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NESTING HABITS OF RURAL AND SUBURBAN HOUSE SPARROWS IN NORTHWEST TENNESSEE

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ABSTRACT

Observations were made on the breeding biology of House Sparrows (*Passer domesticus*) in northwest Tennessee during 1974 and 1975. Comparisons were made between the nesting habits of House Sparrows in a rural area and a suburban area. The rural study area was farm land of western Obion County, and the suburban study area was in Martin (Weakley County). Both areas were provided with nest boxes, and only nests built in boxes were studied. Forty clutches were laid in the rural boxes, and 33 clutches were laid in the suburban boxes. Average clutch size was 4.9 in rural boxes and 4.4 in suburban boxes. The nesting season extended from late March into August, but most clutches were laid in April, May, and June. Nesting success was lower in the rural area primarily due to high rates of egg loss. Incubation required an average of 11.8 days and young remained in nests an average of 14.6 days. Each nesting cycle, of which a pair may have 2 or 3 per year, required approximately 35-40 days, including 2-5 days for nest building, 4-6 days for egg laying, 11-13 days for incubation, and 14-18 days for nestling development.

INTRODUCTION

House Sparrows (*Passer domesticus*) are common, permanent residents throughout Tennessee, yet their breeding biology in Tennessee has received little study. Information on House Sparrows was required as part of a long term study of the ecology of Eastern Bluebirds (*Sialia sialis*), since House Sparrows are aggressive competitors with bluebirds for nesting and, possibly, roosting cavities (Zeleny, 1976:35-36). This paper reports the results of two years (1974 and 1975) of observations on a rural sparrow population in Obion County and a suburban sparrow population in adjacent Weakley County.

STUDY AREA AND METHODS

The rural population of sparrows was studied in the rolling hill farmland of western Obion County. This area was also the site of the bluebird study and has been more completely described elsewhere (Pitts, 1976). Nesting boxes (87 in 1974 and 50 in 1975) were located throughout an area of approximately 1800 ha (4500 acres). Most of these boxes were attached to fence posts at heights of 1.5-2.0 m.

The suburban population of sparrows was studied in Martin (Weakley County) on the University of Tennessee at Martin (UTM) property. This site is approximately 50 km from the rural study area. Forty nest boxes, approximately 6 m apart and 1.5 m high, were attached to a woven wire fence. The UTM Motor Pool and a residential area were to the east and the UTM Experiment Station headquarters, with barns, greenhouses, feed mill, machinery sheds, etc., were to the west.

All nest boxes were rectangular in shape with a single 3.8 cm entrance approximately 15 cm above the floor. Box sizes in the rural area varied from 7.5 X 10 X 20 cm to 12.5 X 12.5 X 20 cm. Suburban nest boxes were either 7.5 X 10 X 21 cm or 10 X 12.5 X 21 cm. Nest boxes were inspected at least once weekly, and usually twice or more per week. Contents of each box were noted and recorded. No nestlings were banded. Contents of rural boxes were removed following each nesting attempt in 1974. All eggs and nesting materials were removed from the rural boxes in 1975 immediately after each clutch had been completed. Some of the removed eggs were measured with dial calipers. Nesting materials and debris were removed from the suburban boxes only once, just prior to the 1975 nesting season.

RESULTS

A total of 103 nesting attempts was recorded during this study. "Nesting attempt" refers to situations in which at least one egg was deposited in a nest constructed in a nest box. In several instances nests were constructed in boxes, but no eggs were deposited; these were not counted as nesting attempts. Thirty-three complete clutches were laid in the suburban boxes, and 40 were laid in the rural boxes. Clutches were judged to be complete if the same number of eggs was present on two consecutive inspections, and if there was evidence of incubation (i.e., female on nest or eggs warm) on the latter visit. Table 1 summarizes various aspects of the nesting activities. The dates on which clutches were initiated are shown in Figure 1, and the seasonal distribution of the different size clutches is shown in Figure 2.

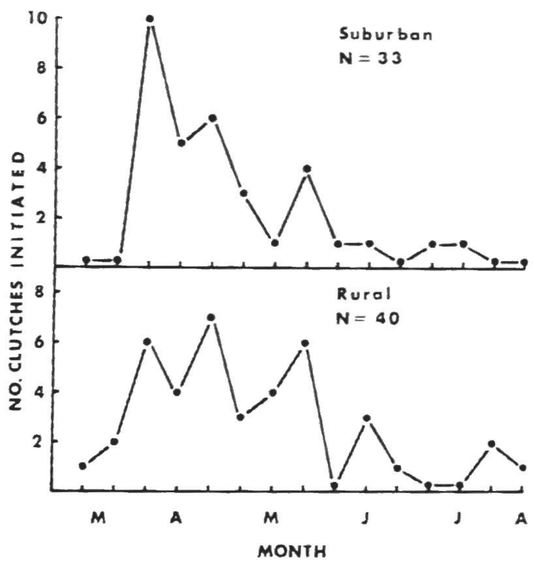

FIG. 1. *Number of House Sparrow clutches initiated during 1974 and 1975 in a suburban area of Weakley County and a rural area of Obion County, Tennessee. Each point represents the number of nests in which eggs were laid during a 10 day period; intervals begin with 16-25 March and end with 3-12 August.*

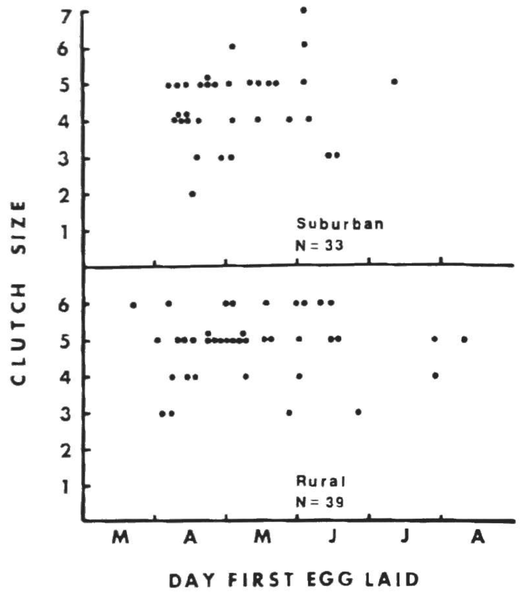

FIG. 2. *Relation between time of year and house sparrow clutch size in rural and suburban nest boxes in northwest Tennessee during 1974 and 1975.*

All of the suburban nest boxes were utilized by House Sparrows; in the rural area boxes within about 300 m of houses, barns, or feed lots were invariably used by sparrows, but boxes more than 300 m from human dwellings were infrequently used. Unpaired males defended nest boxes and called persistently while perched on the tops of the boxes. Judging from the small amounts of nesting material and the accumulations of feces, males roosted in the boxes at night. After pair formation and nest construction the males apparently did not utilize the boxes for roosting.

Nests were constructed of locally available materials, usually dead grasses. Feathers, especially those of chickens, were used to line many of the nests. In the suburban nests, feather substitutes, such as cellophane and paper, were frequently used. In seven of the nests, four rural and three suburban, a single. fresh green sprig of wild carrot (*Daucus carrota*) was placed in the bottom of the nest cup. Nest size varied from small nests approximately 7.5 cm deep to large nests which completely filled the nest box leaving only a tunnel into the nest chamber.

Domed nests located in the open branches of trees were present on both study areas. At the suburban site 12-25 such nests were located in large oaks (*Quercus* sp.) adjacent to the fence supporting the nest boxes. On the south edge of the rural study area, five or six tree nests were present during most of each nesting season in a small grove of black locust (*Robinia pseudoacacia*) near a hog feeding lot.

TABLE 1: *Summary of house sparrow nesting activities in northwest Tennessee.*

	Suburban		Rural	
	1974	1975	1974	1975
Number nest boxes available	40	40	87	50
Number boxes receiving nesting material	34	40	34	24
Number complete clutches laid	18	15	27	13
Total number of eggs laid	87	79	143	101
Number of incomplete clutches	5	6	6	13
Average clutch size	4.4	4.4	4.9	4.9
Number and percentages of eggs that disappeared	20 (23.0%)	16 (20.3%)	43 (30.1%)	*
Number and percentage of eggs that failed to hatch	12 (13.8%)	34 (43.0%)	25 (17.5%)	*
Number and percentage of eggs that hatched	55 (63.2%)	29 (36.7%)	75 (52.4%)	*
Number and percentage of young that disappeared or died in nest boxes	16 (29.1%)	2 (6.9%)	16 (21.3%)	*
Total number of young fledged	39	27	38	*
Nesting success (Number young fledged/total eggs laid)	44.8%	34.2%	26.6%	*
Number and percentage of nests that produced at least one fledgling	14 (77.8%)	8 (53.3%)	11 (40.7%)	*
Average number young fledged per successful nest	2.79	3.38	3.45	*

* *No data available due to removal of nest and contents.*

Eggs were usually laid at the rate of one per day; in one nest the female skipped a day after laying the third egg. Eggs varied in both background color and the amount, size, and color of spots and/or blotches. Usually a single egg, thought to be the last egg laid in the clutch, was distinctly lighter in background color with fewer dark markings. Sizes of eggs were similar within each nest, but eggs in different nests varied greatly. Results of measurements of 28 eggs are: mean length = 21.5 mm, range = 20.3-23.2 mm; mean width = 15.0 mm, range = 14.4-15.8 mm. Included in the 28 eggs were two complete clutches, each with five eggs. Means of these clutches were 22.0 X 15.5 mm and 21.0 X 14.7 mm.

TAXONOMY

Based on the 20 nests for which I obtained the most data the period of incubation was 11.8 days with a range of 10 to 15 days. However, in many nests adults were on the nest for considerable periods of time prior to completion of egg laying, thus obscuring the actual incubation time. Young remained in the nest an average of 14.6 days with a range of 12 to 19 days.

Causes of mortality during the nesting season included predators such as raccoons (*Procyon lotor*), Virginia opossums (*Didelphis virginiana*), and rat snakes (*Elaphe obsoleta*) which took eggs, young, and adults. Large numbers of eggs (e.g., 35% of 1974 rural) disappeared from the nests; many eggs also failed to hatch. Nestlings were not only subject to predation, but also to starvation and high temperatures during the summer.

Several differences were noted in the nesting habits of the rural population and the suburban population of sparrows. Although the length of the nesting season was approximately the same on both areas, extending from late March into early August, the suburban sparrows were more synchronized in their first nesting cycle (Figure 1). Average clutch size was greater in the rural area, but the percentage of egg loss was also greater, resulting in a lower overall nesting success (Table 1). However, the number of young fledged per successful nest was higher in the rural area.

DISCUSSION

The limited observations reported here agree rather well with the more intensive studies of House Sparrows in England by Summers-Smith (1967). The construction of tree nests and the use of cavities was discussed by Summers-Smith (1967:52-57). He mentioned several instances in which sparrows abandoned tree nests in favor of cavities when cavities, such as nest boxes, suddenly became available. He also cited other examples where sparrows continued to use tree nests even though cavities were available. In my suburban site, empty nest boxes were always available, yet tree nests were built less than 20 m away. In the rural area tree nests were most frequently seen in the vicinity of a

hog feeding lot which supported at least 200, and possibly more, House Sparrows. Most of these sparrows nested in the nearby farm buildings; many unoccupied nooks and crannies were available. Apparently at this latitude the use of cavities, or protected sites in buildings, for nest location is not always advantageous, otherwise few, if any, tree nests would now be built. Some of the nests in boxes were like tree nests, being a woven mass of nesting material with a side entrance and tunnel leading to a warmly lined nest chamber. Birds constructing these nests would most likely have been capable of constructing tree nests. Other nests within boxes were very simple, sometimes consisting of only 4-6 cm of stacked grass with a slight central depression. Whether these nests were built by young birds with less hormonal stimulation to build nests, a group of genetically distinct birds, or birds which were influenced by some environmental stimulus to construct a less elaborate nest is unknown.

The presence of sprigs of *Daucus carrota* in some of the nests is unexplained. Sprigs usually appeared between completion of the nest lining and the laying of the first egg. The sprigs did not appear to serve as food or as a source of water as suggested for flower petal eating (Summers-Smith, 1967:38-39). Whether House Sparrows select wild carrot sprigs on the basis of their distinctive appearance or aromatic nature is unknown. Possibly the sprigs serve some role in courtship, or the chemical nature of the plant may elicit a response similar to anting, although objects employed in anting are not carried into the nest (Potter and Hauser, 1974). Other birds, such as hawks, are known to carry green vegetation into nests (Grossman and Hamlet, 1964:129), but the value of this habit has not been explained.

The average clutch size from this study (4.4 for suburban and 4.9 for rural sites) is similar to that found by other United States workers. Will (1973) reported an average clutch size of 4.46, and Weaver (1943) reported an average of 4.73. Largest clutches tended to occur in the middle of the nesting season, although some clutches of six were laid early. Separation of peaks in Figure 1 indicates approximately 40 days are needed for each complete nesting cycle. This would include 2-5 days for nest construction, 4-6 days for egg laying, 11-13 days for incubation, and 14-18 days for nestling development, making a total of 31-42 days. As sparrows were not banded the number of clutches laid by each female is not known. Data of Summers-Smith (1967:72) indicated three distinct peaks of egg laying, but his observations of banded birds showed most females laid only two clutches.

The larger average clutch size on the rural area may have been due to the lower density of nesting pairs. This would possibly allow rural females to gather food more quickly and in larger quantities which would be conducive to larger clutches. However, no data pertaining to the differences in physical condition of the female sparrows or to food availability from the different areas were gathered.

The synchronized laying of first clutches by the suburban sparrows was possibly due to the high nesting density which might have resulted in social stimulation. Rural sparrows were scattered over a much larger area and were not in daily contact with all of the other nesting sparrows. Greater losses of eggs and lower overall nesting success in the rural area may be attributed to predators, especially raccoons and rat snakes, which were responsible for a large number of the losses. The fact that successful rural nests produced, on the average, more young than the suburban nests was perhaps due to the larger clutches which were laid by the rural sparrows and by the all-or-none nature of predators. Nests that were depredated lost all of the eggs and/or young present. Consequently, most nesting attempts produced either no fledglings or several fledglings.

The House Sparrow nesting season closely coincides with the Eastern Bluebird nesting season. Both species typically begin egg laying in late March or early April and continue nesting attempts through July and early August. Each species occasionally lays clutches earlier or later. The result is competition for nesting boxes throughout the nesting season. Several nest boxes were monopolized by sparrows, and even though bluebirds inspected such boxes and indicated their interest they were never able to establish themselves. Other nest boxes located near human dwellings were frequently used by bluebirds; most of these sites had low sparrow populations, probably due to the absence of any exposed hog or cattle feed which seemingly is necessary for the establishment of large rural House Sparrow populations (Robbins, 1973).

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