Estimation model the virtual profit of organic wheat in transition period (Case study of Khorasan Razavi province)

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Abstract

Wheat production with the least use of chemical inputs is an important goal of modern farming to decrease of negative effects of the use of chemical inputs. This paper has estimated the virtual profit of organic wheat in transition period using a cross sectional data of 453 wheat producers of Khorasan Razavi province during 2007. A model introduced to this objective so that it has ability of estimation the virtual yield, revenues, costs and profit of organic wheat based on traditional wheat input-output data. Results of study showed that yield loss of organic wheat compensate in extremely six years. It can consider transition period from one to six year based on price of organic wheat but compensation of reducing farmer's revenue is easier and price pressure on consumer level is lower in six years transition period. Based on the results of the present study, using of introduced model structure is recommended in order to estimate the virtual profit of agricultural organic products.

Keywords: Cost, Organic products, Price, Revenue, Yield

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Response of yield and yield components of three sesame (Sesame indicum L.) cultivars to application of nitrogen and supernitroplus biofertilizer

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Abstract

Recently, biofertilizer application is growing to meet sustainable agriculture goals. The present experiment was designed to evaluate four nitrogen levels (0, 60, 90 and 120 kg N.ha⁻¹) as main plots, two supernitroplus biofertilizer levels (with and without biofertilizer) as sub-plots on yield and yield components of three sesame cultivars (Naz, Oltan and Varamin) as sub-sub-plots in a split-split plot experiment arranged in a randomized complete block design with three replications. Nitrogen rates had a significant effect on number of capsule per plant, number of seed per capsule, 1000-seed weight, number of stem branch per plant and seed yield. Application of biofertilizers could increase percentage of fertile flower in all cultivars while number of capsule per plant increased only in Varamin. Application of biofertilizer caused an increase in seed yield by 10% compared to control. Optimum amount of seed yield was belong to Oltan (3240 kg.ha⁻¹) with 60 kg N.ha⁻¹, Naz (2971 kg.ha⁻¹) and Varamin (2319 kg.ha⁻¹) with 90 and 120 kg N.ha⁻¹. Oltan was superior than Naz while Naz had better performance than Varamin for seed yield.

Keywords: Number of capsule per plant, Number of seed per capsule, Number of stem branch per plant, Percentage of fertile flower, 1000-seed weight
Comparison of two organic fertilizers along with Zn and B elements on concentration, uptake of nutrients and some growth parameters in millet

(Panicum miliaceum L.)

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Abstract

A field experiment was conducted to study the effect of two organic fertilizers along with zinc and boron elements on some growth parameters, concentration and uptake of nutrients in millet (Panicum miliaceum L.) by using factorial based on randomized completely block design with three replications in Qaen region, Iran. The main treatments were municipal solid waste compost and cow manure (each at 0 and 25 t.ha⁻¹) and sub treatments were elements of Zn (0, 50 kg.ha⁻¹) and B (0, 10 kg.ha⁻¹) using their respective ZnSO₄ and H₃BO₃ salts. Results showed that treatments interaction had significant effects on total dry matter yield, number of tillers per plant and plant height of Millet. The highest total dry matter production was achieved by interaction of cow manure along with Zn and B elements. Concentrations of N, Fe, Zn, B and Cu in plant were increased significantly by treatments interaction effects compared to control. Interaction effect of organic fertilizers with B (in the absence of Zn) enhanced plant B concentration significantly, whereas, interaction of organic fertilizers with Zn (in the absence of B) decreased B concentration in plant. The highest plant uptake of N, P, K, Zn, and B was observed in plots with cow manure and Zn and B elements.

Keywords: Cow manure, Micro elements, Municipal solid waste compost, Plant nutrition

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Evaluation of yield and yield components in additive intercropping of grain sorghum (*Sorghum bicolor* L.) and cowpea (*Vigna unguiculata* L.) under complete and limited irrigation conditions

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Abstract

To evaluate the yield and yield components in additive intercropping system of grain sorghum (*Sorghum bicolor* L.) and cowpea (*Vigna unguiculata* L.) under limited irrigation condition, an experiment was conducted in Research Farm of College of Agriculture, University of Tehran, during spring 2006. The experimental treatments were arranged in split plots based on a complete randomized block design with four replications. The limited irrigation (moisture stress) treatments of IR1: normal weekly irrigation (control), IR2: moderate moisture stress during vegetative and generative growth, IR3: moderate moisture stress during vegetative and severe during generative growth, IR4: severe moisture stress during vegetative and moderate during generative growth, were allocated to the main plots and different combinations of sorghum and cowpea in additive intercropping systems of S1: sole sorghum (weed free), S2, S3 and S4 additive series of 15, 30 and 45% of the sole cowpea seed rate mixed with full sorghum seed rate, respectively and S5: sole sorghum (weeded), were allocated to sub plots. The results of the experiment showed that there was a significant effect of limited irrigation systems, additive intercropping systems and their interaction on yield and yield components of sorghum and cowpea. The highest grain yield of sorghum was obtained in normal weekly irrigation treatment (control) which was followed by IR2 irrigation system. The same result was obtained in weed free sorghum treatment which was followed by additive mixture of sorghum+45% cowpea. Additive mixture of sorghum+45% cowpea was the most stable production system at different limited irrigation systems. The highest total sorghum yield (equivalent yield) was obtained in IR1-S4 treatment which was followed by IR2-S4. Based on the results of this experiment the additive mixed cropping of sorghum+45% sole seed rate cowpea at moderate limited irrigation (IR2) could be recommended for yield advantages, higher income, and more efficient utilization of resources in arid and semi arid areas of Iran.

**Keywords:** Equivalent yield, Intercropping, Water stress, Weed,

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The effect of high density and depth of planting on agronomic characteristic of Saffron (Crocus sativus L.) and corms behavior

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Abstract

In order to investigate the effect of high density and depth of planting on agronomic characteristic of Saffron, a field experiment was conducted as a complete randomized block design with three replications in Faculty of Agriculture, Ferdowsi University of Mashhad, Iran during two growing seasons of 2008-2009 and 2009-2010. Treatments were six levels of high densities (8, 11, 13, 16, 19 and 21 ton corms per hectare) and three planting depths (5, 10 and 15 cm). Results indicated that the flowering rate increased in the second year and maximum and minimum of flower number, dry weight of flower and stigma were observed in 10 cm and 5 cm planting depth, respectively. With increasing corm density, flower number, dry weight of flower and stigma were increased significantly and maximum flower number, dry weight of flower and stigma were obtained in 19 and 21 tone corm per hectare. Result of this study showed that the maximum flower and stigma yield was obtained with 10 cm planting depth and 19 t.ha-1. The highest and lowest number of corms observed in 21 and 8 t.ha-1 corms planting with 213.17 and 80.22 corms in m², respectively; however, the maximum dry weight of corm was obtained in 11 tone corms per hectare. The maximum and the minimum of corm number was found in 5 cm and 15 cm planting depth but the highest and lowest dry weights of corm was obtained in 15 cm and 5 cm planting depth, respectively.

Keyword: Corm yield, High density planting, Planting depth, Stigma and flower yield

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Studying correlation and regression equations between traits of grain corn under different fertilizer combinations and drought stress condition

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Abstract

In order to study the combined and separate effects of phosphorus fertilizer, phosphate-solubilizing bacteria and mycorrhizal fungus on adjusting and reducing the loss of yield resulting from drought stress during the stage of growth of grain corn (SC704) an experiment was performed in Aboureihan Campus of the University of Tehran, Iran, during 2007-2008. The experiment was conducted as split plot based on a randomised completely block design (RCBD) with four replications. Experimental factors were drought stress as the main-plot [irrigation after 50 [without drought stress], 100 and 150 mm evaporation from pan class A, and fertilizer compounds as the sub-plot (100% phosphorus (b1), 50% super phosphate triple+ mycorrhizal fungus + Phosphate-solubilizing bacteria (b2), mycorrhizal fungus + Phosphate-solubilizing bacteria (b3), 50% super phosphate triple + Phosphate-solubilizing bacteria (b4), and 50% super phosphate triple + mycorrhizal fungus (b5)). Drought stress happened after seedling establishment. Result of variance analysis showed that drought stress significantly affected plant height, stem dry weight, stem diameter, ear height, kernel number per row, 300 kernel weight, ear weight, ear length, ear diameter, cob diameter, kernel depth, cob percentage and total yield traits. Also, there was not significantly difference between fertilizer treatment for number of Leaf per plant, stem diameter and ear height traits. All the assessed traits in b2 inoculated treatment showed of higher values than other treats under water deficit stress condition. Furthermore, the investigated traits of b5 treat under severe water deficit stress were significantly less pronounced than normal irrigation and low stressed conditions. The results showed that all measured traits in seed inoculums with b2 under the low drought stress stood higher than other treats. Using stepwise regression was performed for grain corn in all conditions and in high stress conditions four traits have been extracted, which describe most 90% of yield variations. These results have completely coincidence with simple correlation analysis.

Keywords: Mycorrhiza fungies, Phosphate-solubilizing bacteria, Super phosphate triple

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Evaluation of freezing tolerance in safflower \textit{(Carthamus tinctorius L.)} genotypes under controlled conditions

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Abstract

In order to evaluate the effect of freezing stress on safflower \textit{(Carthamus tinctorius L.)} genotypes, an experiment was conducted in Faculty of Agriculture, Ferdowsi University of Mashhad, Iran. Treatments included 6 genotypes (K.W.3, K.W.6, K.W.16, Zarghan 279, Line 295 and IL-111) and freezing temperatures (0, -4, -8, -12, -16 and -20 °C). The trial was arranged as factorial based on completely randomized design with three replications. Plants were grown in small pots in natural environment till 5-7 leaf stage and then transferred to controlled conditions and freezing stress were imposed. Survival percentage, plant height, number of nodes per stem, length of internodes, leaf number and area, stem, leaf and plant dry weight were determined after three weeks (end of recovery). Results indicated that there was no difference between genotypes in survival percentage and lethal temperature 50 (LT$_{50}$) was between -13 to -13.5°C. Recovery of plants showed that the dry matter of safflower genotypes was significantly different and the lowest was belonging to IL-111 genotype. The lowest LT$_{50}$ and Reduced Dry Matter Temperature 50 (RDMT$_{50}$) was belong to the Line 295 and IL-111 showing the recovery weakness of these two genotypes compared to others.

Keywords: LT$_{50}$, RDMT$_{50}$, Recovery, Survival percentage

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Allelopathic effects of pigweed (*Amaranthus retroflexus* L.) organs on seed germination and seedling growth of canola (*Brassica napus* L.)

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Abstract

Greenhouse and laboratory studies were conducted to examine the allelopathic effects of water extracts of pigweed (*Amaranthus retroflexus* L.) leaf, stem, root and flower at different growth stages on canola seed germination and seedling growth. Water extracts of leaf, stem, root and flower as individually, binary, ternary and quadri mixtures at 0, 50 and 100% concentrations were made and their effects on the germination, shoot and root length, shoot and root dry matter of canola were investigated. Experiment was conducted in a completely randomized design in factorial arrangement with three replications. The results showed that quadric mixture of leaf, stem, root and flower exerted the most inhibitory effects on canola germination at 100% concentration in maturity stage. The most inhibitory effects on canola shoot length at 100% concentration in 2-4 leaf stage were observed in ternary mixture of leaf, stem and root extract. Quadric mixture of leaf, stem, root and flower extracts had the most inhibitory effects on canola root length at 100% concentration in maturity stage. The most inhibitory effects were observed in quadric mixture extract on canola shoot dry matter at 100% concentration in maturity stage. Ternary extract of leaf, stem and root extracts showed the most inhibitory effects on canola root dry matter at 100% concentration at 2-4 leaf stage.

**Keywords:** Joint effects of allelochemicals, Vegetation stage and flowering stage, Weed

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Effects of planting pattern and the first irrigation date on growth and yield of saffron (Crocus sativus L.)

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Abstract

Studies on crop improvement of saffron (Crocus sativus L.) can play an important role in development of this native crop. In this context, an experiment was conducted at Agricultural Research Station, Ferdowsi University of Mashhad, Iran, as a factorial based on randomized complete block design with three replications, during 2005-2010 years. First studied factor was planting pattern of saffron (planting distances of 20×5, 20×10, 20×15 and 20×20 cm) and the second one was irrigation management (first irrigation performed at the beginning of September, the beginning of October and early November). During these experiments these criteria were studied: fresh flowers yield, stigma dry yield, fresh and dry forage yield, number of mother corm, number of replacement corm, replacement number of corm per mother corm, the total weight of corms without scales, the total weight of scales, weight ratio of corm scales-less to scales, the total weight of corms, average weight of corms, average diameter of corms, average number of buds per corm, the total number of buds, the percentage of corm with abnormal root, leaf dry weight and leaf area. The results showed that, only the planting pattern was affected the studied indexes and the influence of irrigation time and interaction effects between planting pattern and irrigation was not significant. The results of mean comparison showed that the pattern 10×20 cm was comparatively advantage in respect to the studied characteristics. As in this treatment more fresh flower yield (170 kg.ha⁻¹), dry stigma yield (12 kg.ha⁻¹), average weight of corms (9.2 g) and average corm diameter (1.5 cm) was observed. The highest yield of fresh and dry forage (3916 and 1276 kg.ha⁻¹, respectively) was obtained in the pattern 5x20 cm, and then was located 10x20 cm. Moreover, the highest frequency of corm was stand in weight of less than three grams and less than two centimeters in diameter.

Keywords: Cash crop, Flower, Forage, Stigma

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Evaluation of barley (*Hordeum vulgare* L.) and faba bean (*Vicia faba* L.) yield in different density and mixture intercropping via competition indices

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Abstract

In order to study the intercropping of barley (*Hordeum vulgare* L.) and faba bean (*Vicia faba* L.) an experiment was conducted as factorial based on randomized complete block design with two factors and three replications at Sari Agricultural Science and Natural Resources University during 2009. The first factor was two seed ratios include D₁: 75 and 150 kg.ha⁻¹ of faba bean and barley, respectively (optimum seed ratio) and D₂: 100 and 200 kg.ha⁻¹ of faba bean and barley, respectively (high seed ratio) and the second factor consisted of different planting ratio, P₁: sole cropping of faba bean, P₂: 50% faba bean + 50% barley, P₃: 75% faba bean + 25% barley, P₄: 25% faba bean + 75% barley, P₅: sole cropping of barley. Land equivalent ratio (LER) indicated that intercropping of 25% faba bean + 75% barley was better than 50% faba bean + 50% barley. According to significant interaction effects of density and intercropping ratio in terms of seed yield and some competitive indices for both crop species, the highest barley and faba bean yield (3306.66 and 4884.56 kg.ha⁻¹, respectively) were observed in sole cropping with high density. In this experiment, the 75% faba bean + 25% mixture with high density was recorded highest intercropping yield, barley aggressivity value and 27% yield increases of barley in mix-proportion compared to sole crops. Also, the most of faba bean aggressivity value and faba bean yield increases in mix-proportion compared to sole crop were obtained when 25% faba bean + 75% barley mixture with optimum density was used. Furthermore the 75% faba bean + 25% barley treatment plus optimum seed ratio had highest system productivity index.

**Keywords:** Actual yield loss, Aggresivity value, Land equivalent ratio

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Evaluation of radiation absorption and use efficiency in replacement series intercropping of chickpea (*Cicer arietinum* L.) and sesame (*Sesamum indicum* L.)

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Abstract

The present study was carried out to evaluate radiation absorption and use efficiency (RUE) in replacement series intercropping of chickpea and sesame. The Experiment included main factor A (planting methods) with two levels \(a_1\) (row planting) and \(a_2\) (mixed planting) and factor B (replacement planting pattern) consisting of five levels \(b_1\) (chickpea monoculture), \(b_2\) (75% chickpea+25% sesame), \(b_3\) (50% chickpea+50% sesame), \(b_4\) (25% chickpea+75% sesame) and \(b_5\) (sesame monoculture). The experiment was arranged in a split plots design with randomized complete blocks with three replications. Results showed that sesame RUE was higher than chickpea RUE in all treatments. The amount of sesame RUE varied from 1.33 up to 2.07 g.MJ\(^{-1}\) PAR and from 1.27 up to 1.66 g.MJ\(^{-1}\) PAR in row planting and mixed planting, respectively. RUE chickpea, also varied from 0.86 up to 1.14 g.MJ\(^{-1}\) PAR and from 0.48 up to 0.99 g.MJ\(^{-1}\) PAR in row planting and mixed planting, respectively. The results also showed that sesame and chickpea RUE of intercropping treatments was higher than monocrop. In general, the amount of RUE of both crops in row planting was higher than mixed planting either in intercrop or monocrop treatments. On the basis of these results the best recommendable treatment for intercropping is 75% chickpea+25% sesame based on row planting. The chickpea RUE of this treatment was highest level (1.14 g.MJ\(^{-1}\)) among the other treatments and the sesame RUE of this treatment was higher than sesame monocrop RUE. The results of radiation absorption showed that in row intercropping treatments the amount of radiation absorption was higher than sesame monocrop but had not significant differences with chickpea monocrop. The amount of radiation absorption of mixed planting was lower than row planting. Furthermore, the differences between radiation absorption of mixed intercropping treatments and monocrop were not equal to the differences between radiation absorption of row intercropping treatments and monocrop.

**Keywords:** Mixed intercropping, Photosynthetic active radiation, Row intercropping, Shading

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Effect of drought and salinity stresses on germination indices of vetch (*Vicia villosa* L.)

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Abstract

One of the important issues in the arid and semi-arid regions is the water deficit and soil salinity. Therefore, selecting tolerant species to salinity and drought especially in seed germination and emergence stage is important. In the present study the effects of drought and salt stress on seed germination of vetch (*Vicia villosa* L.) which is palatable forage was investigated. The germination percentage, germination rate, plumule and radicle, seed vigor and alometric coefficient under both stresses were recorded. A completely randomised design was carried out using six salinity treatments (control distilled water, 50, 100, 150, 200 and 300 mM NaCl) and six drought treatments (control, 0.2, 0.4, 0.6, 0.8 and 1 MPa polyethylene glycol 6000). For each treatment 15 seeds in Petri dish were placed as replicate and put in Germinator for two weeks. Results showed that both stresses significantly (P<0.001) influenced seed germination trait as a result we found a significant reduction of percentage of seed germination, germination rate, plumule and radicle, alometric coefficient, and seed vigor. Seed germination was found up to 300 mM NaCl and 0.2 MPa whereas the growth of stem and root stopped at 100 and 200 mM NaCl, respectively.

Keywords: Germination percentage, Germination rate, Plumule root, Radicle root, Seed vigor index

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Influence of various rates of triple super phosphate and fertilizer efficiency of broadcasting and banding methods on yield and yield components of corn (Zea mays L.)

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Abstract

In order to investigate the effect of various rates of phosphorus fertilizer and efficiency amount of broadcasting and banding methods on yield and yield components of corn (Zea mays L.), a field experiment were arranged in a split-plot design based on a randomized complete block design with four replications at the Research field, Ramin Agricultural and Natural Resources University, Mollathani, Khouzestan, Iran, during 2008 growing season. Treatments included: phosphorus various amounts (0, 150 and 300 kg.ha⁻¹) as main factor from triple-super phosphate source, and fertilization methods (broadcast fertilizer, banding fertilizer in depths of 10, 20 cm and double banding application in depths of 10 and 20 cm), as sub factor. The results indicated that interaction of phosphorus fertilizer various rates and fertilization methods did not have a significant effect on yield and yield components of corn grain (exception biological yield). However, all various phosphorus fertilizer rates and fertilization methods caused significant differences among grain yield, harvest index and the number grain per row. Between the number of grains per m² and 1000-Kernel were signification differences while fertilizer rates were not significantly different on traits. The number row per ear was not affected by any treatments. In addition, grain yield of double banding treatment was 34% higher than broadcast fertilizer (control) and in fertilizer rate of 150 kg.ha⁻¹ 36% it was higher than 0 kg.ha⁻¹.

Keywords: Banding fertilizer, Fertilization method, Grain yield

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