METHIOCARB-TREATED RICE SEED APPLIED AFTER FIELD DRAINING FAILS TO REPEL BLACKBIRDS FROM SPROUTING RICE

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ABSTRACT

Blackbirds, primarily Agelaius phoeniceus, cause extensive losses to sprouting rice in southwestern Louisiana. Methiocarb applied to seed prior to planting at rates above 1.0 g a.i./kg rice (0.1%) has provided excellent protection to sprouting rice in Louisiana under conditions of high bird pressure. To reduce treatment costs, some farmers have used over-flights of methiocarb-treated seed applied at low rates to part of the field after draining. This study showed this technique was not efficacious under conditions of high bird pressure. Four fields treated in this manner suffered 98% loss of sprouts compared to 100% loss in four untreated fields. Large flocks of blackbirds (> 3,000) fed in all treated and untreated fields during the first four days after draining. Blackbirds were evidently able to distinguish between treated (ungerminated) and untreated (germinated) seed. Large feeding flocks of blackbirds were composed almost entirely of females ($\bar{x}$ = 94%; n = 17); it is not known whether these birds were residents or migrants. We recommend that future studies investigate the efficacy of using mixtures of methio- carb-treated seed and untreated seed at planting time for reducing blackbird damage to sprouting rice.

Blackbirds cause extensive losses to sprouting rice in southwestern Louisiana. Methiocarb applied to rice seed prior to planting at rates above 1.0 g a.i./kg seed provided excellent protection to sprouting rice in Louisiana under conditions of high bird pressure (Holler et al. 1985). Use of methiocarb by growers under emergency (Section 18) exemption from the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) has been low, largely due to the high cost of treating all rice seed used in planting (Holler et al. 1982, 1985).

In 1985 we determined the feasibility of protecting newly planted rice fields from blackbird damage by aerially applying treated seed on the fields upon completion of drainage after planting. This method has been used by farmers in Louisiana and subjective evaluation of its effectivness has been inconclusive. If efficacious, this method would provide the grower with a measure that could be used after planting when bird pressure is known to be high. It would also reduce residues in drainage water and it would result in substantial reduction in the cost of protection.

Personnel of the Crowley, Louisiana Field Station, U.S.D.A. (formerly U.S. Fish and Wildlife Service), provided logistical support. A. Wilson, Rice Research Station, Louisiana State University, Crowley, Louisiana collected sprout count data from one field. Mesurol®[4/] 75% Seed Treater for this test was provided by the Mobay Chemical Corporation, Kansas City, Missouri. The study was conducted by the U.S. Fish and Wildlife Service, Department of the Interior. The Animal Damage Control Program, including the Denver Wildlife Research Center, was transferred to USDA-APHIS (Animal and Plant Health Inspection Service) on 3 March 1986.

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METHODS AND MATERIALS

Test Location and Experimental Fields:

Eight experimental fields (2.8 - 4.1 ha) were selected in early March 1985 south of Miller's Lake, Evangeline Parish, Louisiana in areas of traditionally high blackbird damage to rice. The fields were selected early in the planting season to ensure maximum blackbird pressure. Experimental fields were separated by at least 30 meters and adjacent fields were not planted sooner than 1 week after test fields were drained.

Seed Treatment:

Seed rice was treated at the rate of 1.25 g methiocarb/kg rice (0.125%). An aqueous solution containing 767 g of Mesurol 75% Seed Treater was sprinkled onto 45 kg of seed in an activated concrete mixer. Seed was mixed for 10 minutes following addition of the Mesurol suspension, returned to burlap bags, and allowed to dry for at least 24 hours prior to use.

Experimental Design:

Four of the 8 fields were randomly selected for application of treated seed; the remaining 4 fields served as untreated controls. All fields were aerially seeded with 140-160 kg of untreated seed per hectare between 13 and 22 March using normal cultural practices. Draining of fields commenced after seed began to germinate ($\bar{x}$ 5.6 days post-seeding) and was completed within 24 hours. Treated seed was aerially applied to the 4 fields selected for application early on the morning following drainage. Approximately one-third of the area of these fields was treated at the rate of 64 kg treated seeds per ha; distribution was such that field perimeters and several strips systematically spaced through the interior of each field were treated.

Bird Damage Evaluation:

Fields were sampled as described by Otis et al. (1983). Each field was divided into five strata of equal width. There were 50 paired sample points per field, distributed among strata in proportion to stratum area and located systematically along two field-edge to field-edge transects randomly placed within each stratum perpendicular to an established baseline. Each paired sample point consisted of two 0.19 m^2 plots 1.83 m apart, one protected with a wire mesh exclosure to enable determination of normal sprout density, and the other unprotected.

Undamaged seedlings were counted at all paired sample points when the sprouts were 4-8 cm high, 19-25 days after planting. The difference in seedling counts between enclosed and unprotected areas was defined as the response. Percent loss estimates for each field were calculated as:

$$100 - \left(\frac{\bar{x} \text{ sprouts/unprotected plot}}{\bar{x} \text{ sprouts/protected plot}} \times 100 \right).$$

After fields were drained, but prior to damage assessment, relative bird use of the fields was determined by 30-min counts made once or twice daily for 4 consecutive days and two to three times each week thereafter. Morning counts were made between 0700 and 1000; afternoon counts were made between 1500 and 1730. The numbers and species of blackbirds in the field were recorded each minute of the census. Differences in the average number of blackbirds observed per minute between treated and untreated fields during the first 4 days after draining were compared.

RESULTS AND DISCUSSION

Virtually total sprout loss occurred in fields oversown with treated seed and in control fields, averaging 98% and 100%, respectively (Table 1). Due to this high level of loss, statistical treatment of results was not performed. The few sprouts found in treated fields may have germinated from treated seed applied after draining. This also probably accounted for the higher sprout counts in exclosed plots of treated fields (Table 1).

Bird observations revealed extensive feeding by blackbirds in all experimental fields (Table 2). Flocks of at least 3,000 birds were observed in all fields, and each field had portions of observation periods when no birds were present.

Table 1. Counts of rice seedlings in exclosed and unprotected plots and estimated percent sprout loss in rice fields with and without overflights of methiocarb-treated seed, southwestern Louisiana, March 1985.

Field	Treatment	$\bar{x}$ Sprouts		Percent Sprout Loss
		Protected Plots N = 50/field	Unprotected Plots N = 50/field	
Duos	Control	14.2	0	100
Frugé I	Control	24.1	0	100
Benson I	Control	30.8	< 0.1	100
Frugé III	Control	29.3	< 0.1	100
Benson II	Treated	37.0	1.8	95
Frugé II	Treated	40.1	0	100
Landreneau	Treated	44.6	0.3	99
Frugé IV	Treated	38.4	0.3	99

Table 2. Blackbirds observed feeding in ricefields with and without overflights of methiocarb-treated seed during the first 4 days after draining in southwestern Louisiana, March 1985.

Field	Treatment	Number of 30-Minute Observation Periods	$\bar{x}$ Birds/ Min	Maximum Bird Count	Min-max/Observation Period ($\bar{x}$ Birds/Min)
Duos	Control	6	1,079	3,000	415-1,847
Frugé	Control	7	2,376	10,000	369-8,347
Benson I	Control	6	1,705	9,000	281-4,333
Frugé III	Control	5	633	10,000	0-2,167
			$\bar{x}$ = 1,448		
Benson II	Treated	7	670	4,000	199-1,203
Frugé II	Treated	7	2,018	12,000	10-5,917
Landreneau	Treated	8	925	8,000	38-2,751
Frugé IV	Treated	5	569	4,000	0-1,460
			$\bar{x}$ = 1,045		

We believe that the high bird pressure, the lack of total field coverage with treated seed, the presence of untreated seed, and the obvious difference in appearance of treated (not germinated) and untreated (germinated) seed in the fields all combined to result in the ineffectiveness of the overflight treatments. The large numbers of birds visiting treated fields apparently did not like the treated seed because many hulled but uneaten, or partially eaten treated seeds were found on March 28, two days after treatment in one field (Benson II). However, birds could find abundant untreated, germinated seed that was distinguishable from the treated seed (and probably

preferred regardless of treatment) and they readily consumed this seed. At one field (Duos), two female yellow-headed blackbirds (Xanthocephalus xanthocephalus) were feeding with a flock of up to 2,000 female redwings. The same two birds (assumed because of rare occurrence in this area [Lowery 1974]) were observed feeding with a large flock of female red-winged blackbirds (Agelaius phoeniceus) on the next two days in the same field. This suggests that the same flock may have been returning repeatedly to feed in this field. If so, in the case of a treated field, they could quickly learn to avoid treated seed.

During this study, one observer (Dolbeer) visually estimated the sex composition of each flock of redwings observed in sprouting rice fields between 25-29 March. In all cases the flocks were composed almost entirely of females ($\bar{x}$ = 94% females; min-max = 85-100% females; n = 17). It is not known whether these birds are resident breeders or migrants. Wilson (1985) found that 78% of the blackbirds he collected at this time of year were residents. However, his collections were composed largely of males and were taken from a large area in southwestern Louisiana. The origin (breeding location) of these female redwings should be determined, because it could significantly influence the development of population reduction strategies.

This study indicates that under conditions of high bird pressure in southwestern Louisiana, overflights of methiocarb-treated seed are ineffective in protecting sprouting rice from blackbird damage. As an alternative strategy, we believe that using a mixture of treated and untreated seed at planting time might be efficacious. Cage studies on Batesian mimicry suggest that if the mimic closely resembles the model in appearance and location, partial treatment of the population is just as effective as total treatment (Brower 1960; Avery 1985). If treated and untreated seed were mixed prior to planting, birds would be unable to visually distinguish treated from untreated seeds. We recommend that this approach be investigated in future studies.

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