

Identification of *phlD* Gene with Fluorescent *Pseudomonads* from Rhizospheric Zone of Chickpea and its Relation with Biological Control of Chickpea Fusarium wilt Disease Caused by *Fusarium oxysporum* f. sp. *ciceris*

Z. Ebrahimi Kazemabad^{1*} - H. Rouhani² - F. Jamali³ - E. Mahdikhani Moghadam⁴

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Abstract

Fusarium wilt of chickpea, caused by *F. oxysporum* f. sp. *ciceris*, is one of the most important diseases of this plant in Iran. In order to control this disease, fluorescent pseudomonads were isolated from the rhizosphere of chickpea plants in Khorasan province by using King's B medium (KB). Antifungal activity of 80 bacterial strains against *F. oxysporum* f. sp. *ciceris* was evaluated on KB and potato dextrose agar (PDA) media. Results revealed that from 80 strains tested, 81.25% of in KB and 94.37% in PDA had the ability to inhibit fungal growth. There was a correlation between production antifungal metabolites and biocontrol ability of strains, but there was not any significant correlation between siderophores production and biocontrol ability the strains. Detection of *phlD*, which is considered as the key gene for production of 2, 4- diacetylphloroglucinol biosynthesis in bacterial strains was performed using polymerase chain reaction technique (PCR) and specific primers B2BF/BPR4. Results indicated that 20 strains were *phlD*⁺ and a specific band of 629 bp was amplified in these strains. The results of experiments realized under greenhouse conditions, showed that only M2-15 isolate reduced significantly Fusarium wilt in chickpea, with the rest having positive effect on chickpea growth factors. T26, M2-15 and T90 isolates caused a significant increase in growth factors including dry and fresh root and shoot weights comparing to those of control plants. Among strains studied in this research, M2-15 significantly decreased chickpea wilt under greenhouse conditions.

Keywords: Chickpea, Fusarium wilt, Biological control, 2,4- diacetylphloroglucinol antibiotic, *Pseudomonas fluorescens*

1,2,4- MSc Graduate, Professor and Associate Professor, Department of Plant Protection, Agricultural College, Ferdowsi University of Mashhad, Respectively

(*- Corresponding Author Email: ebrahimi.zahra20@gmail.com)

3- Assistant Professor, Department of Plant Protection, Agricultural College, Khalij Fars University of Bushehr



Part of Predatory Mites of Superfamilies Bdelloidea, Erythraeoidea and Raphignathoidea in Pome Fruit Orchards in Mashhad Region, Iran

S. Paktinat¹ - H. Sadeghi^{2*} - M. Hosseini³ - S. Hatefi⁴

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Abstract

The predatory mites of Suborder Prostigmata are important natural enemies of Spider mites. During 2009-2010, in a faunistic survey of Superfamilies Raphignathoidea, Bdelloidea and Erythraeoidea in Mashhad region (Razavi Khorasan province), different samples were taken from soil, tree foliages, crops and weeds of pome fruit orchards. After clearing the mites in lactophenol fluid, the slides were made using Hoyer's medium and then specimens were identified. In this study, a total of 18 species from 15 genera were collected and identified, of which 16 species are new records for mite fauna of Razavi Khorasan province that marked with (*). Among them, *Eustigmaeus anauniensis* (Canestrini, 1889) had the highest abundance and distribution. All slides are deposited in collection of Plant Protection Department, Ferdowsi University of Mashhad, Iran. The list of species is as follows:

1. Family Bdellidae: *Spinibdella cronini* (Baker & Balock, 1944)*; *Bdella muscorum* Ewing, 1909*; *Biscirus silvaticus* (Kramer, 1881); *Cyta lattiresris* (Hermann, 1804); *Bdellodes kazeruni* Ostovan & Kamali, 1995*, 2. Family Cunaxidae: *Cunaxa setirostris* (Hermann, 1804)*; *Pulaeus glebulentus* Den Heyer, 1980**; *Cunaxoides croceus* Koch, 1838*, 3. Stigmaeidae: *Ledermuelleriopsis zahiri* Khanjani & Ueckermann, 2002*; *Agistemus industani* Gonzalez, 1965*; *Stigmaeus elongatus* Berlese, 1886*; *Eustigmaeus anauniensis* (Canestrini, 1889), 4. Raphignathidae: *Raphignathus zhaoi* Hu, Jing & Liang, 1995*; *R. giselae* Meyer & Ueckermann, 1989*, 5. Eupalopsellidae: *Eupalopsellus crotovallaris* Van Dis & Ueckermann, 1993*, 6. Erythraeidae: *Erythraeus (Zaracarus) iranicus* Saboori & Akrami, 2001*; *Erythraeus (Zaracarus) kurdistaniensis* Khanjani & Ueckermann, 2005*; *Erythraeus (Erythraeus) garmsaricus* Saboori, Goldarazana & Khajeali, 2004*.

Keywords: Fauna, Natural enemies, Prostigmata, Mashhad, Iran

1,2,3,4- MSc Graduate Associate Professor, Assistant Professor and Instructor, Department of Plant Protection, Faculty of Agriculture, Ferdowsi University of Mashhad, Respectively
(*-Corresponding Author Email: sadeghin@um.ac.ir)



Identification and Sequencing of Coat Protein Gene of TYLCV Isolates from Khorasan Razavi Southern and Northern Khorasan Provinces

S. Gharouni Kardani^{1*} - B. Jafarpour² - M. Mehrvar³ - S. Tarighi⁴

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Abstract

Tomato yellow leaf curl virus (TYLCV) is considered as one of the most important tomato viruses in tropical and subtropical areas. In order to identify and investigate the presence of this virus in fields, greenhouses and cultivated tomato plants in tuneles of Khorasan Razavi, Southern and Northern Khorasan provinces, during 2009 and 2011, plants which have been showed the symptoms were collected. Total DNA was extracted from fresh young leaf tissue by CTAB buffer. Polymerase Chain Reaction (PCR) was carried out using degenerate primers shown to be specific for DNA-A of whitefly transmitting geminiviruse and fragments of ~550 bp were amplified by PCR. Furthermore, with a pair of TYLCV specific primer, a viral DNA fragment of 776 bp corresponding to a complete coat protein gene was amplified and cloned. The phylogenetic tree of coat protein (CP) gene of TYLCV were drawn, by MEGA5 software using Neighbor joining method. The results showed that the Khorasan Razavi and Northern Khorasan provinces placed in one group with Shiraz (GU076444) and Israel (AB110218) isolates. And isolate from Southern Khorasan was located in different group and closed to Iranian isolate of TYLCV-Jiroft (GU076452) and one isolate from Oman (DQ644565). This study showed that since the first report of TYLCV in the southern provinces of the country, the virus spreading towards the higher latitudes, so that the high rate of infection in the city of Neyshapur and Dargaz is explored in this study.

Keywords: TYLCV, Polymerase chain reaction, Phylogenic analysis, Cloning

1,2,3,4- PhD Graduate, Professor and Assistant Professors, Department of Plant Protection, College of Agriculture, Ferdowsi University of Mashhad, Respectively
(* - Corresponding Author Email: saragharooni@yahoo.com)



Effect of Cover Crops and Row Space on Weed Control and Potato Yield

F. Samadi¹- H.R. Mohammaddoust Chamanabad^{2*}

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Abstract

Given the importance of sustainable agricultural development, using non-chemical weed management such as cover crops and decreasing row spacing has an importance in weed control and reducing herbicide use. In order to an experiment was conducted at agricultural research site in agricultural college, University of Mohaghegh Ardabili in 2011. The experiment done as factorial based on randomized complete block design with three replications. Factors were cover crops at four levels (rye, wheat, red clover and without cover crop) and row space at three levels (45, 60 and 75 cm). Results showed that cover crop and row space had a significant effect on weed density, weed dry weight, Shanon-Wiener index and potato yield. Cover crop reduced weed density 48.5% compared with check. Increasing row spacing from 45 cm to 75 cm, weed density was decreased 3 times. Maximum potato yield achieved in plots with cover crop and 65 cm row space. These data indicate that cover crops or narrow row space can help non-chemical weed management in sustainable agriculture.

Keywords: Non-chemical weed management, Sustainable agriculture, Row spacing, Cover crop

1,2- Former M.Sc. Student and Associate Professor, Department of Agronomy and Plant Breeding, Faculty of Agriculture, University of Mohaghegh Ardabili

(* - Corresponding Author Email: hr_chamanabad@yahoo.com)



Effect of Host Egg Storage Time and *Wolbachia* Infection on Qualitative Characteristics of *Trichogramma brassicae* Bezdenko (Hym.: Trichogrammatidae)

M. Nazeri¹- A. Ashouri²- M. Hosseini^{3*}

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Abstract

Factors hindering the development of inundative biological control are insect rearing costs and provide an adequate amount of natural enemies at the appropriate time. Storage of natural enemies is a useful technique to increase time flexibility of parasitoids production, and coincide the natural enemies release with pest outbreaks period, and also could reduce costs of mass production. Another way for parasitoids, is to keep host of natural enemies instead of biocontrol agent in cold. In this way because of lack of necessity to survive insect hosts after storage, temperature range and storage periods can be much more than that for predators and parasitoids. In this work, the effects of storage time of host eggs *Ephestia kuehniella* Zeller (Lepidoptera: Pyralidae) on the qualitative characteristics of *Trichogramma brassicae* Bezdenko (Hym.: Trichogrammatidae) were studied. Regarding to identification of *Wolbachia*-infected strain of *T. brassicae* and relative advantages of thelytokous strain, these treatments were applied on thelytokous and arrhenotokous strains of *Trichogramma*. Qualitative characteristics of parasitoids consisted parasitism rate, adult emergence proportion, longevity, fecundity and number of deformed adults. The results indicated negative effects of host storage time on some qualitative characteristics of *T. brassicae*. Developmental time, emergence proportion, longevity, fecundity and wing deformity, were under negative influence of host storage time. However, because of different effect of storage on two strains, by selecting suitable strain, there is a possibility to reduce some negative effects.

Keywords: Cold storage, Mediterranean flour moth, Quality control, Thelytoky, *Wolbachia*

1,2- Former MSc Student and Associate Professor, Department of Plant Protection, Faculty of Agriculture, University of Tehran

3- Assistant Professor, Department of Plant Protection, Faculty of Agriculture, Ferdowsi University of Mashhad

(* Corresponding Author Email: m.hosseini@um.ac.ir)



Effect of Salinity and Temperature on Germination, Seedling Growth, Na and Water Content Characteristics of the Wild Melon (*Cucumis melo*)

S. Sohrabi^{1*} - A. Ghanbari² - M.H. Rashed Mohassel³ - M. Nassiri Mahalati⁴ - J. Gherekhloo⁵

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Abstract

In order to study the interaction of temperature and salinity on seed germination and seedling growth of *Cucumis melo* a factorial experiment was conducted based on CRD with four replications. The factors included four temperature levels (25, 30, 35 and 40 °C) and five salinity levels (0, -0.2, -0.4, -0.6 and -0.8 MPa). Germination rate and percentage, shoot length, root length, seedling vigor index (SVI), Na content and water content were evaluated at the end of trial. The results indicated that germination percentage was 80% at 35°C and -0.8 MPa of salinity, germination rate in 30 and 35°C was more than that in 25 and 45°C. Shoot length, root length and seedling vigor index were greater at 30 and 35°C. Increasing NaCl concentration limited germination, seedling growth and water content, but increased Na content. Comparison of studied traits means showed that there were a significant difference between different salinity concentrations; this difference was more obvious between 25 and 40 °C compared to 30 and 35°C.

Keywords: Seedling vigor index (SVI), Water uptake, Shoot length, Root length

1,2,3,4- PhD Graduate, Associate Professor and Professors, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Ferdowsi University of Mashhad, Respectively

(* - Corresponding Author Email: Simsoh@gmail.com)

5- Assistant Professor, Department of Agronomy, Gorgan University of Agricultural Sciences and Natural Resources



Ability of Three Legume Cover Crops to Control Weeds in Corn

Sh. Nazari¹ - F. Zaefrian^{2*} - E. Farahmandfar³

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Abstract

In order to evaluate the competitive ability of legume cover crops on interference of weeds in corn, an experiment was carried out in Sari Agricultural Sciences and Natural Resources University during 2011 growing season. This research was carried out based on complete block design with three replications. Treatments consisted of three cover crops including: soybean (*Glycine max* L.), fenugreek (*Trigonella foenum gracu* L.) and cowpea (*Vigna unguiculata* L.) planted at two different dates (simultaneous with corn and 21 days after planting of corn), along with two controls (no weeding and weeding). In this study the competition index (CI), ability of withstand competition (AWC), grain yield and morphological characteristics of corn were evaluated. The results showed significant differences in the AWC and CI among the cover crops. 21 days after planting of corn for cowpea had the highest CI. At simultaneous with and 21 days after planting of fenugreek, the lowest CI (0.64 and 0.32 respectively) was observed. Planting cover crops such as soybean at the simultaneous with and 21 days after planting of corn and planting cowpea after 21 days was effective in weed control and also, AWC of corn was highest. Generally, the results of this research showed the highest ones of 11853/13 and 11447/4 Kg h⁻¹ was achieved in control (with weeding) and the cowpea at the 21 days after planting of corn, respectively.

Keywords: Competition Index, Ability of Withstand Competition, Cowpea, Soybean, Fenugreek

1,2,3- MSc Student and Assistant Professors, Department of Agronomy, Agricultural Sciences and Natural Resources University of Sari, Iran, Respectively

(*-Corresponding Author Email: fa_zaefarian@yahoo.com)



The Effects of Some Artificial Diets on Development and Reproduction of Mediterranean fruit fly, *Ceratitis capitata* (Dip.; Tephritidae)

Z. Ahmadi¹ - A. Afshari^{2*} - Sh.A. Mafi Pashakolaei³ - M. Yazdanian⁴

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Abstract

The main objective of this study was to determine the effects of three artificial larval and four artificial adult diets on development and reproduction of Medfly, *Ceratitis capitata* (Wiedemann). The larval diets were based on wheat bran, wheat bud and soybean protein, and the adult diets were based on honey solution, protein hydrolysate, brewer's yeast+sugar, and brewer's yeast+sugar+banana fruit. All experiments were carried out under 25±2 °C, 60±5% RH, and 13:11 h L:D laboratory conditions, using a completely randomized design for larval diets and a factorial design for adults diets. The shortest larval duration, highest larval survival, highest pupal weight, and highest female's weight were observed in wheat bud based diet, and their means were estimated 6.7±0.07 days, 69.3±2.6 %, 9.7±0.007 mg and 7.3±0.2 mg, respectively. In contrast, the larvae reared on soybean protein based diet had the longest developmental period, lowest survival rate, lowest pupal weight, and lowest adult emerging rate with means of 7.54±0.11 days, 60±1.3 %, 8.98±0.06 mg, and 79.84±0.85 % respectively. The results of this study also demonstrated that those flies that fed diets containing both wheat's bran/bud and brewer's yeast during the larval period and provided with mixture of brewer's yeast and sucrose during the adult stage, had the highest reproduction period, fecundity, and eggs fertility. The means of these parameters were estimated as 23.75±0.8 days, 115.2±5.9 eggs/female/lifespan, and 78.1±2.64 %, respectively. In conclusion, wheat bud or bran based diets, and brewer's yeast+sugar were recommended for mass rearing of larvae and feeding of adults Medfly, respectively.

Keywords: Mediterranean fruit fly, Artificial diet, Development, Reproduction

1, 2, 4- Former M.Sc. Student and Assistant Professors of Plant Protection Department, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran, Respectively

(*- Corresponding Author Email: Afshari@gau.ac.ir)

3- Assistant Professor of Entomology, Research Center Agriculture and Natural Resources of Mazandaran, Iran



Effect of Temperature on Germination Rate of Russianthistle (*Salsola kali* L.) Based On Regression Models

R. Asgarpour¹ - S. Mijani^{2*} - R. Ghorbabi³

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Abstract

Salsola kali L. is a summer annual broad-leaved weed and C₄, salt and drought-tolerant species belonging to Chenopodiaceae family. It is a prolific seed-producing weed. In order to investigate the Germination cardinal temperatures of *Salsola kali* L., seeds were collected from North Khorasan (faraj) and Razavi khorasan (mashhad) and a laboratory experiment was conducted at constant temperatures including, 5, 10, 20, 30, 35, 40 and 45 °C with a daily alternating photoperiod (12 h light/12 h dark) in a completely randomized design with four replications in Ferdowsi university of Mashhad. To determine the cardinal temperatures for seed germination, nonlinear regression methods of Quadratic Polynomial (QPN), Intersected-lines (ISL) and Five-parameter Beta (FPB) models have been used. The highest germination percentage was within the range of 10-40 °C, while the highest germination rate occurred in the 20-40°C range. FPB and ISL models showed most suitable fit based on highest R²_{adj} for Razavi Khorasan and North khorasan, respectively. The cardinal temperatures for North khorasan seeds were 2.35, 34.8 and 48.35 °C and for Razavi Khorasan were 2.63, 32.55 and 45.42 °C. By These results, the broad temperature range of germination and invasion ability for this weed would be indicated.

Keywords: Cardinal temperatures, Fallow land, Five-parameter Beta model, Halophyte, Seed

1,2,3 - PhD Students and Professor, Department of Agronomy and Plant Breeding, of Agriculture Faculty, Ferdowsi University of Mashhad

(* - Corresponding Author Email: sajad.mijani@stu-mail.um.ac.ir)



The Effect of Crop Rotation and Nitrogen on Weed Infestation in Potato Field

H.R. Mohammaddoust Chamanabad^{1*} - A. Asghari²

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Abstract

Weeds are important problem in all cropping systems including potato. In order to evaluate the effect of crop rotation and nitrogen on weed structure and potato yield an experiment was conducted from 2007 to 2010 at the agricultural research site, University of Mohagheh Ardabili. The experiment was established as split plot with two factors, potato in crop rotation (with wheat, canola, sugar seed beet and potato) and nitrogen rate (0, 80, 160 and 240 kg ha⁻¹) using a randomized complete block design with three replication. Results showed that weed density in secondary period of crop rotation was 26% lower than first period. Weed density in canola- potato rotation was 58% greater than other rotations. Increasing nitrogen rate increased weed cover. In continuous cropping of potato, without or with applied 240 kg N ha⁻¹ potato cover was lower 35%. Also continuous cropping decreased potato yield 3 to 6 t ha⁻¹. This finding show that crop rotation and nitrogen management can help in non-chemical weed management programs in sustainable agriculture.

Keywords: Crop rotation, Sustainable agriculture, Non-chemical weed management

1,2- Associate Professors, Department of Agronomy and Plant Breeding, Faculty of Agriculture, University of Mohagheh Ardabili

(*- Corresponding Author Email: Hr_chamanabad@yahoo.com)



Determination the Population Density of Different Development Stags of Mediterranean Meal moth *Ephestia kuheniella* Zell. in Date Fruit Sayer Cultivar Based on Spectrophotometry

M. Latifian^{1*} - B. Rad² - M. Ghamari³

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Abstract

This project was conducted to editing sampling program of *Ephestia kuheniella* Zell. based of Spectrophotometer in Sayer date palm cultivar. Results showed that the wave length of maximum absorption for the developmental stages of egg, larva, pupa and adult of *E. kuheniella* in Sayer Cultivar were 1275, 1340, 1360 and 1370 nanometer. Based on these results spectrophotometer had ability to detect the different growth stages of meal moth on studied cultivar. The suitability indicates explain the higher rate of detection of at least 0.5, which of the wavelength of maximum absorption for the diagnosis. The number sampling for proper evaluation of the developmental stages of *E. kuheniella* were equal to 3. Distribution of different development stages of pests on Sayer cultivar were uniform and occasional sampling could be done without consideration of environmental context. The RV and RNP indices were used in this study for evaluating the level of accuracy and sampling Randleman. RV values for four developmental stages were estimated to 1.42, 1.64, 1.78 and 3.71 respectively. The accuracy level of samplings was lower than 10 in all cases, so this method could be explicated for administrative and research sampling program. The sampling cost is necessary besides the low level sampling accuracy. This subject was evaluated using RNP criteria. The amounts of this value for the different developmental stages were lower than 40 and estimated to 35, 30.35, and 28.15 and 13.48 respectively.

Keywords: Date Palm, Meal moth, Spectrophotometer, Sampling

1,2 - Assistant Professor and Researcher of Date Palm and Tropical Fruits Research Institute
(* - Corresponding Author Email: masoud_latifian@yahoo.com)
3- M.Sc of Agriculture



Effect of Reduced Doses of Foramsulfuron (Equip[®]) and Different Nitrogen Rates on Weed Control in Corn (*Zea mays* L.)

F. Ahangarani¹- A. Ghanbari²- M. Rastgoo^{3*}- E. Izadi Darbandi⁴

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Abstract

To evaluate the effect of reduced doses of foramsulfuron and nitrogen rates on weed biomass in corn field, an experiment was conducted using split plots arrangement based on randomized complete block design with three replications at Research Field of Ferdowsi University of Mashhad, in 2011. Main plots were weed control levels comprising three reduced herbicide doses of foramsulfuron (50, 75, and 100% of recommended dose (2 lit.ha⁻¹) 225, 337.5 and 450 g ai.ha⁻¹), control treatment (no control of weed), and completely weeded treatment and sub plots were nitrogen application rates (0, 115, 230, 345 kg ha⁻¹). Results indicated that the highest amount of weed biomass refers to the highest level of nitrogen application (345kg.ha⁻¹). Without nitrogen application, weed control percentage in 50 and 75% of recommended herbicide dose equal to application of 100% of recommended herbicide dose with 345 kg.ha⁻¹ of nitrogen. When 230 kg.ha⁻¹ nitrogen used, 75% of recommended herbicide dose needed to effectively control the weeds. Indeed, we can reduce foramsulfuron dose in corn with optimization of nitrogen application.

Keywords: Herbicide efficacy, Recommended dose, Sulfonylurea, Weed biomass

1,2,3,4- MSc Student and Associate Professors of Agronomy and Plant Breeding Department, Faculty of Agriculture, Ferdowsi University of Mashhad, Respectively
(* - Corresponding Author Email: m.rastgoo@um.ac.ir)



Brief report

Study of Allelopathic Effects of Berseem Clover (*Trifolium alexandrinum*) Shoot Aqueous Extract on Germination and Initial Seedling Growth of Some Weed Species

E. Kazerooni Monfared¹- S. Tokasi^{2*}- M. Banayan Awal³

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Abstract

The allelopathic effects of various concentrations (0 (as control), 5 %, 10 %, 20 % and 40%) of berseem clover shoot extracts were assayed on germination and radicle growth of four weed species (*Amaranthus hybridus*, *Amaranthus albus*, *solanum nigrum* and *chenopodium album*) as completely randomized factorial with 3 replications. The effect of aqueous extract concentration of berseem clover on the mean germination time, radicle length and the equally germination was significant. *S. nigrum* had the highest germination percentage, the longest mean germination time, the highest radicle length and the lowest equally germination. *A. hybridus* had the lowest germination percentage, the mean germination time and *A. albus* had the highest equally germination. In total *S. nigrum* was the most resistant species and *A. hybridus* was the most susceptible species to aqueous extract of berseem clover.

Keywords: Allelopathy, Broad-leaved weeds, Cover crops, Weed control

1 - Assistant Professor of University of Applied Science and Technology, Gilan, Rasht

2,3- PhD Student and Associate Professor, Department of Agronomy and Plant Breeding, Faculty of Agriculture Ferdowsi University of Mashhad, Iran

(* - Corresponding Author Email: stokasi@yahoo.com)



Brief report

Efficiency of Doual-purpose Herbicides Application at Different Stages on Weed Control and Grain Yield of Wheat under Shoushtar Conditions

F. Saadi Al-Kasir¹- A. Modhej^{2*}- R. Farhoudi³

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Abstract

In order to study the efficiency of dual-purpose herbicides at different stages of wheat (*Triticum aestivum*), an experiment was conducted at Shoushtar in 2012. The experiment was factorial with randomized complete block design arrangement of factors and four replicates. Factors were dual-purpose herbicide including Apyros (Sulfosulfuron), Total (Metsulfuron methyl+Sulfosulfuron), Chevalier (Iodosulfuron+mesosulfuron) and Atlantis (Idosulfuron+ mesosulfuron + Surfactant) and different stages of application (early tillering and early stem elongation). Results showed that the effects of herbicides and application stages on weed density were significant. The highest and the lowest wheat grain yield, observed when respectively Total and Chevalier herbicides were used. Herbicide application at the early tillering stages showed more favorable results than those applied at the early stem elongation stage. Application of Total in the early tillering stage significantly reduced weeds density and showed higher grain yield and yield components of wheat.

Keywords: Application stages, Herbicides, Weed

1,2,3- Msc. Student and Assistant Professors, Department of Weed Science, Shoushtar Branch, Islamic Azad University, Shoushtar, Iran

(* - Corresponding Author Email: a.modhej@khuzestan.srbiau.ac.ir)

Brief report
**Population Fluctuations of Wood Boring Beetle *Chrysobothris affinis* (Col.,
Buprestidae) on *Albezia lebeck* in Ahvaz landscapes**

F. Yarahmadi¹ - A. Rajabpour^{2*} - A.A. Seraj³

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Abstract

The wood boring beetle, *Chrysobothris affinis* is the most destructive pest of *Albezia lebeck* in landscape of Ahwaz. Population fluctuations of the pest were investigated on *Albezia lebeck* in Ahwaz landscape during 2010 - 2011. Sampling was monthly performed. In each sampling date, ten trees were randomly chosen and damage symptoms of the pest were monitored. When damage symptoms observed in stem and trunk of the selected trees, tree's bark was removed and numbers of each life stage including egg, larva and adult of this pest were recorded. Red sticky stocks was used for monitoring emergence of adult beetles. Result showed that the pest has two generations a year. Population peaks of egg, larva, pupa and adult stages of this pest were observed in early November, early November, late March, early July, respectively. Adult emergence and egg laying period of the pest were long and lasted six months. Regarding some biological characters of the pest such as long period of adult's emergence and cryptic nature of immature activity under tree's bark, contact insecticides could not be applied against different life stages of the pest and the application just may cause contamination of urban environment and threat of citizens health. Cultural strategies such as enhancement of irrigation and fertilization, and suitable pruning were recommended as alternative control methods.

Keywords: Woodborer pests, Population fluctuations, Urban green landscape

1,2- Assistant Professors, Department of Plant Protection, Ramin Agricultural and Natural Resources University, Ahwaz, Iran

(* - Corresponding Author Email: rajabpoar@ramin.ac.com)

3- Associate Professor, Department of Plant Protection, Shahid Chamran University, Ahwaz, Iran



Brief report
Evaluation of the Effects of Temperature on Germination of Russian Knapweed (*Acroptilon repens*) Seeds Collected from Irrigated and Rainfed Wheat Fields

Sh. Lotfi¹ - M. Rahimizadeh^{2*}

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Abstract

In order to evaluate the response of Russian knapweed seeds to cardinal temperatures a factorial experiment was conducted base on completely randomized design with 3 replications. Russian knapweed seeds (collected from irrigated and rainfed wheat fields), and germination temperatures (constant temperatures of 10, 15, 20, 25, 30 and 35° C) were used as first and second levels of the experiment. Results showed that cardinal temperatures for germination of two Russian knapweed seeds had no significant differences and optimum temperature in both seeds was 25° C. We found significant differences in percentage and uniformity of seed germination between both seed types at different temperatures rates. In low temperature (15° C), the percentage of germination (PG) of seeds were collected irrigated of wheat field was 50% more than PG of seeds were collected from rainfed wheat field. While, in high temperature (30° C), PG of seeds were collected from rainfed wheat field was more than other. These results support the conclusion that drought stress in wheat field increases the seed tolerance to high temperature.

Keywords: Cardinal temperatures, Germination, Parenteral plants

1,2- MSc Graduate and Assistant Professor, Department of Agronomy, Islamic Azad University, Bojnourd Branch
(*-Corresponding Author Email: rahimi1347@gmail.com)