

The effects of soil chemical characteristics on weed species diversity in eastern Mashhad region wheat (*Triticum aestivum* L.) fields

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Abstract

In order to investigate the effects of soil chemical characteristics on weed species diversity in eastern Mashhad region wheat (*Triticum aestivum* L.) fields, an investigation was held in the year 2009. Wheat fields were classified based on the acreage from 3-5, 5-10 and higher than 10 ha. Five random soil samples were taken using a 5 cm diameter auger from the soil of each experimental field and were analyzed in the laboratory to measure carbon, nitrogen, phosphorus, potassium and pH levels. The results indicated that there is a significant correlation between carbon, organic matter, nitrogen, phosphorus, potassium and pH with field area. With increasing field area decreased soil carbon, nitrogen, phosphorus and potassium levels and increased soil pH. A significant negative correlation was found between C/N ratio and field area (a decreased C/N ratio correlated with increased area and vice versa). A significant correlation was found between increasing soil carbon, nitrogen, phosphorus, potassium levels, decreasing soil pH and an increasing shannon index of weeds. The shannon index for weeds was increased with increasing soil carbon, nitrogen, phosphorus and potassium and a decreasing soil pH. Significant correlation was found between increased soil carbon and nitrogen levels and increased weed species richness.

Keywords: Fields area, Shannon index, Species richness

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The effects of soil conditioners on water retention content at different matric suctions in a saline-sodic soil

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Abstract

Application of soil conditioners for remediation of saline- sodic soils is one of the common methods for improving soil properties in arid and semi-arid regions. In order to study the effect of soil conditioners on retention of soil moisture content, an experiment was carried out based on randomized complete block design with three replications in a saline-sodic sandy clay loam soil. The treatments of this research were consisted of control (B), 10 t.ha⁻¹ gypsum powder (G), 10 t.ha⁻¹ municipal compost (C), 0.05, 0.1, and 0.2% of vinylalcoholacrylic acid super absorbent (S₁, S₂ and S₃), and mixtures of different levels of absorbent with compost, and or gypsum powder. After four months, gravimetric water contents in each treatment were measured at nine matric suctions, then available water content (AWC) was calculated. The results showed that experimental treatments increased water content in all matric suctions significantly ($p \leq 0.05$). The amounts of soil moisture in S₁ treatment at 0 (θ_s) and 5 bar matric suctions were 90.67 and 94% more than B treatment, respectively, which they were the highest contents among experimental treatments. At field capacity (0.3 bar suction), CS₁, S₁ and CS₂ treatments had the most effect on soil moisture retention, and the amounts of soil moisture in these treatments were about 73% higher than of B treatment. Also, at permanent wilting point (PWP) S₁ and CS₃ treatments increased soil moisture by 1.6 and 1.42 times more than B treatment. In addition, when mixture of 10 t.ha⁻¹ compost, 0.2% of absorbent was applied to soil, the highest amounts of AWC was obtained and it was 63% more than of B treatment. In addition, application of soil conditioner increased air capacity significantly up to critical limit (0.10 m³ m⁻³). According to the results of this study it can be concluded the mixture of super absorbent in combination with gypsum powder is a suitable solution for retaining more soil moisture content and reducing the evaporation in arid and semi arid area.

Keywords: Air capacity, Available water content, Conditioners, Retention curve

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Environmental impact study of sugar beet (*Beta vulgaris* L.) production using life cycle assessment (Case study: South Khorasan region)

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Abstract

The importance of environmental protection in modern communities is vital, the action and implementation of any program requires the sufficient knowledge and understanding of environment. One of the methods to preserve natural resources and achieving sustainable development, especially sustainable agriculture, is the environmentally evaluation of agriculture production processes. Life cycle assessment approach is an accepted method for determining the side effects of a production process on environment during its complete life cycle. In this research, the impacts of global warming, acidification, fossil resources depletion and water resources depletion of sugar beet (*Beta vulgaris* L.) production on environment is investigated using life cycle assessment method in Khezri Farming Company, one of the major production areas in South Khorasan province. The final environmental indices for global warming, acidification, fossil resource depletion and water resources depletion were 0.0003, 0.002, 0.025 and 0.073, respectively. In other words, the effect of water resources depletion has the greatest damaging potential on environment among others in sugar beet production in this region.

Keywords: Acidification, Global warming, Resource depletion

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Analysis of parametric approaches in qualitative land Suitability evaluation for irrigated wheat (*Triticum aestivum* L.) cultivation at Neyshabur plain

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Abstract

Using parametric approaches for qualitative assessment of land suitability is a useful method for diagnosis of land capability and potential in optimum crop production. By using such methods will hope that to achieve sustainability in based on FAO land evaluation frame works and the presented tables of soil and climate requirements for agronomic crops. We studied qualitative land suitability for irrigated wheat (*Triticum aestivum* L.) at Neyshabur plain. An interpolation function was used to map values to scores in terms of land qualities/characteristics for wheat cultivation and the evaluation was carried out according to parametric approaches of Storie, Square root and Kalogirou. The interpolation technique by GIS functions helped in managing the spatial data and visualizing the results. The land suitability degree for wheat at Neyshabour plain by Storie method ranged from 1.53–33.22, while Square root method fluctuated from 1.35 to 38.72 corresponds to N₂ to S₃ classes. Based on Kalogirou method Land degrees varied from 24.51 to 60.19 corresponds to N₁ – S₂ land suitability classes. Our results indicated that the most important limiting factor for irrigated wheat is soil physical properties. It was demonstrated that using Kalogirou method gives more reliable and realistic results compared to other parametric approaches.

Keywords: Kalogirou, Land utilization, Square root, Storie

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Effect of various corn (*Zea mays* L.) and bean (*Phaseolus vulgaris* L.) intercropping densities on crop yield and weed biomass

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Abstract

In order to study the intercropping effects of maize (*Zea mays* L.) and bean (*Phaseolus vulgaris* L.) and evaluating effect of intercropping on weed biomass, a field experiment was conducted at the Agricultural Research Station, Payamenoor University of Nagadeh, West- Azarbayjan, Iran during growing season of 2009-2010. The experiment was laid out as randomized complete block design with three replications and 15 treatments. Treatments were including mono-cropping of maize densities (5, 7 and 9 plant.m⁻²) and bean densities (45, 55 and 65 plant.m⁻²) and nine treatments of intercropping included combination of densities. Two plant species intercropped as additive series. Results showed that the biological and grain yield of maize and bean were significantly affected by maize and bean densities. The effect of cropping system on weed biomass was significant. The lowest weed biomass was obtained in intercropping and the highest in sole crop. Maximum land equivalent ratio (1.41) and standard land equivalent ratio (1.41) were obtained by five maize plant.m⁻² with 55 plants.m⁻² of bean intercropping combinations. Maximum relative total value (1.31) was obtained in maize and bean intercropping with 7 plants maize and 55 plants bean plant.m⁻² showed the highest profitability. Intercropping monetary advantage in comparison with mono cropping was 58 percent.

Keyword: Intercropping, Land equivalent ratio, Relative value total, Standard land equivalent ratio, Weed

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Effect of mixed cropping on yield and agronomic characteristics of wheat cultivars (*Triticum aestivum* L.)

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Abstract

In order to evaluation the effect of mixed cropping on yield and agronomical characteristics of wheat (*Triticum aestivum* L.) varieties, a field experiment based on a randomized complete block design with four replications was carried out at city of Mahvelat in Khorasan Razavi province, Iran, during growing season of 2007-2008. Treatments including five sole cultures of conventional wheat cultivars viz: Pishtaz (P), Falat (F), Shiraz (S), Qods (Q) and Toss (T), mixed cropping of (F+P), mixed cropping of (F+P+S), mixed cropping of (F+S+T+Q) and mixed cropping of (P+F+S+T+Q) with equal ratio of each cultivar. Traits under study were including grain and biological yield, yield components, harvest index, plant height, ear length and Land equivalent ratio for grain and biological yield of wheat. Results showed that mixed cropping had significant effect on all investigated traits. Maximum grain yield was obtained in (F+P) mixed cropping treatments with 5425 kg.ha⁻¹. Average of mixed cropping treatments had an increasing trend in grain and biological yield as 55% and 32%, respectively. Five mixed cultivars treatment had 21% grain yield less than mean of sole crops. Maximum and minimum LER in grain and biological yield were obtained in mixed cropping treatments in (F+P) and (P+F+S+T+Q), respectively. Based on result of this study, yield of wheat cultivar in mix cropping were superior to sole crops.

Keywords: Inter specific, Land equivalent ratio, Sole culture

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Energy use analysis of cotton (*Gossypium hirsutum* L.) production in Golestan Province and a few strategies for increasing resources productivity

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Abstract

Cotton (*Gossypium hirsutum* L.) as a unique crop in natural fiber production has an important role in texture industry. It has also a large share in oil production for human nutrition and as a protein concentrate for animal feeding. Therefore, cotton role in job opportunities in agriculture, industry and business divisions are undeniable. In order to determine the share of each direct and indirect energy inputs (consisted of fossil fuels, human labore and ...) in energy use efficiency (EUE) of cotton production in Golestan Province (cotton pole of Iran) a field survey was conducted during 2010. Necessary information has been collected via technical questionnaire and face to face interview with 23 farmers who produced cotton in 0.5 to 50 ha. According to data analysis EUE of cotton production in Golestan province estimated as amount of 1.0968. Results showed that the share of variant inputs for cotton production were different. Fuel for tractor and irrigation pump have 24 and 30% of energy input, respectively and in overall 54% of input energy in cotton production was devoted to diesel fuel. Fertilizers and chemicals with 24 and 13% have second and third share of energy use. For improvising productivity of resources (water, soil and chemical inputs) and increment of EUE in cotton production at Golestan province a few technical and management strategy could be recommended. Our top recommendation have been focused on suitable fuel storage, correct operation and maintenance of machines, improvement of cultural practices and fertilizing management.

Keywords: Ecological economics, Industrial crops, Low input agriculture, Sustainable development

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Evaluation of energy budget and productivity of potato (*Solanum tuberosum* L.) farm of Kurdistan province; case study: Dehgolan Plain

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Abstract

The purpose of this study was to determine used energy input and output analysis in commercial and traditional potato (*Solanum tuberosum* L.) production, in Kurdistans, Iran. For this purpose, the data were collected from 50 commercial and 50 traditional potato farms. Farms were selected based on random sampling methods and inquiries were conducted in a face-to-face interviewing from May 2008 up to August 2009. The results indicated that the total energy inputs for commercial and traditional farms were 93330.67 and 44279.52 MJ ha⁻¹, respectively. In commercial system the share of agrochemicals, diesel fuel plus machinery, seed, irrigation water, farmyard manure, and human labor were 42.5, 25.06, 15.40, 10.47, 4.34 and 1.76%, respectively; while in traditional system the amount of mentioned items were 18.21, 27.51, 18.96, 26.28, 1.80 and 7.05%, respectively. About 21.47% of the used total energy inputs in commercial potato production were renewable energy (such as human labor, seeds and farmyard manure) that is increased up to 27.81% for traditional system. Mean energy use efficiency, specific energy, energy productivity and net energy of commercial system were 1.37, 2.62 MJ.kg⁻¹, 0.38 kg.MJ⁻¹ and 34913.07 MJ.ha⁻¹, respectively and in traditional system the rate of mentioned parameters were 1.41, 2.55 MJ.kg⁻¹, 0.39 kg.MJ⁻¹ and 18174.91 MJ.ha⁻¹, respectively.

Keywords: Direct Energy, Indirect Energy, Nonrenewable Energy, Renewable Energy

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Effect of drought stress and sulphur fertilizer on quantity and quality yield of psyllium (*Plantago ovata* L.) in Baluchestan

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Abstract

Management of chemical fertilizers application is very important issues on environment and plant yield especially in arid and-semi arid region. In order to determine the effects of drought stresses and fertilizer levels on quantity and quality yields of psyllium (*Plantago ovata* L.), a study was conducted as split plot based on randomized complete block design with four replications at the Natural Resources and Agriculture Researches Center of Balouchestan, Iran, during growing season of 2009-2010. Treatments included different irrigation regimes (three, five and eight times irrigation during the growing season) as main plots and four levels of sulphur fertilizer (0, 75, 150 and 225 kg.ha⁻¹ sulphur) as sub plot. The results showed that the irrigation regimes and sulphur fertilizer had significant effects on seed and biological yield of psyllium, so the highest seed and biological yields obtained in eight times irrigation. Also, the maximum of these factors were achieved in 225 kg.ha⁻¹ sulphur. The highest harvest index and 1000- seed weight, No. seed per spike and No. spike per plant were observed in eight times irrigation and 225 kg.ha⁻¹ sulphur. The highest plant height was obtained in eight times irrigation and 225 kg.ha⁻¹ sulphur and the maximum mucilage percentage and proline content were obtained in three times irrigation. The maximum mucilage yield and carbohydrate content were achieved in eight times irrigation. Among sulphur fertilizer, the highest amounts for all factors were achieved in 225 kg.ha⁻¹ sulphur. There was positive and significant correlation between seed yield with spike No. per plant, Seed No. per spike, 1000-Seed, biological yield and mucilage yield.

Keywords: Irrigation regime, Medicinal plant, Mucilage, Sulphur fertilizer, Yield

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