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The effect of different media, explants and cytokinin on micropropagation of Norfolk Island pine *(Araucaria excelsa*R.)

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Abstract

Studying the effect of different media, explants and cytokinin on micro propagation of Norfolk Island pine *(Araucaria excels* R.), was conducted in a factorial experiment based on completely randomized design at Imam Khomeini International University, in 2013-2014.Norfolk Island pine (*Araucaria excelsa*) is belonging to *Araucariaceae* family and is native to Norfolk Island in Australia. This plant is a woody or namental plant of high commercial value. Since it is propagated by seed, achieving are generation system is one of the most important goals in this woody plant tissue culture. To evaluate the effect of cytokinins and culture media for bud induction during the process of direct organogenesis, three concentrations of different cytokinins (TDZ, Kinand2ip) and four culture media (WPM, BE, ½MSandTE) were employed. The results showed that the middle shoot explants, 2ip as the best growth regulator and WPM and TE were the best media for inducing axillary buds. The overall results illustrated that plantlet production is depending on hormone type and concentration and culture medium. BAP was the only PGRs that caused root induction in micro shoots. This is the first time to report the effect of culture media in micro propagation of *Araucaria excelsa*.

Keywords: Araucaria excelsa, chorolophyll, hormones, organogenesis, root induction.

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Genetic diversity and factor analysis for yield and some morphological traits in strawberry cultivars

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Abstract

This study was conducted to determine the genetic diversity, factor analysis and heritability of yield and some morphological traits in 20 strawberry cultivars at Agricultural Research Center of Kurdistan, Iran, during 2011-2012. The experiment was done using a randomized complete block design with three replications. Results of analysis of variance showed significant differences among genotypes for all traits at 1% probability level, indicating the existence of genetic diversity among studied cultivars. The highest genotypic coefficient of variation was found for the number of fruit and flower/plant and yield. The highest phenotypic coefficient of variation was observed for the number of fruit, runner and flower/plant. The highest broad sense heritability was estimated for the number of flower and fruit/plant and yield and the lowest broad sense heritability was estimated for the number of runner and leaf area. Results of factor analysis revealed four factors for discrimination of studied traits and these factors distinguished 83.83% of total variation. Results of discrimination of traits via biplot based on the two first factors confirmed the ability of factor analysis for discrimination of traits and the goodness of grouping of genotypes. Among these genotypes and for most of the traits, 'Queen Eliza' was superior.

Keywords: biplot, clustering, discriminative statistics, diversity coefficient, strawberry.

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Evaluation of half-sib families of tall fescue *Lolium arundinaceum* (Schreb) for agro-morphological traits

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Abstract

This study was conducted to study agronomic and morphological characteristics of 25 polycross families of tall fescue during 2011 and 2012 at Research Station farm in Isfahan. Number of days to pollination, height of plant, number of fertile tiller, length and width of flag leaf, stubble surface, spike length, seed and forage yield were evaluated. The highest and the lowest of forage yield were 113 g (family number 25) and 53 g (family number 13), respectively. For seed yield, family numbers 2 and 12 had the highest means and the family number 13 had the lowest mean. Broad-sense heritability of seed yield per plant and seed yield per acre were 66 and 32, respectively. Based on the results of cluster analysis, all families were clustered in four groups. Analysis of variance and mean analysis showed the highest means families for evaluated traits. To improve stubble surface with low broad-sence heritability cross genotypes from first and third group with higher means and genetic distances would be successful. Due to high broad-sense heritability for plant height and spike length select of families from third group could be useful for breeding programs in future.

Keywords: cluster analysis, half-sib family, tall fescue.

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Terminal drought tolerance in promising barley genotypes using stress susceptibility and tolerance indices

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Abstract

Evaluation of drought tolerance for 20 barley genotypes were conducted under normal irrigation and terminal stress condition by withholding irrigation at the time of 50 percent flowering in Varamin land. Experiments were done using randomized complete block design with three replications for identification of tolerant promising barley genotypes to drought stress. Drought effect on grain yield and plant total mass traits was studied and eight of stress indices including Stress Tolerance Index (STI), stress tolerance (TOL), Stress Susceptibility Index (SSI), Mean Productivity (MP), geometric mean productivity (GMP), yield index (YI), yield stability index (YSI), Harmonic mean (HARM) were estimated based on grain yield under stress (YS) and non-stress (YP). A significant and positive correlation was observed between grain yield and total mass (Stress and Potential) with GMP, HARM, MP, YI and STI. Stress indices such as GMP, STI, HARM, YI and MP are much better than YSI, SSI and TOL for predicting YP and YS. By using ranking method for yield and total mass traits genotype Numbers of two and five were categorized as tolerant, however line number one was detected as sensitive genotype. These genotypes can be used in crop development and breeding programs. Genotype numbers eight and nine had the highest yield and total mass and consequently highest economic yield in both stress and non-stress condition that can be introduced for cultivation.

Keywords: barley, grain yield, plant total mass, ranking, stress indices.

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Effects of the BAP, Kin and GA_3 on the *in vitro* shoot regeneration and effects of the activated charcoal and IAA on *in vitro* rooting in lisianthus plant (*Eustoma grandiflurom*)

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Abstract

Lisiantus is introduced among the 10 top cutting flowers in the world. Micropropagation can be used in this plant because of some problems in traditional propagation. In this research, the effects of the growth regulators on the *in vitro* shoot regeneration and rooting of the shoots obtained from nodal explants were investigated. The effects of the different concentrations of BAP and Kin on shoot regeneration in MS medium were investigated according to a completely randomize design (CRD) in the independent experiments. The results indicated that the use of 0.5 mg l^{-1} BAP was the best treatment for shoot regeneration (four shoots per explant). In the next experiment, the interaction of BAP and GA_3 on shoot proliferation was investigated according to a factorial experiment based on CRD. The results showed that the best shoots in terms of quality and quantity (17 shoots per explant) were obtained in MS medium supplemented with 0.5 mg l^{-1} BAP and 0.2 mg l^{-1} GA_3. The shoots produced in this treatment were transferred to MS medium containing different concentrations of IAA (0, 0.2, 0.5 and 1 mg l^{-1}) and activated charcoal (0 and 3 g l^{-1}) to investigate the shoot rooting. MS medium supplemented with 1 mg l^{-1} IAA and without activated charcoal was determined as the optimum medium for shoot rooting.

Keywords: lisiantus (*Eustoma grandiflorum*), micropropagation, rooting, shoot regeneration.

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Evaluation of some advanced lines of durum wheat using several important traits at Isfahan station

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Abstract

In order to evaluate some morphological traits of durum wheat genotypes, 18 elite lines selected from advanced regional durum wheat yield trials. These materials along, with two checks 'Dena' (durum wheat) and 'Parsi' (Bread wheat) were examined using RCB design with three replications at Isfahan research station in two consecutive cropping season. During the cropping season some trials such as the days to heading, days to maturity, plant height, and grain yield were measured and recorded. Analysis of variance showed that 1000 kernel weight, days to 50 percent heading and days to maturity in lines were significant. Effects of year and year × line were not significant for grain yield that indicated good yield stability for these lines. Cluster analysis indices the 20 genotypes separated into three groups, group III had the high grain yield. Number six line (SOMAT_4/ INTER_8//KUCUK) had the highest mean for the plant length and thousand kernel weight in comparison to the majority of the other lines. This line was separated from other lines in the dendrogram. Our factor analysis (FA) indicated that the first two factors account for more than 67 percent of the total variation. The most important traits that created this variation were seed weight and plant height.

Keywords: cluster analysis, factor analysis, grain yield, quantitative traits, year×genotype.

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Evaluation of salt tolerance of different ecotypes of fennel (*Foeniculum vulgare* Mill.)

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Abstract

In order to the study of the salinity effects on seed germination and effecting parameter of fennel (*Foeniculum Vulgare*) was conducted a factorial experiment in a completely randomized design with two factors and three replications. Factor A was 10 ecotypes, including; Sardasht, Saghghez, Kerman, Tabriz,Sabzevar, Rome, Khusf, Bojnoord, Mashhad and Shabestar and factor B was five concentrations of sodium chloride, including; one, three, five, seven and nine ds/m^2. The measured traits were root length, shoot length, seedling length, wet and dry weight of the root, hypocotyls and seedling, root/ shoot length, seed vigor index, germination speed and germination percentage. Analysis of variance showed that the total of ecotypes had significant differences in one Percent in most traits except wet weight of seedling, dry weight of root and germination rate. The mean comparison of ecotypes indicated that the Kerman ecotype with minimal reduction in root and shoot length was the most resistant to salinity. The mean comparison of salinity levels showed that there was a significant difference between different levels of salinity in most traits except the dry weight of root. The study of different levels of salinity in the different traits showed that the most traits decreased with increasing concentration of salt and salt had a negative effect on traits. By considering all traits in all levels of salinity; cluster analysis categorized ecotypes into two clusters. In the first cluster were placed all accessions except, Khusf and Shabestar ecotypes, and in second cluster were placed Khusf and Shabestar ecotypes. The second cluster with a low root length, shoot and seedling, seed vigor, germination percentage and germination speed not good salt tolerance ecotypes.

Keywords: concentration, germination, medicinal, seedling, sodium chloride.

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Determination of incompatibility S-alleles and relationships among them in F1 progenies of two cultivars of hazelnut (*Corylus avellana* L.)

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Abstract

Incompatibility in hazelnut *(C.avellana* L.*)* is the sporophytic type wich is controlled by a single S-locus with multiple alleles. Compatibility of pollen-stigma in hazelnut is an essential factor in planning crosses in breeding program, as well as choosing pollinizers for orchard planting. The aim of this study, fluorescence microscopy was used to determine; S-alleles and compatibility relations among 24 progeny of 'TGL' ×' Cosford'. Four pollen testers were selected for each one of the alleles (S2, S3, S7 and S11) for this purpose. As soon as stiminate catkins elongated and were about to shed pollen, they were collected and dried. The catkins were discarded, pollen collected and stored in freezer (-20^0C). In each seedling trees, two branches emasculated, and bagged. Female clusters were detached from bagged limbs, as they style protrude 2-6 mm. Five female flowers (clusters) from each seeding progeny, pollinated with each pollen testers. About 20 to 24 hours after pollination, the stigmatic styles were detached from buds and squashed in aniline blue dye and examined with fluorescence microscope (40x and 100x).In this research, S-alleles were clearly detected in 22 progenies, however on the other two progenies, only one S-allele was determined. In a compatible pollination, pollen germinates well; the pollen tubes penetrate the stigmatic surface and produce a mass parallel pollen tubes. But in incompatible pollination reactions, pollen germination was often reduced, and pollen grains that germinate produced short tubes.

Keywords: fluorescence microscope, hybrid, pollination, sporophytic.

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Genetic diversity in squash landraces collected from the Northwest of Iran using morphological and physiological characteristics

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Abstract

The genetic diversity was studued in squash landraces collected from the Northwest of Iran using morphological and physiological characteristics. Eaitheen squash landraces belong to pumpkin, ornamental and confectionary groups were examined using a randomized complete block design with three replications at the Agricultural Research Center of Urmia in 2013. Morphological characteristics related to fruit, seed, leave and flower and physiological characteristics such as photosynthesis rate, TSS and pH were investigated in the studied genotypes. The highest value of genetic coefficient of variation was observed for fruit yield and plant length. Most traits had an average to high heritabilities. For characteristics such as fruit weight, fruit length, fruit yield and seed yield, the highest value of genetic gain and for charactristics like primary branching, leaf length, ratio of leaf length to width, flagpole diameter and length and anther length the lowest value of expected genetic gain were obtained. According to principal components analysis, seven components explained 86.95 percent of total variances. In the first component, the contribution and weight of charactristics such as fruit weight, fruit width, internodes, primary branching, fruit yield, seed and 100 seeds weights, TSS, pH, fruit and peduncle lengths, male and female sepals lengths, skin thickness, seed to fruit weight ratio and net photosynthesis rate were relatively high. Results of clustert analysis revealed that the highest genetic distance in the confectionary group was shown between Kenar Burazh and Saatlou landraces, and in the pumpkin group between Khoy and Zayeh Kandi landraces

Keywords: broad sense heritability, cluster analysis, genetic diversity, squash landraces.

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The evaluation of morphological variation and essential oil content of *Salvia* species ecotypes in south-west of Iran

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Abstract

This study was conducted to determine the variability and relationship among different species of Salvia including: *S. syriaca* (5 ecotypes), *S. virgate* (8 ecotypes), *S. reuterana* (6 ecotypes) and *S. multicaulis* (6 ecotypes) collected from the south-west of Iran using morphological traits and essential oil content, this study was conducted at the University of Shahrekord in 2014. Ecotypes M2, M1 and M3 (in *S. multicaulis*), R3 (in *S. reuterana*), S5, S3 and S4 (in *S. syriaca*), V1 and V8 (in *S. virgate*) had the highest essential oil than other ecotypes. Based on the cluster analysis of the species, they were grouped into four clusters. *S. multicaulis* ecotypes were placed in a separate group. *S. reuterana*, *S. syriaca* and *S. virgata* ecotypes distributed in the three other groups. The results of correlation analysis indicated that essential oil content had significantly a negative correlation with plant length, leaf length and petal length and significantly positive correlation with diameter receptacle length and width. According to the results of this study it can be concluded that ecotypes with large receptacle and high essential oil content are suitable for breeding and domestication of these species.

Keywords: essential oil, *Lamiaceae*, morphology, sage, variation.

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