NOTE: Life History of *Lixus bardanae* on Curly Dock (*Rumex crispus*) in Turkey

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The biology of *Lixus bardanae* (F.) (Coleoptera: Curculionidae) on curly dock (*Rumex crispus* L.) in northeastern Anatolia (Bayburt, Erzurum and Kars Provinces), Turkey, was studied during the years 2000 and 2001. *L. bardanae* completes one generation in a year, overwintering as an adult. It feeds on leaves of the host plant. Females lay eggs individually into stems and the young larvae create galleries in stems while feeding. Pupation occurs inside stems in cells fashioned from frass. In late September, adults move into soil and overwinter in an upright position around the roots of the host plant. Infestation levels were found to range between 34% and 84%. Two parasitoids, *Exeristes roborator* F. and *Endromopoda phragmitidis* Perve (Hymenoptera: Ichneumonidae), were reared from *L. bardanae*.

KEY WORDS: Biology; life history; *Lixus bardanae*; *Rumex crispus*; Turkey.

Curly dock (*Rumex crispus* L.) (Polygonaceae) is a perennial that propagates by seed and shoots developing from buds on the uppermost portion of the taproot; it infests a number of crops in Turkey, including sugar beets and sunflowers in Erzurum (10,12). During harvesting, its seeds contaminate those of wheat, thereby reducing grain quality. These impure seed lots facilitate the dissemination of the weed to other fields during planting (11).

The adult of *Lixus bardanae* (F.) (Coleoptera: Curculionidae) feeds on *Rumex* spp. and *Laserpitium gallicum* L. (Apiaceae), and has been recorded in Caucasus, middle Asia, southern Europe, Turkey, France, Germany, Italy, and the Netherlands (1–9). Apart from brief descriptions by Scherf (8) and Ter-Minasyan (9), no detailed information on the biology of *L. bardanae* has been found in the literature.

This study was conducted in Bayburt, Erzurum, and Kars Provinces in the northeastern Anatolia Region of Turkey, the main goal being to investigate the biology of *L. bardanae* on *R. crispus* in this region. The area includes extensive agricultural lands at altitudes between 1500 and 2400 m. The climate is cold and snowy during winter, and warm and dry during summer.

From May to September during 2000 and 2001, at 10-day intervals, observations were conducted in the research areas, especially at Kop Mountain (2400 m alt.); at each inspection, ten plants were randomly selected for examination. During the 2 years all plants with larvae of *L. bardanae* were recorded as infested, and the infestation ratio was determined. Observations about weevil lifestages and their duration were recorded. Overwintering, feeding, mating, egg laying, and feeding damage were assessed under natural conditions. In order to determine the overwintering stage and its location, 17 observations were made in early spring on two occasions (18 May 2000 and 11 May 2001). Observations on feeding (n=27), egg deposition (n=29) and mating (n=16) behavior were also made. When the eggs were first observed in the plants, the plants were marked and periodically examined for hatching. In order to obtain adults and parasitoids, 50 plants containing larvae and pupae

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were held under laboratory conditions (20–25°C and 60–70% r.h.) in ventilated plastic boxes (10×25×10 cm). After emerging, they were scored one by one. All plants were subsequently dissected, the dead pupae due to parasitism were determined, and larval gallery lengths were measured.

Adult *L. bardanae* overwintered at a depth of 1–3 cm in the soil around *R. crispus* roots. Adults were first encountered on 6 June in 2000 and on 8 June in 2001 (Fig. 1). Shortly after emergence, adults fed on foliage by chewing holes in the leaves. The adults were observed in the field until 26 June 2000 and 21 June 2001. Females chewed holes in *R. crispus* stems, laying their eggs individually therein. Eggs were found between 16 June and 4 July in 2000, and 12 June and 7 July in 2001. Each plant usually contained more than one egg. Eggs hatched within 12 to 17 days. Young larvae were first observed on 28 June 2000 and 30 June 2001. Larvae oriented themselves either head down or head up, while mining galleries for feeding within the stems. After almost 2 months of feeding, individual galleries were 15–20 cm long, and each plant had one to 17 larvae. Larvae were found until 29 Aug. 2000 and 9 Sept. 2001, the total larval period lasting about 2 months. Mature larvae build pupal cells within the galleries from stem frass. Pupae were observed from 13 Aug. to 7 Sept. in 2000, and from 10 Aug. to 19 Sept. in 2001. Newly eclosed adults remained in the stems for 5 to 9 days before boring exit holes through the stem walls. Adult emergence began on 27 Aug. in 2000 and on 25 Aug. in 2001. In the field, the adults of the first generation were observed until 16 Sept. in 2000, and 30 Sept. in 2001. At the end of September, adults entered the soil and overwintered in an upright position around the roots of the host plant, usually individually or sometimes in groups of up to five. *L. bardanae* completed only one generation per year in 2000 and 2001 (Fig. 1).

Fig. 1. Duration of biological stages of *Lixus bardanae* in northeastern Anatolia in 2000 and 2001.