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Evaluation of wheat recombinant inbred lines based on morphological and agronomic traits

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Abstract

To identify the high yielding lines with optimal characteristics, 40 recombinant inbred lines derived from a cross between 'Norstar' (winter wheat) and 'Zagros' (spring wheat) cultivars were examined using a randomized complete block design with three replications in 2014 at the Research Station of Faculty of Agriculture, University of Tabriz, Iran. The measured characters consisted of peduncle weight, penultimate weight, spike weight, kernels per spikes, biomass, grain yield, 1000 kernel weight, plant height, peduncle length, penultimate length, spike length, harvest index, flag leaf area and straw yield. Significant differences were observed among lines for all the studied traits, except spike weight, flag leaf area and straw yield. Higher genetic diversity was observed among inbred lines with respect to kernels per spike, number of spikes, biomass and straw yield. Peduncle weight, penultimate weight, kernels per spike, number of spikes and 1000 kernel weight had high heritability. The highest genetic gain was obtained for peduncle weight, penultimate weight and kernels per spike. Based on trait means, lines NO 93, 28, 296 and 31 were identified as superior genotypes. Correlation, stepwise regression and path analysis revealed that kernels per spike and number of spikes were more effective components on grain yield. The analyses were carried out using WARD algorithm and standardized data. Cluster analysis was performed based on all traits and lines were classified into four groups. In factor analysis, four first factors explained about 82 percent of total variations.

Keywords: Genetic gain, Grain yield, Heritability, Path analysis

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Effect of plant growth regulators on direct Shoot regeneration of Henbane

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Abstract

In order to study, *in vitro* bud induction and shoot regeneration of different explants (shoot tip, axillary bud, hypocotyl and cotyledon) of Henbane on MS medium enriched with various concentrations of Kinetin (0, 1, 3 and 5 $mg.l^{-1}$) alone or in combination with Indole-3 acetic acid (0, 0.1 and 0.5 $mg.l^{-1}$) this research was investigated in Urom Zist Tak knowledge-based company plant tissue culture lab at 2013. ANOVA results revealed that the maximum buds inducted (average of 41.62 buds per explants) were in 5 $mg.l^{-1}$ Kin and 0.5 $mg.l^{-1}$ IAA , the maximum shoots regenerated (average of 155.67 shoots per treatment) were in 5 $mg.l^{-1}$ Kin and 0.5 $mg.l^{-1}$ IAA in shoot tip explant and minimum bud induction (average of 1.62 buds per explant) were in 5 $mg.l^{-1}$ Kin and 0.5 $mg.l^{-1}$ IAA , the maximum shoots regenerated (average of 5.7 and 6.5 shoots per treatment) were in MS medium without Kin in hypocotyl explant. The regenerated shoots were rooted in MS and ½ MS media fortified with different concentration of IAA and IBA (0, 1.1 and 2.2 µM) at four weeks. The maximum average root induction (87.50 roots) were MS medium treatment of 1.1, 2.2 µM IBA. The successfully acclimatized rooted plantlets were transferred to green house after 3 weeks with 90 percent of survival rate.

Keywords: Direct regeneration, Explant, *Hyoscyamus reticulatus* L., *In vitro* culture, Plant growth regulators.

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The Correlation between traits and path analysis of yield in tomato

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Abstract

To determine the relationship between yield and components of it and identify the effective traits on yield, 97 tomato landraces from West Azarbaijan in Iran (83 landraces) and Iğdır in Turkey (14 landraces) along with three commercial cultivars were studied using an alpha lattice design with two replications. The experiment was carried out at the Agriculture and Natural Resources Research Center of West Azerbaijan during two years (2012-2013). Combined analysis of variance indicated significant variation among cultivars for all the experimental characters. Correlation analysis revealed significant positive correlation between yield and length and width of cotyledon and true leaves, number of days to fruit maturity, fruit weight, length of fruit, diameter of fruit and pericarp thickness while significant negative correlation was observed between yield and number of flowers per inflorescence, fruit set per cluster, number of fruits per plant, number of days to 50 percent of fruit maturity, total soluble solids (TSS) and acidity. In stepwise regression analysis fruit length, TSS and percentage of fruit set per cluster were entered to the model, respectively. These characters explained 43 percent of yield variation. Path analysis showed that fruit length, leaf width, fruit weight and pericarp thickness have the most positive direct effect on yield. Thus, these traits could be used as selection criteria in tomato breeding programs for yield improvement.

Keywords: Correlation, Landrace, Path analysis, Stepwise regression, Tomato.

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Winter cold tolerance screening of 22 grapevine cultivars of Kurdistan province

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Abstract

In this research, the bud and cane winter cold tolerance of 22 field-grown grapevine cultivars of Kourdestan province Agricultural and Natural Resources Research and Education Center was evaluated at Jan. and Mar. stages in 2012. In these cultivars soluble carbohydrates and water content changes of buds and canes during dormant period also were measured. After exposure to different freezing temperatures (-10 to -30ºC), the bud and cane LT_{50} values were estimated using electrolyte leakage measurement (EL LT_{50}) and bud browning (BB LT_{50}) to determine cold tolerance of vines.Significant differences ($P \leq 0.01$) were found among cold tolerance of cultivars in both stages. The two assays correlated positively, and marked cultivar differences in FT were found.Based on the bud EL LT_{50} values, the highest FT (LT_{50} = -26.5 ºC) in this stage was related to 'Bolmaskah' and 'Gwen Kalahbab' showed the lowest FT (LT_{50} = -20.8 ºC). Based on the bud EL LT_{50} values in Jan., cultivars were classified as hardy (LT_{50} = -25º to 27ºC; 'Bulmaskah', 'Sarqulah', 'Khalili', 'Bidane-Qermez' and Farkhi-Zoodras'), moderately hardy (LT_{50} = -23º to 25ºC; 'Sharshareh', 'Shahini', 'Shirazi', 'Gaznei', 'Rasheh', 'Tabarzeh', 'Bidaneh-Sefid', 'Nafti', 'Molaei'and 'Farkhi-Dirras') and least hardy (LT_{50} = -21º to 23ºC; 'Sahebi', 'Laal', 'Sahnaei', 'Askari', 'Marahei', 'Rish-Baba' and 'Kalehbab'). Unlike to soluble carbohydrates concentration, the bud water content was lower in cold hardy cultivars such as 'Bulmaskah', 'Sarquleh', 'Khalili', 'Bidane-Qermez' and 'Farkhi-Sefid'compared to the other cultivars which confirms the involvement of bud tissue dehydration and carbohydrates soluteaccumulation in freezing protection, demonstrating that these materials can be use as surrogates to evaluate FT in a range of grape germplasm resources.

Keywords: Cold acclimation, Cold stress, Freezing tolerance, Grapevine

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Micropropagation of *Hibiscus rosa-sinensis* through tissue culture

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Abstract

In order to investigate the *in vitro* micropropagation *Hibiscus Rosa-sinensis* three tests in a completely randomized design with 10 replications were performed in tissue culture laboratory Shahid Chamran University in 2014. The first experiment showed the perfect media. Second tests best consentration BAP for multiplication and third tests showed the best type and concentration rooting hormone. Compare average of first experiments showed the highest average shoot length, number of leaves, fresh weight and dry weight was observed in VS than other media. Compare average of second experiments showed the concentration of 5.0 mg per liter hormone BAP highest average shoot length, number of leaves, fresh weight and dry weight than other concentrations was observed. Compare third experiment showed that the average concentration of 2.0 mg per liter of IBA hormone highest percentage of rooting, number of roots and root length was compared to other concentrations.

Keywords: BAP, Hibiscus rosa-sinensis, Media VS, Proliferation, Rotting.

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Assessment of genetic diversity among four olive cultivars using morphological markers

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Abstract

In order to study of genetic diversity and similarity among four native olive cultivars including ‘Mari’, ‘Zard’, ‘Shengeh’ and ‘Rowghani’, these cultivars were evaluated in five regions including Ali abad, Gilvan, Tarom, Manjil and Jamal abad at 2012-2013. There was a significant difference among studied individuals. The correlation coefficient analysis among studied traits showed that there was a good correlation among quantitative traits such as flesh, fruit weight, fruit shape and stone shape, while the correlation among qualitative traits was low. The results of PCA earned three components which accounted 91.93 percent. The scatter diagram of individuals based on two first components showed a good distinction for individuals. The cluster analysis separated six distinct groups in which Mari population formed three neighbour groups. ‘Zard’ population also showed high homogeneity, while ‘Shengeh’ showed the most dispersion however it was closely similarity to ‘Rowghani’ population.

Keywords: Cluster analysis, Complete linkage, Correlation coefficient, Principal Component Analysis

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Screening of winter cold tolerant strawberry cultivars based on physiological indices

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Abstract

In this study, the winter cold tolerance of seven strawberry cultivars was evaluated using a RCBD design with a split plot arrangement at Bu-Ali Sina University in 2014. After exposure of plants to low temperatures (+4, -5, -10, -15, -20 and -25^{o}C), the values of electrolyte leakage, index of freeze injury, RWC, total chlorophyll and chlorophyll fluorescence parameters (F_0, F_m, F_v and F_v/F_m) were measured. Low temperature, cultivar and their interactions had significant effects ($P\leq0.01$) on all measured parameters. Means slicing of traits showed that genotypic differences were most obviously identified in -25^{o}C as compared to the other temperature treatments. There was strong correlations between the evaluation methods for screening winter cold tolerant cultivars. The strawberry `Karssenberg' and `Queen Elisa' were the most cold tolerant cultivars with the lowest electrolyte leakage and freeze injury index. These cultivars had the highest chlorophyll content and chlorophyll fluorescence rates in -25^{o}C whereas `Chandler' and `Tennessie Beauty' with the highest electrolyte leakage and freeze injury index values, the lowest chlorophyll content and chlorophyll fluorescence rates in low temperatures, were the most susceptible cultivars to low temperatures.

Keywords: Chlorophyll fluorescence, Electrolyte leakage, Freezing injury, Screening, Strawberry

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Evaluation of some physicochemical fruit traits of fourteen Cornelian cherry genotypes

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Abstract

In order to determination of elite genotype of cornelian cherry (*Cornus mas* L.) in East Azerbaijan province, Iran, current study was conducted in complete factorial randomized design with three replication on 14 local commercially cultivated genotypes in orchards of Kaleibar, East Azerbaijan, Iran in 2014. For this purpose, 16 quantitative, qualitative and biochemical characteristics of fruits was evaluated. Results of analysis of variance showed significant differences among genotypes for all traits at 1 percent probability level, indicating the existence of genetic diversity among studied cultivars. The highest genotypic coefficient of variation was found for the Anthocyanin content (50) and Vitamin C (23.58). According to cluster analysis, 14 genotypes divided into four clusters. Number four genotype with maximum amounts of phenol, antioxidant, TSS, total acidity, fresh weight, length, volume and diameter of fruits, pulp weight, stone weight, length and diameter have been known an elite genotype.

Keywords: Cherry Fruit, *Cornus mas* L., Diversity, Morphopomological

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The heritability of yield and morphological traits of some clones of *Satureja rechingeri* Jamzad

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Abstract

Satureja rechingeri, belonging to the family Lamiaceae, has been recently used in the pharmaceutical industry due to its high level of carvacrol in the essential oil. The domestication and breeding of suitable *S. rechingeri* variety has beenstarted since few years ago in Iran. The initial screening of natural populations, grown in the same environment, was performed and 58 talentclones were selected. In order to determine the suitable parents to produce synthetic varieties in 2013-2015 in the region of Dezful (Fadak) 58 clones were studied. In the present study, half-sib (HS) progenies of the 58 parent clones were obtained by polycross and were evaluated in a randomized complete block design (RCBD) with six replications. Different production biological traits as plant height, main branches number, lateral branches number, leaf width and length, fresh and dry weight, dry weight of leaves and flowers and essential oil content and yield were evaluated at the full flowering stage. Narrow sense heritability values were calculated based on measurements at the individual plant level (H_1) and based on plot means (H_2). Highest narrow sense heritability was observed for plant diameter, plant height and main branches number while lowest value was obtained for the number of lateral branches. Additive variance and general combining ability were also calculated for each trait. Additive variance was significant for main branch number, fresh weight, and dry weight, weight of leaves and flowers and plant height. By selection of 20 percent of the half-sib families, based on general combining ability for essential oil yield, families of F_{27}, Z_{12}, Z_{37}, F_{14}, E_{59}, E_{37}, Z_{26}, Z_{28}, K_{56} and G_{27}clones can be selected as parents of a synthetic variety.

Keywords: Additive variance, Combining Ability, Heritability, Polycross, *Satureja rechingeri*

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The combining ability and inheritance type of some morphological traits in bread wheat under drought stress using diallel analysis

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Abstract

Breeding for drought stress is one the important purposes in wheat cultivars breeding programs. Grain yield under drought stress is depended on phonological, morphological and physiological features. In order to investigate the general and specific combining ability and genes function under drought stress in three and two bread wheat lines and cultivars respectively, diallel one way cross was performed in Agricultural and Natural Resource Research Station, Tehran. Parents and hybrids (F1) seeds in the fall 2013, were planted in a randomized completely block design with three replicates. Number of grain in spike, number of infertile florets in spike, days to flowering, kernel weight and grain yield traits were evaluated. Results from analysis of variance showed that there are significant differences between genotypes. Results from diallel analysis based on Griffing's experimental Method II, Model B showed that general combining ability (GCA) effect in all traits and specific combining ability (SCA) effect in all traits except number of infertile florets in spike were significant ($P \leq 0.01$). In addition, the ratio of GCA to SCA mean of squares was significant in all traits except days to flowering. Higher portion of additive genetic variance in mentioned traits indicate the higher heritability of these traits and this prepares the selection possibility in early generation for these traits.

Keywords: diallel cross, drought stress, hybridization, wheat, genetic variance

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