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POTENTIAL OF THE SNAIL PARASITIC NEMATODE , *RHABDITIS* SP . IN CONTROLLING THE SNAIL *Eobania vermiculata* (MULLER) AND ITS EFFECT ON ALBINO RAT, *Rattus norvegicus*

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ABSTRACT

The terrestrial snail, *Eobania vermiculata* (Müller) was exposed to different concentrations (10-300 I.S/snail) of the snail parasitic nematode, *Rhabditis* sp. under laboratory conditions (26 ± 2 ^{o}C and 70 ± 5 R. H %). Period needed for snail death decreased from 5.75± 0.64. to 1.7±0.14 days by increasing concentration from 10 IS/snail to 300IS/snail . Period from death to recovering nematodes became shortest 3.1±0.21 days at the concentration 200 I. S/snail and longest 5.77±0.55 days at 20 I. S. Period needed for relaesing nematodes was irregular and showed insignificant differences. Numbers of recovered nematodes were also irregular and not related to the nematode concentrations but showing very highly significant differences.

Three groups of laboratory bred albino rats, *Rattus norvegicus* (five individuals/each) were also exposed to infection with the same nematode (5000 I. S/rat) by three methods ,oral, injection under skin and intrapretoneal injection. No mortality was found for these treatments and no individuals of all the treated rats showed any symptoms of abnormality.

Keywords:*Rhabditis sp, Eobania vermiculata, Rattus norvegicus*, Infectivity.

INTRODUCTION

Terrestrial snails and slugs represent important economic pests in Egypt and in the world (Azzam, 1995 and Godan, 1983). The slug parasitic nematode *Phasmarhabditis hermaphrodita* (Schiender) has been successfully used to control slugs in field experiments (Wilson *et al.,* 1994, 1995, and 1996).The snail parasitic nematode *Rhabditis* sp. was recorded for the first time in Egypt and showed high infectivity different snails, slugs and insects in laboratory (Azzam, 1998). Production of this nematode from different pests was investigated and it was found that *Limax flavus* slug and *Eobania vermiculata* snail were the most adequate hosts producing high numbers of this nematode, (Azzam, 1999).

Further studies on such parasitic nematode are needed to know the most effective concentrations needed to control *E. vermiculata* snails, and safety for mammals.

MATERIALS AND METHODS

The parasitic nematodes were provided from the progeny of the original colony which was isolated for the first time in Egypt by Azzam in September,1996 from *Eobania vermiculata* snail using the same techniique in rearing the parasitic nematodes, method of infection and recovering

nematodes previously described by (Azzam 1998 and 99).

Snails used in this study were collected from Sharkia Governorate, Egypt and maintained at laboratory in rearing cages for four months before running the test to select healthy individuals needed for this investigation.

Three groups of albino, *Rattus norvegicus* rat (five individuals/each) were exposed to infection with *Rhabditis* sp. nematode (5000 I. S in one ml. distilled water/Rat). Infection occurred by three methods:

1- Oral: by using a stomach tube (gavage).
2- Injection under skin of the femur by using normal syringe.
3- Interapretoneal injection..

Another group of five rats was treated with distilled water only as a control. All groups were maintained and followed up in the laboratory for five months and supplied daily with food and water. After this period the rats were dissected to follow any internal infection with the above mentioned nematode species.

RESULTS AND DISCUSSION

Virulence to snails:

Table (1) and (Fig. 1) show that the period needed for snail death was decreased linearly with increasing of log nematode concentrations. With highly significant correlation $r^2 = 0.9$. This period was shortest (1.7 **±** 0.14 days) at the highest concentrations (300 I.S. / snails) while the longest (5.75 **±** 0.64 days) at the lowest concentrations 10 I.S./ snail .

Period from death to initial recovering nematodes was shortest (3.1 ± 0.21 days) at the concentration of 200 I. S and longest (5.17 ± 0.55 days) at 20 I. S./snail

Statistically, very highly significant differences ($P > 0.001$) appeared between the concentration of 20 I. S and each of 30, 40, 60, 70, 90, 100 and 200 I. S, as between 10 I. S and each of 90 and 200 I. S. Highly significant differences ($P > 0.01$) appeared between the concentration of 10 I. S. and 60 I. S. Significant differences ($P > 0.05$) revealed between level of 200 I. S and each of 30, 40, 80, and 300 I. S and insignificant differences between other data.

Period of recovering nematodes appeared irregular with the concentrations applied. The shortest period (17.73 ± 0.91 days) was reported for 50 I. S./snail while the longest (22.71 ± 1.46 days) was recorded at 90 I. S./snail

Statistically, insignificant differences existed between all the data.

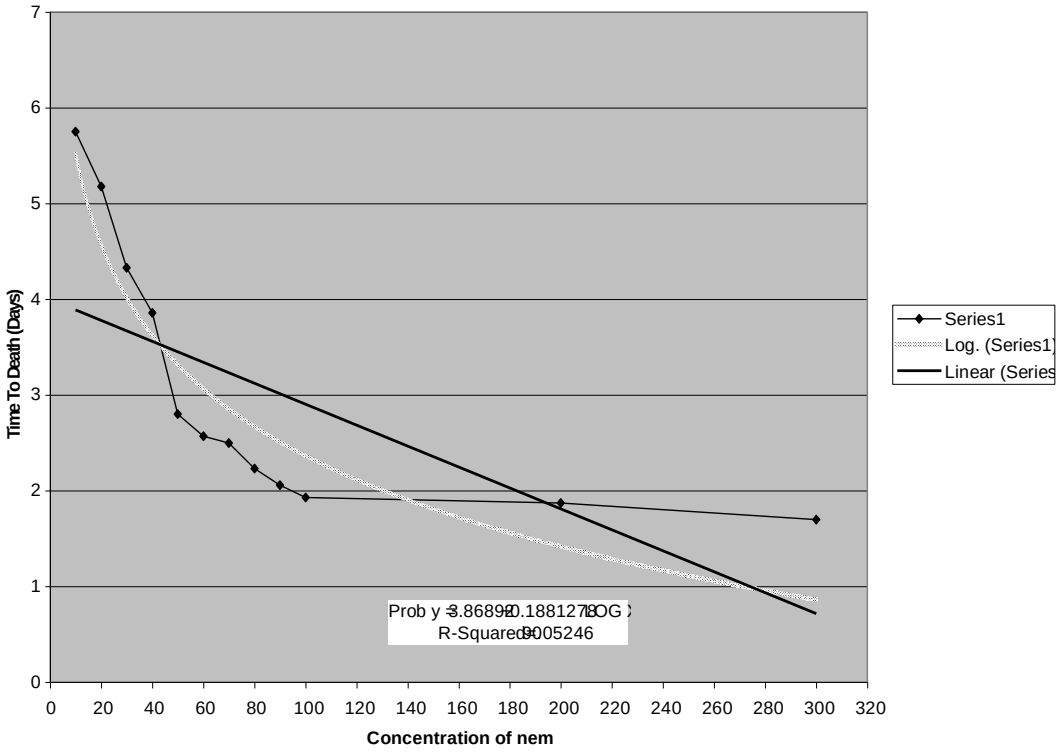
Number of infective stage produced by individual snail infected with different concentrations was also irregular and not related to the concentrations of the nematodes This is in agreement with the result of Saleh and EL Kifl (1994) on the entomopathogenic nematodes *Heterorhabditis* and *Steinernema* infecting the European corn borer *Ostrinia nubilalis***.** They attributed this phenomenon either to the aggregation of the infective juveniles which limits the number of free nematodes invading the host or to the contamination of cadavers by competitive microorganisms like

bacteria and fungi which could be the same reasons for the present data on the snails.

3 .2 Virulence to rats:

No mortality occurred either of the three infected treatment groups or control and no symptoms of illness appeared between rats, in addition to some females become pregnant after mating and produced healthy progeny. Five months post infection, dissected individuals showed no internal infection there was no any evidele of abnprmalitis or differences in the internal organs between treatments and central .

These results indicated that the snail parasitic nematode *Rhabditis* sp. could not infect vertebrate or mammals. Thus, it could considered a s safe method for controlling molluscs.



Fig(1) Relation between concentration of the snail parasitic nematode *Rhabditis* sp and time to death of the host snail *Eobania vermiculata.*

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كفاءة النيماتودا رهابديتس فى مكافحة القوقع إيوبانيا فيرميكيولاتا وتأثيرها على الفأر الابيض التركى

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معهد وقاية النباتات - مركز البحوث الزراعية - جيزة - دقى

تم تعريض القوقع الأرضى أيوبانيا فيرميكيولاتا لتركيزات مختلفة (10 -300 طور معدى / قوقع) من النيماتودا المتطفلة علي القواقع رهابديتس تحت الظروف المعملية (26 ±2م ، 70 ± 5 % رطوبه نسبيه) وجد أن الفترة من العدوى حتى موت القواقع تناقصت بازدياد تركيز النيماتودا مع وجود فرق عالى المعنويه ، سجلت أقل فترة من الموت حتي إنطلاق النيماتودا من القوقع الميت3.1 ± 0.21 يوم عند تركيز 200 طور معدى / قوقع ، بينما كانت أطول فترة 5.17 ± 0.55 يوما ، عند تركيز 20 طور معدى / قوقع 0فترة إنطلاق النيماتودا كانت غير منتظمة مع التغير في التركيزات دون وجود فرق معنوى وكان عدد النيماتودا المنطلق من القوقع بعد الموت أيضا غير منتظم التغير في التركيزات ولكن بفروق معنوية عاليه.

عرضت ثلاث مجموعات من الفأر الأبيض راش نوفيجيكس (الفأر النرويجي) (كل منها 5 أفراد) للعدوى بالنيماتودا رهابديتس 5000 طور معدي / للفأر والثالثة تم عدداها عن طريق الفم

لم يحدث موت لان من أفراد المجموعات الثلاثة ولم يظهر عليها أي أعراض إصابة .

Table (1): Infectivity and recovery of the snail parasitic nematode, *Rhobditis* sp. infected the terrestrial snails , *E. vermiculata* at 26 ± 2 °C and 70 ± 5 R.H %.

No . of nematodes snails Nematode concentration	Duration in days			Numbers of recovered nematode (I.S.)
	From infection to death	From death to recovering	period of recovering (days)	
10	*5.75 ± 0.64 (2 – 11)	*4.85 ± 0.55 (2 – 10)	*20.3 ± 2.18 (10 – 36)	*6961.25 ± 1325.11 (1390 – 20922)
20	5.18 ± 0.56 (2 – 10)	5.17 ± 0.55 (2 – 10)	19.35 ± 1.97 (7 – 36)	5599.09 ± 1134.56 (1360 – 20930)
30	4.35 ± 0.24 (1.5 – 8)	4.06 ± 0.29 (2 – 9)	18 ± 1.52 (9 – 39)	8082.65 ± 1399.3 (2256 – 30900)
40	3.86 ± 0.32 (1.5 – 7)	4 ± 0.22 (3 – 6)	20.15 ± 1.82 (10 – 39)	9273.69 ± 1778.21 (3400 – 33000)
50	2.8 ± 0.21 (1 – 5)	3.93 ± 0.24 (2 – 6)	17.73 ± 0.91 (11 – 26)	14448.73 ± 1548.72 (7950 – 34894)
60	2.57 ± 0.23 (1 – 5)	3.5 ± 0.25 (2 – 6)	20.03 ± 1.45 (9 – 34)	15953.77 ± 2359.82 (2700 – 41980)
70	2.5 ± 0.22 (1 – 5)	3.9 ± 0.27 (2 – 6)	17.83 ± 1.49 (6 – 31)	11999.17 ± 1891.48 (2440 – 30200)
80	2.23 ± 0.19 (1 – 5)	4.07 ±0.28 (2 – 7)	17.87 ± 1.24 (6 – 30)	10619.33 ± 1540.24 (4120 – 30100)
90	2.06 ± 0.17 (0.5 – 5)	3.29 ± 0.37 (2 – 6)	22.71 ± 1.46 (13 – 32)	13520.25 ± 1722.59 (2441 – 28500)
100	1.93 ± 0.16 (0.5 – 4)	3.71 ± 0.23 (2 – 6)	21.89 ±0.92 (14 – 31)	12800 ± 1455.43 (5700 – 28740)
200	1.87 ± 0.16 (0.5 – 4)	3.1 ± 0.21 (2 – 5)	18.41 ± 1.49 (6 – 32)	16510.65 ± 2729.78 (1800 – 59512)
300	1.7 ± 0.14 (0.5 – 4)	4.07 ± 0.25 (2 – 6)	20.31 ± 1.07 (11 –31)	12349.55 ± 1677.7 (2095 – 29100)

*** mean ± SE( ) range Diameter of snails ranged from 23.3 – 30 mm.**