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PROTECTION OF RIPENING SUNFLOWERS FROM BLACKBIRD DAMAGE BY BAITING WITH AVITROL FC CORN CHOPS-99S

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On August 26, 1976 Avitrol FC Corn Chops-99S (AFCC-99S) was federally registered (EPA Registration No. 11649-15) for use in protecting ripening sunflowers from damage by blackbirds. The registration was the culmination of seven years of effort by the U.S. Fish and Wildlife Service to extend the use of AFCC-99, which was registered for use against blackbirds in field corn in April 1972. Ripening sunflowers are probably more intensively damaged by blackbirds in the U.S. than any other crop. In a 1972 survey in 469 randomly selected sunflower fields in North Dakota and Minnesota, Stone (1973) found that 9.7% of heads examined had been damaged by birds.

Initial small-scale tests with AFCC-99S for protecting sunflowers were conducted in North Dakota in 1967. R.V. Hansen and W.K. Pfeifer (unpublished reports of Division of Wildlife Services, North Dakota) reported satisfactory to excellent results by spreading AFCC-99S in disked strips between standing sunflowers in Rolette County in 1967, in Ransom County in 1968 to 1970, in Cass and Ransom counties in 1971, and in Cass County in 1972.

In 1973, the first large-scale tests where AFCC-99S baits were broadcast within ripening sunflower fields were conducted by personnel of the Denver Wildlife Research Center and cooperators. The purpose of this paper is to summarize the data from tests in 1973 and 1974 that largely formed the basis for the registration. Greater detail is presented in the unpublished reports of these studies (Guarino 1974; Besser and Cummings 1975).

1973 Tests

During August and September 1973, all 16 sunflower fields in a 28-section area of Steele County, North Dakota were baited as needed with AFCC-99S with an electric seeder mounted on a vehicle. A damage survey conducted in 1972 in all sunflower fields (N-12) in this 28-section area showed a 23.6% loss on 541 acres (equivalent to a total loss on 127.6 acres). In the test year, only 3.4% of the 676 acres (equivalent to a total loss on 23.0 acres) were lost (Table 1). This difference in loss between the two years occurred despite a 7-fold increase in peak numbers of blackbirds roosting in the major marsh supplying birds to test areas (768,000 in 1973 vs. 100,000 in 1972). In 1973, most small marshes in the locality were dry, and birds concentrated in this large marsh. Although a substantial reduction in damage was obtained in this study when fields were baited, compared with the previous year when they were not baited, we had no data on the normal year-to-year variability in damage in the study area, and hence these data had no statistical reliability.

Individual fields were baited 2 to 14 times because of the large numbers of birds that fed in test fields and because of frequent rains. Despite the many baitings required and assuming the difference in damage between the two years was due to the treatment, a ratio of about \$9 benefit for each \$1 cost was calculated---about \$8,400 worth of sunflowers were saved at a bait and labor cost of \$945. If a 2% loss of the crop resulting from the baiting lanes created by this treatment method is included, costs would increase to \$1,550---still a benefit:cost ratio of 5:1.

An illustration of the effectiveness of baitings (re-baitings) on individual fields is presented in Table 2. During the period of heaviest damage of test fields, 94%, 71%, and 82% fewer birds fed in two adjacent fields within three days after each of three re-baitings, respectively. A total of 68 Red-winged Blackbirds (*Agelaius phoeniceus*) were noted in distress within the first hour of these three re-baitings. These findings support those reported by Dolbeer, et al. (1976) that AFCC-99S baitings are the most effective when large numbers of birds are involved. No baiting was done after September 26; and no nontarget species of birds were known to have been killed, either on the 17.7 acres of transects searched or in the many nonrandom searches made while recording the results of trials in individual fields.

1974 Tests

In 1974, we conducted tests in six treated and six untreated commercial fields in Traill and Grand Forks counties, North Dakota to gather further information on the efficacy of AFCC-993 and its possible hazards to nontarget species. The latter aspect was prompted by a study by Dolbeer, et al. (1974) who found a distinct hazard to nontarget species when AFCC-99S baits were applied to 2-acre experimental plots from August to November in Ohio.

Since an experimental permit had been granted in 1974 to commercially treat many of the most heavily damaged sunflower fields in North Dakota, Minnesota, and South Dakota with AFCC-99S, to ensure a reliable appraisal, we were forced to pay for bird damage occurring in untreated fields. We therefore chose test fields subject to moderate (Traill County) and light (Grand Forks County) bird pressure. Treated fields were baited from aircraft, except on six (of a total of 61) occasions when they were baited by hand, because an aerial applicator was not available. Although rainfall was infrequent, the moderately damaged fields still required 2 to 11 baitings; the lightly damaged fields, 2 to 8 baitings. Baiting began on August 28 and was concluded on October 18.

In these tests, blackbirds consumed 13.4% of the crop in untreated fields and 4.4% in baited fields in Traill County; and 5.5% of the crop in untreated fields and 2.3% in baited fields in Grand Forks County, for an average of 9.4% of the crop in untreated fields and 3.3% in baited fields (Table 3). The latter difference was considered significant ($P = 0.08$), although cost-benefits were unfavorable in the lightly damaged fields of Grand Forks County, where only 42 cents worth of sunflowers were saved for each \$1 of treatment cost. Even in the moderately damaged fields of Traill County, only \$1.98 worth of sunflowers were saved for each \$1 of treatment cost. These benefit-cost ratios were in sharp contrast to the 5- to 9-fold benefits obtained in 1973 in more heavily damaged fields.

As data from the Ohio tests by Dolbeer, et al. (1974) had indicated, hazards to nontarget species were appreciably higher in October than in August and September. Of 300 dead birds found in random and nonrandom searches, 42 (14%) were nontarget species (nearly all fringillids). Of the 42 nontarget species, only one was found before September 22. The findings from extensive searches of commercially-baited fields in areas of heavier damage in North Dakota, Minnesota, and South Dakota more nearly paralleled our 1973 findings---128 acres were searched by walking 92 miles in baited fields and 32 dead birds were found, 29 of which were blackbirds. In 1974, a year of unusually late sunflower maturation, less than one percent of the bait applied by commercial applicators was used after September.

In summary, we feel that AFCC-99S has the potential to effectively and economically protect most fields of ripening sunflowers that suffer damage from blackbirds. Although a hazard to nontarget species of birds exists, we believe that hazards are low in commercial applications normally applied in August and September.

LITERATURE CITED

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TABLE 1. Losses to blackbirds in baited sunflower fields in 1973 and unbaited fields in 1972 in a 28-section study area of Steele County, North Dakota.

	1972 Unbaited	1973 Baited
No. fields	12 ^a	16
Total acres	541	676
Average acres per field	45.1	42.2
No. birds ^b	100,000	768,000
Percent fields damaged	91.7	68.8
Percent loss	23.6	3.4
Total acre - equivalents lost	127.6	23.0

^a One harvested field excluded.

^b Estimated peak numbers of birds roosting in the major marsh associated with the study area.

TABLE 2. Reduction in number of blackbirds using two adjacent-treated fields during the 1-hour period after sunrise, 1-3 days after each of three rebaitings, Steele County, North Dakota, 1973.

Dates	Average no. birds/min			Percent reduction in bird use day 1 to day 3
	Day 1	Day 2	Day 3	
9/6-9/8	15,192 (32) ^a	5,190 (5)	992 (3)	93.5
9/11-9/13	4,300 (10)	-	1,239 (2)	71.2
9/16-9/18	5,513 (26)	1,345 (5)	992 (10)	82.0

^a Number of 4FCC-995-affected birds collected or observed in distress displays in parentheses.

TABLE 3. Loss of sunflowers to birds in 24 test fields in North Dakota, 1974.

Study fields	% Loss		Reduction by treatment
	Untreated fields	Treated fields	
<u>Trail County</u>			
	41.2	13.5	
	17.2	5.1	
	10.2	4.4	
	7.2	2.1	
	3.0	2.0	
	1.5	0.3	
Mean	13.4	4.4	
	(±SE 6.0)	(±SE 2.0)	67.2
<u>Grand Forks County</u>			
	19.1	5.4	
	5.4	2.7	
	3.8	1.9	
	2.2	1.7	
	2.2	1.5	
	0.5	0.4	
Mean	5.5	2.3	
	(±SE 2.8)	(±SE 0.7)	56.9
Test Areas (Mean)	9.4	3.3*	
	(±SE 3.4)	(±SE 1.1)	64.8

*Significantly different (P = 0.05)