EFFECTS OF THE TWO IGR'S METHOPRENE AND FENOXYCARB ON LIPOSCELIS BOSTRYCHOPHILUS AND ACARUS SIRO

Rudolf BÜCHI
Swiss Federal Research Station for Agronomy, Reckenholzstr. 191,
CH-8046 Zürich, Switzerland

ABSTRACT

The two IGR's Methoprene and Fenoxycarb were tested against the booklouse Liposcelis bostrychophilus and the flour mite Acarus siro. The IGR's were admixed to the media. Adult booklice layed eggs on the media. The number of larvae and adults were recorded.
47.5 - 190 ppm of Methoprene reduced adult formation up to 97 % and the number of larvae up to 66 %. Fenoxycarb in the range of 4 - 16 ppm reduced the number of adults up to 99 % and the number of larvae up to 74 %.
The IGR's reduced the number of adult flour mite between 85 and 95 %, and the number of larvae between 80 and 95 %.

INTRODUCTION

In the last few years booklice and mites have increasing importance in granaries in Switzerland (BÜCHI, 1989). We found that booklice and mites are present in small populations in almost all silos. If the conditions are favorable, for instance increased humidity, populations can grow fast. Therefore good control methods are needed. Nothing is published about the effects of IGR's on booklice and very few about mites (EL-HALAWANY, 1981 and SALEH, 1976). We tested the two IGR's Methoprene and Fenoxycarb against the booklouse Liposcelis bostrychophilus and the flour mite Acarus siro.

MATERIAL AND METHODS

Both, L. bostrychophilus and A. siro, were reared on bruised grain with 10 % dried yeast. L. bostrychophilus originated from a complaint of a granary in Switzerland. L. bostrychophilus propagates parthenogenetically. A. siro was kindly supplied by Prof. Levinson of the Max-Planck-Institut für Verhaltensphysiologie, Seewiesen. Sandoz AG, Basle, Switzerland supplied Dianex with 67.5 % Methoprene and Dr. R. Maag Ltd., Dielsdorf, Switzerland Insegar WP25 with 25 % Fenoxycarb. The two IGR's were admixed to the media in different concentrations. The trials were performed in small vials (80 ml) containing 4 g of treated media. For each concentrations 10 vials with 5 adult booklice were used. In two series the number of adults and larvae were recorded after 4, 6 and 8 weeks of duration of the trials.

Trials with A. siro were performed in small vials (20 ml) containing 1 g treated media. One serie consisted of 10 vials with 2 pairs of adult A. siro in each vial. After 3 weeks the number of adults and larvae were counted.

RESULTS AND DISCUSSION

1. L. bostrychophilus

Methoprene inhibited adult formation of L. bostrychophilus up to 97 % (Table 1). The number of larvae was also drastically reduced. After 8 weeks duration of the trials, the effect of the lowest dose (47.5 ppm) Methoprene on adult formation is clearly reduced. Since Methoprene is very stable on wheat we do not know the reason for this loss of efficacy. The effect of Fenoxycarb on adult formation of L. bostrychophilus is more pronounced. With only 4 ppm Fenoxycarb after 6 weeks and 8 weeks the adult formation is almost completely inhibited (Table 2).

Both the IGR's induced superlarvae in L. bostrychophilus. Superlarvae have the size of normal adults, but the colour is white like the normal larvae. Sometimes the superlarvae were spotted with dark spots of adult cuticle. These superlarvae have further properties of larvae. Most of the tarsi have only two segments which is characterictic for larvae, whereas adult animals have three segments. The genitals of the superlarvae were always malformed. Most probably superlarvae were steril, trial to test this are under way. Often in the treated series we found superlarvae with disturbances of ecdysis.

Both the IGR's have also a good effect on the number of larvae. After 9 weeks duration of trials 190 ppm Methoprene and 16 ppm Fenoxycarb give 66 - 70 % reduction of larvae. The effect is slightly increasing with duration of the trials. All superlarvae were classified as larvae, so the effective reduction in number of larvae is higher. This effect on larvae could have two reasons: First a reduction of fecundity that means treated booklice lay fewer eggs than untreated one. Second on ovicidal effect that means under treatment of the IGR's fewer larvae hatch from layed eggs. Further tests are needed to distinguish between the two possibilities.

2. A. siro

Methoprene reduced the number of adult flour mite up to 85 %, Fenoxycarb to about 95 %. The reduction of the number of larvae is also considerable. Both the IGR's reduced the number of larvae between 80 and 95 %, Table 3 and 4 give the results. We don't yet know if the IGR's also induce superlarvae in the flour mite. SALEH (1976) found with Altosid (Methoprene) and Altozar no induction of morphological abnormalities in house dust mite Dermatophagoides farinae.

Our results show that both IGR's are promising agents to control booklice and mites in silos and mills.

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Table 1.: Effect of Methoprene on number of adults and larvae of the booklouse L. bostrychophilus

Dose in ppm	Duration of trial	Number of adults	Reduction of adults in %	Number of larvae	Reduction of larvae in %
0	4 weeks	155		331	
47.5	"	41	73.5	400	-20.8
95	"	10	93.6	230	30.5
190	"	5	96.7	166	49.8
0	4 weeks	144		352	
47.5	"	60	58.3	356	- 1.1
95	"	13	91.0	215	38.9
190	"	8	94.4	179	49.1
0	6 weeks	823		1110	
47.5	"	129	84.3	1197	- 7.8
95	"	62	92.5	937	15.6
190	"	28	96.6	680	38.7
0	6 weeks	840		1029	
47.5	"	130	84.5	1187	-15.3
95	"	77	90.8	912	11.3
190	"	24	97.1	628	39.0
0	8 weeks	4037		3645	
47.5	"	2965	26.6	3974	- 9.0
95	"	985	75.6	2106	42.2
190	"	663	83.6	1335	63.4
0	8 weeks	4327		3039	
47.5	"	2963	31.5	3501	-15.2
95	"	889	79.5	2043	32.7
190	"	664	84.6	1020	66.4

Table 2.: Effect of Fenoxycarb on number of adults and larvae of the booklouse L. bostrychophilus

Dose in ppm	Duration of trial	Number of adults	Reduction of adults in %	Number of larvae	Reduction of larvae in %
0	4 weeks	155		331	
4	"	17	89.0	393	-18.7
8	"	12	92.3	230	30.5
16	"	9	94.2	130	60.7
0	4 weeks	144		352	
4	"	26	81.9	361	- 2.6
8	"	17	88.2	236	33.0
16	"	10	93.1	129	63.4
0	6 weeks	823		1110	
4	"	13	98.4	588	47.0
8	"	18	97.8	514	53.7
16	"	13	98.4	454	59.1
0	6 weeks	840		1029	
4	"	16	98.1	614	40.3
8	"	10	98.8	488	52.6
16	"	9	98.9	397	61.4
0	8 weeks	4037		3645	
4	"	238	94.1	3110	14.6
8	"	215	94.7	1292	64.6
16	"	99	97.5	950	73.9
0	8 weeks	4327		3039	
4	"	276	93.6	2740	9.8
8	"	214	95.1	1162	61.8
16	"	116	97.3	913	70.0

Table 3.: Effect of Methoprene on number of adults and larvae of the flour mite A. siro

Dose in ppm	Number of adults	Reduction of adults in %	Number of larvae	Reduction of larvae in %
0	350		603	
47.5	163	53.4	280	53.6
95	81	76.9	124	79.4
190	83	76.3	99	83.6
0	130		202	
47.5	63	76.2	48	51.5
95	37	88.1	24	71.5
190	32	87.6	25	75.4

Table 4.: Effect of Fenoxycarb on number of adults and larvae of the flour mite A. siro

Dose in ppm	Number of adults	Reduction of adults in %	Number of larvae	Reduction of larvae in %
0	350		630	
0.5	220	37.1	369	38.8
1.0	127	63.7	207	65.7
4.0	23	93.4	55	90.9
8.0	18	94.9	39	93.5
0	508		971	
0.5	329	58.1	635	34.6
2.0	23	95.4	153	84.2
0	562		953	
2.0	7	98.8	154	83.8
4.0	6	98.9	45	95.3
0	767		1304	
1.0	26	96.6	444	66.0
0	316		582	
8.0	24	92.4	40	93.1

EFFETS DE DEUX REGULATEURS DE CROISSANCE, METHOPRENE ET FENOXYCARB, SUR *LIPOSCELIS BOSTRYCHOPHILUS* ET *ACARUS SIRO*

Rudolf BUECHI

Swiss Federal Research Station for Agronomy
Reckenholzstrasse 191, CH-8046 Zuerich, Switzerland

RESUME

Les deux régulateurs de croissance suivants : Méthoprène et Fénoxycarb ont été étudiés sur un psoque, *Liposcelis bostrychophilus* et l'acarien de la farine, *Acarus siro*. Ils ont été ajoutés et mélangés au milieu. Le nombre de larves et d'adultes F1 de *L. bostrychophilus* et de *A. siro* a été compté. 4-6 ppm de Fénoxycarb ont réduit le nombre d'adultes F1 de *L. bostrychophilus* de 99,2 % et le nombre de larves F1 de 76 %. Le méthoprène, avec un taux d'application de 47,5-190 ppm, a réduit le nombre d'adultes F1 de 98 % et le nombre de larves F1 de 77 %. Les deux régulateurs ont induit des superlarves chez *L. bostrychophilus*.

Les effets de ces deux produits sur l'acarien de la farine se sont avérés plus faibles. Les deux ont réduit la formation d'adultes et le nombre de larves F1 d'à peu près 90 %.