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ABSTRACT: Seed rice was treated with 0.25% methiocarb[1] to test its effectiveness as a blackbird repellent in Vermilion Parish, Louisiana in the spring of 1975. Two replications of 3 treated and 3 untreated plots showed 68% more seedlings in treated plots (2,393) than in untreated plots (1,429). Half as many birds (chiefly redwing blackbirds (Agelaius phoeniceus) were recorded in treated (1.18/mi n) as in untreated plots (2.39/min).

INTRODUCTION

Rice is one of the sprouting grains that suffers locally serious losses to blackbirds. Kalmbach (1937) reported damage in Louisiana rice plantings in 1924. More recently, Arkansas rice farmers estimated that their 1968 overall losses to blackbirds at planting time were in excess of $1 million (Pierce 1970).

For the past two decades, rice growers in the southern U.S. have been treating seed rice with aldrin, an insecticide, often primarily to prevent bird damage (Pierce 1970, Besser 1973). Aldrin registrations were cancelled in 1974 and remaining supplies were exhausted in 1975, leaving growers without an effective means for either insect or bird protection.

A promising solution for the problem of bird damage to sprouting grains is treatment of the seed with the chemical bird repellent, methiocarb [3,5-dimethyl-4-(methylthio)phenol methylcarbamate] prior to planting. In three prior studies, treatment of corn seed with methiocarb resulted in substantial protection against blackbirds pulling sprouts (West and Dunks 1969, Guarino and Forbes 1970, Stickley and Guarino 1972). Similarly, Besser (1973) found that a 0.5% methiocarb treatment afforded a high degree of protection to rice seedlings; he recommended that future tests include a concentration of one-half to one-fifth the 0.5% used in his study.

This test was conducted to determine if 0.25% methiocarb applied to seed rice before planting would provide protection against blackbird (primarily redwing) damage. It was conducted near Gueydan, Vermilion Parish, Louisiana, during March and April 1975. Test fields were provided by local rice growers.

MATERIALS AND METHODS

Test Sites

Two rice paddy sites, each containing 6 plots, were selected to provide replicate testing of methiocarb on sprouting rice. At each site, 3 plots were randomly chosen for broadcasting methiocarb-treated seed; the remaining 3 plots were sown with untreated seed. The sites were 9 miles apart.

Site 1 was within 1 mile of the vast coastal marshes which provided excellent roosting cover for thousands of blackbirds. Site 2 was about 10 miles inland but lay in the path of blackbird flights from the coastal marsh.

Site 1 totaled 19.1 acres. Each plot was 66' x 681' (1.03 acres) and plots were separated lengthwise by a 50' unplanted buffer zone. About 9 acres of this paddy were not used for this test.

Site 2 totaled 7.6 acres. Four plots were each 90' x 36O' (0.74 acres) and the remaining two plots were each 120' x 280' (0.77 acres). Plots were separated lengthwise by a 45' unplanted buffer zone. Differences in plot sizes were due to the irregularity of the paddy. About 1.5 acres of this paddy were not used.

Treatment

Fifty-pound batches of rice seed (Brazo variety for Site 1 and Nato for Site 2) were

[1]Manufactured by Chemagro Agricultural Division, Mobay Chemical Corporation.

treated in a portable cement mixer with 0.166 1b of 75% methiocarb wettable powder and 4 fluid oz of Dow Latex 205 (48% solids), an adhesive, suspended in 1 quart of water. This gave a seed treatment of 0.25% methiocarb (a.i.) and 0.24% latex. After treating, the seed was spread over a concrete platform to dry.

Sowing

Current rice planting practices in the Gueydan area include soaking rice seed in water for 24 to 36 hours to stimulate germination, drying the seed for about 24-28 hours, and aerially broadcasting it at 140 lbs per acre in freshly plowed and leveled paddies flooded with 3-4 inches of water. Drainage of the newly planted paddies begins within 24 hours.

In our test, we followed the same methods; however, our plots were planted with only 100 lbs of seed per acre. Both sites were planted on 21 March and were completely drained by 23 March.

Evaluation

We determined plant stands at the conclusion of the test at Site 1 on 7 April and at Site 2 on 6 April (17 and 16 days after planting, respectively) when the rice seedlings were about 3" high and beyond susceptibility to most bird damage. A total of 25 sampling units (1-ft-diameter circles) were randomly established in each plot and the total surviving plants in each unit were recorded. An analysis of variance was run on these data to detect differences between stands on treated and untreated fields.

We recorded the numbers and species of birds visiting each treated and untreated plot at each site twice daily from the time the paddies were drained until the final damage appraisal. Each site was observed for 1/2-hour between sunrise and 10 a.m., and between 5 P.m. and dusk. Five-minute counts were made at each plot to provide comparable data on bird use. The starting point for counts was alternated daily between sites, and among plots.

Residues

To provide information on methiocarb residues resulting from the treatment, we collected 2-pound samples of the two varieties of treated rice immediately after treatment and again just before the seed was sown. In addition, a 1-quart water sample was collected at the drainage outlet of Site 2 when it was about half drained on March 22. Samples of 200 ungerminated seeds and sprouts were also collected from treated plots at each of the two sites, 8 days after sowing, when some sprouts were about 1" tall. All rice and water samples were frozen and returned to the Denver Wildlife Research Center for analysis by an extraction and thin-layer chromatographic technique described by Cunningham (1975).

RESULTS

Damage

A total of 2,393 seedlings was counted in treated sample units and 1,429 in untreated units. The number of surviving seedlings averaged 399 per treated unit and 238 per untreated (significant at $P = 0.017$) (Table 1). At each site, the number of plants was consistently higher in the three treated than in the three untreated plots. Treated plots produced an average of 884,341 plants per acre compared to an average of 528,086 plants per acre for the untreated plots. Although a maximum of 1,800,000 plants could have been produced from a seeding rate of 100 lbs per acre, counts of surviving plants show that only about half this number per acre could be accounted for in any plot. Moreover, this difference was observed in plots where only a few feeding birds were observed. Seedling mortality was probably due to a combination of factors which, in addition to birds, included poor germination, seed drift while planting, insects, and lack of moisture after sprouting.

Bird observations

A total of 15.1 hrs of observations on treated plots and the same number of hours on untreated plots disclosed that red-winged blackbirds caused most of the damage. House sparrows (Passer domesticus) were involved to a lesser extent.

Table 1. A comparison of rice seedlings in sampling units on methiocarb-treated and untreated plots, 16-17 days after planting, Louisiana, 1975.

	Number of seedlings remaining on 25 1-ft. diam. circles	
	Treated	Untreated
Site 1		
Plot 2	327(0.08)[1]	
3	371(0.00)	
5	341(0.14)	
1		18(9.29)
4		284(0.00)
6		256(2.29)
Total	1,039	558
Average	346	186
Site 2		
Plot 2	443(0.29)	
5	496(2.28)	
6	415(4.29)	
1		173(1.65)
3		360(0.00)
4		338(1.10)
Total	1,354	871
Average	451	290
Grand Total	2,393	1,429
Grand Average	399[2](1.18)	238(2.39)

[1]Parentheses show bird visits per minute based on two 5-minute observation counts per plot per day for 15-17 days.

[2]Significantly different from untreated (P = 0.017).

During 122 15-minute count periods (total of three 5-minute count periods for the treated and untreated plots at each site), twice as many birds visited untreated plots (2.39/min) as treated plots (1.18/min). Red-winged blackbirds comprised 89.2% of the total, house sparrows 10.3%, and brown-headed cowbirds (Molothrus ater) 0.5% in untreated plots, and redwings accounted for 98.0% and house sparrows 2.0% of the total in treated plots. Only redwings were recorded at Site 1, whereas all three species were recorded at Site 2. House sparrows accounted for about half the bird use in the untreated plots at Site 2. About 4.5 times more bird activity was recorded during late afternoon counts than early morning counts.

There was an inverse relationship between the number of surviving plants in untreated plots and bird pressure. The greatest bird pressure occurred on untreated Plot 1 at Site 1 which also had the fewest surviving plants (Table 1). In the untreated plots at each site, plant stands were denser on plots visited by the fewest birds; however, this was not the case for treated plots. We attribute this effect to the treatment.

Residues

Methiocarb residues of 2500 ppm {0.25%) were found on the Nato rice seed immediately after treatment; 2100 ppm on rice samples collected after soaking and before sowing; and 317 ppm on ungerminated seeds and sprouts collected 8 days after sowing. A paddy water sample contained 0.136 ppm methiocarb residue. Residues of 1000 ppm were found on the Brazo rice seed collected after soaking and before sowing, and 107 ppm on germinated and ungerminated seeds 8 days after sowing. Unfortunately, Brazo residue samples collected immediately after treatment were lost. The drier-hulled Brazo seed contained much straw and chaff and this may have accounted for the lower residues found compared to those on the Nato seed.

Conclusion

The 0.25% methiocarb treatment provided significant protection to the rice seed from bird damage. At the termination of the test, there were about 1.7 times more rice plants in sampling units in treated plots (2,393), than in untreated plots (1,429).

Because aldrin can no longer be used on rice seed for bird protection, a substitute compound is badly needed. These data show that protection from bird damage can be obtained by a 0.25% methiocarb treatment.

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