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AN ESTIMATION OF BIRD DAMAGES ON SOME FIELD, VEGETABLE AND FRUIT CROPS AT SHARKIA GOVERNORATE, EGYPT

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ABSTRACT: The crop losses due to birds are serious and costly problem for farmers. The hooded crow (*Corvus corone* Linnaeus, 1758) and house sparrow (*Passer domesticus niloticus* Nicoll and Bonhote, 1909) are major pests for many crops in Egypt. In current work bird damage was assessed on maize, snake cucumber at El-Ibrahemia district, while that on pea and guava was determined at Zagazig district, Sharkia Goverenorate during the growing season 2016. Regarding maize, the hooded crow feed on developing ears in corn fields following pollination and early in the grain filling period. The total number of inspected plants was 2800 and the highest losses (9.81%) were recorded in the 7th week. While, the hooded crow attacks snake cucumber fruits causing damage with mean percentage 6.33%. But the pea is preferable vegetable crop to birds, which destroy the leaves, flower buds as well green seeds in pods and this damage may be reduced the yield. The average percentage of damage for pea was 4.41%. The highest percentage of damage was 7.50% which obtained during the 5th week. Guava fruits were vulnerable to house sparrow, birds gnaw fruits. The losses by birds were estimated to be 4.79 and 4.64% in orchards nearby poultry farms and those nearby field crops, respectively.

Key words: Birds, hooded crow, house sparrow, crop loss, maize, snake cucumber, pea, guava.

INTRODUCTION

Birds are extremely distinctive vertebrates with representatives in all continents. The order Passeriformes is the largest order of birds evolved a great diversity of feeding adaptations. Many of these birds are friends to the farmers, as they consume harmful insects and weed seeds. But when certain species feast on economic crops, they could be categorized as pests. House sparrow and hooded crow have been known to depredate different crops as wheat, sorghum, barley, rice, broad bean, sunflower, pea and grape **(El-Deeb, 1991; Metwally *et al.*, 1995; Khattab *et al.*, 2001; Attia, 2006; Mostafa *et al.*, 2008; Attia, 2013)**. Problems associated with wild bird's damage to agriculture were more common in recent decades. The amount and degree of damage are highly variable from place to place and year to year. Several variables enter into the complex picture of bird damage, including season, local weather, time of harvest, amount of crop production and availability as well as distribution of insects and other foods **(Abbasy *et al.*, 2012)**. The bird damage increases at the first 10 meters from the border and decreases in the middle of the field **(Omar and El-Danasory, 2014)**. The small populations of the monk parakeet birds can affect damage in large areas, the crop damage by these birds ranged from mean values of 0.4% to 37%, depending on crop type, with maximum values above 70% in some fields and for some crops **(Senar *et al.*, 2016)**. The house sparrow causes damage to wheat, rice and sorghum crops in different districts of El-Wady El-Gadid Governorate. The damage in rice and sorghum crops may be due to abundance of food to birds **(Kandil and Mobarak, 2017)**. Therefore, the objective of current study was to estimate bird damage to maize, snake cucumber, pea, and guava at Sharkia Governorate.

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MATERIALS AND METHODS

These experiments were conducted in two separate locations, at Tal-Mohamed Village, El-Ibrahemia district and El-Mosalamia Village, Zagazig district, Sharkia Goverenorate, Egypt, during the growing season 2016. We selected certain summer and winter crops to carry out these experiments.

Assessment of Bird Damage to Maize (*Zea maize* L., 1753)

Assessment bird damage was carried out in maize fields during summer season 2016 after silking stage till the harvest. In this regard, two faddans cultivated with maize plants were selected in Tal-Mohamed Village, El-Ibrahemia district, Sharkia Goverenorate. Plants were inspected immediately after pollination, where the ears start filling. The field was divided randomly into 20 subplots (approximately 200 m^2 each). Twenty successive plants were inspected in each plot to estimate the degree of damage in the investigated ears (**El-Deeb, 1991**). Samples were taken weekly and the degree of damage due to bird species in the ears was estimated according to **Hamelink (1981**) by using the following equation:

$$\text{Damage (\%)} = \frac{0.0\times S_1 + 0.25\times S_2 + 0.50\times S_3 + 0.75\times S_4 + 1.0\times S_5}{N} \times 100$$

Where:

S_1 = No. of undamaged ears; S_2 = No. of 1/4 damaged ears; S_3 = No. of 1/2 damaged ears; S_3 = No. of 3/4 damaged ears; S_4 = No. of complete damaged ears; N= total number of examined ears.

Assessment of Bird Damage to Snake Cucumber (*Cucumis melo* var. *flexuosu*)

This trial was conducted in fields cultivated with snake cucumber vegetable during summer season, 2016 after pollination at fruiting stage to assess birds damage. In this respect, two faddans cultivated with snake cucumber were chosen in Tal-Mohamed Village, El-Ibrahemia district, Sharkia Goverenorate. Samples were taken weekly at five distances from the edge toward the center of the experimental field *i.e.,* 5, 10, 15, 20 and 25 meters. Numbers of damaged and undamaged fruits were counted in five successive plants in each sample. Each sample was replicated 5 times. The percentage of damage was calculated by the formula:

$$\text{Damage (\%)} = \frac{\text{No. of damaged fruits}}{\text{Total No. of examined fruits}} \times 100$$

Assessment of Bird Damage to Pea (*Pisum sativum* L., 1753)

Determination of bird damage for pea plants was carried out during the winter season, 2016 after pollination at fruiting stage. Three faddans cultivated with pea were selected in El-Mosalamia Village, Zagazig district, Sharkia Governorate. Samples were taken weekly at five distances from the edge toward the center of the experimental field i.e., 5, 10, 15, 20 and 25 meters. Ten successive plants in each sample were inspected to estimate the degree of damage in ripening stage of the plants. Each sample was replicated 5 times. The percentage of damage was calculated by the formula:

$$\text{Damage (\%)} = \frac{\text{No. of damaged pods}}{\text{Total No. of examined pods}} \times 100$$

Assessment of Bird Damage to Guava *Psidium guajava* L.

Two orchards were selected in El-Mosalamia Village, Zagazig district, Sharkia Governorate, during summer season, 2016 in two different locations, the first nearby poultry farms and the second nearby field crops. The observations were taken weekly during five successive weeks from the beginning of mature stage. All trees were planted in rows, so from rows about 20 trees were chosen randomly for sampling. Number of fruits per tree was determined by counting the number of fruits per branch and multiplying it with the total number of branches present in the given tree. The fruits damaged by birds and dropped were collected and eliminated according to **Hussain *et al.* (1991)**. The percentage of damage was calculated using the following formula:

$$\text{Damage (\%)} = \frac{\text{No. of damaged fruits}}{\text{Total No. of examined fruits}} \times 100$$

Statistical Analysis

Statistical analysis of all obtained data was done using the statistical software **(CoStat, 2005)**. All data were first subjected to one way analysis of variance (ANOVA) and differences between treatments were compared using Duncan's multiple range test at $P \leq 0.05$ level of significance **(Duncan, 1955)**.

RESULTS AND DISCUSSION

Bird Damage to Maize

Maize is one of the preferred food items for hooded and house crow. The crows attacked corn during developing corn ears immediately following pollination and during the early stages of grain filling. It caused a great amount of damage to ears and this can lead to missing or damaged kernels on these ears, induced big losses and poor grain quality. Damage is usually heaviest along field edges but also can involve entire fields.

Results in Table 1 and Fig. 1 show the damage caused by hooded crow (*Corvus corone*) in maize fields at El-Ibrahemia district, Sharkia Governorate during the season of 2016. The total number of inspected plants was 2800 and the highest loss (9.81%) was recorded in the 7th week. The means of damage percentage were 10.11, 8.43, 6.00 and 2.29% recorded at the different degrees of damage 25, 50, 75 and 100%, respectively. On the other hand, it is clear that the mean percentage of damage increased gradually from the 1st week (1.94%) until the 7th week (9.81%).

These results agree with **Khan (2002)** who stated that the damage percentage of house crow *Corvus splendens* on mature maize cobs was 13.54%. **Khattab *et al.* (2002)** revealed that birds used maize stems as perches and attack the cobs with husks and later feed on grains during the developmental stages of the grain. The preferred time was from 35 to 42 days after silking. **Attia (2013)** cleared that hooded crow *Corvus corone sardonius* and house crow *Corvus splendens* cause damage in maize fields and that damage increased throughout the weeks after silking and during the development of grains growth till the sixth week, then decreased in the seventh week.

Bird Damage to Snake Cucumber

Snake cucumber fruits are elongated and consumed immature as cucumber in Egypt. It grows up soil and discoverable to birds. Results in Table 2 and Fig. 2 show the damage caused by hooded crow in snake cucumber fields at El-Ibrahemia district, Sharkia Governorate during the season of 2016. The mean percentage of damage for snake cucumber was 6.33%. The highest attack was obtained during the 6th week (10.79%). The highest losses in snake cucumber were noticed at the first five meters beside the border of the field since the recorded damage was 13.32% for total examined plants.

Statistical analysis of the data in the same table indicated that comparing the damage at different distances far from the border of the field, it was found that there were highly significant differences between the damage at the tested distances. It was clear also that there was a highly significant negative correlation between the percentage of damage caused by hooded crow and the distance from the border toward the center of the field ($r = - 0.982^{**}$). The damage decreased gradually toward the center of the field recording 13.32, 8.70, 5.17, 3.48 and 0.98% of damage at 5, 10, 15, 20 and 25 meters far from the edges of the field, respectively. The highest damage at the border of the field may be due to existing of a number of trees which used as perching and then attacking the plants.

The lowest losses recorded during the 1st week may be due to the plants have a large leaves that form a canopy over the fruits and the birds couldn't distinguish them, while the highest losses recorded during the 6th week because the plants began to wither so there's no cover of leaves over the fruits which began in sight of birds.

These results agree with **Chakravarthy *et al.* (1998)** who cleared that the small green barbet bird (*Megalaima viridis*) consumed cucumber by removing pieces of fruit bit by bit. **Manzoor *et al.* (2013)** calcualted that the watercucumber (*Citrulus lanatus*) damage from seedling to mature fruit stage by three bird pests including the common myna (*Acridotheres tristris*), house crow (*Corvus splendens*) and house sparrow (*Passer domesticus niloticus*). The depredations were more apparent during the

Table 1. Damage percentages caused by hooded crow (*Corvus corone*) in maize fields at El-Ibrahemia district, Sharkia Governorate during the season of 2016

Week after pollination	Total No. of examined plants	Degree of damage				Mean
		25%	50%	75%	100%	
1st	400	5.25	2.50	0.00	0.00	1.94
2nd	400	6.75	5.50	2.25	0.00	3.63
3rd	400	8.50	8.00	6.75	1.00	6.06
4th	400	11.50	9.50	7.50	3.00	7.88
5th	400	11.75	11.00	8.25	3.00	8.50
6th	400	13.25	11.00	8.25	4.00	9.13
7th	400	13.75	11.50	9.00	5.00	9.81
Mean		10.11	8.43	6.00	2.29	6.71

Fig. 1. Degree of damage caused by hooded crow in maize ears, a: moderate damage, b: heavy damage

Table 2. Damage percentages caused by hooded crow (*Corvus corone*) in snake cucumber fields at El-Ibrahemia district, Sharkia Governorate during the season of 2016

Week after pollination	Damage percentage					Mean
	5 m	10 m	15 m	20 m	25 m	
1st	8.00	4.17	0.00	0.00	0.00	2.43
2nd	10.53	5.88	0.00	0.00	0.00	3.28
3rd	11.54	8.33	6.67	4.00	0.00	6.11
4th	17.39	11.11	7.69	5.88	0.00	8.41
5th	14.29	9.09	6.67	4.76	0.00	6.96
6th	18.18	13.64	10.00	6.25	5.88	10.79
Mean	13.32[a]	8.70[b]	5.17[bc]	3.48[cd]	0.98[d]	6.33

LSD 0.05 (distance) = 4.28**, r (damage x distance) = - 0.982**

Means not followed by the same letter(s) in row are significantly different at P≤0.05 according to Duncan's multiple range test.

Fig. 2. Degree of damage caused by hooded crow in snake cucumber fruits, a: primary damage, B: primary damage followed by secondary damage

morning and evening durations, with almost a quiescence at mid day. It is worth referring that, more damage was inflicted on the flowering and mature stages, indicating their predilection.

Bird Damage to Pea

Pea is an important vegetable crop cultivated widely throughout Egypt as a winter crop grown for their edible seed or seed pods. Peas are attacked by many birds as hooded crow, house sparrow and pigeons. The pea is a preferable vegetable to birds, they eat the leaves, flower buds, plucked green pods to feed on green seeds and that damage may be reduced the yield.

Results in Table 3 and Fig. 3 show the damage caused by hooded crow (*Corvus corone*) in pea fields at Zagazig district, Sharkia Governorate during the season of 2016. The mean percentage of damage for pea *Pisum sativum* was 4.41%. The highest percentage of damage (7.50%) was obtained during the 5th week. The highest destruction in pea was noticed at the first five meters beside the border of the field. The damage was about 10.35% for total examined plants. Statistical analysis of the data indicated that there were highly significant differences between the damage at different distances from the border of the field. It was clear also that there was a highly significant negative correlation between the percentage of damage caused by hooded crow and the distance from the border toward the center of the field (r = - 0.962**). The damage decreased gradually toward the center of the field recording 10.35, 6.40, 3.06, 1.54 and 0.68% showing damage at 5, 10, 15, 20 and 25 meters away from the edges of the field, respectively. The highest damage at the border of the field may be due to existing of a number of trees which used as perching and then attacking the plants.

Macmillan and Pollock (1985) mentioned that stomach contents collected from nestling house sparrows *(Passer domesticus niloticus)* showed that plant matter fed to nestlings consisted mainly of cereals (wheat or barley), whose grains were indistinguishable) and peas. Peas were taken mainly in January and cereals in February. Both peas and cereals were fed significantly more to the two older age. **Kale *et al.* (2014)** cleared that blue rock pigeons *Columba livia* damaged 42% of the peas crop. **Manzoor and Haseeb (2015)** revealed that the rose-ringed parakeet birds (*Psittacula krameri*), house crow (*Corvus splendens*), house sparrow (*Passer domesticus niloticus*) and common myna (*Acridotheres tristis*) visiting pea field and feeding or damaging the pods during mornings, afternoons and evenings from December, 2010 to March, 2011.

Bird Damage to Guava

Results in Table 4 and Fig. 4 illustrate damage percentages caused by house sparrow (*Passer domesticus niloticus*) in guava orchards at Zagazig district, Sharkia Governorate in the different two locations the 1st nearby poultry farms and the 2nd nearby field crops during the

Table 3. Damage percentages caused by hooded crow (*Corvus corone*) in pea fields at Zagazig district, Sharkia Governorate during the season of 2016

Week after pollination	Damage percentages					Mean
	5 m	10 m	15 m	20 m	25 m	
1st	5.70	3.41	0.57	0.00	0.00	1.94
2nd	6.63	5.52	1.43	0.50	0.38	2.89
3rd	11.37	4.97	2.71	1.68	0.48	4.24
4th	12.66	7.39	3.98	2.10	1.21	5.47
5th	15.40	10.70	6.62	3.43	1.34	7.50
Mean	10.35[a]	6.40[b]	3.06[bc]	1.54[c]	0.68[c]	4.41

LSD 0.05 (distance) = 3.36**, r (damage x distance) = - 0.962**
Means not followed by the same letter(s) in row are significantly different at P≤0.05 according to Duncan's multiple range test.

Fig. 3. Degree of damage caused by hooded crow in pea pods, a: moderate damage, b: heavy damage

Table 4. Damage percentages caused by house sparrow *Passer domesticus niloticus* in guava orchards at Zagazig district, Sharkia Governorate during the season of 2016

Week from the mature stage	Beside poultry farm				Beside field crops				Mean
	No. of examined trees	Total No. of fruits	No. of damaged fruits	Damage (%)	No. of examined trees	Total No. of fruits	No. of damaged fruits	Damage (%)	
1 st	20	1112	29	2.61	20	1223	36	2.94	2.77 [e]
2 nd	20	1168	45	3.85	20	1113	37	3.32	3.58 [d]
3 rd	20	907	46	5.07	20	1196	61	5.10	5.08 [c]
4 th	20	725	43	5.93	20	704	39	5.54	5.73 [b]
5 th	20	584	38	6.51	20	573	36	6.28	6.39 [a]
Mean	20	899.20	40.20	4.79	20	961.80	41.80	4.64	4.71

LSD 0.05 (average) = 0.63**
Means not followed by the same letter(s) in column are significantly different at P≤0.05 according to Duncan's multiple range test.

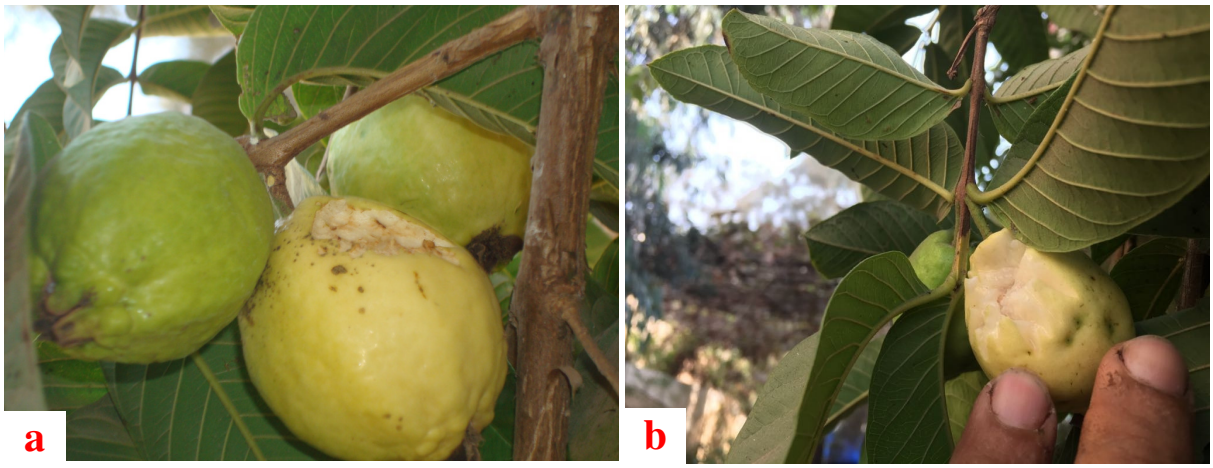

Fig. 4. Degree of damage caused by house sparrow in guava fruits, a: simple damage, b: moderate damage

season of 2016 when the fruits reached the mature stage. The results revealed that percentage of damage increased as the time elapsed from the 1st week till the 5th week with values of 2.61, 3.85, 5.07, 5.93 and 6.51% and 2.94, 3.32, 5.10, 5.54 and 6.28% in orchards nearby poultry farms and field crops, respectively. The mean percentage of damage was 4.79 and 4.64% in orchards nearby poultry farms and field crops, respectively.

These results agree with **Hussain *et al.* (1991)** who cleared that bird damage to guava fruits were estimated to be 17.24%. **Ahmad *et al.* (2012)** mentioned that the depredations of rose-ringed parakeet (*Psittacula krameri* Scopoli) on citrus, guava and mango in a fruit orchard, Faisalabad, Pakistan took place at the unripe stages of the fruits. On mango in morning and evening, it was apparent that, the damage ranged between 53.30 and 48.32%, respectively while the total such depredations were found to be 6.40%. On guava of 1855 damaged guava fruits examined, average damage proportion was 50.10%.

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تقدير أضرار الطيور على بعض محاصيل الحقل والخضر والفاكهة بمحافظة الشرقية ـ مصر

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تعتبر خسائر المحاصيل الناجمة عن الإصابة بالطيور من أخطر المشاكل وأكثرها تكلفة على المزارعين، ويعتبر كل من الغراب البلدي (*Corvus corone*) وعصفور النيل الدوري (*Passer domesticus niloticus*) من أهم الآفات الرئيسية لكثير من المحاصيل في مصر، وفي هذا البحث تم تقييم الأضرار التي تسببها الطيور بالذرة والقثاء في منطقة الابراهيمية، وكذلك البسلة والجوافة في منطقة الزقازيق بمحافظة الشرقية بمصر خلال موسم النمو في عام ٢٠١٦، وبالنسبة للذرة، وجد أن الغراب البلدي يتغذى على الكيزان عقب التلقيح حتي مرحلة امتلاء ونضج الحبوب، وتم فحص ٢٨٠٠ نبات وكانت أعلى الخسائر في الأسبوع السابع بنسبة (٩,٨١%)، أما بخصوص القثاء فيهاجم الغراب البلدي الثمار وكان متوسط نسبة الإصابة ٦,٣٣%، وتعتبر البسلة من أهم الخضروات المفضلة للطيور، فهي تأكل الأوراق وبراعم الزهور وكذلك البذور الخضراء بداخل القرون وبالتالي يقل المحصول، وبلغ متوسط النسبة المئوية للإصابة في البسلة ٤,٤١% وسجلت أعلى نسبة إصابة (٧,٥٠%) خلال الأسبوع الخامس، وبالنسبة للجوافة يقوم عصفور النيل الدوري بالتغذية علي ثمارها، وكانت نسبة الإصابة في بساتين الجوافة القريبة من مزارع الدواجن والقريبة من المحاصيل الحقلية هي ٤,٧٩ و ٤,٦٤% على التوالي.

المحكمـــون:

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