

## EFFECT OF CERTAIN ADDITIVES TO ZINC PHOSPHIDE CRUSHED MAIZE BAIT AGAINST THE HOUSE MOUSE, *MUS MUSCULUS*

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### Abstract

Two experiments were carried out at three areas of Cairo City; El-Helmia El-Gadida, El-Saieda Zeinab and Abbasia to study the effect of certain additives (powder milk, fish meal, blood meal and bone meal) on:

1. The palatability of crushed maize bait.
2. The efficiency of zinc phosphide crushed maize bait.

Data obtained from the first experiment revealed that all tested additives led to an increase in the consumption of crushed maize. The consumption could be arranged in the following decreasing order: 100 % for maize + powdered milk > 23.02% for maize + fish meal > 6.00 % for maize + blood meal > 4.00 % for maize + bone meal > 1.06% for maize alone.

These results urged to carry out the second experiment to investigate the effect of the tested additives on the efficiency of 1% Zinc phosphide bait loaded on crushed maize. Before and post-treatment population density was determined by three methods:

1. The active burrow holes (Abdel-Gawad and Maher Ali, 1982).
2. The food tracks activity method (El-Sherbiny and Awad, 1987)
3. The gnawing activity method (El-Sherbiny *et al.*, 1987).

1% zinc phosphide + 2% of each of the tested additives was used. Results showed that, within the three above mentioned methods, all tested additives led to a higher significant reduction in rodent population than that of the control. Increasing the population reduction due to different additives followed the same trend achieved in case of the effect on increasing the consumption, i.e. powder milk > fishmeal > blood-meal > control. So, the higher the consumption the more successful the control is.

### INTRODUCTION

The success of rodent control depends mainly on the offered bait materials (Calhoun, 1941). Crushed maize was reported to be the most attractive bait for rodents and can be recommended as a carrier for most rodenticides (Marsh and Howard, 1977; Houtcooper, 1978; Abd El-Gawad and Maher Ali, 1982; Desheesh *et al.*, 1987). So, any material that can be added to improve the attractiveness of maize would lead to increase consumption and more successful control of rodent. Abd El-

Gawad and Maher Ali (1982) improved the efficiency of zinc phosphide bait by adding molasses to crushed maize bait. Abd El-Rahman (1991) studied the effect of some aromatic plants on the palatability of crushed maize bait and Asran (1993) enhanced bait consumption by adding sesame oil to crushed maize.

The present work aimed to investigate the effect of some additives that are commercially available (for poultry industry) on crushed maize acceptance by the house mouse, *Mus musculus*, i.e. powdered milk, fish meal, blood meal and bone meal. Also, the effect of these additives on the efficiency of zinc phosphide bait was also studied.

### MATERIALS AND METHODS

The experiments were carried out in three different areas in Cairo City; El-Helmia El-Gadida, El-Saieda Zeinab and Abbasia in old buildings that were not inhabited with people for long time. In all locations, clear signs of rodent infestation were detected. Fifteen traps were distributed in every location to determine the prevailing rodent species. Identification of rodent species was made according to Niethammer (1981).

For preparing the baits, 20 gm of each of the tested additives (powdered milk, fish meal, blood meal or bone meal) were added to 1 kg of crushed maize. In each location, 15 bait stations for each mixture were used, in addition to control treatment (plain crushed maize). Each bait station was loaded with 150 gm of the mixture. Bait stations were randomly distributed and checked every three days. The amount of bait was weighed and completed again to 150 gm, then the stations were randomly redistributed again. The experiment extended to 15 days and the total consumption of each treatment was calculated.

A control experiment was designed to study the effect of the tested additives (powdered milk, fish meal and blood meal) on the efficiency of zinc phosphide. Three locations (desert houses) were elected for this purpose. One of the additives was experimented in a separate location, in addition to its control (1% zinc phosphide bait on crushed maize). Three methods were used to determine the population density in each location mentioned before treatment; 1) the active burrow holes (Abd El-Gawad and Maher Ali, 1982), 2) the food tracks activity method (El-Sherbiny and Awad, 1987); and 3) the gnawing activity method (El-Sherbiny *et al.*, 1987). Crushed maize bait containing 1% zinc phosphide (Anonymous, 1980) + 2% of each

the tested additives was used. The tested baits were packed in paper bags containing 10 gm of each mixture. In each treatment, 100 gm. were distributed all over the place and left until stopped the consumption. Rodent population was determined post treatment using the three methods previously mentioned and percent reduction in population was calculated.

## RESULTS AND DISCUSSION

Identification of trapped rats revealed that the house mouse, *Mus musculus* was the most dominant species in the three locations. Comparison between the different treatments, Table 1 revealed that crushed maize mixed with powdered milk was the most accepted bait for *M.musculus* (560.00, 570.00 and 564.00 gm in the three locations, respectively) followed by maize mixed with fish meal (130.00, 141.00 and 126.00 gm, respectively), followed by maize mixed with blood meal (42.00, 32.00 and 31.00 gm, respectively) followed by maize mixed with bone meal (26.22, 21.00 and 22.00 gm, respectively), and finally maize alone (10.00, 9.00 and 8.00 gm, respectively). Acceptance was arranged descendingly as follows: 100 % for maize + powdered milk > 23.02% for maize + fish meal > 6.00% for maize + blood meal > 4.00% for maize + bone meal > 1.06% for maize alone. It is obvious from the results that 2% powdered milk highly enhanced the acceptance of *M.musculus* to crushed maize compared with the other tested additives. Several authors found similar results by adding different additives to crushed maize bait. Abd El-Gawad and Maher Ali (1982) enhanced the acceptance of rodent species to crushed maize bait by adding sucrose and molasses. Asran (1993) came to the same result by adding sesame oil to crushed maize bait.

The obtained results urged us to investigate the effect of the tested additives on the acceptance of *M.musculus* to 1% zinc phosphide bait loaded on crushed maize as an attempt to overcome the bait shyness phenomenon and increase the reduction of rodent population as a primary step before using other control measurements such as anticoagulant rodenticides.

Results in Table 2 show that adding 2% powdered milk to 1% zinc phosphide bait increased the efficiency of this bait. *M.musculus* population reduction increased from 14.0 % to 50.0% based on number of active burrows method; from 8.0% to 94.5% using the foot tracks activity method; and from 9.0% to 50.0% using the gnawing activity method. Accepted increase was achieved when using fish meal as an additive to zinc phosphide bait. The reduction in rodent population was 27.1, 28.0

and 22.0% versus 13.4, 4.0 and 4.5% in the control treatment, using the three above mentioned methods, respectively. On the other hand, blood meal had little effect in increasing the acceptance of zinc phosphate bait. The recorded reduction in rodent population was 7.7, 10.0 and 9.5% versus 5.6, 3.0 and 4.7% for the control treatment using the same determination methods, respectively.

### RESULTS AND DISCUSSION

The present study was conducted in the laboratory and field to evaluate the effect of zinc phosphate bait on the rodent population in the presence of different attractants. The results showed that the bait was accepted by the rodents in the laboratory and field. The recorded reduction in rodent population was 7.7, 10.0 and 9.5% versus 5.6, 3.0 and 4.7% for the control treatment using the same determination methods, respectively. The results showed that the bait was accepted by the rodents in the laboratory and field. The recorded reduction in rodent population was 7.7, 10.0 and 9.5% versus 5.6, 3.0 and 4.7% for the control treatment using the same determination methods, respectively.

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Table 1. The acceptance of *Mus musculus* to crushed maize mixed with some additives.

Tested baits	Consumption of bait (gm)			Acceptance % <sup>a</sup>
	First location	Second location	Third location	
Maize + powdered milk	560.00	570.00	564.00	100
Maize + fish meal	130.00	141.00	126.00	23.02
Maize + blood meal	42.00	32.00	31.00	6.00
Maize + bone meal	26.22	21.00	22.00	4.00
Maize	10.00	9.00	8.00	1.05

<sup>a</sup> Calculation of acceptance was made according to the total amount of bait consumed.

Table 2. Effect of different additives on the efficiency of zinc phosphide bait.

Treatments	Rodent population density (using different methods)									
	No. of active burrows		% Population reduction	Foot tracks activity		% Population reduction	Gnawing activity		% Population reduction	
	Pre-treatment	Post-treatment		Pre-treatment	Post-treatment		Pre-treatment	Post-treatment		
	<b>1 % zinc phosphide + 2 % powdered milk</b>									
Treatment	90	45	50.0	200	101	94.5	303	150	50.5	
Control*	85	73	14.0	208	192	8.0	299	272	9.0	
	<b>1 % zinc phosphide + 2 % fish meal</b>									
Treatment	85	62	27.1	201	145	28.0	301	235	22.0	
Control*	90	78	13.4	200	192	4.0	200	191	4.5	
	<b>1 % zinc phosphide + 2 % blood meal</b>									
Treatment	92	85	7.7	200	180	10.0	200	181	9.5	
Control*	90	85	5.6	200	194	3.0	192	183	4.7	

\* 1 % Zinc phosphide on crushed maize.

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## تأثير إضافة بعض المواد على استهلاك طعم فوسفيد الزنك المحمل على جريش الذرة ضد الفأر السيسى المنزلى

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أجريت تجربة فى ثلاث أماكن بالقاهرة (الحمية الجديدة والسيدة زينب والعباسية) لدراسة تأثير إضافة مسحوق اللبن وطعم السمك والدم والعظم على استهلاك جريش الذرة بواسطة الفأر السيسى المنزلى. أوضحت الدراسة أن إضافة مسحوق اللبن أعطى أفضلية فى الاستهلاك (٥٦٩ ، ٥٧٠ ، ٥٦٤ جم) يليه طعم السمك (١٣٠ ، ١٤١ ، ١٢٦ جم)، ثم طعم الدم (٤٢ ، ٣٢ ، ٣١ جم) ثم طعم العظم (٢٦ ، ٢٦ ، ٢٢ جم) بينما كان جريش الذرة بمفرده أقل استهلاكاً (١٠ ، ٩ ، ٨ جم).

ومن ناحية أخرى لوحظ أن إضافة مسحوق اللبن بنسبة ٢٪ لطعم فوسفيد الزنك ٨٪ زاد من كفاءة فوسفيد الزنك حيث زاد انخفاض كثافة الفئران من ١٤٪ إلى ٥٠٪ بواسطة الجور العمالة، ومن ٨٪ إلى ٩٤.٥٪ بالنسبة لنشاط تأثير أقدام الفئران، ومن ٩٪ إلى ٥٠.٥٪ بالنسبة لطريقة نشاط قرض الفئران. أما بالنسبة لإضافة طعم السمك زاد معدل انخفاض الكثافة (٤ ، ١٣ ، ٤ ، ٤ ، ٥ ، ٤) إلى (١ ، ٢٧ ، ٢٨ ، ٢٢) وذلك بنفس الطرق المقدر بها الكثافة على التوالي.

أما بالنسبة لطعم الدم حيث كان الأقل تأثيراً حيث زاد معدل انخفاض الكثافة من (٦ ، ٥ ، ٣) إلى (٧ ، ٧ ، ١٠ ، ٩ ، ٥) بنفس الطرق السابقة على التوالي.