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An Analysis in the Diet of House Sparrow, Passer Domesticus in Different Eco-system

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Abstract: House sparrows are extremely sedentary birds, the majority living out their lives with an ambit of 1-2 km. The house sparrow is primarily a seedeater, in rural areas specializing on the seeds of cultivated grain crops such as oats, wheat, barley, corn and maize. Birds living in built up areas, supplement their diet of natural vegetable matter with a variety of household scraps, deliberately put out by humans. In contrast, nestlings are fed almost exclusively on insects and other invertebrates (both in the larval and adult form), with the prey species varying with season. The aim of this work was to study the diet composition of house sparrows in detail rather than to test the effect of nestling food on their body condition. The faecal samples from all nestlings were collected. The diet of nestling house sparrows was assessed by examining 24 faecal samples collected from eight Taluks of Virudhunagar District between September 2012 and September 2013. The main preys found in the faecal samples were Coleoptera, Orthoptera, spiders and Lepidoptera.

Key words: Spider Units · Human Population · Monoculture · Magnification · Exotic Crops

INTRODUCTION

With the ever-growing human population, agricultural practices have totally changed. Today, one can find large tracts of lands under monoculture. India is the world's largest user of chemical pesticides and fertilizers. This intensification in agriculture has led to serious decline in a number of farmland birds and the house sparrow is no exception. The change in cropping patterns and introduction of exotic crops has also led to a decrease in food and large-scale habitat destruction[1].

The two common factors which influence breeding success in birds are resource availability and weather conditions. Food supply during the breeding season is a particularly important determinant of fledgling condition and survival. Nutrition at the nestling stage may affect fitness later in the life of the birds. A low-quality diet poor with nutrients may reduce growth rates in the nestlings of passerines. Detailed knowledge on diet is essential to study the biology of birds. Numerous methods have been used to assess the composition of insectivorous diets[2][1].

MATERIALS AND METHODS

Collection and Inspection of Faeces: Quantitative estimations of the composition of bird diet are often analysed by counting the number and nature of prey remains in faeces. Faecal samples were used to evaluate nestling diet. The problem associated with this method is that certain items which cannot be detected in the sample because of their high digestibility[3]. This can be observed in invertebrates without any hard body parts, such as aphids or ants. However, this bias is not always significant and this method is almost without stress for the nestlings [2].

The aim of the work is to test the effect of nestling food on body condition rather than to describe diet composition in detail. Nestlings commonly produced faecal sacs when handled (Plate 1). A total of 24 faecal sacs were analysed during the period of study (three samples from eight Taluks). After collection, fresh faecal sacs were conserved in vials with 70% ethylalcohol. The contents of each faecal sample were taken into a Petridish. The underside of the dish was scored with radial lines at 20^0 intervals giving 18 equal segments.

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Plate 1: Collection of faecal samples

The contents of each faecal sample were placed on the dish with a small amount of ethanol, spread evenly across the 18 segments and inspected at 30×magnification using a binocular microscope. By rotating the dish through 360° it was possible to record the entire contents and the food objects found in each section [4,5].

The arthropods were identified by using the manual of Ralph *et al*[3]. Identifiable parts were then matched to approximate the number of individuals occurring in each sample (e.g. two mandibles and/or up to six legs represented one beetle) [3].

The relative population of the different invertebrate groups in the diet of nestling was scored according to the numbers of body parts counted. For example, if a faecal sample contained three spider leg tips then that sample would be scored as containing 0.375 spider units and a sample containing two ant legs would be scored as containing 0.33 ant units. This approach overcomes the common mistake of rounding prey fragments up to the nearest whole number[6].

RESULTS

The diet of nestling house sparrows was assessed by examining 24 faecal samples collected from eight Taluks of Virudhunagar District between September 2012 and September 2013. The main preys found in the faecal samples were Coleoptera, Orthoptera, spiders and Lepidoptera [4].

Nestling Diet in Urban Landscape (Fig. 1): The relative proportion of dietary components changed in the different landscapes. In urban sites, the insect preys were Mantidae (23 ± 0.81), spiders (18 ± 1.00), Eumastacoidea (14 ± 1.01), Lepidoptera (11± 0.33), Aphid (11 ± 1.01), Coleoptera (10 ± 1.00), Carabidae (8 ± 0.81), Psyllidae (3 ± 1.24) and Homoptera (2 ± 0.81).

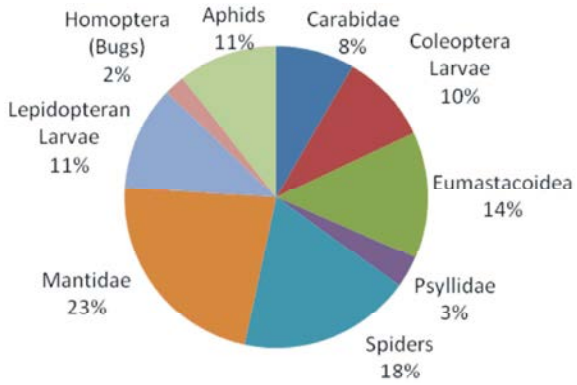

Fig. 1: Insects prey in the urban landscape

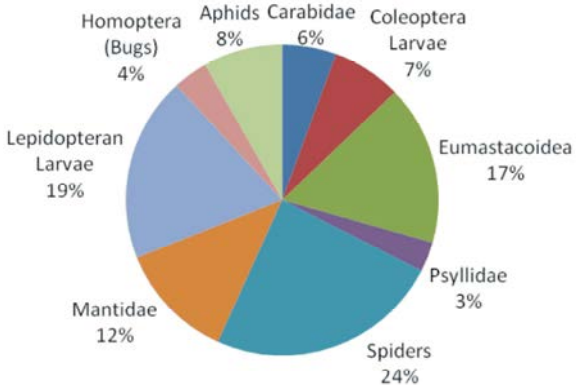

Fig. 2: Insect preys in the sub urban landscape

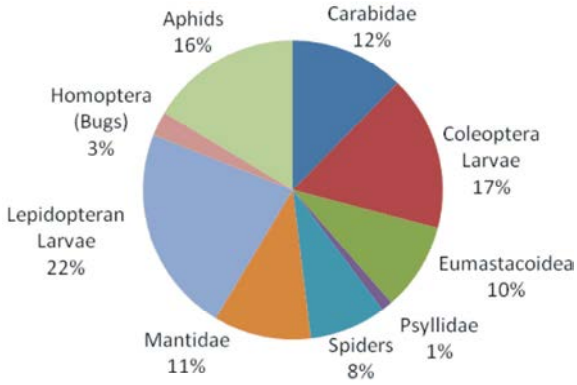

Fig. 3: Insect preys in the rural landscape

Nestling Diet in Sub Urban Landscape (Fig. 2): In the sub urban landscapes the relative proportion of insect preys were spiders (24 ± 0.81), Lepidoptera (19 ± 1.01), Eumastacoidea (17 ± 1.00), Mantidae (12 ± 1.01), Aphid (8 ± 0.81), Coleoptera (7 ± 1.01), Carabidae (6 ± 0.33), Homoptera (4 ± 1.24) and Psyllidae (3 ± 0.33).

Nestling Diet in Rural Landscape (Fig. 3): In rural landscape the relative proportion of insect preys were Lepidoptera (22 ± 1.00), Coleoptera (17 ± 0.81),

Aphid (16 ± 1.00), Carabidae (12 ± 1.24), Mantidae (10 ± 0.33), Eumastacoidea (9 ± 0.33), spiders (8 ± 1.24), Homoptera (3 ± 0.33) and Psyllidae (1 ± 1.01).

The invertebrate prey units of urban study sites were compared statistically with prey units rural area and it was found to be varied significantly ($x^2 = 9.82$, d$f = 14$, $x^2_{15}(0.05) = 16.19$) using Chi-square test. The invertebrate prey units of sub-urban when compared to rural area were also varied significantly ($x^2 = 19.76$, d$f = 14$, $x^2_{15}(0.05) = 16.19$). The invertebrate prey units of urban and sub urban study sites did not vary significantly [chi-square test ($x^2 = 7.88$, d$f = 8$, $x^2_8(0.05) = 15.50$].

DISCUSSION

The reconstruction of the true diet of the house sparrow was not possible, as there is no information on the relative passage rates and detectability of the various prey items from ingestion to defecation. However, an analysis was undertaken to find out the variation in the relative proportions of different prey groups between faecal samples collected from chicks of different study areas of rural, sub urban and urban [5].

The present study indicates the importance of food amount and diet composition of nestling house sparrows in different study areas. The nestlings of house sparrows were fed with a variety of insects and plant material. The principal nestling diet composition, based on faecal analysis, was similar to those reported in the studies conducted in other parts of Europe and other foreign countries. In the present investigation the nestlings consumed mainly Coleopteran beetles and Lepidopteran larva, which accounted for major proportion of animal food in the rural samples. Similar kinds of reports were reported by Anderson[7] who found that the Coleoptera was the most abundant nestling food type in Poland and Bulgaria. Likewise, in the United Kingdom, beetles were the most important prey species by the house sparrows in rural areas of England[5]. However, the beetle families most often encountered in the diet of nestlings in previous studies were usually Carabidae[8]. In the present study the beetles were represented mainly by Carabidae larva which lives in dung and are, therefore, abundant on farm sheds of the villages of the study sites [6-8].

Dictyoptera and Orthoptera formed the major diet in the urban faecal samples. Among the Dictyoptera order, praying mantis and grass hopper of Orthoptera formed major diet of the nestlings. Due to the absence of agriculture and damp free areas it was hard to find the Coleopteran and Lepidoptera larva in the urban areas.

The importance of the animal component of nestling diet was stressed by Vincent[5], who found more plant material within the diet of nestlings that subsequently died than in the diet of those that fledged. A shortage of animal prey in the chick diet of house sparrow causes consumption of unsuitable food or starvation, which leads to lower breeding success.

CONCLUSION

In the present study indicates the importance of food amount and diet composition of nestling house sparrows in different study areas. The nestlings of house sparrows were fed with a variety of insects and plant material. The principal nestling diet composition, based on faecal analysis, was similar to those reported in the studies conducted in other parts of Europe and other foreign countries. In the present investigation the nestlings consumed mainly Coleopteran beetles and Lepidopteran larva, which accounted for major proportion of animal food in the rural samples. Similar kinds of reports were reported by Anderson[7] who found that the Coleoptera was the most abundant nestling food type in Poland and Bulgaria.

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