



Baiting blackbirds (Icteridae) in stubble grain fields during spring migration in South Dakota

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Abstract

Blackbirds (Icteridae) annually damage US\$5–8 million of ripening sunflower in the northern Great Plains. Baiting blackbirds with avicide-treated rice during spring migration might reduce the regional breeding population. In March and April 1996–1997, we simulated a baiting program in eastern South Dakota to compare attractiveness of rice-baited plots placed in fields of corn and soybean stubble. Blackbirds used plots in corn stubble more often than plots in soybean stubble and chose rice-baited plots over unbaited reference plots. We conclude that blackbirds can be successfully baited with avicide-treated rice placed in corn stubble. © 2002 Elsevier Science Ltd. All rights reserved.

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1. Introduction

In the United States, sunflower producers bear economic losses from blackbirds (Icteridae) averaging US\$5–8 million annually (Hothem et al., 1988), despite the use of several nonlethal pest management techniques (Linz and Hanzel, 1997). The majority of blackbird damage occurs in the northern Great Plains, which accounts for >80% of US sunflower production (Bangsund and Leistritz, 1995). The red-winged blackbird (*Agelaius phoeniceus*), whose late-summer population exceeds 35 million (Stehn, 1989), might cause 50% of the damage, while yellow-headed blackbirds (*Xanthocephalus xanthocephalus*) and common grackles (*Quiscalus quisculus*) cause the remainder of the damage (Homan et al., 1994). Knittle et al. (1996) showed that red-winged blackbirds staging in eastern South Dakota dispersed northwest to nesting areas in sunflower growing regions in the Dakotas and Prairie Provinces of Canada. Because of their proximity to sunflower during late summer, these birds probably cause a large portion of the sunflower damage recorded in the

Dakotas (Linz and Hanzel, 1997). Reducing the size of this regional population during spring, prior to the breeding effort, might be an effective solution for reducing blackbird damage to sunflower.

The US Department of Agriculture's National Wildlife Research Center is evaluating the compound, DRC-1339 (3-chloro-*p*-toluidine hydrochloride), to manage the northern Great Plains blackbird population (Linz et al. in press). In the 1980s and 1990s, research on DRC-1339 was initiated to manage blackbirds during late winter (Glahn and Wilson, 1992) and spring (Barras, 1996). During this time, brown rice emerged as the bait of choice for delivering a lethal dose of DRC-1339 (Glahn and Wilson, 1992). Because effective and sound population management using DRC-1339-treated rice baits is contingent upon developing an efficient baiting strategy, we evaluated the attractiveness of brown rice scattered in small plots in fields of stubble corn and soybean in eastern South Dakota during March and April 1996 and 1997.

2. Study area

The study area was in Brookings, Miner, and Lake counties in eastern South Dakota. This area was chosen

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because it is considered to be the most northern region where migrating flocks of blackbirds are large enough to warrant a baiting programme (Sawin, 1999). Eastern South Dakota lies in the Coteau Des Prairies physiographic region in the Central Lowland province. The landscape is characterized by low, rolling hills and a variety of glacial till deposits; undrained lakes and small wetland basins abound (Johnson and Higgins, 1997). Formerly unbroken tall-grass prairie, the land now consists mainly of pasture and row crops. Shelterbelts and windbreaks divide expansive field crops and surround farmsteads and residential areas. Corn and soybean are the principal crops in eastern South Dakota, comprising 92% of the planted crops.

The long-term average temperature and precipitation during March and April in eastern South Dakota are 3.3°C and 4.6 cm, respectively. During our 2-year study, temperatures and precipitation were below average for March and April. In 1996, the temperature averaged 0.2°C and precipitation was 1.3 cm. In 1997, the average temperature was 0.9°C and precipitation was 3.8 cm (SDASS, 2000). An intense early spring storm entered the study area on 5–6 April 1997 and was followed by record cold (−15°C) from April 8 to 12.

3. Methods

In mid-March 1996, we selected three fields each of soybean and corn stubble located near blackbird roosts. We placed one pair of adjacent plots of equal size (~1.1 ha) in each field. One member of each pair was baited with brown rice; the other served as an unbaited reference. In mid-March 1997, we selected four fields of each crop, and the size of the plots was standardized at 0.8 ha. We applied 22.7 kg of brown rice once or twice per week using a seed broadcaster mounted on an all-terrain vehicle. We marked the corners of each plot with colored stakes to assist the observers in delineating plot boundaries. We scanned the paired plots from a blind situated 3-m above ground level and mounted on a pickup truck parked about 25 m from the plots. After a 30-min period of quiet, a single observer recorded the species and numbers of blackbirds using the plots. Observation periods lasted 1 h with 1-min counts alternating on each plot every 5 min (12 observations/h). All observations were made by a pool of four trained observers. During periods of snow, rain, or wind > 32 km/h, observations were not conducted. In both years, the study ended when spring cultivation began.

In 1996, observations started on 21 March and ended on 26 April. We divided the daylight hours into four equal periods with the first observation starting within 30 min of the beginning of each time period. In 1997, observations began on 29 March (after snow had melted in the crop fields) and ended on 29 April. We divided

daylight hours into two equal periods, with the first observation starting within 30 min of the beginning of each period. We eliminated the mid-day time strata in 1997 because bird activity was comparatively low in these strata during 1996.

We used blackbirds per minute of observation as the measurement unit for analyzing bird activity in the plots. A "bird/min" was defined as the number of members of a species present in the plot during a 1-min observation period (Knutsen, 1998).

Within each experimental year, we used Wilcoxon two-sample tests (Cody and Smith, 1997) to test the hypotheses that bird/min did not differ (1) between rice-baited and reference plots within crops, and (2) between rice-baited plots placed in fields of stubble corn and soybean.

4. Results

4.1. Observations in 1996

Four species of blackbirds [brown-headed cowbirds (*Molothrus ater*), red-winged blackbirds, common grackles, yellow-headed blackbirds] were observed during 150 h of timed observations. Red-winged blackbirds accounted for 98.2% of all bird/min (Table 1). The second and third most abundant species were common grackles (1%) and yellow-headed blackbirds (<1%), respectively. Blackbird activity in the plots placed in corn stubble peaked at over 2000 bird/min between 3 and 8 April, whereas blackbird activity in soybean stubble peaked at about 150 bird/min between 9 and 10 April. The number of blackbirds using the plots decreased rapidly after mid-April.

In corn stubble, blackbirds averaged 373 bird/min (SE=140.9) in rice-baited plots and <1 bird/min (SE=0.1) in reference plots ($P<0.01$). In soybean stubble, blackbirds averaged 41 bird/min (SE=11.4) in

Table 1
Total bird min 5-min interval for blackbirds in fields of stubble corn and soybean in eastern South Dakota during March and April 1996

Species	Bird min in corn stubble	Percent of corn stubble total	Bird min in soybean stubble	Percent of soybean stubble total
Red-winged blackbird	339,564	99.7	40,380	96.7
Common grackle	324	0.1	820	2.0
Yellow-headed blackbird	516	0.2	533	1.3
Brown-headed cowbird	24	<0.1	5	<0.1
Total	340,428	100	41,738	100

Table 2
Total bird min 5-min interval for blackbirds in fields of stubble corn and soybean in eastern South Dakota during March and April 1997

Species	Bird min in corn stubble	Percent of corn stubble total	Bird min in soybean stubble	Percent of soybean stubble total
Red-winged blackbird	3938	70.9	1272	93.5
Common grackle	436	7.9	10	0.7
Yellow-headed blackbird	973	17.5	63	4.6
Brown-headed cowbird	51	0.9	15	1.1
Brewer's blackbird	155	2.8	1	<0.1
Total	5553	100	1361	100

rice-baited plots and 6 bird/min (SE = 0.1) in reference plots ($P < 0.01$). Blackbird abundance was significantly greater in rice-baited plots in corn stubble than in soybean stubble ($P < 0.01$).

4.2. 1997

In addition to the four species recorded in 1996, Brewer's blackbirds (*Euphagus cyanocephalus*) were observed in 1997 (Table 2). Red-winged blackbirds accounted for 82% of all bird/mins, while yellow-headed blackbirds and common grackles made up 11% and 4%, respectively. Blackbird abundance in the plots peaked during the third week of April, which was 10–14 days later than in 1996, and declined rapidly in late April.

In corn stubble, blackbirds averaged 5 bird/min (SE = 0.9) in rice-baited plots and 1 bird/min (SE = 0.7) in reference plots ($P < 0.01$). In soybean stubble, they averaged 1 bird/min (SE = 0.3) in rice-baited plots and <1 bird/min (SE = 0.1) in reference plots ($P < 0.01$). There was no statistical difference between blackbird use of rice-baited plots in corn and soybean ($P > 0.1$).

5. Discussion

Arrival and departure dates of blackbirds migrating through eastern South Dakota during our study were consistent with dates reported by the South Dakota Ornithologists Union (1991). In 1997, two early April snow storms covered the landscape and probably forced the birds to delay their migration and remain at their staging sites in more open areas. When the snow melted, blackbirds appeared to move quickly through South Dakota, accounting for the relatively low numbers of blackbirds recorded in the plots in 1997.

Our experiment demonstrated that in 1996 blackbirds strongly preferred corn stubble over soybean stubble.

No preference was shown for either crop in 1997. However, our study was only one of four projects conducted on feeding behaviors of free-ranging blackbirds in eastern South Dakota. Observations during the springs of 1993 (Linz et al., 1995), 1994–1995 (Barras, 1996), and 1998 (Sawin, 1999) indicated that blackbirds preferred to forage in corn stubble over all other cultivated grains, including soybeans. Thus, in four separate studies, blackbirds generally showed a preference for corn stubble. Blackbirds probably preferred foraging in corn stubble over soybean stubble because waste corn was more plentiful and palatable than waste soybean (Dabbert and Martin, 1994). Additionally, cornfields may have contained more weed seeds, which serve as an additional attractant (Linz et al., 1984).

We observed that blackbirds actively sought rice-baited plots when foraging in either kind of stubble. Based on the success of late winter baiting in the southern United States (Glahn and Wilson, 1992), rice might be ideally suited for blackbirds even during spring migration. Rice is a novel food in the northern Great Plains, however, and that necessitates prebaiting as an essential part of a successful baiting program.

We conclude that (1) blackbird numbers, especially numbers of red-winged blackbirds, generally peak during the first 2 weeks of April, but migration can be delayed by adverse weather, particularly late spring snows; (2) blackbirds are attracted to brown rice and thus it is an acceptable bait carrier; and (3) avicide-treated brown rice should be placed in stubble fields of corn to maximize efficiency.

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