



Effects of different sowing date by some of companion crops on the weeds control, morphological traits and yield of corn (*Zea mays* L.) SC 504

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Abstract

In order to study the effects of different sowing dates by some of companion crops on the weeds control, morphological traits and yield of corn Sc 504, a field experiment was carried out of Research Field at Tabriz University during 2010 growing season. Treatments were arranged in a factorial experiment using randomized complete blocks design with three replicatins. Factors was include four levels of companion crops (clover red (*Trifolium pretense* L.), hairy vetch (*Vicia sativa* L.), basil (*Ocimum basilicum* L.) and dill (*Anethum graveolens* L.)) sowing date companion crops with two levels (synchronic cultivation with corn and cultivation 15 days after corn). The result showed that the plant length trait was significantly influenced by companion crops and sowing date interaction, as maximum plant length was observed in synchronized planting corn with clover and minimum plant length was observed in cultivation of hairy vetch in 15 after cultivation of corn. There was significant difference between forage plants for leaf number, as maximum leaf number of plant was observed in the synchronic cultivation of corn with clover. Maximum and minimum grain yield of corn were 4062.9 kg.ha⁻¹ and 3034.2 kg.ha⁻¹ in cultivation of corn with clover and basil respectively. Biomass weed and maximum weed length in the maturity stage of corn were significantly affected by sowing date and companion crops interaction, as maximum and minimum biomass and weed length were significantly in the synchronic cultivation of corn with dill and the concurrent cultivation of corn with clover respectively and this is to rapid growth and high competitive power of clover in the early stage of growth. Also, with increasing of biomass weed and weed length, grain yield of corn linearly reduced. Synchronize cultivation of corn with dill was the best treatment than performance and weed control of other treatments.

Keywords: Biomass of weed, Basil, Clover, Competition, Height of weed

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The ecological effects of different loading rates of metalaxyl on microbial biomass in unplanted and planted soils under field conditions

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Abstract

Fungicides are most widely used pesticides in Iran and the world. Application of fungicides may affect the populations and activity of soil microorganisms, particularly fungi, with a consequence for soil fertility and crop growth. In the current study, the effects of different levels of metalaxyl on soil microbial biomass carbon (C) and nitrogen (N), microbial biomass C/N ratio and metabolic quotient under field conditions were assessed. Two levels of metalaxyl (30 and 60 kg.ha⁻¹) were applied in planted soils with corn and unplanted calcareous soils, using a split-plots experiment in a completely randomized design with three replications. The C and N contents in soil microbial biomass as well as metabolic quotient were measured at 30 and 90 days after the onset of the experiment. Results showed that in cultivated soils metalaxyl application at 30 kg.ha⁻¹ increased (15-80%) significantly ($p \leq 0.01$) the amounts of microbial biomass C and N at both intervals (except microbial biomass C at 90 days) compared to the control soil (0 kg.ha⁻¹), while in uncultivated soils both microbial biomass C and N reduced by almost 1-34%. Microbial biomass C/N ratios in unplanted soils decreased (15 and 53%) with increasing loading rates of metalaxyl, without a clear effect in cultivated soils. On the other hand, metabolic quotient values reduced (48%) at 30 and 60 kg.ha⁻¹ metalaxyl in corn-cultivated soils when compared to untreated soils while in uncultivated soils metalaxyl rate at 30 kg.a⁻¹ had the greatest values at 30 days, and increased with increasing the levels of metalaxyl at 90 days. In summary, application of metalaxyl can either reduce or increase soil biological indices, and the direction and changes are depended upon the application rate of metalaxyl, time elapsed since metalaxyl application and the presence or absence of plant.

Keywords: Fungicide, Microbial carbon, Metabolic quotient, Nitrogen, Plant's presence or absence

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The effects of chemical and biological fertilizers application on forage sorghum (*Sorghum bicolor* L.) yields of different harvests

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Abstract

Management of soil fertility via biological fertilizers inoculation is one of the most important components based on sustainable agriculture. In order to investigate the effects of biological and chemical fertilizers on yield and some morphological traits of forage yield sorghum, a field experiment was conducted as factorial based on randomized complete block design with three replications at Agricultural Research Farm, Agricultural Faculty, Tabriz University during growing season of 2010-2011. The first factor consisted of chemical fertilizer levels of 210 kg.ha⁻¹ urea (100%), 150 kg.ha⁻¹ super phosphate triple (100%), urea (100%)+ super phosphate triple (S.P.T, 100%), urea 50%+ S.P.T. 50%, and control and the second factor comprised biofertilizer levels of biosuper, phosphate Barvar II, biosuper+ phosphate Barvar II and control. The result showed that the sorghum could be produced three harvests during a growth season under Tabriz climatic conditions. Dry forage yield, leaf dry weight and stem dry weight of sorghum in the second harvest were more than other harvests, but the leaf stem ratio at the third harvest was higher than others. At the first harvest, combination of super phosphate triple (100%)+ biosuper+ phosphate Barvar II, at the second harvest, the urea (100%)+ super phosphate triple (100%)+ phosphate Barvar II, and at the third harvest 50% urea+ 50% super phosphate triple+ biosuper+ phosphate Barvar II, increased forage yield, up to 244.6 %, 344.3 % and 121.5 % compared to the control, respectively. Therefore, it was concluded that the sorghum forage yield was increased significantly with integrated application of chemical and bio fertilizers at three harvests compared to chemical and bio fertilizers usage, separately.

Keywords: Biosuper, Fertilizer integrated, Management, Phosphate Barvar II

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Evaluation of basil (*Ocimum basilicum* L.) and sesame (*sesamum indicum* L.) yield in different intercropping mixtures via competition indices

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Abstract

In order to study the possibility of intercropping of basil and sesame, an experiment was carried out in a randomized complete block design with three replications at the Sari Agricultural Sciences and Natural Resources University during growing season of 2009-2010. Treatments consisted of different planting ratio, P₁: sole cropping of basil, P₂: 75% basil+ 25% sesame, P₃: 50% basil+ 50 % sesame, P₄: 25% basil+ 75% sesame and P₅: sole cropping of sesame. In this experiment, the 50 % basil+ 50 % sesame and 25% basil+ 75% sesame had the highest intercropping yield (1141.80 and 1098.75 kg.ha⁻¹, respectively) and land equivalent ratio (LER=1.29 and 1.33, respectively). Also, 50 % basil+ 50 % sesame mixture was recorded the highest crowding coefficient ($K_{\text{basil}} = 1.49$), aggressivity value ($A_{\text{basil}} = -0.19$) and nearly 20% yield increases of basil in mix-proportion compared to sole crop. Furthermore, the most of sesame aggressivity value ($A_{\text{sesame}} = 0.85$) and 97% sesame yield increases were observed in 25% basil+ 75% sesame mixture compared to sole crop. In conclusion, according to high competition efficacy of sesame plant in mix-cropping the 50% basil+ 50 % sesame and 75% basil+ 25% sesame culture ratio produced the highest yield.

Keywords: Actual yield loss, Aggressivity value, Land equivalent ratio

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Evaluation the effects of wheat residues and day or night tillages on weed community and yield of SC 704 corn cultivar (*Zea mays* L.)

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Abstract

Wheat residues management and modification in tillage time are among suggested practices in weed control. To evaluate the effects of wheat residues and tillage time on weed dry matter and leaf area, corn dry matter and corn grain yield, a study was conducted at Darab Agriculture and Natural Resource College, Shiraz University during growing season of 2008-2009. This experiment was conducted in a split plot arrangement based on randomized complete block design with four replications. Tillage time was considered as main plot at two levels of plowing at day time and during the night and residue rates were sub plot at four levels; 0 (control), 25%, 50% and 75% of left wheat residues (3 t.ha⁻¹). The results showed that the tillage time had significant effects on corn dry matter and corn grain yield and also on weed dry matter. The highest grain yield and dry matter of corn and the lowest weed dry matter was obtained from night tillage treatment. The final number of common lambsquarter (*Chenopodium album* L.), foxtail (*Setaria* spp.) at night tillage treatment was 38.6 and 22% lower than that of day tillage, respectively. These differences were significant at 5% probability level. Final number and dry matter of weed, were reduced significantly ($p \leq 0.01$) by using wheat residues. The interactive effects of tillage and crop residue on measured traits were not significant. It was concluded that to achieve the highest grain yield of corn and to suppress the weed on the similar agro-climatic conditions, night tillage and application of 50% of wheat residues might be recommended.

Keywords: Foxtail, Lambsquarter, Night tillage, Sustainable agriculture

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Effect of mycorrhiza inoculation and phosphorus fertilizer on some growth indices of chickpea (*Cicer arietinum* L.) Hashem cultivar

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Abstract

Application of bio-fertilizers, especially mycorrhiza as substituent or complement of chemical fertilizers is one of the most important strategies for plant nutrition in sustainable management of agro-ecosystems. In order to evaluate the separated and integrated application of mycorrhiza biological fertilizer and phosphorus chemical fertilizers on growth indices of chickpea (*Cicer arietinum* L.), an experiment was conducted at the Research Station of Faculty Agriculture of Shahrood University of Technology during growing season of 2009-2010 based on a randomized complete block design with four treatments and three replications. Treatments included: B₁ (control), B₂ (mycorrhiza biological fertilizer), B₃ (25 kg.ha⁻¹ phosphorus fertilizer + mycorrhiza biological fertilizer) and B₄ (50 kg.ha⁻¹ phosphorus fertilizer). The results indicated that B₄ and B₃ treatments significantly increased leaf area index, leaf area duration and dry matter accumulation compared with control (B₁) and mycorrhiza (B₂). The maximum and minimum dry matter obtained at 111 days after planting in B₄ and B₁ with 804.24 and 490.58 g.m⁻² respectively and B₃ treatment (698.41 g.m⁻²) increased dry matter 42.36 % compared with control. Also, B₃ treatment increased plant height, leaf area index and leaf area duration 17.59, 49.18 and 48.74 % compared with control respectively after 90 days of planting. In all indices measured statistically there was no significant difference between B₄ and B₃ treatment. Result of the present study indicated integrated application biological fertilizer and chemical fertilizer in chickpea lead to decreasing of 50% in chemical fertilizer application.

Keywords: Bio-fertilizer, Chemical fertilizer, Leaf area index, Total dry matter

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Assay for applying super absorbent polymer in a low input corn (*Zea mays* L.) production system aimed to reduce drought stress under Mashhad conditions

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Abstract

In order to investigate the effects of super absorbent polymer application on reduction of drought stress to corn, a split plot arrangement based on randomized complete block design with three replications was conducted at Research Field of Agriculture Faculty of Ferdowsi University of Mashhad during growing season of 2010-11. The main plot treatments were 1) application of 40 kg.ha⁻¹ super absorbent, 2) application of 80 kg.ha⁻¹ super absorbent and 3) no application of super absorbent polymer. Three irrigation intervals (7, 10 and 14 days) assigned to sub plots. The results showed that super absorbent application affected plant height (H), and dry matter production (DM) as the highest of these traits resulted from level 2 of super absorbent application (140.5 cm, and 144.5 g.m⁻², respectively). H, DM, canopy temperature (CT), cob number (N), fresh yield (FY), economic yield (EY) and 100-seed weight affected by irrigation intervals. There was no significant difference between 10 and 14 days irrigation interval as H, DM, CT, harvest Index (HI) and 100-seed weight, these results could be important concerning to reduce used water to irrigate corn. As experimental treatments did not have any effect on Leaf Area Index (LAI), and HI, it seems the positive effects of treatments revealed due to improved soil water holding capacity, soil physical properties improvement and reduction of drought stress. Interaction between super absorbent and irrigation intervals indicates that by level 2 super absorbent applications there are no significant differences between 14 and 10 days irrigation intervals, considering all traits. The same interaction just as before happened for 7 and 14 days irrigation intervals, except of EY and DM. In the other hand, by increasing application of super absorbent it could be possible to increase corn irrigation intervals from 7 to 14 days in Mashhad conditions without any reduction in yield and yield components. In general, these results indicate that super absorbent application could increase soil water holding capacity, reduce drought stress and partially supply corn water requirement during the growing season without any reduction in yield.

Keywords: Harvest index, Irrigation interval, Seed yield, Semi-dry area, Soil water holding capacity

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Evaluation of fox tail millet (*Setaria italica*) forage quality in different growth stages

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Abstract

In order to evaluate the quantitative factors in fox tail millet (*Setaria italica* L.) under three stages of growth, an experiment was conducted in Birjand during spring and summer of 2010. The preliminary objective was evaluation of fox tail physiological characteristics on animals that feed them. Planting of Foxtail millet was performed according to local practices and endemic knowledge. Sampling was carried out at Vegetative, flowering and seeding stages, then samples transported to laboratory of animal nutrition. After Drying of sampling, dry matter, dry matter digestibility, crude protein, metabolically energy, Acid Detergent Fiber and Nitrogen Detergent Fiber, Ash and some mineral nutrients were measured. The results showed significant differences in measured characteristics in various phonological stages. Forage quality was higher in flowering and seeding stages than in vegetative stage. Dry matter digestibility and metabolically energy were high and NDF and ADF were less in vegetative stage. Because fox tail millet is leafy and palatable by animal at this stage, it's optimum yield is important. Ability to produce Green fodder by this plant and the possibility of cultivation in different regions and its ability to produce forage for livestock, its planting is recommended.

Keywords: Crude protein, Dry matter digestibility, Forage qualitative factors, Phonological stages

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Evaluation of symbiosis with Mycorrhizal on yield, yield components and essential oil of fennel (*Foeniculum vulgare* Mill.) and ajowan (*Carum copticum* L.) under different nitrogen levels

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Abstract

In order to investigate the effects of mycorrhiza symbiosis and different nitrogen levels on yield, yield components and essential oil content and yield of fennel (*Foeniculum vulgare* Mill.) and ajowan (*Carum copticum* L.), a field experiment was arranged in a factorial based on a randomized complete block design with three replications at the Agricultural Research Station, Ferdowsi University of Mashhad during growing season 2009-2010. The first and the second factors were inoculation with mycorrhiza (with and without inoculation) and nitrogen levels as Urea (0, 50 and 100 kg.ha⁻¹), respectively. Inoculated soil with 200 g mycorrhiza (*Glomus intraradicaes*) was applied at planting time. Urea was used in two stages such as plating time and one month after that. Criteria such as yield components (including number of branch, umbel, umbellet, seed and seed weight), biological and seed yield, harvest index and essential oil content and yield of fennel and ajowan were measured. Results showed that yield components, seed yield, biological yield, harvest index, essential oil content and yield of fennel and ajowan were affected by mycorrhiza and nitrogen level. Mycorrhiza increased fennel and ajowan seed yield (with 35 and 85%, respectively) and essential oil content (with 34 and 30%, respectively). The highest and the lowest 1000-seed weight of fennel and ajowan observed in inoculation (2.9 and 0.3 g) and control (2.1 and 0.2 g), respectively. Nitrogen improved all growth characteristics and decreased essential oil content. There were not significant differences between mycorrhiza and nitrogen interaction. Inoculation with mycorrhiza enhanced root development and hence availability of nutrients, particularly phosphorus. Also, nitrogen is the cause of increase of photosynthesis rate and duration which promote growth and yield, but it declined essential oil content of two species.

Keywords: Ecological agriculture, Phosphorus, Root system, Secondary metabolite

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A primary evaluation on Eriophyid mites as biological control agents of some invasive weed species in Northeast of Iran

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Abstract

Weed biocontrol by using Eriophid mites could be a safe and efficient strategy. In order to find an ecological non-chemical approach for controlling of weeds, and studying the possibility of using Eriophyid mites, field surveys were conducted in Razavi Khorasan and North Khorasan Provinces during spring 2010. Collecting of mites was carried out at all of the vegetative and reproductive stages of these target weeds. Twenty plants of each species were selected and transferred to laboratory after each sampling. The results showed that gall mite (*Aceria drabae* Nalepa 1890) (Acarina: Eriophyidae) is a suitable biocontrol agent for controlling hoary cress. It decreased shoot growth and seed number. Gall mite (*Aceria chondrilla* (G. Can.)) (Acarina: Eriophyidae) was able to prevent seed set and reproductive buds of rush skeletonweed, it could be considered as a potential promising biocontrol agent. Since, Eriophyid mites were able to reduce vegetative and reproductive characteristics of studied weed species, these could be considered as a potential promising biological control agents for using in ecological agriculture.

Keywords: Gall mite, Natural enemy, Non-chemical control, Weed

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Study of qualitative and quantitative yield and some agronomic characteristics of sunflower (*Helianthus annuus* L.) in response of seed inoculation with PGPR in various levels of nitrogen fertilizer

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Abstract

In order to study the qualitative and quantitative yield and some agronomic characteristics of sunflower (*Helianthus annuus* L.) in response to seed inoculation with PGPR under various levels of nitrogen fertilizer, a factorial experiment was conducted based on a randomized complete block design with three replications in field experimental University of Mohaghegh Ardabili during growing season of 2009-2010. Factors were nitrogen fertilizer in three levels (0, 80 and 160 kg N ha⁻¹) as urea and seed inoculation with plant growth promoting rhizobacteria in four levels containing, without inoculation (as control), seed inoculation with *Azotobacter chroococcum* strain 5, *Azospirillum lipoferum* strain OF, *Pseudomonas* strain 186. Results indicated that nitrogen levels and seed inoculation with Plant Growth Promoting Rhizobacteria (PGPR) had significant effects on all of characteristics studied (except grain 1000 weight and stem diameter). Grain yield, plant height, head diameter, seed number per head, yield and oil percentage, yield and protein percentage increased with increasing of nitrogen fertilizer and application of seed inoculation with PGPR. Response of grain yield wasn't the same for various levels of nitrogen fertilizer and seed inoculation with PGPR. The highest grain yield belonged to application of 160 kg N ha⁻¹ and seed inoculation with *Azotobacter*. Means comparison showed that treatment compounds N₁₆₀ × without inoculation with PGPR and N₈₀ × seed inoculation with PGPR *Azotobacter* had similar grain yields. Thus, it can be suggested that in order to increasing of grain yield seed should be inoculated with *Azotobacter* bacteria × 80 kg N/ha in conditions of Ardabil region.

Keywords: *Azotobacter*, Bio fertilizer, Nitrogen, *Pseudomonas*, Oil percentage

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Effects of crop rotation on weed density, biomass and yield of wheat (*Triticum aestivum* L.)

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Abstract

In order to study the weed populations in wheat, under different crop rotations an experiment was carried out at Agricultural Research Station of Jolgeh Rokh, Iran. During growing season this project was done in five years, based on Randomized Complete Bloch Design with three replications, on Crop rotations included: wheat monoculture for the whole period (WWWWW), wheat- wheat- wheat- canola- wheat (WWWCW), wheat- sugar beet- wheat-sugar beet- wheat (WSWSW), wheat- potato- wheat- potato- wheat (WPWPW), wheat- potato- wheat- canola- wheat (WPWCW), wheat- sugar beet- wheat- potato- wheat (WSWPW), wheat- maize- wheat- potato- wheat (WMWPW), wheat- maize- wheat- sugar beet- wheat (WMWSW). Data analysis was done in fifth year. Weed sampling was done at four growth stages of wheat, including tillering, shooting, heading and soft dough stage of grains. Density, dry and fresh weight of each weed species per unit area, besides wheat grain yield were determined. All analysis of variances for traits related to weed were statistically significant ($p \leq 0.01$). The highest weed biomass was obtained in heading stage of wheat, and the greatest weed dry matter in all four growth stages was achieved in WWWWW rotation and the least one in WMWSW rotation. The highest weed density in different growth stages was achieved in rotations 7, 3, and 6. Wheat grain yield in all crop rotation treatments had a significant increase compared to monoculture. It seems that, yield reduction of wheat monoculture is related to weed density, its population and higher weed biomass in this treatment.

Keywords: Cereals, Cropping systems, Dry matter, Weed relative frequency

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