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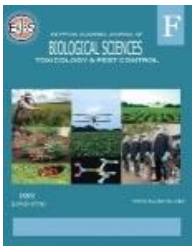

The Role of Nu-Film-17 Spreader in Improvement Droplets Distribution and Increasing Insecticidal Activity of Certain Insecticides on The Spiny Bollworm, *Earias insulana* ON Cotton Plants in Egypt.

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ABSTRACT

Field experiments were carried out of about 14 karats planted with (Giza 86) cotton variety during seasons 2018 and 2019 on 15th July and 1st, 15th August in a field located at Qaha Research Station, Plant Protection Research Institute, Qalyoubia governorate. The selected area was split into 6 plots and the control plot. Two alternative products include Chlorpyriphos (OP's), and Chlorflurzoran (IGR's) were sprayed by using Rotary Matabi sprayer (18 L./fed.) on cotton field highly infested with cotton Spiny bollworm, *Earias insulana* larvae. All tested Insecticides revealed a significant negative influence on *Earias insulana* larvae. The most effective on reduction percentages of bolls infestation was Chlorpyriphos with NU-FILM -17 SPREADER®1% ,5% followed by Chlorflurzoran with NU-FILM -17 SPREADER® 1% ,5% with Rotary Matabi sprayer (18 L./fed.). It could be recommended to use these Insecticides with Low Volume spraying equipment with not less than (18L/Fed.). A satisfactory coverage was obtained on cotton plants. The spectrum of droplets ranging between 120-170 µm (VMD). With sufficient number ranging from 13-265 N/cm². The rate of performance of Rotary Matabi sprayer (18 L./fed.). was 2.4 Fed./day. The results indicated that there was no significant difference between using NU-FILM -17 SPREADER® 1% or 5% in reduction percentages of bolls infestation. Using both Chlorpyriphos and Chlorflurzoran with NU-FILM -17 SPREADER® 1% could be recommended in controlling Spiny bollworm, *Earias insulana* larvae because it increased droplets numbers 54%, decreased droplet sizes 17 % and minimized lost spray on ground 44% which made good spray quality, homogeneity and spray coverage. Also, Low Volume spraying reducing the time lost in the process filling the machines with the spray solution and saving the lost spray on the ground certainly in small plantation around villages.

INTRODUCTION

Cotton *Gossypium barbadense* is one of the most important economic crops. Cotton crop is attacked by a large number of polyphagous pests (Dhawan, 1993). *Earias insulana* (Boisduval) (Noctuidae: Lepidoptera) is known as a cotton pest (Reed, 1994),

(Kumar, *et al*. 2014). Spiny bollworm larvae infesting bolls, damaging cotton squares, buds, flowers, seeds, and fiber, especially at the late growth stage of cotton plants that cause decreasing in the quality and quantity in the lint and oil of the obtained yield. (Butt *et al*., 2001).

In the present study, considerable effort was devoted to searching for some new compounds containing IGR's, Chlorflurzoran that have insecticidal activities against the spiny bollworm which represents one of the most destructive cotton pests in Egypt and many other countries.

The previous compounds and one OP's Chlorpyriphos compound were tested in the cotton field with Rotary Matabi sprayer (18 L./fed.) to study the relationship between spray quality and the larval survival of *Earias insulana* produced by the previous spraying equipment in the field were determined.

A comparative study was carried out on the efficiency of different ground sprayers by (Hindy, 1992 and 1997), who detected a significant variation in the spray deposit due to the arrangement of the nozzles, spray volume, spraying type and rate of application. The world global attention was directed to the minimization of spraying volumes and the control costs which may be happened by using cheap and effective insecticides or using developmental ground spraying techniques with low application costs per feddan (Magdoline *et al*. ,1992) and (Mathews,1992). Maintaining sprayers for pesticide application in a good state of repairing and proper working in order to reduce their harmful effects on human health and environment Dokic *et al.* (2018) . This work aimed to determine the role of insecticides alone and with NU-FILM -17 SPREADER®1%,5% in controlling *E. insulana* larvae on cotton plants with the conservation of agricultural environment.

MATERIALS AND METHODS

The Tested Compunds:

1. Chlorpyriphos (Drusban ®), 48% E.C., 1 L/ fed., (Organophosphorous), Acetyl cholinesterase inhibitor.
2. Chlorflurzoran, (Caprice ®), 5%E. C., 400 / cm^3 / fed. (IGRs), Chitin synthesis inhibitor.
3- NU-FILM -17 SPREADER® : Extender sticker-spreader.

The active ingredient: Pinolene® terpenic polymer non-ionic; di-1-p-Menthene 96%+inert ingredients 4%.

General Properties: It is a superior sticking –extending agent designed to control the life of pesticides. It is compatible with the spray tank with all commercially used pesticide products and soluble fertilizers. It forms a sticky, elastic film which encapsulates and tenaciously holds the pesticide on the crop foliage, this protective film greatly reduces the effects of environmental degrading factors, which reduce the effectiveness of pesticide sprays. It will not foam, freeze or clog nozzles. It improves the initial pesticide deposit and allows excellent re-distribution concentrate sprayer deposits, to give complete homogenous coverage. It prevents rainfall and wind erosion of pesticides from the leaf surfaces. It shields the pesticide spray residue from heat and ultraviolet radiation which often causes pesticide degradation. Pesticide volatilization was minimized by the protective film. Loss of pesticide deposits by the abrasive activity of leaves rubbing together is also prevented.

Spraying Equipment Tested on The Cotton Field:

One ground application machine was selected to perform the scope of this work, as recommended used equipment in applying pesticides on cotton pests.

1. Rotary Matabi sprayer Spraying volume (18 L/fed.) Espine made.

Techno-operational data of the sprayer mentioned in table (1).

Table 1: Techno-Operational data of Rotary Matabi sprayer applied to the Cotton field during seasons (2018,2019).

Items	ɒtary Matabi sprayer
Type of atomization	Centrifugal (Rotary Spinning disc)
Nozzle type	One restirector
Pump type	-
Number of nozzles	1
Pressure (bar)	-
Spray tank (L.)	2+10
Rate of application (L/fed.)	18
Working speed (Km/h.)	2.4
Swath width (m.)	1
Flow rate (L/min.)	0.173
Spray height (m.)	0.5
Type of Spraying	Target in all treatments
Productivity * (fed./h.)	0.571
Rate of performance* (fed./day)	2.4
Source of power	4 big size, 1.5 Volt batteries

* Number of spraying hours = 8 hours daily.
* Calculations of productivity and rate of performance according to Hindy (1992).
*****Number of workers =2.

Calibration and Performance Adjustment of The Tested Equipment:

. Collection and measurement of Spray deposit:

. Collection of the spray deposit

Before spraying each cotton field treatment, a sampling line was constructed of a five-wire holder fixed in diagonal line inside each treatment to collect lost spray between plants; each wire holder top has fixed water-sensitive paper (Novartis Cards) on it. Also, each five cotton plants about 100 cm length, the water-sensitive paper cards were put at three levels of the cotton plant; upper, middle and lower to collect the spray deposits on cotton leaves, were designed after Hindy (1989). After spraying all cards were collected and transferred carefully to the laboratory for measuring and calculating the number of droplets/cm² and its volumes (VMD) in all treatments.

Determination of Spray Deposit:

Both of number and size of blue spots (deposited droplets) on water-sensitive papers (Novartis cards) were measured with a special scaled monocular lens (Strüben)® X15. The volume means diameter (VMD) and mean of droplets number in one square centimeter (N/cm²) was estimated, the spread factor of water-sensitive paper was 2.2, according to Hindy (1992).

Execution of Field Experiments:

a-Arrangements of the Experiments:

Field experiments were carried out during 2018 and 2019 cotton seasons at Qaha Research Station, Plant Protection Research Institute, Qalyoubia Governorate. Cultivated with cotton variety (Giza 86) on April 15th in cotton seasons 2018 and 2019. The experimental design was a randomized complete block with 3 replicates, the whole cultivated area (14 Karats) was divided into equally 6 plots i.e.(10 x8.4) m^2 , each plot were treated with one of the tested insecticides, by the tested equipment while the remaining plot was left untreated as

a control. Cotton seeds were sown at 20 cm distance between hills. Spraying of the tested pesticides took place on cotton plants three times on July, 15th, 1st, and 15th August, respectively, with Rotary sprayer (Matabi) (18L. / fed.) Each Insecticide was applied individually and with NU-FILM -17 SPREADER® 1% ,5%. The experiments were done under local meteorological conditions of 35°C average temperature, 60 % average RH and 2 m/sec. average wind velocity during experiments. To evaluate the effect of the three treatments against spiny bollworms, samples of 25 bolls/plots were randomly picked before and a week after application. Sampling continued weekly until harvest. The collected bolls were transported to the laboratory, where they were carefully dissected and the numbers of larvae, holes, infested squares, infestation percentages and percentages of reduction (or increase) of infestation than control were recorded during the two seasons respectively.

b- Phytotoxic Effect: -

Determined by recording any colour change, leaf curling or flaming up to 8 days after spraying, according to Badr *et al*. (1995).

Calculation and Data Analysis:

a. The reduction percentages in the field experiment were calculated according to Henderson and Tilton (1955).

b. Statistical analysis of results was done according to SAS (Anonymous, 2003) mean separation was conducted using LSD in the same statistical program.

RESULTS

Effect of Spraying Tested Insecticides on Infestation and Reduction Percentages by Spiny Bollworm *E. insulana* During the Cotton Seasons (2018-2019) Using Rotary Matabi Sprayer (18 L./Fed.):

Data presented in Tables (2&3) showed that application of the tested insecticides individually and with NU-FILM -17 SPREADER® 1% , 5% using Rotary Matabi sprayer (18 L./Fed.) caused a significant reduction in percentages of infested cotton bolls by spiny bollworm, Earias *insulana* at the two seasons 2018 and 2019. The average results of two seasons Chlorflurzoran treatment showed 4.05 % boll infestation with *E. insulana* followed by 5.27 % with Chlorpyriphos, 3.09 % boll infestation with Chlorflurzoran + NU-FILM -17 SPREADER® either 1% or 5% followed by 2 % with Chlorpyriphos + NU-FILM -17 SPREADER® either 1% or 5% , respectively, compared with 50.6 % in the control. The Chlorflurzoran 91.6 % reduction in boll infestation with *E. insulana* followed by 89.1 % with Chlorpyriphos, 95.9 % reduction in boll infestation with Chlorpyriphos + NU-FILM -17 SPREADER® either 1% or 5% followed by 93.75 % with Chlorflurzoran + NU-FILM -17 SPREADER® either 1% or 5% , respectively . The results indicated that there was no significant difference between using NU-FILM -17 SPREADER® either 1% or 5% in reduction percentages of bolls infestation. It could be recommended to use these Insecticides + NU-FILM -17 SPREADER® 1% with LV sprayers and spray volume not less than (18 L./Fed.).

Table 2: Effect of spraying tested insecticides on infestation and reduction percentages by spiny bollworm *E. insulana* during Cotton season 2018 using Rotary Matabi sprayer (18 L./Fed.)

Treatments / Inspection date	Control	Chlorflurzoran	Chlorpyriphos	Chlorflurzoran +1% NU FILM	Chlorpyriphos +1% NU FILM	Chlorflurzoran +5% NU FILM	Chlorpyriphos +5% NU FILM
8/7	4	4	4	4	4	4	4
15/7 1st spray	10	10	10	10	10	10	10
22/7	50	5	6.6	4	2.5	4	2.5
Julay Mean	50	5	6.6	4	2.5	4	2.5
Reduction%	-	90	86.8	92	95	92	95
1/8 2rd spray	60	4.8	6.4	3.8	2.3	3.8	2.3
8\8	68	4.5	6	3.5	2	3.5	2
15/8 3rd spray	71	4.3	5.7	3.4	1.9	3.4	1.9
22\8	75	4	5	3	1.8	3	1.8
29\8	77	4	5	3	1.8	3	1.8
August Mean	70.2	4.32	5.62	3.34	1.69	3.34	1.69
Reduction%	-	93.8	92	95.2	97.2	95.2	97.2
General Mean	60.1	4.66	6.1	3.67	2.23	3.67	2.23
General Reduction%	-	91.9^{cb}	89.4^{c}	93.6^{ab}	96.1^{a}	93.6^{ab}	96.1^{a}
LSD between treatments		3.3574					

L.S.D. at (0.5 %) between treatments. Numbers followed by the same letter at the same column are not significantly different.

Table 3: Effect of spraying tested insecticides on infestation and reduction percentages by spiny bollworm *E. insulana* during Cotton season 2019 using Rotary Matabi sprayer (18 L./Fed.)

Treatments / Inspection date	Control	Chlorflurzoran	Chlorpyriphos	Chlorflurzoran +1% NU FILM	Chlorpyriphos +1% NU FILM	Chlorflurzoran +5% NU FILM	Chlorpyriphos +5% NU FILM
8/7	3	3	3	3	3	3	3
15/7 1st spray	6	6	6	6	6	6	6
22/7	35	4	5	3	2	3	2
Julay Mean	35	4	5	3	2	3	2
Reduction%	-	88.6	85.7	91.4	94.3	91.4	94.3
1/8 2rd spray	37	3.5	4.5	2.5	1.8	2.5	1.8
8\8	43	3	4	2	1.5	2	1.5
15/8 3rd spray	49	2.8	3.8	1.9	1.55	1.9	1.55
22\8	52	2.5	3.5	1.8	1.4	1.8	1.4
29\8	55	2.5	3.5	1.8	1.4	1.8	1.4
August Mean	47.2	2.86	3.86	2	1.53	2	1.53
Reduction%	-	93.9	91.8	95.8	96.8	95.8	96.8
General Mean	41.1	3.43	4.43	2.5	1.77	2.5	1.77
General Reduction%	-	91.3^{cp}	88.8^{c}	93.9^{ab}	95.7^{a}	93.9^{ab}	95.7^{a}
LSD between treatments		2.7271					
General Mean of two seasons	50.6	4.05	5.27	3.09	2	3.09	2
General Reduction% of two seasons	-	91.6^{c}	89.1^{d}	93.75^{b}	95.9^{a}	93.75^{b}	95.9^{a}
LSD between treatments		3.3574					

L.S.D. at (0.5 %) between treatments. Numbers followed by the same letter at the same column are not significantly different.

2-Relationship Between Lost Spray-On Ground and The General Reduction of Two Seasons of Bio-Insecticides on Cotton:

Data in Table (4) showed that there was a negative correlation between lost spray-on ground equipment and the bioresidual activity of insecticides used.

a-Rotary Matabi Sprayer (18 L/fed):

Data in Table (4) showed that the lost spray percentages were 7, 8.5, 2.34, 3.85, 1.7 & 2.68 % from the total spray volume in the case of The Chlorflurzoran Chlorpyriphos , Chlorflurzoran + NU-FILM -17 SPREADER® 1% , Chlorpyriphos + NU-FILM -17 SPREADER® 1% , Chlorflurzoran + NU-FILM -17 SPREADER® 5% , Chlorpyriphos + NU-FILM -17 SPREADER® 5 % , respectively. The general reduction % of infestation of *E. insulana* larvae for the two seasons (2018-2019) was 91.6, 89.1, 93.75, 95.9, 93.75 & 95.9 %, respectively, in the case of the same insecticides.

Table 4: Spraying coverage on cotton plants and ground holders produced by Rotary Matabi sprayer (18L.\Fed.) during Cotton seasons (2018 and 2019) against *E. insulana* at Qalubiya Governorate**.**

Treatments / Level	Chlorflurzoran		Chlorpyriphos		Chlorflurzoran +1% NU FILM		Chlorpyriphos +1% NU FILM		Chlorflurzoran +5% NU FILM		Chlorpyriphos +5% NU FILM	
Level	N/cm²	VMD	N/cm²	VMD	N/cm²	VMD	N/cm²	VMD	N/cm²	VMD	N/cm²	VMD
Upper Level	150	144	130	159	250	127	185	124	265	120	190	123
Middle Level	140	148	125	165	240	130	178	126	260	124	188	127
Lower Level	130	150	120	169	220	135	162	130	226	128	166	128
Mean	140	149	125	164	236	131	175	127	250	124	181	126
Ground	32	160	35	170	17	140	21	145	13	135	15	133
% N/Cm² on ground (spray lost	7	_	8.5	_	2.34	_	3.85	_	1.7	_	2.68	-
LSD between levels	N/cm² =1.3404						VMD=1.2834					
LSD between treatments	N/cm² =1.6417						VMD=1.5718					

L.S.D. at (0.5 %) between treatments. All treatments were significantly different.

I) The spectrum of droplets ranging between 120-170 μm (VMD). With a sufficient number ranging from 13-265 N/cm².

II) The rate of performance of Rotary sprayer (Matabi) (18 L./Fed.) was 2.4 Fed./day.

III) The obtained results in Table (4) confirmed the positive relationship between spray volume and droplet sizes, which affects negatively the number of formed droplets.

Relations Between Spray Quality and The General Reduction Percentages of Two Seasons of Certain Insecticides Applied in Cotton Season:

Data in Table (5) showed that the most effective reduction percentage of bolls infestation was Chlorpyriphos with NU-FILM -17 SPREADER®1%,5% followed by Chlorflurzoran with NU-FILM -17 SPREADER® 1%,5% with Rotary Matabi sprayer (18 L./fed.). It could be recommended to use these Insecticides with Low Volume spraying equipment with not less than (18L/Fed.). A satisfactory coverage was obtained on Cotton crop i.e. more than 50 droplets/ cm², and droplet sizes ranged from 120 to 170

μm (VMD). The difference in the mortality percentage was due to the different mode of action of the insecticides and the added NU-FILM -17 SPREADER® 1% ,5% because it it increased droplets numbers 54% , decreased droplet sizes 17 % and minimized lost spray on ground 44% which made good spray quality, homogeneity and spray coverage on Cotton plants ,as shown in Table (6).

Table 5: Relationship between field spray quality of insecticides by Rotary Matabi sprayer (18L.\Fed.) during Cotton seasons (2018 and 2019) against *E. insulana* at Qalubiya Governorate.

Treatments / Level	Chlorflurzoran	Chlorpyriphos	Chlorflurzoran +1% NU FILM	Chlorpyriphos +1% NU FILM	Chlorflurzoran +5% NU FILM	Chlorpyriphos +5% NU FILM
Level	S.Q	S.Q	S.Q	S.Q	S.Q	S.Q
Upper Level	0.96	1.2	0.5	0.67	0.42	0.65
Middle Level	1.06	1.38	0. 5	0.71	0.48	0.68
Lower Level	1.15	1.35	0.6	0.8	0.57	0.77

S.Q = spray quality. = VMD/N/cm^2= Spray quality (degree of homogeneity).
The spray height is constant ~ 0.5 meter in all treatments
VMD= Volume mean diameter ,N/cm^2= Number of droplets/cm^2.

Table 6: The role of NU-FILM-17 SPREADER in improvement droplets distribution (Percentage % of droplets number and size increased or decreased)

Treatments / Level	Chlorflurzoran +1% NU FILM		Chlorpyriphos +1% NU FILM		Chlorflurzoran +5% NU FILM		Chlorpyriphos +5% NU FILM	
Level	N/cm^2	VMD	N/cm^2	VMD	N/cm^2	VMD	N/cm^2	VMD
Upper Level	+ 67	-12	+42	-22	+77	-17	+46	-23
Middle Level	+ 71	-12	+42	-24	+86	-16	+50	-23
Lower Level	+ 69	-10	+35	-23	+74	-15	+38	-24
Mean	+69	-12	+40	-23	+79	-16	+45	-23
Ground	-47	-13	-40	-15	-59	-16	-57	-22

+ = % increased. , - = % decreased.

DISCUSSION

According to our results which showed that. Using both Chlorpyriphos and Chlorflurzoran with NU-FILM -17 SPREADER® 1% could be recommended in controlling Spiny bollworm *Earias insulana* larvae because it increased droplets numbers 54% , decreased droplet sizes 17 % and minimized lost spray on ground 44% which made good spray quality, homogeneity and spray coverage on cotton plants , those were in agreement with Abdel Megeed (2008) who found that foliar treatment of *Eastena aminofert* with spinosad and Chlorpyriphos reduced levels of *E. insulana* infestation, Hindy *et al*. (2004) and Genidy *et al*. (2005) which recommended KZ oil and Pyriproxyfen followed by Agerin using low volume spraying because of reducing the time lost in the process filling the machines, improved the homogeneity of the spray solution on the cotton plant leaves and saving the lost spray of the ground and Bakr *et al*.(2014).

A satisfactory spray coverage was obtained in a field experiment on cotton plant, the optimum droplet sizes were agreed with the droplets spectrum which for controlling insects of field crop should be sized between 140 and 200 μm (VMD) with a number not less than 50 droplets/cm^2 distributed homogeneously on the treated target Himel (1969), (Himel *et al*., 1969) in the optimum droplet size to control cotton leafworm in the cotton fields by ground equipment. Also, the lowest spray volume and the lowest percentage of lost spraying between plants, these may be due to the Revolutions Per Minute (R.P.M.) when we measured with Vebratack, Rotary sprayer (Matabi) (18 L./Fed.) =6000 revolutions per minute, these results were agreed with Hindy *et al.* (1997), (2011), Dar *et al*.(2015) and Dar (2016) who mentioned that there was a positive relationship between the rate of application and spray lost on the ground. Dar (2019), Dar *et al*. (2019) and Dar *et al*. (2020) whom achieved best control results spray volume per fedan, productivity and rate of performance with Motorized Knapsack sprayers. Dar *et al.* (2019) showed that Motorized Knapsack sprayer (Agromondo) (20 L.Fed.) was the best equipment to control seedling pests in the early season of cotton. The rate of performance of Rotary sprayer (Matabi) (18 L./Fed.) was 2.4 Fed./day.

NU-FILM -17 SPREADER® 1% increased droplets numbers 54%, decreased droplet sizes 17 % and minimized lost spray-on ground 44% which made good spray quality, hemogenity and spray coverage, this in agreement with (Mathews,1992) Dobson (2001) who illustrated the typical values for spray quality (homogeneity) =1.2 for spinning disc.

Conclusion

It could be concluded that using both Chlorpyriphos and Chlorflurzoran with NU-FILM -17 SPREADER® 1% could be recommended in controlling Spiny bollworm, *Earias insulana* larvae because it increased droplets numbers, decreased droplet sizes and minimized spray loss on the ground, which made good spray quality and spray coverage. revealed successful management against spiny bollworm *E. insulana* on cotton under our local conditions. There was a negative complete correlation between (VMD) and the general reduction percentages of infestation of *E. insulana* in two seasons (2018-2019) while there was a positive complete correlate between N/cm² and the general reduction percentages of infestation of *E. insulana* in two seasons (2018-2019) in all treatments. Low Volume sprayers promising for the application of insecticides for their minimum spray loss on the ground which reduces environmental pollution and keep the natural enemies and Beneficial soil organisms at their natural populations.

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ARABIC SUMMARY

دور نيو- فيلم١٧ الناشرة فى جودة توزيع القطيرات وزيادة النشاط الابادى لمبيدات معينة على دودة اللوز الشوكية على القطن فى مصر

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تم رش اثنان من المبيدات وهى كلوروبيرفوس (فوسفورى) و كلورفلورزوران (مانع إنسلاخ) سواء منفردين او اضافة نيو-فيلم١٧ الناشرة بتركيزان ١٪ و٥٪ باستخدام وسيلة رش أرضية ذات الحجم الصغير و هى الرشاشة الدورانية ميتابي بحجم رش قدره (١٨ لتر\فدان) على حقل قطن مصاب اصابة شديدة بيرقات دودة اللوزالشوكية.

تم الحصول على تغطية مرضية على نباتات القطن المعاملة و تراوح مدى طيف قطيرات الرش ما بين ١٢٠-١٧٠ ميكرون مع أعداد كافية من القطيرات\سم² تراوحت ما بين١٣-٢٦٥ قطيرة\سم² في المعاملات المختلفة وقد زودت المادة الناشرة من اعداد القطيرات وقللت أحجام القطيرات وتضاءل الفاقد من الرش بين النباتات . و كانت معدل كفاءة الرشاشة ميتابى الدورانية ٢,٤ فدان\يوم باثنان من العمال.

كما أوضحت النتائج أن كلوروبيرفوس+ نيو-فيلم١٧ الناشرة بتركيز ١٪ و٥٪ أكثر فاعلية في مكافحة يرقات دودة اللوز الشوكية يليهم كلورفلورزوران + نيو-فيلم١٧ الناشرة بتركيز ١٪ و٥٪ بحجم الرش ١٨ لتر\فدان الناتج من استخدام ا لرشاشة ميتابى الدورانية وبما انه لافرق معنوى بين تركيزى المادة الناشرة على الكفاءة البيولوجية لكلا المبيدين من ذلك نوصى باستخدام نيو-فيلم١٧ الناشرة بتركيز ١٪ وذلك للحصول على غطاء رش أكثر تجانس مقارنة بعدم وجود المادة الناشرة .

يمكن التوصية بأن استخدام حجوم الرش القليلة أكثر اقتصادية وأكثر سرعة في مكافحة دودة اللوز الشوكية و تقليل الوقت في اعادة الملؤ و تحقيق تجانس محلول الرش على نباتات القطن المعاملة توقير الفاقد من الرش على نباتات القطن مقارنة بالرش التقليدى وذلك فى الحيازات الصغيرة بجوار كردون القرى .