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Evaluation of Seed Treatments and At-Plant Soil Insecticides for the Control of Wireworms (Coleoptera: Elateridae) in Field Corn, 2015

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Subject Editor: Donald Cook

Corn (hybrid, maize, sweet) | Zea mays

Wireworms | Melanotus spp. (Coleoptera: Elateridae)

Wireworms are an important pest of corn, other field crop seedlings, and vegetables and can cause significant damage if not controlled. This field trial was established to evaluate the efficacy of neonicotinoid seed treatments and in-furrow soil insecticides to protect seedling field corn under a heavy wireworm pressure scenario. The trial was conducted on a commercial production field in Perkins County near Madrid, NE (40.781993° N, -101.463666° W). The field was selected for its likelihood to have heavy wireworm pressure due to the following: 1) past farmer observations of crop damage when planted to field corn in 2012; 2) sandy soils (soil type: Valen loamy sand, 3 to 9% slopes); and 3) recent cropping history (livestock were grazed on double cropped rye and sorghum-sudangrass in 2013 and 2014). An RCB design with four treatments (including an untreated check [UTC]) and four replications was used. Each plot was four rows by 30 ft. The trial was planted on 1 May using a small plot research planter at 32,000 seeds per acre at an approximate depth of 1.4–1.75 inches in 30-inch rows. The hybrid planted was TA566-31 (T.A. Seeds, Jersey Shore, PA) with the Agrisure Viptera 3111 Bt trait package. All seed, including the UTC was treated with fungicide Maxim Quattro at 0.064 mg AI/seed. The tested insecticides were applied in-furrow, with calculations based on an application volume of 5 gal/acre. The at-plant insecticide treatments were applied on 1 May at rates given in Table 1. The plots received irrigation, fertilization, and weed management inputs following standard agronomic practices for the region, with no insecticide applications other than the experimental treatments. Plant stand counts and symptoms of wireworm feeding damage (wilting, feeding on leaf, stem, seed or root, or stem scarring) and presence of wireworms for 20 plants per plot were recorded at 7, 14, 21, 28, 35, and 56 days after planting (DAP). Cool, wet weather following planting led to slow plant emergence; therefore, all stand counts at 7 and 14 DAP were zero and are not presented below. The data were analyzed across sample dates using repeated measures PROC MIXED with mean separation by least square means (P = 0.05) in SAS version 9.4.

At 21 DAP, the Ampex 50WG (in-furrow insecticide) treatment resulted in significantly higher stand count when compared with Poncho (seed treatment) and the UTC. However, the stand counts were statistically equivalent amongst all treatments on the remaining dates. Stand counts within the Poncho-treated plots increased over time and were statistically higher at 35 and 56 DAP compared with 21 DAP. The percentage of plants with wireworm feeding show that peak feeding damage occurred at 35 DAP in the UTC, Aztec, and Ampex-treated plots, with percent of plants with symptoms at 35 DAP being significantly higher than at 21 DAP. This research was supported by industry gifts of products and research funding. We thank the landowner, Jay Lee, and ranch manager, Travis Ogg, for their cooperation. We wish to posthumously acknowledge the contributions of the crop consultant, Larry Appel, to this research.
<table>
<thead>
<tr>
<th>Treatment/Formulation</th>
<th>Rate</th>
<th>Plant density (plants per acre)</th>
<th>Percentage of plants with wireworm-feeding symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>21 DAP&lt;sup&gt;a&lt;/sup&gt;</td>
<td>28 DAP</td>
</tr>
<tr>
<td>Untreated check</td>
<td>–</td>
<td>20,250&lt;sup&gt;b&lt;/sup&gt;</td>
<td>24,750&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Poncho 5FS&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.5&lt;sup&gt;c&lt;/sup&gt;</td>
<td>19,500&lt;sup&gt;c&lt;/sup&gt;</td>
<td>25,250&lt;sup&gt;abc&lt;/sup&gt;</td>
</tr>
<tr>
<td>Aztec 4.67GR&lt;sup&gt;d&lt;/sup&gt;</td>
<td>3.0&lt;sup&gt;e&lt;/sup&gt;</td>
<td>25,500&lt;sup&gt;abc&lt;/sup&gt;</td>
<td>27,250&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ampex 50WG&lt;sup&gt;f&lt;/sup&gt;</td>
<td>5.12&lt;sup&gt;g&lt;/sup&gt;</td>
<td>27,250&lt;sup&gt;a&lt;/sup&gt;</td>
<td>28,750&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Means within each response type (plant density or percentage of plants with symptoms) followed by a common letter are not significantly different (FPLSD, P ≤ 0.05).

<sup>a</sup>Days after planting.
<sup>b</sup>Seed treatment (clothianidin).
<sup>c</sup>mg AI per seed.
<sup>d</sup>In-furrow granule at planting (tebupirimphos + cyfluthrin).
<sup>e</sup>lb product per acre.
<sup>f</sup>In-furrow spray at planting (clothianidin).
<sup>g</sup>oz wt product per acre (0.16 lb AI/acre).