



Survey on Changes of Leaf Yield and Black Tea Quality in Different Types of Handy Plucking

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Abstract

In this study, the effects of different types of hand plucking were studied on green leaf yield and black tea quality. Bud and a leaf, bud and two leaves, bud and three leaves and bud and four leaves were the types of hand plucking. Plucking was done on chine's hybrid tea and clone 100 in Fuman Tea Research Station. Shoots were plucked in flashing period regularly during three years. Green leaf yield was determined in every plot annually. Tea shoots were manufactured in Iran traditional form (Orthodox). Percentage of waste was measured after extraction. Quality characteristics were evaluated in black tea samples. Quality characteristics were consisted of chemical compounds (caffeine, total soluble solid, theaflavin, thearubigin, total color and brightness) and organoleptic score. Data were analyzed in split plot design based on randomized complete blocks. As results showed, maximum yield obtained in clone 100 in plucking of bud and three leaves. In the other hand, this treatment has normal quality in both of hybrid and clone 100. Minimum yield, quality and maximum level of waste were in bud and four leaves plucking. In clone 100, quality characteristics were evaluated higher than chine's hybrid tea. There was a correlation of positive and significant between quality component and total sensory score.

Keywords: Handy plucking, Black tea, Yield, Quality

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Comparison of the Growth, Mineral Nutrient Concentrations and Essential Oil of Two Iranian Local Basil (*Ocimum basilicum*) in Hydroponic and Aquaponic Systems

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Abstract

Basil (*Ocimum basilicum*) is an herb belongs to Lamiaceae family. The essential oil of basil is widely utilized as an aromatic agent in the food, pharmaceutical and perfumery industries. Basil essential oil possesses antimicrobial property. Due to high economical value and high demand, basil production in greenhouse for permanent market selling is expanding. In order to the investigation of the effect of soilless culture systems on yield and essential oil content of basil an experiment was arranged as a factorial in the framework of a completely randomized design with two factors, growing system (aquaponics and hydroponics) and varieties (green and violet basil) with 3 replications. The results showed that the most of the growth factors in two cultivars were higher in the hydroponics compared with aquaponics. So that, shoot and root fresh and dry mass, height, leaf area and node number per plant were higher in hydroponics than aquaponics. SPAD value was affected by growing system treatments and it was 12.86% higher in hydroponic system. Essential oil content in shoots was not affected by the systems or cultivars. Lower amount of N, P and Mn in shoots were probable reasons of lower SPAD value and growth reduction of plants in aquaponics compared with hydroponics. Notwithstanding, plants growth were normal and there were no deficiency symptoms in aquaponic-grown plants. Thus, nutrient deficiency in aquaponic system might be alleviated by increasing of the fish number per water volume unit and elevation of fish feeding. Therefore, aquaponic system has potential of medicinal plant production.

Keywords: Aquaponics, Essential oil, Nutrient elements Hydroponics, Basil

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Effects of CO₂ and Light Regimes on Anatomical and Physiological Traits on Three Cultivars of Pansy (*viola tricolor*) in Greenhouse

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Abstract

In one side the negative effects of increasing of concentration of carbon dioxide in the world, and in the other side, the positive effects of greenhouse enrichment by such gas is one of the most important reasons in researching of this gas on different plants. For assessment of the effects of carbon dioxide and light regimes in different genotypes of Pansy (*viola tricolor*) a factorial experiment based on completely randomized design with 3 replications and 18 treatments was conducted at the greenhouses of Ferdowsi University of Mashhad at 2009. The treatments are including; 2 concentrations of carbon dioxide (380 and 1000 $\mu\text{mol/mol}$), 3 light regimes (11000 and 14000 lux and sun light) and 3 cultivars (Yellow-Black, Bourdeaux, Sawyers-Black) of Pansy. The results of this experiment showed that among the 11 measured traits in the most treatments, the traits of length, width and the number of stomata and dry weight of shoot were significant. The concentration of 1000 $\mu\text{mol/mol}$ carbon dioxide had less decreasing of stomata conductivity and dry weight than carbon dioxide 380 $\mu\text{mol/mol}$. Totally the effect of light regimes on the measured traits didn't has any significantly difference with sun light. Among the cultivars, altogether Sawyers was more proper because of less stomata conductivity and probably decreasing of water consumption.

Keywords: Carbon dioxide, Vegetative traits, Light regimes, Pansy (*viola tricolor*)

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Evaluation of Dieback and Early Yellowing of Sycamore Trees (*platanus sp.*) in Mashhad by Using GGE Biplot Analysis

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Abstract

Dieback of trees is a serious problem in many different regions of the world and city authorities are concern about conserving and maintaining the green spaces in the big cites. This study was conducted to evaluate the early dieback and yellowing of sycamore trees (*platanus sp.*) by using a completely randomized block design (Split Split plot) in 15 replications (sites) in 2009. The main plot was plant sampling times (spring, summer and autumn), sub plot was the plant condition (green and yellow) and sub-sub plot was the place of sampling on the tree (down, middle and upper). After sampling, preparation and chemical analysis, total nitrogen, phosphorus, potassium, iron, manganese, zinc and sodium were measured by standard methods and the data was interpreted by using site regression model (GGE biplot analysis). The results showed that nitrogen deficiency was occurred with more intensity in the down layer in summer time compare to the spring time. The results also showed that iron deficiency occurred in the yellow tree groups and zinc deficiency also occurred simultaneously. However zinc deficiency was not proven in the spring time but it occurred in summer time. Iron deficiency was started in the spring time and then more deficiency observed in summer time. With regarding to the obtained results it dose not seem that nutritional deficiency is the main reason of dieback of sycamore trees in Mashhad. These symptoms also might be caused by drought stress and water deficiency, low temperature in winter or early spring. Fungi attack and other diseases can cause similar symptoms.

Keywords: Dieback, Yellowing symptoms, Nutrients, Site regression model (GGE Biplot Analysis), Sycamore

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Influence of Harvest Time on Sensorial Traits of Native Early Apple Cultivars during Cold Storage

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Abstract

The investigations were carried out in 2007 on the fruit of 7 native early-ripening apple cultivars grown in Karaj climatic conditions, harvested in two phenological stages of maturity and ripening. The harvested samples were stored at $(0 \pm 0.5) ^\circ\text{C}$ and $(85 \pm 5) \%$ of humidity. The measured sensorial traits consisted in: aroma, flavor, sweetness, flesh quality and general acceptability achieved by an experienced group of panelists in the predefined temporal intervals during cold storage. Biochemical tests were computed for determination of pH, TA and TSS. The factorial experiment was defined within completely randomized design. The results showed significant differences at 1% probability for most of the evaluated sensorial traits between two picking phases, among cultivars and also in temporal intervals of cold storage. The highest level of storage potential meaning as quality conservation was found in 'Mashad', 'Gol Bahar' and 'Golab-e-Kohanz' descentely for the first picking or maturity phase, while it was shown that the fruit picked at ripening better sensorial qualities were determined in the decreasing order as: 'Golab-e-Isfahan', 'Golab-e-Kohanz', 'Gol Bahar', 'Ghermez-e-Rezaieh', 'Mashad' and 'Assali'. More oscillations of sensorial traits were assessed in the first harvest samples of the early cultivars related to the ripening time. Considering, genetic variability of the plant material and observed qualitative oscillations during different temporal stages of storage it was concluded that highest climacteric point was always occurred at the middle intervals of storage. Higher flavor index was registered in the first intervals of storage for the samples picked at second phase. Ulterior comparative results of panel tests in different temporal intervals for maturity and ripening phases demonstrated that superior levels of sensorial quality registered at ripening was gradually decreased, meaning that no significant difference were observed in the long storage periods of the sensorial values for both of the picking phases.

Keywords: Apple, Harvest time, Cultivar, Cold storage, Sensorial trait.

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Evaluation of Stigma Receptivity Period in Several Peach Cultivars through Controlled Pollination under Field and Laboratory Condition

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Abstract

In order to study stigma receptivity in peach cultivars ('Makhmali', 'Anjiri-ye-tabestane', 'Anjiri-ye maleki', 'Haj-kazemi' and 'Zoodras') controlled pollination was done in both field and laboratory conditions. Before pollination trials the *in vitro* germination of the pollen was tested in petridish. Branches with adequate number of flowers were chosen for controlled pollination. Self Pollination was carried out by hand, on the same day as emasculation (day 0) and thereafter every two days (2, 4, 6, 8 days after emasculation). To allow for growth of pollen tubes pollinated pistils were collected four days after pollination and fixed in FAA. Pistils were washed several times and autoclaved in a solution of 5% sodium sulfite for softening. After staining with aniline blue, the pollen germination at the stigma and pollen tubes growth in each section of style (upper and bottom) and ovary was determined by means of fluorescence microscopy. Results revealed that the stigmas of studied cultivars were receptive at balloon stage and reach their optimum receptivity between 2 and 4 days later. Our studied cultivars in confrontation to occurrence of temperature oscillations in field condition had different reactions at different pollination times. Regarding to pollen germination at the stigma surface and *in vitro* condition and existence the pollen tubes inside the ovary, became clear that studied cultivars are self-compatible and male-fertile.

Keywords: *Prunus persica* (L.) Self-pollination, Stigma receptivity, Pollen tube growth, Temperature

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Evaluating the Effects of Irrigation Interval and Nitrogen on Yield and Yield Components of Fenugreek (*Trigonella foenum-graecum* L.)

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Abstract

To study the effects of irrigation interval and nitrogen level on yield and yield components of Fenugreek medicinal plant, an experiment in split plot arranged in randomized complete block design with three replications conducted at the Azad University of Birjand in 2009. Treatments included; irrigation intervals (4, 8 and 12 day) as main plot and nitrogen fertilizer (none fertilizer, 50, 100 and 150 kg/ha) as subplot. Results showed that the difference between 4 and 8 days of irrigation intervals for seed yield wasn't significant, but the highest amount of forage yield achieved from irrigation after 4 days. Rising of nitrogen level led to increase of yield and yield components and the difference between 100 and 150 kg/ha nitrogen for seed and forage yield wasn't significant. Irrigation interval has a considerable effect on all yield components except of pod length. Nitrogen also has a significant effect on plant height and number of pod per plant but it was insignificant on number of seed per pod, seed weight and pod length. Interaction effect of irrigation and nitrogen indicates that in 4 and 8 days of irrigation intervals, amounts of 100 and 150 kg/ha nitrogen have the highest effect on yield and yield components, but with increase of irrigation intervals to 12 days, 100 kg/ha nitrogen have the highest effect on all traits.

Keywords: Irrigation interval, Nitrogen, Yield, Yield components

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Evaluation of Early Spring Frost Damage in Different Types of Almond and Apricot Cultivars

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Abstract

In fruit trees damage of frost and freezing is depended to time of chilling and tree phenological stage. Almond (*Prunus amygdalus* B.) and apricot (*P. armeniaca* L.) cultivars are usually the first fruit trees to bloom and susceptible to damaging frosts in the early spring. A study was conducted on different types of almond and apricot cultivars in order to investigation the main factors related to frosting, irregular of productivity and low crop load of trees for 10 years. Six almond cultivars; Sahand, A200, Shkoofeh (very late bloom), Touno, Super nova (late bloom and self- compatibility), Managa (early bloom) and 6 apricot cultivars; Canino, Royal, Telton (self- compatibility), Ordbad, Nasiri and Asgarabad (self- Incompatibility) were evaluated for aspects of some biological and physiological characteristics that related to frost tolerance and fruit set. The results of 10 years evaluation showed that some cultivars despite were resistant to spring frost and usually their crop load was optimum. In addition of freezing damage, other factors like; undesirable climatic conditions in flowering time, direct or indirect influence on bearing and fruit set. Touno and Super nova as self compatibility and late blooming almond cultivars, Canino, Royal and Tilton as self- compatibility apricot cultivars were tolerant to cool and unfavorable climatic conditions in early spring. Therefore, they usually had higher and regular productivity. This differences were related to some phenological and physiological characteristics like; time of flowering, interior components of flower buds, time of niter and period of dormancy, temperature reaction of flower buds, effective pollination period, self – compatibility, frost resistance of pistils and flowers.

Keywords: Frost, Freezing, Almond, Apricot, Cultivar

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Effect of Gibberellin Concentrations and Spraying Time on Cracking of Pomegranate Fruit (*Punica granatum* L.) cv. “Malas Esfahan”

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Abstract

Fruit cracking of pomegranate is a phenomenon that is shown at most growing zones of the world. Pomegranate cracking is the main obstacle for production and export, and have a lot of annual economic damage, the present study has been done about pomegranate trees. The purpose of this research is surveying the decreasing of pomegranate cracking and increasing the fruit quantities and qualifies characteristic by using of diverse concentrations of gibberellic acid that is sprayed at the different times. This experiment has been done at pomegranate orchard of Isfahan Center for Research of Agricultural Science and Natural Resources. This study was conducted as a factorial experiment based on randomized complete block design in three replicates. Experimental treatments including gibberellin sprayed with four concentrations of 0, 150, 300 and 450 mg/L, which was applied in three times, including full bloom, a month and two months after full bloom. Gibberellin decreased cracking percentage compared to control. Different stages of gibberellin application did not show any significant difference on cracking percentage. However, by increasing of concentrations and application close to 3rd stage, the cracking rate was decreased. In the first stage, all of used gibberellin concentrations were caused parthenocarpy, and the fruits didn't grow. The effect of gibberellin at different stages and concentrations was significant on the total weight and skin fresh weight. Length, diameter, total acidity, size and volume of fruit were increased by increasing of gibberellin concentrations. The concentration of 450 mg/L showed the maximum effects on fruit quantities and qualities characteristics.

Keywords: *Punica granatum* L., Gibberellic acid, Quantitative and qualitative parameters, Fruit

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Effect of Essential Oil of Some Medicinal Plants and Polyethylene Packaging on Quality and Pomegranate Shelf Life (cv.

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Abstract

Fruit spoilage of pomegranate is one of the most important problems in postharvest stages and its exports. This decay is mainly due to the influence and spread of saprophytic or parasitic fungi into the pomegranate fruits. In this purpose effects of essential oil from medicinal plants include; caraway (*Carum carvi*) and peppermint (*Mentha piperetta*), and packaging (with or no polyethylene bags) were investigated on shelf life, quality, decay percentage, chilling index and biochemical traits. The pomegranate fruits were kept in $5\pm 1^\circ\text{C}$ and 85-90 percent humidity. The results showed that the highest amount of chilling index and weight loss was in without polyethylene bag treatment by 3.45 and 17.03, respectively. On the other hand the most percent of fungal infection was observed in polyethylene alone treatment by 29.41%. Whereas, essential oils (1000 ppm) of caraway and peppermint was able to control postharvest fungal infection caused by LDPE packaging, completely. The usage of caraway essential oil on pomegranate fruits increased phenolic compounds and antioxidant activity, significantly.

Keywords: Phenolic compounds, Fruit decay, Chilling index, Weight loss, Antioxidant activity

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Evaluation of Salicylic Acid and Temperature Treatments on Storability, Postharvest Quality and Antioxidant Activity of Apricot (*Prunus armeniaca* cv. 'Lasgerdi') Fruit

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Abstract

In order to investigate the effect of salicylic acid and temperature treatments on physico-chemical attributes and antioxidant activity was conducted of apricot cultivar 'Lasgerdi' the experiment. The apricot fruits were harvested at the commercial ripening stage, and fruits were immersed in different concentration of salicylic acid as well as distilled water (control) for 5 min, then fruits were packed in boxes with polyethylene cover and stored. The changes in fruit weight, firmness, pH, total soluble solid content, titratable acidity, ascorbic acid, antioxidant activity were estimated after 0, 5, 10, 15 and 20 days during storage. The results showed that the weight loss, firmness, titratable acidity, ascorbic acid and antioxidant activity decreased significantly while the pH and total soluble solid content increased significantly during storage for two temperatures. During the storage period, a significant difference between treatments (control and various concentrations differences of salicylic acid) and various temperature significantly the weight loss and maintained their firmness. In this condition, the highest and lowest of titratable acidity, ascorbic acid and antioxidant activity were observed in treatments of 4 mM salicylic acid and control, respectively. Also, the data showed that the temperature of 4°C positive impact maintained quality and fruit shelf life during storage. Based on our results, the salicylic acid treatment as combination nature and temperature of 4°C may be used commercially to extend the storage life of apricot.

Keywords: Self life, Attribute, Total soluble solids, Ascorbic acid.

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Feasibility Study of X-ray Absorption Application as a Non-destructive Method for Determining Some Qualitative Parameters of Pomegranate Fruit

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Abstract

In the present study application of X-ray computed tomography as a nondestructive technique for estimation of some qualitative parameters of pomegranate fruit was studied. For this purpose, three local cultivars of pomegranate fruit of Fars province, Iran that included; Rabab Malas, Rabab Torsh and Khani Kazeroon were used. The X-ray CT images of pomegranate fruits were prepared using CT-Scan device. Corresponding CT numbers that indicate X-ray absorption value of objective were extracted using K-PACS software. The qualitative parameters such as anthocyanin, titratable acidity, soluble solids, taste index and pH of different pomegranate fruits were measured. Relationships between qualitative parameters and the obtained CT numbers were evaluated using linear regression models. The results indicated that R^2 for estimation of qualitative parameters for all models was more than 0.900. The CT number had positive correlation with titratable acidity and negative correlation with anthocyanin, soluble solids and pH for all pomegranate varieties. The relations for estimating the qualitative parameters of Rabab Malas variety showed the highest precision (0.971, 0.947, 0.963 and 0.946 for anthocyanin, soluble solids, titratable acidity and pH, respectively). The highest correlation was observed between the amount of anthocyanin and CT number for all pomegranate fruit cultivars (with coefficient of determination of 0.971, 0.943 and 0.960 for Rabab Malas, Rabab Torsh, Khani Kazeroon, respectively). Overall results revealed that CT number can be applied as a useful index for estimation of qualitative parameters of pomegranate fruit especially for real-time sensing situations.

Keywords: Pomegranate, Tomography, X-ray absorption, CT number, Fruit quality

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Effects of Postharvest Salicylic acid and *Aloe vera* gel Applications on some of Quality Attributes and Antioxidant Activity of Table Grape (cv. Gisel Uzum)

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Abstract:

Because of the harmful effects of chemicals on human health and environment, use of these compounds in postharvest technology of agricultural crops is recently restricted and it is necessary to find safe compounds for use in postharvest technology of fruits and vegetables. In this study, effects of salicylic acid and *Aloe vera* gel on quality attributes and postharvest life of table grape (cv. Gisel uzum) was studied. Fruit were treated with salicylic acid (0, 1 and 2 mM) and *Aloe vera* gel (33% and 25%), then were stored at $0 \pm 0.5^{\circ}\text{C}$ with 85-95% RH for 45 days. Fruit quality attributes including pH, total soluble solids, total acidity, total phenolics, total antioxidant capacity, and vitamin C were evaluated after 45 days. 2 mM salicylic acid effectively decreased the rate of pH increase. TSS and TA content were significantly affected by 2 mM salicylic acid and 33% *Aloe vera* gel treatments and retained TSS and the reduction of titratable acids and sugars to prevent its decomposition. In this study, the highest total antioxidant activity and total phenols and vitamin C of 2 mM salicylic acid gel and 33% *Aloe vera* gel and Combination treatment with 2mM salicylic acid and 33% *Aloe vera* gel respectively. postharvest treatment of fruit with the combination of salicylic acid and *Aloe vera* gel may be considered as a good alternative to chemicals in postharvest technology of table grapes.

Key words: Table grape, *Aloe vera* gel, Salicylic acid, Total phenolics, Total antioxidant activity

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Investigation of Physiological Responses of Two Citrus Rootstocks to *In Vitro* Salt Stress

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Abstract

In this experiment, physiological responses of two citrus rootstocks [sour orange (*Citrus aurantium* L.) and trifoliolate orange (*Poncirus trifoliata* Raf.)] were investigated under *in vitro* salt stress conditions. This study was conducted on a completely randomized factorial design. Explants (Nucellar seedling obtained from seeds) of both rootstocks were transferred to Murashige and Skoog (MS) solid proliferation medium containing 8.9 μ M BA and 0.5 μ M NAA with different concentrations 0, 50, 100, 150, 200 mM of sodium chloride (NaCl) with six replicates. Results show that leaf chlorophyll index, photosynthesis rate, stomatal conductance, internal CO₂ concentration (C_i), total protein content decreased in both rootstocks by increasing salinity levels, although there was no significant difference for above-mentioned characteristics in the interaction of salinity and rootstock. The amounts of reduction in total protein content, chlorophyll loss and internal CO₂ concentration (C_i), in trifoliolate orange genotype were greater than the sour orange. Also, peroxidase enzyme activity increased by increasing salinity level in both rootstocks, but, the rate of increase in the trifoliolate orange was higher than the sour orange. By increasing salinity levels in the cultural medium, the uptake of sodium (Na⁺) and chlorine (Cl⁻) significantly increased in both rootstocks over 6 weeks culture period. Comparison in to trifoliolate orange, sour orange less sodium and chlorine were taken up. Based obtained results, can be declared, salt tolerance has a negative correlation with Na⁺ and Cl⁻ content in plant tissues, and the plant have a less Na⁺ and Cl⁻ in tissues are more resistant. Thus, sour orange was more tolerant than trifoliolate orange to salt stress and could be has more resistant to high concentration salinity.

Keywords: Peroxidase enzyme, Citrus rootstocks, Salt stress, Photosynthesis, Stomatal conductance

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