

FIELD TRIALS ON THE BAIT ATTRACTIVE DISTANCES AND EVALUATION THE EFFICACY OF METHOMYL USING DIFFERENT CONTROL APPLICATION METHODS AGAINST THE GASTROPOD PEST *Monacha cartusiana* (MÜLLER) INFESTING CLOVER FIELDS.

**Ismail, Sh. A.A.; S.Z.S. Shetaia; A.A.I. Arafa and M.M. Khattab
Plant Protection Research Institute, Agric. Res. Center, Dokki,Giza,
Egypt .**

ABSTRACT

The effect of attractive intervals distances and some control application methods on the efficacy of methomyl against *Monacha cartusiana* (Müller) snails were studied under field conditions during the growing season of 2012/2013. Results revealed that poisonous baits of methomyl containing wheat bran and sugar can syrup can attract *M. cartusiana* snails far from 100 cm. These results included that bait stations of poisonous bran baits for control land snails could be applied on two meters intervals between station and the other. Regarding the evaluation of two application methods commonly used in controlling land snails: spray and poisonous baits. Results indicated that poisonous baits were more effectiveness than spray technique. Moreover when poisonous baits were put as piles on plastic pieces was the best technique to reduce numbers of *M. cartusiana* snails in Egyptian clover fields. Finally, it could be recommended that station of bran poisonous baits could put on two meters intervals and piles on plastic pieces method was the best application methods for controlling land snails under field conditions.

INTRODUCTION

Gastropod molluscs have been largely neglected in the pest control literature, and yet currently constitute some of the most significant and intractable threats to sustainable agriculture. Instances of crop losses from herbivorous gastropods have been reported throughout recorded history. The increased pest status has been associated with cultivation of new crops, intensification of agricultural production system, and the spread through human trade travel of species adapted to these modified environments (Barker, 2002).

In Egypt, land snails have been increased and distributed rapidly in most governorates. They caused considerable damage in field of vegetables and fruit crops as well as ornamental plants where they find the optimal condition for survival and reproduction (Kassab and Daoud 1964). In Sharkia governorate, land snails considered one of the most injurious to crops causing severe damage in vegetables and field crops as well as orchards (Ghamry *et al* 1993, Ismail, 1997, El- Masry, 1997 Ismail, 2004, Lokma, 2007, Ismail *et al*, 2011, Abed, 2011, and Lokma 2013). Most pesticides are applied in spray, dust or granular formulations but only occasionally as baits. In

contrast, molluscicides directed against terrestrial gastropods are only occasionally delivered as sprays or dusts but are more usually deployed in baits. For this reason, application technology is largely concerned with the composition of baits and how, where and when to apply them (Barker, 2002). The present study aim to through light on bait attractive and evaluate some application control methods (spray or poisonous baits) against *M. cartusiana* snails under field conditions at Sharkia Governorate .

MATERIALS AND METHODS

1-Study area :

Study area where subjected to this experiments was belonging to Hehia EL-balad, Hehia district, Sharkia governorate neighboring Bahr Mowais. Field and vegetable crops were cultivated in this area and heavily infested with the glassy clover snail *Monacha cartusiana* (MÜller). A field of Egyptian clover was chosen to conduct this study during the growing season of 2012/ 2013.

2- The effect of intervals baits distances on attractive snails.

A field cultivated with Egyptian clover and heavy infested with *M. cartusiana* (MÜller) snails was chosen for this study. This experiment was carried out in April 2013 during the activity season of land snails. Adult snails selected for this study were collected in the field pre application. Four colors, white, red, blue and black were painted the selected snails in the field pre application .Three replicates were done as follow: snails painted with white color were put in a circle shape at 25 cm, red color snails were put in a circle shape at 50 cm, blue color were put in a circle shape at 75 cm and black color were put in a circle shape at 100 cm, respectively far from poisonous baits. Egyptian clover was cutting immediately pre application. Poisonous baits of methomyl containing wheat bran and sugar can syrup were put in marked places as well as paints 40 adult snails were made a circle shape randomly around the site of poisonous baits at the different chosen distances. Number of live attracted snails was counted and removed after 1,3and 7 days post treatment. It's necessary to clear the difficulty to continue this study after 7 days because increasing Egyptian clover growth.

3-Evaluation of some application control methods in controlling *M. cartusiana* snails:

The aim of this study was to evaluate some control methods such as spray and poisonous baits under field conditions. An area about one feddan cultivated with Egyptian clover and heavy infested with *M. cartusiana* snails was choosed for this study. About 1/4 feddan was selected for every treatment and repeated three times. The first was subjected to spray application of methomyl with 1 liter/fed. On the other hand, poisonous baits were applied at three application methods, hand sowing, under plant stack (Takbeesh) and piles put on plastic pieces.

Egyptian clover was cutting in the beginning of April 2013. Seven days lasted from cutting Egyptian clover, poisonous baits of methomyl was prepared as follows: (2 ml methomyl + 8 ml sugar can syrup + 90 gm wheat

bran) to give 100 parts from poisonous bait. On the other side spray technique was carried out before sun rise in the same day of baits application. Alive and dead snails were calculated at three replicated chosen randomly before treatment and 1,3 ,7,14,and 21 days post treatment .Reduction percentage of land snails were calculated according the formula giving by Henderson and Tilton (1955). Obtained data was subjected to statical analysis to calculated L.S.D. In all cases the field of experiments was irrigated before application

RESULTS AND DISCUSSION

1-The effect of intervals bait distances on snail attractive:

Data in Table (1) showed the ability of methomyl poisonous baits on attraction *M. cartusiana* snails on different intervals distances under field condition.

Table (1): Number of attractive snails of *Monacha cartusiana* to methomyl poison baits at different intervals distances in Egyptian clover field at Sharkia Governorate during the growing season 2012/ 2013.

Days after application	Attractive distance (cm)				Total numbers		
		25	50	75	100	Number	% attracted snails
1	No	18	19	16	20	73	60.8
	%	24.7	26.6	21.9	24.4		
3	No	15	16	15	13	59	49.1
	%	25.4	27.1	25.4	22.0		
7	No	14	12	13	12	51	42.5
	%	53.5	23.5	25.5	23.5		

*It s difficult to inspect, the snails after seven days because the growth of Egyptian clover was increased.

Results revealed that the number of attractive snails was high in the first days post treatments than the other days third and seventh days post treatments. For instance, number of attractive snails recorded 18, 19, 16 and 20snails at 25, 50, 75 and 100 cm, respectively. The parallel values after 3 and 7 days were (15, 16, 15, 13) and (14, 12, 13, 12) snails, respectively, where noticed that, attracted snails were decreased until the end of experiment. Regarding total numbers of the attracted snails were 73.59 and snail with percentages 60.8, 49.1 and 42.5 for the three tested (1, 3 and 7 days), respectively. Generally it could be concluded that the poisonous baits of methomyl which contain wheat bran and sugar cane syrup can attract the snails far from one meter (100 cm).

When discussing these result the literature is very rare in this field Bohm (1957) noticed that in the field the attractive effect is limited to a radius of a, 0.5 to 1 m around each clump, according to Thomas (1948) *Milax budapestensis* were lured to the bait up to a distance of 91.5 cm from a clump. While, the distance was 45.7 cm for *Arion hortinsus*. These distances

appear, however, to be too great for practical application, since Godan (1961) found in laboratory experiments on alfactory sense that, in still air, 12 cm was the upper limit for detection. Clumps of bran or metaldehyde -bran bait placed in the middle of 25 cm² dishes, were detected by *limax maximus* (50 animals) up to distances of 12 cm. At distances of more than 12 cm only 14% of slugs found the bait. In moving air, by contrast, detections over far greater distances had been observed. Thus *Helix pomatia* was able to in strong air currents, to detect cabbage leave up to 40 cm a way, but only to 6 cm in still air (Fischer, 1950). The largest catch after treatment with bait occurs during the first night, as was first noted by Barnes and Well (1942) for metaldehyde. Over a period 7 nights, the number of slugs caught total number (4.684) during the first night was 55 % or more than half during the second and third nights 18% and 18 % respectively. Ismail (2008) found that the general mean of daily movement of *M. cartusiana* snails in cultivated land 0.95 cm while it reached 2.46cm in fallow land. One year later, the same author (2009) found that Birell syrup was more preferable attractive materials than sugar can syrup when mixed with fine wheat bran.

2- Evaluation of some application methods in controlling *M. Cartusiana* snail under field conditions:

Molluscide direct against land molluscs are occasionally delivered as sparays or dusts but are more usually deployed in baits. For this reasons, the effect of two applied control methods spray and poisonous baits against *M. cartusiana* snails poisonous baits were evaluated under field conditions. Spray technique \was applied with methomyl at 1L/F while poisonous baits was applied in three treatments sowing, under plant stack (Takbeesh) and piles put on plastic pieces.

Table (2): Effect of different application methods on the efficiency of methomyl against *Monacha cartusiana* under field conditions at Sharkia Governorate.

Application methods	Reduction percentage after indicated days								
	1 day	3 days	Initial effect after first 3 days	7 days	14 days	21 days	Residual effect during the rest period	General mean	
Spray	31.67	22.26	26.97	10.60	3.85	2.93	5.79	16.38 ^b	
Poisons baits	Sowing	62.89	62.35	62.62	49.16	4.78	31.23	40.39	51.51 ^a
	Takbeesh	82.52	76.53	79.52	55.92	51.58	34.41	47.30	63.41 ^a
	piles	78.41	73.87	76.14	69.76	60.81	57.89	62.82	69.48 ^a

* Numbers followed by the same latter (s) were not significantly different (P< 0.05) according to Dun cans multiple range test.

Data in Table (2) showd that when spray technique applied with methomyl 1 L/F gave 26.97% and5.7% for the initial and residual effect reduction of *M. cartusiana* snails. Regarding general mean it reached 16.38% reducing of *M. cartusiana* snails under field condition .On the other hand methomyl applied as poison baits with three different technique sowing ,

under plant stock (Takbeesh) and piles it gave initial effect for the three tested technique 62.62, 79.52 and 76.14% reduction of *M. cartusiana* snails respectively. The residual effect was less than initial effect where gave 40.39, 47.30 and 62.82% reduction, respectively. Regarding general mean it noticed that piles put on plastic pieces gave the higher effect of reduction percentage than other two technique where gave 69.48, 63.41, and 51.51%, respectively.

Statistical analysis revealed that bait technique was significantly different than spray methods. On the other hand, piles put on plastic pieces was more effective than the other technique in controlling *M. cartusiana* snails. It could be concluded that poison baits methods as control methods of *M. Cartusiana* snails and piles put on plastic pieces bait technique was the best methods in controlling *M. cartusiana snails* in Egyptian clover fields.

Discussing the foregoing results we find different results: Kassab and Daoud (1964) found that copper sulphat when used in spraying at 0.5% under filed condition gave 98.5 percent mortality against both species *Helicella (xeropite) vestalis* and *Theba pisana*. Palis *et al* (1996) reported that nclosamide 70 % up as recommended molluscides for both direct seeded and transplanted leurland rice snail control from the fertilizer and pesticide. They reported that nclosamide 250 EC at 1.0 and 1.5 L/ha provided excellent control of golden apple snails infesting both direct seeded and transplanted lour land rice.

Lokma (2013) tested metaldehyde and methiocarb at three different applications methods, hand sowing under plant stack and put on plastic pieces in field experiment. He found that percent reduction in numbers of *M. cartusiana* snail was markedly increased with hand sowing compared with the other two methods.

REFERENCES

- Abed, M. (2011). Biological studies on land snail *Monacha cartusiana* in Sharkia and Mounofia Governorates. M.Sc. Thesis, Fac. Sci., Al- Azhar Univ., 110 pp.
- Barker, G. M. (2002). Molluscs as crop pestes. CAB, International, Walling Forti Dxon 10 DE. Uk, 468 pp.
- Barnes, H. F. and Well, J. W. (1942). Baiting slugs using metaldehyde mixed aith various substances. Ann. Appl. Bio., 29: 56-58.
- Bohm, D. (1957). Uber Schnecken und Schneckenbekampfung. Pflanzenschutz Berichtewien, 19: 111- 129. C. F. (Godan, D. (1983). Pest slugs and snails, biology and control. Springer- Verlag Berlin Heidelberg, 445pp.
- El- Masry, S. A. (1997). Studies on the control of some land snails infesting certain fruit trees. Ph.D. Thesis, Fac. Agric. Zagazig. Univ., 150 pp.
- Fischer, P. H. (1950). Vieetmoeurs des mollusques. Paris: 1-312. C.F (Godan, D. (1983). Pest slugs and snails, biology and control. Springer-Verlag Berlin Heidelberg, 445pp.)

- Ghamry, E. M.; H. I. El- Deeb and Y. A. Kokab (1993). Ecological and morphological studies in certain land snail at Sharkia Governorate. Egypt. J. Appl. Sci., 8 (11): 213-225.
- Godan, D. (1961). Untersuchungen über die Wirksamkeit von Metaldehyde kodern anf Nadtschnecken unter Berücksichtigung ihrer inrer Verhaltensreaktionen. Nachrichtenble. Deutch. Pflanzenschutzd (Braunschupio), 13:113- 120. C.F (Godan, D. (1983). Pest slugs and snails, biology and control. Springer- Verlag Berlin Heidelberg, 445pp.)
- Henderson, G. F and Tilton, E. W. (1955). Test with acaricides against the brown mite. J. Econ. Entomol. 48: 157- 161.
- Ismail, Sh. A.A. (1997). Ecological, biological and control of certain terrestrial snails infesting some vegetables and field crops in Sharkia Governorate. Ph.D. Thesis, Fac. Agric. Zagazig Univ., 130 pp.
- Ismail, Sh. A.A. (2004). Ecobiological studies on the brown garden snail *Eobaina vermiculata* MÜller under laboratory and filed conditions in Sharkia Governorate. Zagazig J. Agric. Res., 31 (1): 293- 305.
- Ismail, Sh. A.A. (2008). Daily activity, movement and food consumption of *Monacha cartusiana* snails under laboratory and field conditions in Sharkia Governorate. Egypt. J. of Appl. Sci., 23(10B):700-708.
- Ismail, Sh. A. A. (2009) Effect of bait colour, carrier and attractive materials on the efficiency of methomyl against two land snail species under field conditions. Al- Azhar. J. Agric. Sci. Res., 6: 245-254
- Ismail, Sh. A.A.; S. Z. S. Shetaia; A. I. Arafa and S. F. Abd- El-Atty (2011). Incidence and seasonal fluctuations of certain land gastropod species associated with some crops and weeds at Sharkia Governorate. J. Plant Prot. Path., Monsoura Univ., 2 (12): 1103- 1110.
- Kassab, A. and Daoud, H. (1964): Notes on the biology and control of land snails of economic importance in the U.A.R. the Agric. Res. Rev., 12: 77-98.
- Lokma, M. H. E. (2007). Studies on some terrestrial gastropods injurious to field crops at Sharkia Governorate. M.Sc. Thesis, Fac. Agric., Zagazig Univ., 147pp.
- Lokma, M. H. E. (2013): Studies on some terrestrial molluscs injurious to vegetables and field crops in east delta locality (Sharkia and Ismelia). Ph.D. Thesise, Fac. Agric. Moshtohor Benha Univ., 179pp.
- Palis, F. V.; Macatula, R.f. and Browning, A. L. (1996): Niclosamide, an effective molluscicide for the golden apple snail (*Pommaea canaliculata*) Lamark control in Phillippine rice production system. BCPC Sympasium Proceedings No: 66 Slug and Snail Pests in Agriculture 66:213-230.
- Thomas, D. C. (1948). Some observations on damage to potatoes by slugs. Ann. Appl. Biol., 34:246- 251.

تجارب حقلية علي مسافات جذب الطعوم وتقييم كفاءة مبيد الميثوميل باستخدام طرق مكافحة تطبيقية مختلفة ضد الافة البطنقمية موناكا كارتوسيانا (مولر) الذي يصيب حقول البرسيم
شحاتة أحمد علي إسماعيل، سباعي زياد سليمان شيتية، عبد الحق عبد الحق إبراهيم عرفة و محمد محمود درويش خطاب.
معهد بحوث وقاية النباتات- مركز البحوث الزراعية - الدقي - جيزة - مصر.

أجريت دراسات حقلية علي امكانيه جذب الطعوم السامه علي مسافات مختلفه من موضع الطعم السامة تحت الظروف الحقلية وكذلك تم تقييم طريقه الرش وطريقه الطعوم السامه باكثر من طريقة تطبيق وهو النثر والتكبيش ووضع الطعم على هيئة اكوام على قطع بلاستيك

اظهرت النتائج ان الطعم المجهز من مبيد الميثوميل والرده الناعمه والعسل الاسود جذب القواقع للطعم على مسافه متر واحد وهذا يعنى انه يمكن وضع محطات الطعوم السامه على مسافه مترين بين كل محطه واخرى. أما بالنسبه لتقييم طريقه الرش وطريقه الطعوم السامه لمكافحه القواقع الارضيه في حقول البرسيم المصرى اوضحت النتائج أن طريقه المكافحه بالطعم السام هي أكثر كفاءة من طريقه المكافحه بالرش وعند تقييم طريقه المكافحه بالطعوم السامه باكثر من طريقه للتطبيق وهي نثرا وتكبيشا واكوام على قطع بلاستيك اوضحت النتائج ان وضع الطعوم السامه عموما على هيئة اكوام على قطع بلاستيك اعطى اعلى نسبه خفض للتعداد في قوقع البرسيم الزجاجة (موناكا كارتوسيانا) الذي يصيب حقول البرسيم المصرى.

لذا نوصى بوضع محطات الطعوم السامة على مسافة مترين بين المحطة والأخرى واستخدام طريقه المكافحه بالطعوم السامة بوضعها على هيئة اكوام على قطع بلاستيك لمكافحه قوقع البرسيم الزجاجة في حقول البرسيم المصرى.