

Black Watermelon Bug, *Coridius viduatus* (F.) (Heteroptera: Dinidoridae) in Hatay Region of Turkey

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Abstract: Black watermelon bug, *Coridius viduatus* (F.) (Heteroptera: Dinidoridae) is one of the most important pest of watermelon in many of African countries. This species is known to be present in Turkey. Although several studies on this species have been done in countries where it is present, it was not sufficiently studied in Turkey. This pest was observed first time on squirting cucumber [*Ecballium elaterium* (L.) A. Richard (Cucurbitaceae)] in Hatay province in 2004. This plant species is the natural host of several viruses creates significant problems in cucurbit plants in the Mediterranean basin. The studies were conducted in both laboratory and natural conditions in 2007 and 2008. Biological stages of the pest was investigated and determined. Furthermore, damage of the pest on four different cucurbit species [watermelon (*Citrullus lanatus* Matsum. and Nakai), cucumber (*Cucumis sativus* L.), squirting cucumber (*E. elaterium*) and bottle gourd (*Lagenaria siceraria* (Molina) Stadl.)] was investigated. In these studies, it was observed that the pest was able to complete its life cycle when only squirting cucumber and watermelon were used as food sources.

Keywords: Cucurbitaceae, black watermelon bug, *Ecballium elaterium*, Heteroptera, viruses.

INTRODUCTION

Watermelon (*Citrullus lanatus* (Thunb.) Matsum. and Nakai) is the second place in the vegetables as regarded to production quantity. Its production area in the world was 3.2 million ha and total production was 89.1 million tons in 2010. The biggest watermelon producer country is China with 56.7 million tons and Turkey is one of the important watermelons producing country after China, with 3.7 million tons per year. China produces 64% of the total world watermelon production; the share of Turkey is about 4.1% based on years [1]. It was reported that genetic origin of the watermelon is Africa [2, 3] but the exact geographical origin and domestication process of the crop watermelon is not clear. One possible genetic centre is in the Kalahari Desert region where various wild forms of the species can still be found [4, 5] but it has also been suggested that the origin is in the Sahel Region in Northern Africa [6, 7].

Watermelon has been grown in Africa and the Middle East for thousands of years. Throughout history, watermelon was distributed throughout the world as trade and knowledge of central Africa developed. The crop has been cultivated in India since at least 800 AD, and in China since 1100 AD. Watermelon was introduced to Europe either through Spain or Middle East and Anatolia. The distribution of watermelon into northern Europe was relatively slow, perhaps because

of the generally unsuitable climate for watermelon culture in most of Europe. During this time, watermelons were introduced into the New World by European explorer; culture of watermelon was reported in the Massachusetts colony in the 17th century. The spread of watermelon into other parts of the world has followed conventional trade routes [5].

There are several insects causing damage on watermelon important crop species for either Turkey or world. One of them is black watermelon bug (BWB) (*Coridius viduatus* (F.) (Heteroptera: Dinidoridae). The genus, *Coridius*, including this species was described by [8]. Afterwards, this species was represented in *Aspongopus* genus by [9] but current researches classified this species under *Coridius* genus [10-12].

Coridius viduatus is black with 1.8 - 2.0 cm length and 0.8 - 1.0 cm width [13]. It is the most important pest of watermelon in most of the African countries. It is present in almost all Africa, Arabian, Peninsula, Egypt, Israel Iran and Turkey [14, 15]. This pest is known as main pest of watermelon in Sudan [16]. In this country, BWB, a prevalent pest, is collected and its oil is extracted after holding in hot water for certain time. This oil is used as food and medicine in dermatological diseases due to its antibacterial effect [17-19]. As in most countries that insect is consumed in Sudan and one of the most popular one is BWB [18]. Biodiesel production from this insect was reported in this country as well [20]. Although several researches on similar topics related with the pest in the countries where it is present were conducted, there are no sufficient studies on the pest in Turkey. Presence of this species in

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Bursa and Gaziantep provinces was reported [21]. We carried out a study on superfamily of Pentatomoidea in Hatay region (1996 - 1997) but this species was not observed [22]. In later years, it was found first time on squirting cucumber [*Ecballium elaterium* (L.) A. Richard] in 2004 in Hatay province in a research done in Gaziantep and Hatay provinces. It was observed that the insect spread to the larger area than where it was found in following years. Squirting cucumber is single species belongs to *Ecballium* genus in Mediterranean basin [23]. This species is also host of some important viruses in Cucurbitaceae crops [24-28].

The aim of the study is to introduce *C. viduatus*, an important pest in watermelon and melon in the world and a possible pest in Turkey in the near future, and to report the presence and importance of this species in Hatay region.

MATERIALS AND METHODS

Materials were eggs, nymphs and adults of *C. viduatus* and *C. lanatus*, *Cucumis sativus* L., *E. elaterium*, and *Lagenaria siceraria* (Molina) Stadl. species as host plants and net cages (45 x 45 x 70 cm).

Adults of *C. viduatus* were collected from squirting cucumber in nature. They were used in the experiments after they were fed on *E. elaterium* at 24 ± 2 °C, $65 \pm 10\%$ humidity and 14 / 10 h light / dark conditions for a week. Four seedlings from each host plants (watermelon, cucumber, squirting cucumber and bottle gourd) were placed in the cages and a couple (♀ + ♂) of insect for each plant was released (Figure 1a, b). The experiment was conducted with four replications and daily damage was recorded by daily observations. In case of death of insect in the cages, new insects were added. Seedlings were irrigated with tap water when they need and damage duration of *C.*

viduatus on different plant species was determined. Additionally, eggs were placed on four different plants in different four cages and developments of the hatching nymphs were observed. Therefore, it was determined that *C. viduatus* was able complete its life cycle on which plant species. Besides, biological periods of the insect were observed. The experiments were carried out in laboratory of Agricultural Faculty of Mustafa Kemal University in September and October of 2007 and 2008.

Determination of this species was done according to characteristics reported by [12, 29, 30].

RESULTS AND DISCUSSIONS

Length of BWB was measured as 1.84 ± 0.51 (n = 10) cm and width of the insect was 1.07 ± 0.39 (n = 10) cm. Nymphs and adults of the insect causes important damage by feeding on stems, shoots and leaves of watermelon and other Cucurbitaceous crops in early developmental stage of the crops [31]. It was well known that BWB causes important damage on Cucurbitaceous crops in several African countries. In our investigation, we could not reach detail information about BWB in Turkey. This pest was determined first time on squirting cucumber in Hatay province in 24 October 2004. Although population of BWB was low in observed year, it was observed that population and distribution area of BWB has continuously increased for four years. Although number of BWB changed based on plant size, more than 1000 nymphs and adults were counted on one single plant. This result showed that BWB can spread in larger areas in short time period in the near future.

When seedlings of *C. lanatus*, *C. sativus*, *E. elaterium* and *L. siceraria* placed in cages together with *C. viduatus* (a) were compared with control plants (b), it was observed that plant growth was inhibited and *C.*



(a)



(b)

Figure 1: *Coridius viduatus* on *Citrullus lanatus* plants (a) and *Lagenaria siceraria* plants (b) in cages.

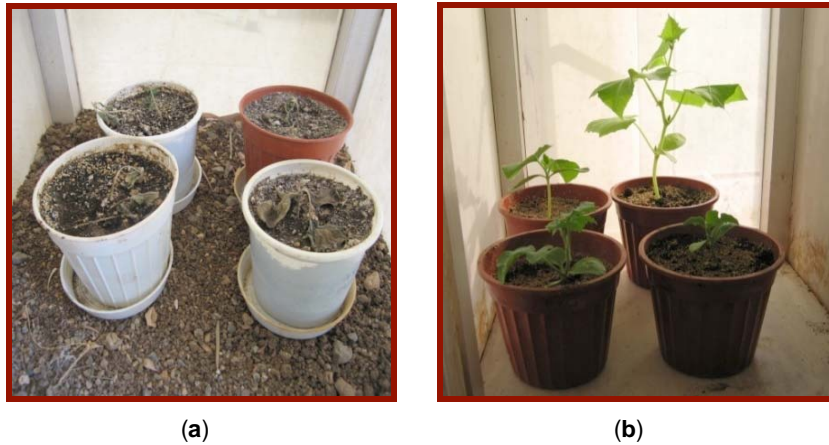


Figure 2: Damage of *Coridius viduatus* on *Citrullus lanatus*, *Cucumis sativus*, *Ecballium elaterium* and *Lagenaria siceraria* seedlings (a) and control plants (b).

viduatus killed all seedlings within two weeks (Figure 2).

In laboratory studies, it was determined that BWB can complete its life cycle on watermelon and squirting cucumber but nymphs hatching (Figure 3a, b) from eggs left by adult on cucumber and bottle gourds could not reach adult stage and complete its life cycle. Under laboratory conditions, when squirting cucumber was used as food at 24 ± 2 °C, time from egg to adults stage was reported as 5 - 6 weeks [27]. According to the same study, one female individual produced 741 eggs for five weeks with high reproduction capacity and 470 nymphs hatched from the eggs transformed to adults. This results shows that BWB is a quite dangerous pest because of its reproduction power.

Watermelon has great importance in either Turkish or world agriculture. It is the third most produced vegetables after tomato and potato in Turkey. Thirty five percent of the watermelon production is done in

Mediterranean region and other important watermelon producing regions are Aegean, Marmara and Southeast Anatolia [32]. When BWB spreads in Cucurbitaceae crops growing area in Turkey, especially in the Mediterranean region a serious dangerous situation for those regions will occur. In studies carried out, BWB was not observed on domesticated Cucurbitaceae species yet. However, squirting cucumber is one of the natural host plants of some viruses in cucurbits. [24], isolated Squirting Cucumber Mosaic Virus from *E. elaterium*. They reported that this virus can infect other commercially important cucurbit species such as watermelon, melon and cucumber. [25], suggested that squirting cucumber is main source of infection for some important viruses causing damage in cucurbits. [26], isolated Cucumber Green Mottle Mosaic Virus from naturally infected melon and squirting cucumber in Israel. [28], reported that *E. elaterium* is a host of Zucchini Yellowing Mosaic Virus but it did not show symptom of the diseases. According

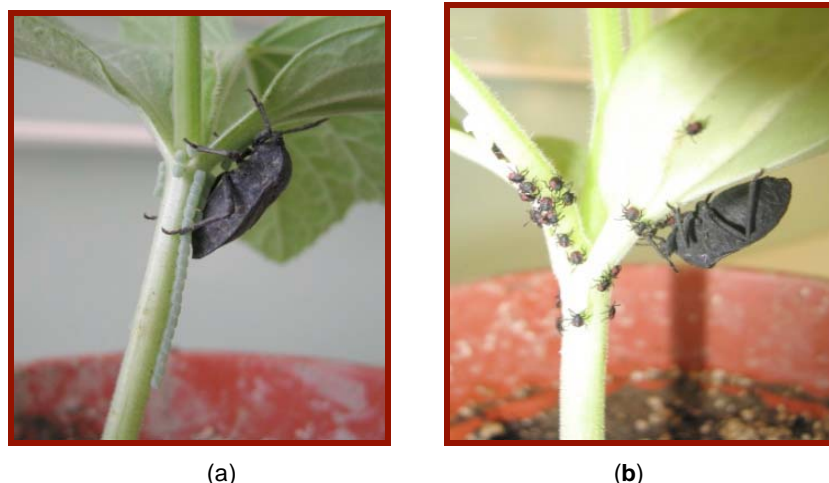


Figure 3: Adult of *Coridius viduatus* leaving egg on *Lagenaria siceraria* plant (a) and nymphs with adult (b).

to literature review we did, there is no any study about transmission of viruses from squirting cucumber to other cucurbit species by BWB. It is a common sense that heteropterans are not prominent vectors for viral, bacterial and fungal plant diseases. However, transmission of some important plant diseases by heteropteran bugs from plant to plant is reported in previous studies. [33, 34], reported that *Nezara viridula* L. (Heteroptera: Pentatomidae) was an important vector in transmission of both bacterial and fungal diseases in soybean.

CONCLUSION

As a conclusion, *C. viduatus* is an important pest in cucurbits crops. On the other hand, this insect will attract the attention of scientists in the future due to its utilization as food in human diet in some countries, production of oil from it and use of this oil both as food and as an antibacterial agent in some skin diseases and production of biodiesel form this insect.

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