TESTS ON THE ACTIVITY OF SLAKED LIME MIXED WITH CATTLE MANURE AGAINST *TROPINOTA SQUALIDA* (SCOP.) GRUBS (SCARABAEIDAE : COLEOPTERA)

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Abstract

The activity of mixing slaked lime with organic manure against *Tropinota squalida* Scop. grubs was evaluated under laboratory and field conditions. The laboratory results showed that mortality was proportionally related to the rate of mixing and time of exposure. 98.7 % mortality was reached in the dry manure mixed with 8% lime in comparison with 10% in dry manure. Lime was more effective against the grubs in the dry mixtrue compared with mixtures containing 4 and 8% water. Almost similar results were obtained when the tests were carried out under field conditions.

INTRODUCTION

Population increase of the rose scarabaeid , *Tropinota squalida* Scop. in different regions of Egypt, Particularly in the newly reclaimed areas has recently been observed on peach and apple trees, and some ornamental plants, especially in orchards where organic manure is used . The grubs of this insect feed on the decaying orgainc matter (humus) (Stewart and Toor, 1983) and are attracted predominantly to dung baits (Smith *et al* ., 1983)

Field obervations indicated that organic manure is the main source of infestation with the grubs of this insect and any endeavour to find successful measures for reducing the intensity of this source could help in decreasing its population density and damage. Mixing the infested manure with slaked lime might fulfil such purpose.

Adding treated manure thereafter to the soil might also benefit of soils suffering form calcium deficiency. The present work was carried out to evaluate the efficiency of such mixtures against the grubs under laboratory and field conditions.

MATERIALS AND METHODS

Laboratory tests

An Amount of cattle dung was spread and exposed to dry up under laboratory conditions (27 - 30°C and 60 - 65 % R. H.) for a month . Slaked lime was thoroughly mixed with quantities of this dry manure at the rates of 2.0 , 4.0 , 6.0 and 8.0 % (V/V) . pots (25 cm diameter) were filled , each with 3.0 kg of the mixtures , using 3 pots for each rate . Another 3 pots were filled with manure only to be used as control.

Watering tests revealed that the water capacity of the manure - lime mixture amounts to 480 ml water per pot (representing 16% (V/V) of the pot content). This rate of watering was found to casue 100% mortality to the grubs within 24h after exposure. On the light of this result, two systems of watering were used; one with 240 ml water/pot to reach half the water capacity (8%), and the second with 120 ml water/pot to reach fourth the water capacity (4%). The impact of the two watering systems on grubs was compared with that of the dry system .

Thirty 3rd instar identical grubs were released on the surface of each pot. In order to maintain the water levels in the pots , they were re-watered 5 days later using the same rates. Inspection of each pot for mortality percent was made 3 , 5 , 7 and 10 days after treatment.

Field tests

Organic manure was mixed with lime at the same rates used in the laboratory. 1/4 cubic meter of the manure was used for each rate. For each mixture, the two systems of watering (8 and 4%) were followed. Other mixtures were left dry for comparison. Each preparation was then divided into 3 portions and each portion was spread over a plastic sheet laid outdoors exposed to natural field conditions after releasing on it 30 third instar grubs. A parallel control treatment using manure only was carried out and mortality counts in the treatments and control were made 10 days later.

RESULTS AND DISCUSSION

Laboratory tests

Effect of rate of lime

The results presented in Table 1 showed that at the low rate of slaked lime (2%), the percent of dead grubs with the two watering systems and the dry treatment was 22.9 %. This value increased to 63.1 % when the rate of lime was 8% in comparison with 8.5 % for the manure separately . These results indicate that the contamination of the soil around the trees with slaked lime might also help reduce the population of the grubs and accordingly reducing the damage caused by this insect to the trees.

The dead grubs showed symptoms of shrinkage and dessication, and this was certainly due to the increase of water loss from the body by the effect of direct contact of the lime particles with the grub cuticle . It is expected also that when larvae feed on lime contaminated humus , the lime might act as a stomach poison, injuring the alimentary gut. The release of carbon dioxide through manure particles might also affect larval survival by suffocation.

Effect of time of exposure

Table 1 showed that as time elapsed after the release of the grubs on the lime - manure mixtures, the number of the affected larvae increased. For example , at the highest rate of lime (8%) , out of thirty larvae, 2, 2.3 , 3.3 and 4.3 died after exposure for 3 , 5, 7 and 10 days , respectively, compared with 1.0 , 1.3, 0.0 and 0.0 in the control .

Effect of watering system

The watering system greatly affected lime activity . About 10.0, 17.6 and 41.0 % total mortalities were obtained with 2% lime treatment in the pots containing 8.0 , 4.0 and 0.0% water , respectively. The same trend was noticed also at the higher rates of lime . At the 8% rate of lime with dry manure the percentages mortality were twice and three times the percentages resulted from mixtures containing 4 and 8% water, respectively. These results indicated that the best efficiency of lime was achieved under dry conditions. These results are in agreement with Smith

Table 1. Activity of slaked lime when mixed with cattle manure against *Tropinota squalida* grubs at different water levels under laboratory conditions.

Rate of lime %	Acerages of dead grubs at indicated days after exposura (a)														
	8 % water					4 % water					dry				
	Days after exposure														
	3	5	7	10	%(b)	3	5	7	10	%	3	5	7	10	%
2.0	0.0	0.0	1.0	2.0	10.0	0.0	2.0	0.0	3.3	17.6*	0.0	2.0	4.3	6.0	41.0*
4.0	0.0	1.0	0.0	2.0	10.0	0.0	2.0	3.3	3.0	27.7*	1.3	4.3	6.0	6.3	59.7*
6.0	3.3	3.0	0.0	0.0	21.0*	0.0	3.0	2.3	2.3	25.3*	4.0	4.3	6.3	9.0	78.7*
8.0	2.0	2.3	3.3	4.3	39.7*	3.0	4.3	4.0	4.0	51.0*	6.0	5.3	8.7	9.3	98.7*
0.0	1.0	1.3	0.0	0.0	7.7	0.0	0.0	1.0	1.3	7.7	0.0	0.0	1.0	2.0	10.0
L.S.D. at 5% level					12.7					3.5					5.1

(a) Ninety larvae were used for each treatment.
(b) Average % of dead grubs through 10 days.
* Denote significant difference.

and Kirk (1984), who stated that dung beetles increase in number during April and May under wet conditions then decrease as the soil dries with the onset of dry summer coditions.

Field tests

The results of the field tests (Table 2) revealed that grubs mortality increased as the manure water content decreased. Mixing the slaked lime with manure at 6.0 % caused 12.7 , 25.3 and 80.4 % grubs mortality in treatments receiving 8.0 , 4.0 % watering and the dry mixtrue, respectively. Although the activity shown under field conditions differed somewhat from that shown in the laboratory tests, yet the results in both experiments followed almost a similar trend.

It could be concluded that adding slaked lime to dry manure before using it , or spreading it around the trees might help reduce the population of the grubs, hence decreasing the damage caused by the emerged adults.

Table 2. Activity of slaked lime mixed with cattle manure against *Tropinota squalida* grubs under field conditions.

Lime %	Percent mortality of grubs at indicated watering systems		
	8.0% water	4.0% water	Dry
2.0	3.3	14.6	12.3
4.0	6.7	20.0*	38.7*
6.0	12.7	25.3*	80.4*
8.0	43.5*	62.0*	88.7*
0.0	3.3	3.3	4.3
L.S.D. at 5% level	7.4	11.8	13.1

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تقييم فعالية الجير المطفي مخلوطاً بالسماد العضوي في مكافحة يرقات جعل الورد الزغبي

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تم تقييم فعالية الجير المطفي بعد خلطه بالسماد العضوي علي يرقات جعل الورد الزغبي معملياً وحقلياً . أوضحت النتائج المعملية أن نسبه الموت في اليرقات كانت تتناسب تناسباً طردياً مع تركيزات المخاليط المستخدمة ، فعند استخدام التركيز المنخفض (٢٪) كان متوسط نسبه موت اليرقات ٢٢,٩ ٪ وقد ارتفعت هذه القيمه الي ٦٣,١ ٪ عند استخدام التركيز العالي (٨٪) بالمقارنة بالسماد منفرداً والذي لم تتعد نسبه الموت فيه ٨,٥ ٪ . وكان هناك ارتباطاً بين نسبه الموت وطول فترة التعريض للسماد المعامل ، فمثلا عند تعريض ٣٠ يرقة لمخلوط يحتوي علي ٨٪ جير مطفي نتجت ابادة قدرها ٦ ، ٥ ، ٩ ، ٩ يرقة بعد ٣ ، ٥ ، ٧ ، ١٠ يوماً من التعرض علي التوالي . وقد أظهرت النتائج أيضا أن الجير المطفي كان أكثر فعالية ضد اليرقات عند خلطه بالسماد الجاف فالمخلوط الجاف المحتوي علي ٨٪ جير مطفي كانت كفاءته ضعف المخلوط المحتوي علي ٤٪ ماء وثلاثة أضعاف المخلوط المحتوي علي ٨٪ ماء.

وعند تطبيق الأختبارات تحت الظروف الحقلية أعطي الجير نتائج مماثله تقريباً لنظيرتها المتحصل عليها معمليا.