Using coconut potassium soap “Cocana” in woolly apple aphid control

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Abstract

*Woolly apple aphid (*Erisoma lanigerum*) belongs to serious pest in IPM and organic apples. The pest is spreading in orchards where the abundance of natural enemies is decreased after applications of not selective insecticides (organophoshates, neonicotinoids). The aphid also appears in dense orchards with unbalanced pruning and fertilization. Although aphid itself is sensitive to the most of registered aphicides the waxy covering produced by the aphids often causes a failure of a common spray programme. As a very effective way how to overcome this barrier is the application of coconut soap (Cocana) close before insecticide treatment. In our trials the efficacy of applied Cocana (2 %) in high volume spray followed by combination of orange oil (Prev B-2) with insecticide Mospilan 20 SP and Pirimior 50 WG on aphid colonies was 97.7 % and 98 %, respectively. The efficacy of Prev B-2 without insecticides was not satisfactory and other preparations must be tested for organic systems.*

Keywords: *Eriosoma lanigerum*, woolly apple aphid, Cocana, Prev B-2

Introduction

During last decade the Czech growers are facing the outbreaks of populations of woolly apple aphid. Although the knowledge about the pest biology and its control is relatively at a good level, the infestations can be extreme in the second half of a season. Except of direct injury on a crop the aphid occurrence is a very unpleasant during the harvest. Owing to wax covering the insecticide treatments provide very poor results even if we use common additives (Break Thru, Silwet, rape oil.). It seems that the failure of pest control results from the physical barrier created by aphids. The other cause of such outbreaks is the lack of natural enemies caused by a frequent use of wide spectrum insecticides. It is known that the *E. lanigerum* control is more successful in IPM orchards where the unselective insecticides were excluded (Nicholas *et al*. 2005). In orchard there were identified more than 80 natural enemies (73 predators, 8 parasitoids) feeding on *E. lanigerum* (Asante 1997). From these organisms the parasitoid wasp *Aphelinus mali* and earwigs (*Forficula auricularia*) appears to be the most efficient in biological protection (Mueller *et al*. 1988, Nicholas *et al*. 2005) and we should pay attention to them in every spray programme. Optimum solution appears to be accepting of organic system or of the products products designed for this system. However, it can be found in the available databases (http://e-phy.agriculture.gouv.fr, www.iobc.ch) that the important natural enemies of *E. lanigerum* such as hymenoptera parasitoids (namely *Aphelinus mali*), syrphids, lady beetles, earwigs and other species are sensitive to many pesticides including those allowed in organic orchards (spinosad, pyrethrum, suplhur). It means that organic system itself does not provide a general solution either and the pesticide choice is important here too. On the other hand, it has been shown that natural enemies themselves are not able to ensure a satisfactory crop protection in the case of emergency. Biological control must be combined with other measures in such situations (Toups *et al*. 2010) including direct and effective insecticide treatments.

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For this purpose we have tested coconut soap (Cocana) which is able to wash up wax covering of the pest and it enables better contact of applied active ingredient with the aphids.

Material and Methods

The trials were performed in late summer 2013 in two orchards situated in different climatic regions (South Moravia, East Bohemia). In each variant 10 shoots heavily attacked by the wooly aphid were selected to evaluations. The length of colonies was measured before and after the applications and the efficacy was calculated according to Henderson-Tilton formula. Cocana was applied several hours before insecticide treatments. Application volume was 100 l/ha for Cocana and 400 l/ha for insecticides. For the trials 3 insecticide were selected: Mospilan 20 SP, Pirimor 50 WG (both IPM) and Prev B-2 (organic). Prev B-2 was used as an additive in IPM variants. Variants, products and further information to the trials are presented in tables 1-2.

Table 1: Trial variants and used products

Variant	Products names and the concentrations
1	Cocana (2%), then Mospilan 20 SP (0.013%)+Prev B-2 (0.4%)
2	Cocana (2%), then Pirimor 50 WG (0.15%)+Prev B-2 (0.4%)
3	Cocana (2%), then Prev B-2 (0.4%)
4	Untreated control

Table 2: Locations and basic information to the trial design.

Orchard	Variants included in trial	Trial size	Sprayer	Date of application	Dates of evaluation
S. Moravia	1, 3, 4	small plot	Knapsack sprayer	August 30	September 2, 4, 6
East Bohemia	2, 4	0.5 ha	Tractor sprayer	August 20	August 27

Results

The effect of Cocana treatments followed by acetamiprid or pirimicarb application with orange oil was visible 2 days after application and it kept growing almost to 100% until the last visit in orchard (ca 1 week after treatment). However, the ahids recovered very soon if orange oil (Prev B-2) without systemic insecticide was used (table 3).

Table 3: Efficacy (Henderson-Tilton) of treatments against woolly apple aphid in a trial.

Variant	Efficcacy calculated to the dates of evaluation			
	August 27	September 2	September 4	September 6
1	-	93.5	95.7	97.7
2	98.0	-	-	-
3		53.0	29.3	0.0

Discussion

The trials showed that woolly apple aphid can be controlled by the common insecticides even in situations with severe infestation. A very good result (efficacy above 95 % with standard aphicides) we can achieve if the wax covering of aphid is perfectly removed. Coconut soap applied before insecticide treatment appears to be a promising tool for this purpose and this way we could help IPM growers in extreme situations. However, it must be understood just as “a fighting a fire” and the *E. lanigerum* control have to be solved in the frame of the whole growing system (choice of location, cultivars and rootstocks, nutrition regime, the way of pruning, spray programme, support of natural enemies, etc.). The lack of systemic effect of Prev B-2 resulted in aphid recovery a few days after treatment and another method must be searched for the extreme situations in organic orchards. Although the parasitation by *A. mali* and the occurrence of other natural enemies was not exactly evaluated in the trial, their role in aphid decline was evident. This experience confirms the necessity to combine various methods in *E. lanigerum* control (Toups *et al*. 2010).

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