NOTE

Baits for Sampling Wireworms (Coleoptera: Elateridae) in Organic Soils (Histosols) of Southern Florida

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In Florida, the Everglades Agricultural Area (EAA) encompasses 260,000 hectares (650,000 acres) of the upper Everglades extending from Lake Okeechobee south ca. 50 km. Most of the soils in the EAA are organic (Histosols) generally containing 85% or more organic matter by weight (Snyder et al. 1978). The area is intensively farmed, with sugarcane and winter vegetables being the principal crops. Wireworms are ubiquitous soil insect pests of most of these crops and soil insecticides are routinely applied at planting for wireworm control.

There exists an extensive literature on using baits to sample for wireworms. These studies have been conducted on different wireworm species, different crops, different soil types, different field conditions, (Briggs and Allen 1980, Doane 1981, Jannson and LeCrone 1989). However, the Histosols of the EAA are unusual soils because of their high organic content and currently no literature exists showing the attractiveness of baits to wireworms in Histosols. Baits have been used in the past to sample for wireworms in the EAA (Samol and Johnson 1973). Currently, baits are still being used by growers in the EAA to sample for wireworms in fields before planting. However, the actual attractiveness of any bait for sampling wireworms in the EAA is currently unknown. The objective of this research was to compare the attractiveness of different baits to wireworms in the Histosols of the EAA.

All tests were conducted on Histosols at the Everglades Research and Education Center at Belle Glade, Florida. Tests were conducted in fallow fields which had been disked following sugarcane. Fields were surveyed by digging to determine the presence of wireworms before tests were conducted.

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Baits selected were simple (no mixtures), inexpensive, and available year-round since these qualities would make the baits useful to growers. Since *Melanotus communis* (Gyllenhal) is a major wireworm pest in the EAA (Cherry and Hall 1986), baits were also selected with this species in mind. Apablaza et al. (1977) showed that red delicious apples, yellow onions, and radishes were attractive to *M. depressus* (Melsheimer) in laboratory tests. Jannson and LeCrone (1989) showed corn seed, corn ear, carrot, and rolled oats were attractive to *M. communis* in marl soils. Since these seven baits fulfilled necessary requirements, they were selected for testing.

Samples consisted of 200 g of each bait placed in individual plastic bags. Apples, onions, radishes, corn ear, and carrots were fresh and sliced when necessary to achieve a 200 g sample. One of each of the seven baits plus one control (= no bait) was used in replication in a 4 by 2 pattern with baits 5 m apart. Ten replications were used in each test with replications being 10 m apart. A randomized complete block design was used for bait placement. Holes were dug 15 cm deep, each bait poured from its plastic bag into the hole, a flag placed through the bait for recovery, and then the bait was covered with soil. Baits were recovered after 14 d since this time period has been successful for attracting wireworms in other studies (Briggs and Allen 1980, Bynum and Archer 1987, Jannson and LeCrone 1989). Baits were recovered by digging-up the bait and adjacent soil in a 25- by 25- by 20-cm deep sample and placing the sample into a bucket. Samples were stored in buckets in a screened insectary for 1-4 d. Each sample was visually examined for wireworms for 30 min in a laboratory. Wireworms were then stored in alcohol and later identified by microscopic examination. Five tests were conducted in five different fields. Testing was conducted during August and October 1991 and during April, June, and July, 1992. The objective of these tests was to determine the overall most attractive bait in different fields and at different times of the year. Hence, data from all five tests were pooled and bait attractiveness determined by comparing the mean number of wireworms found at each bait using Tukey's Test (SAS Institute 1982).

Numbers of wireworms collected at food baits after 14 d in fallow fields are shown in Table 1. Since 95% of all wireworms found were either *Conoderus* spp. or *M. communis*, analysis was restricted to these two groups. These wireworms, especially *M. communis*, are the most important wireworm pests in the EAA. Several baits appeared attractive to *Conoderus* spp. as indicated by higher wireworm numbers than unbaited controls. However, only rolled oats and corn ears attracted significantly more *Conoderus* spp. than unbaited samples (P < 0.05). Likewise, several baits also appeared attractive to *M. communis*. However, only rolled oats and corn seed attracted significantly more *M. communis* than unbaited samples (P < 0.05). Wilson (1940) stated that *M. communis* preferred oats to several other baits in an insectory test, but data were not given. Doane et al. (1975) noted that several species of wireworms were attracted to decomposing oatmeal in laboratory studies. In field tests, Doane (1981) also reported that two wireworm species were attracted to oatmeal baits in Canada. After field tests in marl soil, Jannson and LeCrone (1989) recommended oatmeal-corn flake or rolled oat baits for pre-plant sampling of wireworms in potato fields in southern Florida. Data show that more wireworms of *Conoderus* spp. or *M. communis* were attracted to rolled oat baits than any of the other six baits tested (Table 1). In addition, rolled oats was
Table 1. Wireworms collected at food baits after 14 days in fallow fields.

<table>
<thead>
<tr>
<th>Bait</th>
<th>Conoderus spp.</th>
<th>M. communis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean a</td>
<td>SEM</td>
</tr>
<tr>
<td>Rolled Oats</td>
<td>1.32 a</td>
<td>0.27</td>
</tr>
<tr>
<td>Corn ear</td>
<td>1.30 a</td>
<td>0.33</td>
</tr>
<tr>
<td>Corn seed</td>
<td>1.08 ab</td>
<td>0.23</td>
</tr>
<tr>
<td>Carrot</td>
<td>0.80 ab</td>
<td>0.20</td>
</tr>
<tr>
<td>Onions</td>
<td>0.56 ab</td>
<td>0.13</td>
</tr>
<tr>
<td>Unbaited</td>
<td>0.36 b</td>
<td>0.11</td>
</tr>
<tr>
<td>Apples</td>
<td>0.28 b</td>
<td>0.09</td>
</tr>
<tr>
<td>Radishes</td>
<td>0.26 b</td>
<td>0.08</td>
</tr>
</tbody>
</table>

* Means in a column with the same letter are not significantly different (P > 0.05) using Tukey's Test (SAS Institute 1982). Means calculated from 50 samples/bait = 1 bait/replication X 10 replications/field X 5 fields.

the only bait which attracted significantly more wireworms than unbaited samples for both Conoderus spp. and M. communis (P < 0.05). These data show that rolled oats are a simple, attractive bait that may be used for sampling wireworms in the highly organic soils of the EAA.

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References Cited


