Beeb (1991) reported that the bird damage to ripening stage of wheat, broad bean, barley, sunflower and sorghum reached to 20.68, 2.76, 1.50, 21.03, and 35.60%, respectively.

The management of bird pests has been one of the difficult operations, because many birds are protected by law or ordinance, the specialist must be assure he is not runnig a foul of the law in his work.

The crop protection with bird control methods may be divided in two major classes; direct protection and indirect protection. The 1st involves the use of methods to prevent or dissuade birds from reaching the crops. The 2nd involves repellency or killing the bird to avoid damage to crops. The effectiveness of both approaches depends on full understanding of the ecology of the problem, the bird pest species causing damage, and their life cycle in relation to the economic status in the agroecosystem.

The present study aimed to manage the problems of noxious bird in traditional agricultural environment at Kafr-El-Sheikh Governorate, throughout the suitable useful management.

MATERIALS AND METHODS

The effectiveness of different bird management techniques and approaches were evaluated on some field crops (wheat, barley, rice, broad bean and sorghum) and fruit orchard (vine grape) during the period from 1995 to 1996 years at Kafr-El Sheikh Governorate.

1. During Sowing Stage

2.1 Repellency Effect of some Compounds Coated Seeds: The primary observation indicated that crested lark, *Galereda cristata* and brown-necked raven, *Corvus raficollis* were the main birds pests as they picked up the seeds directly after sowing. The seeds of wheat, barley, rice, and sorghum were coated with Methiocarb or Cyanophos insecticides at rates of 0.5 and 1.0%. The appropriate amount of each compound was added to a 25 ml of water and 10 ml of milk as adhesive, then mixed thoroughly in a beaker (Avery, 1989). Treated seeds were air-dried for 24h. and planted. Each treatment was replicated in three separated plots (100 m2). Another set of three untreated plots were left for comparison. Experimental plots were separated each by 1Km. Damage assessment in treated as well as untreated

areas was carried out according to the methods adopted by El Deeb (1991). Protection index (PI) was also calculated by the equation adopted by Inglis and Isaacon (1987).

$$\text{Protection index (PI)} = \frac{A-B}{A} \times 100$$

Where A = mean damage percentage in the untreated area.

B = mean damage percentage in the treated area.

2. During Ripening Stage

2.1. Efficiency and performance of mechanical approaches

2.1.1. Nests destruction of house sparrow: Nests on randomly selected trees were monthly destroyed during the breeding season of 1995 year using long poles with a large hook at the end. The destroyed nests were cleaned up and fired to prevent the birds from reusing the materials. Bird damage was assessed in the cultivated area treated trees and another one 4Km. far from treated ones as a check control. Protection index (PI) was calculated as mentioned before.

2.1.2 Effect of nylon fish net: The efficacy of nylon fish net as a protection approach was evaluated under the field conditions of wheat, barley, rice, sorghum, broad bean, and vine grape. In each crop, three plots, 20 m2, each were covered directly by nets before the ripening stage of field crops and vine grape. Other plots were left without covering as check control.

2.2. Scaring approaches

Effectiveness of reflecting stripes: Three tested field, 2 feddans each, were chosen for each of the same tested crops. In each experimental area, reflecting stripes 11mm. width with different colours were stretched and strung on wood poles against the wind at 5m intervals in parallel strands. Stripes were suspended 0.15 cm. above the plants. Another field (2 feddans) was left without treatment as check control far at lest 500 m from the treated one. Protection index (PI) was calculated as mentioned before.

2.3 Chemical Approaches

2.3.1 Performance of Fenthion in used wicked-perches: Two fed-

dans were chosen for each crop, which mentioned before. 20 perches filled with Fenthion 11% EC were distributed at the edge and middle of the experimental area of each crop in milky stage and in mature stage for vine grape. Perches were fixed on 3.5m wooden poles (driven 0.3 m in ground) and suspended 0.5m above the plant. Another field, 4km. far from the treated area was chosen as reference for comparison. Efficacy of wicked-perches was calculated for each crop by protection index (PI).

2.3.2 Repellency Effect of sprayed insecticides: The repellency effect of (0.5 & 1.0%) of Cyanophos and Methiocarb insecticides applied in spray form was evaluated at the ripening stage of tested crops except vine grape. Each compound was applied into three separated plots; (each of 2 feddans) and another one was left as check control, 4km. far from the treated field. The compounds were sprayed with the required level using motorized knapsack sprayer.

RESULTS AND DISCUSSION

1.1. During Sowing Stage

1.1Repellency effect of the tested pesticides: Data in Table 1 show that the tested insecticides when used at 0.5 and 1.0% achieved considerable protection for wheat, barley, rice, and sorghum seeds i.e. 78.8 and 92.1, 87.2 and 89.3, 84.5 and 95.0, 80.0 and 94.5% (Methiocarb) and 49.9 and 24.6, 49.7 and 21.4, 54.5 and 41.5, 87.2 and 94.9% (Cyanophos) against crested lark at sowing stage, respectively.

Table 1. Effectiveness of Methiocarb and Cyanophos insecticides as bird repellent at sowing stage of some field crops against crested lark.

Crops	Untreated field	% Damage				% (PI)*			
		Methiocarb		Cyanophos		Methiocarb		Cyanophos	
		0.5%	1.0%	0.5%	1.0%	0.5%	1.0%	0.5%	1.0%
Wheat	20.3 ±2.1	4.3±1.4	1.6±0.8	10.3±3.1	15.3±3.2	78.8	92.1	49.9	24.6
Barley	18.0±1.4	2.4±1.1	2.0±0.9	9.4±3.0	14.7±4.1	87.2	89.3	49.7	21.4
Rice	24.6±3.1	3.8±2.1	1.3±0.7	11.2±2.1	14.4±2.4	84.5	95.0	54.5	41.5
Sorghum	23.5±3.1	4.7±1.8	1.3±0.6	3.0±0.5	1.2±0.4	80.0	94.5	87.2	94.9

* PI = Protection Index

Table 2. The protective potential of some mechanical and scaring approaches for some crops against noxious birds.

Crops	Untreated field	% Damage					
		Mechanical Approaches				Scaring Approaches	
		Nest Destruction		Netting		Reflecting Stripes	
		Treated Field	PI	Covered Field	PI	Taped Field	PI
Wheat	15.6	8.3	46.8	0.0	100	5.5	65.0
Barley	14.2	7.6	46.5	0.0	100	3.6	74.6
Rice	12.3	8.4	31.7	0.0	100	3.1	74.7
Sorghum	8.2	4.6	43.9	0.0	100	2.6	68.3
Broad bean	9.4	6.2	34.0	0.0	100	3.4	64.0
Wine grape	18.2	12.2	33.0	0.0	100	5.3	71.0

PI = Protection Index

Table 3. Effectiveness of chemical approaches in some field crops and fruits against house sparrow and starling.

Crops		% Damage									
	Untreated field	Perches		Spray Application							
		Treated Field	PI	Methioc-arb		Cyanoph-os		PI			
								Methiocarb		Cyanophos	
				A	B	A	B	A	B	A	B
Wheat	15.6	3.5	77.6	5.4	3.8	4.3	3.1	65.4	76.0	72.4	80.1
Barley	14.2	2.2	84.5	5.0	4.1	4.0	3.0	64.7	71.1	71.8	78.8
Rice	12.3	3.1	75.0	4.8	4.2	3.1	2.8	61.0	66.0	68.1	75.0
Sorghum	8.2	1.4	83.0	3.6	2.9	2.0	1.9	56.0	65.0	64.6	75.6
Broad bean	9.4	2.0	79.0	3.5	2.8	2.9	1.4	62.7	70.2	69.1	85.1
Wine grape	18.2	3.6	80.2	-	-	-	-	-	-	-	-

A = 0.5 %
B = 1.0 %
PI = Protection Index

It was observed that seed dressing by Cyanophos (1%) showed less efficiency in seed protection during sowing stage of the treated crops compared with the lower rate (0.5%). This finding may be due to the adverse affect of the higher rate of Cyanophos on germination.

The effectiveness of Methiocarb as bird repellent on rice seeds at sowing stage against blackbird was reported by Holler *et al.* (1982) who found that, mean sprout loss in the four fields planted with seed treated at 0.4% was 3.0% compared with an 82% mean loss in untreated field.

2. During Ripening Stage

2.1 Mechanical approaches

2.1.1 Nest destrution of house sparrow : Destrucion of nests and eggs has been suggested as a method of population reduction of depredating bird species. Data in Table 2 show that the degree of protection by nest destruction method varied according to the species and stage of the crop and the population pressure of birds. It is clear that the highest values of protection index (PI) was recorded in wheat (46.8%) followed dy barley (46.5%), sorghum (439%), broad bean (34.0%),vine grape (33.0%), and rice (31.7%).

Generally, it is evident that removal of nests and eggs of the bird species breeding in and around cropped areas will force the birds to leave breeding ground and shift to anothther area. This method is particularly useful for birds like house sparrow birds, which breed in and around cultivated area.

Bruggers and Ruelle (1981) mentioned that the efficacy of nest destruction operations depends on the species of bird and the species of tree in which it is nesting.

2.1.2 Netting : the nylon fish net having a mesh sufficiently small to prevent passage of even small granivorous birds. Such a method is too expensive for large acreage's, but recommended for high value trails or breeder seed experiments or multiplication trials. Data concerning the efficacy of nylon fish nets for protecting crops from Spanish sparrow, *passer hispaniolensis* and house sparrow, *Passer domestics niloticus* are shown in Table 2. It is clearly evident to notice that, these nets *completely* stopped the access of bird to crops.

In conclusion, netting, is one of the best methods and gave complete protecion to the crops.

Bruggers and Ruelle (1982) reported that physical barriers such as net or acrylic fibers could prevent the bird attacks to research or seed field and provide almost complete protection. The nets are non-toxic, noiseless, and reusable barriers that achieve 100% effectiveness.

2.1.3. Effectiveness of reflecting stripes: Data in Table 2 show that the level of protection by reflecting stripes method varied according to the species of crop and the population pressure of birds. Protecion index being 65.0,74.6,74.7,68.3 and 64.0% during the ripening stage of wheat, barley, rice, sorghum, and broad bean, respectively and 71.0 % for vine grape during the mature stage.

Aiso, data indicate that the effect of reflecting stripes method in repelling the sparrow was highest in the case of rice followed by barley and vine grape. This may be due to host preference.

These findings are in agreement with that reported by Bruggers *et al* (1986) and Dolbeer *et al.* (1986) in Ottawa, and El-Sherbiny *et al.* (1988) in Egypt, who mentioned that the aluminum stripes could protect wheat field from bird damage (pl values) 83.0%.

2.2 Chemical Approaches

2.2.1. Performance of Fenthion in used wicked perches: Data in Table 3 indicate that the application of fenthion in wicked perches drastically reduced the number of house sparrow and starling birds and protected field crops of wheat, barley, rice, sorghum, and broad bean i.e.77.6, 84,5, 75.0, 83.0% and 79.0%, repectively. While protection index for vine grapes reached to 80.2%. Data also, indicate a positive relation between bird abundance and bird damage in ripening stage. Nichols and Crabb (1979) and Martin and Martin (1984) are in agreement with the present obtained findings.

2.2.2. Repellency and bird attack protection of Methiocarb and Cyanophos insecticides: Data in Table 3 pointed out that Methiocarb compound when sprayed with 0.5 and 1.0 levels achieved 65.4 and 76.0, 64.7 and 71.1, 61.0 and 66.0, 56.0, and 65.0 and 62.7 and 70.2% (pl) for wheat, barley, rice, sorghum, and broad bean, respectively. The corresponding values of (Pl) induced by Cyanophos applied with the two concentrations were 72.4 and 80.1, 71.8 and 78.8, 68.1 and 75.0, 64.6 and 75.6 and 69.1 and 85.1, consecutively. Such findings are in harmony with those obtained by Holler *et al.* (1982) and Bruggers *et al.* (1984).

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المكافحة المتكاملة للطيور الضارة في المناطق الزراعية بمحافظة كفر الشيخ

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أجريت هذة الدراسة تحت الظروف البيئية والحقلية لمحافظة كفر الشيخ لتطبيق برنامج المكافحة المتكاملة للطيور الضارة بالزراعة بغرض تنظيم اعداد هذه الطيور والحد من خسائرها على المحاصيل فى أطوار النمو المختلفة، وقد اظهرت النتائج المتحصل عليها ما يلى :

– فى طور الزراعة أظهرت الدراسة أن مركب الميثو كارب (١٪) أعطى أعلى تأثير طارد لطائر القنبر وقد وصلت النسبه المئوية للحماية الى ١ر٩٢ و٣ر٩٨ و ٠ر٩٥و٥ر٩٤ ٪ لكل من القمح و الشعير والارز والذرة الرفيعة على التوالى، وفى نفس الوقت أعطى مركب السيانوفوس (٥ر٠ ٪) كفاءة عالية في حماية بذور المحاصيل عدا النجيليات .

– فى طور النضج أظهرت الطرق الميكانيكية أن هدم أعشاش عصفور النيل الدوري شهريا خلال موسم وضع البيض والتربية من مارس حتى نهاية يونيو يعطى حماية لمحاصيل منطقة الهدم وصلت الى ٨ر ٤٦ و ٥ر٤٦و٧ر٣١و٩ر٤٣و ٠ر٣٤و ٠ر٣٣٪لكل من القمح والشعير والارز والذرة الرفيعةو الفول البلدى والعنب الرومى على الترتيب ، بينما لوحظ أنة عند تغطية المحاصيل باستخدام شباك الصيد النايلون أعطى حماية كامله لهذه المحاصيل، حيث أن هذة التغطية تعمل كحاجز لمنع أعداد الطيور من القيام بمهاجمة المحاصيل . أيضا أوضحت النتائج أن كفاءة استخدام الاشراطة العاكسة تتأثر لنوع المحصول، فقد سجلت أعلى حماية لمحصول الارز (٧ر٧٤٪) يليه الشعير (٦ ,٧٤٪) يلية العنب الرومى (٧١٪) ثم الذرة الرفيعة (٣ر٦٨٪) ثم القمح (٦٥٪) وأخيرا الفول البلدى (٦٤٪)

– وأظهرت الطرق الكيمائية باستخدام المحطات السامة (wicked-perches) أن مركب الفاثينون (١١٪) أعطى نتائج جيدة بتأثيره المميت بالملامسة وذلك عن طريق تقليل أعداد طائر عصفور النيل الدورى والزرزور في المنطقة المعاملة وقد بلغت الحماية ٦ر٧٧ و ٥ر٨٤ و ٠ر٧٥و ٠ر٨٣و ٠ر٧٩و٢ر٨٠٪ لكل من القمح والشعير والارز والذرة الرفيعة والفول البلدى والعنب الرومى على الترتيب

– كما اعطت المركبات الطاردة الميثو كارب والسيانوفوس بطريقة الرش عند معدل ١٪ نسب حماية وصلت الى ٠ر٧٦و١ر٧١و ٠ر٦٦و ٠ ,٢ ,٦٥ر٧٠ للميثوكارب بينما كانت النسب ١ر٨٠و ٨ر٧٨و ٠ر٧٥و٦ر٧٥و١ر٨٥ للسيانوفوس لمحاصيل القمح والشعير والارز والذرة الرفيعة والفول البلدي على التوالى .و عند استخدام المركبين السابقين بمعدل ٥ر٠٪ كانت نسب االحماية ٤ر٦٥و ٧ر٦٤و ٠ر٦١و ٠ر٥٦و٧ر٦٢للميثوكارب و ٤ر٧٢و٨ر٧١و١ر٦٨و٦ر٦٤و١ر٦٩للسيانوفوس علي التوالى.