



First Characterization of *Apple scar skin viroid* from Apple and pear cultivars in Iran and determination of genetic diversity

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Abstract

Apple scar skin viroid (ASSVd) is one of the most destructive viroid diseases in pome fruits orchards which can cause significant economic losses. Symptoms of this viroid including scarring, distortion and dappling were seen in some apple orchards in east-northern of Iran. Sampling was carried out from apple and pear orchards. The RNA was extracted by Silica capture method from leaves. ASSVd was detected by RT-PCR. The purified PCR products were cloned into pGEM®-T Easy Vector and recombinant plasmids were sequenced and sequencing analysis was done. We reported 12 new variants of ASSVd from apple and pear hosts with variable length between 329 to 334 nucleotides. Phylogenetic analysis by the neighbour joining method showed that the Iranian isolates were distinct from other isolates of ASSVd. Mutation sites were indicated along the secondary structure of ASSVd molecule. This study provides the first report of detection and molecular characterization of ASSVd in apple and pear in Iran.

Keywords: ASSVd, Secondary structure, Cloning, Phylogenetic analysis

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Study the Phenology of Lesser Celandine (*Ranunculus ficaria*) and Effect of Planting Depth on Sprouting of its Tuberos -Roots

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Abstract

In order to study the phenological stages and growth period of invasive weed *Ranunculus ficaria* based on degree days and to study the effect of planting depth on sprouting the tubers roots of this weed, two separate experiments were conducted in CRD with 5 replications at Ferdwosi University of Mashhad in 2008. In the first study germinated tubers were planted in 5 cm depth and the observations were noted. In the second experiment, germinated tubers were planted in different depths of 0.25, 1.5, 2.5, 5, 7, 10, 15 and 20 cm. The results indicated that lesser celandine continued the growth until 1014 GDD and 4 phenological stages were recorded in this period. Lesser celandine sprouted from all depths but required GDD for emerging from surface depths were less than 15 and 20 cm planting depth.

Keywords: Invasive, perennial, GDD (growth degree day)

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The Influence of Ammonium Nitrate on Antagonism of Spray Tank Sodium Bicarbonate on Glyphosate and Nicosulfuron Performance on Barnyard - grass and Velvetleaf

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Abstract

The influence of ammonium nitrate (AMN) on antagonism of sodium bicarbonate (NaHCO_3) in spray tank of glyphosate (Roundup®, 41% SL) and nicosulfuron (Cruse®, 4% SC) on barnyard-grass [*Echinochloa crus-galli* (L.) P. Beauv.] and velvetleaf (*Abutilon theophrasti* Medicus.) control were examined in greenhouse studies as a factorial arrangement of treatments 6×2 based on a completely randomized design with six replications (+six control pots) for each weed species at Ferdowsi University of Mashhad, Iran during 2009-10. Factors were included: sodium bicarbonate (Merck, Germany) at six levels (0, 100, 200, 300, 400, 500, and 600 ppm into deionized water (w/v)) in combination with 0 or 0.5 kg/ha AMN (Merck, Germany) as modulator the alkalinity. The herbicide solutions were applied as post emergent at the 3-4 leaf stage of the weeds at the estimated ED_{50} doses at greenhouse in the preliminary experiment (22, and 158 g a.i. ha⁻¹ for nicosulfuron and glyphosate herbicides, respectively) in a spray volume 250 L ha⁻¹. The results showed the significant effect ($P \leq 0.01$) of NaHCO_3 for survival, height, leaf area, and shoot dry weight (% control) four weeks after herbicides application. AMN added to the spray tank decreased significantly ($P \leq 0.01$) the adverse effects of water alkalinity, and increased herbicides efficacy on barnyard-grass and velvetleaf, whereas increasing of nicosulfuron efficacy on barnyard-grass control, and glyphosate efficacy on velvetleaf control were highlight, respectively. In conclusion, the results of this experiment have highlighted the importance of AMN in overcoming to the antagonistic effect of spray tank NaHCO_3 on glyphosate and nicosulfuron efficacy.

Keywords: ED_{50} index, Herbicide performance, Water alkalinity

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Canopy Architecture of Soybean (*Glycine max*), *Xanthium strumarium* and *Amaranthus retroflexus* Under Different Interference Condition

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Abstract

In order to evaluate the effects of *Xanthium strumarium* or *Amaranthus retroflexus* competition under unsprayed and sprayed (half the recommended rate of imazethapyr) on canopy architecture of weed and soybean, field experiment was conducted at the Research Farm of University of Tehran, during the growing season of 2007 and 2008. The experimental design was factorial based on randomized complete block design with three replications. Two herbicide dose (0 and 35g a.i ha⁻¹) and *X. strumarium* (at density of 0, 2, 4, 8 plants m⁻¹ of row) or *A. retroflexus* (at density of 0, 4, 8, 12 plants m⁻¹ of row) interference were studied. Different canopy architecture was found for soybean in monocultures compared to interspecific competition. In monocultures, with exception for lower layer (0-30 cm), soybean plant had similar pattern for LA distribution within the canopy. By increasing density in untreated plot, soybean plants developed a large proportion of their leaf area in the upper portion of the canopy. soybean plants loss their lower (0-60 cm) leaves in competition with the highest densities *A. retroflexus*. However, canopy architecture and leaf area distribution of soybeans grown with *X. strumarium* or *A. retroflexus* was similar to soybeans grown alone in the reduced rate of herbicide. At the density of 2 and 4 plants m⁻¹ of row, *X. strumarium* had leaves in all layers of the canopy and was able to develop and maintain its lower canopy leaves under the shade. In contrast, *A. retroflexus* retained few to no leaves within the lower layers of the canopy. It seems that more competitive ability of *X. strumarium* compared to *A. retroflexus* was mainly due to the growth habit of this plant, which has its leaves distributed evenly within the canopy. Result also showed that crop yield affected more by *X. strumarium* compared with *A. retroflexus*. Our results suggested that on the basis of *X. strumarium* superior competitive ability, it should be given a greater priority for control than *A. retroflexus* in soybean. The half rate of herbicide significantly decreased the competitive ability of *X. strumarium* and *A. retroflexus* indicating that, in soybean, application of this rate is recommended in similar condition.

Keywords: Competition, Leaf area distribution, Reduced rate of herbicide

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Evaluating the Efficacy of MaisTer 3.1% OD (Foramsulfuron + Iodosulfuron + Isoxadifen-ethyl) in the Control of Different Weeds in Corn Fields of Karaj, Jiroft and Fars Regions

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Abstract

In order to evaluate the efficacy of MaisTer 3.1% OD (Foramsulfuron 3% + iodosulfuron 0.1% + isoxadifen-ethyl 3%) in the control of weeds in corn fields, a series of experiments were conducted during 2010 in Karaj, Zarghan and Jiroft. A series of RCBD design with four replications. Treatments were application of a) Nicosulfuron (Kruz) at 2 lit.ha⁻¹, b) Bromoxynil+MCPA (Bromicid M.A) 1.5 lit.ha⁻¹ plus hand weeding of grasses, c) 2,4-D+MCPA (U46 Combifluid) at 1.5 lit.ha⁻¹ plus hand weeding of grasses, d) Rimsulfuron (Titus) at 50 g.ha⁻¹ + Citogate at 0.2%, e) Foramsulfuron (Equip) at 2.5 lit.ha⁻¹, f) Nicosulfuron+Rimsulfuron (Ultima) at 175g.ha⁻¹, tank mix of Bromicide MA at 1 lit.ha⁻¹ + Kruz at 1.5 lit.ha⁻¹, g) Foramsulfuron + iodosulfuron + isoxadifen-ethyl (MaisTer) at 1.25, 1.5, 1.75 lit.ha⁻¹ and h) weed free control. Different characteristics of weeds and corn plants including percent of damages of treatment to weeds and corn based on EWRC scale, weed population and dry matter reduction were evaluated 30 days after spraying. Grain yield was measured after harvest. Results indicated that tank mix of Bromicide MA plus Kruz was the best treatment for weed control and produced the highest corn grain yield. The efficacy of MaisTer at 1.5 lit.ha⁻¹ was similar to Kruz and Ultima for broad leaf weeds as well as some grasses, but the efficacy of MaisTer to control common cocklebur (*Xanthium strumarium*) and foxtail (*Setaria* sp.) was better than dual purpose registered herbicides Kruz and Ultima.

Keywords: 2,4-D + MCPA, Bromoxynil+MCPA, Nicosulfuron, Rimsulfuron

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The Effect of Manure Rates on Diversity and Density of Weeds in Intercropping of Spinach (*Spinacia oleracea* L.) and Garlic (*Allium sativum* L.)

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Abstract

In order to investigate effect of manure rates on diversity and density of weeds in different cropping pattern of spinach and garlic, an experiment was conducted as split plot based on completely randomized block design with three replications at the Agricultural Research Station, Ferdowsi University of Mashhad, during growing season of 2011-2012. Treatment were 3 cow manure rates (0, 10 and 20 ton.ha⁻¹) in main plots and 6 cropping systems (garlic and spinach monocultures and garlic-spinach intercropping with 1:1, 2:2, 3:3 and 4:4 ratio) in sub plots. The results indicated that in 3 weed sampling stages, the effect of different levels of manure on weed density in second and third sampling and weed dry weight in third sampling was significant, statistically. In the second sampling, the highest weed density was obtained in non-application of manure condition that wasn't different with 10 ton.ha⁻¹. in the third sampling, this parameter did not follow a same trend with the second stage. In the third sampling, the highest weed dry weight was obtained in non-application of manure condition (189.50 g.m⁻²). at total stages, the highest weed density and dry weight, with the exception of weed density in third sampling, was observed in garlic monoculture. The interaction effect of manure and cropping pattern treatments showed that at the first stage, the highest and lowest total weed density was observed in garlic monoculture with 10 ton per hectare of manure and spinach monoculture under non application and 10 ton per hectare of manure, respectively. Also, at the second and third sampling stages, the lowest total weed density was obtained in garlic-spinach intercropping with 3:3 ratio under 20 ton per hectare of manure treatment and garlic monoculture under 10 ton per hectare of manure treatment, respectively. The negative correlation was observed between total dry weight of crops and weed density and dry weight. At all stages, the highest Shannon and Simpson diversity were observed in spinach monoculture under 10 ton per hectare of manure treatment. In general, at completed canopy period (the third sampling), among studied intercropping, the lowest dry weight and density of weed per square meter was observed in garlic-spinach intercropping with 4:4 ratio under 10 ton per hectare of manure treatment, but the lowest Shannon, Margalof and Simpson diversity index was obtained in garlic-spinach intercropping with 3:3 ratio under 20 ton per hectare of manure treatment.

Keywords: Density, Dry weight, Shannon index, Margalef index, Simpson index

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Nematicidal Activity of Essential Oils of *Ecalyptus* spp., *Dorema ammoniacum* and *Ferula galbanifula* on Root-knot Nematode (*Meloidogyne javanica*) *In vitro*

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Abstract

Root-knot nematodes (*Meloidogyne* spp.) are one of the most important plant parasitic nematodes which cause damage to crops. In recent years, using of medicinal plants has been considered to many scientists as effective methods for controlling nematodes. In this study, essential oils of *Ecalyptus* spp., *Dorema ammoniacum* and *Ferula galbanifula* were tested against the root-knot nematode (*Meloidogyne javanica*) in vitro conditions. Essential oils were obtained by hydro-distillation using a Clevenger-type apparatus. Five concentrations of each oil were used with three replications. The results was indicated direct relationship the degree of hatching inhibition and juvenile mortality with concentration oils. The essential oil of *Ecalyptus* spp. proved to be most toxicant with the LC₅₀ values of 839 and 2122 ppm against eggs and juveniles, respectively. At the highest concentration (4000 ppm), degree of hatching inhibition by oil of *Ecalyptus* spp., *D. ammoniacum* and *F. galbanifula* were recorded 98.5, 93.9 and 90.3%, respectively. At the same concentration, juveniles mortality were obtained 98.8, 66.7 and 58.7%. The results demonstrated that the essential oils of these plants particularly, oil of *Ecalyptus* spp. can be considered as potential protestants against *M. javanica*.

Keywords: Essential oils, *Ecalyptus* spp., *Dorema ammoniacum*, Nematicidal activity, *Ferula galbanifula*, Root-knot nematode

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Phenology, Morphology and Yield Characteristics of Two *Echinochloa* Weed Species

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Abstract

The experiment was performed to evaluate the morphological, phenological and yield aspects of two different *Echinochloa* species, including barnyardgrass (*E. crus-galli*) and watergrass (*E. orizoides*) as a new-introduced weed species. The study was conducted as a 2-years pot-experiment under outdoor condition at Rice Research Institute of Iran (RRII) in Rasht. The results demonstrated that; time to reach the final height, final leaf appearance in the main stem, first tiller and inflorescence appearance, seed filling initiation, and seed maturity were earlier, and grain yield, harvest index, and 100-seed weight were higher, in watergrass compared with barnyardgrass. However, the seed filling duration was longer, and final number of leaves and tillers, biological yield and shattering percent were lower for watergrass than those of barnyardgrass. Time to final tillering, maximum height, flag leaf and main stem panicle length showed no significant differences between the two species. Therefore, some traits such as shorter life-cycle, higher grain yield, and heavier seeds, will aid the new-introduced species to extend more successfully.

Keywords: Barnyardgrass, competitive ability, invasive weed watergrass

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Effect of Contaminant Lead on *Arthrobotrys oligospora* Growth, Development, Trap Production, Efficiency and Protease Secretion

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Abstract

Lead concentration has recently increased in country side fields and industrial regions. In the research, the effect of different concentrations of lead acetate on *Arthrobotrys oligospora* growth, sporulation, trap formation and efficiency and also the activity of the extracellular protease of the fungus investigated. *A. oligospora* is one of the most important biocontrol agents of plant parasitic nematodes. Results showed that lead acetate in concentration of 150-500 mg l⁻¹ inhibition the fungal growth more than 80 percent and concentration of 500 mg l⁻¹ had the maximum level of inhibition. Fungal sporulation in concentration of 150 mg l⁻¹ and more was significantly reduced in compared to control. Trap formation and efficiency in concentration of 200 mg l⁻¹ and more was reduced, but they increased in 100 mg l⁻¹. Probably low concentration of lead induces trap formation of the fungus. Activity of extracellular protease was also significantly reduced in all concentration tested (100-300 mg l⁻¹), in comparison to control. According to the results, the application of the fungus in biocontrol management of plant parasitic nematodes should be performed under consideration of different environmental factors as well as pollution and concentration of lead in the soil.

Keywords: *Arthrobotrys oligospora*, Biological control, Lead, Protease

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Optimizing Efficacy of Mesosulfuron-methyl+Iodosulfuron-methyl+mefenpyr (Atlantis OD)[®] to Control Wild oat (*Avena ludoviciana*) With the Natural Oils

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Abstract

In order improve the efficacy of mesosulfuron-methyl + iodosulfuron - methyl + mefenpyr (atlantis)[®], a greenhouse experiment of dose-response as factorial experiment in a completely randomized design was conducted in the collage of agriculture Ferdowsi University of Mashhad greenhouse research in 1391. Treatment were included concentration 0, 3.75, 7.5, 15, 22.5, and second factor 30 g a.i. ha⁻¹ of atlantis at 13 levels of with and without vegetable oils (Two concentrations 0.1 and 0.2 percent volume) of soybean, canola, turnip, sesame, sweet almond, and olive against wild oat (*Avena ludoviciana*) with four replications was done. The results showed that the use of vegetable oils significantly ($p < 0.01$) improved efficiency of atlantis. According to wild oat biomass can be ranked respectively rapeseed>olive>soybean>sweet almond>canola>sesame and in concentration of 0.2% respectively rapeseed> soybean> olive> sweet almond>canola> sesame. Result of the sorption of the herbicide atlantis with drops of vegetable oil on the sensitive papare showed that The highest level of discoloration on sensitive paper related to herbicide atlantis with rapeseed oil and lowest surface discoloration was related to herbicide application alone. Results showed that by increasing the content of saturated fatty acids in vegetable oils, ability to decrease surface tension decreases, but effectiveness of herbicide increases.

Keywords: Atlantis, adjuvants, fatty acids, surface tension.

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Evaluation the Weed Density and Growth Parameters in Rice (*Oryza sativa* L.), Duck and *Azolla* sp. Integrated Farming System

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Abstract

In order to evaluate the effects of duck with *Azolla* sp. on weed density and growth parameters in rice-duck farming system, an experiment was conducted at Sari Agricultural Sciences and Natural Resources University during 2012. Experiment was arranged in split plot based on randomized complete block design with three replicates. Main plots were duck at four levels (control, 400, 800 and 1200 pieces per hectare) and sub plots were *Azolla* sp. plus reduced amount of nitrogen at four levels (control, nitrogen as the rate of 50 kg ha⁻¹, *Azolla* as the rate of 500 g m⁻² and *Azolla* plus nitrogen). Weed flora composition in rice field comprised of yellow nutsedge (*Cyperus rotundus*), small-flowered nutsedge (*Cyperus difformis*), barnyard grass (*Echinochloa crus-galli*), bahia grass (*Paspalum notatum*), common water-plantain (*Alisma plantago aquatica* L.) and duckweed (*Lemna minor*). Results indicated that there were significant differences for effects of duck, *Azolla* and nitrogen and interaction of these factors in terms of weed density and growth parameters. The minimum amount of small-flowered nutsedge, yellow nutsedge and bahia grass were observed in 1200 duck per hectare plots which treated with *Azolla* and nitrogen whereas maximum density of those weeds were recorded in rice plots without duck and 50 kg ha⁻¹ of nitrogen (36, 24 and 20 plants m⁻², respectively). Results also revealed that 800 and 1200 duck ha⁻¹ in terms of barnyard grass and 400, 800 and 1200 duck ha⁻¹ in terms of common water-plantain and duckweed provided optimal control. In conclusion, it seems that increasing duck number up to 1200 pieces ha⁻¹ along with *Azolla* and reduced amount of nitrogen is beneficial to control important weeds such as nutsedge and barnyard grass in rice cultivation.

Keywords: Biological control, Barnyard grass, Nitrogen, Nutsedge

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Integrated Management Study (Chemical and Mechanical) of Swallow-wort (*Cynanchum acutum*) in Qazvin Province

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Abstract

Swallow wort is a perennial weed which has caused damage in agricultural fields in Iran especially in orchards. Therefore, an experiment was conducted during 2009-2011 in order to its integrated management in arachis orchard in Abyek based on randomized complete block design with three replications and 18 treatments. The treatments included gramaxon (Paraquat 20% SL), roundup (Glyphosate 41% SL), garlon (Triclopyr 62% EC), cutting, and their combination together control without spraying. Among the treatments, application 3 times Glyphosate 6 L/ha was the best treatment for swallow wort density decrease in the first year, and in the second year best treatments were 2 and 3 times Triclopyr 2 L/ha, and 3 times Glyphosate 6 L/ha. The best treatments in the third year were 2 and 3 times Triclopyr 2 L/ha, and 3 times Glyphosate 6 L/ha. At the third year, the best treatment for swallow wort biomass decrease was 3 times Glyphosate 6 L/ha. However, it had not significant difference with 2 and 3 times Triclopyr 2 L/ha, 3 times Glyphosate 4 L/ha, and 2 times Glyphosate 6 L/ha. Therefore, Glyphosate and Triclopyr had more efficiency in the control of swallow wort, compared to Paraquat and cutting.

Keywords: Swallow wort (*Cynanchum acutum*), Chemical control, Herbicide, Integrated management, Perennial weed

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Contact Toxicity of Some Formulated Herbal Composition on Two Spotted Spider Mite

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Abstract

The two-spotted spider mite, *Tetranychus urticae* Koch, is a polyphagous pest which infests wide range of field, garden and greenhouse crops worldwide. Pesticide applications against this pest have caused development of resistance, undesirable effects on non target organisms and environment and secondary pest outbreak. In recent years, herbal essential oils have received attention as natural plant protection compounds. In this study, lethal effects of 5 formulated compositions based on herbal essential oils including B: extract of chinaberry oil 5%, C: chinaberry oil 5% + peppermint 5% + pennyroyal 2% + cinnamon 2%, D: chinaberry oil 5% + peppermint 2% + pennyroyal 2% + rosemary 2%, E: chinaberry oil 5% + peppermint 2% + pennyroyal 2% + eucalyptus 5% and F: chinaberry oil 5% + peppermint 2% + rosemary 2% + eucalyptus 5% were studied using leaf dipping method on female adults of *T. urticae*. Although composition of E had the highest lethal effect (4.978 ml/l) 24 h after treatment, had no significant difference with the other treatments except compositions of D. The results showed that formulated composition based on peppermint, pennyroyal and eucalyptus with extract of chinaberry have desired contact toxicity against the two spotted spider mite. The findings of this study can be considered for practical use of essential oils as green pesticides.

Keywords: Essential oils, Cinaberry, Biopesticide, Bioassay

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Study of Effects of Grape Powdery Mildew Disease (*Erysiphe necator*) on the Yield and Quality of Grape

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Abstract

Powdery mildew caused by *Erysiphe necator* Schw. is one of the most economically destructive diseases of grapevines all over the world including Iran. In this experiment, The effects of powdery mildew on grape yield, sugar and tartaric acid contents of must quality were quantified for different grapes with 14 cultivars of grapes including Shahani, Kishmishi, Rasmi, Tokolgan, Garashilig, Seyrakpousteh, Khalili, Tabarzeh, Koupakbogan, Aldarag, Sahibi, Agshilig, Yagothi and Tabrizkishmishi were examined in natural infection during 2009-2010 in Ardabil province. Sugar and tartaric acid contents in grape were measured by a hand refractometer and titration with 0.1 M sodium hydroxide respectively. Analysis were carried out on diseased and healthy berries, which these were classified into six classes from low (0) to high (5) disease severity. Highly susceptible and susceptible cultivars diseased berries showed at most weight reduction in yield. Diseased berries had a higher sugar and acid contents than disease-free berries.

Keywords: Erysiphaceae, Grape powdery mildew, Raisin, *Uncinula necator*

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Effect of Haloxi Phop-R- methyl ester doses in different grass weeds growing stages in safflower

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Abstract

A field study was conducted to evaluate the effect of haloxyfop-R-methyl ester doses in different grass weeds in various growing stages in safflower during 2011-2012 growing season in Research Farm of College of Agriculture, Shiraz University. The study was carried out as split split plot based on randomized complete block design with three replicates. The main factor, sub factor and sub sub factor were supergalant (doses: 0.6, 0.8 and 1.0 L ha⁻¹), adjuvant use (with or without adjuvant) and time of herbicide application (2 leaf, 6 leaf, tillering stages of grass weed) respectively. The treatment efficiency in weeds control was examined with generalized liner methods and introducing precise frequency after 2, 4 and 6 weeks. The results showed that the highest herbicide efficiency and the lowest weed dry weight were achieved in 1 L ha⁻¹ supergalant with adjuvant at 2 leaf stage of grass weed. Adjuvant use could reduce weed density by 74% as compared to no adjuvant use treatments. The results also showed that adjuvant use increased weed control at all herbicide doses, and there were no significant difference between weed dry weight reduction in lower dose of herbicide with adjuvant and higher dose of herbicide without adjuvant treatments. Application of supergalant at the rate of 1 L ha⁻¹ with adjuvant in 2 leaf stage of weed caused 87% reduction in grass weed density, which did not differ significantly with 0.8 L ha⁻¹ dose.

Keywords: Herbicide, Adjuvant, Safflower, Wild oat and foxtail

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Study on Some Ecological Aspects of Cutleaf groundcherry (*Physalis angulata* L.) Seed Germination and Dormancy

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Abstract

A better understanding of the factors influencing the germination of weed seeds could facilitate the development of more effective cultural weed management practices. The aim of this research was to determine the effects of environmental factors on seed germination of Cutleaf groundcherry (*Physalis angulata* L.). Results showed that application of gibberellic acid (GA₃) was effective treatment for seeds primary dormancy breaking. *Physalis angulata* seed had identical germination in either light/dark or continuous dark regimes, indicating this weed species is non-photoblastic. However, the maximum germination percentages and germination rates were observed at warmer alternating temperatures. The ranges of response to the constant temperature for germination were widened during afterripening periods. Based on the 2-piece segmented model, the base, the optimum and maximum temperatures for germination of *P. angulata* were estimated to be 8.06, 35.83 and 42.30 °C, respectively. The response thresholds of *P. angulata* to inhibit 50% of maximum germination for salinity and osmotic potential were 59.25 mM and -0.29 MPa, respectively. According to the weibull hydrotime model, hydrotime constant and base water potential to initiate germination were obtained equal to 26 MPa h and -1.45 MPa, respectively.

Keywords: Temperature response, Salinity stress, Drought stress, Hydrotime model

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Brief report

Variation in Tomato Varieties Response to Egyptian Broomrape (*Orobanche aegyptiaca*) Infection

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Abstract

In this study, the susceptibility of twenty-nine tomato varieties to broomrape infection under glasshouse conditions was investigated. Results showed that Differences in susceptibility to infection were significant among tomato varieties. Significant differences were in number and time of broomrape shoots emerging, broomrape dry weigh (shoots and tubercles) and growth and fruit yield of tomato. Moderate levels of resistance were obtained in Viva, Caligen 86, Hyb. PS 6515, Hyb. Firenze (PS 8094) and Cal-jN3 among other tomato varieties. In contrast, varieties of Kimia-Falat, Hyb. Petopride II and Hyb. AP865 were the most susceptible hosts to *Orobanche aegyptiaca*.

Keywords: Broomrape, *Lycopersicon esculentum*, Parasitic weed, Susceptibility, Tolerance.

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Brief report

Insecticidal Efficacy of Different Formulations of Diatomaceous Earth on *Tribolium castaneum* (Herbst) (Col., Tenebrionidae) Adults in Lab Conditions

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Abstract

The insecticidal efficacy of diatomaceous earth, formulation Sayan[®] was evaluated against the red flour beetle adults, *Tribolium castaneum* (Herbst) (Col., Tenebrionidae), in comparison with 3 commercially DE formulations (PyriSec[®], SilicoSec[®] and Insecto[®]) in laboratory conditions (25±1C°, 65±5% R.H. in dark). The effect of different formulation of DE with different doses (100, 250, 500, 1000 and 1500 ppm) were used on 7 days adults of *T. castaneum* at four replicates and the adult mortality was recorded after 1, 2, 3 and 7 days post-treatments. The results showed that there were significant differences among different formulation of DE and also different doses at any exposure intervals. The adult mortality increased with increasing doses and exposure times in all DEs. For Sayan[®], highest and lowest mortality were 96 and 3.3% after 7 and 1 days of exposure at 1500 and 100 ppm doses. There was significant difference among 4 DE formulations, so PyriSec[®] had highest and Sayan[®] had lowest effect on adults mortality: the highest to the lowest effectiveness was being: PyriSec[®] > SilicoSec[®] > Insecto[®] > Sayan[®]

Keywords: Diatomaceous Earth, Sayan[®], *Tribolium castaneum*, Laboratory Conditions, Toxicity

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Brief report
**The First Report of Occurrence of *Feltiella acarisuga* Vallot
(Diptera: Cecidomyiidae) in Iran**

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Abstract

During a faunistic survey of natural enemies of spider mites of genus *Tetranychus* in Mashhad and vicinity, a predatory gall midge species belonging to the family Cecidomyiidae was collected and identified as *Feltiella acarisuga* Vallot. *F. acarisuga* is one of the ten species in the genus *Feltiella* and an important biological control agent of tetranychid mites has previously been reported from various countries in Palearctic, Nearctic and other regions in the world. This is the first report of the species from Iran.

Keywords: Biological control, Gall midge, Natural enemies, *Tetranychus* spp.

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