

Improved Wireworm Monitoring in Manitoba

Suspected wireworm presence was confirmed in >90% of surveyed fields in southern Manitoba. *Hypnoidius bicolor* was the most prevalent among seven different species detected. Only 28% of fields were at the economic threshold of one wireworm per trap.

WIREWORMS ARE THE larval stages of click beetles and have become a major pest of crops on the Canadian Prairies due to a lack of effective control methods. These larvae feed on seed and below-ground plant tissues during the early stages of plant growth. Since they are difficult to scout for, it has been unclear how much of a pest they can be in soybeans and other crops.

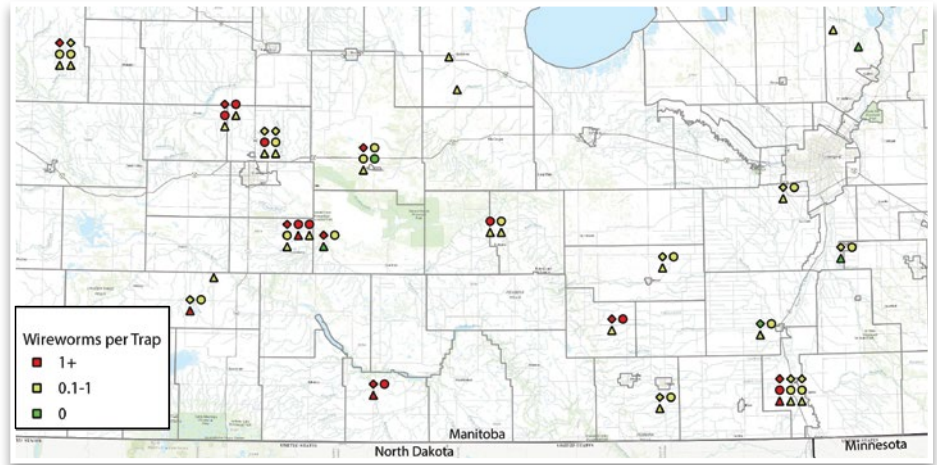
Encouraging responsible use of soybean seed treatments for wireworm control has been a priority at MPSPG. The goal is for farmers to utilize seed treatment on a prescribed basis from knowledge of pest pressure in each field. A greater understanding of wireworm distribution and species composition will help farmers make more informed and economical seed treatment decisions.

Objectives of this study were to:

1. test multiple bait trapping tools and techniques for sampling wireworms,
2. examine the wireworm species composition in Manitoba using DNA barcoding to catalogue the species and
3. determine the damage inflicted on soybean plants by different wireworm species and larval stages.

Fields throughout southern Manitoba that had suspected wireworm presence (19, 26 and 30 fields in 2018, 2019 and 2020, respectively) were surveyed three times (spring, summer, fall) using 16 bait traps per field. Bait traps consisted of wheat seed and vermiculite placed 4.5 inches underground in four transects (the preferred method, optimized prior to surveillance). After two weeks, wireworm extraction and species identification took place. In two fields with high infestations, 125 traps were placed in 25 transects biweekly from late April to October to monitor changes in species over time.

Figure 1. Wireworms collected per trap in 2018 (diamond), 2019 (circle) and 2020 (triangle). The nominal economic threshold is one wireworm per trap.



Wireworms were present in most of the sampled fields (>90%) and more abundant in the spring. However, only 28% of fields had more than one wireworm per trap, which is considered the nominal economic threshold. At least seven known species were identified. *Hypnoidius bicolor* was the most common species found in spring (93% of wireworms present), but the species composition changed drastically in some fields throughout the season. *Limonius californicus* and *H. abbreviatus* became more abundant from May to July, shifting back to *H. bicolor* in August.

The relationship between field conditions and wireworm bait trap catch was assessed. Soil moisture was significantly correlated with wireworm populations, where on average, every 1% increase in moisture has the potential to reduce wireworm abundance by 15%. Warmer soil temperatures (>6°C) resulted in more wireworms. Soil texture was only borderline significant, but wireworm

densities were 13x higher in fine loamy soil than clay soil. Tillage and crop type did not have significant associations with wireworm abundance.

According to laboratory analysis under controlled conditions, it was determined that wireworms were strongly associated with soybean crop damage. *Limonius californicus* was found to cause considerably more damage to plants than both *Hypnoidius* species. Crops grown in sand/silt soil were more susceptible to damage than in clay soil and air temperatures >20°C resulted in the most wireworm damage.

This project has provided a greater understanding of wireworm dynamics in Manitoba. When it comes to management, we aim to develop recommendations for actions based on the full risk profile of the pest. Future directions from this research are to refine economic thresholds for wireworm species present in Manitoba and to monitor how the populations and the threat to soybeans evolve over time. ▀