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The determination of Infestation of *Bactra venosana* (Zeller, 1847) (Lep.; Tortricidae) on *Cyperus rotundus* L. in Adana and Osmaniye Proviences

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Abstract
In the study ın which infestation ratio on Cyperus rotandus of *Bactra venosana* on the fieldsin Osmaniye and Hatay has been calculated, It has been found out that larvae of *B. venosana* gave damage entering into trellis of plants and taproots of the damaged plants were ruined partially while parts of it on the land totally. It has been discovered that one at most *B. venosana* exists on a plant. While low infection was identifiedin August, it was witnessed that the highest infestation happened towards the end of September in both cities. As the infestation conditions are much alike, the highest infection ratio occured in Osmaniye. It was defined that infection was immense on some fields and could figure as 90%.By the way, through this study, it has been determined that *Cyperus rotandus* was proved to be host of *B. venosana* in Turkey for the first time and *B. venosana* is the first record for Turkey fauna.
Keywords: *Bactra venosana*, *Cyperus rotundus*, Biological struggle, Infestation ratio

Adana ve Osmaniye İllerinde Yerfıstığı Alanlarında Bactra venosana Z. (Lep.; Tortrocidae)'nın Cyperus rotundus L. (Topalak)'a Bulaşma Oranlarının Belirlenmesi

Özet
Adana ve Osmaniye illerindeki yerfıstığı tarlalarında *Bactra venosana*'nın *Cyperus rotundus* üzerindeki bulaşma oranlarının hesaplandığı çalışmada, *B. venosana* larvalarının bitkinin kını içerisine girerek zarar yaptıkları ve zarar gören bitkilerin yumrularının kısmen, toprak üstü aksamının ise tamamen zarar gördüğü belirlenmiştir. Bir bitkide en fazla bir adet *B. venosana* larvası tespit edilebilmiştir. Ağustos ayında düşük bulaşma belirlenirken, en yüksek bulaşmanın her iki ilde de eylül ayının sonlarına doğru olduğu görülmüştür. Her iki ildeki bulaşma durumu birbirine benzemekle beraber en fazla bulaşma oranı Osmaniye ilinde olmuştur. Bazı tarlalarda bulaşmanın çok yüksek olduğu ve % 90'lara kadar çıkabildiği belirlenmiştir. Aynı zamanda bu çalışma ile Türkiye'de ilk defa *Cyperus rotundus*'un *B. venosana*'nın konukçusu olduğu ve *B. venosana*'nın Türkiye faunası için ilk kayıt olduğu belirlenmiştir.
Anahtar Kelimeler: *Bactra venosana*, *Cyperus rotundus*, Biyolojik mücadele, Bulaşma oranı

Introduction

Purple nutsedge (*Cyperus rotandus* L.) is in Cyperaceae family, can multiply generally through subterranean in the shape of rhizome and swelling and partially through seeds, has 10-60 cm hull length, stays inside 10 weeds, is a weed enduring several years and summers. Especially, it is a perennial weed leading to major problems on industrail plants, vegetable gardens, vineyards, paddy sods and empthy lands (Özer et al., 1999). It may cause a loss of yields where it is dense (Öngen, 1993). It is known as one out of the weeds leading to loss of yields in many agricultural crops in Turkey (Uluğ et al., 1993).

Many researchers have worked on possibilities of biological struggle against weed since the chemicals used against weeds densely affect the environment negatively. Within this scope, 57 species kinds have been found feeding on *C. rotandus* as a result of the study, yet it has been witnessed that many of those species kinds gave damage to agricultural crops. Within these species, some *Bactra* species (*B. minima* Meyr.,*B. venosana* (Zell). *B. vertuana* Zell.) are considered to be crucial as spy for biological struggle since they can turn to *C. rotandus* (Frick, 1978).

It has been defined that larvae of the species of *Bactra* gave damage entering into trellis of plants and upper parts of the damaged plants vanished drying (Trematerra and Ciampolini, 1989). While larvae of *B. verutana* is determined to be immensely effective in greenhouses when 3 in each root (Frick and Quimby, 1977), it has been defined to be 2, 10, 60 double butterfly release can make contagion as 0%, 10%, 100% respectively under the cage within the conditions of farm (Phatak et al., 1987). What is more, in the studies carried on greenhouses, it has been found out that *B. venosana* can give harm around 72% and *B. minima* 65% (Habib, 1976). As *B. vertuana* can decrease the reproduction of *C. rotandus* under the farming condition (Frick and Chandler, 1978), *B. vertuana* does not have much effect on *C. rotandus* in spring due to high mortality in winter (Frick et al., 1983), and by means of which it has been ascertained that release should be enabled in spring while providing mass reproduction to make them effective (Frick, 1978). It has been defined that release of *B. vertuana* should be made nearly two weeks after the plantation of the crops in May and June while supplying mass reproduction so as to use it as an effective controlling spy (Frick et al., 1983), partial success has been gained through mass release and Purple nutsedge in the

early term in America (Ellison and Barreto, 2004), *B. venosana* was not effective enough due to indigenous parasites in the release in Hawai and Fiji. In this study, contagion ratio and damage types of *B. vertuana* on purple nutsedge on peanut farm in Adana and Osmaniye.

The genus *Bactra* Stephens, 1834, which contains only six species throughout the Europe *B. lancealana* (Hübner, 1799); *B. furfurana* (Haworth, 1811); *B. venosana* (Zeller, 1847); *B. robustana* (Christoph, 1872); *B. lacteana* (Caradja, 1916); *B. suedana* Bengtsson, 1989 (Karsholth and Razowski, 1996), is represented by *Bactra lancealana* (Hübner, 1799); *B. furfurana* (Haworth, 1811); *B. robustana* (Christoph, 1872) in Turkey (Koçak and Kemal, 2009).

Von A. DIAKONOFF, the late leading specialist to *Bactra* and its allies dealt with ten species of this genus found in the Neotropics. This cosmopolitan genus is widely destributed and known from all geographic regions (Razowski and Becker, 2010).

Material and Method

Studies started at the beginning of August in 2011 once in 15 days and continued till October and 7 ground survey have been carried out.Totally 100 purple nutsedges, in different points of 5 peanut farms chosen randomly and seperately fin each city, Adana and Osmaniye, were examined as they were uprooted with a garden trowel. Therefore, 500 purple nutsedges for each city have been examined in each field survey. Infestation ratio has been calculated by estimating a proportion of damaged plants and total plants examined (%). Plants on which there are larva and pupa were brought to laboratory inside ice bars along with their soils covering lower parts of the soil and were taken into culture in cages there. Mature butterflies taken from there were detected by Asisst. Prof. Erol ATAY (Mustafa Kemal University, Biology Department, Hatay – Turkey).

Results and Discussion

According to results gained, identification of *Cyperus rotandus* as host of *B. venosana* was the first record in Turkey. Meanwhile, *B. venosana* is the first record for

Turkey fauna. Larvae of *B. venosana* were detected to enter into trellis of plants making a hole in a place (on the side) close rootneck part on trunk of the plant. Evacuations of larvae proceding towards root of the plant through feding get disposed through that hole (Figure 1). Larvae having completed growing become pupa near the burl of the plant in the upper part of the soil (Figure 2.) It has been established that larvae partly damage the burl of the plant but could not destroy it totally. Furthermore, upper sides of the damaged plants have dried completely and cannot set seed. Trematerra and Ciampolini (1989) statedsimilar results. While Frick and Quimby (1977) mentioned that damage ratio increases hugely when there exist 3 larvae in a plant, no more than one larva could be detected in our study.

Figure 1. The damage of *Bactra venosana*

Figure 2. The pupa of *Bactra venosana*

Infestation ratio of *B. venosana* on *C. rotundus* on peanut farms in Adana and Osmaniye is given on Table 1. While results of Adana and Osmaniye are alike, infestation ratio in Osmaniye is more. In each city, as less infection was determined in the first week of August (1st field survey), the highest infection ratio occured about the last week of September (5th field survey). Frick and Garcia (1975) drew the attention on that damage of such natural enemy on *C. rotundus* got a remarkable level. It has been found out that

infestation ratio on *C. rotundus* incerased till 90% around the end of September under normal farming conditions. However, September in which infestation is so dense is a period during which several agricultural crops are harvested.

Table 1. Infestation ratio of *B. venosana* on *C. rotundus* on peanut fields in Adana and Osmaniye

Field Survey No	Contagion Ratio (%)	
	Adana	Osmaniye
1	27.20	35.20
2	29.80	41.60
3	44.20	54.20
4	62.80	76.20
5	76.60	90.40
6	60.40	73.00
7	52.20	59.60

Therefore, as dense infestation could be considered not to be crucial then, it is necessary to bear in mind that new swelling cannot arise correspondingly with the dry of the upper part of the plant, and this may affect swerling density and quality inside soil adversely. It is obviously clear that development of *C. rotundus* could be decreased if such a natural infestation which happen about the end of seasons takes place at the beginning of seasons. Hence, it is mentioned that *B. vertuana* could avoid the reproduction of *Cyperus rotundus* under normal farming conditions (Frick and Chandler, 1978), yet *B. vertuana* is not effective in spring due to high mortality in winter (Frick et al., 1983); thus, release should be provided approximately two weeks after the crops cultivation in spring and autumn (Frick, 1978), by supplying mass reproduction so that they would be effective (Frick et al., 1983). More detailed studies should be carried on those survey fields, and mass reproduction and release opportunities should be researched. It is considered that release which are applied onto certain areas at the beginning of seasons may supply existing population through

establishing mass reproduction, and this could diminish the development of *C. rotundus*, a great threat in the area.

The Identification of Bactra venosana:

Subfamilia: Olethreutinae

Tribe: Bactrini

Genus: *Bactra* Stephens, 1834

Synonym: *Chiloides* Butler, 1881 (Koçak and Kemal, 2009)

Bactra venosana (Zeller, 1847)

Synonyms: *Phoxopteris venosana* Zeller, 1847; *Aphelia venosana* Herrich-Schaffer, 1849 (Diakonoff, 1954, 1964), *venosana* (Zeller, 1847); *truculenta* Meyrick, 1909; *scythropa* Meyrick, 1911; *geraropa* Meyrick, 1932; *banosii* Gozmany, 1960 (Diakonoff, 1964; Koçak and Kemal, 2009).

B. venosana is new for the Turkish fauna.

This species occurs in Southern Europe, in the islands of the Mediterranean, Northern Africa, Pacific Australia and Southern Asia (Diakonoff, 1954, 1964).

Totally 5 male and 4 female moths have been examined in the systamic study.

Measurements: Length male 5-6 mm, female 6-7 mm; wingspan male 13-14 mm, female 14-16 mm (Figure. 3).

Head pale fuscous with roughly projecting scales above (Figure. 4). Antenna ochreous-whitish. Labial palpus rather long and well developed, second segment strongly dilated by roughly projecting scales above and benaath; third segment short and whithish-gray. Thorax fawn-gray; abdomen dark fuscous. Forewings fawn-gray; cilia whitish-tawny. Hindwings light fuscous; cilia whitish-tawny.

Figure 3. Male of *Bactra venosana*

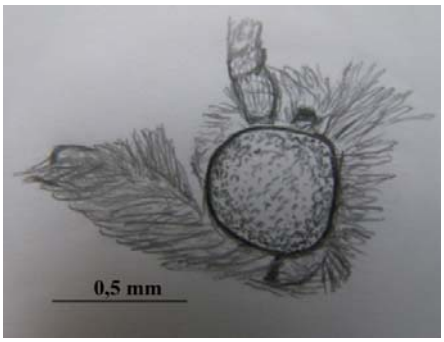

Figure 4. Head of *Bactra venosana*

Figure 5. Male genitalia of *Bactra venosana*

Figure 6. The left valva of *Bactra venosana*

***Male Genitalia*:** Uncus well developed, short and stout, curved, hook set along edges with a dense palisade of spines. Valva rather long and slender, with a clavate cucullus that is rather short, with a broad, obliquely rounded top with the comb of small and short bristles. Sacculus broad, with 5 strong apical bristles and a group of 15 short bristles across the middle of magrinal portion of sacculus. Juxta stong and triangular. Aedeagus robust, with about 10 cornitus. Vinculum with a triangular, ventral edge coverd with small teeth (Figures. 5, 6, 7).

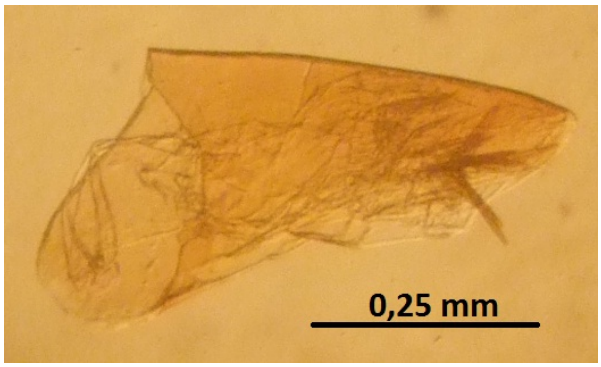

Figure 7. *Aedeagus of Bactra venosana*

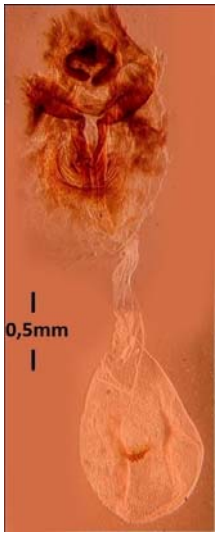

Figure 8. *Female genitalia of Bactra venosana*

***Female Genitalia*:** It is sclerotized as in figure 8. Bursa copulatrix short and membranous. Bursa copulatrix broad and membranous with a small signum.

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