

Relationship between certain tested spraying techniques and residual activity of pyriproxyfen as a lost spray between cotton plants against *S-littoralis* (Bosid)

Reda, F.A. Bakr¹; Nevein S. Ahmed²; Noha A.M. Geneidy¹; M.A. Hindy³ and Rehab. A. A. Dar³.

1- Entomology Dept., fac. of science; Ain shams Univ., Cairo, Egypt.

2- Central Agric. Pest. Lab., Agric Res. Centre, Dokki, Giza, Egypt.

3- Spray Tech. Rec. Dept., Plant pro tec. Res. Instit, Agric. Res. Center, Giza, Egypt.

ABSTRRICT

The present work was carried out to determine quality, quantity of lost spraying on ground and the biological efficiency produced by three ground equipment, knapsack motor sprayer (20L/fed) compression hand held sprayer (94L/fed), and conventional ground motor sprayer (600L/fed). Pyriproxyfen formulation was used for controlling *S. littoralis* (Bosid) on cotton fields with recommended dose and 3/4 recommended dose during season 2006. Data showed that the disappearance of pyriproxyfen residue from soil takes place at the 15th day for Agromondo and Kwazar sprayer treatments, while at the 21st day for wisconsin conventional sprayer treatments. The amount of pyriproxyfen residue in soil sprayed with 3/4 recommended dose rate was less than that sprayed with full recommended dose rate for the three sprayers. Agromondo sprayer revealed the least amount of pyriproxyfen residues in soil followed by kwazar sprayer and wisconsin motor sprayer revealed the largest amount of residues. Also data showed that there was no significant difference between 3/4 recommended dose rate and full recommended dose rate with pyriproxyfen in case of agromondo motor sprayer and hand held sprayer in bioefficacy.

Key words: Spraying, application, pyriproxyfen residue, cotton fields, *S. littoralis*.

INTRODUCTION

The cotton plant is one of the most economically and important crop in Egypt. It was greatly attacked by many pests from seedling stage till harvest, causing various degrees and types of damage. The cotton leaf worm, *S. Littoralis* (Boisd) in particular causes serious damage to cotton plant and others of more than 112 plant species (Hamoudo, 2002). Control programs of *S. littoralis* in Egypt, mostly depend on the use of various conventional insecticides with has given rise to problems such as residual toxicity and development of pest resistance. In order to avoid these hazards, there is great need to develop alternative safe control agent with new modes of action (Murphy *et al*; 1976).

Much attention has been focused on compounds which disrupt the normal process of insect development. They are known as insect growth regulators (IGR's).

Many investigations studied the adsorption of pyriproxyfen in different soils. Data showed that, the longer the contact period was the higher the adsorption and vice versa (Mohamed *et al*. 2002) and Zidan *et al* (2002). A comparative studies on the efficiency of certain ground sprayer was carried out by (Hindy, 1992) who recorded significant variation in the deposit due to the type of nozzles, spray techniques and rate of application.

This work was spot light on the spray quantity, quality of different doses utilizing by three ground

spraying techniques of pyriproxyfen in soil between cotton plants.

MATERIALS AND METHODS

1- Field experiment and sampling:

Field experiment was carried out during cotton season 2006 at 28th June in private cotton field located at Kafer. Bani Ghgrian, Koiesna District, Monofiya Governorate. Cotton seeds variety Giza 89 was planted under the normal field conditions and agriculture practice in plots of 420 m² each. A full coverage spray with pyriproxyfen commercial name (admiral 10% EC) were sprayed at the recommended rate (750 ml/fed) and 3/4 recommended rate (562.5 ml/fed) in adequate meteorological conditions. The spraying equipment were knapsack motor sprayer Agromondo (20L/fed), hand held compression sprayer (Kwazar) (94 L/fed) and conventional motor sprayer (wisconson) (600L/fed). Three replicates of the soil under cotton plants weighting about 500gm were taken at intervals zero time, 1, 3, 7, 10, 15 and 21 days. Subsampling of 100gm for each interval was weighed after complete homogeneity of replicates. The preservation of samples was stored in the deep freezer at -20^oC until analysis. The soil was subjected to the mechanical analysis, and the results obtained are tabulated in (1).

Tabulated (1): Mechanical properties of used soil:

Texture	Mechanical composition		
	% Sand	% Silt	% Clay
Soil	22	44	34

2- Extraction, clean up and Determination:

Soil samples were grinded, and then 100gm were placed in 500 ml conical flasks, each contained 50 gm anhydrous sodium sulphate and 200 ml one methylene chloride. The flasks were shaken for two hours using on electrical shaker. The layers were left to separate, and the solvent was filtered

through a plug of cotton containing anhydrous sodium sulphate into a graduated cylinder and subjected to evaporate at 30^oC using a rotary evaporator and subjected to the method of clean up, The extraction, cleaning up and the determination of samples were done according to the method of (Ahemd *et al* 2001).

Recovery rate:

The average recovery values at the fortified limits 0.5 and 1 ppm in cotton soil were 91.20 and 90.40%, respectively. These values were used to correct all obtained values and to examine the reliability of the analytical procedures

3- Collection and measurement of lost spray on ground:

A sampling line was constructed of five wire holder fixed in diagonal line inside each treatment to collect lost spray between plants; each wire holder top has a fixed water sensitive paper (Novartis cards.) on it. Number and size of blue spots (deposited droplets) on water sensitive papers were measured with a special scaled monocular lens (Struben) with a magnification power of 15x. The diameter data of the spots were corrected with the knowledge of the spread factor, and converted to actual volume mean diameter (VMD), and the number of droplets in one square centimeter according to Gabir (1995).

RESULTS

Table (1): Lost spray on ground, as produced by low volumes ground equipment at the early cotton season (2006), using pyriproxyfen at recommended rate and 3/4 recommended rate against 1st & 2nd larval instars of *S. littozalis*.

Insecticide and dose rate (ml/fed)	Tested sprayer and spray volume (L/fed)	N/cm ² of total spray droplet	N/cm ² droplets on ground	%N/cm ² (ground X 100 after day treatment) / N/cm ² (plants ground)	%Mortality After day of treatment	Average Mean Residue
Pyriproxyfen (750)	Agromondo (20)	582	90	15	95	97.5
	Kwazar (94)	492	105	21	84	92
Pyriproxyfen (562.5)	Agromondo (20)	563	80	14	91	95.5
	Kwazar (94)	424	85	20	82	91

Chemical studies:

I- Residue analysis of pyriproxyfen in contaminated soil under the cotton plants using different ground sprayers with two different doses:

I.A. Motorized knapsack sprayer (Agromondo):

(i) Full recommended dose rate:

Fig. (1) showed that, the initial deposit of pyriproxyfen in soil as determined one hour after application was 4.38 ppm. After one day of application the value decreased to 3.09 ppm indicating the percentages loss 29.45% following that period, the residue rapidly decreased to 0.31 ppm indicating the percentage loss 92.92%, 10 days after application.

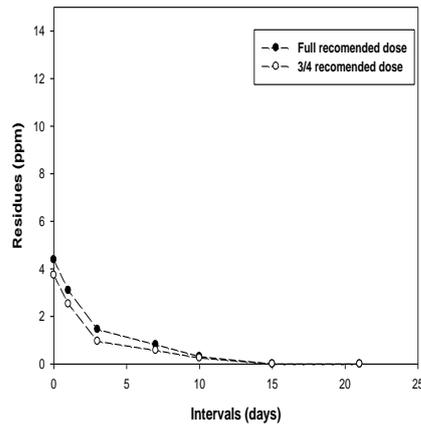


Fig. (1): Pyriproxyfen residues in soil using Agromondo sprayer.

ii) 3/4 Recommended dose rate:

The initial deposit of pyriproxyfen in soil as determined one hour after application was 3.73 ppm. After one day of application the value decreased to 5.52 ppm indicating the percentage loss 32.44% following that period, the residues rapidly decreased to 0.25 ppm indicating the percentage loss 93.30%, 10 days after application.

I.B. Hand- held compression (kwazar) sprayer:-

(i) Full recommended dose rate:

Fig. (2) illustrated that, the initial deposit of pyriproxyfen in soil as determined one hour after

application was 7.09 ppm. After one day of application the value decreased to 6.73 ppm indicating the percentage loss 5.08%. Following that period, the residues rapidly decreased to 0.38 ppm indicating the percentage loss 94.64%, 10 days after application.

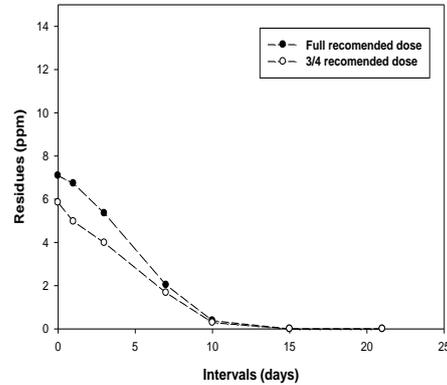


Fig. (2): Pyriproxyfen residues in soil using Kwazar sprayer

(ii) 3/4 Recommended dose rate

The initial deposit of pyriproxyfen in soil as determined one hour after application was 5.85 ppm. After one day of application, the value decreased to 4.97 ppm indicating the percentage loss 15.04%. Following that period, the residue rapidly decreased to 0.29 ppm indicating the percentage loss 95.04%, 10 days after application.

I.C. Conventional motor sprayer (Wisconsin):

(i) Full recommended dose rate

Fig (3) indicated that, the initial deposit of pyriproxyfen in soil as determined one hour after application was 12.56 ppm. After one day of application the value decreased to 11.24 ppm indicating the percentage loss 10.51%. Following that period, the residues rapidly decreased to 0.31 ppm indicating the percentage loss 97.53%, 15 days after application.

(ii) 3/4 Recommended dose rate

Also fig (3) showed that, the initial deposit of pyriproxyfen in soil as determined one hour after application was 10.01 ppm. After one

day of application, the value decreased to 8.06 ppm indicating the percentage loss 19.48%.

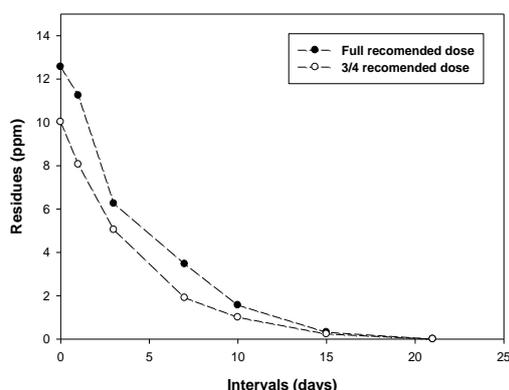


Fig. (3): Pyriproxyfen residues in soil using Wisconson sprayer

Following that period, the residues rapidly decreased to 0.23 ppm indicating the percentage loss 97.70%, 15 days after application. Samples taken after 21 days of application by the three sprayers. The two doses were devoid of any detectable amounts of pyriproxyfen residues in soil according to the sensitivity of the procedure of determination. There was a positive complete correlation between N/cm^2 and the amount of pyriproxyfen residue in soil under cotton plants.

DISCUSSION

As conclusion, data indicate the faster degradation of pyriproxyfen in soil. Agromondo motor sprayer (20L/fed) showed lowest levels of residues with fast degradation rate of all intervals, followed by kwazar sprayer (94L /fed) and finally with wisconson motor sprayer (600L/fed).

The 3/4 recommended dose for the whole sprayers as predicted give lower residues than full recommended dose. According to EL- Sayed *et al.* (1976) which stated that the amount of deposits depended on the rate of application. These, results are in harmony with that obtained by

(Schaefer et al, 1988, and Schaefer and Miura, 1990).

The disappearance of pyriproxyfen residue from soil takes place at the 15th day for Agromondo and kwazar sprayer treatments, while at the 21st day for wisconson sprayers treatments.

The amount of pyriproxyfen residue in soil sprayed with 3/4 recommended dose rate was less than that sprayed with full recommended dose rate for three sprayers as expected. Agromondo sprayer revealed the least amount of pyriproxyfen residues in soil followed by kwazar sprayer, and wisconson sprayer revealed the largest amount of residues.

REFERENCES

- El-Sayed, M. M.; Doghiem, S. M. ; Hindi, S.A.; Shahin, A. and Abd El-Salam, M. (1976). persistence of certain Organophosphorus insecticides on some vegetables Bull- Ent. Soc. Egypt., Econ. Ser. 10: 41-49.
- Gabir, I. (19945). Spraying application of pesticide with aspecial refrence to the ndle of electrostatics (in Arabic) lectures and Notes, fac, Agric, Ain shams Univ. Egypt, 217p.
- Hindy, M. A. (1992). Qualitative distribntion of watery dyed spray proluced by certain ground aprayersin cotton. Bull. Ent. Soc., Egypt, 19: 221- 227.
- Hamouda, L.S. (2002). Toxicological and biochemical studies on the effect of ad miral (IGR) and Nuclear polyhedrosis virus (SNPV) on *S. littoralis* (Boisd) larvae. J. Egypt. Acad. Soc. Environ. Develop. CA. Entomology 92 (1): 15-29.
- Nevein, S.A.; Reda, F.A. B.; Noha, A.M. G.; Hindy, M.A. and Rehab, A.A.D. (2007). Residual activity of

- pyriproxyfen against *S. littoralis* (Boisd) as affected by certain ground application parameters in cotton fields. African, J. Biol. Sci., 3 (2): 45-52.
- Murphy, D.W., Sohi, S.S. and fast, P.G (1976). *B. thuringiensis* enzyme dig ested endotoxin : Effection cultured inssect cells. Science , 194: 954-956.
- Mohamed, K.A.; Gupta, G.; Zidan, Z.H.; Afifi, F.A. and Abd El-Ghani, S.B (2002). Factors influencing the adsorption desorption behaviour and down ward movement of pyriproxyfen and Isoproth; olane pesticides in soils. The first conf. of the central Agric. Pesticide Lab., pp: 91-105.
- Shaefer, C.H. and Miura, T. (1990). chemical persintenee and effects of S-31183, 2- (1-methyl2 (4 phenoxyh enoxyethoxy)

ARABIC SUMMARY

العلاقة بين بعض طرق الرش المختبرة ونشاط الاثر الباقي لمادة البيروبروكسفين كفاقد للرش بين نباتات القطن لمكافحة دودة ورق القطن

رضا فضيل على بكر^١ - نيفين صلاح الدين احمد^٢ - نهى عوني محمد جنيدى^١
محمد عبدالعزيز محمد هندی^٣ - رحاب عبد المطلب عبد المقصود دار^٣

١- قسم علوم الحشرات- كلية العلوم - جامعة عين شمس- القاهرة- مصر

٢- قسم بحوث متبقيات المبيدات وتلوث البيئة- المعمل المركزى للمبيدات- مركز البحوث الزراعية- الدقى الجيزة- مصر

٣- قسم بحوث تكنولوجيا الرش- معهد وقاية النباتات- مركز البحوث الزراعية- الدقى -الجيزة- مصر

يهدف هذا البحث لاجراء تقييم كمى وكيفى للفاقد من رواسب الرش على التربة وعلاقة ذلك بالفاعلية البيولوجية الناتجة عن استخدام ثلاث معدات ارضية - الموتور الظهرى (٢٠ لتر / فدان) - الرشاشة اليدوية ذات المكبس الهوائى (٩٤ لتر / فدان) - وموتور الرش الارضى التقليدى (٦٠٠ لتر / فدان) - حيث تم استخدام مركب البيروبروكسفين فى مكافحة دودة ورق القطن فى حقول القطن لموسم ٢٠٠٦ باستخدام معدل الجرعة الموصى بها ، ٤/٣ الجرعة الموصى بها.

اوضحت النتائج ان اختفاء الاثر الباقي لمركب البيروبروكسفين من التربة تم بعد ١٥ يوم بالنسبة لمعاملات الموتور الظهرى (اجريموندو) والرشاشة اليدوية ذات المكبس الهوائى - بينما معاملات الموتور الارضى التقليدى ٦٠٠ لتر / فدان، اختفى الاثر المتبقى للمركب ذاته فى اليوم الحادى والعشرون. وان الكميات المتبقية من مركب البيروبروكسفين المرشوشة فى التربة بمعدل ٤/٣ الجرعة كانت اقل من الجرعات العادية لنفس الثلاث الات.

حقق الموتور الظهرى (اجريموندو) اقل كمية من متبقيات مبيد البيروبروكسفين يتبعه الرشاشة اليدوية ذات المكبس الهوائى بينما حقق موتور الرش الارضى التقليدى اعلى كمية من المتبقيات - كما اوضحت النتائج انه لا يوجد فرق معنوى فى الفاعلية البيولوجية لمتبقيات البيروبروكسفين بين الجرعة الكاملة و ٤/٣ الجرعة الكاملة على موت يرقات دودة ورق القطن وذلك فى حالة الموتور الظهرى (اجريموندو) و الرشاشة اليدوية ذات المكبس الهوائى.