Chamaesphecia hungarica

Classification

Phylum: Arthropoda
Class: Insecta
Subclass: Pterygota
Division: Exopterygota
Order: Lepidoptera
Suborder: Ditrysia
Superfamily: Sesioidea
Family: Sesiidae
Subfamily: Sesiinae
Tribe: Aegeriini
Genus: *Chamaesphecia*
Species: *C. hungarica* (Tomala)

General Life History

The univoltine adults of *Chamaesphecia hungarica* emerge between mid-May and the end of June in Yugoslavia and Hungary according to Gassmann *et al.* (1991). Field populations established at Delemont, Switzerland began emergence at the end of June and continued for five weeks. Mating occurs in the morning within 24 hours of emergence; under laboratory conditions, about 80% of mating was successful when a newly emerged female was placed with one or two males in a horizontal plastic cylinder (11 x 15 cm) at room temperature. It was important not to add the males until movement of the female abdomen indicated she was calling and the containers had to be cleaned after each copulation to remove any pheromone.

Best oviposition was obtained by offering 15 cm long spurge stems stuck into moist perlite and covered with a plastic cylinder. The females were fed with a few drops of sugar-honey solution poured on the perlite. Oviposition began shortly after mating, with the highest rates of egg laying occuring with a photoperiod of 18 hours at 28° C (Gassmann *et al*., 1991). Average female longevity was five days and they laid an average of 123 eggs (range 59-175, n=7) from a potential of 205 eggs (range 182-215, n=7). The females survived 13 days in the fluctuating temperatures of an unheated greenhouse, but this did not increase the number of eggs laid.

In the field, the eggs are usually laid singly and, during the spurge flowering period more than half of them are laid on the bracts and a few on the stem. The eggs are laid both on the leaves (mostly on the upper surface) and on the stem, before and after flowering.

The larvae of *C. hungarica* hatch in about 17 days at 20° C and penetrate into the shoot a few centimeters above the ground (Gassmann *et al.*,1991). About one half of the larvae hatching from eggs laid on the stem penetrate the stem successfully. Only 20% of those hatching from eggs laid on the leaves and most of those hatching from eggs laid on the upper part of the plant drop-off and die (Gassmann *et al.*, 1991). The young larvae mine the stem cortical parenchyma just below the epidermis for a few centimeters and then move into the pith and down into the root. Most of the larval feeding is done in the root. Measurements of head capsules indicate that there are probably 7 larval instars and they reach the 6th or 7th instar before winter (Gassman *et al.*, 1991). In the spring the larva mines up to the stem base and prepares an emergence hole a few cm above the ground and then pupates within the stem. The empty pupal case is left protruding from the stem after emergence.

Host Range in the Field and Greenhouse Testing

The host range tests showed that *C. hungarica* is restricted to spurges in the *E. esula-virgata* complex. No larval feeding occurred on any plants outside this group that were tested: 17 other *Euphorbia* species, five species in other genera of the family, and seven species in other families. This is a more restrictive host range than any of the agents previously approved for release against leafy spurge. According to Gassmann *et al*. (1991), larval development on the two accessions of North American leafy spurge that were tested were not significantly different than that on the normal host, *E. lucida* Waldst & Kit. However, only the root of North American leafy spurge was suitable for development in contrast to *E. lucida* in which the larvae could develop on both the root and the shoots. The European spurge *E. lathyris* L. also supported larval development although it was a poorer host than species in the *E. esula-virgata* complex, and in field tests the females discriminated against it for oviposition.

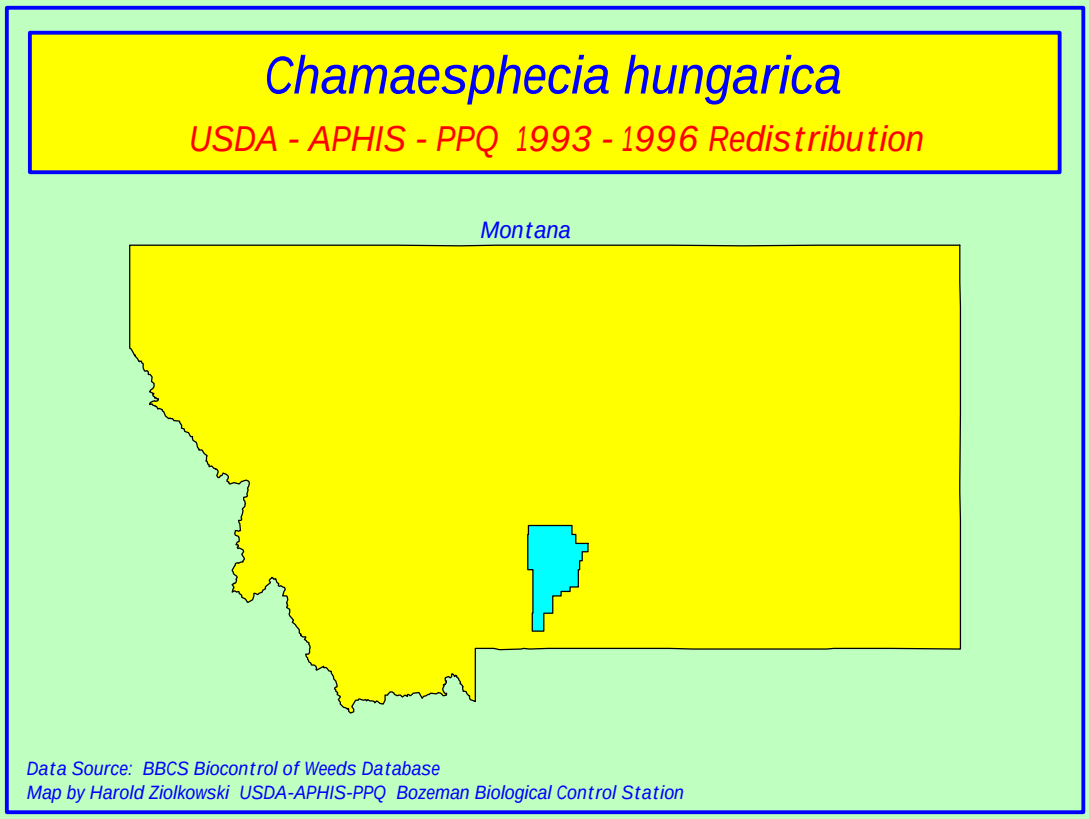
In the laboratory the larvae developed equally well on well-watered and drought-stressed plants (Gassmann *et al*., 1991). This indicates that the field restriction of *C. hungarica* to moist habitats appears to be related to the needs and preference of the adult rather than the larvae. On the basis of the larval survival tests, it is expected that *C. hungarica* will attack and develop on *E. esula* L. in North America growing in moist habitats. The ability of the larvae to penetrate *E. esula* is less than that on *E. lucida*, but there will be a strong selection pressure in North America to improve the larval penetration ability.

Location where *Chamaesphecia hungarica* was originally collected

Insects initially released into the United States were collected in Hungary**.** *C. hungarica* was approved for release in April of 1993. *Chamaesphecia hungarica* native origins include Southeastern Czechoslovakia, Austria, Hungary, and Yugoslavia (Serbia, Croatia).

Current North American Distribution

Through 1996, *C. hungarica* has been released only in Montana. Release and distribution of this organism has been restricted due to low insect availability from European collection sources. Insects imported into quarantine in the United States have been held until females laid eggs. These eggs were released into field locations. Field establishment of *C. hungarica* has not been confirmed.



Specific References on *Chamaesphecia hungarica*

Gassmann, A., I. Tosevski and P. Harris. 1991. *Chamaesphecia hungarica* (Tomala) (Lepidoptera:Sesiidae): A suitable agent for the biological control of leafy spurge (*Euphorbia esula* L.) (Euphorbiaceae) in North America. CABI International Institute of Biological Control, CIBI European Station, CH-2800, Delemont, Switzerland. Final Report**.**

Spencer, N.R., and A.D. Prevost. 1992. An environmental assessment of *Chamaesphecia hungarica***.** Biological Control of Weeds Research Unit, Sidney, MT.