

## The Effects of Bora-care Alone and in Combination with Furfural Against *Microcerotermes diversus* Silvestri (Isoptera: Termitidae) in Laboratory Conditions

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Received:13-12-2011

Accepted:08-06-2013

### Abstract

The use of wood preservatives is a suitable method to protect wooden products from termites attack. The effect of a Glycol Borate wood preservative and termiticide (available commercially as Bora-care) alone and in combination with Furfural were evaluated against *M. diversus* Silvestri (Isoptera: Termitidae). The major termite pest in Khuzestan province, Iran in choice and no-choice tests. It was found that mortality and repellency increased with increasing concentration of glycol borate and also with increasing Furfural concentrations. LC<sub>50</sub> values in choice and no-choice trials increased for Furfural as time increased and their toxicities decreased proportionally, but LC<sub>50</sub> values decreased for the Bora-care as time increased and their toxicities increased proportionally. LT<sub>50</sub> values in choice and no-choice trials had an increasing trend as concentration decreased. In all tests, the glycol borate with Furfural prevented feeding and treated cellulose substrate damage. The results suggest that Bora-care alone and in combination with Furfural could be recommendable as wood preservatives against *M. diversus*.

**Keywords:** *Microcerotermes diversus*, Bora care, Furfural, Repellency, Mortality

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## Effectiveness of Some Acaricides on Almond Spider Mite (*Schizotetranychus smirnovi* Wainst.)

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Received: 01-02-2012

Accepted: 03-12-2013

### Abstract

Almond spider mite was recently out broken in Saman orchards, Chaharmahal va Bakhtiari province. Applying of pesticides to control of the pest increase production cost, environmental pollution, frequency of pesticide resistance and kill natural enemies. The effectiveness of some acaricides on control of the mite was studied in the lab and field conditions. Four acaricides including: Bromopropylate, Fenpyroximate, Fenazaquin, Hexythiazox were used in this study. Bioassay experiments were done by introducing deutonymphs on treated leaves which immersed in the acaricides solutions. Leaves were put on non-stirred, water saturated cotton in the petri dishes (9.8 cm in diameters). Fifteen deutonymph were released on each leaf and petri dishes were kept in the incubator at maintaining  $25 \pm 1^\circ \text{C}$ , RH  $55\% \pm 5$  and photoperiod 14:10 (L:D) and the number of dead mites were counted after 24 h. The highest and lowest toxicity were observed in Fenpyroximate ( $LC_{50}=0.814$ ) and Bromopropylate ( $LC_{50}=6.29$ ) treatments, respectively. In the field conditions, the mentioned acaricides (at the recommended dosage) along with the water spraying were used to control of the pest. Sampling was done one day before, 3, 7 and 14 days after treatments application. Fifteen leaves of each tree (replicate) were randomly sampled and the number of alive mites was counted. Mean comparison using Duncan multiple range test (DMRT) indicated that all used acaricides significantly reduced the mite population.

**Keywords:** Almond, Almond spider mite, Acaricide, Bioassay

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## Efficacy of Glyphosate Mixed with Ammonium-sulfate to Control Weeds Grown in Pistachio (*Pistachio vera*) Gardens

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Received: 21-02-2012

Accepted: 18-08-2013

### Abstract

A field study was conducted to assess the efficacy of glyphosate mixed with ammonium-sulfate on weeds grown in pistachio (*pistachio vera*) orchards in Feyz-Abad, Khorasan-Razavi province, Iran, in 2007. The layout was a randomized complete block design with 21 treatments and three replications. Chemical treatments were glyphosate at doses of 0, 2, 4, 6, 8, 10 and 12 l ha<sup>-1</sup> alone or mixed with 0.5% and 1% (v/v) of ammonium-sulfate. Treatments were applied at 5-7 leafy stage of weeds. 35 days after treatments weed dry matter were determined in each plot. Glyphosate at 8 l ha<sup>-1</sup>, 10 l ha<sup>-1</sup> and 12 l ha<sup>-1</sup> (either alone or mixed with ammonium-sulfate) caused significant decrease in weed density and weed dry matter compare to the weedy check. Glyphosate at 2 l ha<sup>-1</sup> and 4 l ha<sup>-1</sup> made significant decrease in weed density and weed dry matter compared with weedy check but weed control was significantly less than glyphosate at 10 l ha<sup>-1</sup> and 12 l ha<sup>-1</sup>. Ammonium-sulfate at 0.5% and 1% of spraying solution enhanced glyphosate efficacy by 5% and 25%, respectively, diminishing the negative impact of hard water minerals.

**Keywords:** Adjuvants, Ammonium-sulfate, Dose-response, Herbicide efficacy

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## Effect of some Essential Oils on Spore Germination and Colony Growth of *Penicillium digitatum* during *in vitro* Culture

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Received:29-05-2012

Accepted:27-01-2014

### Abstract

In order to control of *Penicillium digitatum* fungi in vitro condition, the effect of essential oils of *Cinnamomum verum*, *Zataria multiflora*, *Mentha piperita*, *Carum carvi*, *Lavandula officinalis* and *Satureja hortensis* on inhibition of spore germination and colony growth at 25,50,75 ppm concentration, was examined. Results showed that the Cinnamon essential oil had the best effect on inhibition of spore germination in MS medium, So that in 50 and 75 ppm concentration spore germination was completely inhibited. After Cinnamon, Satureja essential oil had the best effect and other essential oils did not influence on inhibitory spore germination. After 15 days, the hyphae growth was measured. The results showed that in 25, 50, 75 ppm of Cinnamon essential oil concentration had not significantly different.

**Keywords:** Essential oil, Colony growth, Inhibitory spore germination, *Penicillium digitatum*

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## Some Plant Parasitic Nematode Species of the Genera *Ditylenchus* and *Pratylenchus* (Tylenchomorpha, Tylenchoidea) from Vegetable Fields in Mashhad Area, Iran

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Received: 21-07-2012

Accepted: 11-03-2013

### Abstract

In order to investigate the biodiversity of plant parasitic nematodes of vegetable fields in Mashhad area, 51 soil and root samples were collected during 2010-2011. Nematodes were extracted by centrifugal flotation technique and transferred to glycerin according to the modified De Grisse method (1969). The permanent slides were prepared from the extracted nematodes. The nematodes were identified by light microscopy, based on morphological and morphometrical characters. In this study, seven species of *Ditylenchus* and *Pratylenchus* viz. *D. exilis*, *D. medicaginis*, *D. myceliophagus*, *D. tenuidens*, *P. flakkensis*, *P. neglectus* and *P. thornei* were identified. *D. exilis* and *P. flakkensis* are reported for the first time from Iran.

**Keywords:** Plant parasitic nematode, *Ditylenchus exilis*, *Pratylenchus flakkensis*, Mashhad

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## Integrated Weed Management in Potato with Different Agronomy and Chemical Methods

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Received: 01-08-2012

Accepted: 03-12-2013

### Abstract

In order to evaluate different management treatments on weed structure and potato yield, an experiment was conducted in Ardabil as randomized complete blocks with four replications in 2009. Treatments included weedy (check), weed free (check), Metribuzin as a preplant (standard), black polyethylene, Treflan, Treflan + black polyethylene, cultivation, Treflan + cultivation. Treflan application and polyethylene covering were done in tubering stage. Statistical analysis showed that different agrochemical treatments had significant effect on weed covering percent, weed density, weed dry weight and potato yield. The results showed that weed densities were reduced to lowest level in black polyethylene included treatments. In this treatment weed density were less than 4 per/m<sup>2</sup> and 93.57% less than weedy treatment. The most weed densities were in treatments with weed controlling at earlier potato growing stage. Metribuzin preplant application was reduced weed dry weight comparing to weedy check significantly. In this treatment weed dry weights was less than 2 times comparing to weedy treatment. Different treatments had significant effect on tubers yield and the highest yield production was 39.04 t/ha in black polyethylene included treatments.

**Keywords:** Black polyethylene, Trifluralin, Cultivator, Yield, Potato

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## Allopathic Effects of White Top (*Cardaria draba*) on Germination Characteristics and Growth Seedling of Canola (*Brassica napus*) and Sweet Corn (*Zea mays*) Seed

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Received: 24-09-2012

Accepted: 19-10-2013

### Abstract

In order to evaluate the allelopathic effects of white top (*Cardaria draba* (L.) Desv.) water extracts on corn and canola germination characteristics, an experiment was carried out based on CRD design with three replications in agronomy research lab of Yasouj University. Treatments were included of 25%, 50%, 75% and 100% water extract (50 gr dm/L) of root, leaf and stem, inflorescence and whole plant of whitetop and control (distilled water) were applied. Results showed that germination percent and rate, radicle and shoot length and dry weight, and root/shoot length ratio and dry weight were decreased significantly by increasing extract concentration. Effect of shoot extract was greater than of root. Inhibition percent was increased by extract concentration, but there was not significant differences between 75% and 100% extract concentration. Based on the results, canola was more susceptible than maize to allelopathic effect of whitetop extract. Finally based on the results it is possible to say that whitetop can prevent the germination and growth of canola and sweet corn by producing the allelopathic compounds, and decreasing green surface and undesirable growth of crops.

**Keywords:** Allelopathy water extracts, Germination percent and rate, Inhibition percent, Growth seedling

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## Foramsulfuron and Nicosulfuron Mixtures with 2,4-D plus MCPA on Redroot Pigweed (*Amaranthus retroflexus* L.) and Common lambsquarters (*Chenopodium album* L.)

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Received:27-10-2012

Accepted:23-11-2013

### Abstract

Sulfonylurea herbicides mixtures with phenoxy herbicides can lead to effective control of broadleaved weeds. Pot experiments were conducted to study the effect of foramsulfuron and nicosulfuron mixtures with 2,4-D plus MCPA on redroot pigweed and common lambsquarters in 2010 at the greenhouse of Agricultural Faculty of Ferdowsi University of Mashhad, Iran. Experiments were performed as a completely randomized design with four replications. Treatments consist of several doses of sulfonylurea herbicides, which applied alone or in combination with 2,4-D + MCPA at different ratios at two- to four- true leaf stage. Also, to study the single-cross 704 corn (*Zea mays* L.) injury by applying herbicides alone or in mixture with different ratios, an experiment was conducted in 2011 at the farm of the Faculty of Agriculture, Ferdowsi University of Mashhad, Iran. Based on greenhouse results, effective dose of 2,4-D + MCPA did not decrease in the 87.5:12.5 mixture ratio of 2,4-D + MCPA with foramsulfuron or 75:25 and 50:50 mixture ratios of 2,4-D + MCPA with nicosulfuron on redroot pigweed. This may be caused by interference between herbicides for absorption and translocation. While, interference was observed at equal's or higher mixture ratios of foramsulfuron in mixture with 2,4-D + MCPA on common lambsquarters. Weed species, metabolism rate of herbicide and cuticle structure can be important in higher doses' application of herbicides in mixture and interference between two herbicides. Besides, weed growth stage, more entrance directions and transition of elaborated sap can be effective in translocation of herbicides in an effective dose to the site of action and less interference between herbicides. Sulfonylurea herbicides mixtures with 2,4-D + MCPA did not cause much injury on corn plants based on field study.

**Keywords:** ALS-inhibitors, Effective dose, Herbicides interactions, Mixture ratio, Phenoxy herbicides

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## Study Plant Growth Promoting *Bacillus* Isolates in Tomato Root Colonization and *Meloidogyne javanica* Population Reduction

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Received: 30-10-2012

Accepted: 02-12-2013

### Abstract

In this study, high biocontrol potentially *Bacillus* isolates, against root knot nematode were evaluated from viewpoint of biofilm formation and root colonization in vitro. Among 139 *Bacillus* isolates from tomato rhizosphere of several regions of Razavi Khorasan, 15 strains which show more ability to prevent egg hatch and cause larvae mortality of *Meloidogyne javanica*, were tested in biofilm assay. Based on biofilm amount, six isolates including MD6.5, MD1.8, Bag2.13, N2.2, Ft1.7 and *B. subtilis* were selected for pot experiments and colonization assay. According to our findings, isolates MD1.8, MD6.5 with 75 and 99 % larvae mortality, in vitro maximum biofilm production, tomato root colonization with  $10^6$  and  $2 \times 10^6$  cfu/ml, reducing disease symptoms in comparison to infected control and development of tomato growth parameters, have been suggested as powerful *Bacillus* isolates in field conditions. It seems, efficient colonization of tomato root, using *Bacillus* strains, has an important role in plant protection of root knot agent.

**Keywords:** *Bacillus*, Biofilm, Colonization, Control, Nematode

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## Seasonal Population Fluctuations of the Cabbage White Butterfly, *Pieris rapae* (Linnaeus, 1758) and Diamondback Moth, *Plutella xylostella* (Linnaeus, 1758) on Cauliflower Cultivars

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Received: 29-10-2012

Accepted: 09-11-2013

### Abstract

Small cabbage white butterfly, *Pieris rapae* (L.) (L.) (Lep.: Pieridae) and diamondback moth, *Plutella xylostella* (L.) (Lep. Plutellidae) are two of the most important insect pests of the family Brassicaceae. Use of resistant varieties is suitable management strategy for control of these pests. In order to study the population fluctuations of *P. rapae* and *P. xylostella*, eight cultivars of cauliflower were planted in a completely randomized block design with five block and 40 plot at the Shahed University research field (south of Tehran) and a sampling was performed once every ten days. The highest total density of different stages of *P. rapae* was observed on Smilla and Dogol cultivars and the lowest density of total stages of this pest was observed on Abresfid and Tokita. The highest of the egg density of *P. xylostella* was observed on Smilla and Dogol cultivars and the lowest egg density was on Buris and Takgol cultivars. Larval and pupal density of *P. xylostella* on Smilla and Dogol cultivars was more than that on other cultivars.

**Keywords:** Seasonal population, *Pieris rapae*, *Plutella xylostella*, Cauliflower

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## Evaluation of Relative Resistance of Some Apricot Varieties to *Wilsonomyces carpophilus* Causing Shot Hole Disease

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Received: 29-10-2012

Accepted: 03-12-2013

### Abstract

In this study, eleven cultivars of apricot including two early ripening (Noori pishras and pishras Tabasi) varieties, four mid ripening cultivars namely (Shahroudi, Lasjrdy, Ghazi Gahani and Bagheri) and five late ripening cultivars i.e. (Shahroudi51, Shahroudi48, Shahroudi29, Shahroudi21 and Ketabi) that had a better yield and horticultural characteristics were screened to *Wilsonomyces carpophilus*. All cultivars under greenhouse conditions were evaluated in a completely randomized design with eleven treatments and 5 replicates. To create disease, pathogen was cultured on PDA medium and was inoculated on leaves with concentration conidia of  $10^5 \times$  per ml in distilled water. Percentage of infections and number of available spots on the leaves of cultivars were evaluation criteria. To assess cultivars response in the garden, two-year-old saplings of all varieties planted at farm of KANRRC. Inoculation and cultivars' disease assessment procedure were done as already mentioned but at the end of the season. Data were analyzed using ANOVA. The results of the evaluation of apricot cultivars in the greenhouse showed that there were very significant differences in disease severity on leaves ( $P \leq 0.01$ ) and number of leaf spots ( $P \leq 0.05$ ). Comparing of averages measurements of disease severity on leaves indicated that there was not any significant difference among Lasjrdy, Shahroudi29, Shahroudi51, and Ghazi Gahani cultivars means these cultivars are the most resistant cultivars. Comparing the averages measurements of spots numbers on leaves indicated that Lasjrdy was the most resistant cultivar. While evaluating severity and number of spots on leaves and compared to measurements obtained from the leaves of these two traits in the garden, Analysis of variance showed that there was no significant difference among eleven varieties of apricots in the garden, and all cultivars were in one group.

**Keywords:** Apricot, Stone fruit, *W. carpophilus*, Resistance, Shot hole

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## Investigation The Possibility of Glyphosate Efficacy Improvement in Weeds Control at Hard Water Using Soil Fertility Management

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Received:11-11-2012

Accepted:26-10-2013

### Abstract

In order to study the effect of soil nitrogen content and water hardness on glyphosate efficacy on common lambsquarter (*Chenopodium album* L.) and redroot pigweed (*Amaranthus retroflexus* L.) control, an experiment was carried out as a completely randomized design in a factorial arrangement with three replications. Experimental treatments were included soil nitrogen content (18, 50, 90, 200 and 300 mg/kg soil), glyphosate doses (0, 75, 100, 125, 150, 175 and 200 % glyphosate recommended dose for common lambsquarter (5 lit/ha) and redroot pigweed (3 lit/ha)), calcium carbonate concentration in water (0, 100, 300, 600 and 1200 ppm). Results showed that increasing water hardness decreased glyphosate efficacy in control of two weeds and increased glyphosate ED<sub>50</sub> parameter. Minimum (1453.17 and 906 gr a.i ha<sup>-1</sup> for common lambsquarter and redroot pigweed, respectively) and maximum (3424.45 and 1606 gr. a.i ha<sup>-1</sup> for common lambsquarter and redroot pigweed, respectively) glyphosate ED<sub>50</sub> was observed in 0 and 1200 ppm of water hardness respectively. Increasing soil nitrogen content from 18 to 300 (mg/kg soil) increased glyphosate efficacy in two weeds and glyphosate ED<sub>50</sub> decreased from 3217.03 and 1745.2 to 1612.58 and 896.49 (gr. a.i ha<sup>-1</sup>) for common lambsquarter and redroot pigweed, respectively. Based the results of this experiment, increasing water hardness, glyphosate efficiency decreased on weeds control and increasing soil nitrogen content can decrease the negative effect of water hardness on glyphosate efficacy.

**Keywords:** Dry mater, Water quality, Herbicide, Calcium carbonate

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## Biological Effects of Citrus Peels Essential Oils Against Confused Flour Beetle, *Tribolium confusum* Duval (Coleoptera: Tenebrionidae)

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Received: 03-02-2013

Accepted: 03-12-2013

### Abstract

In this research, fumigation efficiency, repellency and persistence of citrus essential oils extracted from dried peels of orange, bitter orange and mandarin (cultivars: Satsuma, Page, Clemantin) were investigated against adults of confused flour beetle *Tribolium confusum* Duval. The essential oils were extracted by using Clevenger apparatus. 40 ml glass container as bioassay chamber and filter paper (Whatman, N°1) as releasing source of the essential oils were used for evaluating fumigation. Mortalities caused by four concentrations of the essential oils were assayed at 1, 3, 6, 9, 12 and 24 hours after treatment in fumigation effects experiments. Repellency effect of four concentrations, 0.18, 0.36, 0.72 and 1.45  $\mu\text{l}/\text{cm}^2$  was measured by comparing the number of adults in treated and untreated areas. An ascendant trend was observed between the concentrations and mortality in fumigation toxicity assay, but essential oils exert their efficiency in first 12 hours. Highest concentrations of the essential oils (325, 400, 350, 275 and 300  $\mu\text{l}/\text{L}$  air, respectively) were caused more than 97% mortality after 24 hours. The repellencies averages of the four concentrations were 32.5, 65, 55, 37.5 and 40%, respectively. The essential oils persistency were between 12 (Satsuma) to 22 days (Clemantin).

**Keywords:** Essential oil, *Tribolium confusum*, Repellency, Persistence

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## Investigation on The Effects of Several Plant Extracts and Thiamethoxam on Two Sex Life Table of *Chrysoperla carnea* (Stephens) (Neu.: Chrysopidae) in Laboratory Conditions

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Received: 13-02-2013

Accepted: 7-12-2013

### Abstract

Demographic toxicology is a common method for investigation on the sublethal effects of pesticides on natural enemies. The side effects of plant extracts from root of madder (*Rubia tinctorum* L.), seeds of dill (*Aniethum graveolens* L.) and seeds of Galbanum (*Ferula gummosa* Boiss.) in comparison with thiamethoxam were evaluated on life table parameters of *C. carnea* as *Agonoscena pistaciae* predator, under laboratory conditions at  $25 \pm 2$ ,  $65 \pm 5\%$  RH and 16:8 (L: D) photoperiod. The first instar larvae were assayed using Potter Spray Tower method. Results showed significant differences ( $p \leq 0.01$ ) among treatments for gross reproductive rate (GRR), net reproductive rate ( $R_0$  or NRR), intrinsic rate of increase ( $r_m$ ), finite rate of increase ( $\lambda$ ) and mean generation times (T). The highest to lowest of gross and net reproductive rate were observed in *A. graveolens*, *R. tinctorum*, thiamethoxam and *F. gummosa parviflora*, respectively. The maximum intrinsic rate of increase ( $r_m$ ) and finite rate of increase ( $\lambda$ ) were observed in *A. graveolens* and *R. tinctorum* and minimum in thiamethoxam. Thus, the immunity was observed in *A. graveolens* and *R. tinctorum* respectively while thiamethoxam and *F. gummosa* showed the highest inhibiting effect on stable population growth parameters. Two extracts, *A. graveolens* and *R. tinctorum* were the best choices, because of their immunity on *C. carnea* as a biological control agent.

**Keywords:** Pesticides, *Chrysoperla carnea*, *Agonoscena pistaciae*, Life table, Plant extracts

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## Physiological Response of Sugar Beet to Viral Diseases of Rhizomania

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Received: 10-03-2013

Accepted: 03-12-2013

### Abstract

Rhizomania disease is one of the most important threats to worldwide and Iran sugar beet cultivation. Many studies have been done to understanding the physiological effects of the disease on sugar beet, but in Iran conditions has not been done any study for this purpose. This experiment was conducted with four sugar beet cultivars named as Brigita, Zarghan, Jolge and Rasoul in 2010 and natural infested soil in Mashhad. Results of the experiment showed that rhizomania disease affected morphological and physiological characteristics of susceptible sugar beet cultivars. Rhizomania disease decreased green area and leaf photosynthetic performance. In infected plants, the tap root and lateral roots became necrotic and die, and these changes caused decreasing of absorption ability of water and nutrition by root. These adverse changes caused the sugar beet storage root yield was decreased.

**Keywords:** ELISA Test, Leaf conductance, Leaf temperature, SPAD, Chlorophyll fluorescence

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## Brief report

# Effect of Wheat Aquatic Extract (*Triticum aestivum* cv. Chamran) on Germination, Vegetative Growth, Cell Membrane Damage, $\alpha$ -amylase Enzyme and Sucrose Synthetesis Enzymes Activity of Winter Wild Oat (*Avena ludoviciana*)

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Received: 13-02-2012

Accepted: 18-08-2013

## Abstract

In order to evaluate the allelopathic potential of wheat aquatic extracts against winter wild oat (*Avena ludoviciana*) at germination and vegetative growth stage two experiments were conducted in Islamic Azad University, Shoushtar branch at 2012. Germination experiment was laid out according to Completely Randomized Design with four replications and treatments were various concentration of wheat extract (0, 25, 50, 75 and 100%). At winter wild oat vegetative growth stage, treatments were 0, 25, 50 and 75 % of wheat aquatic extract concentration and experiment was laid out according to Randomized Complete Block Design with four replications. Results indicated wheat aquatic extract application exhibited gradual rise inhibitory effect on seed germination, seedling weight, antioxidant enzymes activity and  $\alpha$ -amylase enzyme activity but elevated the mean germination time and malondialdehyde concentration in winter wild oat seedlings. Likewise, seedling weight, antioxidant enzyme activities and sucrose synthetesis enzymes activity were declined with wheat extract application but malondialdehyde concentration increased. In conclusion, wheat aquatic extract decreased seed germination, seedling growth,  $\alpha$ -amylase enzyme and sucrose synthetesis enzymes activity of winter wild oat.

**Keywords:** Antioxidant enzyme, Allelopathy, Malondialdehyde, Biological herbicide

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## Brief report

### New Records of Predatory Carabids (Col.: Carabidae) for Fauna of Iran

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Received: 31-07-2012

Accepted: 11-06-2013

#### Abstract

In survey on the abundance and species diversity of Arthropods associated with organic and conventional wheat fields which carried out in 2010 and 2011 in Mashhad region, a total of 13 species belonging to carabidae family were collected and identified. Among the identified species, *Calosoma auropunctatum dsungaricum* Gebler (Carabinae) and the subspecies *Poecilus cupreus erythropus* Dejean (Pterostichinae) are new records for fauna of Iran. Also, the species *Scarites terricola persicus* Chaudoir (Scaritinae); *Amara ovata* Fabricius (Pterostichinae); *Poecilus nitens* Chaudoir (Pterostichinae); *Calathus mollis* Marsham (Platyninae); *Brachinus explodens* Duftschmid (Brachininae) and *Cylindera germanica* Linnaeus (Cicindelinae) are new records to fauna of Razavi Khorasan province.

**Keywords:** Carabidae, New record, General predator, Razavi Khorasan

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