

Food of Italian Sparrow *Passer italiae* nestlings in Central Italy

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Abstract - The diet of *Passer italiae* nestlings was studied in a wood of Central Italy. All samples contained arthropods, and shell fragments, seeds and gravel were also abundant. Diet diversity changed with age, being maximum at about 8 days of age. Diversity also increased with the number of nestlings. Differences were found with diet of nestlings of *Passer domesticus* and *Passer montanus*. Predation on eggs and nestlings was high.

Introduction

The Italian Sparrow *Passer italiae*, a stabilized hybrid between House Sparrow *Passer domesticus* and Spanish Sparrow *Passer hispaniolensis* (Mayr 1963; Johnston 1969; Massa 1989), is endemic in Italy. A very few researches have been made about this species (Lo Valvo & Lo Verde 1987; Bogliani & Brangi 1990; Bricchetti *et al.* 1993, Sorace 1993) and no one about food of nestlings. In this study we have analyzed nestling food in a Mediterranean wood.

Methods

The research was made in the WWF Natural Oasis "Bosco di Palo" in Ladispoli, near Rome, Italy. The phytosociologic framing of this site can be reported to the *Lathiro-Quercetum cerris* association (Lucchese & Pignatti 1990). Its structure was described by Fraticelli & Sarrocco (1984) and a floristic list is reported in Lucchese (1990).

In the area there were 35 nestboxes which were controlled every two days from April to July 1993. Every time the presence of building material (grass, leaves, etc.), eggs and nestlings was recorded and faecal sacks were collected. They were kept in 70% alcohol and were later analyzed by a stereoscopic microscope with the method of Kleintjes & Dahlsten (1992). The fragments were identified and their presences in the samples were noted. Statistical counts were made on the samples, each containing all the faecal sacks collected in the same nest on the same day.

Table 1. Diet of Italian Sparrow in 59 samples.

ITEM	NUMBER OF SAMPLES	PERCENTAGE OF SAMPLES
ANIMAL MATTER	59	100.0
of which:		
Pulmonata	14	23.8
Opiliones	36	61.0
Araneae	12	20.3
Orthoptera	9	15.1
of which: <i>Gryllotalpidae</i>	2	3.4
Dermaptera	8	13.6
Isoptera	3	5.1
Hemiptera	41	69.5
Neuroptera	1	1.7
Lepidoptera (larvae)	47	79.7
Diptera	1	1.7
Hymenoptera	25	42.4
of which: <i>Formicidae</i>	5	8.5
Coleoptera	52	88.1
of which: <i>Carabidae</i>	2	3.4
<i>Staphylinidae</i>	4	6.8
<i>Scarabaeidae</i>	2	3.4
<i>Cerambycidae</i>	1	1.7
<i>Curculionidae</i>	13	22.0
VEGETAL MATTER	36	61.0
of which:		
Seeds	21	35.6
Other plants	24	40.7
GRIT	41	69.5

Table 2. Diet of Italian Sparrow nestlings in different periods. The first figures refer to absolute numbers of samples; the second ones (in brackets) to percentages of samples containing the item on the total number of samples of the same period.

PERIODS	A 19-31 May	B 1-15 June	C 16 June - 2 July	D 13-29 July
NUMBER OF SAMPLES	13	24	10	12
ANIMAL MATTER	13 (100)	24 (100)	10 (100)	12 (100)
of which:				
Pulmonata	2 (15)	10 (42)	0 (0)	2 (17)
Opiliones	5 (39)	21 (88)	5 (50)	5 (42)
Araneae	1 (8)	3 (13)	2 (20)	6 (50)
Orthoptera	1 (8)	2 (8)	0 (0)	6 (50)
of which: <i>Gryllotalpidae</i>	0 (0)	2 (8)	0 (0)	0 (0)
Dermaptera	0 (0)	6 (25)	1 (10)	1 (8)
Isoptera	3 (23)	0 (0)	0 (0)	0 (0)
Hemiptera	6 (46)	18 (75)	10 (100)	7 (58)
Neuroptera	1 (8)	0 (0)	0 (0)	0 (0)
Lepidoptera (larvae)	11 (85)	19 (79)	7 (70)	10 (83)
Diptera	0 (0)	1 (4)	0 (0)	0 (0)
Hymenoptera	2 (15)	11 (46)	8 (80)	4 (33)
of which: <i>Formicidae</i>	0 (0)	1 (4)	4 (40)	0 (0)
Coleoptera	10 (78)	21 (88)	10 (100)	11 (92)
of which: <i>Carabidae</i>	1 (8)	0 (0)	0 (0)	1 (8)
<i>Staphylinidae</i>	2 (15)	1 (4)	1 (10)	0 (0)
<i>Scarabaeidae</i>	1 (8)	0 (0)	1 (10)	0 (0)
<i>Cerambycidae</i>	1 (8)	0 (0)	0 (0)	0 (0)
<i>Curculionidae</i>	0 (0)	1 (4)	4 (40)	8 (67)
VEGETAL MATTER	10 (77)	17 (71)	5 (50)	4 (33)
of which:				
Seeds	4 (31)	7 (29)	4 (40)	4 (33)
Other plants	9 (69)	13 (54)	2 (20)	0 (0)
GRIT	6 (64)	17 (71)	8 (80)	10 (83)

We grouped the samples in 5 periods: "A" from 16 to 31 May; "B" from 1 to 15 June; "C" from 16 June to 2 July; "D" from 3 to 12 July and "E" from 13 to 29 July (Table 2). The "D" period coincided with the interval between first and second broods, therefore it did not contain any samples.

Moreover, we grouped the samples in four nestling ages: I, from 1 to 3 days old; II, from 4 to 6; III, from 7 to 9; and IV, from 10 to fledging (Table 3), and in three groups after brood size: 2, 3, 4 and more nestlings (Table 4). Chi square tests were calculated from the sums of all samples containing or not containing a given item in each group (seasonal, age or brood size group).

Results

Only 6 (17%) nestboxes were occupied by Italian Sparrows. In seven of 9 broods observed nestlings hatched and in 4 of them the nestlings fledged. We

collected 211 faecal sacks in 59 samples, and therefore each sample contained a mean of 3.4 faecal sacks.

Italian Sparrow nestling food was composed mainly of animal food: we found fragments of arthropods in all samples and vegetal matter only in 54.2% of samples. Moreover, we found grit in a high percentage of samples. A detailed list of matter (Table 1) shows the prevalence of Coleoptera, which were present in 88.1% of the samples. Among these, the only identified species was *Anomala devota* (Rutelidae). Among Hymenoptera there were *Crematogaster scutellaris* (Formicidae) and various Apoidea species. Isoptera were represented by *Reticulitermes lucifugus* (Rhinotermitidae) and Dermaptera by *Forficula auricularia*.

The test for association between Hymenoptera and brood size (2-3 vs. 4 or more) was highly significant (chi square=9.64, df=1, p<0.01).

Food diversity, as estimated by the Shannon index

Table 3. Diet of Italian Sparrow nestlings in different ages. The first figures refer to absolute numbers of samples; the second ones (in brackets) to percentages of samples containing the item on the total number of samples of the same age group.

AGE GROUP AGE (DAYS)	I 1-3	II 4-6	III 7-9	IV 10 AND MORE
NUMBER OF SAMPLES	11	17	16	15
ANIMAL MATTER	11 (100)	17 (100)	16 (100)	15 (100)
of which:				
Pulmonata	0 (0)	6 (35)	5 (31)	3 (20)
Opiliones	7 (64)	10 (59)	12 (75)	7 (47)
Araneae	3 (27)	2 (12)	4 (25)	3 (20)
Orthoptera	1 (9)	1 (6)	5 (31)	2 (13)
of which: <i>Gryllotalpidae</i>	1 (9)	0 (0)	1 (6)	0 (0)
Dermaptera	2 (18)	1 (6)	4 (25)	1 (7)
Isoptera	0 (0)	2 (12)	0 (0)	1 (7)
Hemiptera	10 (91)	9 (53)	12 (75)	10 (67)
Neuroptera	1 (9)	0 (0)	0 (0)	0 (0)
Lepidoptera (larvae)	10 (91)	16 (94)	10 (62)	11 (73)
Diptera	1 (9)	0 (0)	0 (0)	0 (0)
Hymenoptera	3 (27)	7 (41)	10 (62)	5 (33)
of which: <i>Formicidae</i>	1 (9)	2 (12)	0 (0)	2 (13)
Coleoptera	8 (73)	15 (88)	14 (88)	15 (100)
of which: <i>Carabidae</i>	0 (0)	1 (6)	0 (0)	1 (7)
<i>Staphylinidae</i>	0 (0)	2 (12)	0 (0)	2 (14)
<i>Scarabaeidae</i>	0 (0)	1 (6)	0 (0)	1 (7)
<i>Cerambycidae</i>	0 (0)	1 (6)	0 (0)	0 (0)
<i>Curculionidae</i>	3 (27)	2 (12)	5 (31)	3 (20)
VEGETAL MATTER	5 (45)	12 (71)	12 (75)	7 (47)
of which:				
Seeds	3 (27)	4 (24)	9 (56)	5 (33)
Other plants	3 (27)	9 (53)	8 (50)	4 (27)
GRIT	4 (36)	11 (65)	15 (94)	11 (73)

(H'), showed variation with nestling age (Figure 1) and with number of nestlings in brood (Figure 2).

Discussion

The diet of Italian Sparrow nestlings change as the season proceeds and probably reflects what is made available by the environment both in the animal and vegetal fields, as it was found also by Anderson (1984) and Ivanov (1986) in House Sparrow and Tree Sparrow *Passer montanus* respectively. These authors used a different study method in different environments, so the following comparison must be considered only in a general way.

Coleoptera, Lepidoptera and Opiliones are about stable during the whole breeding season, while they were found to decrease in House Sparrow diet when season proceeds (Ivanov 1986). Orthoptera reach their maximum at the end of July, like in House Sparrow (Ivanov 1986). With nestling growing and then

probably with the increase of their digestive ability, Lepidoptera larvae decrease and Coleoptera increase. Isoptera, wings of which were found, were noticed in a range of only 3 days (23-25 May), probably because there was a swarming. Dermaptera and Apoidea were not found in House Sparrow nor Tree Sparrow diets (Seel 1966; Mirza 1972; Anderson 1984; Ivanov 1986). The presence of Apoidea in the diet of Italian Sparrow suggests that this species is able to remove the sting, as other species remove heads of insects (Dahlsten & Herman 1965). We found a low percentage of Diptera, that were instead found to be a dominant element in House Sparrow and Tree Sparrow diet (Seel 1966; Anderson 1984; Ivanov 1986). This non coincidence could be due to different methods of study and not necessarily to a diversity of diet, too.

In the faecal sacks fragments of shells of small Pulmonata were found; they could be important in the diet in order to bring calcium, since they were also found in the stomachs of some females of House

Table 4 - Diet of Italian Sparrow nestlings of different brood sizes. The first figures refer to absolute numbers of samples; the second ones (in brackets) to percentages of samples containing the item on the total number of samples of the same brood size group.

BROOD SIZE	2 NESTLINGS	3 NESTLINGS	4 NESTLINGS AND MORE
NUMBER OF SAMPLES	6	20	33
ANIMAL MATTER	6 (100)	20 (100)	33 (100)
of which:			
Pulmonata	2 (33)	1 (5)	11 (33)
Opiliones	3 (50)	10 (50)	23 (70)
Araneae	3 (50)	2 (10)	7 (21)
Orthoptera	3 (50)	3 (15)	3 (9)
of which: <i>Gryllotalpidae</i>	0 (0)	0 (0)	2 (6)
Dermaptera	0 (0)	1 (5)	7 (21)
Isoptera	0 (0)	3 (15)	0 (0)
Hemiptera	3 (50)	12 (60)	26 (79)
Neuroptera	0 (0)	0 (0)	1 (3)
Lepidoptera (larvae)	6 (100)	17 (85)	24 (73)
Diptera	0 (0)	0 (0)	1 (3)
Hymenoptera	2 (33)	3 (15)	20 (61)
of which: <i>Formicidae</i>	0 (0)	0 (0)	5 (15)
Coleoptera	6 (100)	17 (85)	29 (88)
of which: <i>Carabidae</i>	0 (0)	1 (5)	1 (3)
<i>Staphylinidae</i>	0 (0)	3 (15)	1 (3)
<i>Scarabaeidae</i>	0 (0)	1 (5)	1 (3)
<i>Cerambycidae</i>	0 (0)	1 (5)	0 (0)
<i>Curculionidae</i>	4 (67)	2 (10)	7 (21)
VEGETAL MATTER	3 (50)	13 (65)	20 (61)
of which:			
Seeds	3 (50)	6 (30)	12 (36)
Other plants	0 (0)	11 (55)	13 (39)
GRIT	6 (100)	11 (55)	24 (73)

Sparrow in the breeding season (Pinowska 1975). The same explanation can be due for grit, besides the fact that it could be important to facilitate trituration of food. Grit was also found in Spanish Sparrow diet in a region comparable for climate (Alonso 1985).

Diet diversity changes with age and reaches its maximum at about 8 days of age (Figure 1), when the nestlings have reached their maximum weight (Summers-Smith 1963), because at that time food demand is maximal, and adults are forced to increase the amount of food even by reducing time for selection and amplifying their feeding niche, as it was found also by Krebs *et al.* (1977) in Great Tit *Parus major*. Seed percentage was highest at about the tenth day, probably because nestlings became accustomed to feed what would be their main food in the future.

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Riassunto - L'alimentazione dei pulli di Passera d'Italia *Passer italiae* è stata studiata in un'area dell'Italia centrale attraverso l'analisi delle sacche fecali. Tutti i campioni contenevano Artropodi: erano anche abbondanti semi, frammenti di nicchi di Gasteropodi terrestri e piccoli sassolini. L'indice di diversità della dieta cambiava con l'età e raggiungeva il suo massimo intorno a 8 giorni di età: esso cresceva anche in rapporto al numero di pulli. È stata riscontrata un'alta predazione sia sulle uova che nei confronti dei nidiacei.

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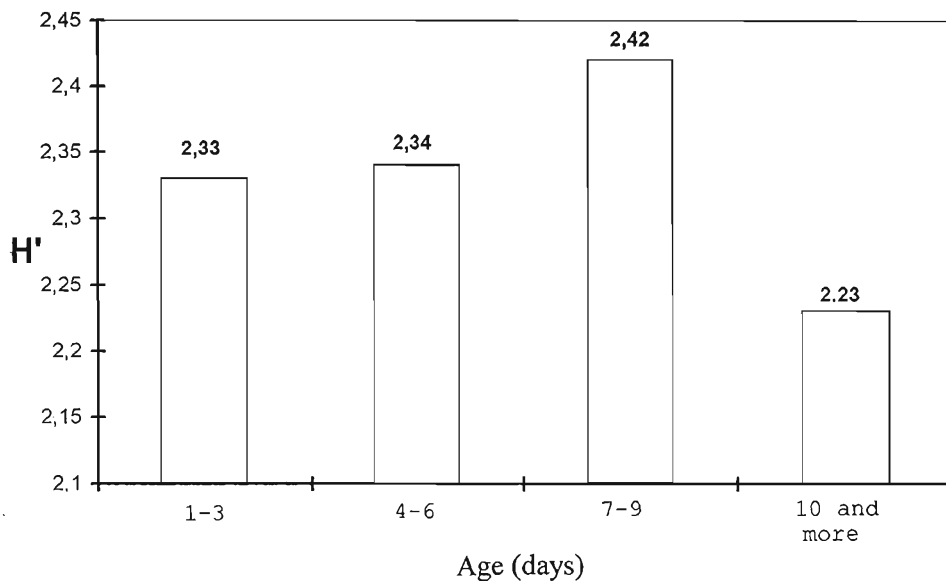


Figure 1. Diversity index (H') of the diet of Italian Sparrow nestlings of different ages (days).

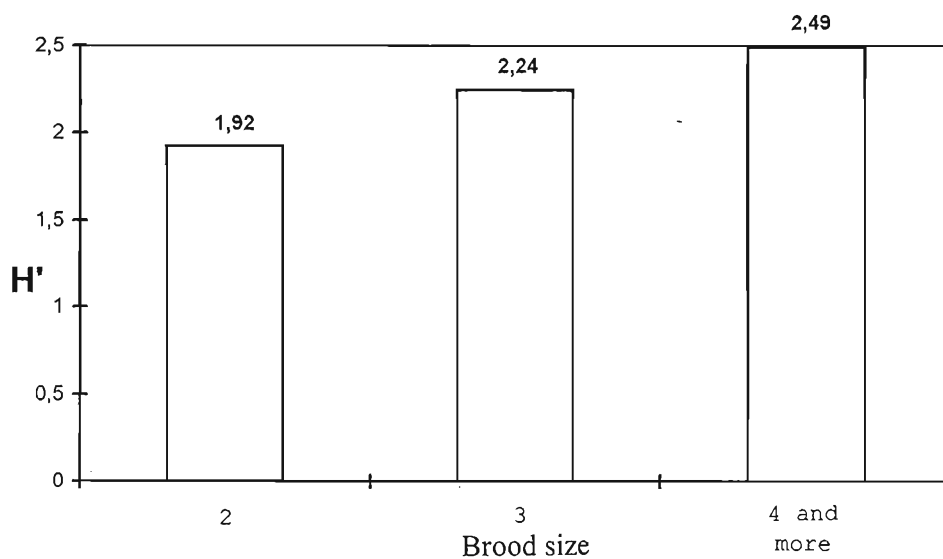


Figure 2. Diversity index (H') of the diet of Italian Sparrow nestlings of different brood sizes.

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