



**Food preferences of certain additives by the Nile rat,
Arvicanthus niloticus Des. using bi-choice tests under
laboratory conditions**

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ABSTRACT

The preference ratios by using the addition of groundnut oil 2% plus sugar 2% to wheat, sorghum, rice, crushed maize and cracked bean were 50.4, 56.6, 54.5, 50.8 and 63.6. The total intake values per day of each food and the food supplemented with groundnut oil + sugar were 12.9, 14.5, 12.3, 11.8 and 6.6 g /100g body weight, respectively. The counted preference ratios of wheat, sorghum, rice, grinded maize and crushed broad bean mixed with coriander plus sugar (2+2%) were 50.4, 54.9, 53.3, 50.4 and 60.6.. The total intake values of each tested food with the supplemented food of coriander + sugar were 12.7, 14.2, 12.0, 11.7 and 6.6 g/ 100g body weight, respectively. In this regard, the addition of anise 2% plus sugar 2% as supplementary item to wheat, sorghum, rice, crushed maize and crushed bean gave preference ratios of 50.4, 54.2, 52.5, 50.4 and 59.7, respectively. However, total intake values of the tested food items with these foods mixed with anise plus sugar as food supplements were 13.1, 14.2, 12.0, 11.3 and 6.7 g/ 100g body wt., respectively. Yeast + sugar (2%+2%) surpassed other supplementary items attaining preference ratios by 50.7, 58.0, 56.3, 54.3 and 66.2 followed by 13.4, 15.0, 12.8, 12.7 and 7.1g/100g body wt. with wheat, sorghum, rice, crushed maize and crushed bean, respectively.

INTRODUCTION

Rodents are a dominant group of mammals. Most of living rodent species belong only to one family, Muridae, and most of rodents exist in Egypt also belong to this family (Abdel-Gawad and Maher, 1982)

Rodents occupy a wide natural habitat; they can be found in forests,

grasslands, agricultural landscapes, villages and townships. Rodents play an important role in the food web, both as consumers of plants and as food resources for many of larger predators, they also help aerating the soil through their digging and burrowing activities such as the Nile rat, *Arvicanthus niloticus* (Brooks and Bowerman, 1973)

The success of rodent control depends on the preference of the bait materials used. The ideal bait is the one that shows attractiveness and acceptance to many rodent species and it is easy to be prepared and to be applied. (Thompson *et al.*, 1972; Brooks and Bowerman, 1973; Abdel-Gawad and Maher Ali, 1982; Asran *et al.*, 1985; El-Deeb *et al.*, 1985; Sherief *et al.*, 1985; El-Bahrawy, 1989; Abd El- Rahman *et al.*, 1991; Shafi *et al.*, 1992; Abdel-Galil, 1997; Khan *et al.*, 2000 ; Witmer *et al.*, 2008 and Desoky, 2011).

The scope of this study is to shed the light upon the preference and consumption of different food items, and their supplements of the Nile rat, *A. niloticus*.

MATERIALS AND METHODS

Five items of foods i. e. wheat, cracked maize, rice, sorghum and cracked broad bean were offered to rats with additives (2% sugar and 2% groundnut oil) and without additive as bi- choice in each unit. This trial repeated five times as replicates. Each combination was offered for five consecutive days. Twenty grams of each food item was given to each rat and water was provided *ad libitum*. For comparisons, all average daily intake were converted to g/ 100 g body weight. Similar trials were used by the other additives instead of groundnut substituted by coriander, yeast and anise.

To avoid position habituation, the position of food containers was rotated daily. Preferences of food was estimated according to Thompson *et al.*, (1972) formula $P = 100T / (T + S)$ where T is the weight of the test food

consumed (or time spent eating the test food) and S is the weight of the standard food eaten

RESULTS AND DISCUSSIONS

Results in Table (1) indicated that when Nile rat supplied with wheat, sorghum, rice, cracked maize and cracked broad bean with the other choice of these foods with the additive groundnut oil + sugar by ratio of 96 food + (2 groundnut +2 sugar), the preference ratios were 50.4, 56.6, 54.5, 50.8 and 63.6. These results explain that addition of groundnut to broad bean improved the attraction of Nile rat to the cracked broad bean whereas the preference ratio was 63.6 while the low preference ratio was occurred when this additive mixed with wheat recording preference value, 50.4. The total intake values per a day of wheat, sorghum, rice, cracked maize and grinded bean with the food supplement, groundnut oil + sugar were 12.9, 14.5, 12.3, 11.8 and 6.6 g /100g body weight, respectively. These results show that total consumption from sorghum and sorghum mixed with groundnut oil plus sugar 2+2% surpassed other food items these results are in agreement with Sherief *et al.*, (1985). They found that the most preferred food was sorghum grain for *A. niloticus*.

Data in Table (2) showed that the counted preference ratios of wheat, sorghum, rice, grinded maize and grinded broad bean mixed with coriander plus sugar (2+2%) were 50.4, 54.9, 53.3, 50.4 and 60.6. These results indicate that addition of coriander and sugar (2+2%) gave the same result when we added groundnut oil +sugar to wheat while their

preference values were less than the addition of groundnut oil+ sugar to the other food items. Furthermore, the total intake values of each tested food with the supplemented food of coriander + sugar were 12.7, 14.2, 12.0, 11.7 and 6.6. In general, the values were less than other recorded when groundnut oil + sugar used.

The addition of anise plus sugar as supplementary item to wheat, sorghum, rice, crushed maize and crushed bean also didn't surpassed groundnut oil plus sugar in the counted preference ratios, whereas the counted preference ratios were 50.4, 54.2, 52.5, 50.4 and 59.7, respectively. Total intake values of the tested food items with these foods mixed with anise plus sugar as food supplements were 13.1, 14.2, 12.0, 11.3 and 6.7, respectively (Table 3)

On the other side, yeast + sugar (2+2%) came at the top of the fore

mentioned supplementary items attaining preference ratios, 50.7, 58.0, 56.3, 54.3 and 66.2 as the followed total intake values, 13.4, 15.0, 12.8, 12.7 and 7.1 with wheat, sorghum, rice, crushed maize and crushed bean, continuously (Table 4).

To sum up, the use of yeast as supplementary item to foods was the highly effective in the food acceptance by the Nile rat than other tested items. This result emphasis other obtained by Desoky (2011)

In conclusion, the above-mentioned results emphasized that the significant effect of attractive in bait of rodents. These results may be useful in preparation of rodenticides baits used in rodent control. Results are in accordance with (Abd El-Rahman *et al.*, 1991, Shafi *et al.*, 1992; Witmer *et al.*, 2008 and Desoky, 2011)

Table (1): Average daily intake of *Arvicanthus niloticus* Des. in bi-choice test with the additive (groundnut oil +sugar) by ratio of 96% + (2%+ 2%)

Serial No.	Food items	Daily intake (g/100 of body wt.) Mean ±SE	Preference ratio	t-value
1	Wheat	6.4±0.08	50.4	18.2
	Wheat + additive	6.5±0.12		
	Total intake	12.9		
2	Sorghum	6.3±0.16	56.6	20.3
	sorghum+ additive	8.2±0.25		
	Total intake	14.5		
3	Rice	5.6± 0.13	54.5	19.9
	Rice+ additive	6.7± .017		
	Total intake	12.3		
4	Cracked maize	5.8 ±0.14	50.8	17.4
	Cracked maize+additive	6.0 ±0.15		
	Total intake	11.8		
5	Cracked broad bean	2.4± .06	63.6	24.2
	Cracked broad bean + additive	4.2± 0.09		
	Total intake	6.6		

Table (2): Average daily intake of *Arvicanthus niloticus* Des. in bi-choice test with the additive (Coriander +sugar) by ratio of 96 %+ (2% +2%)

Serial No.	Food items	Daily intake (g/100 of body wt.) Mean ±SE	Preference Ratio	t-value
1	Wheat	6.3±0.08	50.4	18.2
	Wheat + additive	6.4±0.12		
	Total intake	12.7		
2	Sorghum	6.4±0.16	54.9	20.3
	sorghum+ additive	7.8±0.25		
	Total intake	14.2		
3	Rice	5.6± 0.13	53.3	19.9
	Rice+ additive	6.4± .017		
	Total intake	12.0		
4	Cracked maize	5.8±0.10	50.4	17.4
	Cracked maize + additive	5.9± 0.13 11.7		
	Total intake			
5	Cracked broad bean	2.6± .06	60.6	24.2
	Cracked broad bean + additive	4.0± 0.09 6.6		
	Total intake			

Table (3): Average daily intake of *Arvicanthus niloticus* Des. in bi-choice test with the additive (Anis +sugar) by ratio of 96% + (2 % +2%)

Serial No.	Food items	Daily intake (g/100 of body wt.) Mean ±SE	Preference Ratio	t-value
1	Wheat	6.5 ± 0.08	50.4	18.2
	Wheat + additive	6.6 ± 0.12		
	Total intake	13.1		
2	Sorghum	6.5 ± 0.16	54.2	20.3
	sorghum+ additive	7.7 ± 0.25		
	Total intake	14.2		
3	Rice	5.7± 0.11	52.5	19.9
	Rice+ additive	6.3 ± .017		
	Total intake	12.0		
4	Cracked maize	5.6 ±0.09	50.4	17.4
	Cracked maize + additive	5.7 ± 0.12 11.3		
	Total intake			
5	Cracked broad bean	2.7 ± .0.06	59.7	24.2
	Cracked broad bean + additive	4.0 ± 0.09 6.7		
	Total intake			

Table (4): Average daily intake of *Arvicanthus niloticus* Des. in bi-choice test with the additive (yeast + sugar) by ratio of 96% + (2% +2%)

Serial No.	Food items	Daily intake (g/100 body wt.) Mean \pm SE	Preference %	t-value
1	Wheat	6.6 \pm 0.08		17.2
	Wheat + additive	6.8 \pm 0.12	50.7	
	Total	13.4		
2	Sorghum	6.3 \pm 0.16		21.4
	Sorghum+ additive	8.7 \pm 0.25	58.0	
	Total	15.0		
3	Rice	5.6 \pm 0.13		20.2
	Rice+ additive	7.2 \pm .017	56.3	
	Total	12.8		
4	Cracked maize	5.8 \pm 0.09		17.4
	Cracked maize + additive	6.9 \pm 0.15	54.3	
	Total	12.7		
5	Cracked bean	2.4 \pm .06		24.6
	Cracked bean + additive	4.7 \pm 0.09	66.2	
	Total	7.1		

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التفضيل الغذائي بواسطة جرز الحقل النيلي في إختبارات ثنائية الإختيار تحت ظروف المعمل

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إشتملت هذه الدراسة على إختبار التفضيل الغذائي والإضافات الغذائية وكذا الإستهلاك الكلى لهذه الأغذية بدون وبإضافة بعض المكملات الغذائية بواسطة جرز الحقل النيلي تحت ظروف المعمل وأوضحت النتائج أنه عند إضافة زيت الفول السوداني 2% والسكر 2% إلى القمح، الذرة الرفيعة، الأرز، مجروش الذرة ومجروش الفول البلدى كانت معدلات التفضيل الغذائي 50.4، 56.6، 54.5، 50.8 و63.6 على التوالي وأن قيم الإستهلاك الكلى اليومي من هذه الأغذية بدون وبإضافة زيت الفول السوداني 2% والسكر 2% كانت 12.9، 14.5، 12.3، 11.8 و 6.6 جم/100 جم من وزن الجسم على التوالي

معدلات التفضيل الغذائي بإضافة الكزبرة 2% والسكر 2% لكل من القمح، الذرة الرفيعة، الأرز، مجروش الذرة ومجروش الفول البلدى كانت أقل بمثلتها عند إستخدام زيت الفول السوداني 2% والسكر 2% مسجلة 50.4، 54.2، 52.2، 50.4 و59.7 على التوالي وأن قيم الإستهلاك اليومي الكلى من هذه الأغذية بدون وبإضافة الكزبرة 2% والسكر 2% كانت 12.7، 14.2، 12.0، 11.7 و6.6 جم / 100جم من وزن الجسم. وبإضافة الينسون 2% والسكر 2% لكل من القمح، الذرة الرفيعة، الأرز، مجروش الذرة ومجروش الفول البلدى كانت معدلات التفضيل الغذائي كالتالي 50.4، 54.2، 52.5، 50.4 و59.7 وأن قيم الإستهلاك الكلى اليومي من هذه الأغذية بدون وبإضافة الينسون 2% والسكر 2% كانت 13.1، 14.2، 12.0، 11.3 و6.7 جم 100جم من وزن الجسم تفوقت الخميرة 2% مع السكر 2% عند إضافتها لكل من القمح، الذرة الرفيعة، الأرز، مجروش الذرة ومجروش الفول البلدى فى معدلات التفضيل الغذائى مسجله 50.7، 58.0، 56.3، 54.3 و66.2 وكانت قيم الاستهلاك الكلية اليومية المسجلة من المواد الغذائية المختبرة ومع إضافتها بالخميرة 2% والسكر 2% هى 13.4، 15.0، 12.7، 7.1 جم/ 100 جم من وزن جسم جرز الحقل النيلي.

