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ABSTRACT: From 30 August to 18 September 1985, sunflower and corn mixed baits (75% sunflower meats and 25% cracked corn) treated with 1.50% CAT, (N-(3-chloro-4-methylphenyl)acetamide) were evaluated for reducing blackbird populations near Churchs Ferry, North Dakota. Baits were applied on baiting lanes in sunflower fields with an electric seeder mounted on an all-terrain cycle. Three noncommercial (decoy) sunflower fields were baited with CAT-treated baits diluted 1:9 with similar mixture of untreated bait at a rate of 50 lbs/lane acre (9.3 total treated acres). Based on total bait consumption, the estimate of blackbirds killed by the CAT treatment ranged from 13,266 to 30,650. The total amount of CAT-treated mixed bait consumed was 62.1 pounds.

The predominant species causing damage in the test fields was the red-winged blackbird (Agelaius phoeniceus) Overall, redwings constituted an average of 73% of all birds observed in test fields, yellow-headed blackbirds (Xanthocephalus xanthocephalus) 23%, and common grackles (Quiscalus quiscula) 4%. Peak number of blackbirds feeding in test fields during observation periods varied from 2,250 to 10,635. Peak roost counts for roosts near test fields ranged from 60,000 to 90,000 blackbirds.

Baits treated with an acutely toxic pesticide were evaluated as part of the bait mix and singly on sunflower rows as a toxic-marker. Birds and small mammals did not become immobilized and die close to ingestion sites. These results precluded the use of this toxic marker baits for estimating the number of birds accepting CAT baits. This technique does not appear promising as a technique for reducing local populations and associated sunflower loss.

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INTRODUCTION

In North Dakota, South Dakota, and Minnesota, blackbirds cause extensive damage to ripening sunflower. In the most recent statewide damage survey, conducted in 1980, sunflower losses in the tri-state area amounted to $7.9 million (Hothem et al. 1988). Several techniques are available to sunflower growers for alleviating blackbird damage. These include habitat manipulation, mechanical and pyrotechnic devices, decoy plantings, and a chemical frightening agent (Avitrol) (Besser 1985, Cummings et al. 1987). Each of these techniques, however, has limitations because of cost, logistics, or effectiveness. These concerns have stimulated efforts toward the development of an environmentally safe toxicant for reducing blackbird populations in areas where sunflower damage occurs.

CAT (DRC-2698, N-(3-chloro-4-methylphenyl acetamide) has been considered for reducing blackbird populations. Acute oral toxicity data indicate that CAT has a high level of toxicity to red-winged black-birds (1.8 to 2.7 mg/kg) and starlings (1.0 to 2.6 mg/kg) but only a moderate level of toxicity to most raptors (100 to 300 mg/kg), i.e., red-tailed hawk (Buteo jamaicensis, >200 mg/kg), great horned owl (Bubo virginianus, <200 mg/kg), barn owl Tvto alba <100 mg/kg), and American kestrel (Falco sparverius. >200 mg/kg) (Nichols 1977, Schafer 1979). However, there are mammalian scavengers or predators for which CAT may be acutely toxic, i.e., cats (Felis domesticus, 10 to 15 mg/kg). Secondary hazards were not observed when American kestrels and barn owls were fed blackbirds orally dosed with CAT (5 mg/kg) each day for 30 days (Barger and Peoples 1976). Population control has been used successfully in winter roosts in Kentucky and Tennessee to alleviate public health and nuisance problems (Stickley et al. 1981, 1982) associated with blackbirds. West (1968) and Knittle et al. (1980) have shown that large roosts of starlings can be selectively reduced by baiting staging areas with DRC-1339 (3-chloro-4-methyl benzenamine HCl) baits. Also, Glahn et al. (1989) has shown that baiting staging areas of wintering blackbirds with CAT-treated rice significantly reduced blackbird populations using these areas. CAT, an acetylated metabolite of DRC-1339, has almost identical toxic properties as DRC-1339, but appears more chemically stable to ultraviolet exposure and is not water soluble.

The purpose of this study was to evaluate the effectiveness of CAT-treated baits for reducing roosting blackbird populations using field baiting in established sunflower decoy crops. The study was approved by North Dakota Department of Agriculture (EPA regulations 40 CFR, CH 1, Part 172). Test fields were destroyed at the conclusion of the test.

METHODS

Three oil-variety sunflower fields ranging from 10 to 30 acres were planted specifically for this study during May and June 1985 as decoy crops in areas adjacent to known blackbird roosts. All fields were located near blackbird roosts, shelterbelts, or under known blackbird flightlines in areas of historically high blackbird damage. The test period was between August 30 and September 18, 1985, near Churchs Ferry, North Dakota.

A mix of CAT-treated (1.50%) 75% sunflower meats (SFM) and 25% CAT-treated cracked corn (CCN), diluted 1:9 with a similar mixture of untreated baits, was evaluated in the test fields. The average particle weight in the mix was 33 mg and 25 mg for SFM and CCN, respectively. Each pound of mixed bait contained approximately 14,818 particles; 10,318 SFM of which 1,032 were treated, and 4,500 CCN of which 450 were treated. The criterion for baiting a field with CAT

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baits was the presence of 10% of the nearby roosting population in the field on a single occasion. Baits were distributed on baiting lanes 8 to 10 ft. in width and evenly (every 66 rows) spaced; approximately 7.0% of the total field area was treated. On each bait lane, one row of sunflower was knocked down with a 3-wheeled all-terrain cycle (ATC). On all lanes, downed sunflowers were left to attract blackbirds to the ground. Bait was applied at 50 lbs per bait lane acre from an electric seed broadcaster fitted to the ATC. Rebaiting was dictated by the occurrence of rain (accumulation of 0.25 in), bait decomposition (discoloration in baits), and/or bait depletion by birds.

To estimate bait removal by birds, mammals, and insects, a 1-ft^2 grid was used to sample the number of baits at one randomly chosen plot within each 110-yd section of the bait lane. Each sampling plot was permanently marked with colored toothpicks immediately after the initial baiting. To estimate the number of baits actually eaten by small mammals and/or insects, 10 bird exclosures made of 1 x 2-inch mesh wire 12 x 12 x 4-inch square were placed at random locations within each test field. The grids and exclosures were checked every 2 days until the conclusion of the test. Theoretically, grids and exclosures should have contained an average of 13 and 10 sunflower meats and 4 and 5 cracked corn particles, respectively. Bait depletion was defined as 80% or more of the bait removed from the combined sample plots in a test field by animals and insects. Rebaiting was accomplished by cutting new bait lanes between existing bait lanes. Bait removed from grids and exclosures was documented and summarized by field to determine the percentage of baits actually eaten by birds, small mammals and insects. Three can traps (Bateman 1973) were randomly located in one test field for 7 days to identify the species of mammals and insects responsible for bait removal.

Red-winged blackbirds (Agelaius phoeniceus) were collected from the test area to determine the number of sunflower meats consumed during a day as an index of bait consumption. Birds were shot at random locations and times during the test period. The sex, age, and number of sunflower meats in each birds esophagus and gizzard were recorded.

In addition, toxic-marker (carbofuran 1.50%) baits were added to the CAT bait at a ratio of 1:24 as another means of estimating bait consumption. Birds found dead due to toxic-marker baits would be extrapolated to estimate bird mortality from the treatment. Each bird found dead could equal from 4 to 25 birds actually killed by the treatment, depending on feeding rates.

The number of blackbirds feeding in each treated field was recorded at 2-day intervals during a randomly selected 60-minute period between sunrise and 1100 hr throughout the study. Bird activity was converted to the average number of feeding birds/minute/acre for comparative purposes. The starting time for daily observations was randomly selected among fields to minimize any potential time bias. Estimates of roost populations (Meanley 1965) located near or adjacent to test fields were conducted at 5-day intervals.

Searches for dead target and nontarget birds were conducted daily on all bait lanes and two 1,800 ft sq (6 ft x 300 ft) transects established in adjacent habitat such as shelterbelts and marshes next to each test field. At the conclusion of the test, 5% of each test field was randomly searched for dead birds. Birds found during the searches were recorded and necropsied.

Toxic-marker (1.50% carbofuran) sunflower baits were evaluated independently of the CAT baiting in a sunflower field being used by feeding blackbirds. At 10 locations, spaced 30 ft apart, single marker-treated sunflower meats were placed in the center of a sunflower row and its position marked with a colored toothpick at the edge of the row. The disappearance of these baits was monitored daily and the number of target and nontarget birds found dead from daily searches within 30 ft of bait spots was recorded. The purpose was to check the assumption that there was a direct equivalence between the number of marker baits removed and the number of dead birds found.

RESULTS

The total amount of treated bait applied to all test fields was 468 pounds. Birds consumed 62.1 pounds and about 60% of that was consumed from one test field (Table 1). Estimates, based on bait consumption, of the number of blackbirds killed by the CAT treatment ranged from 13,226, to 30,650. The estimates are based on 85 collected red-winged blackbirds that contained between 29 and 67 sunflower meats per bird. The mean range of blackbirds killed by the treatment in individual test fields was 4,422 to 10,217.

Table 1. Description of treated fields, size, bait applications, bait consumed, and estimated bird mortality near Churchs Ferry, North Dakota - 1985.

Field	Size (acres)	Bird numbers (minute/acre)	Baitings	CAT bait applied (lbs)	CAT bait consumed (lbs)	Estimated bird mortality[a] (low-high)
Pelican	30	08	2	250	37.8	7.930 - 18,321
Degroat	10	58	2	90	6.0	1,321 - 3,053
Beaver	23	37	2	128	18.3	4,015 - 9,276
Total	63	103	6	468	62.1	13,266 - 30,650

[a]Based on the consumption of 29 to 67 sunflower meats per bird.

During the study, red-winged blackbirds were the primary bird species causing damage in most test fields (Figure 1). Overall, redwings constituted an average of 73% of all birds observed in test fields, yellow-headed blackbirds (Xanthocephalus xanthocephalus) 23%, and common grackles (Quiscalus quiscula) 4%. Peak number of blackbirds feeding in test fields during observation periods varied from 2,250 to 10,635. Bird observations of test fields show that the average number of blackbirds using test fields per minute per acre was 34 (range: 8 to 58). Use of all test fields ceased about mid-September. Damage assessments showed that one field was completely consumed and the other fields had reached advanced stages of maturity (Cummings et al. 1989).

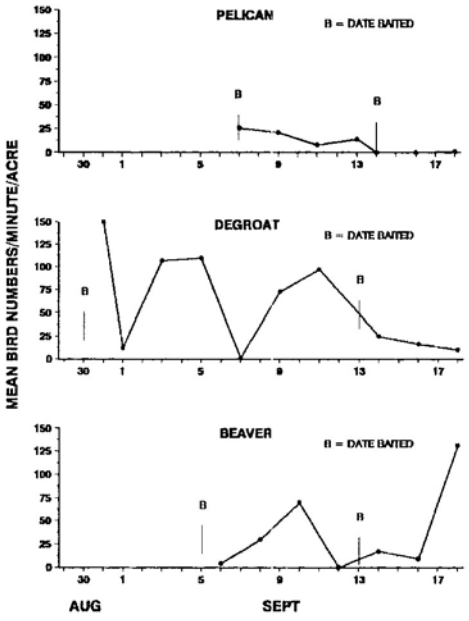

Figure 1. Bird observations of CAT baited fields near Churchs Ferry, North Dakota 1985.

Blackbirds used three different roosts which were 2 to 3 miles from test fields. Peak population counts occurred during early September for all three roosts ranging from 60,000 to 90,000 blackbirds (Figure 2).

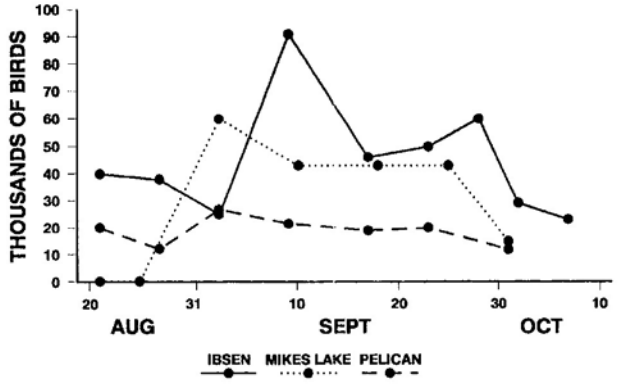

Figure 2. Weekly estimates of roosting blackbird populations within 2 to 3 miles of CAT test fields near Churchs Ferry, North Dakota 1985.

Bird exclosures placed at random locations within test fields showed that insects and/or small mammals removed 16.8% of the 74.2 lbs of baits lost from all treated fields during the test period. Sunflower meats (20.4%) were removed at more than twice the rate of cracked corn (9.6%). Three can traps placed at random locations in one test field for a period of 7 days captured 11 house mice (Mus rnusculus), 55 beetles (Coleoptera spp.), 23 grasshoppers (Tettigoniidae spp.), 13 crickets (Gryllus spp.), 1 shrew (Soricidae spp.) and 4 toads (Anura spp.). It was suspected that mice, beetles, and crickets were involved in bait removal. Bait removal by insects and small mammals has been identified as a major cause of bait depletion in agricultural crops. Woronecki et al. (1979) found that crickets (Gryllus spp.) removed 95% of cracked corn baits from test fields in Ohio within 24 hours of biting. Besser (1985) showed that insects and small rodents removed up to 60% of corn baits daily from treated fields in South Dakota.

During searches of bait lanes in all fields, six dead redwings and one dead mourning dove (Zenaida macroura) were found. Necropsies showed no signs of uremic poisoning, suggesting that these birds were mortalities of toxic-marker treated baits. Other nontarget species such as house sparrows (Passer domesticus), field sparrows (Spizella pusilla), song sparrows (Melospiza georigiana) and American goldfinches (Spinus tristis) were observed in test fields but none were found dead.

Toxic marker-treated baits applied singly in the center of a sunflower row could have been removed by birds, small mammals, and/or insects. Of the 10 baits placed 30 ft apart along a sunflower row, 9 disappeared within 5 days. Only one field sparrow (Spizella pusilla) was found dead within 15 ft of a bait spot. It was concluded that these treated baits were not acting fast enough (1 to 3 minutes to immobilize blackbirds, Davis pers. comm.) to kill birds within 30 ft of the bait spot, that insects removed baits, or baits were adversely affected by the method of preparation, field conditions (such as rain, soil moisture or humidity), or acceptability of treated particle.

DISCUSSION

Bait consumption data suggested that only a small percentage of the blackbird population using baited decoy fields were consuming treated baits. Estimation of the efficacy of this technique for reducing local populations is complicated by the slow-acting nature of CAT, fidelity of birds to an individual field, location of field in relation to the roost, bait removal by small mammals and insects, and the constant turnover of blackbird populations in the treated field.

The toxic-marker baits evaluated as part of the bait mix and singly on sunflower rows did not kill target and nontarget bird species quickly enough to cause mortality to individual birds within 10 to 15 ft of the site of ingestion. To adequately evaluate this technique as an index for bait consumption and hazards to nontargets, a toxic-marker bait must be developed that can immobilize or kill a majority of the species in treated fields within one minute. This would preclude most birds from moving too far from the point of ingestion until death.

Similar baiting techniques have been tried in fruit orchards (Crabb pers. comm.), and the conclusion has been that it is difficult to lure target species away from a preferred food, in our case ripening sunflower, to bait on the ground. Thus, we would not recommend this baiting technique to

control blackbird populations damaging ripening sunflower fields.

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