



Evaluation of Growth Indices and Estimation Seed Yield Loss Threshold of Canola in Response to Various Densities of Crop and Wild Mustard

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ABSTRACT

In order to study the effect of various densities of wild mustard (*Sinapis arvensis* L.) on growth indices of Canola (*Brassica napus* L.) in climate of Molathani, Ahvaz, an experiment was conducted in the experimental field of Ramin Agricultural and Natural Resources University, in 2006-2007. The split-plot set of treatments was arranged within randomized complete block design with four replications. Treatments included of wild mustard at five levels (0, 7, 14, 21 and 35 plants m²) and Canola at three densities (60, 80 and 100 plants m²). The results showed that the increase in mustard density rates lead to decreasing total dry matter, leaf area index, crop growth rate, relative growth rate and mean pod dry matter in three canola densities (60, 80 and 100 plants m²). Somewhat the lowest growth indices was obtained in 35 plants mustard (that is the highest mustard density). In addition damage rate of mustard decreased canola seed yield for 7, 14, 21 and 35 plants mustard up to 61, 71, 76 and 91%, respectively.

Keywords: Plant density, Competition, Yield loss threshold, Growth indices, Canola, Mustard

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Effect of Different Growth Stages and Dew Period Length on Disease Development of *Alternaria alternata* as a Biological Control Agent for *Convolvulus arvensis*

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Abstract

Field bindweed is an important perennial weed of agricultural crops world-wide. There are plant pathogen fungus which could cause necrotic spots on the leaves and stems of *Convolvulus arvensis* under natural conditions. In order to evaluate the effects of weed growth stage and length of dew period on disease development caused by *Alternaria alternata* and *Fusarium sp.* two experiments were performed in the greenhouse based on a completely randomized design in factorial arrangement with four replications during 2006-2007. Spore concentration for both experiments was 10⁷ spores per ml of distilled water. In the first experiment, treatments were different growth stages of field bindweed (cotyledon, 4-leaf, 6-leaf, 9-11-leaf stages). Results showed that disease development in the fungus of *A. alternata* was higher than *Fusarium sp.* The most susceptible growth stage of field bindweed plants to *A. alternata* was 2-4-leaf stage. The second experiment was performed in order to study the effect of dew period length (6, 12, 24 and 48 hour dew periods) on disease development at 4-leaf growth stage of field bindweed. The maximum disease development and minimum weed dry weight were observed with application of the fungus of *A. alternata* at dew periods of 24 and 48 hour, however, plant damage was also observed with a length of 6 hours dew period.

Keywords: Biological control, Bioherbicide, Dew, Phenology, Saturated humidity

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Evaluation of NaCl Salinity Stress Using Three Different Laboratory Methods on Germination and Seedling Growth of Safflower (*Carthamus tinctorius* L.)

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Abstract

To investigate the effects of different salinity levels of NaCl on germination of safflower (cv. Esfahan 24) seeds under three different incubation methods, a factorial experiment was carried out based on a complete randomize design with three replications. Salinity levels were 0, 5, 10, 15 and 20 dSm⁻¹ (NaCl) and incubation methods were sandwich method, and using petri dishes with open or closed doors. The results showed that among investigated traits, including germination percentage and rate, length, fresh and dry weight of root and shoot, salinity had the highest negative correlation with germination percentage. There was not a significant difference in germination percentage between 5 dSm⁻¹ and control, but increasing salinity levels to 10, 15 and 20 dSm⁻¹ led to 13, 23.50 and 39.74 % reduction in germination percentage, respectively, compared to control (P<0.01). Root growth was more sensitive to salinity than shoot growth. The reason of increase in root and shoot lengths and fresh and dry weights in sandwich method compared to petri dishes with close and open doors was lack of limitation for seedling growth and higher germination rate. In higher salinity levels, root length reduction in petri dishes with open door was lower than Petri dishes with close door. It seems that in closed petri dishes, increase of seedling respiration in response to osmotic potential limits seed germination and therefore this method is not appear a suitable method to study *in vitro* germination behavior of safflower in response to salinity.

Keywords: Safflower, Salinity, Germination, Seedling growth

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Agro-Economic Design of Cropping Pattern in Hendijan Irrigation and Drainage Network with Emphasis on Water Resources

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Abstract

Recently, design of cropping pattern based on water resources is getting a high priority. This scheme is complicated, and affected by multiple factors. For investigation, designer must gather a huge data, and classify them. The method of processing and analyzing of the information is important. The method of linear programming based on Lingo software for Hendijan irrigation and drainage network was used. On the basis of water resources situation, physical limitations, ecology and economical parameters, hydromodule was determined. The model with initial data for crop pattern is performed by software to produce projected hydromodule. In this survey, sensitivity analysis on water cost was conducted. Result showed that by increasing water cost and rotation intensity, revenue for each consumption water unit was decreased. The maximum benefit for all available conditions of water on the case of non intensity would be 140 percent, for 3% of crops. The maximum benefit was 133346682 Rls per hectare based on water availability for 2006.

Keywords: Cropping System, Linear Programming, Optimization, Hydromodule

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The Allelopathic Effects of *Sinapis alba* L., *Achillea millefolium* L., *Salvia nemorosa* L., *Artemisia incana* L. and Walnut leaf on red Bean (*Phaseolus coccineus* L.)

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Abstract

In the recent years application of allelopathic effects in weeds management have attracted the attention of many researchers. To study the effects of water extracts and various amount of plants powder of Sinapis, achillea, salvia, artemisia and wanut leaf on seed germination and seedling growth of bean, two separate factorial experiments were carried out in completely randomized design, with 3 and 5 replications, under laboratory and greenhouse conditions in the Agricultural Research Center Western Azerbaijan. In the first experiment, five concentrations of weeds water extracts including 0 (control), 2.5, 5, 7.5 and 10 percents was applied on bean seeds. With increasing in concentration of Sinapis, Achillea and Salvia germination percentage of bean was decreased but Artemisia and Salvia hadn't any effects on the germination. The most preventing effect on radicle and plumule lengths of bean were observed respectively in 90.5 and 83.2 percents with 10% Sinapis concentration. In second experiment soil of the pots was extended with plants powder in rates of 0, 0.33, 0.67, 1 and 1.33 percent. Decrease in plant height and leaf area were in Salvia, with 35.6% and 57.1%, respectively. Salvia concentration of 40 gr in soil, decreased total dry matter with 54% control, but Walnut leaf with amounts of 10, 20, 30 gr in soil increased than total dry matter. Existence of more than 30 gr Salvia and 40 gr Artemisia in the soil decreased 33.7% root dry weight compared to control. 40gr Salvia in soil decreased the dry weight of the seed from 452.6mg (control) to 257.6mg.

Keywords: Allelopathy, Germination, Seedling growth, Weeds, Bean

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Effects of Planting Patterns (Mixed and Intercropping) and Millet Plant Density on Yield and Forage Yield Components of Millet and Soybean under Mashhad Weather Conditions

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Abstract

Intercropping is one of the most important approaches for sustainable agricultural production. In order to evaluate the effect of planting patterns and millet density on forage yield of millet and soybean, an experiment was conducted in the Research Farm of Faculty of Agriculture, Ferdowsi University of Mashhad during the 2007-2008 growing season. The experiment was performed as factorial based on randomized complete block design with three replications. Factors included three planting patterns (sole cropping, intercropping and mixed cropping) and three millet densities (25, 30 and 35 plant per m²). Soybean sole cropping was avoided because the millet was the base plant. The results indicated that fresh and dry forage yield was higher in intercropping compare with sole cropping and mixed cropping. The highest amount of fresh and dry forage was obtained in 35 millet plant per m² treatment. The planting patterns and millet plant density had no significant effect on all morphological characteristics. Monetary Equivalent Ratio (MER) was higher (61%) in row intercropping with 30 millet plant per m² compared to sole crop. In general, row intercropping of millet and soybean with 30 millet plants per m² was an appropriate planting pattern and density when compared with millet sole cropping.

Keywords: Cropping pattern, Density, Millet, Soybean, Forage yield, Monetary Equivalent Ratio (MER)

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Allelopathic Potential of Alfalfa Shoot Aqueous Extract on Germination and Seedling Growth of Four Weed Species

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Abstract

The allelopathic potential of different concentrations (0, 5 %, 10 %, 20 % and 40%) of *Medicago sativa* shoot extracts were assayed on germination and radicle growth of four weed species (*Amaranthus hybridus*, *Amaranthus albus*, *Solanum nigrum* and *Chenopodium album*) in a laboratory experiment as completely randomized factorial with 3 replications. The results showed that, final germination percentage, mean germination time, germination uniformity (GU), time to 10%, 50%, 90% germination and radicle length of all species were influenced by the extract concentration of *M. sativa*. weed species and their interaction. By increasing the aqueous extract concentrations, the final germination percentage decreased linearly and the mean germination time and time to 10 % and 50 % germination increased linearly. radicle length, GU and time to 90 % germination followed a second order regression and by increasing the water extract concentration the radicle length decreased and time to 90 % germination increased and the GU to the 20% concentration increased then decreased. *S. nigrum* had the greatest germination percentage radicle length and GU and *Ch. album* had the longest mean germination time and time to 10%, 50% and 90% germination. *A. hybridus* had the fewest germination percentage, mean germination time, radicle length, time to 10%, 50% and 90% germination and *A. albus* had the fewest germination uniformity. In total *S. nigrum* was the most resistant species and *A. hybridus* was the most susceptible species to water extract of *M. sativa*.

Keywords: Allelopathy, Aqueous extract, Germination, *Medicago sativa*, Seedling growth, Weeds

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Effect of Two Organic Manures, Zinc and Boron on Yield, Yield Components and Grain Chemical Composition in Millet

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Abstract

A field study was conducted in Qaen region using complete randomized blocks with three replications to study the effect of organic manure, zinc and boron on yield and yield components of millet and grain chemical composition. The treatments included factorial arrangement of municipal solid waste compost and cow manure (each at 25 ton ha⁻¹), Zn (0, 50 kg ha⁻¹) and B (0, 10 kg ha⁻¹) by using their respective: ZnSO₄ and H₃BO₃ salts. Results showed that the effect of Zn and B increased total plant biomass, N and K concentrations in grain. Interaction effects of cow manure and Zn, increased grain yield to 239.7 %, total plant biomass 157 % compared to their controls. Organic manure application significantly increased grain yield, total plant biomass, spike length and 1000 grain weight compared to their controls. Interaction effects of B and cow manure increased total plant biomass, P, K and Cu concentrations in grain by 150.6, 102.8, 75 and 118.6 percent, respectively compared to control. So according to the results, Zn, B and organic manures application had significant impacts in improving yield, yield components and seed quality of millet, but more research are needed with respect to amounts of Zn and B and their proper methods of applications.

Keywords: Cow manure, Grain yield, Macro and Micro elements, MSWC

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Effects of Fertilizer Types and Irrigation Intervals on Quantity Criteria of Lavender (*Lavandula angustifolia*), Rosemary (*Rosemarinus officinalis*) and Hyssop (*Hyssopus officinalis*)

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Abstract

In order to investigate the effects of fertilizer types and irrigation regimes on quantitative criteria of three medicinal plants: lavender, rosemary and hyssop, an experiment was conducted at Research Field of Faculty of Agriculture, Ferdowsi University of Mashhad, during two growing years of 2007-2010. A split-split plot design with three replications was used. Treatments were three irrigation intervals (10, 20, 30 days) as main plots and three types of fertilizers in six levels: control, Nitroxin containing *Azotobacter* sp. and *Azospirillum* sp. (5lit/ha), nitrogen fertilizer (50 and 100 kg/ha), cow manure (10 and 20 ton/ha) as subplots. Animal manure and chemical fertilizer were applied at the time of transferring seedlings to the field and Nitroxin was used with the first irrigation. Shoot harvesting was performed twice during the plant growth at the time of full flowering. Increasing irrigation intervals reduced dry matter yield of three species and the highest yield of lavender (3990 kg/ha), rosemary (2380 kg/ha) and hyssop (7380 kg/ha) were obtained with 10 days interval. Also the effect of fertilizer was not significant but the highest yield for lavender (3930kg/ha), rosemary (2535kg/ha) was obtained with 50 kg/ha chemical fertilizer and the highest yield of hyssop (6117kg/ha) resulted in application of 20 ton/ha animal manure. The ratio of leaf dry weight to stem dry weight for both years was gained with 30 days irrigation interval at 20 ton/ha animal manure. In general, the best treatment was 30 days interval irrigation and 20 ton/ha animal manure for the best yield and respective in local conditions.

Keywords: *Lavandula angustifolia*, Irrigation intervals, Manure, Nitroxin, Root to shoot ratio

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Sugar Beet Yield and Quality Characteristics as Affected by Magnetic Field and Silver Nano Particles

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Abstract

In order to study the effects of magnetic field, silver nano particles and micronutrient fertilizers on sugar beet, an experiment was conducted at Razavi Research and Technology Institute, Mashhad, Iran. Experiment carried out with seven treatments based on randomized complete block design with three replications. Treatments included (T₁) magnetic field and silver nano particles + Kemira fertilizer (T₂) magnetic field and silver nano particles + Humax fertilizer (T₃) magnetic field and silver nano particles (T₄) Kemira fertilizer (T₅) Librel fertilizer (T₆) Humax fertilizer and (T₇) control. The results showed that exposure of sugar beet with magnetic field and silver nano particles (T₃) increased root yield about 43 percent more than control. Magnetic field and silver nano particles stimulated shoot yield twice more than control. Magnetic field + silver nano particles treatment showed the highest sugar yield (12.71 ton/ha) but T₄ and control treatments showed the lowest sugar yield. Experimental treatments had no significant effects on root quality except potassium content. It is expectable that magnetic field and silver nano particles could be suitable as an alternative for chemical fertilizers to reduce their application.

Keywords: Sugar yield, Root yield, Sugar of molasses, Root chemical component

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Use of Allelopathic Traits of Several Medicinal Plants on Some Germination Characteristics and Early Growth of Wheat and Wild Oat

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Abstract

Ecosystem pollution and weed resistance to herbicides have led researchers to pay more attention to natural herbicides. To examine allelopathic effects of liquorice, rosemary, chamomile and eucalypt on germination characteristics and early growth of wheat (*Triticum aestivum* L.) and wild oat (*Avena fatua* L.), a factorial experiment based on completely randomized design with 20 treatments and four replicates was conducted at Cereal Laboratory of College of Agricultural, Shiraz University, Iran in 2010. The results showed that rosemary essential oil had most negative effect on germination percentage (G%), seedling length (SL), radicle length (RL), shoot to root length ratio (S/R), relative water content (RWC) and total water content (TWC). The lowest negative effect on G%, SL, RL and TWC was obtained from eucalypt essential oil and the least effect on RWC was observed from liquorice essential oil treatments. Most reduction on S/R was obtained from chamomile essential oil. The effect of stem essential oil on all measured traits, except G%, was more than leaf essential oil. Also wild oat was found to be more responsive than wheat to rosemary and chamomile essential oils. Considering these results, it appeared that control of wild oat by using such essential oil as rosemary and chamomile might be possible under some conditions with appropriate cautions.

Keywords: Allelopathic, Bioherbicide, Biological control, Germination traits

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The Response of Grain Corn Genotypes to Drought and Determination of Drought Tolerance Indices

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Abstract

Water deficit is one of the most common constraints to crop productivity in the world and Iran. In order to study effect of drought stress on morphologic traits, yield and yield components of 34 hybrids of corn, an experiment was carried out based of complete randomized block design with three replication under F.C. irrigation and drought stress in Khorasan Razavi Agricultural Research and Natural Resources Institute Mashhad, Iran on 2010. Results of analysis of variance showed that in both conditions there are significant different between all hybrids for all traits. In this experiment drought tolerance indices as TOL, MP, GMP, SSI, STI, HARM and also Golden Mean (new index) were calculated. Results of hybrid means comparison showed that in F.C. Irrigation condition S.C500 hybrid and in stress condition N.11 hybrid was better than others in yield trait (13/79 and 5/69, respectively). It seems that Harm, STI, MP and GMP indices have a similar ability to separate drought sensitive and tolerant genotypes. According to cluster analysis (UPGMA method) based on stress tolerance and susceptibility indices and grain yield in both F.C. and stress conditions, hybrids were classified in three groups with low intra- and high extra-group similarities. In conclusion, it can be suggested that H11 and SC250 hybrids should be recommended in Mashhad Plain.

Keywords: Multivariate Analysis, Tolerance Index, Mean Productivity, Golden Mean

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Effects of Iodosulfuron Methyl-sodium Plus Mesosulfuron-methyl and Tribenuron Methyl Plus Clodinafop Propargyl Mixed by Fenitroton and Librel BMX Micronutrient Solution on Wheat Growth

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Abstract

Greenhouse experiment was conducted to assess the response of wheat to tank mixture of herbicides with insecticide and manure in Ferdowsi University of Mashhad, Iran. The experiment consisted of 8 treatments: 1- tribenuron methyl ($15-20 \text{ g ha}^{-1}$) + clodinafop propargyl (0.8 L ha^{-1}) 2- tribenuron methyl + clodinafop propargyl + fenitroton (1.2 L ha^{-1}) + librel (1 Kg ha^{-1}) 3- tribenuron methyl + clodinafop propargyl + fenitroton 4- tribenuron methyl + clodinafop propargyl plus librel 5- iodosulfuron + mesosulfuron 6- iodosulfuron + mesosulfuron + fenitroton + librel 7- iodosulfuron + mesosulfuron + fenitroton 8- iodosulfuron + mesosulfuron + librel and 9- untreated control. The layout was a completely randomized design with 4 replications. The combinations were applied in tillering stage. On the base of our results combination of iodosulfuron methyl-sodium plus mesosulfuron-methyl, or plus fenitroton, or plus librel, and iodosulfuron methyl-sodium plus mesosulfuron-methyl, or plus fenitroton caused the most reduction in wheat height by 20% and 15%, leaf area by 44% and 39%, leaf fresh weight by 40% and 38%, shoot fresh weight by 36% and 32%, leaf dry weight by 30% and 25% and shoot dry weight by 37% and 29%, respectively. Combination of tribenuron methyl plus clodinafop propargyl, or plus fenitroton, or plus librel, and tribenuron methyl plus clodinafop propargyl, or plus fenitroton reduced leaf area, fresh weight and dry weight of wheat plants, but this reduction was not as much as previous mixture. Mixture of two herbicides with librel showed no damaging effect on wheat plants.

Keywords: ACCase inhibitors, Damage, Graminae, Micronutrient, Pesticide, Sulfonylurea

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Evolution Effect of Salt Stress on Growth, Antioxidant Enzymes Activity and Malondealdehyd Concentration of Canola Verities

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Abstract

This research was carried on to evaluate the response of rapeseed varieties to salt stress. In this experiment growth response of three rapeseed varieties (Fornex, Consoul and Okamer) in four salinity levels (0, 40, 80 and 120 mmol NaCl) was investigated using a factorial arrangement of factors in a complete randomized block design with three replications. Results indicated that in the highest salinity level shoot dry matter of Fornex and Okamer was decreased, respectively by 58 and 82 percent compared to control condition. under highest salinity, Fornex verity had lowest leaf Na⁺ and Malondealdehyd concentration and the highest leaf K⁺ concentration and Peroxidase activity.

Keywords: Dry weight, Peroxidase activity, Na⁺, K⁺

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Effect of Nitrogen on Competition between Wild Oat (*Avena fatua*) and Wheat (*Triticum aestivum*) at Vegetative Growth Stage

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Abstract

In order to study the effect of nitrogen on competition between wild oat (*Avena fatua*) and wheat (*Triticum aestivum*) at vegetative growth stage, a factorial experiment was conducted based on completely randomized block design with three replications in research greenhouse of faculty of agriculture, at Ferdowsi University of Mashhad in 2008. First factor was five densities (0, 2, 4, 6 and 8 plants per pot) of wild oat in pure stand and competition with wheat (at constant density of 8 plants per pot). The second factor was consisted of five levels of nitrogen (1, 4, 8, 12 and 16 mM). The experiment was finished at the end of vegetative growth stage of wheat based on monoculture treatment at 8 mM of nitrogen. Results showed the significant effects of nitrogen and wild oat's densities on number of tiller and leaf area index of wheat. The number of tiller per plant in both plants increased when the nitrogen levels increased and/or the weed densities decreased. The interaction effect of wild oat densities and nitrogen levels on leaf area index of wheat was significant. The interaction effect was not affected by nitrogen in high levels of wild oat densities and by wild oat densities in low levels of nitrogen. It may demonstrate the dominance of wheat in the low nitrogen levels and wild oat in high densities when they compete each other in early stages of growth. Comparison of relative biomass of wheat at different levels of nitrogen supported this hypothesis. Results showed increasing the amount of nitrogen during the vegetative growth stage, can increase competitiveness of wild oat with wheat.

Keywords: Weed, Density, Competition, Relative biomass

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