCR method. The highest percentage of callus induction was obtained using 0.54  $\mu$ M NAA and 0.44  $\mu$ M BA on 7 days old cotyledon explants. The highest number of direct shoot regenerations was also obtained using M1 (0.54  $\mu$ M NAA and 0.44  $\mu$ M BA) and M7 (0.1  $\mu$ M NAA and 0.44  $\mu$ M BA) media. Hygromycin with a concentration of 15 mg.l<sup>-1</sup>, completely inhibited the regeneration from untransformed explants and it was therefore used in selection medium. Optimal transformation conditions were obtained by co-culturing cotyledon explants with *Agrobacterium tumefaciens* in MS medium without any plant growth regulators for 72 hours. Primary analysis of regenerated plants in DNA level was conducted by specific primers for hph gene and transgenic plants were screened for further studies.

**Keywords:** Lettuce, Genetic manipulation, Tissue culture, Direct shoot regeneration, hph selectable gene

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## Effects of Different Size and Age of Transplants on Marketable and Biological Yield, Harvest Index and some Qualitative Characters of Long – Day and Intermediate- Day Onion (*Allium cepa* L.) Cultivars

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### Abstract

Suitable seedling is one of the most important factors of onion growth and yield in transplanting method (TM). In order to investigation effects of different seedling size and age on marketable yield , biological yield, harvest index and some qualitative characters in onion an experiment was conducted at the Agricultural research Center of East Azarbayjan in 2008. The factorial was conducted based randomized complete block design (CRD) with four replications. The experimental factors were four seedling size 9, 12, 15 and 20<sup>cm</sup> and two varieties of onion: Azar-shahr (red hull and long – day) and Gooli-Ghesseh Zanjan (bright-red skin, intermediate-day). In this research characters as: marketable yield (MY), biological yield (BY), harvest index (H.I), percentage of class I, II and III onion, bulb fresh weight (BFW), bulb dry weight (BDW), percentages of dry matter (DM) and total soluble solids (TSS), specific gravity (SG), bulb volume (BV), texture tightness (TT) and bulb shape index (BSI) were studied. Analysis of variance for the measured traits indicated that except for the SG, other studied characters were significant in 1% level. With increasing of seedling length except for BSI all evaluated characters increased. The Red Azar-shahr was superior cultivar in all attributes, and Gooli-Ghesseh Zanjan was lower. Comparisons of the means of treatments show that the seedling size of 20<sup>cm</sup> had highest values of MY, BY, H.I in Azar-shahr (41.29 t/ha, 233.84 g/p, 89.57% respectively) and lowest was seedling size of 9<sup>cm</sup> in Gooli-Ghesseh Zanjan (10.91 t/ha, 95.89 g/p, 65.69% respectively). Also among of the cultivars that except for the bulb volume, other traits were significant. The seedling size × cultivar interaction were not significant. The data suggest that seedling size of 20<sup>cm</sup> was superior than other seedling size. Therefore seedling size of 20<sup>cm</sup> is recommended of onion planting in TM for the places with the environmental same conditions of this experiment.

**Keyword:** Onion, Transplanting method, Seedling size, Total yield, Bulb characteristics

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## Evaluation on Correlation between Aflatoxigenic *Aspergillus flavus* Growth and Aflatoxin B<sub>1</sub> Production with Elements and Protein Percentage in Pistachio Kernels of Different Cultivars

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### Abstract

In order to investigate correlation between the rate (amount) of micro and macro elements and protein percentage in pistachio kernels of six cultivar including: Akbari, Abbasali, Kaleh gouchi, Ahmadaghaie, Ouhadi and Khanjari with *Aspergillus flavus* growth and aflatoxin B<sub>1</sub> production, the amount of micro and macro elements were measured using atomic absorption, micro-kjeldhal digestion, flame photometric and spectrophotometric methods. The protein percentage of pistachio kernels was measured using macro-kjeldhal method. In order to calculate the *A. flavus* growth and aflatoxin B<sub>1</sub> production on pistachio kernels, one isolate of aflatoxigenic *Aspergillus flavus* was used. Twenty gram of pistachio kernels of mentioned cultivars were taken with 3 replications, and were surface sterilized and then inoculated with one ml of spore suspension ( $2 \times 10^6$  spores/ml) of *A. flavus*. Eight days after inoculation, growth rate and colonization of *A. flavus* on pistachio kernels were measured. Aflatoxin content of samples was extracted by BF method and estimated by TLC and densitometer. Correlation coefficient (r) was calculated for elements and protein percentage with *A. flavus* growth and aflatoxin production, The results indicated that there was a significant relationship between N (negative correlation) and Mn (positive correlation) and *A. flavus* growth, as well as N, P and Na and aflatoxin B<sub>1</sub> production. Also there was a significant correlation between protein percentage and *A. flavus* growth and aflatoxin production.

**Keywords:** Pistachio, Aflatoxin, *Aspergillus flavus*, Cultivar, Elements, Protein

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## Relative Water Content and Gas Exchange of Three Wild Pear Genotypes under Water Stress Conditions

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### Abstract

Three pear genotypes (Nazkeh, Lasoreh and Qevilah), grown in 21 containers, were studied under four irrigation regimes in order to evaluate the leaf relative water content (RWC), photosynthesis, leaf gas exchanges and plant dry weight induced by water stress. Control treatment everyday was irrigation. Irrigation was practiced when soil water potential reached at -0.4, -0.8, and -1.2 MPa for the water stress treatments. All traits measured during water stress and two days after re-watering. The leaf relative water content (93.95%), Leaf photosynthesis rate ( $10.86 \mu\text{molm}^{-2}\text{s}^{-1}$ ), stomatal conductance ( $0.22 \text{molm}^{-2}\text{s}^{-1}$ ) and transpiration ( $11.43 \text{molm}^{-2}\text{s}^{-1}$ ) were the highest in control treatment. But sub-stomatal  $\text{CO}_2$  increased in -0.8 and -1.2 MPa treatments and reached 265.7 and 265.2  $\text{molmol}^{-1}$  respectively. Qevilah genotype had the highest RWC (80.66%) under water stress conditions compared to other two genotypes. RWC had a close relationship with photosynthesis ( $R^2=0.89$ ). Reduction in RWC caused low photosynthesis rate. Leaf photosynthesis was reduced in all genotypes under stressed treatments and was 10.86, 6.72, 0.55 and 0.14  $\mu\text{molm}^{-2}\text{s}^{-1}$  in control, -0.4, -0.8 and -1.2 MPa treatments, respectively. Photosynthesis and sub-stomatal  $\text{CO}_2$  concentration were negatively related ( $R^2=0.95$ ). Photosynthesis rates decreased with decrease in stomatal conductance, and high relationship between them ( $R^2=0.93$ ) implied that stomatal limitation to photosynthesis might have been in operation. Also plant dry weight decreased in all genotypes in drought stress conditions, but, there was no significant differences between control, -0.4 and -0.8 MPa treatments in Qevileh genotype. Plant dry weight decreased in -0.4 MPa water stress treatment in Nazkeh genotype. There were no significant differences between measured traits after re-watering in all treatments. The results showed that Qevileh genotype was more tolerant to drought than other genotypes because of a high RWC and no reduction in plant dry weight in -0.4 and -0.8 MPa than control during water stress.

**Keywords:** Pear, Water stress, Photosynthesis, Gas exchange

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## Physiological Characteristic and Biochemical Changes Six Olive (*Olea europaea* L.) Cultivars under Drought Stress

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### Abstract

Drought is one of the important environmental stresses affecting plants growth. In order to determine olives molecular tolerance to drought in greenhouse conditions, a factorial experiment was carried out based on randomized complete block design with two factors including stress with two levels: control and treatment, - 1.5 MPa and olive cultivars with six levels (Nabali, Gordal, Arbequine, Zard, Roghani and Feshomi) with three replications. In this study, some indices, such as protein, content peroxidase enzymes, ascorbate peroxidase, betaine content, chlorophyll and the number of stomata were measured. Results showed that drought stress reduced the total soluble protein content and it was different in various cultivars. Also drought stress caused a significant accumulation of peroxidase enzyme in olive leaves. Biochemical results showed that Gordal and Zard cultivars were more tolerant in comparison to other cultivars. The Betaine content showed a significant difference in the drought stress treated cultivars compared to the control ones. Chlorophyll a and b and the total chlorophyll content decreased under stress and this reduction was more in Gordal and Nabali than the other cultivars. Stomata density decreased under drought stress. An increase in stomata density appeared in Gordal and Roghani cultivars. It could be concluded that Nabali and Gordal cultivars are relatively more tolerant to drought stress.

**Keywords:** Olive, Stress, Peroxidase enzyme, Betaine, chlorophyll

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## Growth and Yield of Three Local Populations Melon (*Cucumis melo*) as Affected by Poultry Manure Application

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### Abstract

Use of organic fertilizer in production of organic products is important. A field experiment was conducted to investigate the effect of different levels of poultry manure on some growth characteristics and crop yield of Iranian melons. The design was split plot in a randomized complete block design with four replications. Levels of poultry manure (PM) included: 0, 5, 10, 15 and 20 tons per hectare which allocated in main plots and three Iranian melon Mashhadi, Soski and Yellow Jalali in sub-plots. Seeds were planted in the second half of the May 2009. Stem length, ratio width to length fruit, dry matter, total soluble solid compounds of fruit (TSS), fruit weight and performance were measured. Results showed that the local populations of melon and poultry manure levels were statistically significant ( $p < 0.05$ ) on performance and growth characteristics. Increasing levels of poultry manure to 15 tons per hectare enhanced the shoot and fruit dry matter percentage. Jalali and Mashhadi had higher dry matter compared to Soski. Length to width ratio of fruit was not affected by levels of manure. Mashhadi showed the highest ratio of fruit width compared to the others. TSS was not affected by manure application. Interaction of manure and local populations of melon was significant ( $p < 0.05$ ). TSS of Mashhadi with the use 10 tons poultry manure/ha was higher than the others. With application of more than 15 tons manure/ha Jalali and Mashhadi had a higher TSS. The highest fruit weight obtained at level of 20 tons manure/ha. As fruit weight of melon is a desirable factor at the market, using 20 tons of poultry manure/ha is recommended for cultivation of melon in Boenzahra and similar regions and soils.

**Keywords:** Melon, Poultry manure, Yield, Quality

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## Evaluation of the Relationship Between Phenolic Compounds and Skin Color in Three Red Apple Cultivars in Japan

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### Abstract

This study was carried out in Japan for evaluation of the relationship between phenolic compounds and skin color indices of 3 apples cultivars including 'Fuji', 'Jonathan' and 'Jonagold', in 2006. In 'Jonathan', L\* (lightness) increased with decreasing red color of skin. In 'Jonagold', chroma increased with increasing red color. But in 'Fuji', there was no detectable difference between these parameters and visual color change of the skin. In all three cultivars, anthocyanins and quercetins increased with increasing visible red color (decreasing L\* value and hue angle). Phenolic content of the fruit pulp of studied cultivars was not related to fruit external color. Total phenolic compounds of 'Fuji' pulp were higher than those of 'Jonathan' and 'Jonagold'. There was a significantly positive correlation between anthocyanin and quercetin 3-galactoside in all three examined cultivars. In 'Jonathan' and 'Jonagold' chroma was high in the fruits with higher content of anthocyanin, which was accompanied by higher amount of quercetin; however, this relationship was not detected in 'Fuji'. 'Jonagold' peel showed higher content of flavonoids and chlorogenic acid than 'Jonathan' and 'Fuji' apples. There was no significant relationship between the skin color and pulps phenolic content of various fruits of each cultivar with different peel color. Total phenolic in 'Fuji' flesh was higher than that of 'Jonathan' and 'Jonagold'. Analysis of correlation coefficient between skin external color and phenolics content showed that red color of peel is mainly due to anthocyanins and quercetins.

**Keywords:** Apple, Peel color, Phenolic compounds, Anthocyanin, quercetin

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## Evaluation of Qualitative Characteristics in Kiwifruit cv. Hayward Harvested from Different Regions of Guilan Province During two Month Cold Storage

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### Abstract

Having no exact knowledge of most appropriate harvesting time in kiwifruit grown in different regions of Guilan province, as well as the low storage longevity of the fruits are the most important factors causing considerable reduction in both marketability and export affairs. In this study, the influence of fruit quality in term of harvesting time on the postharvest quality and food values of kiwifruit (*Actinidia deliciosa* cv. Hayward) was investigated. Based on the farmer's experiences for each region, the harvesting time is chosen and fruits are harvested. Fruits are sorted and healthy ones are promptly stored at 0.5° C and relative humidity of 85-90% for two months. Results showed that the harvested fruits in most regions had no minimum maturity index at harvest time and usually are much more precociously harvested. Only those fruits with high total soluble solid (TSS) at harvest time could reach to an acceptable amount (more than 12.5 percent) of TSS after two months storage and also had less loss weight ( $P < 0.01$ ) than ones grown on regions harvested earlier. The internal quality of fruits at harvest time and through storage was significantly correlated with TSS at harvest time. Harvested fruits with high TSS had higher amount of ascorbic acid, total phenol and antioxidant capacity at both pre and post of storage. In general, late harvesting of kiwifruits in order to reach to minimum maturity index in most regions of Guilan provinces, could improve fruit quality and also increases the shelf life.

**Keywords:** Antioxidant capacity, Harvest time, kiwifruit, Storage; Total phenol

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## Study the Role of Thermophilic Fungi in Composting for The White Button Mushroom (*Agaricus bisporus*)

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### Abstract

In composting process for the white button mushroom, in addition to chemical reactions of complex compounds present in straw, which provide simple compounds for the mushroom, thermophilic microorganisms, having accumulated N<sub>2</sub> and inorganic matter during the composting processes, offer the microbial biomass as a secondary nutritional source to be consumed by the fungus *Agaricus bisporus*. This work was aiming at identifying the thermophilic fungi promoting *A. bisporus*' mycelia growth. Thermophilic fungi were isolated from mushroom compost, and pre-colonized separately on sterile compost in test tubes as well as on compost extract – glucose agar plates; and beneficial effect of each fungus was evaluated regarding growth promotion and extension rate stimulation of *Agaricus bisporus* mycelia. Identification of the fungi was achieved by morphological methods and molecular means (i.e. the universal primers ITS1 and ITS4 used for amplification of the ITS1, 5.8S and ITS2 region of the rDNA repeat unit). The thermophilic fungi were identified as type 2 isolates of *Scytalidium thermophilum*. The results indicated a significant increase in mycelial growth of *Agaricus bisporus*, compared to the control, on both pre-colonized sterile compost in test tubes and compost extract – glucose agar medium ( $p < 0.05$ ). It was observed that *Agaricus bisporus* mycelia feed on *Scytalidium thermophilum*. Providing appropriate condition for growth of *Scytalidium thermophilum* will increase the yield of *Agaricus bisporus* considerably.

**Keywords:** *Agaricus bisporus*, *Scytalidium thermophilum*, Composting, microbial biomass, ITS1, ITS4

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