

CURRENT RESEARCH ON BIOCONTROL OF WEEDS IN CANADA

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Biological control of *Senecio jacobaea* L.

Harris, P., Wilkinson, A.T.S., Neary, M. and Thompson, L.

Releases of Cinnabar moth, *Tyria jacobaeae* (L.), were made at Nanaimo, B.C. in 1964, at Durham, N.S. in 1963 and at various places in Prince Edward Island between 1964 and 1968. All colonies declined during the first two years after release and had to be supplemented. However, presumably due to selection, survival improved each year and at Nanaimo there was an increase in the larval population from 13,000 in 1967 to over 500,000 in 1968. These larvae not only stripped the stems of flowers and foliage but also did extensive damage to the rosettes. Larvae were present on the weed between June and August inclusive, and in this period the number of stems of *S. jacobaea* decreased from 2.9 per sq. m. to nil (sampling area 268 m. x 280 m.).

The release at Durham was smaller than at Nanaimo and the population build-up has taken longer. Nevertheless the number of larvae increased from under 2,000 in 1967 to over 11,000 in 1968. These larvae stripped the foliage of scattered plants but damage to the weed was not widespread. The moth has not thrived so well in P.E.I. but in 1968, for the first time two colonies of several hundred larvae were found. Thus there is every indication that the Cinnabar moth will make a useful contribution to the control of *S. jacobaea* on both the east and west coasts. Unfortunately, stock of the moth obtained from an apparently healthy colony in California and released at Abbotsford, B.C. in 1966 is infected with a *Nosema* disease that causes heavy larval mortality. Stock from California was also released in P.E.I. but few if any survived; so the disease is probably not present now.

To supplement the Cinnabar moth, a seed fly, *Hylemyia seneciella* Meade, was released in B.C. and P.E.I. in 1968 but no evidence of establishment was found (CDA Research Institute, Belleville, Ontario).

Biological control of *Carduus nutans* L. and *C. acanthoides* L.

Harris, P.

A weevil, *Rhinocyllus conicus* Froel., that breeds in the flower buds of *C. nutans*, was released in 1968 in Saskatchewan and also in Ontario against *C. acanthoides*. It remains to be seen if the weevil can survive and if it will accept in the field the small buds of *C. acanthoides* (CDA Research Institute, Belleville, Ontario).

Biological control of *Euphorbia esula* L. and *E. cyparissias* L.

Harris, P., Alex, J., Arnott, D., Kolack, A. and Awmack, J.W.

Releases of spurge hawk moth, *Celerio euphorbiae* L., in Ontario, Manitoba, Saskatchewan and British Columbia from 1965, have failed except at Braeside, Ontario where a small colony has survived. It is planned to reinforce this colony by propagation. The chief problem at all release sites is predation by ants on the larvae. Thus this moth is not suitable for control of spurge in most parts of Canada and an alternative insect that is less susceptible to ants is being sought (CDA Research Institute, Belleville, Ontario).

Biological control of *Linaria vulgaris* Mill. and *L. dalmatica* L.

Harris, P., Wilkinson, P.A., Carder, A. and Kolack, A.

A moth, *Calophasia lunula* Hufn., released at Belleville, Ontario in 1965 has increased in abundance with the result that small patches of *L. vulgaris* were stripped of foliage. The larvae are present continuously from early June to early September, so that the plants have little opportunity to regenerate. Attempts to establish the moth in Manitoba, Saskatchewan, Alberta and British Columbia have so far failed; but another attempt is being made against *L. dalmatica* at Kamloops, B.C. (CDA Research Institute, Belleville, Ontario).

Biological control of *Hypericum perforatum* L.

Harris, P., Peschken, D.P., and Milroy, J.

The beetles *Chrysolina quadrigemina* (Suffr.) and *C. hyperici* (Forst.), first released in 1950, have reduced the density of *H. perforatum* up to 98% on rangeland in the

southern interior of British Columbia. The beetles have different moisture requirements with *C. hyperici* thriving in the Douglas-fir zone and *C. quadrigemina* in the Ponderosa pine zone which is drier. The effectiveness of *C. quadrigemina* decreases towards the still drier steppic grassland; but a moth, *Anaitis plagiata* L., apparently preadapted to these sites, was released in 1967. It was not recovered in 1968 but because of the area involved this is not evidence that it has not survived.

C. hyperici appears to be preadapted to most climatic conditions of eastern Canada and it could be released with little difficulty if necessary (CDA Research Institute, Belleville, Ontario).

Biological control of *Cirsium arvense* (L.) Scop.

I. *Altica carduorum* Guer.

Peschken, D.P., Friesen, H., Tonks, N. and Banham, F.

This beetle, which feeds exclusively on *C. arvense*, was released in Nova Scotia in 1967, at 4 different locations in Ontario during 1964-67, at Lacombe, Alberta in 1963, at Saanichton and Summerland, B.C. in 1964 and 1967 respectively. Most of the releases were supplemented with further stock in subsequent years. Small colonies survived at Lacombe and Summerland but it has died out in open releases elsewhere although it has thrived wherever protected by a cage. The failure to become established or build up populations large enough to control the thistle is related to predation upon the beetle. Thus in Ontario, egg mortality was almost 100% and although at Lacombe and Summerland it was only 27% and 17% respectively, the larval mortality at those places was 69% and 91% (CDA Research Institute, Belleville, Ontario).

Biological control of *Cirsium arvense* (L.) Scop.

II. *Ceutorhynchus litura* F.

Peschken, D.P.

This weevil was released at three locations near Belleville, Ontario in 1967, but only one colony survived. It spread from about 3.5 m² to 123 m² during the 1968 spring breeding season, but the density of the thistle stand was not reduced (CDA Research Institute, Belleville, Ontario).

Biological control of *Cirsium arvense* (L.) Scop.III. *Urophora cardui* L.

Peschken, D.P.

This fly lays in the leaf buds of *C. arvense* and the larvae produce a stem gall. Side shoot development is stimulated by the gall. However, the dry weight of stems and leaves of healthy plants was 2-3 times and that of the roots 3-5 times greater than those of galled plants. Moreover, 31 healthy plants produced 19 shoots from the roots, whereas the galled plants produced only 5. This indicates that although the fly does not kill the thistle, a large population would reduce its vigour (CDA Research Institute, Belleville, Ontario).