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THE AVICIDAL PERFORMANCE OF SOME PESTICIDES AGAINST HOUSE SPARROW UNDER LABORATORY AND FIELD CONDITIONS

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Abstract

The repellency effect of three compounds, namely (fenarimol, flusilazole and oxadixyl) against the house sparrow *Passer domesticus niloticus* was studied under laboratory and field conditions at Kafr El-Sheikh Governorate. The obtained results from the toxicity and repellency tests (LD_{50}, R_{50} values) indicated that fenarimol exhibited the highest repellency effect against house sparrow birds followed by flusilazole and oxadixyl. The field results were in harmony with those obtained from laboratory, whereas fenarimol compound protected wheat, broad bean, rice and sunflower grains with the highest protection value, while flusilazole ranked the second order followed by oxadixyl compound.

INTRODUCTION

Birds damage to crops, particularly cereal grains, is a serious problem allover the world. In African countries, birds damage to cereal crops reach up to 5-10% of the production (Bruggers and Ruell, (1981).

In Egypt, with a limited cultivated area, horizontal expansion, through reclamation of desert land, is a vital necessity and a major part of the government agricultural development policy. Recently, the house sparrow, *Passer domesticus niloticus* is considered, in Egypt, one of the most the most important agricultural pest in both the newly and old cultivated areas (El- Bacoury, 1981).

Bird repellent approach is considered safe for the environment and living creatures . Their function is sully based on the physical or chemical senses of the target pest. Accordingly, these methods are classified into the following given groups : visual, acoustical, tactile, gustatory and olfactory repellents (smell) (Fitzwater, 1982). A good repellent method or material is the one that affects two or more of these senses.

MATERIALS AND METHODS

1. Tested Compounds

- Rubigan (fungicide).
  Common name: fenarimol.
  Chemical name: 3.(2-chlorophenyl)3.(4-chlorophenyl).5.pyrimidine methanol.
  Rat oral LD_{50} = 2500 mg/ kg.
  It was supplied by Sam Trade Co., in emulsifiable concentrate.

- Punch (fungicide).
  Common name: flusilazole.
  Chemical name: 1-(Bis (4- fluorophenyl methyl) sily) - 1 H- 1,2,4 triazole.
  Rat oral LD_{50} = 1110 mg/kg.
  It was supplied by Dupont Co., in emulsifiable concentrate.

- Sandofan (fungicide).
  Common name: oxadixyl
  Chemical name: 2- methoxy -N - (2 - oxo - 1,3 - oxazolidin - 3 yl) acet 2,6-xylidide.
  Rat oral LD_{50} = 3480 mg/kg
  It was supplied by Sandoz ltd. Co., in wettable powder.

Repellency and toxicity effects of these pesticides had been studied against the adults of house sparrow, *Passer domesticus niloticus*.

2. Tested Animals

Birds were trapped by (Paro trap) and transferred directly in aviary (2.4 x 2.4 x 3.6 m) to the laboratory. Trapped birds were housed in a communal wire mesh holding cages (53x25x38cm) of one bird / cage, for two weeks before testing. They were allowed free access to the same diet and water acclimatization. For each test ten birds were housed individually for 4 days before treatment.

3. Laboratory Studies

3.1. One-choice method : The method that described by Shumake *et al.* (1977) and Sheft *et al* (1982) based on original methods of Starr *et al.* (1964) was followed.

For each test, 10 grams untreated whole sorghum grains were offered to the tested birds for four successive days then the same birds were offered another 10 grams coated sorghum with the tested concentration of each compound, i.e 0.0043,

0.0063, 0.0074 and 0.0107%(Fenarimol) , 0.013, 0.0149, 0.0215 and 0.0446% (Flusilazole) and 0.060, 0.072, 0.086 and 0.124% (oxadixyl) for the same pre - treatment period. The consumed amount of untreated and treated surghum grains was daily calculated. The repellency potential was calculated according to the equation adopted by Manson *et al.* (1989).

$$\text{Treated grain acceptance \%} = \frac{\text{Average consumed treated grains (g)}}{\text{Average consumed treated+untreated grains (g)}} \times 100$$

Bird with food acceptance less than 40% are considered repelled.

3.2. Two-choice method : The choice method test described by Russell *et al.* (1989) was adopted. Ten individually caged birds were used for each concentration of tested compound. Ten grams from treated and or from untreated grains were separately offered to each bird daily in two small Petri - dishes for 4 successive days. The position of the two dishes was altered daily to prevent any bias to location and consumed amounts of sorghum grains were recorded. The repellency potential was calculated according to Manson *et al.* (1989).

3.3. R_{50} determination : R_{50} values were calculated for the three tested chemicals, by using the method of Engeman *et al.* (1989). Ten individually caged house sparrows were used for each concentration of tested compound. Untreated food particles were used for 4 successive days in acclimatizing bird for testing and counting its average number. In treatd sorghum grains particles for 24 hour period, birds that consumed less than 40% from the offered food were considered repelled. The percentage of consumed food particles and repelled bird from treated seeds were estimated for each concentration. R_{50} means that half the population of birds used in the test consumed less than half of the offered treated food. The estimated R_{50}% value was calculated according to Weil method (1952).

3.4.Toxicity tests : Acute oral toxicity assessment was based on that adopted by Shefte *et al.* (1982). Birds were gavaged with propylene glycol solution of each chemical with the dose volume adjusted for the birds weight (the amount of solution equal to 0.5% of bird weight). Sparrow were gavaged using a microsyringe with a short length of polyethlene tubing attached to a hypodermic needle. After dosing, birds were individually caged, provided with food and water and observed for 6 hours for sings of toxicosis and 48 hours for mortality. Depending upon the mortality at initial dose, LD_{50} values were calculated by Weil method (1952) and Finney (1971).

Hazard factor was calculated from the following equation (Schafer *et al.* 1983).

$$\text{Hazard factor} = \frac{P_{50}\ (mg/kg)}{LD_{50}\ (mg\ /\ kg)}$$

4. Field Studies

The protective potential of the three tested compounds, from house sparrow birds attacking during ripening stage of wheat, broad bean, rice and sunflower crops was investigated under field conditions at Kafr El - Sheikh Governorate. Each pesticide was sprayed at the rate of 0.05% by using hand compression sprayer during the flowering stag of each crop . Each compound was applied on one feddans for each crop and replicated three times in addition to another one feddan left without treatment as a check leaving two hundred meters apart from another treatment in all directions . Bird damage assessment was carried out in treated and untreated areas every 15 days after spraying (El-Deeb 1990). Protection index (PI) was calculated by the equation adopted by Inglis and Isscson (1987).

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

Where:

A= mean damage percentage in untreated plots.

B= mean damage percentage in treated plots.

RESULTS AND DISCUSSION

1. laboratory experiments

The repellency effect of the three tested compounds against house sparrow bird was determined under laboratory conditions using one and two choice feeding methods.

Data in Table 1 revealed that all tested concentrations of the three evaluated compounds showed considerable repellency effects. Such effects enhanced with increasing of pesticide concentrations. Since birds with food acceptance were less than 40% considered repelled (Manson *et al.* 1989), fenarimol compound at 0.0043,

0.0062 and 0.0107% repelled birds by 64.4 & 63.2; 71.0 & 68.4 ; 72.0 & 69.6 and 77.4 & 77.2% with one & two - choice, respectively.

The same trend of results was observed when flusilazole and oxadixyl compounds used with one and two - choice feeding methods. The repellency percent reached 64.0 to 85.4 (flusilazole), 64.4 to 77.0 (fenarimol) and 68.0 to 88.4% (oxadixyl) with the lowest and highest concentrations, respectively.

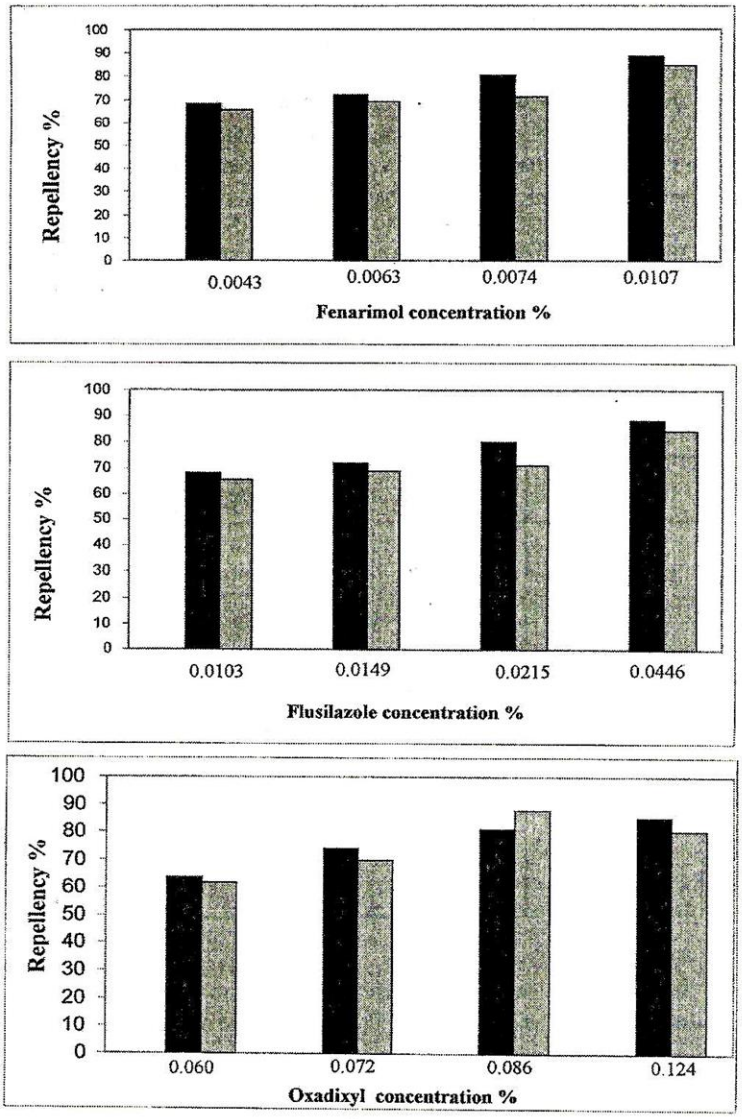
The acute oral toxicity, repellency and hazard potential of the three tested pesticides against house sparrow were determined by standardized testing procedures under laboratory conditions.

Table 1. Repellency potential of tested pesticides against house sparrow, *Passer domesticus niloticus* under laboratory conditions.

Tested Compounds	Concentration %	Repellency %	
		No choice feeding	Two-choice feeding
Fenarimol	0.0043	64.4	63.2
	0.0063	71.0	68.4
	0.0074	72.0	69.6
	0.0107	77.0	77.2
Flusilazole	0.0103	64.0	61.9
	0.0149	74.2	70.1
	0.0215	81.4	78.8
	0.0446	85.4	80.5
Oxadixyl	0.060	68.0	65.6
	0.072	72.0	69.1
	0.086	80.0	71.0
	0.124	88.4	84.6

Data in Table 2 indicate that house sparrow was more susceptible to fenarimol, flusilazole and oxadixyl showing R_{50} of 0.0056, 0.0195 and 0.076%, respectively. Also, average values of lethal effect LD_{50} and hazard factor reached 0.83, 0.0068; 0.90, 0.220 and 1.24 mg / kg b.w, 0.0613, respectively with the same compounds.

Discussing the aforementioned results, it could be concluded that fenarimol and flusilazole are proved considerable potential to cause acute avian poisoning, while oxadixyl showed little potential.



Repellency potential of tested pesticides against house sparrow under laboratory conditions.

The avicidal activities (toxicity and repellency) of some pesticides were studied and reported by many researchers, i.e. Hudson *et al.* (1979), Shefte *et al.* (1982), Schafer *et al.* (1983) and Sultana *et al.* (1986).

Table 2. Lethal effect, repellency and hazard factor of tested pesticides on the house sparrow *Passer domesticus niloticus*.

tested Compounds	R_{50} (mg / kg seeds)	LD_{50} (mg / kg b.w)	H.F
Fenarimol	0.0056	0.83	0.0068
Flusilazole	0.0195	0.90	0.0220
Oxadixyl	0.0760	1.24	0.0613

H.F= Hazard factor .

2. Field experiments

Data in Table 3 indicate that field repellency of the three tested compounds was noticeably differed according to the chemical structure and crop species. The results from the experimental field were parallel with those obtained from laboratory trials. Fenarimol achieved satisfactory protection to wheat, broad bean, rice and sunflower grains being 71.5, 72.9, 80.0 and 78.0% , respectively. Flusilazole ranked the second order showing 68.6, 69.4, 74.5 and 74.2% repellency followed by oxadixyl i.e. 65.6, 67.0, 69.1 and 70.5% on the same crops, respectively .

The variation in avicides efficiency in relation to crop species is in harmony with that obtained by Martin and Jackson (1977) and Wilson (1993).

Table 3. Efficacy of tested pesticides for protecting crops from house sparrow attack .

Crops	% Damage in untreated fields	Fenarimol		Flusilazole		Oxadixyl	
		% Damage	% P. I	% Damage	% P. I	% Damage	% P. I
Wheat	17.2	4.9	71.5	5.4	68.6	5.9	65.6
Broad bean	8.5	2.3	72.9	2.6	69.4	2.8	67.0
Rice	5.5	1.1	80.0	1.4	74.5	1.7	69.1
Sunflower	13.2	2.9	78.0	3.4	74.2	3.9	70.5

P. I = Protection Index.

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تأثير بعض المبيدات ضد عصفور النيل الدوري معمليا وحقليا

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معهد بحوث وقاية النباتات – مركز البحوث الزراعية – دقي – جيزة

تم دراسة التأثير الطارد لثلاثة مركبات هي (فيناريمول، فلوزيلازول، اوكسادايكسايل) ضد عصفور النيل الدوري معمليا وحقليا بمحافظة كفر الشيخ ، وقد اشارت النتائج المتحصل عليها من اختبارات السمية واختبارات التأثير الطارد لهذه المركبات ان مركب الفيناريمول كان الاعلى تأثيرا يليه مركب فلوزيلازول ثم مركب اوكسادايكسايل، كذلك كانت النتائج الحقلية متطابقة مع النتائج المعملية حيث أعطى مركب الفيناريمول أعلى نسبة حماية لمحاصيل القمح والفول البلدي والارز وعباد الشمس، وجاء مركب فلوزيلازول في المرتبة الثانية، بينما حقق مركب اوكسادايكسايل اقل نسبة حماية لهذه المحاصيل.