

Use of Organo Silicones for the Control of Vineyard acarians

Ioan OROIAN, Ioan OLTEAN, Viorel FLORIAN, Antonia ODAGIU, Ioan BRAȘOVEAN

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Mănăștur st., no. 3 – 5, 400372 Cluj-Napoca, Romania, (e-mail: neluoroian@gmail.com)

Abstract

The efficacy of six acaricide products (Danirun 11 EC – 0.06%, Nissorun 10 WP – 0.06%, Demitan 200 SC – 0.07%, Neoron 500 EC – 0.08%, Mitac 20 EC – 0.2% and Omite 57 EW - 0.10%) and 0.15 L/Ha Silwet L 77 adjuvant in fight against Tetranychidae during grapevine vegetation period was tested. During 2007 testing was performed within the grapevine plantation of the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. When the acarian harmful effects are over the economical threshold, the following products are recommended: egg stage - Nissorun 10 WP – 0.06%; larvae stages - Nissorun 10 WP – 0.06%; Danirun 11 EC – 0.06%; Mitac 20 EC – 0.2%; Demitan 200 SC – 0.07%; Neoron 500 EC – 0.1%; adult stages - Mitac 20 EC – 0.2%; Danirun 11 EC – 0.06%; Demitan 200 SC – 0.07%; Neoron 500 EC – 0.1%. The use of the Silwet L 77 adjuvant determined: the increase of the effect against eggs by 3.9 – 22.5% (in Nissorun 10 WP reached 100%); the increase of the effect against the larvae by 6.3 – 8.1%, (in 10 WP and Danirun 11 EC reached 100%, 99.9% in Demitan 200 SC and Neoron 500 EC, and 99.8% in Mitac 20 EC); the increase of the effect against adults by 5 – 13.1% (99.9% in Mitac 20 EC, 99.6% in Demitan 200 SC, and 99.3% in Neoron 500 EC).

Key words: organo silicones, acarians, Tetranychidae, Silwet L 77

Introduction

The acarians – Tetranychidae - are the main pathogens (mites), economical important, of the grapevine plantations, being present in majority of grapevine basins (Oroian I. et al., 2006).

High densities were recorded in plantations from hilly areas where phytosanitary treatments are periodically performed. The attack of these mites produces strong depigmentation of the leaves, reducing the photosynthesis capacity that has major implications in grape production (Tipping C., 2002; Tipping C. et al., 2003). During 2007, the experimental objectives were:

testing the fight efficacy of some acaricide against acarians summer forms (eggs, larvae, adults).

increasing the biological efficacy of the acaricide used in grapevine plantations by using 0.015% Silwet L 77 adjuvant.

The climatic conditions recorded during March – October (table 1) were similar to the average multi-annual values (air temperature, humidity, precipitations) characteristic to the area and did not negatively influenced the development of the acarian populations.

Material and method

During 2007 testing was performed within the grapevine plantation of the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. This plantation is destined both for teaching and production purposes, and possesses a collection of zoned grape strains.

In order to verify the efficacy of the acaricide in fight against Tetranychidae during vegetation period, the

treatments were performed when the acarian populations were over the damage economical threshold (DET).

In 2007 the biological efficacy of six products (Danirun 11 EC – 0.06%, Nissorun 10 WP – 0.06%, Demitan 200 SC – 0.07%, Neoron 500 EC – 0.08%, Mitac 20 EC – 0.2% and Omite 57 EW - 0.10%) concerning the fight against tetranichid acarians during vegetation period was tested. The effect of the 0.15 L/Ha Silwet L 77 adjuvant administration combined to each of above mentioned products was also tested. A number of 12 experimental variants and control (untreated) were used. The evaluation of the acarian populations was performed both against and after treatment, in order to calculate the biological efficacy.

The experimental lot was formed of 25 grapevines/variant, with 3 repetitions each. The treatments were performed using the "GUARANY" sprinkle pump, with 1000 L/Ha.

The treatments were performed at 24.VI.2007, and evaluation of the efficacy at 28.VI.2007. The evaluation of the efficacy of the tested products was performed using the binocular magnifying glass for numbering live or dead acarians, by stages of development, found on a sample of 100 leaves/repetition, 300 leaves/variant, respectively.

The statistical analysis was performed with WINSTAT v. 7.0 programme.

Results

The results obtained in 2007 in fight against the acarians from the grapevine plantations are presented in table 2. The table shows the contribution of all tested products to the considerable reducing of the acarian populations from the experimental lots. Very significant and distinctly significant differences were obtained between the treatments with acaricides and acaricides + surfactant in all developmental stages. The use of the Silwet L 77 adjuvant determined the increase of the biological efficacy of all products in fight against different stages of development of the acarians (<http://www.chemtura.com.md/produse/silwet.htm>; www.helenachemical-west.com).

Discussion

The biological efficacy of the tested products is different compared to control, function of the affected developmental stage. The best results, statistically not assured, compared to control were recorded in fight against larvae and adults.

For Nissorun 10 WP (acaricide with contact and ingestion effect, and translaminary), a very satisfactory efficacy was obtained even within the egg stage in both experimental variants (alone or together with Silwet L 77). This product is well known as having very satisfactory action on egg and larvae fight. According to literature, it determines small decrease of the adult populations, but produces their sterilization. The use of the Silwet L 77 adjuvant, determined the increase of the efficacy of Nissorun 10 WP by 9.7% in fight against eggs (efficacy reached 100% within this variant), by 6.3% in fight against larvae (efficacy reached 100% within this variant, too) and by 13.1% in adult fight. The Nissorun product is recommended to be included within the fight strategies when the egg and larvae stages are predominant in the acarian population. Danirun 11 EC, a contact insect – acaricide, has effect on all developmental stages. It has translaminar action and shock effect, and determined special results in fight against larvae and adults. Used in concentration of 0.06% determined 71.3% egg mortality, 93.7% larvae and 93.2% adults mortality. The uses of the Silwet L 77 adjuvant determined the increase of the product efficacy by 11.1% in egg fight, 6.3% in larvae fight (efficacy reached 100% in this variant too) and by 5.7% in adult fight. The Demitan 200 SC acaricide has good contact action on larvae and adults, with prolonged effect in control of the acarian populations. The action of this product could be improved by 3.9% in egg fight, by 8.1% in larvae fight and by 9% in adult fight, using the Silwet L 77 adjuvant. The biggest increase of the efficacy of the product Demitan was recorded when the Silwet L 77 adjuvant was used.

Neoran 500 EC is a contact acaricide with very good action against larvae and adults. The increase of the efficacy against acarians was recorded for this product, too, when the Silwet L 77 adjuvant was used. The efficacy increased by 22.5% in egg fight, by 7.6% in larvae fight and by 7.9% in adult fight. The Mitac 20 EC product is one of the best acaricide, with contact and ingestion action on larvae and adults. It has translaminar action and can act through vapors. In experimental field, it had the best efficacy in fight against adults, when products were used without the tested adjuvant. The use of the Silwet L 77 adjuvant determined

the increase of the Mitac 20 EC efficacy by 6.2% in egg fight, by 7.6% in larvae and by 6% in adult fight. Among all variants, the use of this combination gave the best results in fight against adults.

Compared to other products, Omite 57 EW produced the less satisfactory results in fight against all developmental stages. However, the mortality produced in mobile stages (larvae and adults) was between 90.4% and 91.9%. This product has two important qualities:

selectivity for the *Tydeus* and *Thyphlodromus* acariphagous acarians.

the effect of the product is increased by the high temperatures (this effect was not recorded in other products)

The use of the Silwet L 77 adjuvant determined the 7.5% increase of the effect against eggs, by 7.6% in larvae and by 5% in adults.

The control untreated variant recorded the biggest acarian population in all developmental stages. Their values are much over the economical threshold and losses produced by these mite populations are very large.

Conclusions

1. During the vegetation period, in order to fight against acarian summer stages, and function of the structure of the developmental stage of the acarian populations, the use of 1 – 2 treatments, when their harmful effect is over the economical threshold, is recommended.

The recommended products are:

- egg stage: Nissorun 10 WP – 0.06%;
 - larvae stages: Nissorun 10 WP – 0.06%; Danirun 11 EC – 0.06%; Mitac 20 EC – 0.2%; Demitan 200 SC – 0.07%; Neoron 500EC – 0.1%;
 - adult stages: Mitac 20 EC – 0.2%; Danirun 11 EC – 0.06%; Demitan 200 SC – 0.07%; Neoron 500EC – 0.1%;
2. When the presence of the acarophagous acarians presence is recorded on plantation, or when the temperatures are very high when the treatments are applied, the Omite 57 EW – 0.1% product is recommended.
 3. In order to prevent the acarian resistance against acaricide, the alternative use of the phytoprotection products is recommended.
 4. The use of the 0.15 L/Ha Silwet L 77 adjuvant for increasing the biological efficacy of the acaricide is recommended.
 5. The use of the Silwet L 77 adjuvant determined the improvement of the treatment efficacy, demonstrated by:
 - the increase of the effect against eggs by 3.9 – 22.5%, (in Nissorun 10 WP reached 100%)
 - the increase of the effect against the larvae by 6.3 – 8.1%, (100% in 10 WP and Danirun 11 EC, 99.9% in Demitan 200 SC and Neoron 500 EC, and 99.8% in Mitac 20 EC)
 - the increase of the effect against adults by 5 – 13.1%, (99.9% in 20 Mitac EC, 99.6% in Demitan 200 SC, and 99.3% in Neoron 500 EC).

Table 1 Meteorological data by 2007

Month	Temperature (°C)		Precipitations (mm)		Relative humidity (%)
	Normal	Realized	Normal	Realized	
III	3.5	5.4	41.7	12.2	92
IV	9.1	11.0	50.6	79.8	86
V	14.1	15.4	79.8	90.2	70
VI	17.1	17.8	96.5	27.3	79
VII	18.7	18.9	81.7	135.2	85
VIII	17.6	16.6	76.4	80.3	80
IX	13.8	12.4	42.7	30.9	89
X	8.7	6.4	32.8	27.3	88
Total	12.8	12.9	502.2	452.9	

Table 2. The efficacy of some phytosanitary products in fight against acarians during 2007

Var.	Product	Conc. %	Active substance	Developmental stage	Average no. of live stages/ leaf	Efficacy %	Difference t s	t
1.	Danirun 11 EC	0.06	Fenpropathrin + Hexytiasox	egg	0.35	71.3***	1 – 2	-5,323
				larvae	0.272	93.7***		-4,000
				adult	0.504	93.2**		-3,066
2.	Danirun 11 EC + Silwet L 77	0.06 + 0.015	Fenpropathrin + Hexytiasox	egg	0.214	82.4		
				larvae	0	100		
				adult	0.082	98.9		
3.	Nissorun 10 WP	0.06	Hexytiazox	egg	0.106	91.3***	3 – 4	-5,688
				larvae	0.272	93.7***		-9,119
				adult	5.632	24.3**		-2,765
4.	Nissorun 10 WP + Silwet L 77	0.06 + 0.015	Hexytiazox	egg	0	100		
				larvae	0	100		
				adult	4.626	37.8		
5.	Demitan 200 SC	0.07	Fenazaquin	egg	0.612	49.8**	5 – 6	-6,742
				larvae	0.356	91.8***		-4,172
				adult	0.676	90.9***		-7,106
6.	Demitan 200 SC + Silwet L 77	0.07 + 0.015	Fenazaquin	egg	0.564	53.7		
				larvae	0.004	99.9		
				adult	0.030	99.6		
7.	Neoron 500 EC	0.08	Bromopropilat	egg	0.654	42.4***	7 – 8	
				larvae	0.334	92.3***		
				adult	0.640	91.4***		
8.	Neoron 500 EC + Silwet L 77	0.08 + 0.015	Bromopropilat	egg	0.428	64.9		
				larvae	0.004	99.9		
				adult	0.052	99.3		
9.	Mitac 20EC	0.20	Amitraz	egg	0.510	58.1***	9 - 10	-8,784
				larvae	0.338	92.2***		-5,581
				adult	0.452	93.9***		-6,952
10.	Mitac 20EC + Silwet L 77	0.20 + 0.015	Amitraz	egg	0.434	64.3		
				larvae	0.008	99.8		
				adult	0.008	99.9		
11.	Omite 57 EW	0.10	Propargit	egg	0.894	26.7***	11 – 12	-4,126
				larvae	0.416	90.4**		-3,054
				adult	0.602	91.9**		-2,931
12.	Omite 57 EW + Silwet L 77	0.10 + 0.015	Propargit	egg	0.802	34.2		
				larvae	0.086	98.0		
				adult	0.230	96.9		
13.	Control untreated	-	-	egg	1.220	-		
				larvae	4.340	-		
				adult	7.440	-		

(** - p > 0.01%; ***, p > 0.001)

References

- Oroian, I., Oltean I., Florian V., Brașovean I. (2006). Efectul superspreadersului SILWET L-77 în amestecuri pesticide la culturile agricole. Contract de cercetare științifică – Chemtura International, Contract nr. 2128/15.06.
- Tipping C., Bikoba V., Chander G.J., Mitcham E.J. (2003). Efficacy of Silwet L-77 Against Several Arthropod Pests of Table Grape. *Journal of Economic Entomology*, 96 (1), pp. 246-250
- Tipping C. (2002). Toxic effects of Silwet L-77 on several arthropods associated with table grapes. http://esa.confex.com/esa/2002/techprogram/paper_6296.htm
- SILWET L-77 surfactant universal. <http://www.chemtura.com.md/produse/silwet.htm>
- SILWET L-77®, Technical Data Sheet SL77080596, www.helenachemical-west.com

sa2008_0916