

## SUSCEPTIBILITY AND PALATABILITY OF SOME EGYPTIAN RODENTS TO ZINC PHOSPHIDE

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### Abstract

Toxicity studies of zinc phosphide ( $Zn_3P_2$ ) on some Egyptian rodents showed that in both choice and no-choice tests, the tested animals could be arranged in a descending order of susceptibility to zinc phosphide at 1% concentration as follows : *Mus musculus* > *Arvicanthis niloticus* > *Rattus rattus* > *Rattus norvegicus*. In choice test, palatability had a negative correlation with the concentration. The palatability percentages at 1% zinc phosphide were 45.5%, 39.3%, 38.5% and 31.4% for *M. Musculus*, *R. rattus*, *A. niloticus* and *R. norvegicus*, respectively. The mean of death length in choice test was slightly longer than in no-choice test for the different examined animals. Among the three zinc phosphide concentrations tested (1%, 2% and 3%), the poison bait of 1% gave satisfactory mortality under laboratory conditions.

### INTRODUCTION

Zinc phosphide is still the common rodenticide used in Egypt. It is rather cheap, produced locally and a quick killer to rodents.

The current work deals with the effect of zinc phosphide against the Nile rat, *A. niloticus*, the climb rat, *R. rattus*, the Norway rat, *R. norvegicus* and the house mouse, *M. musculus*. Their palatability to zinc phosphide was also studied.

A concise review of the development and evaluation of zinc phosphide was presented by Litchfield and Wilcok (1949), Greaves (1966), Swaroop (1966), Hood (1972), Helal *et al.* (1975), Tongatavee (1978), Richard *et al.* (1979) and Greaves (1979).

## MATERIALS AND METHODS

The Nile rat, *A. niloticus*, the climb rat, *R. rattus* the Norway rat, *R. norvegicus* and the house mouse, *M. musculus* were collected from El - Badrashin district, Giza Governorate . The sample for every species and for each experiment was 10 (5 males and 5 females ) . Rats were weighed to the nearest gram and sex determined. Animals were retained in individual cages, 42x24x17 cm for a maximum of one week before initiating the tests. Abnormally large or small animals, or obviously pregnant individuals were not included in the experiment.

Technical grade zinc phosphide (94% active ingredient) was provided by Abu Zaabal Company. The compound was mixed thoroughly with fresh crushed maize at the concentrations 1,2 and 3%.

Food was removed from the animal cages four hours before administering the chemical . Choice and no-choice feeding experiments were conducted using zinc phosphide and plain baits. In the choice test described by Htun and Brooks (1979) two Food cups were provided to individually cages animals. One contained plain crushed maize and the other 1,2, or 3% zinc phosphide - treated crushed maize. The position of the cups was changed daily to avoid possible bias of position preference . Twenty grams of treated and untreated food was provided daily. Intake of poison and plain baits were recorded and computed to g/kg body weight of the tested animals. Palatability was calculated. Water was provided to rodents during the experiments. Mortality was observed daily, recorded for a week after poisoning and death was expressed as the mean of death length in hours.

In the no - choice test, zinc phosphide - treated crushed maize was offered at the concentrations 1, 2 , and 3% by weight. Bait consumption was recorded daily and weighed to the nearest 0.1g.

## RESULTS AND DISCUSSION

Results in table 1 shows that in both choice and no - choice tests the tested species could be arranged in a descending order of susceptibility to zinc phosphide at

1% concentration as follows : *M. Musculus* > *A. niloticus* > *R. rattus* > *R. norvegicus*. Helal *et al.* (1975) stated that Egyptian rodents are arranged in the following order according to their susceptibility to Cyimidin : *Acomys chritinus* > *R. norvegicus* > *R. Rattus elaxandrinus* > *A. niloticus* and *R. Rattus frugivorus*.

In choice test, the palatability of the tested animals had a negative correlation with the used concentrations . The palatability of *A. niloticus* to zinc phosphide at 1% , 2% and 3% was 38.5% , 21.7% and 17.66 % respectively. On the other hand the palatability percentages at 1% concentration of zinc phosphide for *M. musculus*, *R. rattus*, *A. niloticus* and *R. norvegicus* were 45.5 % , 39.3%, 38.5% and 31.4% , respectively. Richard *et al.*, 1979 reported that *Bandicota bengalensis* was less prone to bait shyness than *R. rattus*.

The mean of death length in choice test was a little longer than in no - choice test for the different animals. The means in both treatments were 38& 31 h, 31 & 30 h, 40 & 34 h and 38 & 30 for *A. niloticus*, *R. rattus*, *R. norvegicus* and *M. musculus* at 1% concentration of zinc phosphide, respectively.

Table 1 shows that 1% zinc phosphide bait gave satisfactory mortality for the examined animals under laboratory conditions as follows : 80% and 90% for *A. niloticus*, 80% and 80% for *R. rattus* , 70% and 70% for *R. norvegicus* and 90% and 100% for *M. musculus* in both choice and no - choice tests, respectively. Hunt and brooks (1979) suggested that a 2.5% zinc phosphide bait was probably better, whereas Sunythe and khan ( 1978) recommended the use of a 2% bait in the field.

Table 1. Choice and no - choice tests of crushed maize treated with zinc phosphide offered to different rodents under laboratory conditions.

Exp.	Rodent	Concentration	(Mean) and range of body weight (g)	Mean bait intake (g)		Palatability %	Mean $Zn_3P_2$ (g/kg)	Mortality	Mean of death length in hrs.
No - Choice	<i>Arvicanthus niloticus</i>	1%	121 (166) 197	1.5	3.9	38.5	9.0	8/10	38
		2%	120 (160) 194	1.0	4.6	21.7	6.3	6/10	36
		3%	108 (141) 200	0.9	5.1	17.6	6.4	6/10	26
	<i>Rattus rattus</i>	1%	115 (163) 180	1.1	2.8	39.3	6.7	8/10	31
		2%	153 (170) 220	1.0	4.3	23.3	5.9	5/10	31
		3%	115 (157) 189	1.0	4.5	22.2	6.4	5/10	24
	<i>Rattus norvegicus</i>	1%	110 196 289	1.1	3.5	31.4	5.6	7/10	40
		2%	151 230 300	1.0	4.9	20.4	4.3	5/10	36
		3%	142 210 268	0.9	5.5	16.4	4.3	4/10	24
	<i>Mus musculus</i>	1%	18 (20) 22	0.5	1.1	45.5	25.0	9/10	38
		2%	16 (18) 21	0.4	1.3	30.7	22.2	7/10	38
		3%	17 (18) 21	0.4	1.5	26.7	22.2	6/10	25
No - Choice	<i>A. niloticus</i>	1%	114 (146) 184	2.3			15.8	9/10	31
		2%	110 (140) 177	1.9			13.6	8/10	35
		3%	103 (131) 175	1.5			11.5	8/10	24
	<i>R. rattus</i>	1%	117 (134) 166	1.9			14.2	8/10	30
		2%	100 (139) 171	2.0			14.4	8/10	28
		3%	98 (132) 169	1.7			12.9	8/10	25
	<i>R. norvegicus</i>	1%	127 (167) 210	1.6			9.6	7/10	34
		2%	142 (198) 256	1.6			8.1	7/10	34
		3%	138 (151) 189	1.4			9.3	7/10	27
	<i>Mus musculus</i>	1%	17 (21) 24	1.8			85.7	10/10	30
		2%	19 (10) 21	1.3			68.4	10/10	32
		3%	18 (20) 23	1.2			60.0	10/10	24



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## حساسية بعض أنواع القوارض المصرية لفوسفيد الزنك ومدي قابليتها له

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أوضحت نتائج الدراسات علي سمية فوسفيد الزنك بتركيزات ٨٪، ٢٪، ٢٪ لبعض أنواع القوارض المصرية وقابليتها له في العمل ما يلي :-

١ - أمكن ترتيب الأنواع المختبره تنازليا تبعا لحساسيتها لفوسفيد الزنك عند تركيز ٨٪ كما يلي :

فؤيره المنازل > فأر الحقل > الفأر المتسلق > الفأر الثرويجي في كل من الاختبار الاختياري وغير الاختياري لطعم فوسفيد الزنك.

٢ - العلاقة سالبة بين درجة قابليه الفئران المختبره وطعم فوسفيد الزنك وتركيزات الفوسفيد . ومن جهة أخرى فإن نسب قابليه فؤيرة المنازل والفأر المتسلق وفأر الحقل والفأر الثرويجي كانت علي التوالي ٤٥,٥٪، ٣٩,٣٪، ٣٨,٥٪، ٢١,٤٪ عند تركيز ٨٪.

٣ - كان متوسط طول المدة اللازمة للموت بعد تناول طعم فوسفيد الزنك أطول قليلاً في حالة الحيوانات تحت ظروف الإختبار عنها في عدم الإختبار وذلك بالنسبة للأنواع الأربعة المختبره.

٤ - أعطي تركيز ٨٪ فوسفيد زنك نسب موت مرضيه للأنواع المختبره تحت الظروف العملية.