



Crops Improvement

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Effect of Priming and its Duration on Quality of In-pod Seeds Germination and Seedling Vigour of Sainfoin 'Eski' under Laboratory Conditions

*Mehdi Ramezani^{*1&2} and Reza Rezaei Sokht-Abandani^{1&2}*

1 & 2. Ph.D. Student, Department of Agronomy, Islamic Azad University, Tehran, Iran, Young Researcher Club Member Talent and Elitest, Science and Research Branch, Tehran, Iran.

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Abstract

To study the effects of priming on seed germination traits of sainfoin 'Eski', a factorial in randomized complete block design with three replications was conducted at the laboratory of agricultural research center of Sari in 2011. Treatments consisted of polyethylene glycol (PEG6000) at 5 and 10%, potassium nitrate (KNO_3) at 5 and 10% and potassium chloride (KCl) at 5 and 10% levels and 6, 12 and 24 hours of treatment duration. The most significant interaction of time \times priming vigor, root length and germination rate was achieved by priming solution containing PEG 10% for 12 hours. The highest germination percentage and total number of seedlings was achieved by 5 and 10% PEG for 6 and 12 hours and the least with a solution of KCl 10% for 6 hours, respectively. The highest shoot length and seedling length was obtained at PEG 10% for 12 hours and the least at KCl 10% for 24 hours. The highest and lowest number of normal seedlings, were observed by a solution of PEG 10% for 12 hours and KCl 10% for 24 hours, respectively. The highest R/S ratio was obtained in a solution of PEG 5% for 6 hours and the lowest ratio was observed in the solution of KNO_3 10%. The lowest weight ratio of R/S was obtained in a solution of KNO_3 and KCl 10% for 6 and 24 hours and the highest dry weight of R/S in priming with PEG 10% for 12 hours.

Keywords: germination and seedling growth, sainfoin, seed priming, time.



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Effects of Foliar Application of P, Zn and Fe on Grain Yield and Yield Components of Chick Pea (*Cicer arietinum* L.)

Sara Vaziri Kateshori^{*1}, Masha-allah Daneshvar², Akbar Sohrabi³ and Farhad Nazariyan Firozabadi⁴

1. M.Sc. Student, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Lorestan, Lorestan – Iran (Corresponding Author*)
2. Assistant Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Lorestan, Lorestan – Iran
3. Assistant Professor, Department of Soil Science, Faculty of Agriculture, University of Lorestan, Lorestan – Iran
4. Associate Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Lorestan, Lorestan – Iran

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Abstract

To evaluate the effects of various levels of phosphorous and foliar application of iron and zinc on grain yield and yield components of chick pea (*Cicer arietinum* L.), an experiment was conducted on split plot factorial based on randomized complete block design with three replications during 2010-2011 growth season at the Agricultural College Research Farm, Lorestan University. Factors included phosphorous fertilizer at three levels ($P_1=0$ kg/ha, $P_2=100$ kg/ha, $P_3=200$ kg/ha, soil application) in the main plots. Fe and Zn each at three levels ($F_1, Z_1=0$, $F_2, Z_2 = 0.3$ and $F_3, Z_3 = 0.6$ percent, foliar application) were placed in the sub plots. The results showed that P, Fe and Zn levels had significant effects on grain yield, number of pod per m^2 and 100 seed weight. Interaction effect of P and Fe was significant on biological yield, grain yield, 100 seed weight and number of pod per m^2 . Also interaction effect of P and Zn was significant on grain yield. Interaction effects of P, Fe and Zn were significant on grain yield, 100 seed weight and biological yield. The maximum grain yield was obtained from $P_3F_3Z_3$ treatment with grain yield 1228 kg/ha. It seems $P_3F_3Z_3$ treatment is optimum amount for chick pea (cultivar ILC482) under the study condition.

Keywords: biological yield, chemical fertilizer, dryland farming, harvest index, nutrients.



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Response of Seed Yield Components, Protein and Oil Content of Soybean (*Glycine max* L.) Cultivars to Various Sowing Date in Shirvan

Mahmood Ghorbanzadeh Neghab^{*1}, Hamid Reza Babaei², Gorbanali Rassam³, Alireza Dadkhah⁴ and Asghar Khoshnood⁵

1. Assistant Professor, Department of Plant Production Technology, Shirvan Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad- Iran (Corresponding Author*)
2. Assistant Professor, Seed and Plant Improvement Institute, Karaj – Iran
3. Assistant Professor, Department of Plant Production Technology, Shirvan Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad - Iran.
4. Associate Professor, Department of Plant Production Technology, Shirvan Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad – Iran.
5. Assistant Professor, Department of Plant Production Technology, Shirvan Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad – Iran.

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Abstract

To study the response of yield, yield components, protein and oil content of soybean cultivars to delay in planting in Shirvan region, an experiment was conducted at Research Farm of the Faculty of Agriculture, Shirvan in 2010. In this study, nine soybean cultivars (Habit, Hack, Black Hack, Cencutry, Cloumbos, Clark, Sahar, Zane and Willams) were evaluated at different sowing dates (20 May, 4 June and 20 June) in factorial experiment based on randomized complete block design with three replications. The results indicated that yield components, protein content and grain yield significantly reduced by delay planting. The first planting (20 May) had the highest grain yield (2338 kg/ha). There were significant differences between soybean cultivars for grain yield and other traits except oil content. Zane cultivar had the highest grain yield. Sahar cultivar had the lowest grain yield due to the reduced harvest index, increase days to flowering and days to podding. The results indicated that delay in planting causes reduction in grain yield. Zane, Black Hack, and Hack cultivars had the highest grain yield in all planting dates.

Keywords: grain yield, oil, protein, soybean and yield components.



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The Role of Priming and Planting Density on Improvement of Morphological and Physiological Traits of Two Hybrid Maize (*Zea mays* L. Single Cross 704) under Field Conditions

Mehdi Ramezani^{*1&2} and Reza Rezaei Sokht-Abandani^{1&2}

1 & 2. Ph.D. Student, Department of Agronomy, Islamic Azad University, Tehran, Iran, Young Researcher Club Member Talent and Elitest, Science and Research Branch, Tehran, Iran.

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Abstract

To determine the effects of priming and planting density on improvement of morphological and physiological traits of the two hybrid corns SC (S.C. 704) under double cropping in Sari, a split plot experiment as randomized complete block design with four replications was conducted in 2010. Treatments included two densities of 80 and 100 thousand plants per hectare as the first factor and osmopriming of seeds of two hybrids of corn (S.C. 704), with a solution of 10% polyethylene glycol (6000 PEG), 0.5% potassium nitrate (KNO₃), 2% potassium chloride (KCl), water (hydropriming) and control (without priming) were considered as the second factor. The results showed that plant height using the priming solution of 10% polyethylene glycol and 100 thousand plants per hectare density was 33 percent higher than 0.5% potassium nitrate and 2% potassium chloride with the density of 80 thousand plants per ha. Also the forage yield per hectare with the density of 100 thousand plants was 14.42% more than 80 thousand density. Best plant density and priming concentration for leaf area index (LAI), crop growth rate (CGR) and net assimilation rate (NAR) were the density of 80 thousand plants per hectare and 10% polyethylene glycol. Therefore, it is concluded that adequate forage yield (54730 kg/ha) of the hybrid corn used in this study were obtained by the density of 100 thousand plants per hectare and 10% polyethylene glycol solution.

Keywords: corn, density, dual cultivated, morphological and physiological traits, priming.



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Effect of Simultaneous Chemical and Organic Fertilizer Application on Plant and Soil Chemical Properties of Barley (*Hordeum vulgare* L. var Turkman) under Water Deficit Irrigation Regimes

Saeedeh Maleki Farahani^{*1} Daryoosh Mazaheri² and Mohammad Reza Chaichi³

1. MSc. Student, Department of Agronomy and Crops Breeding, College of Agricultural Sciences, Shahed University, Tehran – Iran. (Corresponding Author*)
2. Professor, Department of Agronomy and Crops Breeding, College of Agriculture and Natural Resources, University of Tehran, Karaj – Iran.
3. Professor, Department of Agronomy and Crop Breeding, College of Agriculture and Natural Resources, University of Tehran, Karaj – Iran.

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Abstract

To evaluate the effects of fertilizing and deficit irrigation regimes on some chemical properties of soil and plant, an experiment was conducted during 2007 and 2008 growing seasons. Experimental design was a split plot based on a randomized complete block design with four replications. The treatments consisted of three deficit irrigation regimes (main plots) and six soil fertilizing systems (sub-plots). The irrigation treatments were included non-stressed, medium stress and severe stress. Fertilizing systems consisted of no fertilizing as control, phosphorous and nitrogen biofertilizers, 100% chemical fertilizer, vermicompost, 50% chemical fertilizer + 50% vermicompost, and 50% chemical fertilizer + biofertilizer as the sub plots. Integrated application of chemical and organic fertilizers increased soil P more than the other fertilizing systems. Integrated fertilizers increased plant N in compare with other fertilizing systems. Fertilizers containing vermicompost had more soil organic carbon, nitrogen and phosphorus or plant N and P under water stress rather than the others. Biofertilizer increased soil and plant P content under normal irrigation.

Keywords: barley, biofertilizer, chemical fertilizer, deficit irrigation, vermicompost.



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Effect of Soil Application of Iron and Manganese Sulfate on Quantitative and Qualitative Characteristics of Forage Maize Hybrid Single Cross 704

*Raziyeh Nabavi Moghadam^{*1}, Mohammad Hosein Saberi² and Mohammad Hasan Sayyari³*

1. M.Sc. Student, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Islamic Azad University (Branch of Birjand), Birjand – Iran. (Coressponding Author *)
2. Assistant Professor, Agriculture and Natural Resources Institute of South-Khorasan, Birjand – Iran.
3. Assistant Professor, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Birjand University, Birjand – Iran.

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Abstract

To investigate the effect of different amounts of Fe and Mn on qualitative and quantitative traits of forage maize (*Zea mays* L.) hybrid single cross 704, an experiment was conducted as a factorial in a randomized complete block design with 16 treatments and three replications at Qaneat city (Southern Khorasan Province) in 2010. Treatments consisted of 4 levels of FeSO_4 (no fertilizer as control and 30, 60 and 90 kg/ha) and 4 levels of MnSO_4 (no fertilizer as control and 10, 20 and 40 kg/ha). With increase of Fe and Mn fertilizers, a significant increase was occurred in plant height, leaf number, stem diameter, dry weight (stem, leaf, maize) and dry forage yield. Increased rates to optimum level (Fe-60 and Mn-20 kg/ha fertilizers according to the soil test), increased the yield, but more fertilizer reduced the quality. Therefore for forage with good quality and quantity, 60 and 20 kg/ha of Fe and Mn fertilizers, respectively is recommended for this area.

Keywords: dry forage yield, economy, micro element, optimize use fertilizer, soil test.



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Effects of Seed Priming by Salicylic Acid on Wheat cv. Alvand Bread Quality under Late Sowing Condition

*Mahdi Abdolahi^{*1} and Farid Shekari²*

- 1 . M.Sc. Student, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Zanjan, Zanjan – Iran. (Corresponding Author *)
- 2 . Associate Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Zanjan, Zanjan – Iran.

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Abstract

To evaluate the effects of seed priming with salicylic acid on quality and baking traits of wheat flour, cv. Alvand, under different sowing dates, a factorial experiment was conducted on the basis of complete randomized block design. The factors were seed priming with salicylic acid (including untreated seeds or control treatment, 400, 800, 1200, 1600, 2000 and 2400 μM concentrations of salicylic acid) and two sowing dates (23rd of Oct. and 22nd of Nov.). Results showed that priming slightly decreased (less than 1%) protein percent compared to control treatment in both sowing dates. It may be due to positive effects of salicylic acid on seed yield and higher accumulation of starch in seeds compared to protein. On the other hand, priming enhanced Zeleny number and loaf volume. Wet gluten, gluten index and seed yield increased by application of seed priming. This was higher in second sowing date compared to the first sowing date. In addition, higher concentrations of salicylic acid lead to more increment in measured parameters.

Keywords: late planting, priming, quality traits, salicylic acid, wheat.



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Efficiency of Herbicides at Reduced Rates and its Integration with Mulch for Weed Control in Tomato (*Lycopersicon Esculentum*)

*Seyed Shahram Shafiey¹, Hasan Mohammad Alizadeh², Hosein Moghadam³ and Ali Reza Yousefi^{*4}*

1. M.Sc. graduated Student, Department of Agronomy and Crop Breeding, College of Agriculture and Natural Resource, University of Tehran, Karaj - Iran.
2. Professor, Department of Agronomy and Crop Breeding, College of Agriculture and Natural Resource, University of Tehran, Karaj - Iran.
3. Assistant Professor, Department of Agronomy and Crop Breeding, College of Agriculture and Natural Resource, University of Tehran, Karaj - Iran.
4. Assistant Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Zanjan, Zanjan - Iran. (Corresponding Author *)

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Abstract

To study the effect of different weed control methods in tomato, an experiment was conducted as completely randomized block design with three replications at the research farm of University of Tehran (Karaj) in 2008. The treatments consisted of post emergence (at recommended rate) or pre emergence (reduced rate in combination with mulch) application of metribuzin, rimsulfuron and sulfosulfuron, and also different binary combinations of these herbicides which applied post or pre emergence (in combination with mulch), metribuzin+haloxyfop-methyl, trifluralin+metribuzin, and also mulch alone, weed free and weedy checks. Traits such as weed density and biomass, tomato fruit yield and biomass were evaluated. The results showed that only post emergence application of sulfosulfuron (92%), sulfosulfuron+rimsulfuron (93%) controlled bindweed effectively. However, all herbicide treatments provided good (more than 80%) to excellent (more than 90%) control of redroot pigweed, smooth pigweed and common purslane. Tomato response to rimsulfuron, sulfosulfuron and metribuzin consisted of chlorosis in new terminal growth that recovery occurred after 4 weeks. The results suggest that acceptable control of different weed species in tomato could be obtained by pre-emergence application of rimsulfuron, sulfosulfuron and metribuzin in combination with either mulch or post-emergence herbicide.

Keywords: integrated weed management, metribuzin, mulch, haloxyfop-methyl, rimsulfuron, sulfosulfuron.



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Growth and Nitrogen Use Efficiency Response of Wheat (*Triticum aestivum* L.) and Wild Mustard (*Sinapis arvensis* L.) to Increased Nitrogen Levels

Mohammad Reza Moradi Talavat^{*1} Ataollah Siadat²
and

1. Assistant Professor, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Ramin University of Agriculture and Natural Resources, Ramin – Iran. (Corresponding Author *)
2. Professor, Faculty of Agriculture, Ramin University of Agriculture and Natural Resources, Ramin – Iran

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Abstract

To investigate wheat and wild mustard growth and competition to N levels, an experiment was conducted in Ramin Agriculture and Natural Resources University of Khuzestan, located at 36 km North of Ahvaz. Treatments included planting wheat solely, wild mustard solely, and intercropping wheat and wild mustard in pots. These combinations were exposed to N levels including 0, 60, 120 and 180 kg.ha⁻¹. The results showed that grain yield, dry matter and spike number of wheat increased by increased N levels in sole crop treatment. These traits decreased by N levels when competing against wild mustard. Wheat grain and total protein content increased up to 120 kg N.ha⁻¹ by increased N levels, but decreased while competing against wild mustard. The highest N apparent recovery by wheat was obtained from sole cropping of this crop and 120 kg N.ha⁻¹. The lowest rate of this parameter was observed in competition condition against wild mustard and the level of 180 kg N.ha⁻¹. The results showed that wild mustard traits had positive response to increased N levels, regardless to competition against wheat.

Keywords: competition, integrated management, N apparent recovery, N uptake, N use efficiency, wheat.



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Effect of Irrigation Duration and Rootstock on Concentration of some Nutrient Elements in Young 'Thomson Navel' Orange Leaves

Ali Reza Abdolahpour¹, Mahmood Gasem Nejad², Ali Momenpour^{*3} and Ali Reza Eshkvari⁴

1. M.Sc. Student, Department of Soil Science, Faculty of Agriculture, University of Guilan, Rasht – Iran.
2. Associate Professor, Department of Horticultural Science, Faculty of Agriculture, University of Guilan, Rasht – Iran.
3. Ph.D. student, Department of Horticultural Science, Faculty of Agriculture, University of Guilan, Rasht – Iran. (Corresponding Author *)
4. Researcher, Citrus Research Institute, Ramsar – Iran.

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Abstract

In this study, effect of irrigation duration on concentration of some macro and micro nutrient elements in 'Thompson Navel' orange leaves grafted on three rootstocks was evaluated as a factorial experiment in completely randomized block design. Factors included rootstocks in three levels (*Poncirus trifoliata*, *Citrus aurantium* and Troyer citrange (*Citrus sinensis* × *Poncirus trifoliata*)) and irrigation durations in four levels (2, 4, 6 and 8 days). The results showed that rootstocks and irrigation duration can significantly affect scion leaf nutrient elements concentration. With irrigation of two days intervals, the differences among citrus rootstocks for nutrient elements absorption was significant. In two days interval of irrigation (no stress), significantly higher copper concentrations by sour orange, potassium concentrations by poncirus and phosphor, nitrogen, iron and zinc by Troyer citrange rootstocks were absorbed as measured in 'Thompson Navel' leaves. In 8 days interval irrigation treatment, significantly higher copper and zinc concentrations by sour orange, nitrogen and potassium concentrations by poncirus and phosphor by troyer citrange rootstocks were measured in 'Thompson navel' leaf as a scion. Overall, all rootstocks used in this study, that are common citrus rootstocks in the North of Iran, did not show any preference in nutrient element absorption at drought stress conditions.

Keywords: citrus, concentration of macro and micro Elements, drought stress.



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Effect of Salicylic Acid on Spring Frost Tolerance of Grape (*Vitis vinifera*) Cultivar 'Bidaneh Sefid'

Ahmad Ershadi^{*1} and Samira Taheri²

1. Assistant Professor, Department of Horticulture, Faculty of Agriculture, Bu-Ali Sina University, Hamedan – Iran. (Corresponding Author *)
2. M.Sc. Student, Department of Horticulture, Faculty of Agriculture, Bu-Ali Sina University, Hamedan – Iran.

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Abstract

Frost in early spring is one of the limiting factors in the production of grape. Chemicals offer useful approach to reduce low temperature-induced damages. Different concentrations of salicylic acid including: 0 (control), 0.5, 1 and 2 mM were sprayed twice on 10 year-old 'Bidaneh Sefid' grape vines at full bloom stage and changes in leaf soluble carbohydrates, proline and protein levels were measured in the next day morning. Leaf and stem samples were subjected to low temperatures of 0, -2, -4 and -8°C while flower clusters were exposed to temperature of 0, -2 and -4°C for three hours. Salicylic acid at 0.5mM concentration resulted in the highest amounts of soluble carbohydrates while the maximum proline content was observed with 0.5 and 1mM concentrations. Salicylic acid at 2mM concentration caused a decrease in soluble protein level. Salicylic acid, low temperature and their interactions had a significant effect on electrolyte leakage of different tissues. Salicylic acid treatments led to a reduction in electrolyte leakage of stem, leaf and cluster samples, compared to control. It seems that salicylic acid minimizes the negative effects of low temperature with evidence of less membrane damage by up-regulating the accumulation of osmoregulators such as soluble carbohydrates and proline.

Keywords: cold stress, electrolyte leakage, grape, proline, soluble carbohydrates.



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Modeling Seed Aging Effect on Wheat Seedling Emergence in Drought Stress: Optimizing Germin Program to Predict Emergence Pattern

*Elias Soltani^{*1}, Afshin Soltani² and Mostafa Oveisi³*

1. Assistant Professor, Department of Agronomy and Crop Breeding Science, Aburaihan Campus, University of Tehran, Pakdasht, Tehran - Iran. (Corresponding Author *)
2. Professor, Department of Agronomy, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan – Iran.
3. Assistant Professor, Department of Agronomy and Crop Breeding Science, Aburaihan Campus, University of Tehran, Pakdasht, Tehran - Iran.

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Abstract

There are some computer programs to calculate germination related traits such as Germin which have using problems. The aim of this work was to adjust Germin for calculating germination related traits. Seed aging effects on the seedling emergence was modeled using the optimized Germin. This study was conducted based on completely randomized design in a factorial combination of five seeds aging treatments (0, 48, 72, 96 and 144h accelerated aging periods) and 3 levels of environmental factors. Results indicated that Chapman-Richards function adequately described cumulative emergence in all aging treatments and three environmental conditions. Emergence percentage and rate were decreased by seed aging periods from 145 to 194 °C day. Results showed that observed thermal time for emergence increased as accelerated ageing periods increased and drought stress resulted in increased thermal time. For example, thermal time increased to 240 °C day in 144h accelerated aged seeds in severe drought. Results indicated that with increasing thermal time in optimum condition, thermal time would increase linearly in the drought stress. Optimized program could calculate germination related traits. Therefore, it is recommended to use the optimized Germin in seed science research.

Keywords: accelerated aging, Chapman-Richards model, Germination, seed aging, thermal time.



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Introduce the Suitable Medium for Asymbiotic Germination of *Epipactis Veratrifolia*

Shirin Dianati^{*1}, Mohsen Kafi², Masoud Mirmasoumi³, Valiollah Mozaffarian⁴ and Ali Reza Salami⁵

1. Instructor, Department of Horticulture, College of Aboreihan, University of Tehran, Pakdasht – Iran. (Corresponding Author *)
2. Professor, College of Agriculture and Natural Resources, University of Tehran, Karaj – Iran.
3. Instructor, Department of Biology, College of Science, University of Tehran, Tehran – Iran.
4. Associate Professor, Research Institute of Forests and Rangelands, Karaj – Iran.
5. Assistant Professor, College of Agriculture and Natural Resources, University of Tehran, Tehran – Iran.

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Abstract

Five different media with two concentrations and kinds of carbohydrates and peptone treatments were examined for their effectiveness in promoting asymbiotic seed germination of *Epipactis veratrifolia*. Results revealed significant differences between media on seed germination percentage and protocorm growth and Fast medium has the best effect on both. Carbohydrate treatments had significant effect on seed germination percentage but not on protocorm growth. Modified Fast medium with 5 gr l⁻¹ fructose and 12 gr l⁻¹ sucrose and 2 gr l⁻¹ peptone (MFH2P2) was the best medium for seed germination (49.6%) and Modified Fast medium with 30 gr l⁻¹ sucrose and 2 gr l⁻¹ peptone (MFH1P2) was the best medium for protocorm growth (17.3 mm). Media, carbohydrate and peptone influence seed germination percentage, while media and peptone alone influence protocorm growth. In addition, use of *in vitro* culture significantly reduced relatively long period of time which is necessary for seed germination and protocorm plantlets growth in natural conditions (approximately 2 years).

Keywords: carbohydrate, *in vitro* culture, native orchid of Iran, terrestrial orchid, peptone, protocorm growth.



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Salinity Effects on Some Morphological and Biochemical Changes of Almond (*Prunus dulcis* Mill.)

Hamid Rahnemoun^{*1}, Farid Shekari², Jalil Dejampour³ and Mohammad Bagher Khorshidi³

1. Instructor, Agriculture and Natural Resources Institute of East-Azərbayjan, Tabriz – Iran. (Corresponding Author *)
2. Associate Professor, Department of Agronomy, Faculty of Agriculture, University of Zanjan, Zanjan – Iran.
3. Associate Professor, Agriculture and Natural Resources Institute of East-Azərbayjan, Tabriz – Iran.

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Abstract

To evaluate morphological and biochemical changes of almond (*Prunus dulcis* Mill.) under salt stress conditions and determine relationship among accumulation of Na and Cl with these traits, an experiment was conducted based on completely randomized design with four treatments including 0 (control), 25, 50 and 75 mM of pure sodium chloride and three replications from 2010 to 2012. The seed of healthy almond genotypes grown in natural saline areas of East-Azerbaijan province were used as the experimental material in this study. Salt treatments were influenced during eight weeks following the growth and appearance of 15 – 20 leaves on each seedling. The results showed that the threshold of marginal leaf scorch symptoms was in relation with an accumulation of 9–11 mg/g DW Na. Also, mean of free proline content increased from 37.7 to 117.9 $\mu\text{mol.g}^{-1}$ FW linearly and significantly in parallel with the accumulation of Na and Cl in the leaves. Under same conditions, catalase and ascorbate-peroxidase activity increased significantly; however peroxidase activity increased up to 50 mM salinity but decreased subsequently at higher levels of salt.

Keywords: ascorbate peroxidase, catalase, saline areas, sodium chloride, stress.



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Effect of Seed Tuber Size, Nitrogen Rate and Harvest Date on Yield and Yield Components of Potato

Peyman Sharifi^{1}, Unes Izadpanah², Mohammad Naghi Safarзад Vishekaei³ and Mohammad Arash Tahmourespour⁴*

1. Assistant Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, Rasht Branch, Islamic Azad University, Rasht – Iran. (Corresponding Author *)
2. MSc. Student, Department of Agronomy and Crop Breeding, Faculty of Agriculture, Guilan Science and Research Branch, Islamic Azad University, Rasht – Iran.
3. Assistant Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, Rasht Branch, Islamic Azad University, Rasht – Iran.
4. M.Sc. Student, Department of Agronomy and Crop Breeding, Faculty of Agriculture, Guilan Science and Research Branch, Islamic Azad University, Rasht – Iran.

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Abstract

A factorial experiment based on a randomized complete block design with three replications was carried out in order to study the effects of tuber size, nitrogen fertilizer and harvest date on yield and yield components of potato. This experiment was conducted in a grower's farm in Uraki village located in Chabahar city, in 2011. In this experiment, the treatments were two levels of tuber size (smaller and larger than 35 mm), four levels of nitrogen fertilizer (0, 60, 120 and 180 kg ha⁻¹) and two levels of harvest date (105 and 112 days after emergence). The results of analysis of variance indicated that effects of tuber size, nitrogen rate and tuber size × nitrogen rate interaction effect were significant for all of the studied traits at 0.01 probability level. Effect of harvest date was significant on total tuber yield, number of large tubers, tuber yield and dry matter. The results of this experiment indicated increasing nitrogen up to 120 kg ha⁻¹, increased total tuber number, number of large tubers, tuber yield and dry matter. But using up to 180 kg of nitrogen per hectare reduced these traits. According to the results of this research, it seems that under our experiments condition, tuber size larger than 35 mm, using 120 kg nitrogen per hectare which harvested 112 days after emergence date of tubers (1st of April) produced 41500 kg ha⁻¹ tuber which is suitable to gain the highest yield of tubers for planting the 'Sante' cultivar.

Keywords: harvest time, nitrogen fertilizer, tuber size, tuber yield.