

The effects of different levels of irrigation and nitrogen fertilizer on productivity and efficiency in corn (*Zea mays* L.), sugar beet (*Beta vulgaris* L.) and sesame (*Sesamum indicum* L.)

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Submitted: 10-07-2011

Accepted: 23-10-2011

Abstract

Optimum uses of water and nitrogen resources are the most important factors in agricultural systems due to limitations of agricultural inputs especially water. In order to investigate the effect of different levels of nitrogen fertilizer and irrigation on efficiency and productivity of water consumption in three crop (sugar beet, corn and sesame) an experiment was carried out as strip split plot based on randomized complete block design with three replications at the Agricultural Research Station, Ferdowsi University of Mashhad during growing season of 2008-2009. The main, sub and strip factors were three species (sugar beet, corn and sesame), three irrigation levels (100, 75 and 50% of water requirement of each crop) and four nitrogen levels (0, 50, 100 and 150 kg.ha⁻¹), respectively. The result showed that the highest water use efficiency was observed as 2.4, 1.8 and 1.5 kg DM.m⁻³ in corn, sugar beet and sesame, respectively. The maximum water use productivity was obtained for sugar beet (4200 Rails.m³), sesame (2123 Rails.m³) and then for corn (1768 Rails.m³). Interaction effect between water and nitrogen was significant on water use efficiency and productivity for all three studied crops. Water use efficiency declined up to 19% by decreasing 25% of water requirement. Water use productivity decreased in all three studied crops by increasing nitrogen consumption. It seems that high nitrogen level could not be affect on reducing drought stress effects.

Keywords: Drought stress, Economic efficiency, Harvest index, Water requirement

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Assessing the status of agrobiodiversity through calculation of species richness index using the method of rarefaction (A case study: Shahre-Rey city located in south of Tehran, Iran)

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Submitted: 26-09-2011

Accepted: 05-05-2012

Abstract

Biodiversity refers to all forms of living animals, plants and microorganisms and agro-biodiversity is a component of biodiversity that represents diversity in arable lands. The aim of this study was to determine the biodiversity status of agro-ecosystems of Shahr-e-Rey city located in south of Tehran, through calculating species richness index using rarefaction method. To collect required data, eight villages (Dorsun Abad, Kaiser Abad, Azim Abad, Deh Kheir, Taleb Abad, Qomi Abad, Ibrahim Abad and Khanlouq) of three district (Kahrizak, Ghaleno and Fashafuyeh), were selected as experimental samples. The results showed that the three villages of Ghaleno district (DehKheir, Qomi Abad and Taleb Abad) with species richness index of 14.85, 14.68 and 13.11 respectively, had the highest value of biodiversity in their agro ecosystems, while Azim Abad in Kahrizak district and Khanlouq in Fashafouyeh district with the value of 12.06 and 12.25 species richness index has the lowest levels of biodiversity. Rarefaction method application for calculating species richness diversity indicated that due to low surface area of arable lands, Taleb Abad and Ghomi Abad villages has the lowest number of species in their agro ecosystems. However, these villages had the highest value of equiponderated of species richness index between targeted villages.

Keywords: Agro-ecosystem, Monitoring, Sampling, Sustainable development

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Effects of different types and rates of organic manures on Egyptian broomrape (*Orobanche aegyptiaca* Perss.) control in tomato (*Lycopersicon esculentum* Mill.)

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Submitted: 28-12-2011

Accepted: 21-07-2012

Abstract

In order to study the effect of different types and rates of animal manure and spent mushroom compost on controlling Egyptian broomrape (*Orobanche aegyptiaca* Perss.) in tomato (*Mill. Lycopersicon esculentum*), two studies were conducted on randomized complete block design with three replications at Research green house, College of Agriculture, Ferdowsi University of Mashhad and Nemooneh field of Astane Ghods Razavi during two years of 2009 and 2010. Greenhouse study treatments were consist of poultry, cow, sheep manure and spent mushroom compost, which each one applied at four rates (10, 20, 30 and 40 t.ha⁻¹). Field experiment treatments were included of poultry, cow and sheep manure that each one applied at two rates (20 and 40 t.ha⁻¹). Result of the greenhouse study indicated that poultry manure significantly reduced orobanch infestation and increase tomato dry weight compared to control. But in the field experiment, the maximum fruit yield (68 t.ha⁻¹) with the minimum orobanch dry weight were obtained with sheep manure. The effect of cow manure was similar to poultry manure in all measured traits. In the field study, rates of manure application had no significant effect on orobanch fresh and dry weights. The findings indicated that all treatments of animal manure reduced orobanch infestation. But the mechanism of orobanch growth suppression due to animal manures application is unknown. It seems fermentation of different organic matters can produced heat and the resulting toxic compounds such as certain organic acids, ammonia and ammonium salts that may reduce orobanch growth at proper concentrations.

Keywords: Cow manure, Poultry manure, Sheep manure, Spent mushroom compost

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The Effect of irrigation regime and sowing depth on yield and yield components of Persian shallot (*Allium altissimum* Regel.) in Mashhad climatic conditions

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Submitted: 04-09-2012

Accepted: 03-03-2013

Abstract

Shallot (*Allium altissimum* Regel.) is a medicinal, industrial and perennial plant that has underground tubers. It is one of the most important Allium species in Iran, which normally grows in semi-cold to very cold highlands. Because of being a wild plant, shallot is encounter with water deficit during its growth season. Therefore evaluation of water requirement of shallot is important. In order to assess the effects of different irrigation regimes and planting depth, a factorial experiment based on randomized complete block design with three replications was conducted at Agricultural Research Station Ferdowsi University of Mashhad, faculty of Agriculture. Treatments were five irrigation levels: no irrigation (I₁), irrigation after 80±5 mm evaporation from pan evaporation (I₂), irrigation after 60±5 mm evaporation from pan evaporation (I₃), irrigation after 40±5 mm evaporation from pan evaporation (I₄) and irrigation after 20±5 mm evaporation from pan evaporation (I₅, control) and two levels of sowing depth of 5 cm (D₁) and 10 cm (D₂). Results showed that dry bulb yield, biological yield, harvest index and plant height were reduced by increasing irrigation intervals. Sowing depth had no significant effect on the parameters studied. Also the interaction between irrigation levels and sowing depth reduced plant height, dry bulb yield and harvest index. The interaction between irrigation and sowing depth was significant in leaf area index and crop growth rate. Shallot reacts to the amount of available water positively, but sowing depth of 10 cm has no effect on the bulb.

Keyword: Crop growth rate, Dry weight of bulb, Harvest index, Plant height

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Effect of plant density and planting pattern on quantitative and qualitative characteristics of Balangu (*Lallemantia royleana* Benth.)

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Submitted: 30-09-2012

Accepted: 03-03-2013

Abstract

In order to evaluate the effects of plant density and planting pattern on quantitative and qualitative characteristics of Balangu (*Lallemantia royleana* Benth.) as a medicinal plant, an experiment was conducted at Research station of Faculty of Agriculture, Ferdowsi University of Mashhad, Iran, during growing season of 2011-2012. A factorial layout based on a randomized complete block design with nine treatments and three replications was used. The treatments comprised three levels of planting density (60, 70 and 80 plants.m⁻²) and three levels of planting pattern (row planting, mixed row planting and flat planting). Studied criteria of Balangu were quantitative characteristics (such as number of lateral stems, plant height, 1000-seed weight, biological and seed yield and harvest index) and qualitative characteristics (including mucilage content and yield; and swelling factor). Results showed that all quantitative characteristics of Balangu except 1000-seed weight were significantly increased by plant density. Qualitative characteristics were not significantly affected by plant density except mucilage yield but the maximum quantitative and qualitative characteristics were obtained by row planting. Interactions between plant density and planting pattern showed that the maximum of seed and mucilage yield were obtained by row planting and plant density of 80 plants.m⁻². Non significantly affected by planting pattern and plant density showed that Balangu can tolerates the environmental effects and this is the important property for plants selection and development.

Keywords: Mucilage, Swelling factor, Yield

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Determining crop coefficient of Binam and Khazar cultivars of rice by lysimeter and controlled basins in Rasht region

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Submitted: 18-11-2012

Accepted: 27-04-2013

Abstract

Estimating and determining of rice water requirement, being the main cultivate of Rasht region, is crucial for devoting water to this region. Equations which are used to calculate the reference evapotranspiration (ET_0) are not match to all climatic conditions, due to their empirical bases. So, it is necessary to clarify proper methods for each region. Crop coefficient (K_c) is also the main parameter for determining each plant's potential evapotranspiration and subsequently plant water requirement. Hence in this study, evapotranspiration data for grass and rice i.e. Binam and Khazar cultivars were collected in Rice Research Institute of Rash, by using drainable lysimeter at ten-day periods during three consecutive crop seasons. The reference evapotranspiration were calculated and compared with 16 empirical equations results included in Ref-ET software. Significant differences of them have been evaluated using SPSS software. Also, the crop coefficient values were calculated for each variety of rice. In all three equations i.e. Hargreaves, Priestley-Taylor and Penman (FAO 24) have not shown any significant differences. Among three methods, Hargreaves equation is recommended for Rasht region because, this equation as compared with others is a temperature-based method and would consider global warming phenomenon. Also, the average of crop coefficient (K_c) for Khazar and Binam in three consecutive crop seasons were 1.10 and 1.09, respectively.

Keywords: Hargreaves, Penman, Priestley-Taylor, Reference evapotranspiration, Water requirement

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Environmental risk assessment of registered insecticides in Iran using Environmental Impact Quotient (EIQ) index

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Submitted: 10-11-2012

Accepted: 10-06-2013

Abstract

In the last decades, pesticides have been used extensively, in order to control pests and plant diseases, but negative impacts of pesticides caused several environmental problems and put human health in danger. In order to decrease environmental hazards of pesticide, risk of pesticide application should be measured briefly and precisely. In this study environmental impacts of registered insecticides in Iran which applied in 2001-2002, 2003-2004, 2004-2005, are considered using environmental impact quotient (EIQ) index. Results showed that among considered insecticides, Imidacloprid, Fipronil and Tiodicarb, potentially (EIQ) were the most hazardous insecticides, respectively. Taking rate of application and active ingredient of insecticide in to account, environmental impact (practical toxicity) per cultivated hectare (EIQ Field) of each provinces were investigated. In this regard, among different province of Iran, Kerman, Mazandaran and Golestan were in danger more than the others, respectively. Besides, considering the amount of agricultural production in provinces, environmental impact per ton of production were calculated for each provinces which three northern provinces of Mazandaran, Golestan and Guilan, respectively endure the most environmental impact per ton of production. Eventually based on environmental impact quotient, results demonstrated that majority of environmental impacts of insecticide in Iran were due to inadequate knowledge and also overuse of a few number of insecticides. Therefore, by improving knowledge about environmental impact of pesticides and also developing environmental friendly and ecological based methods, negative environmental impacts of insecticides will be reduced significantly.

Keywords: Environmental impacts, Environmental impact quotient, Pesticide

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Investigation on the effect of different sources of fertilizers on growth indices and yield of coneflower (*Echinacea purpurea* L.) as a medicinal plant

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Submitted: 31-12-2012

Accepted: 10-06-2013

Abstract

In order to investigate the response of coneflower to applying chemical fertilizer and incorporation with municipal solid waste compost (MSWC), a pot experiment was conducted as completely randomized design with six treatments included: control (without applying chemical fertilizer and compost), chemical fertilizer (150 kg N, 120 kg P₂O₅ and 250 kg K₂O per hectare from urea, triple super phosphate and potassium sulphate source, respectively) (CF), 30 t.ha⁻¹ MSWC, 15 t.ha⁻¹ MSWC + 1/4 CF, 15 t.ha⁻¹ MSWC+2/4 CF, and 15 t.ha⁻¹ MSWC + 3/4 CF with three replications during 2012 in Sari Agricultural Sciences and Natural Resources University. Results indicated that growth and yield indices such as the number of flowers per plant, number of lateral branches, number of petals, main flower's diameter, receptacle's diameter, main stem's diameter, fresh weight of flower, dry weight of flower and concentration of chlorophyll a and b in flowering stage were affected by application of chemical fertilizer and MSWC. The incorporation 15t.ha⁻¹ MSWC + 1/4 CF also enhanced the diameter of receptacle, main stem's diameter, the number of petals, 30%, 30% and 50%, respectively. Meanwhile, applying 15 t.ha⁻¹ MSWC + 1/4 CF/ha increased the concentration of chlorophyll a, chlorophyll b, number of flowers per plant, total fresh and dry matter of flower about 80%.

Keywords: Chemical fertilizer, Chlorophyll a and b, Fresh and dry weight, Municipal solid waste compost

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Effect of plant growth promoting rhizobacteria, Nitroxin and sulfur on quantity and quality of castor bean (*Ricinus Communis* L.) in Sistan region

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Submitted: 09-01-2013

Accepted: 10-06-2013

Abstract

The castor bean oil is high value in industry around of world. Plant nutrition and plant growth promoting rhizobacteria (PGPR) are important for crop production. An experiment was set up to investigate the effect of nitrogen (N), sulfur (S) fertilizers and PGPR on seed yield production of *Ricinus communis* L. This experiment was carry out in factorial layout based on complete randomize block design with three replicates at Research Center of University of Zabol during growing season of 2011-2012. The treatments were PGPR with three types of bacteria (control, Nitroxin , and Super Nitroplas 2 L.ha⁻¹), three levels of nitrogen (0, 150 and 200 kg.ha⁻¹) and two levels of sulfur fertilizer (0 and 300 kg.ha⁻¹). The results showed that grain weight, 1000-seed weight, number of capsule and number of seed per plant were not affected by studied treatments. The highest effect of PGPR was on dry weight of capsule, plant height, number of leaf per plant, oil percentage and amount of seed protein. Number of inflorescence just affected by sulfur treatments and most of studied plant characters affected by N fertilizers. The highest and the lowest oil percentage were related to Nitroxin and Super Nitroplas 51.89 and 47.85, respectively. Also the highest and the lowest plant height were related to Nitroxin and control treatments 82.29 and 53.33, respectively.

Keywords: Inflorescence, Leaf area, Oil percentage, Protein, 1000 seed weight

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The effect of different N fertilizer sources on forage yield of Berseem clover (*Trifolium alexandrinum* L.) in an additive intercropping system with basil (*Ocimum basilicum* L.) in Karaj climatic conditions

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Submitted: 23-02-2013

Accepted: 03-08-2013

Abstract

In order to study the effect of different N fertilizer on berseem forage in an intercropping with basil, this experiment was conducted in Research Farm of College of Agriculture, University of Tehran during growing season 2011. Experimental treatments were arranged as split plots based on a randomized complete block design with three replications. Different fertilizers consisted of control (no N fertilizer), 100% chemical fertilizer, biological fertilizer, and integrated fertilizer (biological fertilizer + 50% N fertilizer) were assigned to the main plots while different additive intercropping patterns of basil mono cropping (weed free), basil mono cropping (weed infested), berseem clover mono cropping (weed free), berseem clover mono cropping (weed contaminated), berseem clover + %25 basil, berseem clover + %50 basil, berseem clover + %75 basil, berseem clover + %100 basil were assigned to the sub plots. The biological fertilizer comprised of *Rhizobium* (*Rhizobium trefoli*) + *Azotobacter* (*Azotobacter* sp.) + *Azosprilium* (*Azosprilium* sp.) + *Bacillus* (*Bacillus* sp.) + *Mycorrhiza* (*Mycorrhiza* sp.). The results showed that the highest basil forage yield (two harvests) (4223 kg.ha^{-1}) was obtained from basil mono cropping (weed free) treatment when received integrated fertilizer. The highest forage yield (4833 kg.ha^{-1}) for berseem clover was obtained from clover mono cropping (weed free) at 100% chemical fertilizing treatment. The highest total forage yield (berseem clover + basil) (5983 kg.ha^{-1}) was obtained from berseem clover + %50 basil and berseem clover + %75 basil at integrated N fertilizer treatment. The best Land Equivalent Ratio and Relative Competition ratio were obtained at berseem clover + %75 basil and berseem clover + %100 basil treatments. Our results suggested that integrated fertilizer could be considered as the best fertilizing system to substitute for chemical N fertilizer (Urea) in additive intercropping of berseem clover and basil.

Keywords: Biological fertilizer, Competition intensity, Integrated fertilizer, Medicinal forage, Relative Yield Total

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The effect of climate change on the economy of rain fed wheat (a case study in Northern Khorasan)

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Submitted: 23-02-2013

Accepted: 23-09-2013

Abstract

Climate change is a phenomenon that has made the most concern in communities and decision making centers. This phenomenon has important effects on different aspects of human life. One of the most important crops that are affected by climate change is wheat. Accordingly, data and information of Northern Khorasan have been used to study the effects of climate change on rain-fed wheat yield. For this reason, climatic data of Bojnourd synoptic station from 1984 to 2010 and economic data of Northern Khorasan rain-fed wheat available in Jihad Keshavarzi administration were used to analyze previous situation and detecting climate change and determine a relationship between economic yield and climatic variables. To determine relationship between economy of rain-fed wheat and regional climate, maximum and minimum temperature, annual precipitation and also cost of wheat production, price of wheat and barley, and cropping area have been selected as independent variables and yield and income of wheat have been selected as dependent variables. In addition, for prediction of the amount of climatic elements in future, numerical climatic meso scale models HADCM and LARS-WG have been used. The results showed that climate change occurred in 30 past years and there is significant relation between logarithm of maximum and minimum temperature and annual precipitation, and wheat yield. Using resulted equation for yield and income of wheat and the results from numerical climatic model showing 0.5 degree Celsius increasing of minimum and maximum temperature and decreasing 25 mm of precipitation from 2010 to 2039 in the region, increasing in wheat yield ($10 \text{ kg} \cdot \text{ha}^{-1}$) and income ($250000 \text{ t} \cdot \text{thousand Rial}^{-1}$) have been predicted in this region.

Keywords: Climate change, Climatic prediction, Dry farming, Northern Khorasan, Wheat economic yield

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Evaluation of yield and yield components of maize (*Zea mays* L.) in intercropping with peanuts (*Arachis hypogaea* L.)

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Submitted: 06-04-2012

Accepted: 18-11-2012

Abstract

In order to study the sowing system, row distance and weeding effect on yield and yield components of intercropped maize with peanut, this experiment was conducted, as factorial based on a RCBD with three replications at the research farm of agriculture center of Zabol University (Iran) during growing season 2011-2012. Sowing system were four levels including sole maize, sole peanut, 50% maize + 50% peanut, 100% maize + 100% peanut as the first factor and row distance as the second factor in two levels 40 and 50 cm and weeding as third factor in three levels of non-weeding, once weeding, twice weeding. The results showed that effect of the sowing system was significant on plant height, stem diameter, Number of kernel/ear⁻¹, Number of kernel/row⁻¹, Number of ear/plant⁻¹, 1000-grain weight, biological yield, economical yield and harvest index of maize. Effect of weeding was significant on studied characteristics excluding of biological yield, economical yield and harvest index. The highest economical yield was obtained from sole maize, twice weeding and density of 50 cm. The highest LER was observed from 100% maize + 100% peanut.

Keywords: Ear number, Economical yield, Harvest index, LER

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Evaluation of the qualitative traits of safflower (*Carthamus tinctorius* L.) as affected by *Azotobacter* and Mycorrhizal symbiosis

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Submitted: 18-04-2013

Accepted: 03-08-2013

Abstract

This study was performed for evaluation of the qualitative traits of safflower (*Carthamus tinctorius* L.) as affected by *Azotobacter* and mycorrhizal symbiosis (host plant root symbiosis with the *Glomus* fungi) as factorial experiment based on randomized complete block design with three replications in research farm of college of Arak Islamic Azad University during growing season of 2011-2012. Treatments including of inoculated with *Azotobacter* in three levels (Non-inoculated, inoculation with *Azotobacter*-5 and inoculation with *Azotobacter*-12) and *Glomus* fungi treatment in four levels (Non-inoculated, inoculation with *Glomus intraradices*, inoculation with *Glomus mosseae* and inoculation with mixed *G. intraradices* and *G. mosseae*). Results showed that interaction effect of *Azotobacter* and *Glomus* fungi (the combined use of the two combinations) had significant effect on seed phosphorous percent, mycorrhizal dependency and seed nitrogen percent of safflower. The highest seed phosphorus (0.58%) was observed from inoculation with *Azotobacter*-5 and inoculation with mixed *G. intraradices* and *G. mosseae* (A₁M₃) and the lowest (0.37%) from treatment of inoculation with *Azotobacter*-5 and inoculation with *G. mosseae* (A₁M₂). Highest (3.14%) and lowest (2.46%) seed nitrogen were obtained with inoculation with *Azotobacter*-12 and inoculation with mixed *G. intraradices* and *G. mosseae* (A₂M₃) and non-inoculated with *Azotobacter* and inoculation with *G. intraradices* (A₀M₁), respectively. The main effect of *Azotobacter* and *Glomus* fungi inoculation was on seed oil percent, seed oil yield, seed phosphorous percent, root colonization percent and mycorrhizal dependency of safflower. The highest seed oil percent, seed oil yield, seed phosphorus percent, root colonization percent and mycorrhizal dependency of inoculation with *Azotobacter*-12 than those obtained from non-inoculated.

Keywords: Inoculation with *Glomus* fungi, Oil, Relative water content of leaf, Root colonization, Seed phosphorous

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The effects of saline and fresh water application with organic and chemical fertilizers on some quantitative characters and ion accumulation in cumin (*Cuminum cyminum* L.)

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Submitted: 18-04-2013

Accepted: 03-08-2013

Abstract

Salinity tolerance is one of the most important affecting factors on agricultural production in arid and semi-arid areas. In order to study the effects of saline and fresh water irrigation with application of organic and NPK fertilizers on cumin, a split plot experiment based on randomized complete block design was carried out with three replications during 2011 and 2012, at the research farm of Zabol University. Main factor was irrigation regimes (fresh water, and saline water EC: 4.180 dS.m⁻¹) and the sub factor were including individual and combining treatments of manure and NPK fertilizer and control. Results indicated that increasing soluble salts in water irrigation until 4.180 dS.m⁻¹ range, plant height, seed weight, and number of umbel per plant, number of seeds per umbel and plant, and yield decreased but the percentage and yield of essence was increased. Increasing the concentration of sodium ions lead to decrease concentrations of potassium, phosphorus, calcium and magnesium of cumin seed. Among the different fertilizer treatments, separate application of organic and chemical fertilizers have little advantage, but integrated chemical fertilizer and manure was more effective to improve the most investigated characters. Interaction of water and fertilizer regimes was significant on yield, seed weight, plant height, oil percentage and sodium content. In general, in order to reduce pollution of chemical fertilizers and the compensation lack of soil organic matter in arid and semi-arid areas, NPK fertilizer (40:20:15 kg.ha⁻¹ ratio with 20 t.ha⁻¹ manure) in area is recommended.

Keywords: EC, Medicinal plant, Mineral nutrients, Organic and chemical fertilizer, Yield and yield components

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Evaluation of integrated management of organic manure application and mycorrhiza inoculation on growth criteria, qualitative and essential oil yield of hyssop (*Hyssopus officinalis* L.) under Mashhad climatic conditions

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Submitted: 24-04-2013

Accepted: 11-11-2013

Abstract

In order to study impacts of organic manure levels and inoculation with mycorrhiza fungi on growth, quantitative and qualitative yield of hyssop (*Hyssopus officinalis* L.), a field experiment was conducted as factorial based on a randomized complete block design with three replications at the Agricultural Research Station, Ferdowsi University of Mashhad, during two growing seasons of 2009-2010 and 2010-2011. Mycorrhiza inoculation (with and without inoculation) and five levels of organic manure as decomposed cow manure (zero, 10, 20, 30 and 40 t.ha⁻¹) were considered as treatments. Plant height, canopy diameter, leaf to shoot ratio, shoot dry weight, essential oil content and essential oil yield of hyssop were measured and calculated accordingly. The results showed that the simple and interaction effects between organic manure and mycorrhiza were significant ($p \leq 0.01$) on plant height, canopy diameter, leaf to stem ratio, shoot dry weight and essential oil content and yield of hyssop. By increasing organic manure level from zero to 30 t.ha⁻¹ enhanced shoot dry weight and essential oil yield of hyssop up to 127 and 43%, respectively. Whereas by increasing organic manure level up to 40 t.ha⁻¹ improved these traits up to 12 and 24%, respectively. Mycorrhiza inoculation enhanced shoot dry weight and essential oil yield up to 19 and 14%, respectively. The second year, growth of hyssop plants due to suitable establishment and more availability of nutrients were higher than the first year. Organic manure enhanced growth and yield of hyssop due to availability of nutrients and improvement in soil characteristics. Mycorrhiza inoculation promoted growth and yield of this valuable medicinal plant because of root development and nutrient availability particularly phosphorus.

Keywords: Ecological management, Organic fertilizer, Phosphorus, Root system, Soil fertility

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The effect of integrated phosphate fertilizer management on vegetative growth and forage yield of two barely (*Hordeum vulgare* L.) cultivars (Fasih and Bahman)

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Submitted: 13-05-2013

Accepted: 01-09-2013

Abstract

In order to investigate the effect of phosphate fertilizer on two forage barley cultivars, an experiment was conducted during 2010-2011. The experiment was designed based on a randomized complete block design with three replications. The treatments were arranged in a factorial arrangement. The treatments consisted of different phosphorus fertilizers and barley cultivars. The phosphorus fertilizer treatment consisted of: No fertilizer application (control), Application of triple superphosphate fertilizer, Seed inoculation by biological fertilizer (*Pseudomonas fluorescense*), Seed inoculation + application of 100% chemical P recommended, Seed inoculation + application of 75% of chemical P recommended, Seed inoculation + application of 50% chemical P recommended and Seed inoculation + application of 25% chemical P recommended. Barley cultivars factor consisted of Fasih and Bahman cultivars. In this research some characteristics including plant height, number of tiller per plant, dried forage yield and leaf/stem ratio were evaluated. The results showed that the height of Fasih cultivar was significantly higher than Bahman at all fertilizing levels. The number of tillers per plant was significantly higher in 100% chemical and integrated fertilizer compared to control (no fertilizer). The highest dry forage yield for Fasih cultivar was obtained when biological and integrated fertilizers (Seed inoculation + application of 75% of chemical P) were applied. The highest leaf/stem ratio for both cultivars was obtained when integrated fertilizer of BC₅₀ (Seed inoculation + application of 50% chemical P) was applied.

Keywords: Dry forage yield, Leaf /stem ratio, Phosphate solubilizing bacteria, *Pseudomonas fluorescense*

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Environmental impacts of peanut (*Arachis hypogaea* L.) production in Astaneh Ashrafiyeh of Guilan province, Iran

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Submitted: 25-09-2013

Accepted: 09-01-2014

Abstract

In order to assess the environmental impacts of peanut (*Arachis hypogaea* L.) production in Guilan province, a study was performed by the life cycle assessment (LCA) method. Six environmental impacts such as global warming, acidification, terrestrial eutrophication, depletion of fossil resources, the depletion of potassium and the depletion of phosphate were investigated. In this research, the consumption of nitrogen, phosphorus and potassium fertilizers and diesel fuel for the production and drying of peanut were set as the input to production system that cause the environmental impacts. Data analysis revealed that the final indicators for one-ton production of peanut for the global warming, acidity, the depletion of fossil resources, eutrophication, the depletion of potassium resources and the depletion of phosphate resources were 0.036, 0.194, 3.64, 0.316, 0.0243 and 0.266, respectively. It suggested that in one ton production of peanut in Guilan province, the depletion of fossil resources has the most severe environmental effect followed by the eutrophication. In this study, the environmental index (EcoX) and resources depletion index (RDI) for one-ton production of peanut were obtained with 0.55 and 3.93, respectively. Also, final indicators for the global warming, acidification, the depletion of fossil resources, eutrophication, the depletion of phosphate resources and the depletion of potassium resources were 0.0015, 0.0082, 0.153, 0.0112 and 0.0010, respectively, for generating 1000 MJ energy.

Keywords: Acidification, Depletion of resources, ECOX, Global warming, Life cycle assessment

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Effects of planting date and density on yield and yield components of pumpkin (*Cucurbita pepo* L.) under Mashhad conditions

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Submitted: 10-06-2013

Accepted: 06-10-2013

Abstract

In order to study the effects of planting date and plant density on quantitative traits of pumpkin (*Cucurbita pepo* L.) as a medicinal plant, an experiment was conducted as split plot arrangement based on a randomized complete block design with three replications at Agricultural Research Farm of Ferdowsi University of Mashhad, during growing season of 2011-2012. Treatments consisted of three planting date (1 May, 11 May and 21 May) and two plant density levels (2.5 and 4 plants.m⁻²) which were allocated to main plots and sub plots, respectively. At the end of the growing season, the seed yield, fruit yield, number of fruits per m², number of seed per m², number of seed per fruit, seed weight per fruit, 1000- seed weight and harvest index were recorded. Results showed that the second planting date (11 May) resulted in highest quantitative traits of pumpkin. The density of 2.5 plants.m⁻², compared to the density of 4 plants.m⁻², could result in highest fruit yield (5487 kg.ha⁻¹), seed yield (196.97 kg.ha⁻¹) and yield components. The interactions between planting date and plant density were NOT significant in terms of fruit and seed yield but among the other yield components, significantly affect the number of seed per m² (236.45), the number of seed per fruit (284.33) and the seed weight per fruit (36.23 g) at the probability level of 5%. Overall this study showed that the optimum planting date and suitable density can play an important role in increasing fruit and seed yield of the pumpkin plant, considering the usefulness of this plant in the food, cosmetics, and medicinal industry.

Keywords: Environmental factors, Growing period length, Planting distance

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Evaluation on factors affecting weeds population density and yield loss of wheat: a case study in Golestan province – Sarmahale village in Bandargaz

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Submitted: 18-01-2014

Accepted: 02-07-2014

Abstract

In order to investigate the factors affecting weed population density and yield loss of wheat, a non-systematic survey experiment was conducted in 45 fields in the township of Bandar-gaz (Sarmahaleh village) during 2012. Wheat and weed sampling were taken randomly in two stages (Heading and Harvest maturity) from the five points of each field using 1m*1m quadrat. All information on crop management including land area, farmer experience, the seedbed preparation, sowing date, cultivar and site preparation of them, sowing ways, seed rate, weed control methods, type, amount and time of herbicide application, fungicide use and wheat harvest time were collected during a growing season by preparing questionnaire and to complete them by farmers. At the end of the growing season, the actual yield harvested by farmers was recorded. Among the various parameters, wheat plant and raceme density, farmer experience, wheat variety and Topic + Geranestar herbicide application had significant effects on weed population. Weed density decreased with increasing wheat plant density. Also, there was less weed density in field of high experience farmer. Weed density was less in N8118 variety than N8019 variety and lack of Topic + Granestar herbicide application resulted in increased weeds density. Among weed different species, *Avena* sp., *Phalaris minor* and *Sinapis arvensis* had the highest negative effect on wheat yield. Model study showed that if wheat plant density was optimum and there were weeds, yield will be 2713 kg.ha⁻¹ and if weeds remove, yield will increase up to 2877 kg.ha⁻¹ (yield gap equal 164 kg.ha⁻¹). Among weed, *Phalaris minor* (12 plants.m⁻²), *Sinapis arvensis* (three plants.m⁻²) and *Avena* sp. (two plants.m⁻²) with 65, 18 and 17% yield loss, respectively, were the strongest competitor with wheat.

Keywords: Crop management, Farmer experience, Herbicide

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