Association of the cotton shedder bug *Creontiades pallidus* (Rambur) with the entomophtorous fungus *Entomophtora erupta* (Dustan) Hall in Israel

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ABSTRACT The cotton shedder bug *Creontiades pallidus* (Rambur) (Heteroptera: Miridae) generally inhabits alfalfa fields in the Bet Shean valley of Israel. It is often overlooked in spite of the fact that it feeds on the leaves of its hosts. The damage to cotton flowers and bolls grown in the vicinity of alfalfa was thought to be caused by this insect and was first investigated in 1985. In 1988, it was proved that the insect had been the cause of total loss of large cotton fields. In the course of the examination of the corpses of many nymphs and adults, the presence of a mycelium was noticed. The fungus was identified as *Entomophtora erupta* (Dustan) Hall. In certain conditions, this entomophtorous fungus may be considered as an efficient insect pathogen and may play an important role in the biological control of this pest in the Bet Shean Valley.

IZVLEČEK ODNOSI MED ŠKODLJIVCEM BOMBAŽEVCA, STENICO *CREONTIADES PALLIDUS* (RAMBUR) IN GLIVO *ENTOMOPHTORA ERUPTA* (DUSTAN) HALL V IZRAELU Stenice *Creontiades pallidus* (Rambur) (Heteroptera: Miridae) živijo v dolini Bet Shean (Izrael) predvsem na poljih lucerne. Čeprav sesajo liste te hranilne rastline, jih kmetovalci pogosto prezrejo. Leta 1985 so prvič raziskovali tudi škodo, ki so jo te stenice domnevno povzročile tudi na bombažnih poljih v bližini lucerniš. Leta 1988 pa so dokazali, da so te žuželke povzročile popolno uničenje velikih polj bombaževca. Pri pregledovanju teles ličink in odraslih stenic so ugotovili prisotnost micelija glive, ki so jo kasneje določili za vrsto *Entomophtora erupta* (Dustan) Hall. Ob določenih razmerah je lahko ta patogena gliva uspešna pri uničevanju teh žuželk in bi lahko postala pomemben dejavnik pri biološki kontroli stenic *Creontiades pallidus*.

Introduction

The cotton shedder bug *Creontiades pallidus* is known in different countries as a pest affecting a variety of vegetable and industrial crops (NAKASH et al., 1989; PEARSON and MAXWELL DARLING, 1958; STAM, 1987). This bug is always found in alfalfa fields but it has always been overlooked as no damage could be related to it. However, the bug is often

seen preying on other insects in alfalfa (NAKASH, personal observations). In 1986, this bug was first reported as having caused damage to cotton. Specimens of two species of bugs were captured on cotton and sent to A. GOGALA in Yugoslavia who identified them respectively as *Creontiades pallidus* (Rambur) 1845 and *Campylomma impicta* (Wagner) 1956, both belonging to the Miridae family. Preliminary studies, conducted in 1986, showed clearly that the damage to the cotton could have been induced only by *C. pallidus*. In 1988, this bug destroyed bolls from several, almost entire large cotton fields.

In 1986, it was found that a certain part of the bug population showed infection due to a fungal disease. The fungus was identified by BEN-ZÉEV et al., 1988, as *Entomophthora erupta* (Dustan) Hall. Earlier on this same fungus had been observed in four more cases to have affected only the mirid bugs (DUSTAN 1924; HALL 1959; WHEELER 1972) in Canada and the USA. A different species of the fungus, *E. helvetica*, was identified from a mirid in Switzerland (BEN-ZÉEV et al., 1985). Other known species of *Entomophthora* are found on the Diptera and Homoptera. The *Entomophthora* species of the Diptera had already been cultured on some artificial media.

C. pallidus in Israel

C. palldius is found in alfalfa fields in the Bet Shean Valley in small populations during the winter months. The population growth starts in May and ends in July. It then drops down to a certain level, followed by some fluctuations until November. In cotton, the populations reach their peak during the same period, but are considerably affected by chemical applications intended for other pests. Preliminary screening of host plants for *C. pallidus* has revealed that this bug is polyphagous although, in Bet Shean, it prefers to feed and reproduce on alfalfa and cotton.

In alfalfa, no signs of damage can be attributed to *C. pallidus*. On the contrary, *C. pallidus* showed to be somewhat beneficial as it preys on caterpillars and aphids. Damage is caused quite frequently by this bug on cotton. The puncturing of the flower bud results in the immediate degeneration of the flower which sheds soon thereafter. In small bolls the puncture is easily detected as a small black, shiny spot. Small bolls react in the same way as flower buds and are shed quite rapidly. Big bolls are not shed; however, the internal tissue of the peel develops soon after being pierced a hypertrophic growth which results in a quick opening of the boll parts. The unripe seed hairs rot very soon afterward.

In the Bet Shean area, plants are usually wet with dew on most of the summer mornings. This creates good conditions for the epidemiology of the Entomophthorous fungus. These conditions prevailed in the summers of 1986 and 1987 whereby *E. erupta* reduced the bug population to a size which

could cause but little damage. In 1988, the summer was very dry and not favourable to the growth of *E. erupta*. The bug populations reached relatively high peaks, causing the shedding of almost all flower buds and of small bolls in some fields where this bug had been previously overlooked in the spraying programmes.

Discussion

The cotton shed bug has adapted itself in the hot Bet Shean Valley mostly to alfalfa which grows all the year round. Probably, as a result of intense cutting of the alfalfa during the summer, the bug is forced to seek new hosts nearby. According to the high number of the bug offspring produced on it, cotton appears to be a suitable substitute for alfalfa (unpublished data). The ordinary and weak chemicals used on cotton in Israel at the beginning of the growing season does not seem to affect the bug which survives by feeding only on plants, having lost its insect prey.

The meteorological conditions prevailing in the Bet Shean Valley at the A beginning of most summers, favour the development of *E. erupta* and its epidemiology. This fungus produces conidia on the external surface of the insect when the latter is still alive. The wandering bug spreads inoculum for further infection. The specificity of *E. erupta* to Mirid bugs is interesting as it can serve as a biological control measure in the field when the fungus arrives late. So far, no study has been conducted on the subject.

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