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BOTANICAL CHARACTERISTICS OF AUTUMNAL BLACKBIRD ROOSTS IN CENTRAL OHIO[1]

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ABSTRACT. Vegetative parameters of 14 autumn blackbird roosts in central Ohio were measured. Common characteristics of roosts included young trees ($\bar{x}$ = 11.30 years, SD = 2.86), high densities ($\bar{x}$ = 7746 trees/ha, SD = 5328), and thick canopies. Plant communities were adapted to moist sites and included American elm (*Ulmus americana*), silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*) and black cherry (*Prunus serotina*). Tree density, twig height, and twig index were significantly related to numbers of birds per ha.

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INTRODUCTION

Red-winged blackbirds (*Agelaius phoeniceus*), common grackles (*Quiscalus quiscala*), brown-headed cowbirds (*Molothrus ater*), and starlings (*Sturnus vulgaris*) spend nights in concentrations at common roost sites in late summer and fall. Roosts often contain thousands of birds, and noise and droppings are often objectionable to people living nearby. Blackbirds can cause economic losses (Dolbeer et al. 1978), pest problems (Meanley 1971), hazards to aircraft (Bloekpoel 1976), and may be dangerous to human health (Tosh et al. 1970). Roosts constitute points where management to relieve blackbird problems could be concentrated.

Little is known about the vegetation comprising tree roost sites. Several previous studies found roosts situated in single species stands such as mature, open grown live oak (*Quercus virginiana*) (Good and Johnson 1978), a plantation of 20-year-old loblolly pine (*Pinus taeda*) (Francis 1976), and a plantation of white pine (*Pinus strobus*) (Kelty and Lustick 1977). Mature Norway maple (*Acer platanoides*) and sycamore (*Platanus occidentalis*) were used for urban roosting in Pennsylvania (Jumber 1956). In an urban Iowa roost, large maples (*Acer* spp.) were used by blackbirds (Bliese 1953). New Jersey roosts appear to be typified by young, early successional hardwood stands of diverse composition (Lyon 1979, Lyon and Caccamise 1981). However, most of these studies have not involved detailed measurements of vegetation comprising roosts, and no study has considered autumn roosts in Ohio. Detailed vegetation information is necessary if roosting behavior is to be fully understood and modified when necessary.

The present study was undertaken to define quantitatively and qualitatively the vegetation characteristics of fall roosts utilized by blackbirds in central Ohio.

STUDY SITE

Efforts to locate blackbird roosts were concentrated in an area centered on the middle of Columbus, Ohio and extended 70 km in all directions; the circular area of study was approximately 15,000 km^2. The original vegetation type of this area was deciduous forest (Good 1979). Presently, forested tracts are scattered among agricultural, residential, and industrial land holdings.

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METHODS AND MATERIALS

Roads in the study area were driven in the evenings of August, September, and October 1977 and 1978, and flocks or flightlines were followed when possible. Fourteen roosts were located. Roost populations were estimated weekly during September, October, and November until roost desertion; birds returning to the roost in evening were counted in blocks of 100. Roost boundaries were determined by observing concentrations of bird droppings and mapped using the compass-traverse method (Mosby 1971). A compensating polar planimeter was used to estimate areas of roosts.

Tree species, density, frequency, and mean basal area were estimated for each roost using the point-centered quarter method (Cottam and Curtis 1956). Starting points for transects were randomly located on the roost perimeter. A point was sampled every 10 m along a randomly drawn azimuth. All roosts required at least 3 transects, and number of points/roost ranged from 25 to 102.

Foliage height profiles (MacArthur and Horn 1969) were measured in 13 roosts before leaves had fallen. One roost was not located until after many leaves had fallen and therefore was not sampled. Sample points were chosen in the same manner as those for the point-centered quarter method. For each roost, 16 readings from a tripod-mounted 35-mm camera with 135-mm telephoto lens were taken at 10 separate sample points. The viewing screen of the camera had a 4-by-4 grid, and each intersection with canopy vegetation was recorded from the focusing scale of the lens for each of the 16 grid intersections. Twig height is the average distance from the camera lens at all sample points to the nearest piece of vegetation in the canopy. Twig index measures average number of pieces of vegetation touched by a straight vertical line passing through an average 1 m of the canopy and indicates density.

At each of 12 roosts, 20 trees were sampled to determine age. A starting point on the roost perimeter, a compass direction and a number paces into the roost were randomly selected. The nearest tree to this point became the first sample and subsequent sample trees were randomly determined by a new compass direction and number of paces. An increment borer was used to extract a core at 1.3 m from ground, and annual rings were counted.

RESULTS

Maximum blackbird populations of the 14 roosts ranged from 20,000 to 300,000 birds (table 1). An approximation of species composition in the 14 roosts was 40% grackles, 40% starlings, 15% red-winged blackbirds and 5% brown-headed cowbirds. A few American robins (*Turdus migratorius*) were observed at several roosts. Maximum roost populations were correlated with roost area (R^2 = 0.41).

Roost areas ranged from 0.04 to 2.75 ha (table 1). Most roosts occupied the entire area or a large portion of an isolated woodlot. No roost was located in a stand larger than twice the size of the roost.

All 14 roosts were dominated by deciduous trees usually found on moist soils. American elm (*Ulmus americana*), silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), and black cherry (*Prunus serotina*) accounted for 89% of occurances (table 1). Most roosts were comprised almost entirely of one, 2, or 3 species. In all roosts, the 3 most common tree species within each roost accounted for at least 80% of the stand. Trees dominated roost sites and only a sparse population of plants with little diversity existed at ground level.

High tree densities were typical of roosts. The 14 roosts ranged from 1749 to 22,102 trees/ha with a grand mean of 7746 trees/ha (SD = 5328) (table 2). Mean basal area of roost trees ranged from 5.26 to 81.71 cm^2 (table 2). The roosts had a grand mean basal area of 25.79 cm^2 (SD = 20.74). Roosts with the largest mean basal areas showed the greatest variability in the range of basal areas. Larger basal areas were correlated with lower tree densities (R^2 = 0.58).

Mean twig height ranged from 3.33 to 8.89 m (table 2), and grand mean height was 6.14 m (SD = 1.65). Twig index ranged from 1.39 to 2.65 with a mean of 2.19 (SD = 0.42) (table 2). Variability within individual roosts was small, and most canopy vegetation occurred within a narrow vertical range. Roosts with the highest canopies also had the most vertical depth in canopies.

Roost trees had a grand mean age of 11.30 years (SD = 2.86) (table 2). Individual roosts ranged in mean age from 8.90 to 16.85 years (CV = −.25); 67% of the roosts were between 8.90 and 11.84 years of age. Ages specified were minimum since corings were taken at 1.3 m from ground.

TABLE 1

Blackbird populations, areas of roosts, and trees occurring most frequently in autumnal blackbird roosts in central Ohio, 1977–78.

Roost Number	Roost Area (ha)	Maximum Bird Population	Number Trees Sampled	*Ulmus americana*	*Acer saccharinum*	*Fraxinus pennsylvanica*	*Acer rubrum*	*Acer saccharum*	*Prunus serotina*	Others
1	0.04	20,000	100	97 (97%)	—	—	—	—	2 (2%)	1 (1%)
2	0.41	60,000	120	43 (36%)	—	30 (25%)	—	—	9 (7%)	38 (32%)
3	0.49	100,000	120	10 (8%)	—	84 (70%)	—	—	—	26 (22%)
4	0.45	40,000	200	196 (98%)	—	—	—	—	—	4 (2%)
5	1.36	300,000	408	26 (6%)	189 (46%)	84 (21%)	11 (3%)	—	8 (2%)	90 (22%)
6	0.73	75,000	200	33 (17%)	—	—	—	98 (49%)	66 (33%)	3 (1%)
7	1.81	100,000	200	22 (11%)	170 (85%)	—	—	—	—	8 (4%)
8	0.42	25,000	100	17 (17%)	—	—	—	—	68 (68%)	15 (15%)
9	1.17	110,000	268	—	—	—	268 (100%)	—	—	—
10	0.45	40,000	100	40 (40%)	31 (31%)	25 (25%)	—	—	—	4 (4%)
11	1.31	45,000	200	3 (1%)	—	49 (25%)	—	105 (52%)	15 (8%)	28 (14%)
12	1.11	45,000	200	99 (49%)	—	48 (24%)	—	5 (2%)	17 (9%)	31 (16%)
13	1.55	90,000	160	27 (17%)	124 (78%)	4 (2%)	—	—	2 (1%)	3 (2%)
14	2.75	220,000	200	159 (80%)	—	8 (4%)	—	—	9 (4%)	24 (12%)
		TOTAL	2,576	772 (30%)	514 (20%)	332 (13%)	279 (11%)	208 (8%)	196 (8%)	275 (11%)

Some trees could have been 2–5 years older than mentioned, but it is possible for all species encountered to reach 1.3 m in one year on the excellent soils of roosts. Mean basal areas of roosts were correlated with mean age ($R^2 = 0.45$).

A multiple regression analysis was conducted using maximum birds per ha as the dependent variable and basal area, age, density, twig height, and twig index as the 5 independent variables for each roost. Tree density ($P < 0.01$), twig height ($P < 0.01$), and twig index ($P < 0.05$) were significant in explaining the variation in birds per ha. When tree density, twig height, and twig index are considered together, they account for 57% of the variation in birds per ha.

DISCUSSION

The 14 roosts share several distinguishable characteristics: the dominant species were deciduous trees usually found on moist soils; stand age was young and homogeneous; tree density was high, and tree canopies occurred within a narrow vertical range and were dense.

Tree density, twig height, and twig index appear to be important factors influencing the number of birds attracted to roosts. These factors define a dense canopy which may be important in creating an advantageous microclimate (Francis 1976, Kelty and Lustick 1977) and/or may allow congregations of birds favorable for exchange of information about foraging loca-

TABLE 2

Vegetation parameters for fall blackbird roosts in central Ohio, 1977–78.

Roost Number	$\bar{x}$ Age (years) n = 20	$\bar{x}$ Density (trees/ha)	$\bar{x}$ Basal area (cm^2)	n for Density and Basal Area	$\bar{x}$ Twig Height (m)	Twig Index
1	9.95 (2.66)*	22,102	5.26 (2.06)	100	3.33 (1.70)	1.39
2	11.84 (6.22)	8,852	12.31 (7.02)	120	4.59 (1.93)	1.94
3	11.10 (5.43)	4,419	25.79 (14.39)	120	6.20 (3.04)	2.01
4	11.45 (3.85)	10,251	12.01 (5.10)	200	6.16 (2.98)	2.27
5	8.90 (3.54)	5,004	14.05 (8.40)	204	4.20 (2.05)	1.83
6	9.10 (3.35)	7,892	16.55 (11.22)	200	4.97 (2.10)	2.60
7	10.30 (5.05)	4,579	34.00 (10.46)	200	8.89 (2.10)	2.55
8	13.45 (3.85)	1,749	81.71 (60.13)	100	7.01 (2.39)	2.22
9	6.85 (2.01)	13,338	14.05 (4.08)	268	5.94 (1.44)	2.20
10	16.85 (4.93)	2,971	52.81 (113.29)	100	7.87 (5.27)	2.65
11	—	11,143	8.97 (21.98)	200	5.24 (1.95)	1.55
12	15.70 (5.86)	3,047	39.93 (31.37)	200	7.28 (4.63)	2.65
13	—	6,974	22.56 (11.34)	160	8.15 (3.14)	2.65
14	10.15 (4.32)	6,123	21.07 (11.88)	200	—	—

*Parentheses denote standard deviations

tions (Ward and Zahavi 1973). Close perching may also aid birds in detecting and avoiding predators (Gadgil 1972, Zahavi 1971). Or, perhaps numerous branches simply provide abundant, suitable perching positions.

The habitat in our 14 autumn roosts is different than that described by most other researchers considering tree roosts (Bliese 1953, Jumber 1956, Francis 1976, Kelty and Lustick 1977, Good and Johnson 1978) but it is similar to that characterized by Lyon (1979). Like us, Lyon (1979) examined autumn roosts, while the other workers researched winter aggregations. However, all roosts seem to share the characteristic of a dense canopy.

Central Ohio blackbird roosts can be viewed as a middle successional stage and have their beginnings in abandoned crop land, orchards, and pastures. This habitat is a transitional stage and appears to remain attractive to blackbirds for a short period. However, new roost sites emerge on the periphery of expanding cities as farm land is idled through purchase by speculative developers.

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