BIOLOGICAL CONTROL OF CUSCUTA spp.

III. PHENOLOGY, BIOLOGY AND HOST-SPECIFICITY OF HERPYSTIS CUSCUTAE BRADLEY [LEP., TORTRICIDAE]

BY

G. M. BALOCH, A. I. MOHYUDDIN & M. A. GHANI

Life history and status of Herystis cuscutae as biological control agent have been investigated. Of the ten Cuscuta spp. in Pakistan it infested only C. reflexa on six host plants of which Adhatoda vasica and Dodonaea viscosa were the most preferred. Variations in its period of activity in different areas were attributed to the differences in the fruiting periods of its host. It was found to have a tolerance for extremes of climates, was multivoltine, could complete development on some convolvules, legumes and umbellifers among the plants of 28 families tested and was apparently free from natural enemies.

BALOCH et al. (1967 a, b) and BALOCH (1968) reported a number of apparently promising insect agents for the biological control of Cuscuta spp. including Herystis cuscutae BRADLEY (referred to previously as? Herystis sp. and Acrolita sp.). This is the second insect enemy of Cuscuta which has been studied in some detail because of its wide distribution, high population densities, ability to inflict appreciable damage, and it is being described for the first time from C. reflexa. The previous species studied in detail was Melanagromyza cuscutae Hg. (BALOCH et al., 1967 b).

BRADLEY (1968) considers this to be referable to a paralectotype female of H. jejuna MEYR. from Dibidi (India) but different from the lectotype male from the same locality and the paralectotype female from Pusa (India). He, therefore, concludes that unless a wrong abdomen had at some stage been attached to the Dibidi female, the original series of jejuna was mixed and that H. cuscutae also occurs in India. The fact that the type specimens of H. jejuna from India were collected in September, October and February which is also the active period of H. cuscutae at Barakahu (West Pakistan), lends support to BRADLEY'S conclusion that possibly the latter also occurs in India.
In addition to *H. jejuna*, also recorded from the Solomon Islands and the New Hebrides, there are two more species (*H. pallidula* MEYR. and *H. tinctoria* MEYR.) known from India; two (*H. avida* MEYR. and *H. chrysosema* TURNER) from Queensland; one (*H. iodryas* MEYR.) from Yunnan; and one (*H. rusticula* MEYR.) from the Seychelles, but the biology and host-plants of none of these are known (BRADLEY, *loc. cit.*).

**Phenology**

In West Pakistan *H. cuscutae* becomes active from September in the northern areas; its population increases gradually, reaching a peak in December-January and then declines and disappears finally from *Cuscuta* by the end of February. However, the insect has been observed to be active even in March in southern West Pakistan and from March to June in East Pakistan. Field studies showed that it mainly attacks fruits and only those vines which twine around the host plants of the weed. This is probably because vines in such situations are comparatively thicker and due to their attachment to the host-plant afford better protection to the larvae than those hanging freely in the air.

The fruiting period of even the same species of *Cuscuta* varies under different climatic conditions. Therefore, the asynchrony in the periods of activity at different localities is most probably in response to the different fruiting periods of the host. December and January are the coldest months and June the hottest in Pakistan. Thus, it could be reasonably assumed that *H. cuscutae* is capable of tolerating the extremes of climate but that its activity is limited to the fruiting period of the host.

It is not known exactly how many generations occur within a year, but since the larvae could be found throughout the active period at one locality, it appears to be multivoltine. As the total developmental period of the immature stages is approximately 26 days, and the active period is about 4-5 months (September-January and March-June), there could at least be 4-5 generations. With the disappearance of fruits, the insect also disappears from the field, probably undergoing diapause as full-grown larvae in the soil or under plant trash till the next fruiting season.

**Biology**

Eggs (fig. 1) — creamy, 0.60-0.66 mm. long, 0.33-0.48 mm. wide, upper surface slightly raised in the middle, with reticulate chorion — were deposited singly or in groups of 2-6 (overlapping) on the vines or fruits. Freshly hatched larvae wandered a little, probably in search of a suitable site, and then bored inside the vine or fruit. They usually