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## Crops Improvement

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### Evaluation of Drought Tolerance indices in different Sweet Corn Hybrids

*Farhad Azizi*<sup>\*1</sup> . *Ali Mahrokh*<sup>2</sup>

1. Assistant Professor, Seed and Plant Research Institute, Karaj, Iran (Corresponding Author\*)

2. M.Sc. Seed and Plant Research Institute, Karaj, Iran

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#### Abstract

In order to comparison and determination of the best drought tolerance indices in sweet corn hybrids, an experiment was conducted using a randomized complete block design in split plot lay out with three replications at Seed and Plant Improvement Institute in Karaj in 2006. Three irrigation levels (irrigation after 75 as control, 100 and 125 millimeters cumulative evaporation from class A evaporation pan) were assigned as main plots and 12 sweet corn hybrids include KSC403su, Chase, Esquire, Rival, Reveille, Diva, Shimmer, Shaker, PS107, Golda, Royalty and Rana were considered as sub plots. Mean Productivity (MP), Tolerance Index (TOL), Geometric Mean Productivity (GMP), Stress Susceptibility Index (SSI), Stress Tolerance Index (STI) were used to evaluate tolerance or sensitivity to drought stress of the hybrids. STI and GMP indices had a positive and significant correlation with grain yield in non-stress and stress conditions (mild and severe stress treatments). STI and GMP indices showed that Hybrids Diva and Golda had optimum yield in non-stress condition but their yield decreased in severe stress condition. Hybrids KSC403su, Esquire, Shimmer and Shaker had low yield in non-stress but they had suitable yield in severe stress condition. Hybrids Chase, Rival and Reveille had low yield in non-stress and severe stress conditions. Hybrids PS107, Royalty and Rana had optimum yield in both non-stress and stress condition. Therefore, they can be recommended to use in stress and optimum conditions.

**Keywords:** drought stress, grain yield, hybrid, susceptibility, sweet corn.



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### Effect of plant density on yield and quality of four commercial edible linseeds

*Ali Tadayyon<sup>1\*</sup>, Shahram Torabian<sup>2</sup>, Mahmoud Reza Tadayon<sup>3</sup>*

1. Associate Professor, Department of Agronomy, Faculty of Agriculture, University of Shahrekord, Shahrekord, Iran (Corresponding Author\*)
2. M.Sc. Student, Department of Agronomy, Faculty of Agriculture, University of Shahrekord, Shahrekord, Iran
3. Associate Professor, Department of Agronomy, Faculty of Agriculture, University of Shahrekord, Shahrekord, Iran

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#### Abstract

In order to evaluate the variation of some of quantitative and qualitative traits of different varieties of linseed under different plant densities, an experiment was conducted in the research station of the Faculty of Agriculture in Shahrekord University in 2009. This experiment was arranged as factorial in RCBD design with three replications. Four linseeds originated from Australia, Canada, France and Iran varieties were used as the first factor, and three plant densities of 300, 500, and 1000 plants per m<sup>2</sup> were used as the second factor. Based on the results of this experiment, except for traits of seed number per capsule, 1000 seeds weight days to maturity and protein percent, other traits such as plant height, grain yield and oil content significantly responded to the plant density. The highest plant height and maximum grain yield at 1000 plants per m<sup>2</sup> and the greatest amount of oil content at density of 500 plants per m<sup>2</sup> were produced. All measured traits had significant effect in different linseed varieties. The highest plant height in Canadian linseed, the maximum grain yield, and days to maturity in Iranian linseed, the greatest amount of protein in France linseed and the maximum oil content in Canadian linseed were observed. Except for the trait of seed number per capsule, 1000 seeds weight, days to maturity, others including plant height, grain yield, percent of protein and oil content were significantly different in the interaction between density and variety. Canadian and Iranian linseed at density of 1000 plants per m<sup>2</sup> produced maximum plant height, Iranian linseed at density of 1000 plants per m<sup>2</sup> produced maximum grain yield and, France linseed at density of 1000 plants per m<sup>2</sup> produced the greatest protein percent, and Canadian linseed at density of 300 plants per m<sup>2</sup> also produced maximum oil percent. The general result in this experiment showed that, the density of 1000 plants per m<sup>2</sup> was the best plant density and the Iranian linseed, due to great oil content and grain yield, was the most important linseed among other varieties.

**Keywords:** linseed, oil, plant density, protein percent, yield.



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### Evaluation of some of biochemical and physiological traits in wheat cultivars in response to salinity stress at seedling stage

*Ezatollah Esfandiari<sup>1\*</sup>, Adel Javadi<sup>2</sup>, Majid Shokrpour<sup>3</sup>*

1. Associate Professor, Department of Agronomy, Faculty of Agriculture, University of Maragheh, Maragheh, Iran (Corresponding Author)
2. M.Sc., Department of Agronomy, Faculty of Agriculture, University of Maragheh, Maragheh, Iran
3. Assistant Professor, Department of Horticultural Science and Landscape, Faculty of Agriculture, University of Tehran, Karaj, Iran

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#### Abstract

In order to evaluate the physiological and biochemical traits in response to salinity, six varieties of wheat were cultivated in a split plot based on randomized complete block design in the growth chamber in the department of agronomy, faculty of agriculture, University of Maragheh. Seedlings of wheat cultivars, in three to four leaves stage were treated with 200 mM NaCl for 14 days. After the elapsed mentioned time, the activity of some antioxidant enzymes, oxidative stress indices and some physiological parameters were measured. The results showed that lipid peroxidation in all cultivars except Augusta significantly increased compared to controls. Salinity reduces membrane stability index in cultivars. While the mentioned index was stable and did not change significantly in both environments in other cultivars. Ascorbate peroxidase and catalase activities showed a significant decrease in Koohdasht, Pishtaz and MV17 cultivars under salt stress in comparison with the control. But salinity increased ascorbate peroxidase activity and decreased catalase activity in Ayzngran. Guaicul peroxidase activity was reduced by salinity only in Augusta. Glutathione S-transferase only increased in Gaskogen and Kohdasht and Pishtaz cultivars had decreased significantly. Moreover, the results showed that, despite the increase in sodium uptake by the roots of all cultivars, only Ayzngran and Augusta had the ability to transfer control of sodium to crown and leaves. Moreover, among cultivars studied, salinity significantly reduced the total dry weight per plant of Kohdasht. As a final result can be stated, although sodium is toxic element for cell metabolism, especially the leaf cells, but if the increased activity of antioxidant enzymes with the ability to store this element, except in areas cytotcell, would reduce the toxicity of this element, even wheat variety is not able to prevent the transmission of sodium to leaves.

**Keywords:** antioxidant enzymes, dry weight, oxidative stress indices, sodium, wheat.



## Crops Improvement

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### Evaluation of quantitative and qualitative forage characteristics in different ecotypes of sainfoin at Shahrekord region

*Ali Tadayyon<sup>1</sup>. Mohammad Rafieiohossain<sup>\*2</sup>*

1. Associate Professor, Department of Agronomy, Faculty of Agriculture, University of Shahrekord, Shahrekord, Iran
2. Faculty member, Department of Agronomy, Faculty of Agriculture, University of Shahrekord, Shahrekord, Iran (Corresponding Author<sup>\*</sup>)

Received: September 24, 2012

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#### Abstract

In order to evaluate the quantitative and qualitative forage characteristics of different sainfoin ecotypes, a field experiment was conducted in a Randomized Complete Block Design (RCBD) with three replications at the Research Station of Agricultural College of Shahrekord University. In this experiment, the amount of wet and dry weight of above-ground plants, plant height, and the protein and fiber contents were measured at three stages of pre-flowering, initiation of flowering and full flowering. The number of sainfoin forage cuts and variation of protein and fiber content at different forage cuts were analyzed by a split-plot on time. The results in this experiment showed that, the amount of wet, dry weight, plant height, and the protein and fiber contents were significantly affected at different ecotypes of sainfoin in all harvest stages and number of forage cutting was not significantly affected in all sainfoin ecotypes. Based on the data analysis according to split plot design in time, the factors of ecotypes and number of cutting were affected significantly. The 2<sup>nd</sup> and 4<sup>th</sup> cutting were produced maximum protein content and the 5<sup>th</sup> cutting produced maximum fiber content. The interaction between ecotype and number of cutting was not significant. Regarding to quantitative (yield) and qualitative (protein content) characteristics of forage, cultivation of Aligodarz ecotype of sainfoin showed superiority over other ecotypes.

**Keywords:** biomass, ecotype, fiber, forage, protein.



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### Effects of different methods of urea application and harvesting time on the physical properties of maize (*Zea mays* L.) hybrids

*Sajad Kordi*<sup>\*1</sup>, *Mohammad Eskandari*<sup>2</sup>, *'Ali Fadavi*<sup>3</sup>, *'Mehrsad Barary*<sup>4</sup>, *'Masoud Rafiee*<sup>5</sup>, *'Ali Ashraf Mehrabi*<sup>6</sup>

1. M.Sc., Department of Agronomy, Faculty of Agriculture, University of Ilam, Ilam, Iran (Corresponding Author<sup>\*</sup>)
2. M.Sc., Department of Mechanics of Agricultural Machineries, Faculty of Agriculture, University of Ilam, Ilam, Iran
3. Assistant Professor, College of Aburaihan, University of Tehran, Pakdasht, Iran
4. Assistant Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Ilam, Ilam, Iran
5. Assistant Professor, Khoram Abad Agricultural Research Center, Ilam, Iran
6. Assistant Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Ilam, Ilam, Iran

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#### Abstract

A field experiment was conducted to study the physical properties of maize grain in response to different urea fertilization methods (urea foliar spraying and soil application), three harvest times (grain moisture content of 20, 30 and 40 percent) in four maize hybrids (three foreign hybrids e.g. NS640, Jeta600, Konsur580 and one common hybrid, SC704 as control) at Khorram Abad Agricultural Research Station in 2010. The experimental design was a strip split plot based on a complete block design with four replications. The fertilization method was considered as horizontal factor and the vertical factors were hybrid and grain moisture content (harvest time) in a split plot arrangement. Analysis of variance showed that there were significant differences among grain moisture at harvest time treatments in terms of length, bulk density, real density and specific grain area. The 20% grain moisture at harvest time was the best based on the physical properties. Also the effect of fertilization methods was significant for grain width and 1000-grain weight. Results showed that the highest grain width (7.81mm) and thousand kernel weight (257.38g) was achieved at urea soil application. According to the results, Jeta Hybrid showed better physical properties compared to the other hybrids. Because, this hybrid had the highest real density (1.71 g/cm<sup>3</sup>), porosity (54.23%) and thousand kernel weight (266.57g), indicating higher grain quality.

**Keywords:** corn, fertilizer application, hybrid, porosity, real density.



## Crops Improvement

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### Effect of irrigation and plant density on yield of two varieties of cotton in Isfahan Province

*Majid Jafaraghaei<sup>1</sup>, Amir Hooshang Jalali<sup>2</sup>*

1. M.Sc. Isfahan Agriculture and Natural Resources Center, Isfahan, Iran (Corresponding Author<sup>^</sup>)
2. Assistant Professor, Isfahan Agriculture and Natural Resources Center, Isfahan, Iran

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#### Abstract

To investigate the effect of water treatment and plant density on yield and yield components of two cotton cultivar, a two-year experiment (2006-2007) was carried out in Esfahan Agricultural Research Center. The use of a split plot factorial based on complete block with four replications for study. Two irrigation levels 135 (I1) and 180 (I2) mm of cumulative pan evaporation Class A, from flowering stage to the end of growth were assigned as main plots and treatment combination of two varieties of Mehr and Oltan of cotton and plant spacing 12, 15 and 18 cm (respectively, 120.95 and 80 thousand plants ha<sup>-1</sup>) were assigned made up as subplots. The results showed that both cultivars Mehr and Oltan in the density of 95 thousand plants per hectare in I1 irrigation treatments, respectively, with 2805 and 2745 kg ha<sup>-1</sup> of yields produced the highest levels of yield compared to other treatments. In the I2 irrigation treatment and 95 thousand plants ha<sup>-1</sup> density, Oltan cultivars producing 2119 kg ha<sup>-1</sup>, and had lowest yield compared to other treatments. In both cultivars in 95 thousand plants ha<sup>-1</sup>, between the two treatments of irrigation levels, no significant differences in terms of leaf dry weight. The results showed that irrigation after flowering phase until the end of growth, based on 135 mm evaporation basin A and the density of 95 thousand plants ha<sup>-1</sup> can be proposed, for both cultivars studied.

**Keywords:** boll, leaf, photosynthesis, plant spacing, stem.





## Crops Improvement

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### Study some physiological and morphological responses of three sugar beet (*Beta vulgaris* L.) cultivars to salinity stress

*Nafiseh Asadi Nasab*<sup>\*1</sup>, *Payman Hassibi*<sup>2</sup>, *Habibollah Roshanfekr*<sup>3</sup>, *Moosa Meskarbashi*<sup>4</sup>

1. M.Sc., Department of Agronomy and Crop Breeding, Faculty of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran (Corresponding Author<sup>\*</sup>)
2. Assistant Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran
3. Assistant Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran
4. Associate Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, Shahid Chamran University of Ahvaz, Ahvaz, Iran

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#### Abstract

To study some physiological and morphological traits of sugar beet varieties in response to salinity stress, three multi-germ sugar beets (13030, 22393 and IC) were grown in the greenhouse, Faculty of Agriculture, Shahid Chamran University, in 2009. The experiment was carried out under three levels of salinity in form of sodium chloride source, that included control (zero), 100 and 200 mM using factorial design test based on a randomized complete block with three replications. Seeds were sown in plastic pots and salt treatments were begun 30 days after sowing. After 60 days salt treatment, the plants were harvested and analyzed. The analysis of variance results showed that salinity had significant effect on all of the parameters. The results of mean comparisons showed that by increasing salinity, root dry weight, shoot and leaf area significantly decreased, but salinity had not significant effect on the leaf number. Indeed, by increasing of salinity, the relative water content of leaf and stomatal conductance were decreased, while, the relative membrane permeability and proline content in leaves of all genotypes increased. Higher concentrations of sodium chloride decreased osmotic potential. An increase of proline neither affected electrolyte leakage nor plant water status. Therefore, in sugar beet, the antioxidant role of proline could not provide plasma membranes protection against damage caused by salt stress. According to this study, root dry weight of 90 days plants, was related to drought tolerance in the three varieties studied.

**Keywords:** osmotic potential, proline, relative membrane permeability, relative water content, salinity susceptibility index.



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### Effect of integrated management of phosphorus fertilizer on quantitative and qualitative yield of two forage corn cultivars in Varamin

Seyed Mohammad Reza Ehteshami<sup>\*1</sup>, Iman Janzamin<sup>2</sup>, Mehdi Ramezani<sup>3</sup>, Kazem Khavazi<sup>4</sup>, Behnam Zand<sup>5</sup>

1. Assistant Professor, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Guilan, Guilan, Iran (Corresponding Author<sup>\*</sup>)
2. M.Sc., Department of Agronomy and Crop Breeding, Faculty of Agriculture, Islamic Azad University of Roodehen, Roodehen, Iran
3. Ph.D student, Department of Agronomy and Crop Breeding, Faculty of Agriculture, University of Guilan, Guilan, Iran
4. Associate Professor, Research Institute of Soil and Water, Tehran, Iran
5. Assistant Professor, Agricultural and Natural Resource Research Center of Tehran, Tehran, Iran

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#### Abstract

In order to investigate the role of *Bacillus cogulans* on yield of two forage corn cultivars, an experiment carried out at Agricultural Research Center of Tehran Province during 2009-2010. The experiment design consisted of three randomized complete blocks in a factorial arrangement. Investigated treatments consisted of the kind of phosphorus and cultivar. The phosphorus factor included of the application of triple super phosphate fertilizer and without seed inoculation, without fertilizer and without seed inoculation (control), seed inoculation and 100% P recommended, seed inoculation and 75% P recommended, seed inoculation and 50% P recommended, seed inoculation without fertilizer and cultivar factor included of S. C. 704 and 647. The application of 75% fertilizer and seed inoculation had the highest amount in the most of investigated characteristics. As regards forage quality, seed inoculation with %75 fertilizers showed the highest dry matter digestibility, crude protein and Water Soluble Carbohydrates, too. The present finding showed that phosphate-solubilizing microorganisms can improve crop yield.

**Keywords:** agronomic relative efficiency, fertilizer agronomic efficiency, phosphate-solubilizing bacteria, phosphorus, quality.



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### Comparison the effect of various planting methods on yield and yield component of onion cultivars in short-day conditions in Minab

*Hamed Hassanzadeh Khankahdani<sup>1\*</sup>, Abdolhossein Aboutalebi Jahromi<sup>2</sup>, Ebrahim Zakerifard Mollahassani<sup>3</sup>*

1. Researcher, Minab Agricultural Research Station, Minab, Iran (Corresponding Author<sup>^</sup>)
2. Assistant Professor, Department of Horticulture, Islamic Azad University, Jahrom Branch, Jahrom, Iran
3. Researcher, Minab Agricultural Research Station, Minab, Iran

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#### Abstract

This experiment was performed based on split plot in RCBD with three replications in Minab Agricultural Research Station during two successive years. Main plots were allocated to planting method (basin and furrow) and sub plot to four Onion cultivars ('Primavera', 'White Early Grano 502', 'HT3544' and 'HT3560'). Nurseries were done in October and the transplants were transferred to main land in December. All plots were irrigated based on findings of previous studies. Finally, the characters such as bulb yield, multi-center percent, length and diameter of bulb, bulb shape index, bulb weight and time of bulb producing and harvesting were recorded. Results showed that planting method had significant influence on bulb yield. Bulb yield of basin method was 28% more than furrow method and had significant difference together. The greatest bulb yield was observed in 'HT3560' cultivar and the least in 'WEG502' cultivar without any significant difference. 'WEG502' cultivar also was harvested 18 days later than other cultivars in two years and it had multi-center percent more than other cultivars. Generally, two new cultivars ('HT3544' and 'HT3560') were better than dominant cultivated cultivars ('Primavera' and 'WEG502') in two years of experiment.

**Keywords:** irrigation method, Minab, short-day onion, south of Iran, yield comparison.



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### Response of promising line N<sub>8119</sub> of wheat to application of phosphate bio-fertilizer

*Irاندokht Mansoori<sup>\*1</sup>*

1. Instructor, Department of Agronomy and Crops Breeding, Faculty of Agriculture, Sari Agricultural Sciences and Natural Resources University, Sari, Iran

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Accepted: May 21, 2013

#### Abstract

In order to determine the effects of applied phosphate bio-fertilizer on yield and morphological traits of wheat, a research was conducted in Sari Agricultural Sciences and Natural Resources University during 2008-2010. A factorial experiment was performed based on randomized complete block design with four replications. The first factor consists of two levels of phosphate bio-fertilizer (0 and 100 g ha<sup>-1</sup>) and the second factor was three levels of phosphate fertilizer (0, 60 and 90 kg ha<sup>-1</sup>). Results showed that bio-fertilizer increased significantly grain yield, spike/m<sup>2</sup>, seed /spike, spike length, 1000 seeds weight and harvest index, however, had no significant effect on plant height. There was no significant difference between 60 and 90 kg ha<sup>-1</sup> phosphate fertilizer treatments obtained with 100 g ha<sup>-1</sup> bio-fertilizer (528.40 and 532.95 kg ha<sup>-1</sup> respectively) in term of total grain yield. Therefore, application of 60 kg ha<sup>-1</sup> phosphate fertilizer with bio-fertilizer instead of conventionally using phosphate fertilizer in Mazandaran (90 kg ha<sup>-1</sup>), not only save nearly 30 kg ha<sup>-1</sup> phosphate fertilizer, but also prevent soil and water pollutions.

**Keywords:** biological fertilizer, harvest index, phosphate fertilizer, yield, 1000 seeds weight



## Crops Improvement

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### Evaluation of morpho – physiological traits in some *Triticum urartu* populations of Iran under normal and water deficit stress conditions

Ali Reza Pouraboughaddareh<sup>1</sup>, Seyed Siamak Alavikia<sup>\*2</sup>, Mohammad Moghaddam<sup>3</sup>, Ali Ashraf Mehrabi<sup>4</sup>,  
Mohammad Amin Mazinani<sup>1</sup>

1. M.Sc., Department of Plants Breeding and Biotechnology, Faculty of Agriculture, University of Tabriz, Tabriz, Iran
2. Assistant Professor, Department of Plant Breeding and Biotechnology, Faculty of Agriculture, University of Tabriz, Tabriz, Iran (Corresponding Author<sup>\*</sup>)
3. Professor, Department of Plants Breeding and Biotechnology, Faculty of Agriculture, University of Tabriz, Tabriz, Iran
4. Assistant professor, Department of Agronomy and Crops Breeding, Faculty of Agriculture, University of Ilam, Ilam, Iran

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#### Abstract

To evaluate the effect of water deficit stress on agronomic and morpho-physiological traits in eight populations of *Triticum urartu* species, an experiment was conducted using a split plot design based on a randomized complete block design with three replications at Research Station of Faculty of Agriculture, Tabriz University in 2010-2011. Analysis of variance indicated significant differences among populations in approximately all traits excluding number of total tillers per plant, total weight of spike, harvest index, chlorophyll index, and duration of grain filling, indicating the existence of genetic variation among populations. Genetic coefficient of variation was high for most traits such as leaf area, biomass, harvest index and grain yield per plant under both stress and control conditions. Based on yield related traits, populations collected from Marivan and Songhor were more droughts tolerant. Cluster analysis grouped the studied populations in two clusters so that tolerant populations were placed in one separate cluster. In general, results of this study showed that wild einkorn populations (*Triticum urartu*) of Iran, especially populations from Kermanshah and Kurdistan provinces were more tolerant to water deficit regarding morpho- physiological and agronomic traits.

**Keywords:** drought tolerance, einkorn, genetic diversity, germplasm, wild wheat.



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### Effect of cooperation of *Azotobacter chroococcum* strains on yield, yield components and qualitative indices of rapeseed (*Brassica napus* L.) in Rasht

Mona Soroori<sup>1</sup>, Seyed Mohammad Reza Ehteshami<sup>2\*</sup>, Mohammad Rabiee<sup>3</sup>, Kazem Khavazi<sup>4</sup>

1. M.Sc. Student, Department of Agronomy and Crops Breeding, Faculty of Agricultural Sciences, University of Guilan, Rasht, Iran
2. Assistant Professor, Department of Agronomy and Crops Breeding, Faculty of Agricultural Sciences, University of Guilan, Rasht, Iran (Corresponding Author<sup>\*</sup>)
3. Faculty Member, Research Institute of Rice, Rasht, Iran
4. Faculty Member, Research Institute of Soil and Water, Karaj, Iran

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#### Abstract

To evaluate effect of *Azotobacter chroococcum* strains on yield, yield components and qualitative indices of winter rapeseed (*Brassica napus* L.), an experiment was conducted during 2009-2010 growing season at Research Institute of Rice in Rasht. The experimental design was completely randomized block, with three replications. Investigated treatments were including control (without seed inoculation), seed inoculation with *Azotobacter chroococcum* strains 6, 9, 11, 12, 13, 14, 15, 16, 19, 21, 23, 25, 28, 35 and 38. Results showed that *Azotobacter chroococcum* significantly affected on all traits. The highest seed oil yield and K, P, Mg content caused by *A. chroococcum* strain 14. *A. chroococcum* strain 12 caused the highest seed yield with average of 3532.43 kg/ha that did not have significant difference with strains 9 and 14. The strain 12 caused the highest seed yield components and N, Ca, oil seed content. Growth promoting hormones production, N<sub>2</sub> fixation, mineral nutrients dissolubility such as phosphorus, siderophore production and kinds of antibiotics are the effect of *Azotobacter chroococcum* mechanisms that seems to be using at least one of these mechanisms increased plant yield. Generally, *A. chroococcum* strain 12, *A. chroococcum* strain 14 and *A. chroococcum* strain 9 had more positive effect on traits compared with other strains. Results of this experiment showed that using *A. chroococcum* increases yield and qualitative traits of rapeseed and therefore can be used as a supplementary for fertilizers.

**Keywords:** *Azotobacter*, nutrients, oil content, rapeseed, yield.



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### Evaluation of nitrogen fertilizer management effects on yield in flowering stage of rapeseed in Gorgan region

Ali Reza Behdadian<sup>1\*</sup>, Afshin Soltani<sup>2</sup>, Ebrahim Zeynali<sup>3</sup>, Hosein Ajamnoruzi<sup>4</sup>, Hasan Masoumi<sup>5</sup>

1. M.Sc. Student, Department of Agronomy and Crops Breeding, Faculty of Agriculture, Islamic Azad University, Gorgan Branch, Gorgan, Iran (Corresponding Author<sup>\*</sup>)
2. Professor, Department of Agronomy and Crops Breeding, Faculty of Agriculture, Agricultural and Natural Resources University of Gorgan, Gorgan, Iran
3. Assistant Professor, Department of Agronomy and Crops Breeding, Faculty of Agriculture, Agricultural and Natural Resources University of Gorgan, Gorgan, Iran
4. Assistant Professor, Department of Agronomy and Crops Breeding, Faculty of Agriculture, Islamic Azad University, Gorgan Branch, Gorgan, Iran
5. Ph.D, Department of Agriculture, Consulting Engineers of Jame Iran, Tehran, Iran

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#### Abstract

To evaluate the effects of nitrogen management at yellow budding stage on seed yield with using nitrogen nutrition index (ratio of nitrogen concentration in the plant to optimum concentration), of rapeseed farms in Gorgan, an experiment was conducted as a nested model arranged in a complete randomized design (CRD) in 2010. Fifteen rapeseed fields were classified at three levels of management (optimum, middle, weak). During the experiment, questionnaires were completed by farmers for quantification of agricultural management. The results showed that levels of management are significantly difference from nitrogen nutrition index (NNI) ( $P < 0.01$ ). Although quantities of nitrogen nutrition index (NNI) were higher in optimum level of management than the middle and weak levels, but at all management levels during the growing season, the index was less than one. This indicates restriction in development and production due to nitrogen deficiency. Nitrogen nutrition index in yellow budding stage have, significant positive correlation ( $P < 0.05$ ) with seed yield, and confirmed importance of access to nitrogen sources in yellow budding stage.

**Keywords:** critical nitrogen, fertilizer management, nitrogen nutrition index, rapeseed, seed yield.



## Crops Improvement

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### Effects of farm yard manure application on weed control and yield in millet- mungbean intercropping

*Mohammad Reza Asgharipour<sup>1\*</sup>, Mousa Khatamipour<sup>2</sup>*

1. Associate Professor, Department of Agronomy and Crops Breeding, Faculty of Agriculture, University of Zabol, Zabol, Iran (Corresponding Author<sup>\*</sup>)
2. M.Sc. Student, Department of Agronomy, Faculty of Agriculture, University of Zabol, Zabol, Iran

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#### Abstract

A field experiment was conducted to study the effect of manure and various combinations of foxtail millet and mungbean intercropping on the grain yield, weed performance, and the nutrients concentration of millet. The experimental design was a split plot with three replications. Main plots were different manure rates (0, 15 and 30 t ha<sup>-1</sup>) and the subplots comprised five combinations of intercropping (sole millet and mungbean, combinations of 100% millet+15% millet, 100% millet+30% millet, 100% millet+45% millet). Manure, intercropping and interactions between them significantly influenced the grain yield of both crops. The highest grain yield in mungbean was observed in combination of 100% millet+30% mungbean along with application of 30 t manure ha<sup>-1</sup>. The combination of 100% millet+45% mungbean had the greatest absorption of radiation. Intercropping of millet and mungbean controlled weeds better than sole culture. Combination of 100% millet + 45% mungbean and 100% millet + 15% mungbean along with application of 30 t manure ha<sup>-1</sup> resulted to the greatest N and K in grains of millet, respectively.

**Keywords:** additive series intercropping, nitrogen, nutrients, potassium, radiation interception.





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### Study on spatial distribution of weeds in corn field using geostatistics relations

*Behrouz Mahmodi<sup>1</sup> Hematollah Pirdashti<sup>2\*</sup>, Mohammad Yaghubi Khaneghahi<sup>3</sup>*

1. M.Sc. Student, Department of Agronomy and Crops Breeding, Sari Agricultural Sciences and Natural Resources University, Sari, Iran
2. Associate Professor, Department of Agronomy and Crops Breeding, Genetics and Agricultural Biotechnology Institute of Tabarestan, Sari Agricultural Sciences and Natural Resources University, Sari, Iran (Corresponding Author<sup>\*</sup>)
3. Instructor, Genetics and Agricultural Biotechnology Institute of Tabarestan, Sari Agricultural Sciences and Natural Resources University, Sari, Iran

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#### Abstract

A field experiment was conducted to investigate the spatial distribution of weeds at the Sari Agricultural Sciences and Natural Resources University in 2011. Field was divided into 42 grids (1.5×1.5 feet) then all samples were taken from grids intersection points before corn planting, after harvesting and ear emergence stage. Weed maps and semi variance analysis carried out using RW99 and Gs<sup>+</sup> softwares. The results showed that the highest amount of weed population belongs to prostrate pigweed, nutsedge and redroot pigweed, respectively. There was a strong and moderate spatial correlation as spherical and exponential variograms model at all stages of sampling. The seed banks were patches with different sizes and densities. Seed bank patchy pattern at the beginning of season was in accordance with seed bank at the end of season. Knowing the seed bank density, we can forecast weed seedling density during crop growing season.

**Keywords:** distribution pattern, nutsedge, pigweed, seed bank, spatial distribution.