BLACKBIRD USE OF WILDLIFE CONSERVATION SUNFLOWER PLOTS

GEORGE M. LINZ, USDA, APHIS, Wildlife Services, National Wildlife Research Center, Great Plains Field Station, Bismarck, ND, USA
JONATHAN M. RAETZMAN, Department of Biological Sciences, North Dakota State University, Fargo, ND, USA
HEATH M. HAGY, Department of Biological Sciences, North Dakota State University, Fargo, ND, USA
H. JEFFREY HOMAN, USDA, APHIS, Wildlife Services, National Wildlife Research Center, Great Plains Field Station, Bismarck, ND, USA
WILLIAM J. BLEIER, Department of Biological Sciences, North Dakota State University, Fargo, ND, USA

***Abstract*:** Blackbird (*Icteridae*) damage to ripening sunflower fields in North Dakota ranges from $5-10 million and has probably forced many growers to abandon this crop. From 2004 to 2006, USDA, APHIS, Wildlife Services cost-shared Wildlife Conservation Sunflower Plots (WCSP) with sunflower growers. The objective of the WCSP was to provide blackbirds an attractive nearby alternative food source to reduce damage in commercial fields. From 2004 through 2006, sunflower damage in the WCSP's was 39%, 32%, and 60%, respectively. In comparison, damage in nearby commercial fields was 5%, 4%, and 18%, over those years. In 2006, drought in the region may have concentrated blackbirds into more permanent wetlands, contributing to higher levels of local damage. Conversely, the lower levels of damage in both 2004 and 2005 may have been a consequence of better water levels in more ephemeral wetlands, which dispersed the birds among more roost sites. We believe that avian use of WCSP was influenced by the nearness of shelterbelts, cattail-dominated wetlands, and contiguous blocks of commercial sunflower. We speculate that WCSP can reduce bird damage in nearby commercial fields.

Key words: avian damage, blackbird, lure crops, sunflower, wildlife conservation sunflower plots, wildlife depredation

Proceedings of the 12th Wildlife Damage Management Conference (D.L. Nolte, W.M. Arjo, D.H. Stalman, Eds). 2007

INTRODUCTION

'Decoy' plantings of sunflower can sometimes reduce bird damage to nearby commercial sunflower fields (Cummings et al. 1987). For a variety of reasons, largely logistical and economic in nature, the use of 'decoy' sunflower fields did not become wide-spread. Bird damage management techniques, such as mechanical scare devices, bird repellents, avicides, and shooting, are problematic at best and can be hazardous (Linz and Hanzel 1997). Some of these methods, however, might be more effective if alternative foraging sites are available (Avery and Cummings 2003). In this paper, we provide data showing that Wildlife Conservation Sunflower Plots (WCSP) might be an environmentally-friendly method of reducing blackbird (*Icteridae spp*) damage to commercial

sunflower fields and other grain crops (Galle 2005, Hagy 2006, Schaaf 2003).

METHODS

Study Site Selection

From 2004 to 2006, United States Department of Agriculture, Animal Plant Health Inspection Service, Wildlife Services contracted with cooperative sunflower growers to plant WCSP up to 8 ha in areas with historical blackbird problems. In 2004 and 2006, final site selection was unsupervised and left to the discretion of individual growers. In 2005, we helped growers select locations based on proximity of wetlands and shelterbelts. Contracted producers were compensated US $375.00/ha in 2004. In 2005 and 2006, seed companies provided free hybrid oilseed cultivars and producers were paid $325/ha to help off-set costs.

In the spring of 2004, 17 WCSP were planted. Of these plots, 4 WCSP failed to mature due to unfavorable growing conditions and were excluded. In 2005, we selected 25 WCSP from a pool of about 35 applicants and again 4 fields failed to produce a viable crop. In 2006, 25 WCSP were successfully planted and reached maturity.

Land Use Surveys

In 2004 and 2005, we estimated areal coverage of land types within a 2.4-km radius of each WCSP. Visual ground surveys were used to identify and map all agricultural crops, shelterbelts, grasslands, developed areas, and wetlands. We used ArcInfo 9.1, a Geographic Information System (GIS), to overlay and quantify the digitized land features. Digital Ortho Quads, obtained from the Natural Resources Conservation Service, were used as base maps.

Damage Surveys

We divided each WCSP into 4 equal-sized strata and randomly selected 1 transect within each stratum. Twenty-four plots were proportionally allocated based on the length of each transect. Each transect was divided into equal intervals with 1, 1.5 m long assessment plot placed in each interval. The location of the first plot in each transect was a randomly selected distance between the field edge and the end of first interval. The other 5 plots were placed systematically equidistance from each other. Each plot was marked using Global Positioning System and individual plants were flagged for future identification. Damage was measured to the nearest cm^2 using a gridded template (Hothem et al. 1988). In 2004 and 2005, final damage surveys were conducted in mid-October. In 2006, damage surveys were conducted between 19 to 26 September.

In 2004 and 2005, we counted all blackbirds within the WCSP and in all commercial sunflower fields within a 2.4 km radius of the WCSP. Surveys were conducted between 0.5 hr and 2 hr after sunrise and between 2.5 hr and 0.5 hr before sunset. The entire field was scanned for 5-15 minutes depending on the field size. In 2004, blackbird surveys were conducted weekly from 20 August to 18 October. In 2005, blackbird surveys were conducted every 8 to 10 days, from 22 August to 20 October.

Statistical Analysis

Means, standard errors, and 95% confidence intervals were determined for blackbird damage, blackbirds/ha, blackbird flock composition, seed produced (kg/ha), and seed eaten (kg/ha) in WCSP.

Due to small sample sizes in 2004 (n = 13) and 2005 (n = 21), years were combined (n = 34) in order to strengthen our analyses. For the 2004 and 2005 data,

regression models were ranked by their R-squared values to explore relationships with the dependent variables and various combinations of the explanatory variables (4 maximum per model).

RESULTS

Blackbird Species and Numbers

In 2004, 33,000 and 42,000 blackbirds were observed in WCSP and commercial sunflower fields, respectively. Blackbird density was 52 blackbirds/ha (95% CI ± 25.1) in WCSP, and 112 blackbirds/ha (95% CI ± 8.33) in commercial sunflower fields. Blackbird densities were significantly higher in WCSP than commercial sunflower fields ($P \leq 0.001$). Compositions of blackbird flocks were similar between WCSP and commercial fields with an average composition of 82% red-winged blackbirds, 9% yellow-headed blackbirds, and 9% common grackles.

In 2005, 53,000 and 47,000 were observed in WCSP and commercial sunflower fields, respectively. Blackbird density was 70 blackbirds/ha (95% CI ± 54.4) in WCSP, and 4 blackbirds/ha (95% CI ± 2.3) in commercial fields. Similar to 2004, blackbird densities were higher in WCSP than commercial sunflower fields ($P \leq 0.001$). Blackbird flocks were composed of 65% (95% CI ± 8.5) red-winged blackbirds (*Ageloius phoeniceus*), 26% (95% CI ± 7.4) yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), and 9% (95% CI ± 5.4) common grackles (*Quiscalus quiscalus*) in WCSP. Similarly in commercial sunflower fields, blackbird flocks consisted of 67% (95% CI ± 4.4) red-winged blackbirds, 23% (95% CI ± 3.6) yellow-headed blackbirds, and 8% (95% CI ± 3.4) common grackles.

Damage Levels

In 2004, the 13 WCSP had 39% (95% CI ± 16.7) damage. There were 23 commercial sunflower fields within a 2.4 km radius of the WCSP. In 2005, the 21 WCSP had 32% (95% CI ± 12.2) damage. In 2006, the 26 WCSP had 60% (95% CI ± 15.0) damage.

Land Use

Regression analysis showed that a 3-variable model containing aerial coverage of grass, proximity of WCSP to nearest wetland, and proximity to the nearest commercial sunflower field was statistically significant ($P < 0.05$, $r^2 = 0.25$) with blackbird damage. Blackbird damage in WCSP was inversely related to both the amount of grass coverage and the distance to nearest wetland (e.g., greater distances related to less damage). On the other hand, distance to commercial sunflower was directly related to blackbird damage in WCSP (i.e., greater distance yielded greater damage).

Cost and Benefits

We assumed that for every kilogram of sunflower taken from the WCSP, a kilogram of sunflower was saved in a nearby commercial field (Cummings et al. 1987). Costs for the decoy fields including land rental, fertilizer, and pre-emergent herbicide, was about US $325/ha. If the cost of the seed donated by private industry is added, then the growers were paid the equivalent of US $375/ha. Assuming a production of 1680 kg/ha, and a value of $0.31/kg, the breakeven point per ha for cost and benefits is 62% damage (i.e., 1680 kg/ha X 0.62 X $0.31/kg = $325, which is the input cost of a WCSP planting).

DISCUSSION

Our study showed that ripening sunflower fields, if strategically placed, can

lure foraging blackbirds away from commercial fields. The WCSP presumably reduced the damage in commercial fields by providing energy needs for blackbirds that would have otherwise been obtained from commercial fields. We speculated that a positive cost-benefit ratio was achieved if a WCSP received 62% damage. WCSP may be economically feasible in certain situations, and our study lends further credence to the idea of using the WCSP decoy field concept as part of integrated pest management program.

Over 3 years, Cummings et al. (1987) paid growers $74/ha to plant 9 oilseed-variety sunflower fields and 1 interplanted corn and sunflower field (range 4 to 22 ha). They reported a cost-benefit ratio of 1:3.7 during the study. The planting costs were lower than ours because we have not included costs of inflation that have accrued over the 25 years. Additionally, the lands used were a combination of both idled private lands and government-owned land, which also reduced the costs of planting.

We suggest resurrecting the idea of 'decoy' fields for the purpose of providing alternative foraging sites for blackbirds, and encourage expanding this idea into a formal program of 'Wildlife Conservation Sunflower Plots'. The WCSP could potentially meet blackbird foraging flock needs, act as migratory bird stop-over havens, and reduce damage to commercial sunflower acreages in North Dakota. Funding for a WCSP program could be provided by a consortium of federal, state, and private entities, such as agriculture and conservation groups that might benefit from this program.

MANAGEMENT IMPLICATIONS

To maximize the potential of WCSP for reducing damage levels, we suggest the following: 1) Place plots near wetlands with historical blackbird roosts; 2) Place the plot between the wetland and commercial sunflower field; 3) Maximize the edge of plot around the wetland habitat; 4) Plant quality oilseed sunflower in a density sufficient to maximize yield (~49,400 plants/ha); and 5) Choose an early ripening seed to attract blackbirds to the plot prior to the ripening of the commercial field.

ACKNOWLEDGEMENTS

We thank USDA, APHIS, North Dakota/South Dakota Wildlife Services, USDA, APHIS, Wildlife Service's National Wildlife Research Center, and North Dakota State University's Department of Biological Sciences for providing the resources needed to complete this study.

LITERATURE CITED

AVERY, A.L., AND J.L. CUMMINGS. 2003. Chemical repellents for reducing crop damage by blackbirds. Pages 41-48 *in* George M. Linz, editor. Proceedings of symposium on management of North American blackbirds. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, National Wildlife Research Center, Fort Collins, CO.

CUMMINGS, J.L., J.L. GUARINO, C.E. KNITTLE, AND W.C. ROYAL, JR. 1987. Decoy plantings for reducing blackbird damage to nearby commercial sunflower fields. Crop Protection 6:56-60.

GALLE, A.G. 2005. Avian use of harvested crop fields during spring migration through the southern drift plains regions of North Dakota. M.S. Thesis, North Dakota State University, Fargo, ND, USA.

HAGY, H.M. 2006. Avian use of USDA Wildlife Conservation Sunflower Plots compared to commercial sunflower and small grain crops in North Dakota. M.S. Thesis, North Dakota State University, Fargo, ND, USA.

HOTHEM, R.L., R.W. DEHAVEN, AND S.D. FAIRAIZL. 1988. Bird damage to sunflower in North Dakota, South Dakota and

Minnesota, 1979-1981. U.S. Fish and Wildlife Service Technical Report 15.

LINZ, G.M. AND J.J. HANZEL. 1997. Birds and sunflower. Pages 381-394 *in* A.A. Schneiter, editor. Soil Science of America Publishers, Madison, WI.

SCHAAF, D.A. 2003. Avian use of ripening sunflower fields. M..S. Thesis, North Dakota State University, Fargo, ND, USA.