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METHIOCARB FOR REPELLING BLACKBIRDS FROM RIPENING RICE

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ABSTRACT

Tests were conducted at Davis, California, during the fall of 1970 to determine the effectiveness of the experimental bird repellent, methiocarb [4-(methylthio)-3,5-xylyl *N*-methylcarbamate], for reducing damage to ripening rice by red-winged and tricolored blackbirds (*Agelaius phoeniceus* and *A. tricolor*). When birds were placed in cages containing either methiocarb-treated rice or untreated rice, the average damage for two tests was reduced 68 per cent by a 10.0 lb/acre treatment and 57 per cent by a 3.2 lb/acre treatment, based on yield differences. However, when differences were measured by the numbers of missing kernels, damage was reduced by 90 and 56 per cent by the 10.0 and 3.2 lb/acre treatments respectively. When birds were placed in larger cages covering both untreated subplots and subplots treated with several levels of methiocarb (1.0, 3.2, 5.6, and 10.0 lb/acre), less protection was provided, but damage was still reduced significantly on the methiocarb treated subplots. In a small-scale field test at Biggs, California, a 10.0 lb/acre methiocarb treatment reduced blackbird damage to ripening field rice by about 50%.

INTRODUCTION

Blackbirds of several species damage maturing rice in the Sacramento Valley of California and in other rice-growing districts of the United States. When thousands of blackbirds feed on a single field of such a high-yielding, high-value crop, the loss to an individual farmer can be substantial.

One approach to solving this type of problem is with chemical repellents. Methiocarb [DRC-736; Mesurol®; 4-(methylthio)-3,5-xylyl *N*-methyl-carbamate[3]], an experimental repellent, has already shown its usefulness for preventing bird damage to sprouting grains (1-4; Stickley and Guarino, Unpublished MS), and recent laboratory studies have indicated that it may also be effective for ripening grains (5). The purpose of this study was to determine the effectiveness of various concentrations of methiocarb for repelling blackbirds from ripening rice. The tests were conducted during September and October 1970 on rice grown at the University of California Rice Research Facility at Davis, California.

MATERIALS AND METHODS

Four tests were conducted with blackbirds placed in cages containing ripening rice. In two of the tests, treated and untreated rice plots were in separate small cages; in each of the other two tests, treated

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[3] Chemical provided by Chemagro Corporation, Kansas City, Mo. Reference to trade or product names does not imply endorsement of commercial products by the Federal Government.

and untreated subplots were in a single large cage. A formulation of methiocarb (75% wettable powder), Dow Latex 512 R (0.5%), and water was sprayed on the standing rice at a rate equivalent to 15 gallons per acre. Blackbirds were placed in the test cages within 24 hours after spraying.

Test 1: Six-ft-square plots of Earlirose rice in the hard dough stage were each treated with one of three levels (0, 3.2, and 10.0 lb/acre) of methiocarb; each level was replicated twice. A 7 × 7 × 6 – ft wire cage was placed over each of the six plots, and four tricolored blackbirds (*Agelaius tricolor*) and four red-winged blackbirds (*Agelaius phoeniceus*) were held in each cage for 14 days. A supplemental food supply consisting of barnyard-grass (*Echinochloa* sp.), cracked rice, and Ralston-Purina Eggena crumbles was provided *ad libitum* in each cage. Pre- and post-test weights were recorded for each bird.

Test 2: Plots of dough stage Calrose rice of the same size used in Test 1 were treated with the same levels of methiocarb. Each level was replicated four times, and 12 tricolored blackbirds were held in each cage for 10 days. In addition, four plots without chemical treatment or birds were enclosed with cages to provide data on expected yields. Supplemental food was provided as in Test 1, but only during the first 7 days.

Test 3: A 28 × 28 × 6 – ft wire cage was placed over nine 6-ft-square subplots of dough stage Earlirose rice in which three treatment levels (0, 3.2, and 10.0 lb/acre) of methiocarb were replicated three times in a Latin-square design. Seventy-five tricolored blackbirds were held in the cage for 10 days.

Test 4: The same size cage as used in Test 3 was placed over 16 4-ft-square subplots of Calrose rice in the hard dough stage. Four treatment levels (0, 1.0, 3.2, and 5.6 lb/acre) of methiocarb were replicated four times in a Latin-square design. One hundred tricolored blackbirds were held in the cage for 10 days.

Evaluation: From 10 to 20 rice panicles were randomly collected from each plot or subplot in each test. Panicles were clipped one inch below the first primary branch, and the number of missing kernels and the total weight were recorded for each. The remaining rice in each plot was harvested and threshed, the moisture determined, and the grain yield converted to a standard 14% moisture content. A 1500-gram sample of paddy rice from each treatment level in each test was supplied to the Federal-State Grain Inspector for determining milling quality. Data were analyzed by a one-way analysis of variance, and the means were separated by Duncan's new multiple-range test; $P < 0.05$ was accepted as the criterion of significance.

RESULTS AND DISCUSSION

Tests 1 and 2, Separate Small Cages

All measurements in Test 1 indicated that substantial repellency was provided by the 3.2 lb/acre treatment and that the 10.0 lb/acre treatment was even more effective (Table 1). The number of missing kernels per panicle decreased significantly with each increase in treatment level. There was a corresponding increase in panicle weight as treatment level increased, but the only significant difference was between the 10.0 lb/acre and untreated plots. Total yields also increased in response to increasing

treatment, but since only two replications were involved, a statistical comparison was not made. The amount of supplemental food consumed and weight changes of birds were highly variable, showing no apparent correlation to treatment level.

In a separate study conducted at the same time, four totally protected plots the same size as the Test 1 plots, and within 50 ft yielded an average of 2900 grams of rice per plot. If the actual plot yields in Test 1 (Table 1) are subtracted from this expected yield, the untreated plots lost 1,095 grams of rice, the 10.0 lb/acre treatment lost 442 grams, and the 3.2 lb/acre treatment lost 578 grams. The two levels of methiocarb treatment thus reduced the expected damage (1,095 grams) by about 60% and 47%. The damage reduction estimates based on missing kernels were even larger: 90% and 53%, respectively. The missing kernel data may have indicated more protection than was actually provided, however, since kernels that were damaged by "milking" may have remained on the panicles and would not have been counted as missing.

Test 2 also showed substantial protection provided by both levels of methiocarb (Table 1). More bird-days were involved in this test than in Test 1, and the differences in damage among treatments were even more pronounced. All measurements differed significantly between treatments, except yield in the 10.0 and 3.2 lb/acre plots and missing kernels in the 10.0 lb/acre and totally protected plots.

Supplemental food consumption in this test was correlated with treatment. Birds in the 0, 3.2, and 10.0 lb/acre plots ate 55%, 63%, and 74%, respectively, of the daily amount provided; and the difference between the 0 and 10.0 lb/acre figures was significant.

When damage reduction is calculated from expected yield (2,978 grams) as in Test 1, the expected losses were reduced about 76% and 68% by the 10.0 and 3.2 lb/acre treatments, respectively. Again, the damage reduction estimates based on missing kernels were even higher: 90% and 59%.

Tests 3 and 4, Single Large Cages

Blackbirds in the large cages were observed feeding on both the treated and the untreated plots. No consistent differences were observed in bird pressure or damage between treatments, and damage varied greatly among plots of the same treatment level.

Analysis of the panicle weights, missing kernels, and plot yields, however, showed that some overall protection was still provided by the methiocarb treatments in each test and that rice production increased with the level of treatment (Table 1). The only exception was in Test 4, where the yield in the 3.2 lb/acre plot was slightly smaller than that in the 1.0 lb/acre plot. However, even the 1.0 lb/acre plots produced more rice than the untreated. In both tests, some of the differences between treatment levels in panicle weights and missing kernels were statistically significant, further substantiating the repellency of methiocarb.

Methiocarb apparently had little, if any, effect on the milling quality of rice in any of the tests, as the values for head rice and total rice in the treated and untreated plots were quite constant.

Testing Design Differences

In Tests 1 and 2, where each cage contained only one treatment, visible diffe-

rences in damage were evident among treatments within 3 days after the birds were introduced; by the end of the tests, these differences were striking. These observations and the more pronounced repellency indicated by the data for these tests are in contrast to the less pronounced differences obtained when treated and untreated rice were exposed in the same cage. Poorer protection has also been obtained by other workers who exposed both repellent-treated and untreated foods together in a limited area. West et al. (2) reported that small methiocarb-treated plots in large untreated cornfields did not give good protection but that the same treatment was very effective when applied to entire fields. They suggested that good repellents may have been discarded in the past because laboratory and cage tests with them were improperly designed. Our results seem to support this conclusion. Tests 3 and 4, in which three or four different treatments were intermixed in a small area and there were no visual cues to differentiate treated rice from untreated, perhaps presented too difficult a learning situation for the birds. In contrast, Tests 1 and 2, where the birds had a simple choice between treated ripening rice and other kinds of untreated food, may more nearly simulate actual field conditions.

Field Test

While the cage tests were in progress, a small-scale field test was conducted at the California Cooperative Rice Research Foundation at Biggs, California, where blackbirds were severely damaging early-maturing rice varieties. A 12 × 100-ft plot of experimental rice (S-8146, short-grained, Pearl Variety) treated with methiocarb at 10.0 lb/acre produced almost 50% more rice than an adjacent untreated plot, even though some bird damage had already occurred before treatment.

This small-scale field test further indicates that methiocarb at 3.0 to 10.0 lb/acre (or perhaps even lower application rates) has promise for reducing blackbird damage to fields of ripening rice, and large-scale field tests are planned.

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REFERENCES

1. West, R. R., 1968: Protecting sprouting corn from pheasants with DRC-736. Trans. 13th Ann. Conf. Central Mountain and Plains Section Wildl. Soc. p. 12.

2. West, R. R., Brunton, R. B., and Cunningham, D. J., 1969: Repelling pheasants from sprouting corn with

a carbamate insecticide. J. Wildl. Mgmt. **33**: 216-219.

3. West, R. R., and Dunks, J. H., 1969: Repelling boat-tailed grackles from sprouting corn with a carbamate compound. J. Texas Acad. Sci. **21**: 231-232.

4. Guarino, J. L., and Forbes, J. E., 1970: Preventing bird damage to sprouting corn with a carbamate repellent. New York Fish and Game J. **17** (2): 117-120.

5. Schafer, E. W., and Brunton, R. B., 1971: Chemicals as bird repellents: Two promising agents. J. Wildl. Mgmt. **35**: 569-572.

Table 1. Mean measurements of rice yield in plots treated with methiocarb and exposed to caged blackbirds.

Methiocarb treatment (lb/acre)	Panicle weight (grams)*	No. of kernels missing*	Plot yield (grams)	Milling quality % total rice	Milling quality % head rice
Test 1 (2 plots per treatment, individual small cages)					
Protected**	--	0.68	2900	--	--
10.0	2.55[a]	2.40[a] (90%)	2458 (60%)	--	--
3.2	2.43[ab]	11.25[b] (53%)	2322 (47%)	--	--
0.0	1.94[b]	24.55[c]	1805	--	--
Test 2 (4 plots per treatment, individual small cages)					
Protected**	2.71[a]	0.68[a]	2978[a]	69.5	67.5
10.0	2.40[b] (83%)	5.62[a] (90%)	2570[b] (76%)	69.5	68.5
3.2	1.92[c] (58%)	22.90[b] (59%)	2421[b] (68%)	69.0	67.5
0.0	0.84[d]	56.23[c]	1230[c]	69.5	67.5
Test 3 (3 subplots per treatment, single large cage)					
Protected**	--	0.68	--	--	--
10.0	2.41[a]	6.87[a] (69%)	2881[a]	68.5	57.5
3.2	2.20[ab]	15.72[ab] (29%)	2823[a]	69.0	55.5
0.0	1.82[b]	22.87[b]	2109[a]	69.5	62.5
Test 4 (4 subplots per treatment, single large cage)					
Protected**	--	0.68	--	--	--
5.6	2.24[a]	16.05[a] (34%)	1196[a]	70.0	69.5
3.2	2.02[ab]	17.53[a] (27%)	1099[a]	70.0	69.0
1.0	1.85[bc]	18.10[a] (25%)	1122[a]	70.0	70.0
0.0	1.74[c]	24.85[a]	915[a]	70.5	70.5

* Based on 45 panicles per treatment in Test 3 and 40 panicles per treatment in Tests 1, 2, and 4.

** On four totally protected plots (Test 2), 0.68 kernels per panicle was found missing because of handling losses, and this figure was used in Tests 1, 3 and 4 for computing damage reduction based on missing kernels. Plot yield in Test 1 is based on data from four nearby protected plots in another study.

Within each test, means followed by the same superscript letter are not significantly different.

Figures in parentheses are calculations of the percent reduction in damage.