Evaluation of Two Spinosyn Products on The Differential Response of *Spodoptera Littoralis* Tagged Egg Masses, Through Field Observation in Beheira Governorate In EGYPT

Abd El-Rahman, Kh.A and A.Z. EL-Naggar
Plant Protection Research Institute, Agric. Res. Center, Alex., Egypt
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ABSTRACT

Field trials, utilizing two Spinosyn products; Spinosad and spinetoram were made in Beheira Governorate to combat the egg masses of the cotton leaf worm, *Spodoptera littoralis*, throughout the subsequent seasons of 2005 and 2006.Spinetoram (radiant 12 SC) as gram active ingredient or as volume of formulated compound was significantly stronger than Spinosad (spintor 24 SC) on egg masses of cotton leaf worm. Adding mineral oil enhanced the activity of both products especially at the lower rates. Mortality of the entire egg masses was achieved by Spinetoram12 SC at 20ml (2.4gm a.i.) and by Spinosad 24 SC at 50 ml (12 gm a.i.) /fed. ; confirming that Spinetoram as active ingredient was 5 times stronger than Spinosad.

INTRODUCTION

The cotton leaf worm Spodoptera *littoralis* (Boisd) (CLW) is a key pest in Egypt. It is active all year round attacking cotton as well as more than 29 plants hosts of crops and vegetables in Egypt. Cotton, clover and soybean may represent the most preferable host crops.

The rate of CLW infestation could reach up to 50,000 egg-masses /fed, causing severe damage to leaves, flowers and bolls (Temerak 2002). CLW has 7 generations all over year with 3 ones on cotton. The most serious one is during June coming from clover. Majority of the egg masses is deposited on the lower surface of cotton leaves. Before spraying program, Ministry of Agricultural (MOA) use to pick up the egg masses of this pest every 3 days for a period of 4 – 5 weeks from recently irrigated cotton field. Hand-picking of CLW egg-masses is practiced as reliable and safe approach of control, particularly in the first generation of CLW on cotton in Egypt (El-Badawy et al., 1980). Nowadays, satisfactory hand picking is facing serious problems due to the labour availability as well as the cost.

However, this process is not enough to control CLW due to its overlapping generations. In addition, when cotton grows too big, this process becomes too difficult .Consequently; the Ministry of Agriculture

(MOA) used to spray the cotton plantations by pesticides besides hand picking (Temerak 2002).

El-Dahan *et al.* (1990) indicated that IGRs are very weak to control egg masses but chlorpyrifos ethyl was the best ovicides for all ages of CLW egg masses. However, MOA cancelled the conventional insecticides as control measure against CLW egg masses to conserve the natural enemies (Temerak 2002).

For the time being Spinosad is the only rapid product with the MOA to face egg masses and conserve the natural enemies; besides the compliment from the unavailability of extra safe good ovidcide. Radiant was chosen to be investigated for its possible efficiency of against CLW egg masses in order to add an additional resource of control measures.

MATERIALS AND METHODS

Products used

1- Spinetoram (Radiant 12 SC) is a new product from Spinosyns group. It is usually used at the recommended rate of 10, 15 and 20 ml/fed. alone or in tank mix with mineral oil at 1000ml/fed.

It was tested at five progressive rates from 15 up to 55 ml /fed .in 2005.In 2006 these rates were 10 up to 50 ml/fed. The least one was mixed with one Liter of mineral oil.

2-Spinosad (Spintor 24 SC): is a metabolite of the Actinomycete, *Saccharopolyspora spinosa* Martz & Yao. It is a naturally occurring mixture of two active products (Spinosyn A & D). It is a trademark of Dow Agro Sciences Co.

The used rates were 20, 30 ml alone or in tank mixed with 1000ml mineral oil/fed in addition to the recommended rate (50ml/fed.). The performed trials were made by tagging the natural fresh egg masses located on the lower surface of cotton leaves in the field. The assessment of mortality was done at 1st, 2 nd and 3 rd day after spray.

Screening for effective doses of Spinetoram (Radiant 12 SC)

A field trial was done in an experimental station at Beheira Governorate to screen the effective doses; in 2005.Cotton variety was Giza 89. During June, fresh egg-masses were tagged on the lower surfaces of the leaves of cotton plants. Forty egg masses were tagged / treatment. Total of 280 ones was used including untreated.

Comparative efficiency of mixed lower doses of spintor24SC and radiant 12 SC with mineral oil

Another field trial was also conducted in an experimental station at Beheira Governorate in 2006 to determine the effective lower dose of both tested products mixed with mineral oil. Cotton variety was Giza 89. During

June, freshly deposited egg-masses are usually located and tagged on the lower surfaces of the leaves of cotton plants. Forty five egg masses were tagged / treatment. Total of 450 ones was used including untreated.

Prevailing temperature and relative humidity were 29° C and 70 %, respectively. Spraying was made by Knapsack sprayer and at the flowering stage. Spray applications took place on 8, June and 10, June for 2005 and 2006, respectively

Assessment

Daily inspection was followed up to 3 days after hatching. The inspected egg masses were classified as follow:

1-Eggmasses hatched, showing the alive neonate larvae without any kill were referred as hatched alive

2-Eggmasses hatched, showing at time of inspection all larvae as a mix of alive and dead ones are referred as hatched alive/dead

3. -Egg masses having the neonate larvae dead inside the eggs (cannot hatched) or on the way to hatch are referred as dead inside; while the egg masses having the neonate larvae dead on the top of egg masses are referred as dead outside

RESULTS AND DISCUSSION

The included results in Table 1 show the calculated percentages of mortality of the tagged egg masses of *S.littoralis*, after treatment by Radiant 12 SC and Spintor 24SC at Beheira Governorate. Taking in consideration that the best way and the proper time for controlling an insect like CLW is to spray the egg masses or the freshly hatched neonate larvae before they get distributed through many directions and began to cause considerable damage of leaves.

Radiant at 25 ml/fed showed entire mortality (100 %) of the treated egg masses; and was equal to that observed for Spintor 24 SC at 50 ml/fed. This result confirmed that Radiant 12 SC is significantly stronger than spintor. Whereas, Radiant as formulation was as 2.5 times stronger than Spintor.

Mortality numbers of the entire tagged egg masses after being sprayed by Radiant or Spintor alone or/and in mixture with mineral oil are shown in Table 2. Percent total mortality of tagged egg masses and

number of inspected cotton leaves showing symptoms of larval feeding are also included in Table 3.

Adding oil appeared to enhance the activity of both products especially at the applied lower rates. The lower rate of Radiant 12 SC as

10ml/fed was up lifted to be as 50 ml by adding oil. The same trend was valid for Spintor at 20 and 30 ml/fed (table2).

Adding oil may protect both products from UV light and consequently prolongs their residual effect. Adding mineral oil enhances performance, elongate residual time and persistence of certain products (El-Deeb 1993 and Mourad *et al.*, 1994). Nolting *et* al. (1997) indicated that mortality of treated eggs of *Heliothis* started at the larva ingestion Spinosad when they fed on the contaminated chorion of the egg during hatching. It was observed that before neonate larvae die, most of moribund larvae were standing vertically. Peterson *et al.* (1997) indicated that application of Spinosad in conjunction with naturally occurring beneficial arthropods are an excellent example of a functional cotton integrated pest management (IPM) program. Spinosad is one the of most promising new chemicals, which has a favorable mammalian toxicity and environmental profile (Sparks *et al.* 1995).The availability of a novel chemical group, with a new mode of action that is different from conventional insecticides in current use, is an assistance to insecticide resistance management programs (Horowitz and Ishaaya 1994). Furthermore, Temerak 2003 indicated that Spinosad is not easily affected by the existing resistance mechanisms for conventional insecticides in Egypt.

Generally it could be concluded that Radiant 12 SC at 20 ml/fed or Spintor 24 SC (Spinosad) at 50 ml /fed. can replace handpicking of egg masses in Egypt. In order to attain efficient control and lower expenses, addition of oil can reduce the applied rate as well as the cost.

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Table (1): Efficiency of Radiant 12 SC and / or Spintor 24 SC treatment upon the mortality of the tagged egg masses of *Spodoptera littoralis* in Beheira Governorate.

Treatment	Rate (ml)/Fed	Total No. tagged	No. of killed egg masses			Mortality % of egg masses		
			1st d	2nd d	3rd d	1st d	2nd d	3rd d
Radiant 12 Sc	55	40	40	40	40	100	100	100
	45	40	40	40	40	100	100	100
	35	40	40	40	40	100	100	100
	25	40	40	40	40	100	100	100
	15	40	28	36	40	70	90	100
Spintor	50	40	38	39	40	95	97.5	100
Untreated check		40						

Table (2): Efficiency of Radiant 12 SC and / or Spintor 24 SC on the mortality of tagged egg masses of *Spodoptera littorallis* in Beheira Governorate.

Treatment	Rate (ml) / fed	No. of hatched alive larvae			No. of hatched alive+ dead			No. dead outside+ inside		
		1st d	2nd d	3rd d	1st d	2nd d	3rd d	1st d	2nd d	3rd d
Radiant 12 SC	50	0	0	0	0	0	0	45	45	45
	40	0	0	0	0	0	0	45	45	45
	30	0	0	0	9	0	0	36	45	45
	20	0	0	0	12	0	0	33	45	45
	10	5	4	3	20	16	12	20	25	30
Radiant+ oil	10+ 1000	0	0	0	3	2	0	42	43	45
Spintor	50	0	0	0	0	0	0	45	45	45
Spintor+ oil	30+ 1000	0	0	0	7	0	0	38	45	45
	20+1000	0	0	0	22	7	0	23	38	45
Untreated check		45	45	45	0	0	0	0	0	0

Table (3): Effect of performed field treatments on the percent of entire mortality of *S. littoralis* egg masses and revealed symptoms of cotton leaves damage.

Treatment	Rate (ml) / Fed.	Mortality % of egg masses			No. of damaged leaves
		1st d	2nd d	3rd d	
Radiant 12 Sc	50	100	100	100	0
	40	100	100	100	0
	30	80	100	100	0
	20	73	100	100	0
	10	44	55.5	66.6	5
Radiant + oil	10+1000	93	95.5	100	0
Spintor	50	100	100	100	0
Spintor+ oil	30+1000	84.4	100	100	0
	20+1000	51.1	84.4	100	0
Untreated check					100

الملخص العربى

تأثير مركبين من مجموعة سبينوسين على لطع دودة ورق القطن وذلك من خلال دراسات حقلية فى محافظة البحيرة

خليفة أحمد عبد الرحمن – على زكريا النجار

معهد بحوث وقاية النباتات– مركز البحوث الزراعية – الإسكندرية – مصر

تم إجراء دراسات حقلية لدراسة تأثير مركبين من مجموعة سبينوسين وهما سبينوساد ، والسباينتورام على لطع دودة ورق القطن وذلك فى موسمين متتالين ٢٠٠٥ ، ٢٠٠٦ فى محافظة البحيرة.

أظهرت النتائج أن مركب السباينتورام (الرادينت ١٢ إس سى) مقدرا بالجم من المادة الفعالة أو بالحجم من تجهيزه المركب كان أكثر تأثيرا من مركب السبينوساد (سبينتور ٢٤ إس سى) على لطع دودة ورق القطن وأوضحت النتائج كذلك أن إضافة الزيت المعدنى زاد من فعالية تلك المركبات وخاصة فى الجرعات المنخفضة.أعطى كل من مركبى السباينتورام ١٢ إس سى بتركيز ٢٠ مل (٢,٤ جم مادة فعالة) ومركب السبينوساد٢٤ إس سى بتركيز ٥٠ مل (١٢ جم مادة فعالة) نسبة موت ١٠٠ % . وأوضحت النتائج الأخيرة أن مركب السباينتورام مقدرا بالجم مادة فعالة كان أقوى ٥ مرات عن مركب السبينوساد.