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](image)

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 Bathypelectes 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 Bathypelectes 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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Photos by sjbarkley