

Comparisons between blackbird damage to corn and sunflower in North Dakota



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ABSTRACT

For sunflower producers in North Dakota, blackbird (Icterinae) damage is a chronic problem costing millions of dollars annually. Sunflower damage surveys were last completed in the state in 1979–1980. Since the last surveys, corn plantings have increased 6-fold to 1500×10^3 ha, whereas sunflower hectare has declined by >75% to 310×10^3 ha. Blackbirds forage on both crops, and this rapid change in North Dakota's agricultural landscape was a sound inducement for reassessing crop damage. Field surveys are an important step in damage methods development because they are used for measuring efficacy, as well as assessing historical changes in the quality and quantity of damage. During 2009–2010, we conducted damage surveys on corn and sunflower. We surveyed 120 randomly selected 3.2×3.2 -km plots in North Dakota's Prairie Pothole Region. This region of numerous wetlands has historically produced the majority of the state's sunflower crop, in addition to harboring a blackbird population of 25 million birds. Over the 2-year study, we measured damage in 68 cornfields and 27 sunflower fields. Annual damage averaged 5.0×10^3 t (12 kg/ha, US \$1.3 million) for corn and 7.2×10^3 t (45 kg/ha, US \$3.5 million) for sunflower. Percentage damage was significantly greater in sunflower ($\bar{x} = 2.7\%$) than corn ($\bar{x} = 0.2\%$). The lower per-unit cost of producing corn makes it a potential lure crop for managing blackbird damage to sunflower. However, the two crops should be phenologically synchronized because corn matures earlier than sunflower and becomes less attractive to blackbirds.

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1. Introduction

North Dakota annually leads North America in oilseed sunflower production, but plantings in North Dakota have fallen over 75%, from 1300×10^3 ha in the late 1970s to 310×10^3 ha today (NASS, 2013). The decline in sunflower has been precipitous in the Prairie Pothole Region (PPR), especially in the central and southern portions, which are renowned for their abundance of cattail-dominated (*Typha* spp.) wetlands and concomitant large populations of blackbirds (Icterinae) (Nelms et al., 1999; Ralston et al., 2007). Sunflower damage caused by blackbirds generally ranks third (behind plant spacing and disease) as the most limiting factor on production (Kandel, 2013). Despite the likelihood of suffering greater overall economic losses from other sources (e.g., disease

and insects), producer surveys have indicated consistently that blackbirds are one of the leading causes of sunflower's decline in the PPR (Kleingartner, 2002; Klosterman, 2011; Kandel, 2013). This outsized influence on producer perceptions in part results from the lack of management techniques to significantly reduce damage, which effectively makes blackbirds an unmanageable problem and differentiates it from other potential sources of damage (Kleingartner, 2002; Linz et al., 2011).

Of the three major blackbird species in North Dakota, red-winged blackbirds (*Agelaius phoeniceus* L) cause the most damage (Linz and Hanzel, 1997; Peer et al., 2003). According to North American Breeding Bird Survey indices, the PPR of North Dakota has some of the highest densities of red-winged blackbirds (RWBL) on the continent (Sauer et al., 2013). Peer et al. (2003) used the indices to estimate that 8.4 million RWBL were reproducing in North Dakota's PPR. By late summer, recruitment of young brings the population to 12.2 million birds. When combined with the two other resident populations of blackbirds, common grackles (*Quiscalus quiscula* L) and yellow-headed blackbirds (*Xanthocephalus xanthocephalus* Bonaparte), the late-summer population in the PPR is 25.4 million (from Peer et al., 2003). Most blackbird damage

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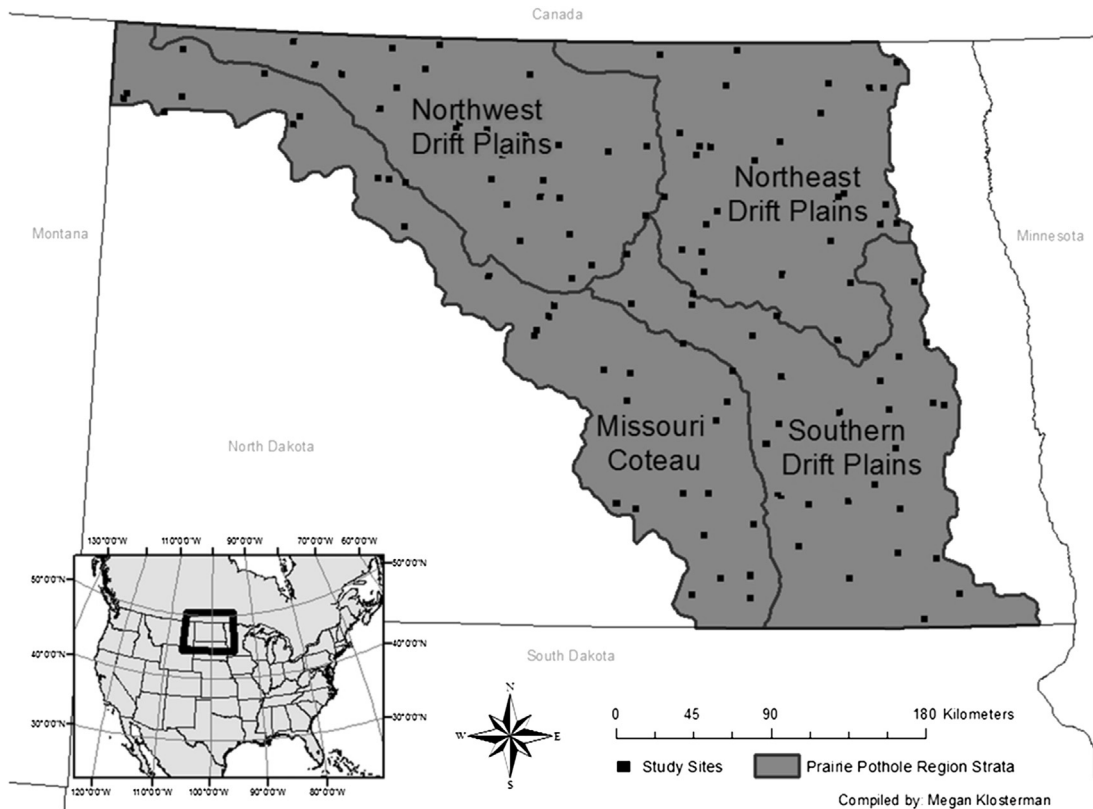


Fig. 1. The strata of the Prairie Pothole Region of North Dakota with locations of 120 sites used for bird damage surveys.

(~75%) occurs between late August and mid-September (Cummins et al., 1989). Blackbirds in North Dakota molt in late August, which hampers their flight ability, causing them to remain in natal areas (Linz et al., 1983). The majority of sunflower damage is thus attributed to resident birds (Dolbeer, 1982).

The last statewide bird damage surveys for sunflower in North Dakota were completed in 1979 and 1980 (Hothem et al., 1988). Although described nominally as ‘statewide’ surveys, they were largely conducted in the PPR (87% of the fields), where soil conditions are conducive for producing high yields of sunflower. Annual damage was 0.9% (18.3×10^3 t @ 13 kg/ha) and 2.6% (26.9×10^3 t @ 30 kg/ha), respectively, which is equivalent to US \$9.0 million and \$13.2 million at oilseed sunflower’s current price (\$0.49/kg, [March 2013]). Agricultural practices have changed since these data were gathered. For example, corn comprised only a small portion (260×10^3 ha) of agricultural plantings during the late 1970s and early 1980s. Corn became an economically important crop in North Dakota in the early 2000s, and over the last decade has tripled to 1500×10^3 ha (NASS, 2013). Production increases were a result of higher prices and concurrent introduction of hybrid corn varieties better suited for the semi-arid climate and short-growing seasons of the northern Great Plains.

Corn producers have reported instances of blackbird damage, but no formal surveys have been conducted to document losses. Most of the corn damage occurs in early August during the milk stage and dough stage of kernel development, when kernels are soft (Weatherhead et al., 1982). Blackbirds usually switch to alternate food sources after the kernels harden (Linz et al., 1984). Sunflower damage occurs over a longer period than corn damage, starting about mid-August and lasting until the fields are harvested in October. The increase in corn production and the decrease in sunflower production in North Dakota has created an interesting

dynamic in blackbird damage because corn and sunflower are both highly preferred foods (Linz et al., 1984). To our knowledge, no studies have measured damage in an agricultural landscape where two crops preferred by blackbirds are so easily accessible. Additionally, more than three decades have passed since the last sunflower damage surveys were conducted in North Dakota. The rapid change in crop compositions justified the need for new surveys. Damage surveys are important part of management research because they are used for evaluating potential efficacy of newly developed methods, as well as evaluating techniques in current use. Further, they can be used for measuring quantitative and qualitative changes of damage over time. From 2009 to 2010, we measured blackbird damage in mature sunflower and cornfields in 120 randomly selected 3.2×3.2 -km plots in the PPR.

2. Methods

2.1. Study area

Our study area (95,200 km²) was in the Drift Prairie and Missouri Coteau physiographic regions (Fig. 1). These regions comprised just over one-half of North Dakota’s land area. The topography of the PPR consisted of gently rolling ground moraines interspersed by flat extents of lake plains created from the Wisconsin Glaciation. The soils were glacial lake plain and glacial till plain, being highly permeable sandy loams and loamy sands. Originally an expansive region of nearly treeless mixed-grass prairie, most of the area has now been converted to cropland, with about 60% of the land in harvestable crops. Moderately extensive tracts of native prairie still exist, but they are often heavily grazed. Small shallow-basined wetlands (potholes) pocked the region. Wetland density averaged 7/km² and area totaled

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