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Wild Turkeys Cause Little Damage to Row Crops in Illinois

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ABSTRACT

Similar to much of the agricultural Midwest, Eastern wild turkey (*Meleagris gallopavo silvestris*) populations have increased considerably in Illinois, making them more visible to landowners and occasionally being blamed for crop damage. We studied food habits of turkeys and wildlife damage to row crops to assess whether turkeys were causing damage to corn and soybeans in Illinois. Crops and gizzards were collected from 118 hunter-harvested turkeys during spring 2002. Corn and/or soybeans were found in >30% of samples, but these crops were consumed as waste grain and no young plants were detected. We sampled newly planted corn and soybean fields for wildlife damage during spring 2002 in areas where turkeys were present. Of 11,150 corn plants inspected, only 0.4% were damaged, and only 1 damaged plant was attributable to avian sources. Of 53,918 soybean plants sampled, 4.7% were damaged by wildlife, and none were attributable to turkeys. We sampled damage to 8,944 ears of corn during fall 2002; only 1.7% of ears were damaged, and none by turkeys. Similar to other studies in the agricultural Midwest, we found turkeys caused no definitive damage to row crops in Illinois.

Key words: food habits, human-wildlife conflict, *Meleagris gallopavo*, wild turkey

INTRODUCTION

Wild turkey populations have been restored and enhanced through introductions and reintroductions in 49 states within the last 40 years, and nationwide populations are estimated to exceed 5 million birds with the Midwest having the highest densities (Kurzejeski et al., 1987, Miller et al., 2000, Tapley et al., 2001). Agricultural habitats are distributed throughout most of the Eastern wild turkey's (*Meleagris gallopavo silvestris*) distributional range. In the agriculturally-dominated Midwest, it has become clear to wildlife managers that agricultural habitats are actively used by turkeys (Porter, 1977, Craven, 1989, Gabrey et al., 1993, Miller et al., 2000, Swanson et al., 2001). Since turkeys are relatively large, gregarious, and feed during the day, they are readily observed in agricultural areas. This increased abundance and greater visibility of turkeys has led to concern among farmers, and wildlife managers as to the degree of agricultural damage caused by turkeys. Studying food habits of turkeys and crop damage simultaneously could prove useful in dispelling myths and changing how this species is perceived by concerned farmers. Therefore, several Midwestern states have studied turkeys in agricul-

tural landscapes and investigated the perceived or real agricultural damage turkeys cause (Craven, 1989, Gabrey et al., 1993, Paisley et al., 1996, Swanson et al., 2001).

The Illinois Department of Natural Resources (IDNR) has received increasing numbers of complaints from landowners blaming turkeys for crop damage (P. Shelton, IDNR, personal communication) which prompted our study of turkey damage to crops in Illinois. Specifically, we quantified (1) food habits of turkeys during spring, and (2) summer crop damage attributable to turkeys. Our goal was to provide wildlife managers with information regarding how much turkeys actually damage crops in Illinois.

MATERIALS AND METHODS

Study Areas

The study area for the food habits objective included the 96 of 102 Illinois counties open to the 2002 spring turkey hunting season. The predominant land cover type in Illinois is row crop agriculture; about 54% of the land cover is row crops and 11% is forest (Foster et al., 1997). Forest cover at the county level ranges from 40-60% in the unglaciated Shawnee Hills region in extreme southern Illinois to <5% in the intensively farmed east-central portion of the state (Luman et al., 1996).

The study area for the crop damage objective was a 1,082-ha area of private land located in Jackson County, in southern Illinois, constructed from radiotelemetry locations of turkeys in a concurrent study (Greene, 2003). Land cover on the southern Illinois study area was 49% deciduous forest, dominated by white oak (*Quercus alba*), black oak (*Q. rubra*), and hickories (*Carya* spp.); 37% cropland (26% in row crops, primarily corn and soybeans); and 6% rural grasslands (Luman et al., 1996). The remaining 8% cover was transportation (i.e., roads and railroads), urban areas, and streams.

Food Habits

Turkey crops were collected from hunters during the 2002 Illinois spring turkey season (8 Apr-16 May). A request for hunter assistance in crop and gizzard collections was included in all 2002 spring turkey season permit packets issued by the IDNR, and a toll-free telephone number was established for successful hunters to contact the Cooperative Wildlife Research Laboratory (CWRL) at Southern Illinois University Carbondale. An automated request for hunter cooperation was also added to the IDNR's telephone check-in system for successful hunters mid-way through the hunting season. Successful hunters were asked to save and freeze the crop and gizzard from their harvested turkey and then contact the CWRL to receive a postage-paid envelope and packing materials.

Crop and gizzard samples were placed in a freezer until all samples were received. Contents were analyzed using methods described by Martin et al. (1946) and Swanson et al. (1974); these methods are the standard for studies of turkey food habits (Paisley et al., 1996, Swanson et al., 2001). Crops were separated from gizzards and total volume of crop contents was measured using water displacement in a graduated cylinder. Contents were then separated by like types, and volume of each food type was measured as above. Food items <1 cc were recorded as trace and only included in the frequency of occurrence data. Gizzard contents were inspected and any identifiable food items not found in the respective crop were included in the frequency of occurrence data.

Row Crop Damage

Four corn and 4 soybean fields in the Jackson County study area were sampled to estimate damage caused by wildlife during 5 June-26 July 2002. A systematic sampling design was chosen to ensure total field coverage and to reduce biases associated with sampling fields with different land cover types and proportions along their respective borders. First, a baseline was established at the longest field axis and parallel to the rows. Then, an initial transect was randomly located along the baseline and a total of 10 equidistant perpendicular transects were located along the baseline extending to the field edges. The number of plots required for each transect was determined by the formula:

$$\text{Number of plots/transect} = (\text{transect length}/\text{sum of all transects}) \times \text{field area}$$

An initial plot location was randomly located along each transect and the required number of plots were located perpendicular to and equidistant along transects. Plot length began at the transect and successive plots extended in opposite directions. Plots were 10 m × 2-rows-wide for corn and 10 m x 3-rows-wide for soybeans.

We recorded the following data along crop transects: total number of plants, number of plants grazed or otherwise damaged by wildlife, and wildlife species responsible for damage. The latter was determined using a combination of wildlife sign and criteria described by Dolbeer (1980) and the Ohio Department of Natural Resources (2001); turkey damage was identified as an "avian source" of damage. We assessed the nature of damage done to specific plants, and when possible, identified tracks and droppings of wildlife species coincident with damage occurrence. For example, avian sources of damage were generally indicated by digging and scratching of the seed bed, and deer damage appeared as ragged leaf edges following browsing. Plants grazed or damaged were marked and their fate recorded. Fields were sampled once/week for 4 weeks, beginning 1 week post-emergence.

The 4 corn fields were sampled during spring-summer 2002 and 1 additional field was sampled for wildlife damage in September 2002. Soybeans were not sampled in the fall because they were not considered a primary turkey food source (Korschgen, 1967). Transects and plots were established using the same methods as aforementioned. Total number of ears/plot, number of ears damaged, and wildlife species responsible were recorded.

RESULTS

Food Habits

We collected 118 food habit samples from hunters; 102 consisted of the crop and gizzard and 16 consisted of the gizzard only. Forty-one food items (33 plant, 8 animal) were identified (Table 1). Corn ranked first in frequency of occurrence, aggregate volume, and aggregate percent. Soybeans ranked fifth in frequency of occurrence and sixth in aggregate volume and aggregate percent. All agricultural food items were waste, and no emergent agricultural plants were found. Corn accounted for 42.9% of the total volume (29.7% frequency of occurrence), and soybeans 2.7% of total volume (12.7% frequency of occurrence). Wheat was found only in trace amounts (<1% frequency of occurrence).

Plant to animal ratios based on aggregate volume and aggregate percent were 37.0:1, and 17.0:1, respectively.

Row Crop Damage

We sampled 53,918 soybean plants in the spring, of which only 2,515 (4.7%) were damaged. Only 2 sources of damage were identified: white-tailed deer (*Odocoileus virginianus*) and woodchuck (*Marmota monax*). Avian sources caused no damage to soybean plants. A total of 11,150 corn plants was sampled, of which, only 50 (0.4%) were damaged. Insects damaged the most plants (n = 31), followed by deer (n=18) and birds (n=1).

We examined 8,944 corn ears for damage in the fall; 153 (1.7%) were damaged. European corn borer damage and stalk rot were combined as they were sometimes impossible to discern and accounted for 58.8% of all damage. Avian sources, deer, and raccoon (*Procyon lotor*) accounted for 26.1%, 12.4%, and 2.6% of all damage, respectively.

DISCUSSION

Turkeys did not cause any definitive damage to row crops in Illinois. However, turkey use of waste grains, especially corn, as a food source in agricultural landscapes has been documented by several researchers (Lancia and Klimstra, 1978, Porter, 1980, Payer and Craven, 1995, Paisley et al., 1996) and our results indicate that turkeys use waste grains extensively in Illinois. In spring, agricultural crops constituted >45% (42.9% corn) of the foods found in crop and gizzard samples. Because no unweathered seeds or seedlings of any agricultural crops were observed in any of the spring samples, agricultural food items were only waste from the previous harvest. These results are generally unsurprising given the abundance of waste grain in Illinois cropfields (Warner et al., 1989).

Most turkey food habits studies depict soybeans as a rarely used food item, if they are even mentioned at all (Korschgen, 1967, Hurst, 1992, Payer and Craven, 1995). In contrast, we found soybeans accounted for 3% (12.7% frequency of occurrence) of the total food volume in spring. However, these food habits studies were conducted before populations proliferated in agricultural regions and this may be the reason soybeans are rarely mentioned in the literature as a turkey food item.

Turkeys have been documented to consume hundreds of different plant and animal species throughout the year (Mosby and Handley, 1943), and we found 41 different food items used by turkeys in this study. The diversity of food items available to turkeys between highly agricultural areas and those areas considered ideal turkey habitat (i.e., a 1:1 mix of open land to forested land; Kurzejeski and Lewis, 1990) are probably very different. However, the fact that turkeys very are adaptable, opportunistic feeders, and now thrive in areas once considered less than optimal (i.e., agricultural areas), suggests that managing habitat for food production may be less important than managing for needs such as nesting, brood rearing, and roosting refugia (Hurst, 1992). The exception would be the northern limit of turkey range, where turkey populations can be expanded with programs that supplement natural food availability. In northern turkey populations, turkeys can sustain themselves on agricultural crops such as corn food plots during periods of persistent deep snow that limits natural food availability (Haroldson, 1996, Porter et al., 1980).

Crop damage by wildlife is a major concern for landowners and farmers, and has been studied at multiple scales and using various techniques (Paisley et al., 1996). In the top 10 corn-producing states, wildlife were estimated to reduce yield by 1.7 bushels/ha, and yield lost in Illinois alone was 0.9 bushel/ha (Wywialowski, 1996). Other studies (Gabrey et al., 1993, Payer and Craven, 1995, Paisley et al., 1996) have addressed the issue of turkey damage to crops and have generally concluded that turkey damage was minimal, especially to emergent crops. Although turkeys caused no definitive crop damage in our study, several other sources contributed to crop loss. As in our study, Clarke and Young (1986) reported insects caused the most damage to seedling corn in Iowa. Avian damage occurred less frequently in Illinois compared to other studies (Hiesterberg, 1983). However, bird damage, especially by blackbirds, is not evenly distributed and is influenced by a variety of factors (Bollinger and Caslick, 1985), making direct comparisons between regions difficult. Deer and raccoons also caused damage to crops in Illinois, as reported by other studies (Gabrey et al., 1993, Swanson et al., 2001).

CONCLUSIONS

Turkeys have been labeled as diet generalists by wildlife biologists, and this is supported by our study and numerous other food habits studies. Conducting more food habits studies and compiling lists of what turkeys eat will probably not change this fact or reveal much novel information. However, food habits studies in combination with more specific questions may add to the knowledge base of turkey ecology. For example, what foods are critical to a pre-laying hen and how might this affect reproductive success and hence turkey numbers?

Most studies of turkey damage have concluded that it is minimal or nonexistent (Gabrey et al., 1993, Swanson et al., 2001). Further turkey damage studies at current population levels are unlikely to reveal contrasting results. However, if more land is converted to agricultural (row crops) land use, especially given increased interest in ethanol production in the Midwest and Illinois (Bies, 2006), reliance on agricultural foods may increase. Perhaps then the issue of turkey damage will need to be revisited.

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Table 1. Percent frequency (%F), aggregate volume (AV), and aggregate percent (AP) of food items found in crops and gizzards of 118 wild turkeys harvested in Illinois during the spring 2002 hunting season.

Food item	%F	AV	AP
Plant foods			
Corn, *Zea mays*	29.7	42.9	44.8
Grass leaves, Graminae	17.8	2.6	1.8
Hackberry, *Celtis laevigata*	16.9	trace	trace
Dandelion, *Taraxacum officinale*	14.4	4.3	4.5
Soybeans, *Max glycine*	12.7	2.7	3.7
Unclassified grass seed	11.0	14.6	4.1
Buttercup, *Ranunculus* spp.	9.3	6.2	11.4
Undetermined plants and debris	9.3	trace	trace
Clover, *Trifolium* spp.	6.8	15.8	5.5
Kentucky coffee, *Gymnocladus dioca*	3.4	trace	trace
Yellow harlequin, *Corydalis flavula*	3.4	1.3	2.2
Fescue, *Festuca arundinacea*	3.4	trace	trace
Rattlesnake fern, *Botrychium virginianum*	2.5	trace	trace
Chickweed, *Stellaria media*	2.5	trace	trace
Crabgrass, *Digitaria sanguinalis*	2.5	0.6	1.4
Sedges, *Carex* spp.	2.5	trace	trace
Ragweed, *Ambrosia artemisiifolia*	1.7	trace	trace
Unidentified legume, Legumaceae	1.7	0.3	0.4
Jack-in-the-pulpit, *Arisaema atrorubens*	0.8	trace	trace
Osage orange, *Maclura pomifera*	0.8	trace	trace
Green dragon, *A. dracontium*	0.8	trace	trace
Violet, *Viola* spp.	0.8	trace	trace
Acorn, *Quercus* spp.	0.8	trace	trace
Sedge seed, *Carex* spp.	0.8	trace	trace
Clover, *Meliotus* spp.	0.8	trace	trace
Wheat, *Triticum aestivus*	0.8	trace	trace
Poison ivy, *Rhus radicans*	0.8	trace	trace
Persimmon, *Diospyros virginiana*	0.8	trace	trace
Wild strawberry, *Duchesnea indica*	0.8	trace	trace
Raspberry, *Rubus* spp.	0.8	trace	trace
Foxtail, *Setaria faberii*	0.8	0.6	2.7
Daisy fleabane, *Erigeron annuus*	0.8	trace	trace
Buckwheat, *Fagopyrum sagitattum*	0.8	trace	trace
Animal foods			
Beetle, Coleoptera	5.1	1.0	1.8
Stinkbug, Pentatomidae	5.9	0.2	0.1
Assasin bug, Reduviidae	3.4	trace	trace
Earthworm, Annelida	0.8	trace	trace
Snail, Gastropoda	0.8	trace	trace
Grasshopper, Orthoptera	0.8	trace	trace
Caterpiller, Lepidoptera	0.8	trace	trace
Unidentified insects	0.8	trace	trace