

Smicronyx smreczynskii F. Solari, 1952 (Insecta: Curculionidae): Possibilities for Biological Control of Two *Cuscuta* species (Cuscutaceae) in District of Ruse

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Abstract: In the area of the Institute of Agriculture and Seed Science “Obraztsov Chiflik” – Ruse, Bulgaria, during the last 15 years it was observed that the formation of galls in dodder (*Cuscuta*) caused by *Smicronyx smreczynskii* F. Solari, 1952 was not affected by weather conditions. Such formation occurred in two *Cuscuta* spp. One or two larvae of this species were registered per single gall. Some biological data about the larval stage of *S. smreczynskii* are presented. Studies of *Smicronyx smreczynskii* are important for the biological control of dodder.

Key words: *Smicronyx smreczynskii*, biology, *Cuscuta* species, biological control

Introduction

The parasitic weeds of the genus *Cuscuta* L. (dodders) are ubiquitous in Bulgaria. Their negative economic impact is the highest in forage crops (SAUERBORN *et al.* 2007). *Cuscuta* spp. has an inhibitory effect on alfalfa (*Medicago sativa* L.) and adversely affects the creation of uniform and productive grass-cover. There is a number of weed species in the genus *Cuscuta*, in which biological control can be applied. Insects have been studied for their role as potential agents for dodder control in crops and several reports showed that weevils may be used for this purpose (MARIKOVSKII, IVANNIKOV 1966, BALOCH 1968).

In order to determine the possibilities for biological control under conditions of sustainable agriculture in the region of the Institute of Agriculture and Seed Science (IASS) “Obraztsov Chiflik” – Ruse, the associated insect fauna was surveyed. In the present communication, we present the results of our observations on the biology of weevil *Smicronyx smreczynskii* F. Solari, 1952 (Curculionidae), a species with potential importance as an agent of biological control of *Cuscuta* spp.

Material and Methods

The observations were carried out in the region of IASS “Obraztsov Chiflik” – Ruse (altitude

152 m). Both crops and weeds characterized with significant levels of infestation with dodder were studied. Two species of the genus *Cuscuta*, i.e. field dodder, *Cuscuta arvensis* Beyr. Ex Engelm., and alfalfa dodder, *Cuscuta epithymum* L., were observed in stands of field crops and weeds. Galls on dodder plants were counted. Galls collected in May, June and July 2011-2013, were analyzed and larvae living in them were counted. Galls were placed in glass containers under laboratory conditions. Samples from the emerging specimens were identified by Dr Enzo Colonnelli, ARDE Museo Civico di Zoologia, Rome, Italy.

Results and Discussion

In the survey of the weed, an abundant gall formation was found (Fig. 1). Up to 11 galls per branch were counted. The weevil species was identified as *Smicronyx smreczynskii* F. Solari, 1952.

According to HEIJERMAN, ALDERS (2000), *S. smreczynskii* resembles *S. jungermanniae* (Reich, 1797), but the body of the former is wider and its cephalothorax is slightly longer. The average edge is less pronounced; the prothorax is much broader than long and rounded. The body and the legs are black; the elytra are dotted with brownish flakes, forming bright spots on the upper side. The elongated and flat body



Fig. 1. *Smicronyx smreczynskii*: gall formation

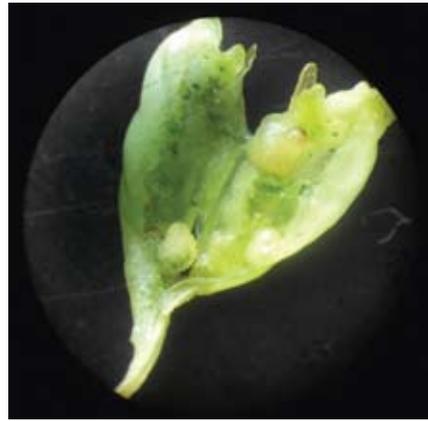


Fig. 2. *Smicronyx smreczynskii*: larvae in the gall

has a length of 2-2.2 mm, and the legs are rather short.

The larva develops into a spherical, rarely fusiform gall, reaching a length up to 6 mm, reddish in colour. Pupation occurs in the soil. The species is hard to be determined by the traits specified in keys and must be identified by a specialist.

We recorded the presence of 1-2 larvae per a gall (Fig. 1). After reaching full maturity, the larvae leave the galls. The larvae that are still in galls are green, while those leaving the galls in last larval instar are yellowish with brown head. The larvae are typical of weevils, i.e. curved and legless. Their length is about 1.5 mm (Fig. 2). The pupal stage lasts 10-12 days. The adult insect is a beetle with a length of about 2 mm.

S. smreczynskii is widespread across Europe: Southern Sweden, Poland, Czech Republic, Slovakia, Northwestern Italy, Serbia, Bulgaria, Moldova, etc. (HEIJERMAN, ALDERS 2000). According to DIEKMANN (1986), the species of *Smicronyx* live in cool and moist areas, such as edges of forest clearings and near water basins. According to ANGELOV (1980), the species are found in dry and wet biotopes. In Bulgaria, the pest is found from May to July, at altitudes from 200 to 1400 m, at various sites, e.g., Vidin, Yambol, Stara Zagora spa, Plovdiv, Asenovgrad, Sestrimo, Zemen (Kyustendil), Golo Burdo and rest house "Sandanski" (Pirin).

According to our observations, over the last 15 years the formation of galls in dodder caused by *Smicronyx* was not affected by the weather condi-

tions and was seen in both wet and dry habitats. This occurred in dodder regardless of the host plant.

A factor that can restrict the effect of the impact of *Smicronyx* spp. is the treatment of soil, in particular the deep plowing. The pupa can be destroyed or buried deep, which make the emergence of the adult insect impossible. Pesticides applied in pest control during the flight of the beneficial species (*Smicronyx*) are another limiting factor during the vegetation (SAUERBORN *et al.* 2007).

The disadvantages of the biological control of weeds are in that it takes a long time (from 5 to 10 years) to achieve effect, and requires governmental support and high initial investments. Furthermore, the biological control is not attractive for the industry, and the short-acting control is not suitable, for example in cash-crops (TESSEMA 2007).

The finding that *S. smreczynskii* are destroyers of the reproductive organs of dodder in the region of Ruse is important because dodder is a harmful parasitic weed and presents a serious problem in field crops, especially in alfalfa, field clover, etc. Since the climatic conditions in Bulgaria are obviously suitable for the development of *S. smreczynskii*, the study of this pest is extremely important to start the biological control of the dodder in Bulgaria.

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