HAZARDS TO WILDLIFE IN CORN FIELDS TREATED WITH TEMIK®

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Bowling Green, Ohio

INTRODUCTION

Temik is the trademark of Union Carbide for agricultural chemicals containing aldicarb as the active ingredient. Temik products are effective in controlling a wide variety of insects, mites, and nematodes and are in use worldwide. Aldicarb, the active ingredient, is a potent acetylcholinesterase and is used in granular formulations containing 5% to 20% aldicarb. The 15% formulation used in their studies has an acute oral LD50 for rabbits of 5.3 - 10.6 mg/kg. Ground feeding birds might be exposed to aldicarb by taking up Temik granules that are incompletely incorporated into the soil.

The field trial conducted between 7 May and 14 June 1983 consisted of four treated plots and two reference plots; plots ranged from 15 to 47 acres in size. All fields in the study were located in the immediate area of Blissfield, Michigan. William Erickson, Hidenori Fukui, and Mark Jackson assisted with some of the observations. We acknowledge the support of Union Carbide, especially that of Dr. T. C. DeWitt, Product Development, and Sales Representative Jerry Miller, and the farmers on whose fields the observations were made.

CENSUS METHODS

Field methods included a 10-minute observation period at one corner of each field followed by a perimeter walk and random transect surveys. The total field area surveyed accounted for approximately 10% of the total acreage. Bird numbers and species and carcass recoveries for birds and mammals were recorded on each perimeter/transect walk. Territorial (singing) males in field border areas were mapped during the walk. Edwards et al. (1979) had advocated this procedure in similar field trials.

Pre-treatment observation and carcass recovery were conducted for at least three days on each field. Comparable observations were conducted daily for the first week, then every other day during the second week post-planting. Some variations occurred in the schedule due to weather conditions. General observations were made of mammals and their burrows and tracks. Extensive checks also were made in the ditch bank areas to recover bird or mammal carcasses.

Temik 15G was applied by farmers using standard corn planting equipment in accordance with the label granted under a Federal Experimental Use permit (264-EUP-67). The rate was 1.5 lb ai/A applied in a 7" band and incorporated at planting. Since Temik is highly toxic, particular attention was paid to ends of rows, where spillage could be a problem. Surface spills of fertilizer were noted in one field; Temik granules were not observed on the surface, however.

FIELD SITE OVERVIEW

Isley Farm Plot (Fig. 1)
The Isley field (ca 47 acres) offered the most diverse habitat, being bordered by two
woodlots; a third woodlot was nearby, and ditches bordered on portions of the south, 
est, and northeast sides. Nine-hundred and fifty birds of 73 species were recorded 
during the perimeter/transect survey on this field. The large species diversity was due to 
movement of migratory birds, particularly warblers. Ditches bordering portions of two 
sides of the field provided nesting areas for red-winged blackbirds. The light sandy soil 
dried out fairly rapidly, facilitating early planting.

**Fisher Farm Plot #1 (Fig. 2)**
Fisher field #1 (ca 30 acres) was surrounded by other fields on two sides and a paved 
road on the east. A shallow ditch (generally dry) bordered the field on the north; a power 
line running beside the ditch provided perches for territorial red-winged blackbirds.

**Fisher Farm Plot #2 (Fig. 3)**
Fisher field #1 (ca 23 acres) was surrounded by other crop fields and bordered by 
ditches on the north and south sides that provided nesting habitat for red-winged 
blackbirds. The lighter soils in the Fisher #1 and #2 fields facilitated normal planting 
times. This field served as one of the untreated control fields.

**Eisenmann Farm Plot (Fig. 4)**
The Eisenmann field (ca 30 acres) was bordered by Rouget Road on the south, other 
fields on the east and west, and a ditch on the north side. A few trees were present in 
scattered locations. A stand of winter wheat was situated just north of the ditch. Red- 
winged blackbirds were common in the ditch/wheat field area. The soils were heavy and 
took a long time to dry, thus delaying planting until June 1st.

**Goetz Farm Plot (Fig. 5)**
The treated area of the Goetz field (ca 25 acres) comprised the outer 12 rows (near 
the Raisin River) of a 150-acre corn field. The field, although diked, had flooded in the 
spring and the heavy soils were slow in drying. A portion of the field was underwater 
until early June and was frequented by a variety of shore birds. The spring pond 
eventually dried out and was planted. Hot weather and rapid evaporation at planting 
enhanced seed germination and corn emergence. Trees and shrubs along the river 
bank provided varied habitat for birds; the predominant singing males were indigo 
buntings.

**Brubaker Farm Plot (Fig. 6)**
The Brubaker field (ca 15 acres) was located near the Raisin River and was bordered 
on the south by a woodlot and on the north and west by housing units. A power line 
adjacent to a field access road paralleled the north end of the field. This field served as 
one of the untreated control areas. Thirteen acres of land on the east were dedicated to 
PIK and supported a light cover crop.

**RESULTS AND DISCUSSION**
A total of 4019 birds of 93 species was identified during the wildlife monitoring 
study. The red-winged blackbird was the predominant species in the study area, 
followed by the song sparrow, horned lark, and grackle. The 15 most abundant species 
of birds (Table 1) were essentially the same as those recorded by Dolbeer and Stehn 
(1983) during their 16-year analysis of bird populations in North America.

A look at redwing activity (Table 2, Fig. 1, 2, 3, and 4) reveals bird sightings from pre- 
treatment to post-treatment periods to be fairly consistent. For example, ten pairs were 
seen consistently throughout the trial at the Isley field (Fig. 1). However, a decline in 
redwing numbers was noted at both the Fisher #1 and Fisher #2 fields, the second being 
an untreated control site. The large drop at Fisher #1 was attributed to change in 
habitat. This field had been planted in clover and supported a good number of birds, but 
many birds were displaced when the field was plowed. Bobolinks, which were present in 
both Fisher fields, moved out at plowing time (prior to Temik treatment). This trend also 
was noted in the song sparrow numbers (Table 3).
Grackle activity increased in most fields after planting. This is due partly to the late May planting of the Eisenmann, Goetz, and Brubaker fields, thus coinciding with the establishment of grackle territories (Table 4).

Bird activity in ditch bank vegetation continued throughout the trial. For example, the ten reedwing pairs at the Isley site all had nests with eggs; and when last checked, eight of the ten nests had young. The same pattern was observed at the Fisher #2 control field.

No bird carcasses were recovered during the trial. Two white-footed mice (Peromyscus leucopus) carcasses were recovered, one from the Goetz field and one from the Eisenmann field. Analysis of the mice by Union Carbide revealed Temik residues of 0.87 and 2.6 ppm in the body, respectively, and residues of 0.26 and 1.1 ppm, respectively, in the skin. Both mice had corn sprout material in their stomachs and were found within 48 hours of corn emergence. It is considered likely that these mice were Temik victims.

Relatively few mammals were seen during the study period, since twilight or nocturnal observations were not attempted. A female red fox with two cubs was seen at a ditch-bank den adjacent to the Eisenmann field. This group remained active during the observation period.

Other mammals (or their sign) were seen and logged during the study. Deer and burrowing mammals remained active during the entire study period. No changes in activity patterns (in some cases indicated by tracks) were evident, but the observations were too limited to permit formal analysis.

Raptors were rarely seen. There is no trend evident between the pre- and post-treatment observations. We did not see any indication of vultures feeding in any of the fields under observation nor any concentration of hawks in the test areas.

Great-horned owls were observed at intervals during the test in one of the Isley woodlots and may have been nesting there. Screech owls may have been present in woodlots adjoining some fields but were not seen. No observations linked these raptors with the treatment effort. No indication of decreased numbers of raptors during the course of the tests was evident.

Initially statistical treatment of data was desired. However, the planting patterns among the fields were not uniform. Two groups of fields, based on planting dates, were available. Even within these groups, however, fields were not comparable because of specific locations and differing cultural practices. This advised against the use of formal statistical procedures.

Mammal observations were too few and scattered to permit even simple statistical tests. Avian observations focused on resident birds, especially involving the census of singing males. That numbers before and after treatments in both treated and control fields were similar is the basis for judgement of no impact, and statistical tests are not needed. In-field bird populations changed drastically when fields were prepared for planting, some species increasing, others decreasing. These shifts due to habitat changes had no relation to the chemical treatment. In fact, numbers of species and numbers of birds observed remained constant or increased in the test fields during the observation period, further emphasizing the impact of seasonal and habitat changes on data interpretation.

Only two carcasses (white-footed mice) were found (both in treated fields); no further population evaluation was possible. This pattern of mortality would have no impact on small mammal populations that lived in field borders and occasionally ventured into fields to feed on seedlings.

CONCLUSIONS

1. No bird mortality was observed. Numbers of singing males were similar in
areas adjacent to treated and control fields. No evidence of treatment impact was found for area birds, including raptors.

2. While two mice were found, presumably killed by feeding on newly emerged corn seedlings, this does not constitute any population hazard.

3. Other small mammals and larger mammals, including fox, were not observed in large numbers; but their activities and general frequency of sightings did not change during the study.

4. It is concluded that Temik in corn can be used safely relative to wildlife when applied according to label directions.

LITERATURE CITED


TABLE 1. The 15 most abundant species of birds recorded during the Temik wildlife study.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Species</th>
<th>Number</th>
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<tbody>
<tr>
<td>1</td>
<td>Red-winged blackbird</td>
<td>952</td>
</tr>
<tr>
<td>2</td>
<td>Song sparrow</td>
<td>396</td>
</tr>
<tr>
<td>3</td>
<td>Horned lark</td>
<td>296</td>
</tr>
<tr>
<td>4</td>
<td>Grackle</td>
<td>277</td>
</tr>
<tr>
<td>5</td>
<td>Barn swallow</td>
<td>236</td>
</tr>
<tr>
<td>6</td>
<td>Starling</td>
<td>173</td>
</tr>
<tr>
<td>7</td>
<td>Blue jay</td>
<td>149</td>
</tr>
<tr>
<td>8</td>
<td>Mourning dove</td>
<td>149</td>
</tr>
<tr>
<td>9</td>
<td>Robin</td>
<td>148</td>
</tr>
<tr>
<td>10</td>
<td>Vesper sparrow</td>
<td>87</td>
</tr>
<tr>
<td>11</td>
<td>Kildeer</td>
<td>78</td>
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<tr>
<td>12</td>
<td>House sparrow</td>
<td>77</td>
</tr>
<tr>
<td>13</td>
<td>Indigo bunting</td>
<td>70</td>
</tr>
<tr>
<td>14</td>
<td>Cowbird</td>
<td>67</td>
</tr>
<tr>
<td>15</td>
<td>Savannah sparrow</td>
<td>63</td>
</tr>
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TABLE 2. A summary of red-winged blackbird counts during the perimeter/transect census.

<table>
<thead>
<tr>
<th>Field Site</th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
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<tbody>
<tr>
<td>Isley</td>
<td>91</td>
<td>(22.8)</td>
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<tr>
<td>Fisher 1</td>
<td>82</td>
<td>(27.3)</td>
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<tr>
<td>Fisher 2</td>
<td>57</td>
<td>(19.0)</td>
</tr>
<tr>
<td>Eisenmann</td>
<td>22</td>
<td>(7.3)</td>
</tr>
<tr>
<td>Goetz</td>
<td>4</td>
<td>(1.3)</td>
</tr>
<tr>
<td>Brubaker</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>(Control)</td>
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<td></td>
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TABLE 3. A summary of song sparrow counts during the perimeter/transect census.

<table>
<thead>
<tr>
<th>Field Site</th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
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</thead>
<tbody>
<tr>
<td>Isley</td>
<td>29</td>
<td>(7.2)</td>
</tr>
<tr>
<td>Fisher 1</td>
<td>65</td>
<td>(21.7)</td>
</tr>
<tr>
<td>Fisher 2</td>
<td>20</td>
<td>(6.7)</td>
</tr>
<tr>
<td>Eisenmann</td>
<td>13</td>
<td>(4.3)</td>
</tr>
<tr>
<td>Goetz</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>Brubaker</td>
<td>1</td>
<td>(0.3)</td>
</tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE 4. A summary of grackle counts during the perimeter/transect census.

<table>
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<th>Field Site</th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
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<td>Isley</td>
<td>4</td>
<td>(1.0)</td>
</tr>
<tr>
<td>Fisher 1</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>Fisher 2</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>Eisenmann</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>Goetz</td>
<td>2</td>
<td>(0.7)</td>
</tr>
<tr>
<td>Brubaker</td>
<td>5</td>
<td>(1.7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key To Maps

Territorial/Singing Males

☐ Pre-

☐ Post

☐ Both

Nesting Conditions

○ - Nest

○ - Nest with eggs

○ - Nest with young

Other Sightings

▲ Pre-

▲ Post

▲ Both

Abbreviations

BL - Bobolinks
BS - Barn Swallow
FL - Flycatcher
GR - Grackle
HL - Horned Lark
HS - House Sparrow
IN - Indigo Bunting
KD - KIdeer
MD - Morning Dove
RB - Robin
RW - Redwing Blackbird
SA - Savannah Sparrow
SB - Shore Birds
SS - Song Sparrow
ST - Starling
VS - Vesper Sparrow

Types of Fields

□ Soybeans
□ Oats
□ Tomatoes
□ Corn
□ Wheat
□ Potatoes
□ Woodlot
□ PK
□ Structure
FIGURE 1. Isley Farm Plot

FIGURE 2. Fisher Farm Plot #1
FIGURE 3. Fisher Farm Plot #2

FIGURE 4. Eisenmann Farm Plot
FIGURE 5. Goetz Farm Plot

FIGURE 6. Brubaker Farm Plot