

Some additions used to increase the toxicity of Paraphenylenediamine (PPD) against three rodent species under laboratory conditions, Egypt

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ABSTRACT: The work here in aims to use three concentrations (1,2 and 3%) of neem seed extracts adding to 4% Paraphenylenediamine (PPD),the previously recommended dose (**Saudi, 2012**) in order to improve of PPD against three rodent species: white billed rat, *Rattus rattus frugivorus*, Nile grass rat, *Arvicanthis niloticus* and house mice, *Mus musculus* under laboratory conditions. The results showed a high rate of consumption of the bait when using with the low concentrations of neem seed extract compared with the lowest one. While the 4% PPD without additions was the first in bait consumption. Rodent females increased high rate of baits as compared with males. The consumption were (53.40 and 39.35), (80.90 and 57.15), (32.70 and 21.55 g/animal) for females and males of white billed rat, *R. r. frugivorus*, Nile grass rat, *Arvicanthis niloticus* and house mice, *Mus musculus* respectively. Mean of consumed baits were: 69.03, 46.37 and 27.13 g/animal Nile grass rat, *Arvicanthis niloticus*, white billed rat, *R. r. frugivorus*, and house mice, *Mus musculus* respectively. The results also indicated that the period of stay alive of tasted animals increases gradually with an increasing of neem seed extract (carried on crushed maize) compared to using also control bait. Females were most durable and lasted the longest life span of males for all rodent species tested. These periods were (9.0 and 14.35), (9.50 and 15.10), (7.75 and 13.05 day) for white billed rat, *R. r. frugivorus*, Nile grass rat, *A. niloticus* and house mice, *M. musculus*, respectively. Also the Nile grass rat, *A. niloticus* showed a longer period of survival than the other two species(i.e. the Norway rat, *R. norvegicus* and the house mouse, *M. musculus*). On the other hand, the reduction in weight in the males of the three tasted rodent species, was less than the reduction in weight of females were using neem seed extract concentrations carried on crushed maize.

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Keywords: Paraphenylenediamine, *Rattus rattus frugivorus*, *Arvicanthis niloticus*, *Mus musculus*

Introduction

The neem plant (*Azadirachta indica*) is very common in Pakistan, Sri Lanka, Thailand and Cambodia, it is recognized as an important medical plant (**Quarles, 1994; Jain, 1983; Ketkar, 1976; Parkash and Rao, 1997; Maydell Von, 1986; Schmuttere, 1990; Tewari, 1992.**) In last 60 years it was introduced to some African and Latin American countries in order to provide shade and for firewood. The uses of neem oil, traditionally in medicinal hair oils, is also used to rheumatism, blood disorders, hepatitis and eye diseases etc. Neem also has many non-pharmacological uses. Traditionally, neem leaves are mixed with food grain for pest control in storage. Histopathological results of the uterus indicated papilloma in the endometrium, proliferation in surface layer and secretory cells with circular nucleus, and clear cytoplasm, which increased in the animals treated with high doses. Based on the results of this study, it appears that neem could be used as a natural and comparatively safe infertility agent to control harmful rodents (**Mohsen et al., 2008**).

MATERIALS AND METHODS

Rodents were trapped from Al-Azhar University Experimental Farm in Assiut, then transferred into the laboratory. The captured rodents were classified into species and sexed mature males and females. The healthy animals from *A. niloticus* and *R. r. frugivorus* (100-160g in weight) and the *M. musculus* (25-30g) were chosen. All rodent species were divided into groups each group contained 10 mature animals (5 males and 5 females). The animals were singly caged and suitably accommodated in the laboratory for ten days, provided with enough crushed maize bait and water. The tests of the material concentrations were 1% to 3% of neem seed extract add to 4% PPD with enough crushed maize as bait compared with 4% PPD only as control bait. The animals were left until death or 21 days. The time of mortality, bait consumption, susceptibility for males and females and weight fluctuations were determined. The obtained data were statistically analyzed using F test for recognizing the significant among the tested treatments.

Results and disscution

1-Differences on consumed bait of neem seed extracts between three rodent species:

Data in Table (1) and Figure (1) revealed the consumption of baits by three rodent species (white billed rat, *R. r. frugivorus*, Nile grass rat, *A. niloticus* and house mice, *M. musculus*). Animals were fed on various concentrations of neem seed extract carried on crushed maize. Mean of consumed baits were: 46.37, 69.03 and 27.13 g/animal for three rodent species, respectively. Records of each concentration against three rodent species were: 40.56, 37.63 and 39.40 g/ animal for 1%, 2% and 3% neem seed extracts respectively. While, the control treatment was 72.43g/ animal. In case of *R. r. frugivorus*, the consumed baits were :40.70, 33.90 and 35.50 g/ animal, were: 54.30,51.80 and 56.90g /animal for *A. niloticus*. And 26.70, 27.20 and 25.80 g/ animal for *M. musculus* when used the concentrations of 1%, 2% and 3% neem seed extracts carried on crushed maize, respectively. Highly significant differences were counted between mean consumed bait by *R. r. frugivorus*, *A. niloticus* and *M. musculus*. There were significant differences between mean consumption of

1% and 2% and between 1% and 3% and insignificant difference was records when used 2% and 3% neem seed extracts carried on crushed maize for the three rodent species.

The obtained data revealed that the *A. niloticus*, is able to consume high baits as compared with the other two species *R. r. frugivorus*, and *M. musculus*, this may be due mainly to the long period of time that *A. niloticus*, can stay a life as compared with the other two species.

The same Table showed also the effect of neem seed extracts on males and females of the three rodent species. Females consumed 53.40, 80.90 and 32.70 g/ animal. While, males consumed 39.35, 57.15 and 21.55 g/ animal. As recorded for *R. r. frugivorus*, *A. niloticus*, and *M. musculus*, respectively. Significant differences were noticed between mean consumption of males and females for the three rodent species. Highly significant differences also were counted between mean consumption of bait for males and females of *R. r. frugivorus*, *A. niloticus*, and *M. musculus* (39.55 and 55.67g/ animal respectively).

Table (1): Effect of various concentrations of neem seed extracts on bait consumption of three rodent species under laboratory conditions

Species		<i>R. r. frugivorus</i>	<i>A. niloticus</i>	<i>M. musculus</i>	Mean
Male	1%N.S.E	35.80 hijk	47.80 de	21.20 m	34.93 d
	2%N.S.E	29.80 i	43.60 efg	22.60 m	32.00 d
	3%N.S.E	30.00 kl	51.40 d	22.40 m	34.60 d
	control	61.80 c	85.80 b	20.00 m	55.87 b
Mean		39.35 D	57.15 B	21.55 F	39.35 B
Female	1%N.S.E	45.60 def	60.80 c	32.20 ijkl	46.20 c
	2%N.S.E	38.00 ghi	60.00 c	31.80 jkl	43.27 c
	3%N.S.E	41.00 fgh	62.40 c	29.20 l	44.20 c
	Control	85.80 b	140.40 a	37.60 hij	89.00 a
Mean		53.40 C	80.90 A	32.70 E	55.67 A
Mean of male and female	1%N.S.E	40.70 e	54.30 cd	26.70 g	40.56 B
	2%N.S.E	33.90 f	51.80 d	27.20 g	37.63 C
	3%N.S.E	35.50 f	56.90 c	25.80 g	39.40 BC
	control	75.40 b	113.10 a	28.80 g	72.43 A
Mean		46.37 B	69.03 A	27.13 C	47.51

Control = PPD 4%, 1%N.S.E= PPD4%+1% neem seed extract, 2%N.S.E= PPD4% +2% neem seed extract, 3%N.S.E= PPD4%+3% neem seed extract.

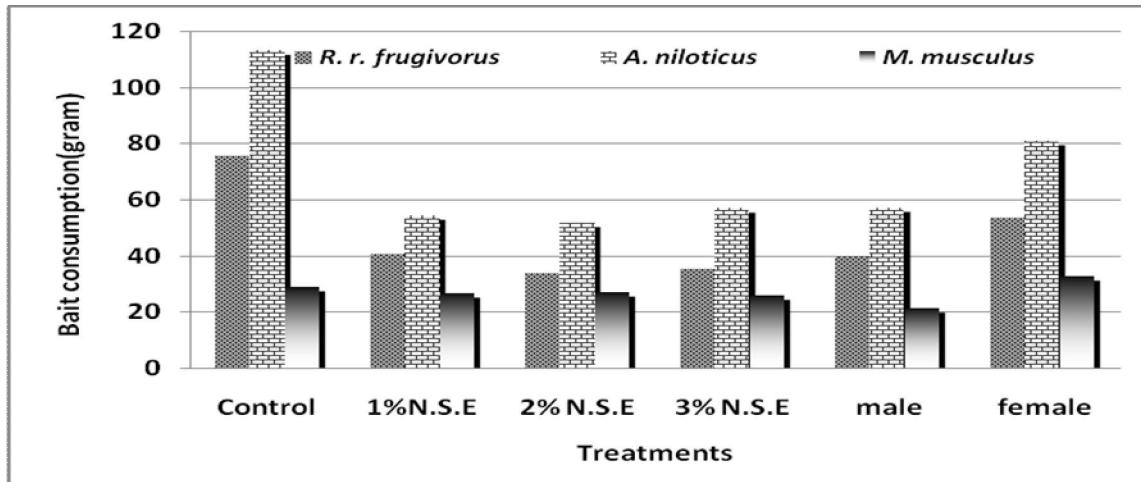


Figure (1): Effect of various concentrations of neem seed extracts on bait consumption of three rodent species under laboratory conditions.

2- Post treatment duration(day):

Data in Table (2) and Figure (2) show the life periods counted from treatment with poison baits until death for three rodent species (*R. r. frugivorus*, *A. niloticus*, and *M. musculus*). The mean time periods were: 11.67, 12.00 and 10.40 day/ animal for the above mentioned three species, respectively. The maximum time was 12.30 day/ animal followed by 11.67 day/ animal and the lowest one was 10.40 day/ animal for *A. niloticus*, *R. r. frugivorus* and *M. musculus* respectively. Males of the three species remained by period of time as compared with females, the periods were 9.0, 9.5 and 7.75 day/ animal for males and 14.35, 15.10 and 13.05 day/ animal for females of *R. r. frugivorus*, *A. niloticus* and *M. musculus*. Rodents treated with 1% neem seed extract still alive for 9.90, 10.10 and 9.20 day/ animal, while in 2% concentration resulted in 14.20, 13.60 and 10.70 day/ animal. While, 3% showed 14.20, 14.0 and 12.80 day/ animal as compared with 8.40, 11.50 and 8.90 day/ animal for control bait for *R. r. frugivorus*, *A. niloticus* and *M. musculus*, respectively. Significant differences were recorded between mean time of males and females and between the three rodent species.

Generally females are more tolerated for all concentrations of neem seed extracts as compared with males. This may be due mainly to the fat concentrations in females body as compared with males.

Table (2): Effect of various concentrations of neem seed extracts on time to death of three rodent species under laboratory conditions.

Species		<i>R. r. frugivorus</i>	<i>A. niloticus</i>	<i>M. musculus</i>	Mean
Treatment.	1%N.S.E	8.40 k	8.60 k	7.20 l	8.07 f
	2%N.S.E	10.60 fgh	10.40 ghi	8.40 k	9.80 e
	3%N.S.E	10.60 fgh	10.20 hi	9.60 ij	10.13 e
	Control	6.40 lm	8.80 jk	5.80 m	7.00 g
	Mean	9.00 d	9.50 d	7.75 e	8.75 B
Male	1%N.S.E	11.40 ghi	11.60 e	11.20 efg	11.40 d
	2%N.S.E	17.80 a	16.80 b	13.00 d	15.86 b
	3%N.S.E	17.80 a	17.80 a	16.00 b	17.20 a
	Control	10.40 ghi	14.20 a	12.00 e	12.20 c
	Mean	14.35 b	15.10 a	13.05 c	14.17 A
Female	1%N.S.E	9.90 e	10.10 de	9.20 f	9.73 c
	2%N.S.E	14.20 a	13.60 a	10.70 d	12.83 b
	3%N.S.E	14.20 a	14.00 a	12.80 b	13.66 a
	control	8.40 g	11.50 c	8.90 fg	9.60 c
	Mean	11.67 b	12.300 a	10.400 c	11.46

Control = PPD 4%, 1%N.S.E= PPD4%+1% neem seed extract, 2%N.S.E= PPD4% +2% neem seed extract, 3%N.S.E= PPD4%+3% neem seed extract.

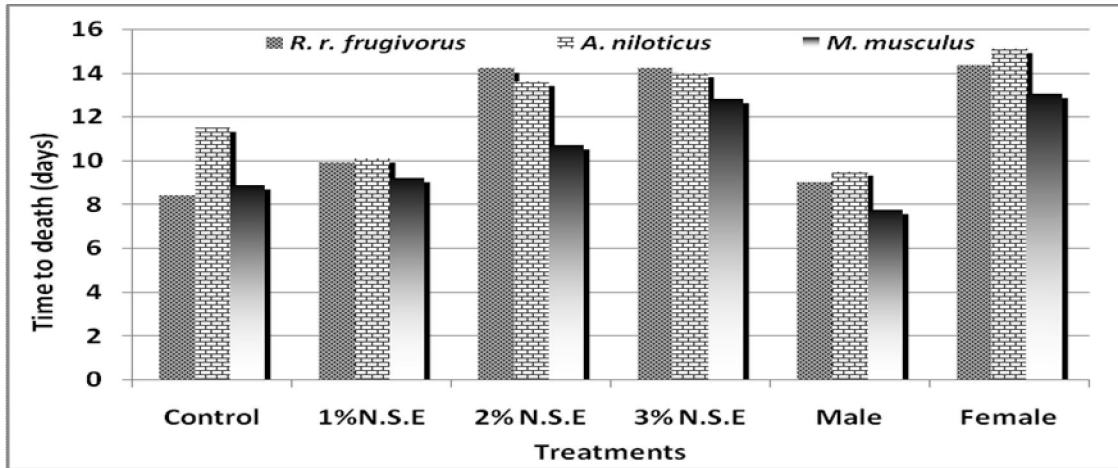


Figure (2): Effect of various concentrations of neem seed extracts on time to death of three rodent species under laboratory conditions.

3- Body weight fluctuation:

Data in Table (3) and Figure(3) show the fluctuation of body weights of rodents after treatment with various concentrations of neem seed extracts. High decrease In body weight was recorded for *A. niloticus* followed by *R. r. frugivorus*, and finally *M. musculus* with 6.25, 5.08 and 2.27 g/ anima, respectively. The same trend was observed in females as compared with males (6.35, 8.45 and 2.45 for males and 3.80, 4.05 and 2.10 g/ animals for males of *R. r. frugivorus*, *A. niloticus* and *M. musculus*, respectively. In case of *R. r. frugivorus* high decrease was recorded when used in 2%, 3% and control treatment as compared with 1% neem seed extracts 6.0, 5.50, 5.70 and 3.10 g/ animal, respectively. The *A. niloticus* high fluctuation in control treatment 10.20g/ animal followed by 5.30, 4.80 and 4.70 g/ animal 2%, 1% and 3% neem seed extracts respectively. in case of *M. musculus* (3.09g/ animal in control bait) followed by 2.40, 1.90 and 1.80g/ animal when used 3, 2, 1% neem seed extracts respectively. This may be due to the repellent taste for the highest concentrations as compared with lowest one. Highly significant difference was recorded between mean fluctuation of rodent species and significant difference was found between mean fluctuation of males as compared with females in all rodent tasted.

Table (3): Effect of various concentrations of neem seed extracts on body weights of three rodent species under laboratory conditions.

Species Treatments.		<i>R. r. frugivorus</i>	<i>A. niloticus</i>	<i>M. musculus</i>	Mean
Male	1%N.S.E	2.40 fghi	2.80 fg	1.40 j	2. 20 f
	2%N.S.E	4.00 e	2.40 fghi	1.80 ij	2.73 e
	3%N.S.E	4.00 e	2.40 fghi	2.20 ghi	2.86 e
	Control	4.80 d	8.60 b	3.00 f	5.47 c
Mean		3.80 c	4.05 c	2.10 d	3.32 B
Female	1%N.S.E	3.80 e	6.80 c	2.20 ghi	4.26 d
	2%N.S.E	8.00 b	8.20 b	2.00 hij	6.07 b
	3%N.S.E	7.00 c	7.00 c	2.60 fgh	5.53 c
	Control	6.60 c	11.80 a	3.00 f	7.13 a
Mean		6.35 b	8.45 a	2.45 d	5.75 A
Mean of male and female	1%N.S.E	3.10 f	4.80 de	1.80 h	3.23 C
	2%N.S.E	6.00 b	5.30 cd	1.90 gh	4.40 B
	3%N.S.E	5.50 bc	4.70 e	2.40 g	4.20 B
	control	5.70 bc	10.20 a	3.00 f	6.30 A
Mean		5.08 B	6.25 A	2.27 C	4.53

Control = PPD 4%, 1%N.S.E= PPD4%+1%neem seed extract, 2%N.S.E= PPD4% +2% neem seed extract, 3%N.S.E= PPD4%+3% neem seed extract.

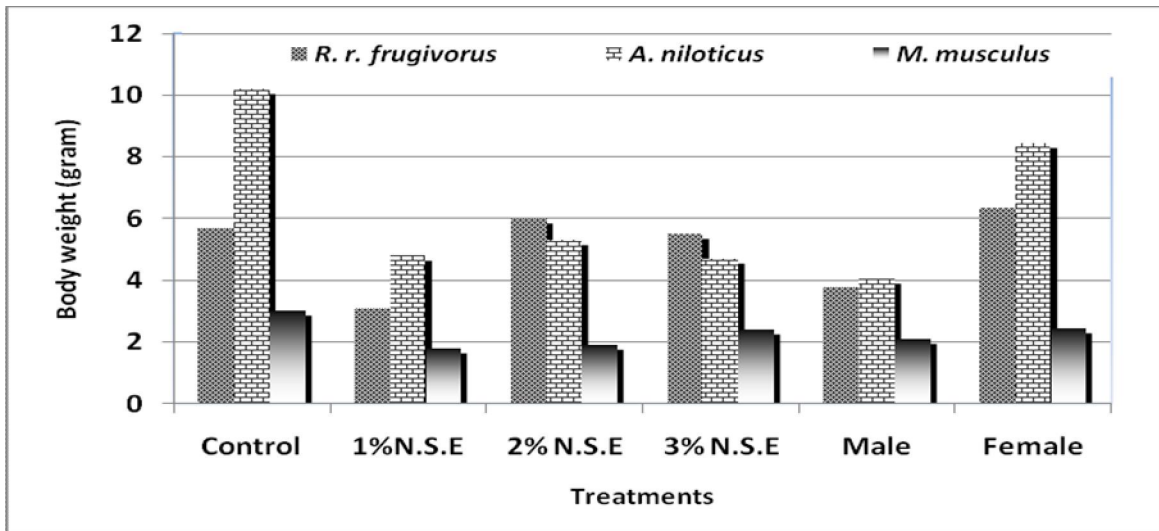


Figure (3): Effect of various concentrations of neem seed extracts on body weights of three rodent species under laboratory conditions.

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REFERANCES

1. **Quarles, W. (1994).** Neem tree pesticide protect ornamental plants. IPM. Practitioner 16:1.
2. **Jain, H. K. (1983).** Neem in Agriculture. Research Bulletin No 40. Indian Agricultural Research Institute, New Delhi.63 pp.
3. **Ketkar, S.C.M. (1976).** Utilization of neem (*Azadirachta indica* Jess) and its Byproducts. 1st Ed, Nana Denge Sadhana press, poona (India).234 pp.
4. **Parkash, A.; and J.Rao. (1997).** Botanical pesticide in Agriculture. CRC press, Inc. Lewis Publishers. Boca Raton, Florida. 459 pp.
5. **Maydell Von, H. J. (1986).** Trees and shrubs of the Sahel. Their characteristic and uses. GTZ, Eschborn. Germany. 525 pp.
6. **Mohsen, M.; Masoumeh, M.; Mahmoud, G.; Alireza, K. and Lida, J. (2008):** Sterility and Abortive Effects of the Commercial Neem (*Azadirachta indica* Jess.) extract neem on female rat (*Rattus norvegicus*). Turk, J, Zool, Vol 32: 155-162.
7. **Saudi, A. S. (2012).** Using of some environmentally available alternatives as rodenticides in Assiut area. Ph.D. Thesis, Fac. Agric., Al-Azhar University. pp.149.
8. **Schmuttere, H. (1990).** Properties and potential of natural pesticides from the neem tree *Azadirachta indica*. Annu. Rev. Entomol. 35: 271- 279.
9. **Tewari, D. N. (1992).** Monograph of neem (*Azadirachta indica* Jess). International Book Distributors, Dehra Dun, India. 274pp.

بعض الإضافات المستخدمة لزيادة سمية البارافينيلين داي أمين ضد ثلاثة أنواع من القوارض تحت الظروف المعملية، مصر

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يهدف هذا البحث الي استخدام ثلاثة تركيزات من مستخلص بذور النيم 1 و2 و3% مضافة الي 4% من البارافينيلين داي امين المحمل على جريش الذرة مقارنة بالبارافينيلين داي امين بتركيز 4% بدون إضافات كتركيز موسى به وكان الهدف من استخدام مستخلص بذور النيم هو زيادة فاعلية البارافينيلين وجرذ الحقل النيلبي *Rattus rattus frugivorus* المتسلق ذو البطن البيضاء داي امين ضد ثلاثة أنواع من القوارض المنتشرة في أسبوط وهي الجرذ تحت الظروف المعملية. *Mus musculus* والفأر السيسي *Arvicanthis niloticus*

وأظهرت النتائج ارتفاع معدل الاستهلاك من التركيزات المنخفضة من مستخلص بذور النيم مقارنة بالمرتفعة ومقارنة البارافينيلين داي امين بدون إضافات حيث كان الأعلى استهلاكاً. وكانت إناث الحيوانات أعلى استهلاكاً من الذكور حيث أعطت (53.4 و 39.5 جرام لكل حيوان) (8.0.9 و

57.15 جرام لكل حيوان) و 23.70 و 21.55 جرام لكل حيوان) لكل من الجرذ المتسلق ذو البطن البيضاء وجرذ الحقل النيلي والفأر السبسي على التوالي . وتشير البيانات الي أن الجرذ المتسلق ذو البطن البيضاء كان الأعلى استهلاكاً وكان الفأر السبسي الأقل استهلاكاً حيث كان معدل الاستهلاك 90.3 و 46.37 و 27.13 جرام لكل حيوان للأنواع الثلاثة على التوالي .

كما أشارت النتائج الي اختلاف فترة بقاء الحيوان على قيد الحياة بعد المعاملة للأنواع الثلاثة المختبرة من القوارض حيث إن هذه الفترة تزيد كلما زاد تركيز مستخلص بذور النيم في الغذاء مقارنة بالتغذية على الباربافينيلين داي امين بتركيز 4% بدون إضافة من مستخلص بذور النيم. وكانت الإناث أكثر تحملاً واستمرت لفترة أطول على قيد الحياة حيث كانت المدة (9 و 14.35 يوم لكل حيوان) و (9.5 و 10.15 يوم لكل حيوان) و (7.75 و 13.05 يوم لكل حيوان) لكل من الجرذ المتسلق ذو البطن البيضاء وجرذ الحقل النيلي والفأر السبسي على التوالي. ومن حيث الأنواع أشارت النتائج الي أن جرذ الحقل النيلي كان أكثر تحملاً من النوعين الآخرين وذلك من خلال طول مده بقاءه حياً عن غيره من الأنواع المختبرة.

كما أظهرت النتائج وجود خفض في وزن الحيوانات المختبرة بالتركيزات المختلفة من مستخلص بذور النيم المحمل على جريش الذرة . وكان الخفض في وزن الذكور اقل من الخفض في وزن الإناث لكل الأنواع المختبرة.

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