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Contents

Effect of Different Rice Varieties on Age Specific Life Table and Population Growth Parameters of *Trichogramma brassicae*, the Egg Parasitoid of the Striped Stem Borer, *Chilo suppressalis*

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ABSTRACT

Effect of different rice varieties, as the first link of the food chain, on age specific life table and population growth parameters of the egg parasitoid wasp, *Trichogramma brassicae* Bezdenko, as the third link of the food chain was studied. Four commonly planted rice varieties, including two early maturity cultivars namely, Tarom-Mahalli and Tarom-Hashemi and two late maturity cultivars namely, Fajr and Neda were considered as the hosts of stripped stem borer, *Chilo supressalis* Walker. Stripped stem borer was reared on each variety for two generations. The eggs of the 2nd generation from each rice variety exposed to egg parasitoid wasps inside test tubes for experiments. Based on the collected data, the most important life table parameters, survival rate (l_x), age specific fertility (m_x), probability of surviving (p_x), probability of dying (q_x), difference in survivorship (d_x), life expectancy (e_x) and population growth parameters, net reproductive rate (R_0), intrinsic rate of increase (r_m), finite rate of increase (λ), mean generation time (T), and doubling time (DT) of were estimated. The results showed that all life table and population growth parameters of the parasitoid wasp were different statistically depending on each rice variety in the first link of the food chain. Between early and late maturity rice varieties, the values of evaluated population growth parameters were better in late maturity rice variety than early maturity rice varieties. In the first day of adult emergence, the highest value of life expectancy was 3.14 in Neda (late maturity) and the lowest was 2.69 in Tarom-Mahalli (late maturity) rice varieties. Similarly, the highest values of intrinsic rate of increase were estimated in late maturity rice variety. The highest value of intrinsic rate of increase was 0.452 female offspring/female/day in Fajr (late maturity rice variety), and the lowest was 0.442 female offspring/female/ day in Tarom-Mahalli (early maturity rice variety). Results confirmed that the change of the plant variety in the 1st link of the food chain can affect life table parameters of the organisms in the 3rd link of the food chain.

Keywords: *Trichogramma brassicae*, Demography, Population, Egg parasitoid, Biological control.

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Biological and Phylogenetic Characteristics of an Iranian Gladiouls Isolate of *Bean yellow mosaic virus*

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ABSTRACT

During 2008-2009, a total of 154 gladiolus (*Gladiolus grandiflorus)* corms were collected from the distribution centers in Karaj (Iran). After cultivation, fresh leaf samples of all germinated corms were tested by DAS-ELISA, which revealed the infection of 74.02% of plants with *Bean yellow mosaic virus* (BYMV). Following biological purification of an isolate, designated as BYMV-GPK, its host range was determined. The molecular mass of BYMV-GPK coat protein was estimated as 34 KDa by SDS-PAGE, which was confirmed by western blot analysis. DAS-ELISA and tissue print immunoassay (TPIA) techniques showed similar sensitivity in detection of BYMV in leaf tissue of infected gladiolus plants, but none of them were able to detect BYMV in corm tissue of the same infected plants. Two fragments of GPK genome, corresponding to HC-Pro and 3´ end regions with 600 and 1100 bp in length, respectively, were amplified by RT-PCR. Phylogenetic analysis based on the nucleotide and deduced amino acid sequence of HC-Pro and genomic 3´ end region showed that BYMV isolates clustered into separate groups according to their host origin and GPK isolate was closely related to a trifolium and other gladiolus isolates.

Keywords: BYMV, DAS-ELISA, Gladiolus, Phylogeny, TPIA, Western blot.

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Study of Genetic Diversity of *Fusarium verticillioides* Isolates the Causal Agent of Rice Root Rot Disease Using SSR Marker

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(Received: 28 Dec. 2013- Accepted: 16 Sep. 2014)

ABSTRACT

Root rot caused by *Fusarium verticillioides* is one of the most important rice diseases in Ilam Province. In order to determine genetic diversity of pathogen, 56 samples were collected from rice paddies of different regions in Ilam province. Molecular test was carried out with a set of five pairs of SSR primers after purification and identification of isolates. The SSR primers amplified a total 26 alleles among isolates. The average of allele number was 5.2 per each primer. 40 alleles were observed in 5H08 and 5H09 loci as highest allele numbers and 24 alleles were observed in 5H12 locus as lowest. The polymorphism index content value was the highest in primers 5H07 with 0.37 and the lowest in primers 4H18 with 0.14. The average of PIC was 0.25 in all primers. Cluster analysis of data using Neighbor joining method and Jaccard's coefficient, divided the isolates into 10 groups at 8% similarity level. Result of ANOVA showed that 98% of genetic diversity related to the isolates and only 2% related to different geographical regions. Therefore, there is the high genetic similarity between isolates from different geographic regions. High genetic similarity can be attributed to emigration of gene or genotype as a result of various factors.

Keywords: Genetic diversity, *Fusarium verticillioides*, SSR, Rice.

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Resistance Assessment of Different Sunflower Varieties to Charcoal Rot Disease in Golestan Province

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ABSTRACT

Charcoal rot, caused by *Macrophomina phaseolina*, is one of the most important diseases of sunflower in Golestan province. Host resistance may be the only feasible method to manage this disease. Accordingly, the resistance of 18 varieties of common recommendations for the region in the form of a randomized complete block design (RCBD) against isolates of *M. phaseolina* was assessed. Statistical analysis of the results showed a significant difference in sunflower varieties used in this study, in case of infected plants percentage. The other recorded traits (growth period, stem diameter, head diameter, plant height, seed yield and seed weight) also showed significant differences among treatments. Based on these results, Var. R-244 and Var. Cms60/52XR-256 were introduced as the most resistant and the most susceptible varieties to charcoal rot, respectively (0.25 and 8.5% of infected plants, respectively), while the highest and lowest seed yield belonged to Var. Progress and Var. R-256, respectively.

Keywords: Charcoal rot disease, *Macrophomina phaseolina*, Sunflower varieties, Resistance, Golestan province.

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Study on Antifungal Effects of Five Plant Species Extract Against *Fusarium solani* and *Rhizoctonia solani* on Bean

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ABSTRACT

Root rot is one of the important diseases of bean in Zanjan province and two fungal pathogens, *Rhizoctonia solani* and *Fusarium solani* are the major causal agents of this disease in the region. In this research, the inhibitory effect of n-hexane, di-ethyl-ether, chloroform and ethanol extracts of five plant species, hermel (*Peganum harmala*), thyme (*Thymus kotschyanus*), yarrow (*Achillea wilhelmsii*), pennyroyal (*Mentha pulegium*) and garlic (*Allium sativum*) on mycelial growth of *R. solani* and *F. solani* was studied using poisoned food technique at four levels of 100, 250, 500 and 1000 ppm with three replications. After laboratory experiments, the most effective extracts, were applied against bean root rot under greenhouse conditions. According to the results from in vitro studies, n- hexane extract of thyme and pennyroyal (both at the level of 1000 ppm) had the most inhibitory effect against both pathogens and also caused cytoplasm granulation and leakage of intracellular compounds of hypha of both fungi. At greenhouse experiments, hexane extract of thyme and menthe not only significantly reduced the root rot percentage, but also had significant increasing effect on most plant growth parameters ($P = 0.05$).

Keywords: Beans, Fungistasis, Fungal root rot, Plant extract, Thyme.

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Phylogenetic Structure of *Trichoderma harzianum* s.l. from Some Climates of Iran

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ABSTRACT

Strains of *Trichoderma harzianum* have a great importance because of affecting mankind by being used as biological control agents against plant pathogens. In the present study, we planned to characterize the phylogenetic structure of *T. harzianum* recovered from different geographical origins and various habitats in some climates of Iran (NC, SCD, CSW). In order to screen 239 collected *Trichoderma* isolates, the strains were pre-screened by RAPD-PCR, and representatives were selected for sequencing of ITS1-5.8 s-ITS2 genomic region. Totally, 176 *T. harzianum* isolates were obtained. Fourteen phylotypes were found as a result of maximum parsimony analysis of 76 ITS1 and ITS2 sequences related to *T. harzianum*, including one single-member phylotype representing a novel ITS allele for *T. harzianum*, endemic to Iran. Finding a unique ITS allele of *T. harzainum* in climate CSW may be an indicative of the effective role of this kind of climatic conditions on arising this new ITS allele.

Keywords: Allele, Biological control, Phylogeny, ITS, Phylotype.

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Study of Host Preference and Life Cycle of the Colorado Potato Beetle, *Leptinotarsa decemlineata*, on 33 Potato Cultivars

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ABSTRACT

In this research, the host preference and life cycle of the Colorado potato beetle, *Leptinotarsa decemlineata* (Say), was studied on 33 potato cultivars. Significant difference was observed for all studied traits. The lowest numbers of adults were attracted to cultivars Raja, Carlita and Bridget with mean values of 0.33, 0.5 and 0.5 adults respectively. The lowest egg numbers were observed on Bright, Baltica and Raja with mean values of 23.5, 28.6 and 30.9 egg per hill respectively. The longest larval and pupal developmental times were observed on Satina, Idol and Eba with mean values of 36.6, 36.2 and 35.6 days respectively. The highest larval and pupal mortalities were observed on Delikate, Carlita, Armada, Raja and Bridget with mean values of 91.1, 88. 9, 84.4, 80 and 80 percent respectively. The longest life cycle time durations of beetle (egg to adult) were observed on Idol, Satina and Elles with mean values of 42.9, 42.6 and 42.2 days respectively. Therefore, it was concluded that among the 33 cultivars studied in this research, cultivars Bridget, Raja and Bright were the least suitable cultivars for the Colorado potato beetle and they can be used in the IPM of the pest.

Keywords: Colorado potato beetle, Host preference, Potato cultivars, Life cycle.

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Ability of *Fusarium culmorum* Isolates in Producing Trichothecene - from Wheat Farms of West Azarbayjan Province Based on *TRI13* Gene Screening

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ABSTRACT

Fusarium culmorum which is considered as the causal agent of fusarium head blight, can produce deoxynivalenol (DON), nivalenol (NIV) and their acetylated derivatives. This study has been assessed in order to detect the *Tri13* gene using primer pairs Tri13DONR/Tri13F and Tri13R/Tri13NIVF, to investigate the potential of *F. culmorum* isolates in producing DON and NIV in West Azarbayjan province, Iran. In this study, 98 *F. culmorum* isolates were obtained from Urmia, Khoy, Miandoab, Maku, Tekab and Mahabad regions. For this purpose, *F. culmorum* isolates were identified based on the morphological characteristics as well as specific primer pairs, C51F/C51R. Production of DON and NIV were detected in these isolates according to *Tri13* gene. Results showed that 60.2%of the isolates had the potential to produce DON and 39.8%of them had ability to produce NIV.

Keywords: Deoxynivalenol, Fusarium head blight, Nivalenol, *tri13*, Wheat.

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Effect of Resistant and Susceptible Wheat Cultivars on Biology and Predation Rate of *Hippodamia variegata* Feeding on Russian Wheat Aphid

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ABSTRACT

In this study, the possible effects of host plant resistance on some demographic parameters and predation rate of *Hippodamia variegata* Goeze life stages have been investigated. Demographic data and predation rate have been analyzed by the age-stage two-sex life table and consumption rate program. Obtained results showed that pre-adult duration and total pre-oviposition period (TPOP) of ladybirds that fed by Omid (resistant cultivar) originated aphids were significantly shorter (14.99±0.04 and 16.96±0.09 respectively). Additionally, time from egg to death (54.09±3.2), adult longevity (48.67±2.8) and oviposition period (24.24±1.42) of these lady beetles were significantly longer. The average predation rate of first, second, third, fourth larval stages and male and females feeding on Omid cultivar were 30.37±1.77, 50.51±2.57, 83.39±4.39, 259.52±6.05, 4965.47±241.35 and 8516.62±406.67 and for Sardari were 28.1±1.16, 39.37±2.53, 86±4.12, 210±6.66,4750±376.11 and 6971.04±29, respectively.

Keywords: Russian wheat aphid, *Hippodamia variegata*, Host plant resistance, Life table, Predation rate.

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Investigation of Species Diversity of Buprestid Beetles in Forests of Kurdistan Province

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ABSTRACT

Buprestid beetles are one of the important components of the biodiversity of forest ecosystem in Kurdistan Province. Different characteristics of biodiversity of buprestid beetles were studied by use of window trap, colored pan and colored sticky trap in these forests during 2009 and 2010. A total of 1205 specimens of 44 species were caught by use of considered traps during appearance of adults. Evaluation of dominance structure of species composition by use of Heydemann's classification showed that Buprestid beetles of Kurdistan forests include 3 dominant species, 3 subdominant species, 12 rare species and 26 subrare species. X^2 test of parametric indices showed that structure of species diversity conformed logarithmic series. Investigation of fluctuations of species richness during appearance of adults showed that maximum and minimum of considered index in May and October were 30 and 1 respectively. As well as maximum of obtained species diversity was 4/02 bit in June.

Keywords: Forest, Kurdistan, Buprestidae, Biodiversity.

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Wilting of Olive and Seedling Branches and its Relative Control by Soil Solarization in Zanjan, Gorgan and Mashhad

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ABSTRACT

Wilt of one branch of olive trees and seedlings is one of main important disease in most parts of Iran and other countries. The disease was surveyed in various areas including Zanjan and Golestan provinces during recent years. Wilting branch, leaves, plant roots and soils around the roots have been collected from the studied areas. The samples were cultured on PDA and SDA media after surface sterilization with 0.5% sodium hypochlorite. Soil samples were diluted in water agar for isolation of the pathogen. Morphological characteristics in particular phialide and sporse showed that the causal agent of the disease was *Verticillum dahliae* which is a soil borne fungi and isolated from all samples and soil. Investigation showed that some olive varieties were relatively resistant to the pathogen. After two to six weeks application of the soil solarization treatment on infected soil, the average population density of the pathogen was decreased from 30 -75% separately. Using solarized soil and resistant olive seedlings on pots in glasshouse showed the lessening of the disease visibly.

Keywords: Branch wilt, Olive,*Verticillium dahliae*, Solarization.

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Genetic Diversity of Fluorescent Pseudomonads Isolated from Wheat Fields with Biocontrol Ability against *Gaeumannomyces graminis var. tritici*

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ABSTRACT

In this research, 21 different isolates of fluorescent pseudomonads was provided and after investigation of their biochemical characteristics, and their ability to control take-all disease of wheat, their genetic diversity and relation between DNA fingerprinting and biocontrol ability of the isolates was investigated using rep-PCR molecular marker. DNA fingerprinting results and the drown dendrogram showed that19 fluorescent pseudomonads isolates differentiated in 25-100% genetic similarity level and the isolates belonged to nine fingerprinting groups assigned by letters A-I. Based on these results, there was a relation between DNA fingerprinting and inhibition zone, production of HCN and diacetylphloroglucinol production bioassays. Therefore, we suggested that rep-PCR molecular marker is a useful tool for identification and screening of fluorescent pseudomonads with bio-control ability.

Keywords: Wheat, take-all, genetic diversity, *Pseudomonas flourescens*, biological control.

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Identification of Potato Rhizoctonia Anastomosis Groups in Hamadan and Kurdistan Provinces and Survey of Their Biological Control Possibility using *Trichoderma* spp.

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ABSTRACT

During survey of potato Rhizoctonia disease in 2006, 50 isolates with characters of *Rhizoctonia solani* fungus from stems and roots and eight isolates from sclerotia, on potatoes surface, were obtained from fields and storages of Hamadan and Kurdistan Provinces. After nuclear staining and physiological surveys, all of the isolates identified as *R. solani*. For determining anastomosis groups of isolates, anastomosis carried out with tester isolates. Finally, 56 isolates belonged to AG-3, one isolate belonged to AG-4 and one isolate did not anastomoses with any available tester anastomosis groups in this study. Pathogenicity test of 25 isolates shown they are virulence. Biocontrol potential of four species of *Trichoderma*, including *T. brevicompactum, T. koningiopsis*, *T. andinensis*, and *T. virens* were studied on two pathogen isolates (6 and 16), that had highest pathogenicity in pathogenicity test, in laboratory. Results showed that except *T. andinensis*, other *Trichoderma* spp. developed, establish and sporulated on pathogen colony after stopping its growth and destroyed pathogen hypha as coiling them. Volatile compounds of all *Trichoderma* spp. had significant effects on reducing pathogen isolates growth and among them *T. virens, T. koningiopsis* and *T. brevicompactum* had a higher inhibition, respectively. In studding non volatile compounds, *T. brevicompactum* inhibiting pathogen growth completely.

Keywords: *Rhizoctonia solani*, Biological control, *Trichoderma* spp.

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Functional and Numerical Response of the Parasitoid Wasp *Eretmocerus delhiensis* Parasiting *Neomaskellia andropogonis* on Sugarcane in Laboratory Conditions

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ABSTRACT

Functional and numerical responses of *Eretmocerus delhiensis* Mani parasitizing sugarcane whitefly, *Neomaskellia andropogonis* Corbett were investigated under laboratory conditions. Newly emerged (<24 h) female parasitoid was confined for 24h in a clip cage together with 5, 10, 20, 40, 60 and 100 individuals of *N. andropogonis* at their third nymphal stage. The parasitoid exhibited type II functional response and at the above mentioned densities mean of 4.7, 6.9, 12.3, 17.5, 20.8 and 25.7 nymphs were parasitized, respectively. The rate of attack and handling time were 0.06 h^{-1} and 0.76 h, respectively. In numerical response experiment a single parasitoid laid 21.1, 31.2, 63.7, 76.4, 85.2 and 101.4 eggs in aforementioned densities, respectively. Mean longevity ranged was 15-17 days at above mentioned densities.

Keywords: *Eretmocerus delhiensis*, *Neomaskellia andropogonis*, Functional response, Numerical response.

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Life Table of *Cryptolaemus mointrouzieri* Fed on Ovisacs of *Pulvinaria aurantii* on Clementine Mandarin and Sour Orange

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ABSTRACT

The coccinellid, *Cryptolaemus mointrouzieri* Mulsant is one of the most efficient predators of orange pulvinaria scale, *Pulvinaria auranti* Cockerell. In this research, the biological characteristics of *C. mointrouzieri* were studied when fed on ovisacs of *P. aurantii* reared on leaves of two host plants (clementine mandarin and sour orange), under controlled conditions at 26±1°C, 70±5% RH and 14:10 (L:D) h. The data were analyzed using the age-stage, two-sex life table model. This ladybird had significantly faster development and more fecundity when fed on scale ovisacs reared on clementine mandarin than on sour orange. Significant differences were observed in population growth parameters of ladybird on two treatments. The intrinsic rate of natural increase (r_m), finite rate of increase (λ), net reproductive rate (R_0) and generation time (T) were 0.122 day^{-1}, 1.129 day^{-1}, 309.0 offspring/female and 47.1 day on clementine mandarin and 0.110 day^{-1}, 1.116 day^{-1}, 214.2 offspring/female and 48.8 day on sour orange, respectively. These results demonstrated that positive effects of host plant on population growth parameters of this ladybird feeding on *P. aurantii* were higher on clementine mandarin than on sour orange.

Keywords: Development, Reproductive, Host plant, Soft scale, Ladybird.

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Gene Ontology of *Trichoderma harzianum* Differential ESTs During Colonization of Tomato Spermosphere and Rhizoplane

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ABSTRACT

Some *Trichoderma* strains are used as biocontrol agents against phytopathogens. Differential display reverse transcriptase PCR (DDRT-PCR) has been developed to detect differentially expressed genes of *T. harzianum* T7 during colonization stages of tomato spermosphere and rhizoplane. DDRT-PCR products were displayed on gel and 62 differential bands excised, purified, cloned, and sequenced. Obtained ESTs were submit-queried to NCBI database by BLAST2GO search and their gene ontology was evaluated. Most of the transcripts corresponded to known or hypothetical proteins. These proteins corresponded to different functional groups, which play role in metabolism, signaling both within and between cells, host interaction, protein transport, translation, controlling of cell growth and survival, adaptation to environmental variables, transportation of biomolecules between nucleus and cytoplasm, regulating protein function, cell division, catalyzing analogous reactions, repairing damaged DNA molecules, and other vital functions in different organisms. Some of the detected ESTs in this study corresponded to genes encoding enzymes potentially involved in nutritional support of *Trichoderma* in its ecological niches.

Keywords: BLAST2GO, ESTs, DDRT-PCR and Gene Function.

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A Faunistic Survey on the Bee Flies (Dip.: Bombyliidae) in Alborz Province with Two New Records from Iran

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ABSTRACT

Bee flies are important pollinators in nature. Their larvae are predators or parasites of other insects such as beetles and locust eggs so they are important for balancing of insect population. In this study the adult bee flies were collected from arid and semi-arid rangelands in Alborz province using insect nets and Pan traps from April to September in 2012. The samples which were extracted from white pan traps, stored in 96% ethanol and others were stabilized by standard insect pins. The samples were identified using some keys such sa: Greathead & Evenhuis (2001) at the genus level and keys Engel (1932-1937), Linder (1975), Zaitzev (1966) and Gharali (2010) at the species level. All of the species were confirmed with Dr Babak Gharali in Research Center for Agriculture and Natural Resources of Ghazvin province. A total of 18 species and 12 genera were identified. All of the species are new records for the province, of which two species are new records for Iran. Identified species are as follows: *Exoprosopa pectoralis* Loew, 1862, *E. grandis* (Weidemann, 1820), *E. amseli* Oldroyd, 1961*, *Caecanthrax arabicus* (Macquart, 1840), *Thyridanthrax. elegans* (Weidemann, 1820), *T. griseolus* (Klug, 1832), *Lomatia belzebul* (Fabricius, 1794), *Usia bicolor* Macquart, 1855, *Conophorus pseudaduncus* Paramonov, 1929, *Heteralonia kirgizorum (*Paramonov, 1928)*, *H. megerlei* (Meigen, 1820), *H. suffusa* (Klug, 1832), *Callostoma soror* Loew, 1873; *Veribubo misellus* (loew, 1869), *Hemipenthes subvelutina* Zaitzev, 1966, *Phthiria pulicaria* Mikan, 1796, *P. vagans* Loew, 1846, *Micomitra stupida* (Rossi, 1790).

Keywords: Alborz, Bombyliidae, Fauna, new records.

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