

Aphthona czwalinae



Classification

Phylum: Arthropoda

Class: Insecta

Subclass: Pterygota

Division: Endopterygota

Order: Coleoptera

Suborder: Polyphaga

Superfamily: Chrysomeloidea

Family: Chrysomelidae

Subfamily: Halticinae

Tribe: Aphthonini

Genus: *Aphthona*

Species: *Aphthona czwalinae* Weise

General Life History

There is little published information available on *Aphthona czwalinae* biology, but its life history is similar to that of other univoltine *Aphthona* species (Maw, 1981; Rees and Spencer, 1993). *A. czwalinae* overwinters as a diapausing larva, in the soil and on or near a leafy spurge root. Overwintered larvae resume development in the spring, and pupation occurs within a soil cell from late spring to early summer. Adult beetles emerge from the soil throughout the summer, and begin feeding on leafy spurge leaves and flowering structures.

A. czwalinae adults are about 3 mm long; they rarely fly under field conditions and instead move about by hopping in typical flea beetle fashion. Adults are relatively long-lived beetles, capable of surviving several weeks to several months, depending on field conditions (Maw, 1981). At a given location, *A. czwalinae* adults begin to emerge and reach their peak abundance earlier than do adults of most other introduced *Aphthona* spp. (Hansen, unpublished data).

Mating occurs on leafy spurge shoots, after which adult females lay eggs at the soil surface or in the soil, on or near the base of a leafy spurge stem. Generally, *Aphthona* spp. females lay a total of 100-300 eggs during their lifetime, in a series of small groups every three to five days (Maw, 1981). Larvae hatch, burrow into the soil, and begin feeding on very small leafy spurge roots and root hairs. As they develop, *A. czwalinae* larvae utilize progressively larger spurge roots; mature larvae may also be found burrowing within large lateral roots and root buds. Larval root feeding continues through the summer and into the fall, until cold temperatures and the onset of dormancy. There are a total of three larval stadia.

Host Range in the Field and Greenhouse Tests

Aphthona czwalinae appears to feed only on leafy spurge (*Euphorbia esula* L.) and several other closely related *Euphorbia* spp. in its native Europe (Gassmann, 1984). To date, introduced United States populations of *A. czwalinae* and *A. lacertosa* have been reported only from *E. esula*.

Laboratory and controlled field studies showed limited feeding by *Aphthona czwalinae* adults on the foliage of a number of European and North American *Euphorbia* spp. (Gassmann, 1984). However, only a few European *Euphorbia* spp. in the subgenus *Esula* supported larval development and could be considered likely hosts (Gassmann, 1984). No North American *Euphorbia* spp. in the subgenus *Esula* were included in these host specificity tests. Thus, the host plant range of *Aphthona czwalinae* appears restricted to the subgeneric level, and may only include leafy spurge and other Eurasian *Euphorbia* species in the subgenus *Esula*.

List of known parasitoids or predators of *Aphthona czwalinae*

Consumption of *Aphthona* spp. larvae and adults by generalist predators, particularly ants, has been reported anecdotally. No native or introduced parasitoids have been reported among *A. czwalinae* populations in the United States.

Impact of *Aphthona czwalinae* on Leafy Spurge

Under optimal site conditions, *Aphthona czwalinae*/*A. lacertosa* populations will, directly or indirectly, kill leafy spurge plants over large areas. As leafy spurge stem densities decline, the relative abundance of nontarget grasses and forbs will increase. Leafy spurge control over hundreds of acres has been reported from some locations in the western United States where *A. czwalinae* and *A. lacertosa* were released.

The host range of *Aphthona czwalinae* is limited to a subset of plant species in the subgenus *Esula* of the genus *Euphorbia*, including the target weed (leafy spurge) and cypress spurge (*E. cyparissias* L.), an introduced weed in eastern North America. The two federally-protected native spurges (*Euphorbia garberi* Engelm. and *E. deltiodes* Engelm. ex Chapm.) are in the subgenus *Chamaesyce* (Pemberton, 1985) and are not potential host plants for *A. czwalinae*.

The potential host status of 21 North American species (occurring north of Mexico) in the subgenus *Esula* has not been evaluated, including *E. purpurea* (Raf.) Fernald and *E. telephiodes* Chapm., two rare species being considered for protection (Pemberton, 1985). Of these, nine are annuals that could possibly be utilized by *A. czwalinae*, but would not permit completion of the life cycle and, hence, population establishment; flea beetle larvae require plant roots year-round. The 12 perennial species in the subgenus could be considered potential *A. czwalinae* hosts, though most occur in the southern United States and are not sympatric with leafy spurge populations (Pemberton, 1985).

Location where *Aphthona czwalinae* was originally collected

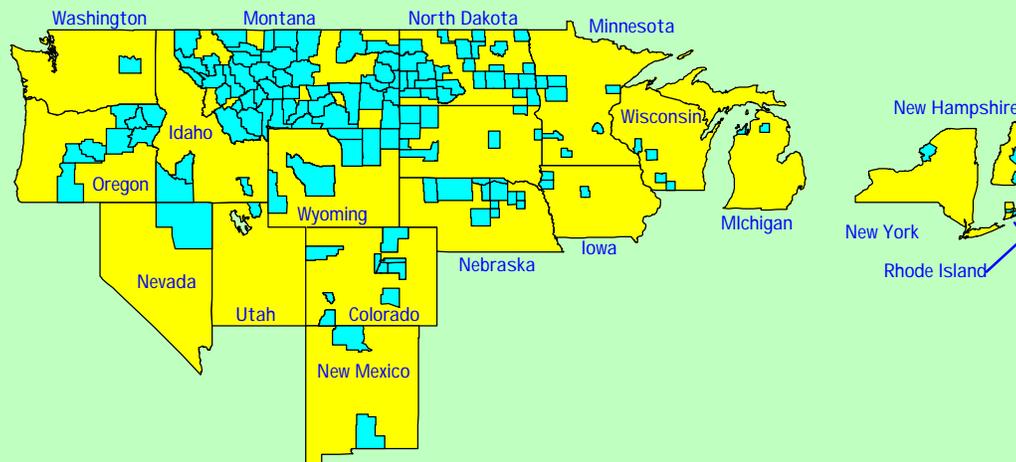
Insects initially released in the United States were collected in Austria and Hungary. *Aphthona czwalinae* is found from central and eastern Europe to central Asia and eastern Siberia.

Current North American Distribution

Aphthona czwalinae was approved for United States release in July of 1987. Through 1999, mixed *A. czwalinae*/*A. lacertosa* populations have been released in 19 states and over 160 counties. In several states, *A. czwalinae* and *A. lacertosa* have been widely distributed throughout spurge infested counties. These species also have a limited distribution in central and western Canada.

Aphthona lacertosa & Aphthona czwalinae

USDA - APHIS - PPO 1989 - 1999 Redistribution



Data Source: BBCS Biocontrol of Weeds Database
Map by Harold Ziolkowski USDA-APHIS-PPO Bozeman Biological Control Station

Expected North American Range

There are no obvious climatic or ecological barriers to survival and establishment of *Aphthona czwalinae* in most or all of the spurge-infested areas of the United States and Canada. However, *A. czwalinae* appears adapted to sites that are more mesic than those best suited to other introduced *Aphthona* spp. The largest *A. czwalinae* populations should be expected where precipitation patterns and/or soil conditions favor comparatively higher moisture levels. Of course, the ultimate North American range of this insect will reflect the extent of human redistribution activities.

Specific References on the *Aphthona czwalinae*

Gassmann, A. 1984. *Aphthona czwalinae* Weise (Coleoptera: Chrysomelidae): A candidate for the biological control of leafy spurge in North America. Intl. Inst. of Biol. Contr., Delémont, Switzerland. Final screening report: 20.