

## **FOOD PREFERENCE AND FOOD CONSUMPTION OF HOUSE SPARROW *Passer domesticus niloticus* Nicoll and Bonhote UNDER LABORATORY CONDITIONS**

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### **ABSTRACT**

Laboratory study in cages was conducted, using different plant seeds to estimate the food preference of house sparrow, *Passer domesticus niloticus* Nicoll and Bonhote. Under choice and non choice test. Sparrows showed a clear difference in food preference among various seeds, while under non choice tests, sparrows preferred wheat, soybean, sorghum, safflower, sunflower and fenugreek respectively but under choice tests, sparrows preferred soybean, wheat, safflower, sunflower, sorghum and fenugreek respectively.

**Keywords:** Passer- Food preference, food consumption, seeds, choice, non-choice.

### **INTRODUCTION**

The house sparrow *Passer domesticus niloticus* Nicoll and Bonhote. was the most destructive pest of cereal crops. During certain seasons of the year it forages in the cropland in large numbers. Such foraging flocks damage the standing crops to a great extent. As the house sparrow has great predilection for maturing seeds, it inflicts great damage on the maturing crops of wheat, rice, sorghum and millet (Rashid, 1972; Bashir, 1978; and Beg *et al.*, 1982). As such the House sparrow has come into a potential or direct competition with man. Food resource selection in animals was influenced by a variety of factors. Availability ultimately dictates what an animal may consume; with preference determining which available food items were consumed (Frazer and McWilliams 2002).

Feeding preference experiments were an appropriate way to look at food selection under controlled conditions, because availability of food items was known and thus a preference for presented items can be assessed objectively. Simple offer preference experiments (Non-choice) test only one food item at a time to determine if the animal will consume the item when no other food was available (Cueto *et al.* 2001).

Multiple-offer preference experiments (Choice), also known as cafeteria trials, expose a test subject to more than one food item at a time and measure use of each food item to determine a preference for one over the others (Roa 1992; Cueto *et al.* 2001

The aim of this experimental design that combined both choice and non-choice feeding to detect food preferences and food consumption by house sparrow individuals. Using both testing methods allowed us to determine which seeds House sparrows individuals preferred to eat and daily consumption, in order to use the valuable bait for control.

## MATERIALS AND METHODS

All food preference experiments were carried out under laboratory conditions of Department of Agricultural zoology and Nematology, Faculty of Agriculture, Al-Azhr University Nasr city, Cairo.

House sparrow individuals *Passer domesticus niloticus* Nicoll and Bonhote. (body weight 13 g) were trapped from different location in fields. Individuals were adapted in laboratory at 10 days before trans it to housed in cage. (2m×1 m ×1m) under a 12/12 h light/dark regime. Individuals were housed in wire mesh cages measuring (40 X 30 X 20 cm) with a 30 X17 cm opening on the top front were used for non-choice and choice tests. These cages were placed under laboratory conditions (The average recorded temperature  $25 \pm 3^{\circ}\text{C}$  and the average relative humidity  $65 \pm 5\%$ ).

Exterminates were conducted within this short period to prevent captive individuals from becoming acclimated to a laboratory diet, which may change their natural preferences (Karasov, 1996).

All individuals of house sparrow were mentioned on *alibitum* normal pelleted diet for an acclimatizing period of 10 days before conducting the experiments. As and when required, healthy individuals of approximately the same weight used throughout the experiments.

### SEEDS TESTED:

Wheat (*Triticum* spp.), Safflower (*Carthamus tinctorius*), Sunflower (*Helianthus annuus*), Soybean (*Glycine max*), Fenugreek (*Trigonella foenum-graecum*) and Sorghum (*Sorghum bicolor*) were chosen as test seeds because these species have been shown to be important indicators of preferred habitat for House sparrow.

One kg samples each of commercially grown seeds of were purchased from farmers at El-Menoufia Governorate for use in this experiment. Product characteristics therefore reflect what is produced and available to birds.

### Experimental trials

Under the non-choice test, 5 birds were offered grains with each type at the rate of 20 g/day for 5 days, while the choice test, grains of each type were offered to a group of 5 birds at the rate of 20 g/day for 5 days. The positions of feeding trays were changed daily to avoid place preference trend. Mean daily consumption of grain bait/day/bird was calculated.

In non-choice feeding test; each bird housed singly was afforded with one type of food (a cup containing 20 g) every day during the five successive days. But in choice trails, two food cups (each containing 20 g of food) were offered to each bird housed singly. The position of cups was changed daily to avoid any bias of position preference. The purpose of this trial, offering an alternative food alongside, was to simulate an actual situation as in bird's natural environment.

### Statistical analyses:

We analyzed data of choice experiments with one way ANOVA test differences between seed species, where the overall mean for each treatment in each experiment was considered a replicate. We used Mean  $\pm$

SE for analysis of non-choice to reveal differences in seed species use among bird during each research period.

## RESULTS AND DISCUSSION

The term “preference” was used here to indicate that certain seeds were eaten more frequently than others, that is, it refers to the relative numbers of seeds eaten.

Seeds have been found to differ in many ways, although not always consistently. They have been shown to differ in their physical properties (e.g. size, shape, texture, taste, odour), and nutrition levels (e.g. protein and nitrogen levels, amino acids, certain vitamins and minerals) (Woese *et al.*, 1997; Benbrook *et al.*, 2005). Differences in many of these properties have been shown previously to instigate a selection response for one particular food over another. Choice and non-choice tests showed that all bird species have clear preferences when consuming seeds:

### 1-Non-choice experiment:

Data in Table (1) and (Fig. 1) indicated the average daily consumption of six plant seeds (wheat, soybean, sorghum safflower, sunflower, and fenugreek by house sparrow under laboratory conditions.

**Table (1): Mean weight of seeds eaten in non-choice feeding experiments of house sparrow under laboratory conditions.**

non-choice experimental						
Seeds	Food items and daily intake g					
Days	wheat	Safflower	soybean	Sunflower	Fenugreek	Sorghum
1 <sup>st</sup>	6.6	2.4	2.6	1.4	1.6	1.6
2nd	2.6	1.6	2.4	1.8	1.2	1.4
3rd	2.4	1.2	2.6	1.4	1.2	1.6
4th	2.2	1.4	3.6	1.4	1.4	2.1
5th	2.1	1.2	2.8	1.4	1.4	1.6
Mean ± SE	3.16±0.41	1.56±0.16	2.8±0.22	1.48±0.11	1.36±0.11	1.64±0.14

The wheat grains were the most consumed by house sparrow individuals (3.16g/days) followed by soybean 2.8 g/days, sorghum 1.64 g/days, safflower 1.56 g/days, sunflower 1.48 g/days and fenugreek 1.36 g/days respectively.

These results agree with Willson and Harmeson (1973) suggested that seeds may be selected according to eat of handling, but in their study, House sparrow chose foods with higher caloric content at lower ambient temperatures. No correlation was found between energetic efficiency and seed preference. Blem (1976) found significant relationships between food composition and energetic efficiency in the House sparrow. Specifically, there was a strong positive correlation between energetic efficiency and fat content of food and a negative correlation between protein content efficiency.

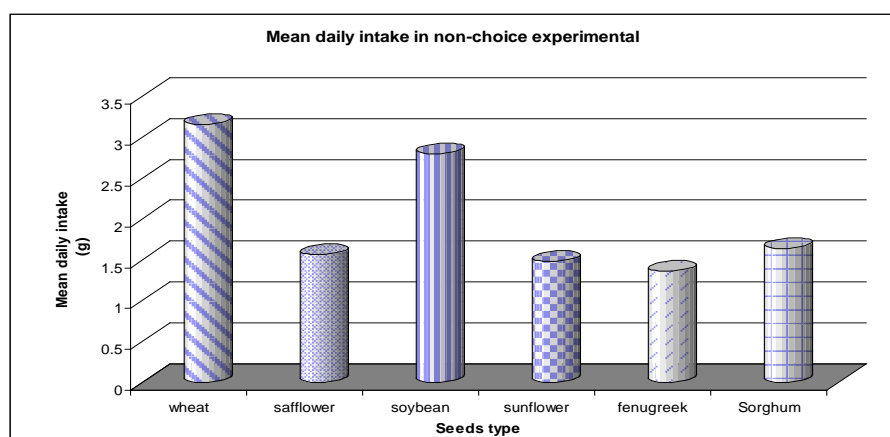


Fig. (1): Mean Food consumption after 5 days feeding period in non-choice tests.

### 2-Choice experiment:

Date in Table (2) and fig. (2) Showed that, (a) the soybean was the most preferable seed than sunflower for house sparrow as average consumed of them in five days was 3.26 and 2.19 gm/ day respectively. (b) Sorghum was preferred in sparrow's food choice between sorghum and sunflower as the average consumed in five days of them 2.73 and 2.46 gm/days respectively. (c) Sunflower was preferred than wheat in sparrows food choice between the as average consumed in five days was 2.06 and 1.66 gm/day respectively. (d) Soybean was preferred in sparrows food choice between soybean and sorghum as average consumed with them in five days was 3.46 and 2.4 gm/day respectively. (e) Wheat was most preferred in sparrows food choice between fenugreek and them as average consumed in five days was 4.46 and 2.13 gm/day respectively. (f) Safflower was high preferred in sparrows food choice between safflower and fenugreek as average consumed registered in five days was 4.04 and 1.5 gm/day respectively.

In generally, soybean, wheat and safflower was the most preferable seed for house sparrow, while the fenugreek seeds was low preferred in house sparrow feeds.

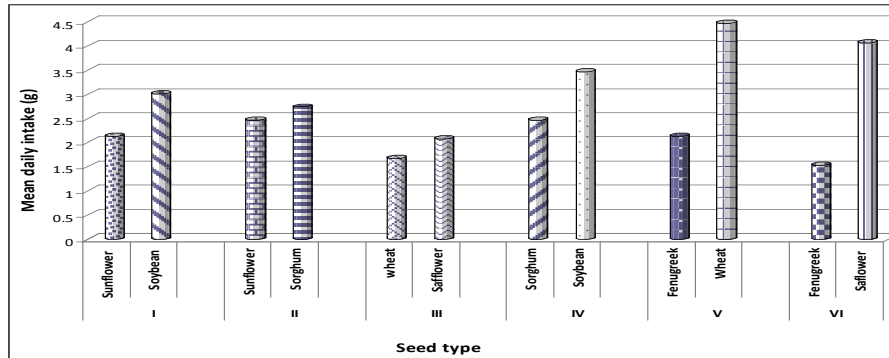
These data agree with some previous studies, House sparrows eat various kinds of seed 60% of corn, wheat, oats, etc., 18 % of cereals 17 % of weed seed, and 4% of insects. (Chapman,1966). Sprenkle and Blem (1984) display that in seed preference tests, house sparrow chose soybean seeds almost exclusively at all temperatures. As Roa (1992) suggests, non-choice experiments appeared to overestimate the consumption of some food items that may not be strictly preferred. Maron *et al.* (1999) supported that grass seeds were preferred over forb seeds by sparrow.



**(Statically analysis variations between groups by one way ANOVAs)**

Data showed that, across a range of experiments in two different study systems, birds preferred soybean, wheat, safflower, sunflower, sorghum and fenugreek.

The wheat grain and soybean seeds were always preferred by the house sparrow. Choice experiments seemed to underestimate potential consumption of some items whose use depends on presence or absence of preferred food (Cueto *et al.* 2001).



**Fig. (2): Mean Food consumption after 5 days feeding period in choice tests.**

Laboratory experiments on seed preferences have indicated that, a major determinant of seed preferences is ease of handling, and that the numbers of calories per seed, and the potential caloric intake per unit time from each seed type, are less important in determining seed preferences (Willson 1971).

Seed morphology may also influence seed preference due to mechanical constraints (Pulliam and Brand 1975, Diaz 1994) or increased handling times (Zach and Falls 1978, Schluter 1982, Diaz 1994). Seeds that have large awns, such as (*Helianthus annuus*, maybe avoided by House Sparrows, despite their high energy content, because of the difficulty these features may cause in extracting the seeds (Pulliam and Brand 1975).

Nutrition is another important factor explaining preferences for certain food items over others (Diaz 1996; Hayslette and Mirarchi 2001 and Frazer and McWilliams 2002, Bosque and Calchi 2003, Schaefer *et al.* 2003). Seeds were used by birds in proportion to their profitability; thus, seeds that provide the best sources of specific nutrients may be preferred at certain times (Hayslette and Mirarchi 2001).

Seeds were among the best sources of fatty acids, which are highly concentrated energy sources. Therefore, birds were predicted to alter their diets to incorporate such foods to maximize energy (Hayslette and Mirarchi 2001).

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### التفضيل الغذائي والاستهلاك اليومي لطائر عصفور النيل الدورى تحت الظروف المعملية

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#### الهدف من البحث:

معرفة الغذاء المفضل والاستهلاك اليومي لعصفور النيل الدورى *Passer domesticus niloticus* Nicoll and Bonhote تحت الظروف المعملية باستخدام نوعين من التغذية:-

أولاً: التغذية الإجبارية تم تقديم عدة انواع من الحبوب وهى القمح، فول الصويا، الذرة الرفيعة، القرطم، عباد الشمس والحلبة.  
ثانياً: التغذية الاختيارية:- تم تقديم نوعين من الحبوب فى تغذية ثنائية (عباد الشمس - فول الصويا) ، (عباد الشمس – القرطم) ، (القرطم – القمح) ، (الذرة الرفيعة – فول الصويا) ، (الحلبة – القمح) و (الحلبة – القرطم).

وقد أظهرت نتائج التغذية الاجبارية أن حبوب القمح كانت الأكثر تفضيلاً واستهلاكاً تلاها حبوب فول الصويا، الذرة الرفيعة، القرطم، عباد الشمس حيث كان متوسط الاستهلاك اليومي 3.16، 2.8، 1.64، 1.56، 1.48 جم/يوم على التوالي. بينما كانت حبوب الحلبة الأقل تفضيلاً واستهلاكاً حيث بلغ متوسط الاستهلاك اليومي 1.36 جم/يوم.  
فى حين كانت حبوب القمح هى الأكثر تفضيلاً واستهلاكاً تلتها حبوب فول الصويا ، القرطم، عباد الشمس، الذرة الرفيعة بينما كانت حبوب الحلبة الأقل تفضيلاً واستهلاكاً عند التغذية الاختيارية.

#### قام بتحكيم البحث

كلية الزراعة – جامعة المنصورة  
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أ.د / عمر عبد الحميد نصار  
أ.د / عبد الستار محمد متولى





**Table (2): Mean weight of seeds eaten in choice feeding experiments of House sparrow under laboratory conditions.**

		Choice experimental											
		Food items and daily intake (gm)											
Days	I		II		III		IV		V		VI		
Seeds	Sunflower	Soybean	Sunflower	Sorghum	Safflower	wheat	Sorghum	soybean	Fenugreek	Wheat	Fenugreek	Safflower	
1 <sup>st</sup>	2.66	3	3	3.6	1	2	5.6	4.6	3.3	4.3	1.3	5	
2nd	2.2	2.5	2.6	3.4	1.6	1.3	2	3.3	2	6	1.3	3.3	
3rd	2.1	2.8	2	3	1.6	1.6	1.3	2.6	2	2	2.3	4	
4th	2.3	3.6	2.3	2	2.6	1.3	1.6	3.3	2	5	1.3	4.3	
5th	2.2	3.9	2.3	1.6	3.3	2	1.3	3.3	1.3	3	1.3	3.6	
Mean ± SE	2.13±0.21	3.00±0.41	2.46±0.25	2.73±0.34	2.06±0.31	1.66±0.18	2.4±0.47	3.46±0.43	2.13±0.32	4.46±0.35	1.58±0.16	4.06±0.22	

Groups	I	II	III	IV	V	VI
I	--	0.03 ns	0.7 ns	0.4 ns	0.73	0.23 ns
II	0.03 ns	--	0.73 ns	0.36 ns	0.7 ns	0.2 ns
III	0.7 ns	0.73 ns	--	1.1 *	1.4 *	0.9 *
IV	0.4 ns	0.36 ns	1.1 *	--	0.33 ns	0.5 ns
V	0.73	0.7 ns	1.4 *	0.33 ns	--	
VI	0.23 ns	0.2 ns	0.9 *	0.16 ns	0.5 ns	--