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PROTECTING SEEDED RICE FROM BLACKBIRDS WITH METHIOCARB

Jerome F. Besser¹

ABSTRACT

A study was conducted at Anahuac National Wildlife Refuge, Chambers County, Texas, during April 1972 to determine the effectiveness of the experimental bird repellent methiocarb [4-(methylthio)-3,5 xylyl *N*-methyl carbamate] for protecting seeded rice from feeding blackbirds. Three 1-acre plots where seed was treated with 0.5% methiocarb produced about eight times more rice seedlings per acre (522,000) than three plots sown with untreated seed (66,000). Red-winged blackbirds (*Agelaius phoeniceus*) comprised 97.4% of the 8,902 grain-feeding birds recorded in 59 observations of the six 1-acre plots, and about 13 times more redwings fed on untreated plots than treated ones. Appraisal of lower concentrations of methiocarb for this use is recommended.

INTRODUCTION

Blackbirds often cause locally serious losses to many kinds of sprouting grains; rice is among those most heavily damaged. Severe blackbird damage to seeded rice in the United States was reported in Louisiana as early as 1924 (Kalmbach 1937). More recently, Pierce (1970 : page 102) reported that Arkansas rice producers in 1968 estimated that "poor stands due to blackbird damage to sprouting rice on 31,024 acres

resulted in an estimated loss in yield of rice valued at \$336,200," or more than \$10 worth of rice per acre.

One promising solution for the problem of birds damaging sprouting rice is treatment of the seed with a chemical repellent before seeding. Methiocarb [DRC-736; 4-(methylthio)-3,5 xylyl *N*-methyl-carbamate], an experimental carbamate insecticide, is repellent at very low concentrations to a number of species of birds (Schafer and Brunton 1971). Treatment of seed corn with methiocarb has resulted in substantial reductions in the number of sprouts pulled by blackbirds (West and Dunks 1969; Guarino and Forbes 1970; Stickley and Guarino 1972). De Haven *et al.* (1971) showed that methiocarb also provided substantial protection against blackbird attack when sprayed on plots of ripening rice.

Some rice farmers that I interviewed admitted candidly that they used highly toxic and/or persistent insecticides as much to kill blackbirds pulling sprouts as to kill soil insects that damage the seed. Occasionally, species other than blackbirds are killed. Such misuse of insecticides may be circumvented if methiocarb protects rice seedlings.

In early April 1971, personnel of the Anahuac National Wildlife Refuge in Cham-

¹ U.S. Bureau of Sport Fisheries and Wildlife, Denver Wildlife Research Center, Denver, Colorado 80225.

bers County, Texas, reported that seedlings in refuge rice plantings were being seriously damaged by blackbirds. They tried a variety of bird-frightening methods at that time without much success. This study was conducted to determine whether satisfactory stands of rice seedlings could be produced in this area from seed treated with methiocarb.

MATERIALS AND METHODS

Three pairs of 1-acre plots on the Anahuac Refuge were seeded with Nova rice on April 6, 1972. Within each pair, treated rice was assigned to one plot and untreated rice to the other. The two plots were located on adjacent rice checks; only the outer 1-acre portion of each 2- or 3-acre check was seeded, leaving at least 50 yards of unseeded area between the treated and untreated plots. All three pairs of plots, were within 2 miles of one another and subject to damage by the same bird populations.

Treated seed was coated with a suspension containing, on the basis of seed weight, 0.5% methiocarb (0.67% of 75% wettable powder), 0.24% latex solids (0.5% of a latex containing 48% solid), and 4.0% water. Seed was dropped on the cloddy surface of each rice check at the rate of 100 lb/acre by a tractor-drawn Gandy seeder with orifices 8 inches apart. A culti-packer then broke up the dry clods, covering most seeds with about 1 inch of soil. The checks were flooded to a depth of 6 to 18 inches on April 7 and were drained, sooner than normal, the following day to allow rapid germination and to facilitate sampling of stands on treated and untreated plots. Since the rice was not to be harvested (data have

not yet been completely assembled to show whether rice grown from seeds treated with methiocarb is safe for human consumption), the plots were given no further care after being drained.

Daily bird observations were begun after the plots were seeded on April 6 and continued through April 21, when seedlings were about 3 inches tall and most birds had stopped feeding on the plots. An observation consisted of counting the largest number of birds of each species feeding within a plot during a 5-minute period. One 5-minute observation on each of the six plots was easily made within 1 hour. From one to eight such observations were made daily, except on days when the plots were flooded, for a total of 59 observations per plot.

Stands of rice seedlings were sampled on April 19 and 20. Each 1-acre plot was gridded into 100 0.01-acre sub-plots, and the center point of a 1-square-foot circle was randomly chosen within each sub-plot. All seedlings within 6.77 inches of the plot center were tallied.

RESULTS AND DISCUSSION

Two weeks after seeding, about eight times more rice seedlings were counted on the three treated plots than on the three untreated plots (average, 522,000 seedlings per acre, versus 66,000) (Table 1). Early draining to facilitate sampling interfered with germination of some seeds. Ungerminated seeds inadequately covered with soil were present on many of the treated sub-plots. However, very few were found on the untreated sub-plots; numerous empty seed hulls showed that most had been eaten by birds.

During the 59 observations, 9,208 birds of 18 species were counted feeding on the seeded plots. All but 71 were of grain-feeding species, and 97.4% (8,902) of these were red-winged blackbirds, mostly adult males. Although it was not possible to accurately determine the size of the redwing population that fed on the test plots, I estimated their numbers at approximately 2,000. The greatest number of redwings counted in a single census of all plots was 397 (372 on the treated vs. 25 on the untreated) on April 15, when seedlings were about 1.5 inches high.

About 13 times more redwings fed on the untreated plots than on the treated ones (totals, 8,272 vs. 630) (Table 2). Redwings were quickly repelled from feeding on seeds and seedlings within the treated plots. Within a few days after seeding, it was easy to recognize the untreated plots, since they appeared to have just been harrowed (Fig. 1A). This was caused by redwings prying up small clods to feed on the sprouting seeds. Treated fields were flat, with only an occasional overturned clod (Fig. 1B).

There was also a sharp contrast in the feeding behavior of redwings on treated and untreated plots after seeds began sprouting. A bird alighting on a treated plot was usually with six or fewer birds making an initial exploration. It usually uprooted a few nearby seedlings from among the multitude available and left within 5 minutes. In contrast, a bird alighting on an untreated plot was usually with 12 or more birds, joining a group of 25 or more already feeding. It usually stayed more than 15 minutes, sometimes covering the entire length of the plot (about 500 yards) in search of the few

remaining newly emerged sprouts.

Species of birds other than redwings caused little damage. Altogether, 185 mottled ducks (*Anas fulvigula*) were recorded in the 59 observations -- 115 on the untreated plots and 70 on the treated. The greatest number of mottled ducks noted in a single census was 22 -- 13 on the untreated and 9 on the treated. Nineteen blue winged teal (*Anas discors*), no more than 5 on a single census, were also recorded, all on the untreated plots. Feeding by both duck species was largely confined to the poorly drained area along the dike of each rice check, and they spent most of their time loafing rather than feeding.

Other species that feed on sprouting rice were recorded only occasionally. The totals included 11 brown-headed cowbirds (*Molothrus ater*), 6 boat-tailed grackles (*Cassidix mexicanus*), 6 dickcissels (*Spiza americana*), a bobolink (*Dolichonyx oryzivorus*) and a meadowlark (*Sturnella magna*). The other grain-feeding species recorded was the savannah sparrow (*Passerculus sandwichensis*), 6 individuals. Nine species of invertebrate feeders, mostly shorebirds, were attracted to the rice plots after they were drained. The total included 29 lesser yellowlegs (*Totanus flavipes*), 22 killdeers (*Charadrius vociferus*), 4 long-billed curlews (*Numenius americanus*), 4 pectoral sandpipers (*Erolia melanotos*), 3 black-bellied plovers (*Squatarola squatarola*), 3 common snipe (*Capella gallinago*), 2 golden plovers (*Pluvialis dominica*), 2 black-necked stilts (*Himantopus mexicanus*), a snowy plover (*Charadrius alexandrinus*) and a snowy egret (*Leucophoyx thula*). These birds presumably took only invertebrates but may have inadvertently uprooted a few rice seedlings.

RECOMMENDATION

The high degree of protection that 0.5% methiocarb provided rice seedlings from redwing damage indicates that a lower concentration may also provide adequate protection. I suggest that future tests include a concentration of about one-half to one-fifth the 0.5% used in this study.

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Table 1. Counts of rice seedlings on untreated (U) and methiocarb treated (T) plots 14 days after seeding.

Plot pair	Number of seedlings			
	Counted on 100 1-ft ² circles		Calculated per acre	
	U	T	U	T
1	8	921*	3,485	401,188
2	18	1,185*	7,841	516,185
3	429	1,490*	186,872	649,044
Average	151.7	1,198.7	66,066	522,139

* Significantly different ($P < 0.01$) from corresponding untreated plot by chi-square analysis.

Table 2. Numbers of red-winged blackbirds feeding on untreated (U) and methiocarb-treated (T) plots after seeding on April 6.

Date	No. of 5-minute observation periods per plot	Total number observed feeding						Average per observation all plots	
		Plot Pair 1		Plot Pair 2		Plot Pair 3		U	T
		U	T	U	T	U	T	U	T
April 6	1	10	2	5	2	0	0	3.0	1.3
7	3	18	1	8	5	20	0	15.3	2.0
8	0*	0*	0*	0*	0*	0*	0*	0*	0*
9	1	33	1	0*	0*	26	0	29.5	0.5
10	5	258	44	154	36	169	16	116.2	19.2
11	5	132	66	225	45	124	7	96.2	23.6
12	6	174	67	315	34	148	19	106.2	20.0
13	6	265	15	328	23	198	2	131.8	6.7
14	8	743	46	380	29	529	32	206.5	13.4
15	5	671	23	359	14	406	4	287.2	8.2
16	5	392	10	284	5	273	5	189.8	4.0
17	5	371	43	334	4	201	2	181.2	9.8
18	4	197	6	175	14	123	1	123.8	5.3
19	2	38	0	62	0	20	6	60.0	3.0
20	2	33	0	32	0	9	1	37.0	0.5
21	1	0	0	10	0	0	0	10.0	0.0
Total	59	3,355	321**	2,671	211**	2,246	95**	140.2	10.6**

* Flooded - no redwings able to feed.

** Significantly different ($P < 0.01$) from corresponding untreated plot by chi-square analysis.

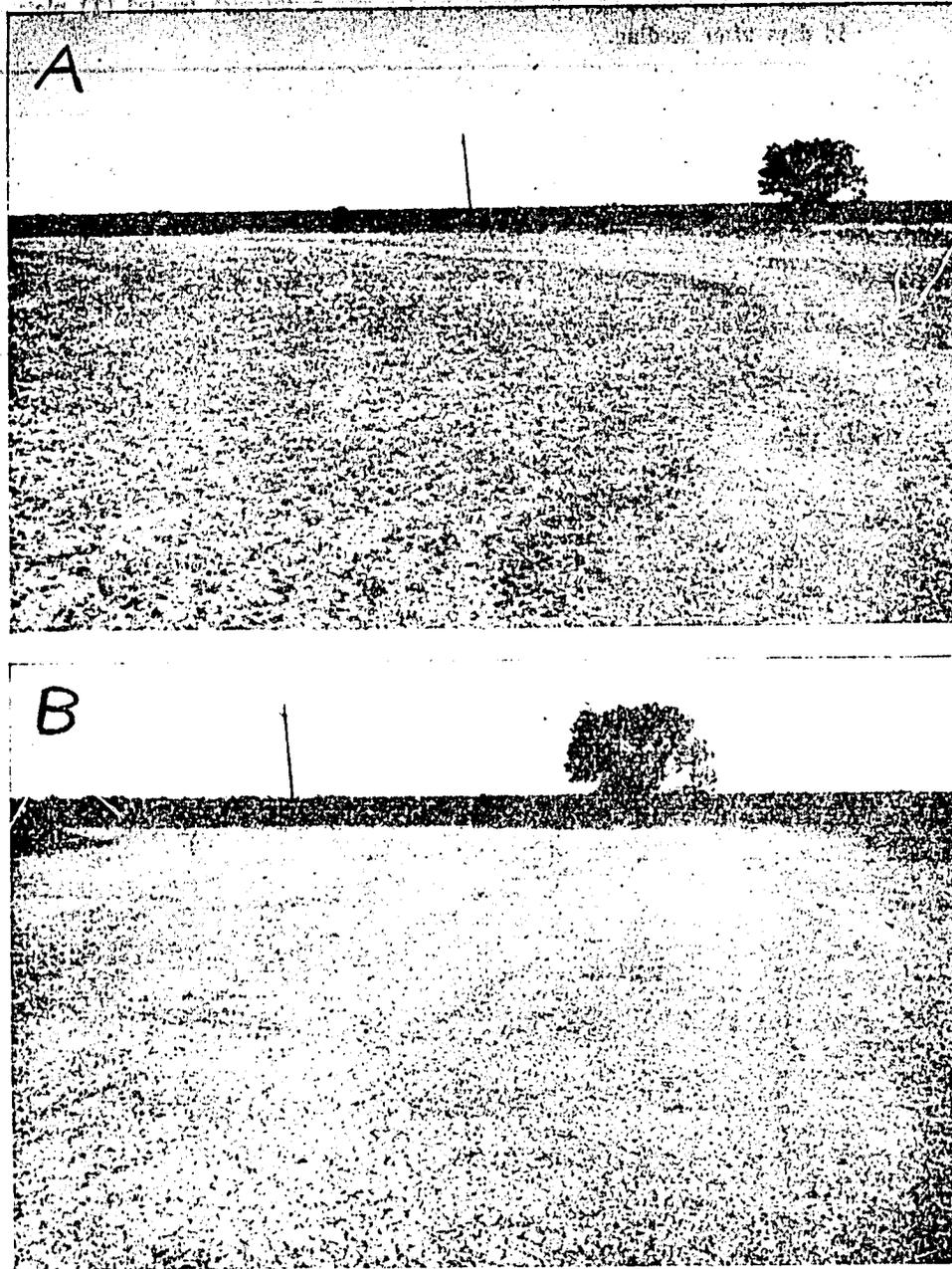


Fig. 1. Effects of 0.5% methiocarb seed treatment 14 days after seeding. The upper photo (A) shows a plot seeded with untreated rice; note that birds have overturned so many clods looking for sprouts that the ground appears to have been harrowed. The lower photo (B) shows the undisturbed appearance of an adjacent plot seeded with treated rice.