Efficacy of the Product *Spinosad* an Insecticide Used in the Control of Tomato Leafminer (*Tuta absoluta* – Meyrick, 1917)

Elena BRATU^{1*)}, Alexandra Maria PETCUCI^{2*)} and Gabriela SOVAREL¹⁾

¹⁾ Plant Protection Laboratory, Research and Development Institute for Vegetable and Flower Growing, Calea București no. 22, Vidra-077185, Ilfov, Romania; gabriela_sovarel@yahoo.com

²⁾ Biology Manager – Romania & Adria, Dow AgroSciences Export SAS, Rep. Office Bucharest;

*) corresponding authors: bratu.bpe@icdlfvidra.ro; ampetcuci@dow.com

BulletinUASVM Horticulture 72(1) / 2015

Print ISSN 1843-5254, Electronic ISSN 1843-5394

DOI:10.15835/buasvmcn-hort:10876

ABSTRACT

Product *Spinosad* was applied at doses varying between 48 to 120 g a.i./ha (one or 2 times at 14 days interval) against tomato leafminer, *Tuta absoluta*, in tomato (Prekos F1) grown in plastic tunnels. Observations concerning product phytotoxicity, % of attacked area/leaf and plant, were made at one week after each treatment, and 4 weeks after first treatment. Efficacy was determined from the average of the two indicators monitored. Best results (99.8 %) were obtained from *spinosad* at 120 g a.i./ha 28 days after a single application. Comparison standard-control *emamectin-benzoate* used once at a rate of 14.25 g a.i./ha had comparable efficacy (99.0%) at the same evaluation, while a second standard product, *imidacloprid* at 200 g a.i./ha rate only reached 81.9 % after 28 days. No phytotoxic effects were observed.

Keywords: efficacy, *emamectin-benzoate*, *spinosad*, *Tuta absoluta*

INTRODUCTION

Currently, tomato leafminer (*Tuta absoluta*) represents, one of the most economically important pests of tomato. Originally from South America (Peru, Columbia, etc.), tomato leafminer was first identified in Spain in 2006 and has spread rapidly within Europe (Desneux *et al.*, 2010) and outside of the European continent. The species now occurs from Latvia in the north, Turkmenistan and Iran in the east, United Kingdom in the west and into Greece and Turkey in the south. In Romania, miner moth was first recognized in the North West zone (Satu Mare, 2009) and one year later was found near Bucharest, in greenhouse crops. Rapid expansion of resistant pest populations to a range of different pesticides make tomato leafminer, one of the most dangerous pest of commercial tomato crops (Antonio Cesar dos Santos *et al.*, 2011).

Aims and objectives. *Tuta absoluta* has developed resistance to a range of insecticide products including some of the most widely used products such as the pyrethroids (e.g., gamma-cyhalothrin). We wanted to evaluate the product *spinosad* determine if it could be an effective solution for integrated control of this pest. *Spinosad* contains *spinosyn A* and *spinosyn D*, which are two naturally occurring secondary metabolites of the soil

actinomycete *Saccharopolyspora spinosa*. The research report here had as objectives to determine the efficacy and persistence of *spinosad* compared to standard products.

MATERIALS AND METHODS

The experiment was performed in a plastic tunnel, planted to tomato ("Prekos F1" cultivar) in the second cycle. A randomized complete block experimental design with controls included was used. The experiment evaluated three *spinosad* treatments: 2 applications of 48 g a.i./ha; 2 applications of 60 g a.i./ha; and one application of 120 g a.i./ha. Two commercial standard products were included in the trial: *emamectin-benzoate* applied at 7.12 g a.i./ha 2 times and 14.25 g a.i./ha applied once; and *imidacloprid* applied at 100 g a.i./ha twice and 200 g a.i. l/ha applied once. The interval between applications was 14 days. Observations were made at 2 and 7 days after each treatment, and 14 days after the second treatment. Data were recorded on product phytotoxicity, percent of attacked area/leaf, and plant. Statistical analysis was performed.

RESULTS AND DISCUSSION

Knock down activity varied between 21 % and 75 % in the case of attacked area/leaf (Table 1), and from

Tab. 1. Dynamic *Spinosad* product effectiveness in reducing **attack area/leaf** of *Tuta absoluta* pest at tomato crop under plastic tunnel

Product	Rate (g a.i./ ha)	Efficacy (%) after:					
		2 DAA1	7 DAA1	14 DAA1- 0 DAA2	16 DAA1- 2 DAA2	21 DAA1- 7 DAA2	28 DAA1- 14 DAA2
Spinosad 240 SC	48.0 (2X)	21.0	53.3	74.9	92.3	97.2	98.2
Spinosad 240 SC	60.0 (2X)	61.1	74.8	82.5	97.5	99.7	99.3
Spinosad 240 SC	120.0 (1X)	75.0	75.0	99.7	100.0	99.9	99.8
Emamectin-benzoate 0.95 WG	7.12 (2X)	50.0	75.0	94.3	97.7	94.2	98.2
Emamectin-benzoate 0.95 WG	14.25 (1X)	52.8	75.0	98.9	98.5	96.2	99.3
Imidacloprid 200 SC	100.0 (2X)	38.4	70.4	69.0	70.8	68.4	65.8
Imidacloprid 200 SC	200.0 (1X)	49.6	74.6	94.2	95.9	79.4	81.0
Untreated check – attack level %	-	0.605	1.280	2.510	2.923	14.74	19.25
LSD (P=.05) – % attack area/leaf		0.9097	0.7261	0.7888	1.0485	2.8638	3.6772
Standard deviation		0.6185	0.4937	0.5363	0.7129	1.9472	2.5002

DAA1...A2 = days after first....second application

Tab. 2. Dynamic of *Spinosad* product effectiveness in reducing **attack area/plant** of *Tuta absoluta* pest at tomato crop under plastic tunnel

Product	Rate (g a.i./ ha)	Efficacy (%) after:					
		2 DAA1	7 DAA1	14 DAA1- 0 DAA2	16 DAA1- 2 DAA2	21 DAA1- 7 DAA2	28 DAA1- 14 DAA2
Spinosad 240 SC	48.0 (2X)	42.3	47.5	71.8	95.0	98.7	99.0
Spinosad 240 SC	60.0 (2X)	50.0	74.6	88.6	97.1	99.6	99.6
Spinosad 240 SC	120.0 (1X)	50.0	87.5	92.5	99.2	99.9	99.7
Emamectin-benzoate 0.95 WG	7.12 (2X)	25.0	87.5	96.0	97.5	96.9	98.1
Emamectin-benzoate 0.95 WG	14.25 (1X)	50.0	87.5	98.5	98.9	97.6	98.7
Imidacloprid 200 SC	100.0 (2X)	25.0	67.8	57.8	82.2	72.5	71.7
Imidacloprid 200 SC	200.0 (1X)	47.5	73.1	92.8	92.7	84.8	82.7
Untreated check – attack level %	-	0.418	0.740	3.688	4.168	22.125	25.050
LSD (P=.05) – % attack area/ plant		0.7829	0.4119	0.9512	1.457	3.6904	4.1387
Standard deviation		0.5323	0.2801	0.6467	0.9906	2.5092	2.8139

Tab. 3. Dynamic of *Spinosad* product effectiveness in reducing *Tuta absoluta* attack at tomato crop under plastic tunnel

Product	Rate (g a.i./ ha)	Efficacy (%) after:					
		2 DAA1	7 DAA1	14 DAA1- 0 DAA2	16 DAA1- 2 DAA2	21 DAA1- 7 DAA2	28 DAA1- 14 DAA2
Spinosad 240 SC	48.0 (2X)	31.7	50.4	73.4	93.7	98.0	98.6
Spinosad 240 SC	60.0 (2X)	55.5	74.7	85.6	97.3	99.7	99.5
Spinosad 240 SC	120.0 (1X)	62.5	81.3	96.1	99.6	99.9	99.8
Emamectin-benzoate 0.95 WG	7.12 (2X)	37.5	81.3	95.2	97.6	95.6	98.2
Emamectin-benzoate 0.95 WG	14.25 (1X)	51.4	81.3	98.7	98.7	96.9	99.0
Imidacloprid 200 SC	100.0 (2X)	31.7	69.1	63.4	76.5	70.5	68.8
Imidacloprid 200 SC	200.0 (1X)	48.6	73.9	93.5	94.3	82.1	81.9
Untreated check	-	-	-	-	-	-	-

25% up to 87.5% in case of attacked area/plant (Table 2). For residual activity the values varied from 68.4% to 100% (Table 1) and from 57.8 % to 99.9% (Table 2). Calculating the average values obtained from the two indicators, the greatest efficacy (99.8% and 99%,) was recorded 28 days after the treatment with *spinosad* (120 g a.i./ha) and *emamectin-benzoate* (14.25 g a.i./ha) used in single application (Table 3). *Imidacloprid* efficacy, applied in a single dose (200 g a.i./ha), reached maximum 94.3%, at 16 days after treatment, but lost the residual activity at 28 days after treatment. Insecticides applied 2 times at a lower dose gave good results also, but their efficacy increased slowly. No phytotoxic symptoms were observed. *Spinosad* gave similar results in some other studies performed in Brasil (Antonio Cesar dos Santos et al., 2011) and Egypt (Saad Mousa et al. 2013).

CONCLUSION

Spinosad (120 g a.i./ha) had a high activity and long lasting effect against tomato leafminer, *Tuta*

absoluta assuring the pest control at a level comparable with emamectin-benzoate product (14.25 g a.i./ha). Obtained results recommend this product to be introduced in the integrated tomato leafminer control on greenhouse tomatoes crops.

REFERENCES

- Desneux N, Wajnberg E, Wyckhuys KAG, Burgio G, Arpaia S, Narváez-Vasquez C, Gonzales-Cabrera J, Catalán Ruescas D, Tabone E, Frandon J, Pizzol J, Poncet C, Cabello T, Urbaneja A (2010). Biological invasion of European tomato crops by *Tuta absoluta*: ecology, geographic expansion and prospects for biological control. *Jour. Pest. Sci.*, 83:3, 197-215.
- Santos dos A.C, Oliveira de Freitas Bueno RC, Silva Vieira S, Adeney de Freitas B (2011). Efficacy of insecticides on *Tuta absoluta* (Meyrick) and other pest in pole tomato. *BioAssay*, 6:4 (2011).
- Saad M, Sharma A, Baiomy F, Fathi E (2013). The status of tomato leafminer; *Tuta absoluta* (Meyrick) (Lepidoptera, Gelsenchiidae) In Egypt and potential effective pesticides. *Academic J. Entomol.* 6 (3): 110-115, 2013.