CONTROLLING OF DATE-PALM SNAIL *COCHLICELLA ACUTA (MULLER) FAM: HELICIDAE.* BY USING SAFE MATERIALS COMPARED WITH RECOMMENDED MOLLUSCICIDES AT DUMIAT GOVERNORATE

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Abstract

These studies were conducted at Dumiat province on date-palm snail *Cochlicella acuta* (Muller) Fam: Helicidae. under field and Laboratory conditions to evaluate the efficiency of four safe materials, agricultural sulphur, calcium super phosphate, hydrated lime and ashes compared with three recommended molluscicides, Lannate 90%, metaldehyde and skipper.

Under laboratory conditions, lannate90% recorded high mortality (94%) followed by, metaldehyde bait, agricultural sulphur, skipper, hydrated lime, ashes and calcium super phosphate which represented 91%, 90%, 89%, 81%, 78% and 71% respectively.

Under field conditions tested palms were chosen from five locations, El-Senania, Kafr El Batikh, Om El-Redda, El-Rekabiah and Kafr El-Ghab of Dumiat Governorate.

The obtained data showed significant differences between tested compounds which recorded, (81%),(75%), 74%, (70%) and (69%) for lannate 90, metaldehyde, agricultural sulphur, skipper and hydrated lime. While calcium super phosphate and ashes were similar or equal (63%) for each, safe materials were effective by rates of 250,500, 500 and 250 gram/palm of agricultural sulphur, calcium super phosphate, hydrated lime and ashes respectively, while lannate90,metaldehyde and skipper used in rates, 5.0, 20.0 and 20.0 gram/palm respectively.

INTRODUCTION

In the recent years, land snails increased and became dangerous agricultural pest causing great damage to field and vegetable corps in addition to horticultural vegetations such as citrus, guava, orchard, pear, mango and date palm as well as ornamental plants eating all plant parts. Further more damage was manifested in chewing soft vegetative parts such as flowers, fruits. Godan(1983) and El-Okda(1980).

The use of specific molluscicides and other candidate insecticides is considered one of the most effective measures available at present for the control of terrestrial gastropods, also using molluscicides in high concentrations has a toxic effect on man and livestock and cause pollution of environment El-Wakil and Radwan (1991).

Moreover, watery molluscicides caused great damage to the primary bud of the palm specially which planted in a new land as reclamation crop in desert and semi-desert land and caused palm deterioration resulting from bacterial and fungal disease, thus we must find a suitable method for safety control without harmful toxicity, environmental pollution and costs, Ghamry et al (1994) also Duncan(1983), El Hwashy and others(1996) several important reviews have been published during the present decade Kloos and Mc Cullough (1982) Marston and Hostetmann (1985) and Mott (1987)

In recent years, many researchers tried to find anew methods, Agricultural, biological, mechanical and ecological control more safe, cheaper, readily available such as wild herb (Ambrosia maritime) Godan(1983).

Therefore, this study was planned to find safe materials, available, cheaper and effective against land snails and useful for plant as fertilizer and preventive treatment against fungal and bacterial diseases, the hope that they may available and suitable than the use of imported harmful molluscicides and insecticides Port and Ester (2002) and Satoshi (2003).

MATERIALS AND METHODS

1- Tested compounds and rates

a) Compounds under laboratory conditions:-

these followed compounds were used in rate of one gram/20 cm of cabbage leaf

1- agricultural sulphur:-

Used as dust on cabbage leaves by the rate of one gram / replicate

2- Calcium super phosphate:

In sort of dust on leaves by using powder sprinkler as well as hydrated lime and ashes.

3- lannate (methomyl) 90:

Provided by Dupont company and used as dust by using power sprayer on cabbage leaves.

4- Metaldeyde bait:-(recommended molluscicides).

Used as dust by pulverizing the pellets or grains and treat the leaves with dust by using sprinkler.

5- Skipper:- (recommended molluscicides).

Using the pulverized skipper pellets as dust and sprayed on cabbage leaves

Tested snails *C.acuta* were collected from untreated fields from Dumiat Governorate in November 2004 and reared in laboratory, fed on fresh cabbage leaves for 3 months before starting the experiments.

b) Under field conditions

These studies carried out in El-Senania, Kafr El-Batekh, El-Rekabia, Om Redda and Kafr Saad during the Peroid of 2005, using the followed compounds:-

1- Agricultural sulphur in rate of 250gram/palm.

2- Calcium super phosphate used as fertilizer and control by direct sowing on palm by rate of 500 gram/palm.

3- Loam: in sort of dust by rate of 500 gram/palm.

4- Ashes: sprayed as dust by rate of 250gram/palm.

5- lannate 90 as powder by rate of 5 gram/palm but sprayed by fine powder sprayer.

6- The same technique with metaldehyde and skipper by using 20 gram/palm for each.

Technique used

In El- Serw agricultural research station,The studies were carried out into three replicates for each treatment in laboratory addition to control (eight treatments X three replicates).

25 snails were put in plastic jar[10x20x10cm] as a replicate.eight treatments X three replicates X 25 snails.

Plastic jars relatively full of mixed soil with sand[1:1] as substrate of each replicate

Tested snails exposed and fed on treated cabbage leaves for 24 hours, and then dead snails were counted and transferred on clean and fresh cabbage leaves for measuring the residual effect after 3, 5, 10, 15 days.dead snails were counted carefully and recorded to Godan (1983) and Abbott (1925) number of snails was counted pre and after treatment in both of laboratorial and field trials.

Analysis of variance was carried out to state the significant differences between tested compounds .

RESULTS AND DISCUSSION

Data in table 1 revaluated that there are significantly different between recommended molluscicides, candidate insecticides and safe materials as showed :-

1-under laboratory conditions

Lannate 90 recorded high mortality through 24 hours exposure followed by metaldehyde, agricultural sulphur, skipper, loam, ashes and calcium super phosphate, (14.8), (13.4), (12.6), (12.6), (10.9), (10.7) and (9.7) respectively and the reduction percentages were, (59%), (54%), (50%), (50%), (44%), (43%) and (39%) for

lannate 90, metaldehyde, skipper, agricultural sulpher, hydrated lime, ashes and calcium super phosphate respectively Also, final or grand effect resulting from mean of total reduction of snails as a resiclual effect of tested compounds where recorded 23.6 individuals from 25 tested snails followed by, metaldehyde, agricultural sulphur, skipper, hydrated lime, ashes, and calcium super phosphate (22.7), (22.6), (22.2), (20.2), (19.6) and (17.7) respectively.

Residual effect of tested compounds showed the accumulation of mortality through the period of the trail or after 15 days reduction percentages (94%), (91%), (90%), (89%), (81%), (78%) and (71%) for lannate 90, metaldehyde, agricultural sulphur, skipper, hydrated lime, ashes and finally calcium super phosphate.

From analysis of variances, Data showed no significantly different between tested compounds after 24h. exposure, while there were significantly different between tested compounds after 3days as well as in the case of 5, 10, 15 days respectively, comes in agreement with that of Cowie (2001) and El-Wakil and Radwan (1992).

2-Under Field Conditions

After relatively successive results which obtained from laboratorial trails, these compounds evaluated under field conditions, in El-Senania, Kafr El-Batekh, El-Rekabia, Om Redd and Kafr Saad where date-palm were common and wildly spread at damiatta governorate through the period of March –April2005.The obtained data which showed in table2 treated palms were chosen randomly from open fields, planted of mixed fruit trees beside date-palms, snail counting and carried out carefully as a natural number of snails on tested palms(22palms from each location) seven treatments with three replicates of each treatment in addition to one palm for control. .

Table 1. The effect of tested safe materials compared with recommended molluscicides against date-palm snail *cochlicella acuta* under laboratory conditions at Dumiat Governorate.

Tested Compounds	No. Of Tested Snails	After 24h.Expouser				Residual Effect Of Tested Compounds Under Laboratory Conditions			
		NO. Of Dead Snails	R%	NO. After 3 days	NO. After 5 days	NO. After 10 days	NO. After 15 days	Grand NO. Of Dead Snails	R%
Agricultural sulphur	25	12.0 a	50	7.0 a	1.7 bc	0.66 b	1.3 bc	22.6	90
Calcium super phosphate Hydrated	25	9.7 a	39.5	5.7 ab	1.3 c	0.66 b	0.3 bc	17.7	71
lime	25	10.7 a	44	5.3 ab	1.3 c	1.0 ab	1.9 a	20.2	81
ashes	25	10.7 a	43	4.3 bc	2.3 ab	1.3 a	1 ab	19.6	78
Lannate90	25	14.3 a	59	5.7 ab	2.6 ab	0.3 b	0.7 c	23.6	94
metaldhyde	25	13.0 a	54	4.3 bc	3.0 c	1.4 ab	1 ab	22.7	91
skipper	25	12.0 a	50	3.0 c	3.3 ab	2.6 a	1.3 a	22.2	89
control .	25	0.33 b	1.30	0.3 d	0.0 d	0.3 b	0.0 C	0.9	3.6
L.S.D 0.05	L.S.D	5.18		1.92	0.93	0.80	0.75		

Table 2. Number of dead snails as a residual effect of tested compounds against date-palm snail *C-acuta* under field conditions through the period of March-April 2005

Tested Compounds	No. of Snails On Palm Pretrea-Tment	Residual Effect Of Tested Compounds Under Field Conditions								Mean of Total Dead Snails
		After 3days		After 5days		After 10days		After 15days		
		No. Dead Snails	R%	No. Dead Snails	R%	No. Dead Snails	R%	No. Dead Snails	R%	
Agricultural Sulphur	250.0	92.3	36.9	110	38.5	141.3	56.5	184	74	184
Calcium Super Phosphate	286.0	83.7	29.3	141	49.2	158	55.0	180	63	180
Hydrated Lime	210.0	100.0	47.6	100	47.6	144	68.6	145	69	145
Ashes	224.0	84.0	37.5	98	43.7	138	61.6	139	63	139
Lannate90	232.0	140	60.3	147.4	63.5	164	71	187	81	187
Metaldhyde	246.0	144	58.5	156	63.4	159	65	183	75	183
Skipper	228.0	130	57.6	141.6	62.1	143	63	159	70	159
Control	210.0	4.0	1.9	2.0	1	0.0	0	0.0	0	6.0
L.SD			4.67		4.34		4.11		2.78	

Table 3.Number of dead snails as a residual effect of tested compounds against date-palm snail *C-acuta* under field conditions through the period of March-April 2005

Tested Compounds	No. Of Snails On Palm Pre trea-Tment	Residual Effect Of Tested Compounds Under Field Conditions								Mean Of Total Dead Snails
		After 3days		After 5days		After 10days		After 15days		
		No. Dead Snails	R%	No. Dead Snails	R%	No. Dead Snails	R%	No. Dead Snails	R%	
Agricultural Sulphur	250	92.3	36.9c	110	38.5d	141.3	56.5d	184	74B	184
Calcium Super Phosphate	286	83.7	29.3d	141	49.2b	158	55.0d	180	63D	180
Hydrated Lime	210.0	100.0	47.6b	100	47.6bc	144	68.6ab	145	69C	145
Ashes	224	84.0	37.5c	98	43.7c	138	61.6c	139	63D	139
Lannate90	232	140	60.3A	147.4	63.5a	164	71a	187	81A	187
Metaldhyde	246	144	58.5a	156	63.4a	159	65c	183	75B	183
Skipper	228	130	57.6a	141.6	62.1a	143	63bc	159	70C	159
Control	210	4.0	1.9E	2.0	1E	0.0	0E	0.0	0E	6
L.SD			4.67		4.34		4.11		2.78	

Means followed by the same letter are not significantly different according to the analysis of variance.

Mean numbers of life snails before treatment were, 250.0, 286.0, 210, 224.0, 232.0, 246, 228.0 and 210.0 snails.

Agricultural sulphur, calcium super phosphate, loam, ashes, lannate 90, metaldehyde, skipper and control respectively, the reduction of snail numbers increased gradually through 3, 5, 10, 15 days after control where

Mean number of dead individuals on tested palms after 15 days recorded 184, 180, 145, 139, 187, 183, 159 and 6.0 snails for agricultural sulphur, calcium super phosphate, hydrated lime, ashes, lannate 90, metaldhyde, skipper and control .dead snails were removed and transformed to the laboratory in plastic jars, counted carefully and recorded according to Godan (1983).Lannate 90 recorded high mortality after 3days (140) individuals followed by Metaldehyde, skipper and loam where represented 60.3%, 58.5, 57.6, 47.6, 37.5% 36.9 and 29.3 for Lannate 90, metaldehyde, skipper, hydrated lime, Ashes, agricultural sulphur and calcium super phosphate, respectively.

The total mean of dead snails was recorded after 15days for agricultural sulphur, calcium super phosphate, Loam, Ashes, Lannate 90, Metaldehyde, Skipper, (184.0), (180.0), (145.0), (139.0), (187.4), (183.6) and (159.4) respectively, reduction percentages were recorded (74%), (63%), (69%), (63%), (81%) (75%) and (76%) for each, agricultural sulphur, Calcium super phosphate, hydrated lime, Ashes, respectively. We find that Lannate 90, recorded high mortality percentage (81%) followed by metaldehyde, calcium super phosphate, skipper and Loam, (75%), (74%), (70%), (69%) while ashes and calcium super phosphate recorded the same percentage 63% for each these results agreed with Godan(1983), Baker(2002) and Cowie(2001).

Analysis of variance was conducted to state the significant differences between mortality percentages as showed in table3 in addition to L.SD, means followed by the same letters mean that there is no significant different between tested compounds and these letters followed the percentages of dead snails which resulting from tested compounds agreeable with El-Wakil and Radwan (1992).

On other hand under field conditions, tested compounds showed significant deference throw 3, 5, 10, 15days as residual effect where L.SD recorded 4.67, 4.34, 4.11 and 2.78 respectively these safe compounds acted as irritating compounds against land snails.

CONCLUSION

According to obtained data from table 1, 2, 3 The relative results of recommended molluscicides, candidate insecticides and safe materials which

principally used as fertilizer which available, cheaper and more safe for man and his livestock, moreover, preventive treatment against snails bacterial and fungal disease without environmental pollution, from the previous results, agricultural sulphur, hydrated lime and Ashes were readily available to use against land snails specially *C.acuta* on date-palm when planted in new reclaimed land desert and semi-desert.

Using watery sprayer cause great damage and destruction to the primary bud of palms due to bacterial and fungal disease.

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مكافحة قوقع نخيل البلح *Cochlicell acuta* باستخدام المواد الآمنة مع المقارنة بمبيدات الرخويات.

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معهد بحوث وقاية النباتات- مركز البحوث الزراعية- الدقي- جيزة.

أجريت هذه الدراسات في محافظة دمياط على قوقع نخيل البلح *C.acuta* تحت الظروف المعملية والحقلية لتقييم تأثير أربعة من المواد الآمنة والمتاحة والتي تستخدم طبيعياً كأسمدة وهي:-

١- الكبريت الزراعي بصورته المجهزة على شكل مسحوق.

٢- سماد سوبر فوسفات الكالسيوم.

٣- الجير المطفي والمخزن جيداً في أكياس بلاستيك.

٤- تراب القش.

بالإضافة إلى اثنين من المبيدات الرخوية الموصي بها وهي:-

٥- الميتالدهيد على شكل حبيبات طعوم مجهزة.

٦- الاسكيبر على شكل حبيبات طعوم مجهزة.

كذلك استخدام المبيد الحشري لانيت ٩٠ وهو من المجموعة التي تستخدم في مقاومة الرخويات.

الهدف الرئيسي لهذه التجربة هو إمكانية وجود بدائل للمبيدات الضارة بالبيئة وصحة الإنسان والحيوان ومنع تلوث الفاكهة بمتبقيات المبيدات والأهم من ذلك كله ظروف طبيعة نمو النخيل حيث أن الفسائل المنقولة للأراضي الجديدة والمستصلحة حساسة جداً للرطوبة والماء الذي يؤدي إلى تلف وتعفن البرعم الرئيسي للفسيلة بسبب القابلية لنمو البكتيريا والميكروبات التي ساعد عليها استخدام المبيدات المائية.

لذلك كان لابد من إيجاد بدائل آمنة على صورة مساحيق جافة وفي نفس الوقت تستخدم كأسمدة علاوة على أنها متوفرة ورخيصة التكاليف.

من خلال التجربة المعملية نجد أن اللانيت ٩٠ حقق نسبة إبادة ٩٤% يليه الميتالدهيد ٩١% يليه الكبريت الزراعي ٩٠% ثم بعد ذلك الإسكيبر ٨٩% والجير المطفي٨١% وتراب القش ٧٨% تم أخيرا السوبر فوسفات ٧١% بينما تحت الظروف الحقلية فقد كانت نسب الإبادة كما يلي ٨١% ، ٧٥%، ٧٤%، ٧٠%، ٦٩% لكلاً من اللانيت٩٠، الميتالدهيد، الإسكيبر، والجير المطفي بالترتيب.

أما بالنسبة لسوبر فوسفات الكالسيوم فقد كانت نسبة الإبادة ٦٣% ورماد القش ٦٢% كمتوسطات نهائية بعد ١٥يوم من استخدام المبيدات مما يعطي الأمل في إيجاد حل لمشاكل تلوث البيئة وغذاء صحي آمن.