Sunflower Growers Use Nonlethal Methods to Manage Blackbird Damage

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ABSTRACT Blackbird damage to sunflower in the Prairie Pothole Region of North Dakota, South Dakota, and Minnesota is an unyielding challenge to the industry. Large populations of blackbirds and environmental concerns have driven the direction of research toward nonlethal methods that can be implemented locally. Currently, Wildlife Services field specialists lend propane cannons to growers and spray wetlands with glyphosate to fragment dense cattail stands used by roosting blackbirds. After researchers demonstrated decoy crops (wildlife conservation sunflower plots), some growers have adapted the basic principles and have started diverting blackbirds from sunflower, a high value crop, to alternative lesser-value crops, such as corn. USDA and university scientists are developing a perennial sunflower that might significantly lower the costs of planting WCSP. Growers now have access to several desiccants that hasten the crop harvest and thus avoid late-season blackbird damage. Finally, researchers are closer to developing an effective chemical bird repellent. In this paper, we outline current nonlethal blackbird management strategies.

KEY WORDS blackbirds, common grackle, crop damage, nonlethal management, Prairie Pothole Region, red-winged blackbird, sunflower, yellow-headed blackbird.

Sunflower is a high-value crop that grows well in the semi-arid climate of the northern Great Plains (Bangsund and Leistritz 1995, Blamey et al. 1997). Blackbirds, numbering in the millions, can cause damage so severe that some growers eliminate this otherwise profitable crop from their rotation. The statewide levels of 1% to 2% damage do not portray the clustered nature and severity of blackbird damage (Hothem et al. 1988, Klosterman et al. 2010). Extreme levels of damage are locally variable, both within and among years, due to cropping patterns and suitability of wetlands for roosting blackbirds. These factors, along with a large population of blackbirds, nontarget hazards, lack of bait acceptance, and difficult logistics have driven the direction of research toward nonlethal methods that can be implemented locally. Since the mid-1970s, researchers have tested a variety of new damage abatement methods and have modified others in their attempts to reduce blackbird damage to ripening sunflower in the Prairie Pothole Region (PPR) of the northern Great Plains. In this paper, we outline current blackbird management strategies and suggest an integrated management strategy that growers might use within the next decade.

CULTURAL PRACTICES

One obvious bird management strategy is to plant crops that are not susceptible to blackbird damage near traditional roosts (Linz and Hanzel 1997). This is not a very satisfying approach for growers because sunflower is a valuable rotational crop. Another strategy is to desiccate the crop after physiological maturity to advance the harvest date. For many years, paraquat and sodium chlorate were used to quickly desiccate sunflower plants (Roesler 2009). The chemicals allowed harvest to occur three weeks earlier than waiting for a natural dry-down. Unfortunately, if a precipitation event occurs before harvest, the desiccated plants tend to reabsorb moisture, ultimately delaying the harvest date. In 2007, the US Environmental Protection Agency (EPA) labeled glyphosate (N-(phosphonomethyl) glycine) for late-season weed control in sunflower, thereby providing the added benefit of advancing the harvest date by killing the sunflower plants. Glyphosate applications to plants that have achieved physiological maturity (seeds at <35% moisture) do not cause reductions in either yield or oil content and the plants do not absorb moisture if precipitation occurs (Johnson and Peterson 2007). In 2010, Kixor™

(saflufenacil) became available for desiccating sunflower and controlling broadleaf weeds. Kixor can be tank-mixed with glyphosate for control of grass. This tank mix dries sunflower faster than glyphosate alone and dries the stem faster than paraquat (Howatt et al. 2008, Roesler 2009).

SHOOTING

We consider shooting, although lethal to an individual bird, to be a dispersal technique because of its gross inefficiency in reducing depredating populations. Wildlife Services (WS) field specialists and sunflower growers shoot at blackbirds to kill some as well as frighten them from ripening sunflower (Linz and Homan 1998). Growers will use all calibers of rifles and shotguns to chase birds from their fields, whereas WS personnel use only shotguns with steel shot. Shooting might enhance the effectiveness of propane cannons and other pyrotechnics (Bishop et al. 2003, Cook et al. 2008) and prevent birds from habituating to certain fields.

PROPANE EXPLODERS AND PYROTECHNICS

Propane exploders are the most popular of the mechanical scare devices used by growers and wildlife professionals in the PPR (Conover 2002). Cummings et al. (1986) provided data supporting the use of propane cannons in specific situations involving large numbers of blackbirds without ingrained feeding patterns. Timers and infrared motion sensors can be used to vary the time between explosions, and thus reduce the rate of habituation. Although untested experimentally, firing pyrotechnics and live ammunition should augment propane exploders in dispersing blackbirds from susceptible fields.

In 2010, North Dakota WS field specialists deployed >500 propane cannons across the state to protect sunflower, and used pyrotechnics and shotguns for reinforcement (P. Mastrangelo, WS, personal communication). The specialists counseled growers to elevate the devices on metal drums to enhance the effects of the propane explosion. They additionally recommended that to reduce habituation, the cannons should be placed on rotating platforms so that the sound would project in a different direction at each firing. WS also launched 5,000 rounds of pyrotechnics and distributed 37,000 rounds of pyrotechnics to growers; a practice that will be discontinued in 2011 due to concerns by the Bureau of Alcohol, Tobacco, Firearms and Explosives over safety and misuse.

AERIAL HAZING

Currently, a few growers hire private fixed-wing aircraft and helicopters to chase birds from their fields. Handegard (1988) suggested that chasing resident blackbirds was inefficient early in the damage season but claimed better success later in the season, when the birds were farther along in their molt and better prepared to migrate. Besser (1978) likewise claimed that aerial hazing was inefficient. When harassed, the birds often just took refuge under the sunflower canopy. Moreover, Besser (1979) noted that the costs of hiring a pilot and aircraft increased faster than the value of the sunflower crop, making the program uneconomical.

WILDLIFE CONSERVATION PLOTS

An alternative quality food source is critical for success of nonlethal blackbird deterrent measures in commercial sunflower (Avery 2003). The alternative food should be less valuable, such as corn or a lower-valued oilseed sunflower. The alternative foods should be capable of providing food throughout the damage period, especially during early seed development when most damage occurs in sunflower (Cummings et al. 1987).

Cummings et al. (1987) evaluated the use of decoy plots (wildlife conservation plots [WCSP]) and concluded that success of this method was dependent on: 1) field placement, 2) use of publicly owned lands to reduce rent costs, and 3) a staggered maturation of plants within each food plot to encourage continual exploitation until the commercial crop was harvested. In 2004 and 2005, WS offered farmers cost-share opportunities to plant WCSP with oilseed sunflower. Growers planted 41 8-ha WCSP near cattail-dominated wetlands in areas that had an extensive history of blackbird damage (Hagy et al. 2008). Blackbird damage to WCSP was found to be extremely variable, ranging annually from 0% to 100%. The program ended, but some growers on their own accord adapted the basic principles of diverting blackbirds from high-value sunflower to lower-valued crops. To increase economic benefits of WCSP, Kantar (2009) is developing a perennial sunflower that could be planted near traditional roost sites to attract blackbirds and other wildlife, while additionally serving to stabilize the surrounding highly erodible lands typically found around PPR wetlands.

ROOST HABITAT MANAGEMENT

In 1991, WS initiated a cattail management program in North Dakota and South Dakota with the goal to disrupt the critical habitat link between blackbird damage and nearby cattail-dominated wetlands (Otis and Kilburn 1988, Linz et al. 1995). Since the program's inception, WS has annually sprayed 1,500 to 2,367 ha of cattails (Linz et al. 2010). Currently, helicopters are used to spray wetlands with 28 L ha^{-1} of an aqueous solution containing 2.2 kg ha^{-1} glyphosate and 1% v/v surfactant. In 2010, treatment cost, including glyphosate, surfactant, and helicopter application, was about U.S. $95/ha. If water depths remain stable at >30 cm, there should be few living cattail for at least 4 years (Linz et al. 2010). Continuation of this federal program in future years is contingent on the availability of funds. However, growers can spray cattails at their own expense.

CHEMICAL REPELLENTS

Wildlife managers recognize that an integrated pest management plan aimed at reducing or dispersing blackbird damage would benefit from the discovery of an environmentally friendly and cost-effective chemical bird repellent. Recent research has focused on evaluating registered pesticides and natural products as candidate blackbird repellents.

Bird Shield™ (methyl anthranilate, Bird Shield Repellent Corporation, Pullman, Washington) and Flock-Buster (e. g., lemon grass oil, garlic oil, clove oil, peppermint oil, rosemary oil, thyme oil and white pepper) are registered for use as bird repellents on ripening crops. However, both products appear to produce inconsistent results in the laboratory and field. Werner et al. (2005) found that Bird Shield was not effective for repelling blackbirds from ripening rice and sunflower fields. Werner et al. (2010) also evaluated Flock Buster (Skeet-R-Gone, Grand Forks, ND) as a blackbird repellent for sunflower and did not find a concentration-response relationship when they tested at 25–200% of the label rate.

Many registered fungicides, insecticides, and naturally occurring products have been evaluated as blackbird repellents for ripening rice and sunflower crops. Of the fungicides, GWN-4770 (flutolanil; Gowan Company, Yuma, AZ) showed good repellency (Werner et al. 2008a). In a field trial within rice fields in Louisiana, blackbirds consumed 28% of rice seeds treated with 20,000 ppm GWN-4770 compared to 68% of untreated seeds. The manufacturer subsequently applied for a U.S. patent on the active ingredient of GWN-4770 as an avian repellent.

Two insecticides, both marketed by Dow AgroSciences (Indianapolis, IN), have shown repellency. Lorsban-4E (chlorpyrifos) and Cobalt (chlorpyrifos and γ-cyhalothrin) provide >80% repellency for sunflower treated with ≥50% of the label rates (Linz et al. 2006, Werner et al. 2010). Lorsban-4E and Cobalt are labeled by the EPA for use only as insecticides and are illegal for use as bird repellents.

Several naturally occurring products have also been recently evaluated as candidate blackbird repellents. Of these, 9,10-anthraquinone, appears to be most promising (Heckmanns and Meisenheimer 1944). Cage trials and field trials have demonstrated that anthraquinone-based repellents can effectively protect corn, sunflower, and rice seed from blackbirds. It may be useful for repelling free-ranging birds from ripening crops, but more testing is needed (Avery et al. 2000, Avery 2003, Avery and Cummings 2003, Cummings et al. 2002). Supplemental field efficacy studies will be necessary for registration of anthraquinone-based repellents (Werner et al. 2009).

CONCLUSIONS

We suggest a tiered suite of currently available methods for use as an effective blackbird management plan in the PPR. The first tier includes: 1) managing dense cattail stands to disperse large roosting concentrations of blackbirds, and 2) using a plant desiccant to accelerate fall harvest. The second tier includes: 1) using propane cannons outfitted with timers and moved regularly about the field and, 2) planting decoy crops in strategic locations. The third tier includes: 1) synchronizing planting time of sunflower with neighbors to eliminate a mix of early- or late-maturing sunflower crops, which entice blackbirds to remain in the area, and 2) leaving stubble, especially sunflower, unplowed for as long as possible to provide alternative feeding sites for blackbirds.

In the next decade, we are hopeful that an effective bird repellent will be registered for use on ripening sunflower (and other grain crops) and that a perennial sunflower will be available for use as an alternative food source for blackbirds and other birds.

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