

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

2 - Second Eastern Wildlife Damage Control
Conference (1985)

Eastern Wildlife Damage Control Conferences

September 1985

MANAGEMENT IMPLICATIONS DERIVED FROM BIRD DAMAGE ASSESSMENTS IN NORTH DAKOTA SUNFLOWER

Joseph L. Guarino

U. S. Fish and Wildlife Service, Denver Wildlife Research Center

John L. Cummings

U. S. Fish and Wildlife Service, Denver Wildlife Research Center

Follow this and additional works at: <http://digitalcommons.unl.edu/ewdcc2>



Part of the [Environmental Health and Protection Commons](#)

Guarino, Joseph L. and Cummings, John L., "MANAGEMENT IMPLICATIONS DERIVED FROM BIRD DAMAGE ASSESSMENTS IN NORTH DAKOTA SUNFLOWER" (1985). 2 - Second Eastern Wildlife Damage Control Conference (1985). 20. <http://digitalcommons.unl.edu/ewdcc2/20>

This Article is brought to you for free and open access by the Eastern Wildlife Damage Control Conferences at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in 2 - Second Eastern Wildlife Damage Control Conference (1985) by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

MANAGEMENT IMPLICATIONS DERIVED FROM BIRD DAMAGE
ASSESSMENTS IN NORTH DAKOTA SUNFLOWER

by Joseph L. Guarino and John L. Cummings/1/

ABSTRACT

The most recent estimate of black-bird damage to ripening sunflower (Helianthus annuus) in North Dakota in 1980 exceeded \$6 million. Although less than 5% of the sunflower fields in the state received greater than 10% damage in each of four past survey years, as much as 50% of the total state-wide damage occurred in these fields. This loss can be combated with cost-effective control. Successful control requires timely action when blackbirds are in large concentrations. Frightening blackbirds from fields early in the damage season disperses damage and this can result in compensatory growth by sunflower, whereby yields at harvest are largely unaffected.

INTRODUCTION

North Dakota produced 72 percent of the United States sunflower crop on about 3.5 million acres of land in 1982 (Statistical Reporting Service 1983). Production has increased rapidly since 1959 when only about 13,500 acres were harvested (Thomason 1974). With the expansion of sunflower into every county in North Dakota came an increasing number of complaints of seed losses caused by blackbirds. Red-winged Blackbirds (Agelaius phoeniceus) are primarily responsible for the damage, although Common Grackles (Quiscalus quiscula) and Yellow-headed Blackbirds (Xanthocephalus xanthocephalus) are becoming increasingly important. The oil varieties of seed are preferred by Red-winged Blackbirds and bear the brunt of the damage (Besser 1978).

State-wide losses to blackbirds are significant and warrant our attention. Damage is not uniformly

distributed, rather it is localized and at each foci proportional to the size of nearby marsh roosts. The patterns of damage (how much, where, and when) to ripening sunflower are highly variable and are influenced by the numbers and species of birds together with the sex and age composition and origin (migratory or resident birds) of the depredating flocks. Weather, planting and harvest dates, crop maturity, and field location in relation to marsh roosts also contribute to variability in damage patterns.

This paper briefly summarizes findings from several recent black-bird damage assessment studies conducted on ripening sunflower in North Dakota by personnel of the Denver Wildlife Research Center (DWRC), U. S. Fish and Wildlife Service (FWS). Data from which blackbird damage patterns were established were collected by DWRC personnel during state-wide, county-wide, local, and individual sunflower field objective surveys. Our purpose is to summarize the characteristics of these damage patterns in order to develop a practical management strategy.

EXTENT AND MAGNITUDE OF DAMAGE

North Dakota produced 183,150 tons of sunflower seed on 407,000 acres in 1972 and 1,252,200 tons on 1,880,000 acres in 1978 (Lilleboe 1979). In 1972, blackbirds consumed 1.4% of the North Dakota sunflower crop in 11 eastern counties -- the principal areas for the crop (Henne et al. 1979); the damage amounted to \$300,000. In 1978, sunflower was grown in all North Dakota counties and the loss to birds was estimated at 1.2% of the crop or \$3.2 million (Besser and DeHaven 1980). Thus, blackbirds destroyed 2,564 tons (12.6 lb/acre) and 15,026 tons (16.0 lb/acre) in 1972 and 1978, respectively (Table 1).

1. U. S. Fish and Wildlife Service,
Denver Wildlife Research Center,
Bldg. 16, Denver Federal Center,
P. O. Box 25266, Denver, Colorado
80225-0266

In 1979 and 1980, sunflower production was 2,290,580 tons on 3,375,386 acres and 1,090,175 tons on 2,233,784 acres and seed losses were to 0.9% of the crop worth \$3.6 and 2.7% worth \$6.5 million, respectively. At these rates, birds consumed an estimated 20,615 tons in 1979 and 29,435 tons in 1980 (R. Hothem, unpubl. data). Although the total state-wide loss (in tons) to birds increased with greater production from 1972 through 1980, estimated lb/acre losses were similar for at least the first three survey years indicating that the increased losses were attributed to the expansion of the sunflower production range and increases in acreage in some of the better blackbird habitat in North Dakota. In 1980, the lb/acre loss was double the average of the first three surveys, but this was considered an artifact of the sampling design (R. Hothem, unpubl. data). Increases in dollar losses were a result of increased seed consumed and higher market value of harvested seed.

On a county-wide basis the only available damage data are for 1981 for Benson and Bottineau counties which had losses of 1,464 and 660 tons worth \$321,000 and \$146,000, respectively (R. Hothem, unpubl. data). In a specific location, in a 144-square-mile area centered on a large blackbird roost at Sheyenne Lake near Harvey, North Dakota, bird damage in 1981 amounted to about 225 tons (69 lb/acre) worth about \$49,500. Damage in a similar 144-square-mile area adjacent to and comprising part of the Sheyenne Lake block amounted to 169 tons (26 lb/acre) worth about \$52,000 in 1983 (Jaeger et al. 1983). Losses in this area in each of the 3 years shown in Table 1 occurred despite the use of various control methods by growers. In addition, in 1983 all sunflower fields within this block with a given number of blackbirds were treated with Avitrol (HC1) FC-Corn Chops-99S. However, there was no significant difference in tons lost to blackbirds in 1983 compared to 1981 (Jaeger et al. 1983).

DISTRIBUTION OF DAMAGE

Only 1 of 11 counties sampled in 1972, 4 of 36 in 1978 (Henne et al. 1979), 6 of 52 in 1979 and 7 of 53 in 1980 (R. Hothem, unpubl. data) had an average loss to birds of >2%. Benson was the most consistently heavily damaged county with losses of 7.5, 3.4 and 2.4 percent for 1979, 1980, and 1981, respectively. Only 4 other counties (Bottineau, Eddy, McHenry, and Sheridan) in 2 of 3 survey years had losses >2%. All counties with consistent losses are in the Drift Plains and Missouri Coteau physiographic regions of central North Dakota. These regions are described by Colton et al. (1963), and are high sunflower producing areas characterized by having as many as a dozen water basins per square mile (Besser et al. 1979). These areas have prime blackbird roosting and loafing habitats and are intermingled with sunflower fields for feeding.

In an individual field, blackbirds begin to feed on seeds where the first heads ripen. Damage then generally fans out from these areas as other heads ripen. Field location, in relation to a blackbird roost, flight lines of blackbirds emanating from these roosts, and surrounding habitat (trees, shelterbelts) is the most important variable positively associated with damage. An analysis of environmental factors collected during state-wide damage surveys in North Dakota in 1979 and 1980 showed that fields adjacent to marsh roosts received 2 to 4 times more damage than more distant fields (C. Kilburn, unpubl. data). Sterner and Hothem (1981) showed that of 30 fields sampled in a 144-square-mile area, greatest damage (i.e., >10%) occurred in 6 fields adjacent to the Sheyenne Marsh roost. Although it is obvious that sunflower fields adjacent to roosts sustain the heaviest damage this fact is not well documented. At times, fields adjacent to roosts can be totally destroyed by blackbirds. C. Kilburn (unpubl. data) also showed that low weed density in fields was correlated with low damage, especially

in the absence of adjacent standing crops, that fields with rows wider than 30 inches received more damage, and that larger heads in fields received more damage. The latter doesn't imply that a field comprised of all large heads would get more damage than one of all small heads.

Although total blackbird damage estimates to sunflower in state-wide or regional areas provide overall economic loss, knowledge of the distribution of damage levels; i.e., the number of fields that fall into different damage categories (<5%, 6-10%, 11-20%, >20%) is also important for determining combatable losses economically. Of special importance is the number of fields that receive >10% damage (an estimated level that we chose as the threshold of cost effective control). Stated simply, this is the level at which the cost of control equals the damage loss. Economically, nothing would be gained by using control at or below this level. This estimated 10% level is higher than the >5% threshold for bird damage in corn reported by Dolbeer (1981). However, threshold levels are highly variable depending on the cost and effectiveness of control devices used and on the ability to predict bird damage, yield, and market price of seed. In addition, individual growers probably do not achieve the same level of protection by using control devices as reported in the literature by researchers who have tightly controlled test conditions. Consequently, cost benefits for growers would be reduced and the threshold level of cost effective control increased. Using an estimated market value of \$132 per acre for sunflower oil seed (ave. 1981-1984 - \$1.20/CWT and 1100 lb/acre) growers would have to anticipate >\$13.20 losses per acre before they would benefit economically from using available control methods assuming these methods would give 100% protection. In practice, 100% protection is seldom, if ever achieved. Sunflower growers commonly use acetylene exploders or Avitrol FC Corn Chops 99-S for protecting their fields from

blackbirds. Cummings et al. (1983) report that it cost \$14 per acre to operate one acetylene unit combined with a "pop-up" scarecrow. The most recent (August 1985) estimate for aerially applied Avitrol bait is \$7.00 per acre for two applications (K. Green, pers. comm.). Considering the variables associated in determining a threshold level for cost-effective control, the >10% damage level used here for sunflower appears to be within bounds.

Surveys in North Dakota showed that only 9 of 361 (2.5%) sunflower fields sampled received >10% damage in 1972 and 7 of 365 (1.9%) in 1978 (Henne et al. 1979), 8 of 573 (1.4%) in 1979, and 15 of 336 (4.5%) in 1980 (R. Hothem, unpubl. data). In 1981, in two of the most heavily and consistently damaged counties (Benson and Bottineau) in North Dakota, only 5 of 100 (5.0%) fields had >10% damage (R. Hothem, unpubl. data). However, in 1980 and 1981, in the 144-section area surrounding a major blackbird roost near Harvey, in Sheridan County, a total of 14 of 68 (21%) fields had damage >10% (Sterner and Hothem 1981, 1982). The number of fields in North Dakota with >10% damage may be greater than estimated in the damage surveys because growers were probably using some form of control in most fields with moderate to heavy bird pressure during the years the assessments were made and may have reduced damage in many fields. Nevertheless, these findings indicate that only a small percentage of all fields in North Dakota warrant control effort. At the cost of most presently available control methods, any efforts made in protecting 95 percent of the fields in North Dakota would result in negative cost-benefit ratios.

However, the fields that received >10% damage bear the brunt of the total losses each year, thus pointing out the severity of the losses that occurred to a small percentage of growers that owned these fields. And, equally important, about 30 to 50% of the total state-wide losses for the

four survey years were economically combatable (Table 1).

TIMING OF DAMAGE

In a 1979-1982 study on timing of blackbird damage in 24 fields in North Dakota, damage peaked at an average of 9 days after sunflower seed first became vulnerable to birds (when ray flowers began to wilt and drop on about 10% of the heads in a field) and that 40% of the damage occurred between 3 and 9 days after first-vulnerability. Also, 65 percent of the damage occurred between 3 and 15 days after first-vulnerability, and economically serious damage (>10%) occurred in each 3-day period. In addition, 79% of the damage occurred on heads with green and green-yellow bowls (receptacles), 56% on half-inverted heads, and 91% on the soft-seed stage of development. These findings indicate that major effort to control damage should be made during this short period (3 to 15 days after seed vulnerability) in the 7 to 10-week long damage period to achieve the greatest cost-benefit.

In an attempt to increase the accuracy of sunflower seed loss measurements, Sedgwick et al. (1983) showed in fields with simulated bird damage near Harvey, North Dakota that yields at harvest were similar for both undamaged heads and heads with up to 15% of the seed removed during the first 2 weeks after sunflower seeds first become vulnerable to birds. This compensatory growth in damaged heads was substantiated in a 1984 study in the same general area that showed remaining sunflower seeds in heads damaged up to 30% by black birds during the milk-dough stage of seed development (about 2 weeks after vulnerability to birds) weighed 13% more than those from undamaged heads (G. Linz, unpubl. data). Compensatory growth implies an overestimate of damage when assessments are made at harvest, and data are presently being analyzed to develop a correction factor for use in future damage estimates. These findings on compensatory growth suggest that by fright-

ening blackbirds from fields during the first 2 weeks of vulnerability and keeping damage on individual heads below 15% that yields should be unaffected.

MANAGEMENT STRATEGY

Several management implications follow from this analysis of blackbird damage patterns in ripening sunflower in North Dakota:

- (1) Up to 50% of damage can be controlled cost-effectively using current control methods directed at individual fields likely to receive >10% damage.
- (2) Growers should plant alternative crops adjacent to large blackbird roosts and should maintain weed-free fields.
- (3) Growers should concentrate control efforts from 3 to 15 days after seeds first become vulnerable to blackbirds when damage is likely to be most severe and in order to take advantage of growth compensation by remaining seeds.
- (4) Dispersing birds from large roosts would be more cost-effective than control in individual sunflower fields, and would therefore allow for greater overall reduction in damage. This approach, however, would require efforts by organized grower groups.

REFERENCES

- BESSER, J. F. 1978. Birds and sunflower. Pages 263-278 in Jack F. Carter, ed. Sunflower Science and Technology. Am. Soc. of Agron., Madison, WI.
- BESSER, J. F., W. J. BERG, AND C. E. KNITTLE. 1979. Late-summer feeding patterns of red-winged blackbirds in a sunflower-growing area of North Dakota. Proc. Bird Control Semin., Bowling Green State University, Bowling Green, OH. 8:209-214.

- BESSER, J. F. and R. W. DEHAVEN. 1980. An estimate of bird damage to sunflower based on acreages harvested in North Dakota in 1978. Unpubl. Bird Damage Research Report No. 150/2/, Denver Wildl. Res. Ctr., U. S. Fish and Wildlife Service, Denver, CO. 3 pp.
- COLTON, R. B., R. W. LEMKE, AND R. M. LINDVALL. 1963. Preliminary glacial map of North Dakota. U.S. Geol. Surv., Misc. Geol. Invest. Map No. 1-331.
- CUMMINGS, J. L., C. E. KNITTLE, AND J. L. GUARINO. 1983. An evaluation of a mechanical, audio-visual, scare-device for reducing blackbird damage to ripening sunflower. Part II. Unpubl. Bird Damage Research Report No. 284, Denver Wildl. Res. Ctr., U.S. Fish and Wildlife Service, Denver, CO. 12 pp.
- DOLBEER, R. A. 1981. Cost-benefit determination of blackbird damage control for cornfields. Wildl. Soc. Bull. 9:44-51.
- HENNE, D. R., W. K. PFEIFER, AND J. F. BESSER. 1979. A revised estimate of bird damage to sunflowers in North Dakota in 1978. Unpubl. Bird Damage Research Report No. 134, Denver Wildl. Res. Ctr., U. S. Fish and Wildlife Service, Denver, CO. 6 pp.
- JAEGER, M. M., J. L. CUMMINGS, D. L. OTIS, J. L. GUARINO, AND C. E. KNITTLE. 1983. Effect of Avitrol baiting on bird damage to ripening sunflower within a 144-section block of North Dakota. Proc. Bird Control Semin., Bowling Green State University, Bowling Green, OH. 9:247-253.
- LILLEBOE, D. 1979. Crop reporting service, "Our goal is to provide facts for decision making." The Sunflower. May/June pp. 12,26.
- SEDGWICK, J. A., J. L. OLDEMEYER, AND E. L. SMITH. 1983. Growth compensation in sunflowers. Unpubl. Bird Damage Research Report No. 283, Denver Wildl. Res. Ctr., U. S. Fish and Wildlife Service, Denver, CO. 10 pp.
- STATISTICAL REPORTING SERVICE. 1983. Crop production: 1982 Annual Summary. Wash., D.C. 42 pp.
- STERNER, R. T. AND R. L. HOTHEM. 1981. Analysis of blackbird damage to sunflower fields surrounding Sheyenne Lake, North Dakota. 1980. Unpubl. Bird Damage Research Report No. 199, Denver Wildl. Res. Ctr., U. S. Fish and Wildlife Service, Denver, CO. 23 pp.
- STERNER, R. T. AND R. L. HOTHEM. 1982. Analysis of blackbird damage to sunflower fields surrounding Sheyenne Lake, North Dakota. 1981. Unpubl. Bird Damage Research Report No. 251, Denver Wildl. Res. Ctr., U. S. Fish and Wildlife Service, Denver, CO. 16 pp.
- THOMASON, F. G. 1974. The U.S. sunflower seed situation. The National Sunflower Grower 1(11):7-14.

72/Unpublished reports cited here are available upon request from the authors of this paper.

Table 1. Blackbird damage to sunflower in North Dakota^{1/}.

State-wide	Tons produced (thousand)	%	Loss			% of total loss economically combatable ^{2/}
			lb/acre	Tons (thousands)	Dollars (millions)	
1972	183.2	1.4	12.6	2.57	0.30	50.6
1978	1,252.2	1.2	16.0	15.03	3.22	30.2
1979	2,290.6	0.9	12.2	20.62	3.58	29.6
1980	1,090.2	2.7	26.4	29.44	6.53	37.7
<u>County-wide</u>						
1981 ^{3/}	61.0	2.4	37.5	1.46	0.32	29.1
1981 ^{4/}	37.0	1.8	18.0	0.66	0.15	61.3
<u>Local^{5/}</u>						
1981	4.3	5.3	68.4	0.23	0.05	53.8
1983	9.9	1.7	25.6	0.17	0.05	18.5
1984	7.8	2.4	24.0	0.19	0.03	26.6

^{1/} Most data extrapolated from Besser and DeHaven (1980), Henne et al. (1979), Jaeger et al. (1983), Lilleboe (1979), Sterner (1982), and Hothem (unpubl).

^{2/} Total losses in fields >10% damage-calculated from above sources.

^{3/} Benson County

^{4/} Bottineau County

^{5/} 144-square mile block near Harvey, Sheridan County