

The effect of plant growth promoting rhizobacteria (PGPR) on quantitative and qualitative characteristics of *Sesamum indicum* L. with application of cover crops of *Lathyrus* sp. and Persian clover (*Trifolium resopinatum* L.)

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Abstract

Cover crops cultivation and application of plant growth rhizobacteria are the key factors to enhance agroecosystem health. A field experiment was conducted at the Research Farm of Faculty of Agriculture, Ferdowsi University of Mashhad, Iran, during growing season of 2009-2010. A split plot arrangement based on a complete randomized block design with three replications was used. Cultivation and no cultivation of *Lathyrus* sp. and Persian clover (*Trifolium resopinatum*) in autumn assigned to the main plots. The sub plot factor consisted of three different types of biofertilizers plus control, including 1-nitroxin (containing of *Azotobacter* sp. and *Azospirillum* sp.), 2- phosphate solubilizing bacteria (PSB) (containing of *Bacillus* sp. and *Pseudomonas* sp.), 3- biosulfur (containing of *Thiobacillus* ssp.) and 4- control (no fertilizer). The results showed the effect of cover crops on seed number and seed weight per plant, biological and seed yield was significant, as the seed yield increased of 9 %. In general, biofertilizers showed superiority due to the most studied traits compared to control. Nitroxin, PSB and biosulfur increased biological yield of 44, 28 and 26 % compared to control, respectively. Cover crops and biofertilizers interactions, showed significant effect on all studied traits, as the highest and the lowest harvest index resulted in cover crop combined with biofertilizers (22.1%) and cultivation and no cultivation of cover crops combined with control (15.3%), respectively. The highest seed oil and protein content resulted from cover crops plus biofertilizers (42.4%) and cover crops plus PSB (22.5%), respectively. In general, the results showed cover crops cultivation in combination with biofertilizers application could be an ecological alternative for chemical fertilizers, in addition of achieving advantages of cover crops. According to the results, it should be possible to design an ecological cropping system and produce appropriate and healthy sesame in agreement with ecofriendly agricultural production guidelines.

Keywords: Biofertilizer, Biosulfur, Seed oil

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Effect of organic fertilizers on quality and quantity characteristics of blond psyllium (*Plantago ovata* Forssk.) clasping peperweed (*Lepidium perfoliatum* L.), qodumeh Shirazi (*Alyssum homolocarpum* L.) and dragon's head (*Lalementia iberica* L.)

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Abstract

This experiment was carried out in experimental farm of Agricultural Faculty of Ferdowsi University of Mashhad, Iran during 2010. The design was split plot with three replications. Main plots were the medicinal plant species consist of: blond psyllium (*Plantago ovate* Forssk.), clasping peperweed (*Lepidium perfoliatum* L.), qodumeh Shirazi (*Alyssum homolocarpum* L.) dragon's head (*Lalementia iberica* L.) and subplots were various organic fertilizer consist of cow manure, vermicompost (based on cow manure), coffee compost and spent mushroom compost. Results showed that medicinal plants had significant difference for number of seeds per plant, shoot dry matter, seed yield, plant height and mucilage percentage. Effect of various organic matter on all traits except for 1000-seed weight was significant. Interaction of organic fertilizers and plant was significant for dry matter. dragon's head had the most mucilage percentage (27.75%) and cow manure was the best fertilizer because it had the highest amounts of dry matter (1816 kg.ha⁻¹), seed yield (467.5 kg.ha⁻¹), number seed per plant (550 seeds.plant⁻¹), plant height (23.17 cm) and mucilage percentage (20.75%).

Keywords: Cow manure, Mucilage medicinal plant, Mushroom compost, Seed yield

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Effects of planting date and corm density on growth and yield of saffron (*Crocus sativus* L.) under Malayer climatic conditions

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Abstract

In order to evaluate the effects of planting date and corm density on yield and some other traits of saffron under climatic conditions of Malayer in the West of Iran, an experiment was conducted using split plots based on randomized complete blocks design with four replications. Different planting dates (15th July, 15th August and 15th September) were allocated in the main plots and different corm densities (25, 50, 75 and 100 corms.m⁻²) were in the subplots. Based on results, the effects of planting date on flower number, leaf number, length and weight of stigma was significant, whereas effects of planting density on flower number and flowering period, leaf length and number, stigma length and weight, number of daughter corms and stigma yield was significant. The highest amount of saffron yield (2.7 kg.ha⁻¹) obtained in the first planting date but there wasn't significant different between planting date treatments. None of experimental treatments have significant effects on the beginning of flowering, but by increasing corm density the length of flowering period significantly decreased. By increasing planting density from 25 corms.m⁻² to 100 corm.m⁻² the number of daughter corms decreased by 56%. Generally, planting date of 15th of July caused higher growth in saffron than other planting dates. A number of 100 corms.m⁻² showed higher yield and shorter length of flowering period.

Keywords: Daughter corm, Flowering period, Saffron leaf, Stigma yield

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The effect of plant growth promoting rhizobacteria, nitrogen and phosphorus on relative agronomic efficiency of fertilizers, growth parameters and yield of wheat (*Triticum aestivum* L.) cultivar N-80-19 in Sari

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Abstract

In order to evaluate the efficiency of plant growth promoting rhizobacteria (PGPR) plus nitrogen and phosphorous chemical fertilizers on relative agronomic efficiency of P and N fertilizers and some agronomic parameters of wheat (*Triticum aestivum* L.) cultivar N-80-19, an experiment was conducted at Sari Agricultural Sciences and Natural Resources University during growing season of 2008-2009. Experiment was arranged in split-split plot based on randomized complete block design with three levels (0, 25 and 50 kg.ha⁻¹) and sub-plots were considered PGPR at four levels (control, inoculation with nitrogen fixing bacteria (PFB), phosphate solubilizing bacteria (PSB) and dual inoculation with PFB and PSB) with three replications. Results showed that the application of biofertilizers significantly increased relative agronomic efficiency of N and P fertilizers, spike number, plant height, flag leaf area, grain yield and grain weight of wheat. Application of biofertilizers increased wheat grain yield as much as 46.6% as compared to control. Double inoculation of biofertilizers improved relative agronomic efficiency of fertilizers by 58.4 and 76.5% as compared to control, respectively. Integrated treatments showed higher performance compared to separate treatments. Generally, biofertilizers with low levels of P and N fertilizers significantly improved yield components of wheat without any reduction in yield related parameters.

Keywords: Biofertilizer, Chemical fertilizer, Grain weight, Leaf area, Spike number

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Biodiversity of predatory mites of super families of Raphignathoidea, Bdelloidea and Erythraeoidea in pomefruit orchards in Mashhad, Torghabe and Shandiz regions

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Abstract

The predatory mites of suborder prostigmata are important natural enemies of spider mites. In this study abundance and biodiversity of predatory mites of Super families of Raphignathoidea, Bdelloidea and Erythraeoidea in pomefruit orchards of Mashhad) Educational orchard of Agricultural College of Ferdowsi University of Mashhad, Agricultural Research Centre of Torogh and Laeen, Torghabe and Shandiz regions were evaluated. In each sampling site and during 12-sampling dates, two samples each including one Kg of apple, pear and quince foliages and soil were taken randomly throughout different seasons of year 2009. Biodiversity of predatory mites were measured using biodiversity indices and were analyzed using one-way ANOVA. As a result, a total of 20 species from 15 genera and six families of predatory mites were collected and identified. There was a significant difference in Shannon-Wiener indices of predatory mites among sampling sites. The highest and least values of Shannon-Wiener index for predatory mites were estimated in Laeen (1.92 ± 0.02) and Torogh (1.26 ± 0.06), respectively. In terms of species richness, the highest value of Margalef's index was measured for Laeen (2.49 ± 0.02) which was significantly higher than those of other sites. The value of evenness of Torghabe-Shandiz was the highest and that of Torogh was the least. The dominant predator species in pomefruit orchards of Mashhad and Torghabe-Shandiz regions were *Eustigmaeus anaumiensis* and *Stigmaeus elongatus* with relative abundance of 33.5% and 17.6 %, respectively.

Keywords: Diversity, Natural enemies, Species richness

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Investigation on the effect of cotton cultivars and different planting dates on barley-cotton double cropping system in Gonabad climatic conditions

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Abstract

In order to investigate the response of cotton cultivars (*Gossypium hirsutum* L.) to conventional-cropping and double-cropping systems a field experiment was conducted as split plot based on randomized completely block design with three replications at Gonabad Agriculture and Natural Resources Research Station during growing season of 2009-2010. The treatments included of recommended planting date (5th May), sowing after final irrigation of barley (22th May), sowing after harvest of barley in the same field (5th June) and three cotton cultivars: Varamin, Khordad and Sepid. The results showed that the highest plant height (60.2 cm) was observed in second sowing date. Experimental treatments did not have any significant effect on number of Monopodial and sympodial branches of cotton. The highest earliness percentage was obtained from recommended planting date compared to other treatments. The highest lint weight per boll (6.5 g) was related to sowing of Varamin cultivar at 3th planting date and had a significant difference with other treatments. Furthermore, this cultivar at the other planting dates had relatively higher lint yield. In the case of the interaction effect between treatments on 1st pick yield, by delaying in sowing date lint yield decreased, however, Khordad cultivar in recommended planting date had the highest value (1600 kg.ha⁻¹). In the 2st harvest, only the effect of planting date was statically significant and for the 3th planting date was achieved the highest 2st pick yield. In the case of interaction, effects on total lint yield, both Varamin and Khordad cultivars had the same lint yields in the first planting date. Although, in overall at the all planting dates Khordad cultivar showed the highest lint yield. In overall, growing Khordad cultivar at third planting date under double cropping after barley is appropriate in climatic conditions of Gonabad.

Keywords: Boll, Earliness, Fiber, Lint yield, Plant density

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Effect of irrigation and nitrogen fertilizer levels on yield and yield components of dill (*Anethum graveolens* L.)

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Abstract

In order to investigate the effect of irrigation and nitrogen fertilizer on yield and yield components of (*Anethum graveolens* L.), a field experiment was performed in Agricultural Research Farm of the University of Tabriz, Iran, during growing season of 2009-2010. The experiment was carried out as split plot based on randomized complete block design with three replications. Irrigation treatments (irrigation after 70, 100, 130 mm evaporation from class A pan) and nitrogen levels (0, 40, 80, 120 kg.ha⁻¹) were allocated to main and sub-plots, respectively. The results showed that nitrogen fertilizer had significant ($p \leq 0.05$) effect on minor diameter umbrella, 1000-seed weight, seed yield and harvest index. However, irrigation and effect between irrigation and nitrogen were not affected any of the traits. The greatest minor diameter umbrella was obtained with control nitrogen treatment and maximum 1000-seed weight, harvest index and seed yield were obtained from 40 kg.ha⁻¹ nitrogen. There was no any significant difference between 40 and 80 kg.ha⁻¹ nitrogen levels. Therefore, it seems that for producing the highest yield application of 40 kg.ha⁻¹ nitrogen is suitable. As water deficit no significant effects on this traits, of dill, it can be concluded that dill is a tolerant plant to drought stress.

Keywords: Dill, Harvest index, Nitrogen supply, Water stress, 1000-seed weight

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Evaluation of genetic and geographical diversity of garlic (*Allium sativum* L.) ecotypes of Iran using ISSR and M13 molecular markers

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Abstract

Garlic (*Allium sativum* L.) as one of the most valuable industrial and pharmaceutical plants has been studied from many aspects because of its importance. But there is not any sufficient and reliable information about its distribution and classification. So its types are categorized according to traditional, local or geographical names or some visual traits. The most important reason is the sterility of garlic and its flowering inability. This study, as the first report of using ISSR and M13 markers on Iranian garlic ecotypes, was performed to evaluate the genetic diversity and relationship and distinguish the repetitious clones among populations from Iran. According to our results, 26 studied clones were categorized as 24 different genotypes with a possibility of classifying them into four groups coincide with their geographical gathering zone. Group one contains ecotypes from north and western North of Hamadan province and group two contains clones from west and south west of Hamadan province, central, east and south east of Iran. Sample from Ahvaz was the only member of group three and ecotypes from North and eastern north of Iran formed group four.

Keywords: Genetic Polymorphism, Intraspecific divergence, Phylogeny

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