Section V
Soil Arthropods

Wireworm Control in Potatoes.

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Abstract

Wireworms (Coleoptera: Elateridae) are the most important soil-dwelling pest of potatoes in the U.S. Growers in the U.S. rely on preventative soil insecticide treatments for wireworm control. The few registered insecticides are all organophosphates or carbamates, and are only moderately-effective often resulting in sporadic control of wireworms. The Environmental Protection Agency (EPA) is in the process of re-registering pesticides under the requirements of the Food Quality Protection Act and could eventually cancel some or all organophosphate and carbamate pesticides on potatoes. Therefore, during the last four years we conducted a set of efficacy trials with the overall goal of anticipating the possible cancellation of broad-spectrum pesticides by determining potential chemistries that would reduce wireworm damage. In furrow treatments in general presented a lower average number of holes / tuber than seed treatments. Fipronil (phenylpyrazole) insecticide has consistently been the most efficient insecticide in the last three years. Most damage to tubers occurred after mid-June. This indicates that all the wireworm insecticides may be applied prematurely (at planting) because the wireworm damage is occurring mostly at the end of the season when the effectiveness of these insecticides has probably been reduced. Therefore, this could be the reason why insecticides against wireworms are only partially effective at reducing wireworm damage.

Efficacy Trials in Idaho

We have conducted efficacy trials in potatoes for the last four years for wireworm control in Idaho. Because of the patchy distribution of wireworm damage found in previous years, we redesign the experimental plots for efficacy trial and instead of having a single check plot for each experimental block, each individual treatment had an untreated check consisting of one untreated row 25 ft long on each side. Therefore, the complete individual treatment plot consisted of four 25 ft long rows (36 inch row spacing), with the two central rows treated with the insecticide and the two bordering rows left as checks. All the current registered insecticides represented the broad-spectrum insecticides including the insecticide standard, phorate (Thimet 15G). Newer more selective insecticides included the following: the neonicotinoids, imidacloprid and thiamethoxam; the phenylpyrazole, fipronil; the pyrethroid, bifenthrin; as well as several other promising experimental materials. Different application methods were included (seed treatments, in furrow at planting, granular treatments applied utilizing a belt applicator on the planter, and liquid treatments applied with a modified CO_2 backpack sprayer).

The center two rows and the bordering rows of each plot were harvested the first week of October for wireworm damage evaluations. Fifty tubers per each 25 ft row, for a total of 100

tubers per plot and 400 tubers per treatment, were examined for feeding damage. Fifty tubers per each check row were also examined. Weight and number of external feeding sites were recorded for each tuber. For percentage of affected tubers, a tuber with one or more wireworm holes was considered an affected tuber. More than 28,000 tubers/ year were examined for this experiment. Data were analyzed using an analysis of variance. A mean separation test (LSD, p=0.05) was used to determine significant differences between treatments.

The mean number of holes per tuber, percentage of affected tubers, weight per tuber, and USDA number one tubers (tubers weighing more than 114 grams and with no defects were considered number 1) were evaluated. We also determined the timing of wireworm peak activity (represented by the number of affected tubers and also the percentage of affected tubers during the whole season) to optimize efficacy of insecticide application methods.

Conclusions:

1. Limited availability of completely effective chemicals
2. Lack of efficient and labor-friendly monitoring tools which would allow growers to predict likelihood of damage or to assist in decisions about the necessity of insecticide treatment
3. In furrow treatments in general presented a lower average number of holes / tuber than seed treatments
4. Fipronil (phenylpyrazole) insecticide has consistently been the most efficient insecticide
5. Most damage to tubers occurred after mid-June. This indicates that all the wireworm insecticides may be applied prematurely (at planting) because the wireworm damage is occurring mostly at the end of the season when the effectiveness of these insecticides has probably been reduced. Therefore, this could be the reason why insecticides against wireworms are only partially effective at reducing wireworm damage.

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