



Alfalfa weevil and its parasitoids

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The alfalfa weevil increased from a minor pest in 2001 to be the principal insect pest of alfalfa in 2014. Its biological control agent *Bathyplectes curculionis*, a parasitoid wasp, now also occurs in most areas where alfalfa weevil is found on the Canadian Prairies.

The alfalfa weevil (*Hypera postica*) was first found in Canada in southeastern Alberta and southwestern Saskatchewan in 1954, but remained of little concern until the mid-1990s when the weevil expanded its range across southern Saskatchewan and into Manitoba. The alfalfa weevil is now an economic pest causing serious losses to alfalfa hay quantity and quality, and is present in most alfalfa seed-producing areas of the prairies.

In 2001, researchers from the AAFC began a long-term study to determine the distribution and population size of alfalfa weevil in Saskatchewan. Researchers also assessed population trends and parasitism of *Bathyplectes curculionis* and other biological control agents, and the possible effect of the parasitoid on the weevil. The study also determined the morphological and molecular diagnoses for the described *Bathyplectes* species in North America.

Field surveys from over 177 sites recorded distribution and size of alfalfa weevil populations across Saskatchewan and selected sites in Manitoba and Alberta from 2001 to 2014. Alfalfa fields were

sampled by sweeping and/or stem collecting usually, in June or early July. The alfalfa stems were assessed to determine the percentage of stems damaged by alfalfa weevil. All of the insects collected in the sweeps were identified to determine the distribution and numbers of alfalfa weevils, *Bathyplectes* parasitoid wasps and other biological control agents.

Tissue samples from selected specimens of *Bathyplectes* collected in the study, and from historical specimens in the Canadian National Collection of Insects, Arachnids, and Nematodes, were submitted to the Canadian Centre for DNA Barcoding for molecular sequencing and analysis.

Alfalfa weevil spreads

The results from the long-term field surveys showed that the alfalfa weevil increased from a minor pest in 2001 to be the principal insect pest of alfalfa in 2014. The alfalfa weevil originally spread across Saskatchewan from southwest to southeast, and eventually northward and westward. By 2014, only northwestern and west central areas of Saskatchewan remained relatively alfalfa weevil free. Alfalfa weevil populations were the highest in southern and eastern parts of the province. The distribution of alfalfa weevil also expanded across Manitoba and has been moving north in Alberta.



Alfalfa weevil larvae feeding on alfalfa

The survey results also showed that the *Bathyplectes* parasitoid wasp population and distribution was correlated with alfalfa weevil distribution, with the greatest number of sites containing *Bathyplectes* found in the same crop districts with the highest alfalfa weevil populations. Other parasitoids collected in the surveys included many specimens of the wasp *Oomyzus incertus*,

previously rarely found, and *Microctonus colesi*. The impact of alfalfa weevil declines as its natural enemies increase in species and numbers. Conservation of these parasitoids is an important step in maximizing their effectiveness as alfalfa weevil biocontrol agents.

From the molecular sequencing results, researchers conclude that *B. curculionis* was the only *Bathyplectes* species collected in the study. Overall, the data indicates a fairly general distribution of *B. curculionis* across Saskatchewan, and it is likely that *B. curculionis* now occurs in most areas where alfalfa weevil is found on the Canadian Prairies. As part of the project, researchers developed an illustrated key to described species of *Bathyplectes* of North America, as well as DNA barcodes of most species.

Biological control agents, such as *B. curculionis* identified in this study, along with the potential establishment of others such as *B. anurus* and *M. aethiops*, hold promise for natural suppression of alfalfa weevil populations below economic thresholds on the Canadian Prairies.

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