

**FEEDING HABITS OF SOME BIRDS (ORDER:
PASSERIFORMES) IN DIFFERENT
AGRICULTURAL HABITATS**

By

NORHAN AHMED MOHAMMED AHMED

B.Sc. Agric. Sc. (Entomology), Ain Shams University, 2006

M.Sc. Agric. Sc. (Zoology), Ain Shams University, 2013

**A Thesis Submitted in Partial Fulfillment
Of
The Requirements for the Degree of**

**DOCTOR OF PHILOSOPHY
in
Agricultural Sciences
(Agricultural Zoology)**

**Department of Plant Protection
Faculty of Agriculture
Ain Shams University**

2019

FEEDING HABITS OF SOME BIRDS (ORDER: PASSERIFORMES) IN DIFFERENT AGRICULTURAL HABITATS

By

NORHAN AHMED MOHAMMED AHMED

B.Sc. Agric. Sc. (Entomology), Ain Shams University, 2006

M.Sc. Agric. Sc. (Zoology), Ain Shams University, 2013

Under the supervision of:

Dr. Abdalla Shehata Mohammd Kassab

Prof. Emeritus of Agricultural Zoology, Department of Plant Protection, Faculty of Agriculture, Ain Shams University (Principal Supervisor)

Dr. Ahmed Eid Abd El- Megeed Mahgoob

Associate Prof. of Agricultural Zoology, Department of Plant Protection, Faculty of Agriculture, Ain Shams University

Dr. Ola Hussein Mohammed Abdel bar

Assistant Prof. of Agricultural Botany, Department of Agricultural Botany, Faculty of Agriculture, Ain Shams University

ABSTRACT

Norhan Ahmed Mohamed Ahmed: Feeding Habits of Some Birds (Order: Passeriformes) in Different Agricultural Habitats. Unpublished Ph.D. Thesis, Department of Plant Protection, Faculty of Agriculture, Ain Shams University, 2019

Passerine wild birds cause considerable damage for agricultural crops. The present work was, therefore, proposed to: 1- define the most economic important passerine wild birds via an ecological survey, 2- assess the food consumption and food preference, by wild birds, under greenhouse condition, 3- clarify the distributional pattern of crop damage in mono-cropped cultivations, 4- assess and evaluate crop damage in concomitant cultivations and 5- develop an ecofriendly method, alongside other methods, for reducing crop damage by wild birds in under field conditions.

The ecological survey indicated that, house sparrows, *Passer domesticus niloticus*, and hooded crows, *Corvus corone cornix*, were the most noxious and prevalent passerine wild birds especially in old cultivated lands. The population numbers of these birds increased throughout Spring and Summer seasons and decreased during Autumn and Winter seasons 2015-2017. Correlation between ambient temperature or daylight and population numbers of both birds were varying between different years of survey. In addition, statistical analysis proved a significant difference in population numbers of both birds in cultivated crops.

As with food consumption and food preference by house sparrows and hooded crows, a monochoice and multichoice experiments were conducted under greenhouse conditions. The results indicated that, both birds consumed daily seeds and seedlings of soft wheat and hard wheat higher than those of barley and sunflower. Apparently, the amount of food consumption by hooded crow was higher several times than those of house sparrow. Generally, both birds were approximately similar in their

food preference, but not similar in their food consumption. These experiments confirmed that crop loss of seeds at postharvest stage and assured the seeding damage at early preharvest stage in fields by birds. To assess the distributional pattern of crop damage in monocrop cultivations at the farm of the Faculty of Agriculture, of Shalakan, two experiments were carried out in plots away from and adjacent to the nesting sites of house sparrows.

Obtained data revealed that crop damage in all tested cultivars located nearby the nesting sites (*i.e.* beside field borders) were comparatively higher than those in the central of the field. Therefore, any program of bird damage management must focus on borders to provide some protection.

For evaluating crop damage by house sparrows, a current experiment were conducted by growing varying cultivars adjacent to fixed cultivar. Obtained results proved that: sunflower could be grown nearby barley and soft wheat, but away from hard wheat; barley could be grown nearby sunflower or soft wheat, but away from hard wheat; soft wheat could be grown nearby sunflower, but away from hard wheat; hard wheat could be grown nearby barley or sunflower, but away from soft wheat.

For reducing crop damage by house sparrow under field conditions, concomitant cultivation by using lure crops alongside with ecofriendly methods, such as netting, avicidal repellent, metallic stripes, and scarecrow, were conducted. Obtained data stressed that: netting method was the most effective practice to prevent house sparrows damage, particularly, in combined cultivation by using sunflower as a lure crop which recorded the least crop damage at par; spraying Tukom (avicidal repellent) caused a highly protection to all tested crops; scaring methods by using stripes and scarecrow achieved less crop damage in soft wheat and hard wheat, but modestly damage to barley and sunflower. In this respect, maximum management of bird damage may be adopted with

combinable methods from lure crops, repellent avicide, netting, stripes and scarecrow to attain wide spectrum advantages.

Key words House sparrows, *Passer domesticus*, hooded crows, Soft wheat, hard wheat, sunflower, barley, Tukom.

ACKNOWLEDGEMENT

The author wishes to express her deepest appreciation to **Dr. Abdalla Shehata Mohamed Kassab**, Emeritus Professor of Agricultural Zoology, Department of Plant Protection, Faculty of Agriculture, Ain Shams University for his direct supervision, Keen assistance in writing and finalizing data, invaluable efforts for reviewing the manuscript, and for his sincere help during the course of this work.

Sincere appreciation to **Dr. Ahmed Eid Abdel-Megeed Mahgoob**, Assistant Professor of Agricultural Zoology, Department of Plant Protection, Faculty of Agriculture, Ain Shams University, for his encouragement, guidance during the experimental work and in preparation and finalizing data of the manuscript.

Deepest gratitude is also extended to **Dr. Ola Hussein Mohamed Abd-Elbr**, Assistant Professor of Agricultural Botany, Faculty of Agriculture, Ain Shams University, for her supervision, assistant in work and for her valuable help.

The author also indebted to all staff-members of the Department of Plant Protection, Faculty of Agriculture, Ain Shams University for their encouragement and collaboration during this study. Great thanks are also extended to all staff-members of the Farm of the Faculty of Agriculture at Shalkan village, Qalubia Governorate, for their assistant and collaboration during the experimentation years.

CONTENT

	page
1. INTRODUCTION	1
2. REVIEW OF LITERATURE	3
2.1. Survey of wild birds	3
2.2. Feeding habits	7
2.3. Damage of birds to agricultural crops	9
2.4. Controlling bird damage	15
3. MATERIALS AND METHODS	17
3.1. Bird survey	17
3.1.1 Objectives of survey	17
3.1.2 Place and date of survey	17
3.1.3 Identification and counts of birds	18
3.1.4 Statistical analysis of data	18
3.2. Feeding habits study	18
3. 2.1 Tested birds	18
3.2.2 Tested plants	19
3.2.3 Tested sites	19
3.2.4 Framework of experimental design	19
3.2.4.1 Non-choice feeding tests	19
3.2.4.1.1 Screenhouse experiments	20
3.2.4.1.1.1 Assessment of seed consumption (seed preference)	20
3.2.4.1.1.2 Assessment of seedling damage	20
3.2.4.1.2 Distribution pattern of crop damage experiments	21
3.2.4.1.1 Agricultural practices	21
3.2.4.1.2 Sampling and measurements	21
3.2.4.1.3 Statistical analysis	22
3.2.4.2 Food choice (multichoice) experiments	22
3.2.4.2.1 Assessment of seedling damage at Screenhouse:	22
3.2.4.2.2 Assessment of crop damage in neighboring cultivations.	22
3.2.4.2.2.1 Assessment of soft wheat damage when cultivated	

adjacent to other crops	22
3.2.4.2.2.2 Assessment of hard wheat damage when cultivated adjacent to other crops	23
3.2.4.2.2.3 Assessment of sunflower damage when cultivated adjacent to other crops	23
3.2.4.2.2.4 Assessment of barley damage when cultivated adjacent to other crops	23
3.2.4.2.2. 5.1 Agricultural practices of tested cultivars	23
3.2.4.2.2.5.2 Sampling and measurements of tested cultivars	23
3.3 Controlling bird damage:	24
3.3.1 Tested bird	24
3.3.2 Tested plant crops	24
3.3.3 Tested site	25
3.3.4 Agricultural practices	25
3.3.5 Framework of experimental design	25
3.3.5.1 Tested protective control methods	26
3.5.1.1 Tested attracting crop method	26
3.5.1.2 Tested frightening method by reflecting stripes	26
3.5.1.3 Tested frightening method by scarecrow	26
3.5.1.4 Tested netting method	26
3.5.1.5 Tested spraying avicide method	27
3.3.6. Practical experiments	27
3.3.6.1 Assessment of soft wheat damage under selected control methods	
3.3.6.2 Assessment of hard wheat damage under selected control methods	28
3.3.6.3 Assessment of barley damage under selected control methods	28
3.3.6.5 Sampling and measurements	28
3.3.6.6 Statistical analysis of data	29
4. RESULTS AND DISCUSSION	30

4.1 Survey of Passerine birds	30
4.2. Identification and abundance of passerine birds	30
4.3. Classification and feeding habits of the surveyed passerine birds	32
4.3.1. Impact of seasonal changes on the population dynamics of house sparrow and hooded crow	37
4.3.1.2. Impact of the ambient temperature on the population dynamics of house sparrow and hooded crow	38
4.3.1.3. Impact of daylight duration on the population dynamics of house sparrow and hooded crow	41
4.3.1.4 Impact of seasonal sequences on the population dynamics of house sparrow and hooded crow	45
4.3.1.5 Impact of crop sequences on the population dynamics of house sparrow and hooded crow	48
4.4. Food preference of seeds and seedlings by house sparrow and hooded crow under greenhouse condition	51
4.4.1 Assessment of seed and grain consumption by house sparrow and hooded crow	51
4.4.1.1 Non- choice (monochoice) trials	52
4.4.1.2 Choice (multichoice) trials	54
4.5. . Assessment of seedling by house sparrow and hooded crow	57
4.5.1 Non- choice (monochoice) test	57
4.5.2 Choice (multichoice) test	59
4.6 Distribution pattern of crop damage experiments	61
4.6.1 Assessment of crop damage nearby nests of house sparrows	62
4.6.2 Assessment of crop damage faraway from birds nests	63
4.7 Evaluation of crop damage by house sparrows under field condition	65

4.7.1. Assessment of soft wheat damage by house sparrows when grown adjacent to other crop species	65
4.7.1.2 Assessment of barley damage by house sparrows when grown adjacent to other crop species	66
4.7.1.3 Assessment of hard wheat damage by house sparrows when grown adjacent to other crop species	67
4.7.1.4 Assessment of sunflower damage by house sparrows when grown adjacent to other crop species	68
4.5 Evaluating of protective method on crop damage caused by house sparrow under field conditions	71
5. SUMMARY	78
6. CONCLUSION	83
7. REFERENCES	85
ARABIC SUMMARY	1

LIST OF TABLES

No.	Title	Page
1	Number of birds /Feddan/ month belonging to Order: Passeriformes, grouped from two Fields (Qalubia and Sharkia Governorates) during 2015-2017 in relation to land types	31
2	Number of birds /Feddan/ Year belonging to Order: Passeriformes grouped from two Fields (Qalubia and Sharkia Governorates) during 2015-2017 in relation to land types	31
3	Number of birds / Feddan/ Year belonging to different Orders grouped from two Fields (Qalubia and Sharkia Governorates) during two successive years (2015-2017) under field conditions	33
4	Number of birds Feddan/ Year belonging to Order: Passeriformes grouped from two Fields (Qalubia and Sharkia Governorates) during two successive years (2015-2017) under field conditions	34
5	Number of house sparrow and hooded crow Feddan/ Year grouped from Shalakan,Qalubia Governorate during 2015-2016 in relation to temperature and daylight	39
6	Number of house sparrow and hooded crow Feddan/ Season belonging to Order: Passeriformes, grouped from Field of Qalubia Governorate during 2015-2016 in relation to different seasons	46
7	Number of house sparrow and hooded crow Feddan/ Season belonging to Order: Passeriformes, grouped from Field of Qalubia Governorate during 2016-2017 in relation to different seasons	46
8	Number of sparrow or crow / Feddan/ plant cultivar from farm field at Qalubia Governorate (2015-2017) in relation to cover plants	49
9	Number of sparrow or crow / Feddan/ plant cultivar from farm field at Qalubia Governorate during 2015-2017 in relation to cover plants	49
10	Average weight (g) of food consumption in non- choice test of	

	house sparrow and hooded crow for different types of food in cages under greenhouse conditions	52
11	Average weight (g) of food consumption in choice test of house sparrow and hooded crow for different types of food in cages under greenhouse conditions	55
12	Percentage of food consumption in non-choice test seedling damage of house sparrow and hooded crow in cages under greenhouse conditions	58
13	Percentage of food consumption in choice test seedling damage of house sparrow and hooded crow in cages under greenhouse conditions	60
14	Percentage of crop damage caused by house sparrow in soft wheat, hard wheat, barley and sunflower under field conditions in winter season of 2017	62
15	Percentage of crop damage caused by house sparrow in soft wheat, hard wheat, barley and sunflower under field conditions in winter season of 2017	63
16	Percentage of crop damage caused by house sparrow in soft wheat when grown nearby hard wheat, barley and sunflower under field conditions in winter season of 2017	65
17	Percentage damage caused by house sparrow to barley when grown nearby soft wheat, hard wheat and sunflower under field conditions in winter season of 2017	67
18	Percentage of crop damage caused by house sparrow to hard wheat, soft wheat, barley and sunflower under field conditions in winter season of 2017	68
19	Percentage of crop damage caused by house sparrow to sunflower when grown nearby soft wheat, hard wheat and barley under field conditions in winter season of 2017	69
20	Percentage of damage (crop loss) caused by house sparrow in soft wheat, hard wheat, barley and sunflower under several protective methods in winter seasons of 2016- 2017	72

LIST OF FIGURES

No	Title	Page
1	Frequency of birds species in old lands and reclaimed lands (Qalubia and Sharkia Governorates) during 2015 - 2017.	35
2	Frequency of birds species in old lands and reclaimed lands (Qalubia and Sharkia Governorates) during 2015 - 2017.	35
3	Temperatures and Population number of house sparrow and hooded crow at Shalkan of El-Qalubia, Governorate during Aug. 2015- July 2016.	40
4	Temperatures and Population number of house sparrow and hooded crow at Shalkanof El-Qalubia, Governorate during Aug. 2016- July 2017.	40
5	Daylight and Population number of house sparrow and hooded crow at Shalkan of El-Qalubia, Governorate during Aug. 2015- July 2016.	44
6	Daylight and Population number of house sparrow and hooded crow at Shalkanof El-Qalubia, Governorate during Aug. 2016- July 2017.	44
7	Number of house sparrow or hooded crow / Feddan/ Season grouped from field of Qalubia Governorate during 2015-2016.	47
8	Number of house sparrow or hooded crow / Feddan/ Season grouped from field of Qalubia Governorate during 2016-2017.	47
9	Number of house sparrow or hooded crow / Feddan/ Year belonging to Order : Passeriformes grouped from field at Qalubia Governorate during two successive years (2015-2017) in relation to cover plants.	50
10	Number of house sparrow or hooded crow / Feddan/ Year belonging to Order : Passeriformes grouped from field at Qalubia Governorate during two successive years (2015-	

	2017) in relation to cover plants.	50
11	Average weight (g) of food consumption in non- choice test of house sparrow for different types of food in cages under screenhouse conditions.	53
12	Average weight (g) of food consumption in non- choice test of hooded crow for different types of food in cages under screenhouse conditions.	54
13	Average weight (g) of food consumption in choice test of house sparrow for different types of food in cages under screenhouse conditions.	56
14	Average weight (g) of food consumption in choice test of hooded crow for different types of food in cages under screenhouse conditions	57
15	Percentage of food consumption in non-choice test seedling damage of house sparrow in cages under screenhouse conditions.	58
16	Food consumption in non- choice seedling damage of hooded crow in cages under screenhouse conditions	59
17	Food consumption in non- choice seedling damage of hooded crow in cages under screenhouse conditions	60
18	Percentage of food consumption in choice test seedling damage of hooded crow in cages under screenhouse conditions	61
19	Percentage of plant damage caused by house sparrow crops under field conditions in winter and summer seasons of 2016- 2017	62
20	Percentage of damage within field cultivated with soft wheat, hard wheat, barely, and sunflower faraway from nests of house sparrow.	64

21	Percentage of soft wheat damage caused by house sparrow when grown nearby soft wheat, hard wheat, barley, and sunflower crops under field conditions in winter season of 2016 /2017.	66
22	Percentage of barley damage caused by house sparrow when grown nearby soft wheat, barley, sunflower and hard wheat under field conditions in winter season of 2017.	67
23	Percentage of hard wheat damage caused by house sparrow when grown nearby soft wheat, barley, sunflower and hard wheat, crops under field conditions in winter season of 2017.	68
24	Percentage of sunflower damage caused by house sparrow when grown nearby sunflower, hard wheat, soft wheat and barley crops under field conditions in winter season of 2017.	70
25	Percentage of damage (crop loss) caused by house sparrow in Soft wheat under several protective methods in winter seasons of 2016- 2017.	73
26	Percentage of damage (crop loss) caused by house sparrow in hard wheat under several protective methods in winter seasons of 2016- 2017.	73
27	Percentage of damage (crop loss) caused by house sparrow in barely under several protective methods in winter seasons of 2016- 2017.	74
28	Percentage of damage (crop loss) caused by house sparrow in sunflower under several protective methods in winter seasons of 2016- 2017.	74