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FOOD OF HOUSE SPARROW IN THE CULTIVATIONS OF FAISALABAD

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An analysis of the stomach contents of the House Sparrow (*Passer domesticus*), collected from March through September from the cultivations of Faisalabad District revealed that the sparrows ate mainly plant seeds in which seeds of wheat, fodder and weed plants were prominent. The diet of the nestlings, however, was largely comprised of insects and cereals, particularly wheat.

INTRODUCTION

The House Sparrow (*Passer domesticus*) is believed to inflict serious damage to cereal crops in Pakistan. This study attempts to clarify the relation of the House Sparrow to the growing wheat crop in the central Punjab. The study was carried out from March through September in Faisalabad, one of the largest wheat growing areas of the province of Punjab.

MATERIALS AND METHODS

A total of 103 stomachs of nestling and 200 of postnestling House Sparrows was collected from the cultivations of Faisalabad District. The leading crop of the area was wheat. Other crops of the study area present during this sampling period were sorghum maize, millet, vegetables, fodder and other agricultural plants. Small fruit orchards, wastelands, roadside forest plantation made up the rest of the picture.

The contents of the stomachs were preserved in formalin and stored in 80% alcohol before the various food items were tallied under a binocular microscope. To determine the intensity of occurrence, homogenized smears of each stomach content were examined in ten randomly selected microscopic fields at a fixed magnification and the food particles were indentified, counted and prorated.

RESULTS

Food of Nestling

a. *Frequency of occurrence*

Insects were the staple items of the diet of the nestlings. They were represented in 92% (N=103) of the stomachs while mollusks and arachnids occurred in only 2% and 5% of them (Table 1).

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Table 1. *Frequency of occurrence of various food items in the House Sparrow*

Food	Frequency (%)	
	Nestlings (N=103)	Post-Nestlings (N=209)
Animal Food		38 (18 2)
Mollusca	2 (1.9)	–
Arachnida	5 (4.9)	–
Insecta	95 (92.1)	31 (14 8)
Coleoptera	54 (52.4)	12 (5.7)
Lepidoptera	36 (35.0)	12 (5.7)
Diptera	31 (30.1)	3 (1.4)
Hemiptera	12 (11.7)	7 (3.4)
Orthoptera	11 (10.7)	1 (0.5)
Hymenoptera	9 (8.7)	1 (0.5)
Odonata	5 (4 9)	–
Neuroptera	–	1 (0.5)
Unidentified	19 (18.5)	–
Feather and hair	–	6 (2.9)
Plant Food		
Seed and grains	76 (73.8)	192 (91.9)
Wheat	61 (59.2)	118 (56.5)
Echinochloa spp.	–	108 (51.7)
Chenopodium spp.	–	79 (37.8)
Grasses	–	21 (10.0)
Sorghum	18 (17.5)	5 (2.4)
Rice	15 (14.6)	17 (8.1)
Rumex spp.	–	9 (4.3)
Trifolium alexandrinum	–	8 (3.8)
Gram	7 (6.8)	3 (1.4)
Maize	5 (4.9)	2 (1.0)
Melon	–	5 (2.4)
Millet	2 (1.9)	1 (0.5)
Mash	2 (1.9)	–
Clover	–	1 (0.5)
Piazi	–	1 (0.5)
Unidentified seeds	6 (5.8)	18 (8.6)

Among the insects, coleopterans were most frequent (52%) which were followed by Lepidoptera (35%), Diptera (30%) Hemiptera (12%), Orthoptera (11%), Hymenoptera (9%), and Odonata (5%). Unidentified insects were recorded from 19% of the stomachs. Adult beetles (24%) especially ladybird beetles (23%) among coleopterans, and caterpillars (29%) and armyworm larvae (10%) among the coleopterans were the most frequently occurring food items. Flowerflies and maggots in Diptera, aphids in Hemiptera, and oothecae of Orthoptera also occurred fairly frequently in the stomachs.

Wheat grains were represented in 59% of the stomachs. Other food grains represented in the stomach contents were sorghum (18%), rice (15%), gram (7%), maize (5%), millet (2%) and mash (*Phaseolus mungo*) (2%). The frequency of occurrence for weed and other non-edible seeds was 6%.

b. *Intensity of occurrence*

Count of food particles from ten randomly selected microscopic fields for contents of each of the 103 stomachs revealed that 54% of the particles was due to animals and 46% due to plants (Table 2). Insects contributed 53% of the total food particles. Among the insects, Lepidoptera, Coleoptera, and Diptera were the most intensively consumed animals; ladybird (12%) and other beetles (8%), armyworm larvae (4%), caterpillars (18%), oothecae of Orthoptera (3%), floworflies (4%) and dipteran larvae (9%) being the staple items.

About 46% of the particles belonged to plants of which 26% was due to wheat, 7% due to sorghum and 6% due to rice. The remaining 6% of the food particles belonged to the seeds of weeds, gram, maize, mash and millet (Table 2).

c. *Monthly variations*

Insects and wheat grains were main staples of the diet of the House Sparrow during the four months of the present sampling period. Coleoptera, among the insects had been the main source of nourishment to the nestlings. Frequency of occurrence for these nestlings varied from 50% (June) to 80% (March). Lepidopterans, dipterans and hymenopterans were consumed during all the three months of the spring season; the ranges of frequency of occurrence for the respective groups being 20% (March) to 40% (May), 7% (April) to 48%

Table 2. *Relative abundance of the particles of various food items in the stomach contents of the House Sparrow*

Food	Number (%) Nestlings	Post-Nestling
Animal Food	393 54.4)	111 2.2
1. Mollusca	2 (0.3)	—
2. Arachnida	8 (1.1)	—
3. Insecta	383 (53.1)	97 (1.9)
i) Lepidoptera	87 (12.1)	19 (0.4)
ii) Coleoptera	85 (11.8)	15 (0.3)
iii) Diptera	68 (9.4)	17 (0.3)
iv) Orthoptera	17 (2.4)	1 (0 02)
v) Hemiptera	16 (2.2)	35 (0.7)
vi) Hymenoptera	13 (1 8)	1 (0.02)
vii) Odonata and Ephemeroptera	10 (1.4)	.
viii) Unidentified	87 (12.1)	8 (0.16)
4. Feather and Hair	—	12 (0.3)
Plant Food	329 (45.6)	4939 (97.8)
1. Seeds and Grains	329 (45.6)	4128 (87.7)
Wheat	185 (25.6)	2363 (46 8)
Echinochloa spp.	—	1041 (20.6)
Sorghum	52 (7.2)	11 (0.2)
Rice	46 (6.4)	97 (1.9)
Chenopodium	—	370 (7.3)
Grain	9 (1.2)	—
Maize	9 (1.2)	4 (0.1)
Mash & millet	6 (0.8)	—
Unidentified seeds	22 (3.0)	542 (10.7)
Miscellaneous	—	511 (10.1)

(May), and 5% (March) to 15% (April). Hemipterans were represented in all the monthly samples except that of April and they occurred with a frequency range of 10% (May) to 30% (March). Odonatans were represented in May (8%) and June (13%) samples only. Thus, in March six, in April five, in May seven and in June three orders of insects were represented in the stomach contents of the nestlings.

The plant food of the nestlings was comprised of wheat, sorghum, millet, mash, rice, maize and seeds of wild and ornamental plants. Wheat and sorghum were consumed all through the sampling period and the frequency of occurrence in the monthly sample ranged between 50% (June) and 74% (April) and 12% (June) and 19% (May), respectively. Gram and rice were consumed during the spring months only and their frequencies of occurrence in the monthly samples were 4% (May), 11% (April) and 19% (May). Maize was consumed in May (10%)and June (13%),whereas seeds of wild and ornamental plants were consumed in March (20%) and April (7%). The level of utilization of millet and mash was low and restricted to one or two months.

d. *Effect of age*

Nestlings with closed eyes and 3-10 gm. body weight were fed upon animal foods more intensively than in the advanced growth stages. They were fed mainly on immature Diptera (51%), Lepidoptera (51%), and Coleoptera (49%). Orthoptera (21%), Hemiptera (18%), and Odonata (8%) were the other important items in the diet of these nestlings. Although Coleoptera was consistently consumed till fledging time, yet it occurred most frequently in middle-age nestlings weighing 10-24 gm. Besides Coleoptera, these nestlings drew their nourishment mainly from Lepidoptera (30%), Diptera (16%), Hymenoptera (14%), Hemiptera (9%) and Orthoptera (7%). Nestlings in a more advanced stage of growth were fed on animal food less intensively than in the earlier stages. The animal part of the diet of these nestlings was largely due to Coleoptera (40%), Diptera (20%) and Lepidoptera (15%).

Wheat was the most important constituent of the diet of nestlings particularly those in advanced stages of growth. Sorghum and rice were important cereal foods for the early and middle-age nestlings but wheat was the most con-

sistent and frequently occurring grain in the stomachs of the nestlings of all growth stages; its frequency of occurrence varied from 41% to 75%.

FOOD OF POST – NESTLING STAGES

a. *Frequency of occurrence*

In a total of 209 stomachs, 92% carried seeds of plants in which wheat (57%), *Echinochloa* (52%), *Chenopodium* (38%), rice (8%), and grasses (10%) were the most frequent items. Animal food was recorded from 18% of the stomachs. The frequency of occurrence of insects (15%) was mainly due to Lepidoptera, Coleoptera, and Hemiptera (Table 1).

b. *Intensity of occurrence*

About 98% of the particles in the contents of the stomach was due to plants. Wheat (47%), *Echinochloa* (21%) and *Chenopodium* (7%) seeds were the staples of the diet of the non-nestling sparrows (Table 2).

c. *Monthly variations*

Post-nestling stages of the House Sparrow consumed seeds of plants intensively throughout the sampling period of this study. Among the food grains, wheat, rice, millet, gram, and maize were eaten. Of those, wheat and rice were the staple items as their frequency of occurrence in the monthly samples varied between 42% (September) and 71% (May), and 4% (September) and 37% (August), respectively. Wheat grains were eaten intensively in May (71%), June (67%), and rice in August (37%).

The sparrows also consumed seeds of fodder crops, namely, sorghum, shaftal (*Trifolium resupinatum*), berseem (*T. alexandrinum*), lucern and *Echinochloa*. The latter was eaten throughout the sampling period and its frequency of occurrence ranged from 37% (May) to 96% (September). Seeds of weeds, particularly those of *Chenopodium* and *Rumex* were eaten rather consistently. The frequency of occurrence for *Chenopodium* varied from 30% (June) to 50% (May) and for *Rumex* from 4% (May) and 16% (August). *Rumex* was not represented in the April sample. Seed of grasses were consumed in all the months except June and the frequency of occurrence ranged from 6% (April) to 25% (September).

Animal food, particulaly insects, was present in all the monthly samples. The frequency of occurrence for animal food ranged between 5% and 33%; May (27%) and June (33%) being the months of peak consumption.

DISCUSSION

The House sparrow population living in the agroecosystem of the central Punjab functions mainly at the level of primary consumers. However, when the young are being raised, it also functions at the level of secondary and tertiary consumers for the sparrows feed their young insects that feed on the plants and insects that feed upon each other. Plant seeds are important source of nourishment to the nestling also, particularly for the ones in advanced stages of development. Introduction of improved cultivars of cereals with better protein contents might cause a shift in the diet of the nestlings in favour of the cereals. This would render the sparrow mainly a primary consumer and a more serious pest of agriculture.

Preponderance of seeds in the diet of the House Sparrow and its congeners is well known (Bortoli, 1973; Keil, 1973; Wines and Dyer, 1977). Seeds of weeds and *Echinochloa* spp. constituted a significant part of the diet of the House Sparrow of the present study area. Thus, the Sparrows (in post-nestling stages) ate not only a much smaller portion of insect food than what they fed their nestlings, but they also depended on cereal crops to a much lesser extent.

Intensive consumption of the cereals by the House Sparrow generally associated with flock feeding which is often quite localized. For this reason sparrows not feeding in flocks might have somwehat different food stuffs in their stomachs. Thus, determination of economic inpact derived solely from estimates of food consumption should not be considered a final assessment. In the present study, consumption of wheat grain by the bird in March and April, which are the ripening and harvesting months for the crop, may be taken as a loss to the farmer. But, utilization of this grain in late May and thereafter indicated that the sparrows had gleaned them from the fields and that the grains had already lost their utility to the farmer. In fact, by consuming shredded wheat grains the sparrows competed for this food with field rats and mice, and granivorous ants.

Analysis of the contents of the sparrow stomachs indicated that April and May were the months when abundant and varied food was available and in June both plant and animal food became scarce. Perhaps this scarcity of food is partly responsible for retarding, as noted by Ahmad (1982), the rate of reproduction in the House Sparrows in early summer.

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