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Original article (Orijinal araştırma)

A new pest: Rush veneer, *Nomophila noctuella* Denis & Schiffermüller, 1775 (Lepidoptera: Crambidae) on alfalfa (*Medicago sativa* L.) and its larval parasitoids in Iğdır province of Turkey[1]

Iğdır ilinde yoncada (*Medicago sativa* L.) yeni bir zararlı, *Nomophila noctuella* Denis & Schiffermüller, 1775 (Lepidoptera: Crambidae) ve larva parazitoitleri

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Summary

Rush Veneer, *Nomophila noctuella* Denis & Schiffermüller, 1775 (Lepidoptera: Crambidae) is a pest fed with grass-pasture forage plants in many countries. The aim of this study was to determine damage state, and larvae parasitoids of *N. noctuella* found at alfalfa (*Medicago sativa* L.) fields of Iğdır province in the years 2014-2015. For this aim, a survey was performed every 3-7 days in April-June and September-December months. In the survey, each field was monitored and the larvae were collected from alfalfa fields and kept in boxes covered with nets in the laboratory at 25±1ºC and 65±5% RH. and following pupation, adult moths and larvae parasitoids were obtained. During the survey conducted at alfalfa fields, the larvae of the pest preferred alfalfa fields planted in April month and damaged the plantation at changing rates by cutting-eating them from 3-5 cm upper part of root of alfalfa plants at the height of 7-10 cm. Of larvae cultivated in the laboratory, *Chelonus oculator* (Fabricius, 1775) *C. inanitus* (Linnaeus, 1767) parasitoids belonging to Braconidae (Hymenoptera) family were also obtained in the study. As a result, the present study revealed that Rush Veneer, *N. noctuella* for alfalfa plants was a new pest recorded for the first time in Turkey. *N. noctuella* is the new host of *C. oculator* and *C. inanitus* in the world.

Key words: *Nomophila noctuella*, new pest, larval parasitoids, alfalfa, Iğdır

Özet

Nomophila noctuella Denis & Schiffermüller, 1775 (Lepidoptera: Crambidae) birçok ülkede çayır-mera yem bitkileriyle beslendiği bilinmektedir. Bu çalışma, Iğdır ili yonca (*Medicago sativa* L.) alanlarında zarar yaptığı belirlenen *N. noctuella* 'nın zararını ve doğal düşmanlarını belirlemek amacıyla 2014-2015 yıllarında yürütülmüştür. Çalışmalar, Nisan-Haziran ve Eylül-Ekim aylarında 3-7 gün aralıklarla yeni ekilmiş yonca alanlarına gidilerek gözlemler yapılmış ve her tarladan larvalar toplanarak 25±1ºC ve 65±5% RH ortamında kültüre alınmıştır. Çalışmalarda, zararlının Nisan ve Eylül aylarında yeni ekilmiş yonca bitkilerini tercih ettiği, 7-10 cm boya ulaşmış bitkinin kökten 3-5 cm yukarısından keserek beslendiği tespit edilmiştir. Zararlının parazitoiti olarak *Chelonus oculator* (Fabricius, 1775) ve *C. inanitus* (Linnaeus,1767) (Hymenoptera, Braconidae) türleri elde edilmiştir. *N. noctuella*'nın Türkiye'de yonca bitkisinde yeni bir zararlı olduğu ve elde edilen parazitoitler içinde yeni bir konukçusu olduğu belirlenmiştir.

Anahtar sözcükler: *Nomophila noctuella*, yeni zararlı, larva parasitoitleri, yonca, Iğdır

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Introduction

The genus *Nomophila* (Lepidoptera, Crambidae) comprises of 17 identified species distributed across North America, South America, Africa, Europe, temperate Asia, the Oriental region and Australia. Rush Veneer, *Nomophila noctuella* Denis & Schiffermüller, has wingspan 26-32 mm. At the time of the rest, wing of moth has a very elongated and narrow shape, which makes it easily recognizable. The mature larvae of the species are 15 to 20 mm long, gray green and spotted. Larvae vary between 13 and 22 mm (1/2 to 7/8 inch) in length. A significant damage symptom is a silk thread leading from the tunnel to the base of the clipped seedling (Philip et al. ,1990). There are two to four generations per year)Furniss & Carolin, 1977). The larvae feed with clover, polygonum, wheat and vaccinium (Drake & Decker, 1927). At the same time, Anjos et al. (1986), Teixeira et al. (1999) and Zanuncio et al. (2001) addressed that the pest damaged Eucalyptus seedlings and *Pseudotsuga menziesii* var. *glauca* (Johnson & Duffield, 1961). In 1919, the insect seriously damaged newly seeded fields of sweet clover in Illinois. Virtually, damage of this insect is reported in every year for some locations in Illinois (Flint, 1922). In literature, some authors reported faunistic and zoological knowledge of the insect from Turkey in the past (Koçak, 2001; Atay, 2005; Aytekin & Kütük, 2011). However, the data published on the damage of the insect is scanty in Turkey. Therefore, the aim of this work was to investigate damage state and larvae parasitoids of *N. noctuella* that harmfully influences alfalfa (*Medicago sativa* L.) fields of Iğdır province in the years 2014-2015.

Material and Method

This study was conducted with the objective to determine damage state and larvae parasitoids of Rush Veneer, *Nomophila noctuella* Denis & Schiffermüller found at four alfalfa (*Medicago sativa* L.) fields of Aralık district (Tazeköy and Yukarı Çiftlik) of Iğdır province between April-June and September-December in 2014 and 2015. In the survey, each field was monitored every 3-7 days in April-June and September-December months and the larvae were collected from alfalfa fields and kept in boxes covered with nets in the laboratory at 25±1ºC and 65±5% r.h. and adult moths and larvae parasitoids were obtained. Adult of *N. noctuella* was identified by Erol Atay. Obtained parasitoids species were identified by Prof. Dr. Ahmet Beyarslan (Bitlis Eren University, Faculty of Arts and Science, Department of Biology, Bitlis/ Turkey) as *Chelonus inanitus* and *C. oculator*.

Results and Discussion

The Rush Veneer, *Nomophila noctuella* is a cosmopolitan species. It has been recorded in Cyprus, Syria, Lebanon, Israel, Arabian peninsula, Iraq, Iran, Pakistan, India, Chinese, Japan (Munroe, 1973), Iceland, Norway, Denmark, Swiss, East Europe, Indonesia, Lithuanian, Poland, Czech Republic, The Netherlands, Britain, Ireland, Belgium, Luxembourg, France, Spain, Italy, Austria, Hungary, Yugoslavia, Romania, Bulgaria, Albania, Greece, Swedish (Svensson, 1999), Turkey (Karsholt & Razowski, 1996; Medvedev, 1997; Koçak, 2001; Atay, 2005), and Balkan Peninsula (Fazekas, 2009). Distribution of *N. noctuella* in Turkey has been reported by Koçak & Kemal (2009) (Figure 1).

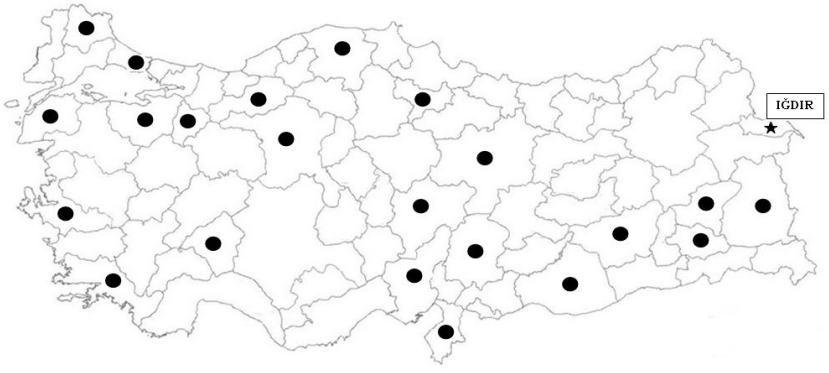

Figure 1. Distribution of *Nomophila noctuella* in Turkey (Koçak & Kemal 2009).

The damage of the pest on alfalfa (*Medicago sativa* L.) fields in Aralık district of Iğdır province has not yet been documented in Turkey until now. In this research, the damage of the larvae of the pest preferred alfalfa fields planted in April month was examined for Tazeköy (39°55’35’’N, 44°30’57’’E, 822 m) and Yukarı Çiftlik (39°51'38"N, 44°34'33"E, 817 m) of Aralık distinct of the province. The pest has damaged the plantation at varying rates by feeding leaves and by cutting-eating them from 3-5 cm upper part of the root of alfalfa plants at the height of 7-10 cm. In agreement with the present study, Smith (1942) reported that the damage was done by eating irregular shallow excavations on the stalk usually covering the area with silk. The larvae were surface feeders and did not burrow into the stalk. In addition, when prodded, they moved equally well backward or forward in their burrow. From the present study, it was understood that the larvae during the daytime have hidden within gallery under especially parts of corn stalks or other plant residues in the field, as also confirmed by Ellis (1925) for two generations of the pest in New England. In relation to the present findings, it was observed that *N. noctuella* over winters at mature larval stage within tunnel under plant residues, which was similar to those of Flint (1922) in New York, and Zanuncio et al. (1999). In respect to the present findings, the larvae in sunless hours of the days has fed with fresh plants around the places where they hidden (Figure 2). Additionally, therein, they have been pupae within cocon in the gallery. Zanuncio et al. (1999) announced that the presence of the pest for two to four generations per year could show variability with respect to the regions. It was observed to be only two generations of the pest for the Iğdır microclimate condition. The difference may be ascribed to climatic conditions. Due to the fact that the larvae fed with alfalfa plants in the fields, sporadic spaces have been observed in the fields. Aiming to prevent the damage, farmers have adopted chemical controls or made re-plantation therein. Due to economic losses, it is very important to conduct further investigations on the damage levels of the pest, found commonly in the alfalfa fields of Iğdır province.

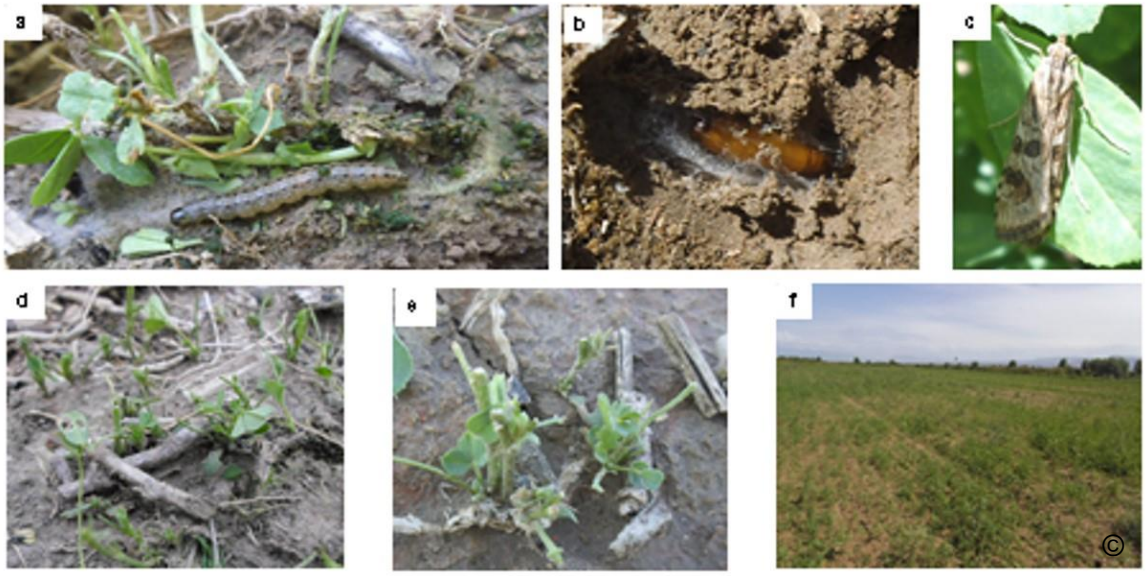

Figure 2. The larvae (a), pupa (b), adult (c) and damaged (d, e, f) of *Nomophila noctuella.*

From the study, the new findings illustrated that the pest damaged the alfalfa fields planted newly across Aras River, Armenian border especially during spring and autumn seasons. It was determined that the adults of *N. noctuella* flied about the alfalfa fields up to the mid-September.

Parasitoids of *Nomophila* sp. were identified by Zanuncio et al. (1999), and it was reported that *Diplazon laetatorius* (Fab.) and *Eiphosoma* sp. two species of the Porizontini and Mesostenini tribes, all of which are peculiar to the Ichneumonidae family of Hymenoptera. Besides, Yu et al. (2012) reported that parasitoids of *N. noctuella* were *Cotesia pyralidis* (Muesebeck, 1921) *Meteorus cinctellus* (Spinola 1808), *Meteorus rubens* (Nees, 1811).

In this studies, the primary mortality factors of the rush veneer were determined to be two species of parasitoids belonging to Braconidae family of Hymenoptera. The parasitoids are *Chelonus inanitus* (Linnaeus,1767) (7 ♀♀, 5 ♂♂) and *C. oculator* (Fabricius, 1775) (4 ♀♀**,** 4 ♂♂) being egg-larval parasitoids. They were reared for the first time from larvae of *N. noctuella*. Detailed information about the two egg-larval parasitoid species of *N. noctuella* was;

***Chelonus inanitus* (Linnaeus,1767)**

Material studied: Iğdır, Aralık, Taze köy, 39°55′35.23″N, 44°30′59.5″E, 822 m, 04.VI.2014, 4 ♀♀, 1 ♂; Yukarı Çiftlik, 39°52′3.82″N, 44°33′28.75″E, 814 m, 03.VI.2014, 3 ♀♀, 4 ♂♂.

Hosts: *Agrotis segetum* (Schiff.)*Spodoptera exigua* (Hübner, 1808) (Modarres, 1997; Shojai, 1998; Khanjani, 2004); *Spodoptera littoralis* (Boisduval, 1833), (Lepidoptera: Noctuidae) (Tomkins et al., 1987; Wharton et al., 1998), *Phthorimaea operculella* (Zeller) (Lepidoptera: Gelechiidae), *Etiella zinckenella* (Treitschke, 1832) (Lepidoptera: Phycitidae) (Balevski, 1998); *Mesoligia literosa* (Haworth, 1809), *Chortodes elymi* (Treitschke, 1825), *Eucosma aemulana* (Schläger, 1849), *S. tripoliana* (Barrett, 1880) (Lepidoptera: Tortricidae) (Watanabe, 1937); *Aethes francillana* (Fabricius, 1794) (Lepidoptera: Tortricidae); *Haritalodes derogata* (Fabricius, 1775) (Lepidoptera: Crambidae); *Ostrinia nubilalis* (Hubner, 1796) (Lepidoptera: Pyraustidae); *Oligia strigilis* (Linnaeus, 1758), *Leucania loreyi* (Duponchel, 1827), *Peridroma saucia* (Hubner, 1808), , *Pseudaletia unipuncta* (Haworth, 1809) (Lepidoptera: Noctuidae) (Yu et al., 2012). *Nomophila noctuella* (Denis& Schiffermüller, 1775) (new host record).

Distributions: Albania, Algeria, Armenia, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, former Czechoslovakia, former Yugoslavia, Denmark, Egypt, Finland, France Germany, Greece, Hungary, Iran, Ireland, Israel, Italy, Korea, Latvia, Lithuania, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey (Yu et al., 2005), Turkey: Adapazarı, Afyon, Amasya, Balıkesir, Bilecik, Bursa, Canakkale, Çorum, Edirne, İçel, Kastamonu, Kayseri, Kırklareli, Tekirdağ (Aydoğdu & Beyarslan, 2002; Beyarslan, 1985; Beyarslan et al., 2002; Kohl, 1905).

***Chelonus oculator* (Fabricius, 1775)**

Material studied: Iğdır, Aralık, Taze köy, 39°55′35.23″N, 44°30′59.5″E, 822 m, 04.VI.2014, 1 ♀, 1 ♂; 39°55′39.6″N, 44°30′28.99″E, 822 m, 25.V.2015, 3 ♀♀, 1 ♂; Yukarı Çiftlik, 39°52′3.82″N, 44°33′28.75″E, 814 m, 03.VI.2014, 2 ♂♂.

Hosts: *Agrotis segetum* (Denis & Schiffermuller, 1775), *Chortodes elymi* (Treitschke, 1825), *Spodoptera exigua* (Hubner, 1808), *Helicoverpa armigera* (Hubner, 1809), *Heliothis peltigera* (Denis & Schiffermuller 1775), *Heliothis viriplaca* (Hufnagel, 1766), (Lepidoptera: Noctuidae); *Etiella zinckenella* (Treitschke, 1832) (Lepidoptera: Phycitidae); *Coleophora anatipennella* (Hubner, 1796) (Lepidoptera: Coleophoridae); *Loxostege sticticalis* (Linnaeus, 1761) (Lepidoptera: Pyraustidae); *Zeiraphera isertana* Fabricius, 1794 (Lepidoptera: Tortricidae) (Tobias, 1995). *Spodoptera littoralis* (Boisduval, 1833), *Ephestia kuehniella* Zeller, 1879 (Özkan & Özmen, 2001). *Cydia corticana* Hubner (Lepidoptera: Tortricidae); *Leucania loreyi* (Duponchel, 1827) (Lepidoptera: Noctuidae); *Homoeosoma nebulella* (Denis & Schiffermuller, 1775); *Ostrinia nubilalis* (Hubner, 1796) (Lepidoptera: Pyralidae (Yu et al., 2012). *Nomophila noctuella* (Denis& Schiffermüller, 1775) (new host record).

Distribution: Afghanistan, Albania, Azerbaijan, Belgium, Bulgaria, Croatia, Czech Republic, former Czechoslovakia, former Yugoslavia Finland, France, Georgia, Germany, Greece, Hungary, Iran, Italy, Kazakhstan, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan (Yu et al., 2005), Caucasus, Kazakhstan, Central Asia, North Africa, Iran, and Western Europe (Tobias, 1995), Turkey (Özkan & Özmen 2001; Aydoğdu & Beyarslan, 2002).

As a result, the present study revealed that Rush Veneer, *N. noctuella* for alfalfa plants was a new pest recorded for the first time in Iğdır province of Turkey. More particularly, the pest damaged the alfalfa fields sown newly during spring and autumn seasons. Also, *N. noctuella* is the new host of *C. oculator* and *C. inanitus* in the world. Further studies are still required for better determining damage of the pest,

and especially more effective pest control in alfalfa fields. We recommend that farmers take necessary measures on reducing the damage of the pest for alfalfa fields cultivated newly.

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