



## Row intercropping of borage (*Borago officinalis* L.) with bean (*Phaseolus vulgaris* L.) on possible evaluating of the best strip width and assessing of its ecological characteristics

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### Abstract

In order to investigate the effects of row intercropping of bean (*Phaseolus vulgaris* L.) with borage (*Borago officinalis* L.) on its ecological characteristics such as weed and insect diversity, composition and density and their yield and evaluating of the best strip width, a field experiment was conducted based on randomized complete block design with three replications at the Agricultural Research Station, Ferdowsi University of Mashhad, Iran during growing reason of 2009-2010. Treatments included one row of bean + one row of borage (1:1), two rows of bean + two rows of borage (2:2), three rows of bean + three rows of borage (3:3), four rows of bean + four rows of borage (4:4) and pure bean and borage. Results indicated that the highest economic yield of bean and borage were achieved in monoculture with 4.46 and 0.12 t.ha<sup>-1</sup> and 4:4 with 2.30 and 0.05 t.ha<sup>-1</sup>, respectively. The row intercropping of bean with borage and strip width affected its ecological characteristics such as weed diversity, density and dry matter. With increasing crop diversity, weed density and dry matter decreased. The lowest and the highest weed dry matter were observed in pure bean and two rows of bean + two rows of borage, respectively. The maximum population of biological predators and pets were obtained in two rows of bean + two rows of borage (20.3%) and pure bean (20.5%), respectively. In general, row intercropping of common bean with borage increased land equivalent ratio, and strip width of 2:2 (1.55) was the most promising one.

**Keywords:** Diversity, Medicinal plants, Shannon index, Weed

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## Effect of phosphorus and organic matter on availability and iron uptake in mays (*Zea mays* L.)

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### Abstract

Iron is an essential microelement for plant growth. Low content of organic matter and excess application of phosphate fertilizer in soils can be affected on availability of iron. In this study the effect of iron, phosphorus and organic matter on growth and iron uptake of mays was evaluated. A greenhouse experiment was conducted with two levels of cattle manure (0 and 1 %), three levels of phosphorus (0, 200, 400 kg.ha<sup>-1</sup> triple super phosphate) and three levels of iron (0, 20, 40 kg.ha<sup>-1</sup> sequestrene 138). The experiment was carried out based on a completely randomized design with a factorial arrangement using two replications. Plants were grown in a sandy loam soil for eight weeks. Results showed that application of cattle manure significantly increased shoot dry weight, iron concentration and iron uptake of maize. The application of phosphorus along with iron treatment increased shoot dry weight at 20 kg.ha<sup>-1</sup> iron but it had a negative effect at higher levels of iron. Application of iron increased concentration and total iron uptake of plants. However, phosphorous revealed an opposite effect. Interaction between treatments showed that application of cattle manure can improve the negative effects of excess phosphorus.

**Keywords:** Cattle manure, Interaction of phosphorus and iron, Plant nutrition, Trace elements

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## Screening of sesame ecotypes (*Sesamum indicum* L.) for salinity tolerance under field conditions:

### 1-Phenological and morphological characteristics

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#### Abstract

Salinity is one of the most restrictions in plant growth in dry and semi dry land which effects production of many crops such as sesame. In order to study the phenology and morphology characteristics of 43 ecotypes and line of sesame (*Sesamum indicum* L.) under salinity of irrigation water ( $5.2 \text{ dS.m}^{-1}$ ) a field experiment was conducted at research farm of center of excellence for special crops, Ferdowsi University of Mashhad, Iran, during growing season of 2009-2010 based on a randomized complete block design with three replications. Results showed that four sesame ecotypes could not emerge, 14 sesame ecotypes had appropriate emergence but died before reproductive stage and only 58 % of sesame ecotypes could alive until maturity. There was significant difference between sesame ecotypes for phenological stages and were varied from 64 to 81 days for vegetative and 60 to 65 days for reproductive stages. Plant height, number and length of branches also were different between sesame ecotypes. The highest and the lowest plant height were observed in MSC43 and MSC12 ecotypes, respectively. Number of branches per plant was from 1 to 8 and length of branches in 32 percent of ecotypes was more than 100 cm. There was a considerable correlation between seed weight in plant with reproductive growth ( $r=0.38^{**}$ ) and plant height ( $r=0.25$ ). In addition different response of sesame ecotypes to saline water and also better morphological indices in some sesame ecotypes may be show the tolerance of these accessions to salinity. More studies may be useful for selection of sesame salt tolerance resources.

**Keywords:** Branch, GDD, Height, Reproductive, Vegetative

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## Study the concentration of macroelements in forage mays (*Zea mays* L.) (SC 704) as effected by inoculation with mycorrhizal fungi and *Azotobacter chroococcum* under different levels of nitrogen

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### Abstract

Nitrogen and phosphorus are two necessary macronutrients for plant growth and yield. These two elements now will be added to soil by chemical fertilizers. This research has been carried out based on randomized completely block design with three replications at Markazi Province Agricultural Research Station, Iran, during growing season of 2004-2005 to evaluate the effects of *Azotobacter chroococcum* and Mycorrhiza (*Glomus intraradices*) as biofertilizers and urea as chemical fertilizers on concentrations of N, P, K, Na, Ca and crude protein (%) in corn (*Zea mays* L.) shoot tissues and dry matter of corn. *Azotobacter chroococcum* used as two levels (inoculated and uninoculated), mycorrhiza (*Glomus intraradices*) in two levels (inoculated and uninoculated) and urea in four levels (0, 75, 150 and 300 kg.ha<sup>-1</sup>). Results showed that *Azotobacter chroococcum* affected significantly all studied criteria except of K shoot concentration, but mycorrhizan (*Glomus intraradices*) only had a increasing significantly effect on N, K, Na and Crude protein. The interaction between *Azotobacter chroococcum* and Mycorrhiza (*Glomus intraradices*) had the most increasing effect on dry matter, N, Na and Crude protein. Therefore, based on our results it can be concluded that in order to prevent polluting the agricultural soil, environmental and other water supplies from nitrogen chemical fertilizers, application of *Azotobacter chroococcum* or combined with mycorrhizal fungi with 150 kg.ha<sup>-1</sup> Urea is recommended.

**Keywords:** Biofertilizers, Inoculants, Plant nutrition, Uptake

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## Land suitability evaluation for wheat (*Triticum aestivum* L.), mays (*Zea mays* L.) and cotton (*Gossypium herbaceum* L.) production using GIS at Neyshabour plain

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### Abstract

Land evaluation is the process of predicting the land use potential on the basis of its attributes. At the present study the qualitative land suitability evaluation was investigated for specific cereal crops including irrigated wheat (*Triticum aestivum* L.), mays (*Zea mays* L.) and cotton (*Gossypium herbaceum* L.), based on FAO land evaluation frame works (1976, 1983 and 1985), climatic and soil requirements for each crop and the parametric approach based on Kalugirou method at central plain of Neyshabour, northeast of Iran. Some sixteen soil series were studied on six land units by precise soil survey and their morphological and physicochemical properties were determined. Climatic and land qualities/characteristics for each crop were determined using the tables of crop requirements. An interpolation function was used to map values to scores in terms of land qualities/characteristics for land utilization types and the evaluation was carried out according to Kalogirou parametric approach. The interpolation technique by GIS functions helped in managing the spatial data and visualizing the results. Land suitability assessment for selected crops at the study area indicated that the priority for crops culture is wheat, mays and cotton, respectively. The results showed that the most important limiting factor is physical properties of soils for wheat culture, while mays and corn cultures are limited mainly by climatic conditions. The results indicated that 100% of Neyshabour plain has S<sub>3</sub> and S<sub>2</sub> suitability classes for wheat culture. While these two classes for corn production is calculated 69.15 percent totally and practically cotton doesn't have S<sub>3</sub> and S<sub>2</sub> suitability classes. It seems that by improving soil physical properties, wheat and mays cultivations results higher suitability class. According to low climatic index and climate rate for cotton cultivation at Neyshabour plain this culture is not recommended at the study area.

**Keywords:** Kalugiro, Land utilization, Parametric approach, Square root

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## Evaluation of phosphorous biofertilizer and chemical phosphorous influence on fodder quality of corn (*Zea mays* L.) and grass pea (*Lathyrus sativa* L.) intercropping

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### Abstract

Intercropping is considered as a method for increasing yield per unit and stability. In order to evaluate the effects of phosphorous biofertilizer and chemical phosphorous on fodder quality of corn (*Zea mays* L.) and grass pea (*Lathyrus sativa* L.) intercropping, two field experiments were conducted as factorial based on randomized complete block design with four replications at two places simultaneously in Kerman and Bardsir during growing season of 2009-2010. The investigated factors included four levels of phosphorous fertilizer (100 g.ha<sup>-1</sup> of phosphorous biofertilizer, 150 kg.ha<sup>-1</sup> of chemical fertilizer, %50 phosphorous biofertilizer+%50 chemical phosphorous and control) and five replacement intercropping patterns consist of sole crop of corn and grass pea, various proportions of corn and grass pea (75:25, 50:50 and 25:75). The result showed that the location effect on dry matter digestibility, crude protein, ash percentage, neutral detergent fiber and acid detergent fiber was significant but location effect on water soluble carbohydrate was not significant. Moreover, dry matter digestibility, crude protein, ash percentage, neutral detergent fiber, acid detergent fiber and water soluble carbohydrate influenced by various proportions of intercropping, extremely. Also, phosphorous applying on all of mentioned traits was significant, unless ash percentage. Dry matter digestibility, water soluble carbohydrate and crude protein of fodder influenced by various proportions of intercropping×phosphorous fertilizer interaction. Various proportions of corn and grass pea intercropping had higher fodder quality than sole cop of them; because, they had higher values of dry Matter digestibility, crude protein, water soluble carbohydrate and ash Percentage and lower values of neutral detergent fiber and acid detergent fiber. Dabble application of phosphorous biofertilizer and chemical phosphorous promote fodder quality due to increase solubility of insoluble phosphorous, phosphorous uptake, digestibility and crude protein of related intercropping proportions and phosphorous level. Also, results showed that intercropping had a positive effect on qualitative traits of corn and grass pee fodder.

**Keywords:** Crude protein, Dry matter digestibility, Intercropping patterns, Water Soluble Carbohydrate

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## Investigation of dryland wheat (*Triticum aestivum* L. cv. Azar 2) plants response to symbiosis with arbuscular mycorrhiza and mycorrhiza like fungi under different levels of drought stress

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### Abstract

In order to evaluate arbuscular mycorrhiza (*Glomuss mossea*) and mycorrhiza-like (*Piriformospora indica*) effects on yield, yield components and some morphological (cv. Azar 2) traits of wheat (*Triticum aestivum* L.) under water deficit stress, a pot experiment was conducted as factorial experiment based on completely randomized design with four replications. Treatments were drought stress at three levels (FC, -5 and -10 bar) and fungi inoculation at four levels (mycorrhiza (AM), mycorrhiza-like (MLF) and co-inoculation of AM+MLF and control). Results showed that the water stress significantly decreased 1000-grain weight, spike harvest index, fertility percent of spike, plant height, peduncle and extrusion length and colonization percent while grain density per spike markedly increased. Fungi inoculation significantly improved all studied traits except harvest index, 1000-grain weight and root colonization. Co-inoculation of AM and MLF had the best performance in terms of all mentioned parameters. Interaction effects of fungi and water stress was significant on grain and biological yield, spike and grain number and positively affected by fungi inoculation. Among fungi treatments, however, co-inoculation of AM+MLF had the best performance and recommended for both stress and non stress conditions.

**Keywords:** Colonization percent, Morphological characteristics, Yield

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## The influence of barley (*Hordeum vulgare* L.) residue managements on the $\beta$ -glucosidase activity in soil

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### Abstract

$\beta$ -Glucosidase is involved in the degradation of cellulose in soil and has the potential for monitoring biological soil quality. The objective of this study was to determine the effects of barley residue placement, burning, nitrogen fertilizer and tillage management on  $\beta$ -glucosidase enzyme after a period of 90 days. A field experiment was carried out based on a completely randomized design with a factorial arrangement using two replications. The treatments were included two levels of barley residue (3 and 6 t.ha<sup>-1</sup>), burning (without and with stubble burning), urea fertilizer (0 and 125 kg.ha<sup>-1</sup>) and tillage systems (no-till, conventional tillage). Results showed that 6 t.ha<sup>-1</sup> crop residue treatment increased  $\beta$ -glucosidase activity in comparison with 3 t.ha<sup>-1</sup> treatment at 0-5 cm. However, stubble burning and tillage treatments significantly decreased  $\beta$ -glucosidase activity while the nitrogen fertilizer significantly increased  $\beta$ -glucosidase activity. The results of this experiment showed that no-tillage system along with crop residue retention of 6 t. ha<sup>-1</sup> and without stubble burning systems could be the most short-term effective management to protect and promote  $\beta$ -glucosidase activity.

**Keywords:**  $\beta$ -glucosidase, Burning, N fertilizer, Soil quality, Tillage

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