The study of analog variants for mating disruption pest, cabbage moth

Maria Călin[1], Maria Feneşan[2], Tina Oana Cristea[1], Silvia Ambăruş[1], D.I. Avasiloaiei[1]
[1]Vegetable Research and Development Station Bacău
sclbac@legumebac.ro
[2]"Raluca Ripan" Institute for Research in Chemistry Cluj-Napoca

Keywords: Brassica, pheromone, noctuidae

ABSTRACT

The experimentations were accomplished at Vegetable Research and Development Station Bacău, during 2008-2009. In 2008, the hard infestation of eggs with *Trichograma evanescens* Westw from generations 1 and 2 determined a low attack degree (GA%) of 11,3% in generation 1 (over the economic damage threat attack (EDTA) and 2,1% in generation II (under EDTA). In 2009 the dispensers with analogue pheromones, for mating disruption, variant C4 were experimented in the autumn cabbage crop, in the second generation of cabbage moth. In conditions of a low population of *Mamestra brassicae* L., in the un-treated control a higher number of eggs (with 30.7% more, comparing with the variant Analog C4) were laid down. The percentage of larva apparition of cabbage moth was higher at the control variant - 67%, comparatively with 14,5% in variant Analog C4. As a result, the frequency of attack (AF%) surpassed the economic damage threat attack (EDTA) in control variant, its value being 11,9%. In variant Analog C4 the frequency of attack AF% was below the economic damage threat attack (EDTA), respectively 2,4%.

INTRODUCTION

Mating disruption of cabbage moth is a pest management technique for control of pest infestations (Stephen and colab. 2009; Carter and Fraser, 2003).

Mating disruption involves the utilization of synthesized sex pheromone to disrupt the reproductive cycle of this pest. This method exploits the male insects' natural response to female by introducing a synthetic pheromone into the insects' habitat. The synthetic pheromone is a volatile organic chemical for to mimic the species-specific sex pheromone produced by the female insect (Stephen and colab. 2009).

The general effect of mating disruption is to confuse the male insects by masking the natural pheromone of female, causing the males to follow "false pheromone trails" at the expense of finding mates, and affecting the males' ability to respond to "calling" females. Consequently, the male population experiences a reduced probability of successfully locating and mating with females, which leads to the eventual cessation of breeding and collapse of the insect infestation. Many farmers consider mating disruption to be among the most environmentally friendly treatments used control of pest infestations (Stephen and colab. 2009; Carter and Fraser, 2003).

Different countries use pheromone programs for controlling low to moderate pest population density (Kakizaki, 2002).

SCDL Bacau and I.C.C. Cluj Napoca has accomplished synthesis of variants with analog of pheromones for experiments in the field during 2008-2009. In the present paper we present the preliminary results of this semichemicals tip.

MATERIAL AND METHODS

The dispensers with analogue pheromones for mating disruption were installed on the cabbage plants in the following variants:

2008

Analog C4 – MD vegetables – early and summer cabbage experiment - 2200 mp.
Analog C5 – MD vegetables – autumn cabbage experiment - 2000 mp.

2009

Analog C4 – MD vegetables – autumn cabbage experiment 1,1 ha.

The decadal observations were accomplished over the number of eggs and clusters deposed, the frequency (F%) and intensity of attack (I%), attack degree (GA%).

RESULTS AND DISCUSSIONS

In the conditions of existence of some noctuidae lepidopters that were in phase of gradation regression, the number of clusters and eggs deposed by them on 100 plants (the analyzed sample) was low (tab. 1). The hard infestation of eggs with *Trichograma evanescens* Westw from generations 1 and 2 determined a low attack degree (GA%) of 11,3% in generation 1 (over the economic damage threat attack (EDTA) and 2,1% in generation II (under EDTA).

2009

The utilization of variant Analog C4 allowed the obtaining of the following results (table 2).

We can observe that the first clusters and apparition of larva were observed in the 1st decade of September. As a result the attack of noctuidae lepidopters started in September (fig. 1).

Analyzing the obtained dates, we observed that in the control, un-treated variant, a higher number of eggs (with 30.7% more, comparatively with the variant Analog C4) were deposed.

The percentage of eggs emersion was higher at the control variant – 67%, comparatively with 14,5% in variant Analog C4. As a result, at the un-treated control, the attack frequency (AF%) overcome the economic damage threat attack (EDTA), with a value of 11,9%.

In variant Analog C4, AF% was under EDTA, respectively 2,4%.

CONCLUSIONS

2008 - In the conditions of existence of some noctuidae lepidopters that were in phase of gradation regression, the number of clusters and eggs deposed by them on 100 plants (the analysed sample) was low. The hard infestation of eggs with *Trichograma evanescens* Westw from generations 1 and 2 determined a low attack degree (GA%) of 11,3% in generation 1 (over the economic damage threat attack (EDTA) and 2,1% in generation II (under EDTA).

2009 - The dispensers with analogue pheromones, for mating disruption, variant C4 were experimented in the autumn cabbage crop, in the second generation of cabbage moth. In conditions of a low population of *Mamestra brassicae* L., in the un-treated control a higher number of eggs (with 30.7% more, comparing with the variant Analog C4) were laid down.

The percentage of larva apparition of cabbage moth was higher at the control variant – 67%, comparatively with 14,5% in variant Analog C4. As a result, the frequency of attack (AF%) surpassed the economic damage threat attack (EDTA) in control variant, its value being 11,9%. In variant Analog C4 the frequency of attack AF% was below the economic damage threat attack (EDTA), respectively 2,4%.

REFERENCES

Kakizaki, M. 2002. Suppression effects on populations of the cabbage armyworm, Mamestra brassicae, and the flax budworm, Heliothis maritima adaucta (Lepidoptera: Noctuidae), by mating disruption using the sex pheromone. Ann. Rep. Soc. Plant Prot. North Japan.

Stephen C. Welter, Carolyn Pickel, Jocelyn Millar, Frances Cave, Robert A. Van 3. Steenwyk, John Dunley, 2009 Pheromone mating disruption offers selective management options for key pests. California Agriculture, Volume 59, Number 1

N. Carter, H. Fraser, 2003 Mating Disruption for Management of Insect Pests. OMAFRA.2003

TABLES

Table 1 - Testing of mating disruption

Nr. crt.	Specification	No. clusters on 100 plants	No. eggs, from which:				Obs.
			Total	No. of parasitized eggs	No. of emerged eggs	%	
Analog C4 – MD vegetables – early and summer cabbage experiment - 2200 mp.							
1	**Analog C4**	9	115	46	69	60	GA 11,3%
2	**Control un-treated**	7	120	52	68	56,7	GA 10,3%
Analog C5 – MD vegetables – autumn cabbage experiment - 2000 mp.							
1	**Analog C5**	3	68	60	8	11,8	GA 2,5%
2	**Control untreated**	2	66	61	6	9,0	GA 2,1%

Table 2 - Testing mating disruption Analog C4 – autumn cabbage experiment

Nr. crt.	Specification	No. clusters on 100 plants	No. eggs, from which:			Observations
			Total	No. emerged eggs	%	
September 1st decade						
1	**Analog C4**	2	124	18	14,5	F% 2,4%
2	**Control untreated**	7	179	120	67,0	F% 11,9

FIGURES

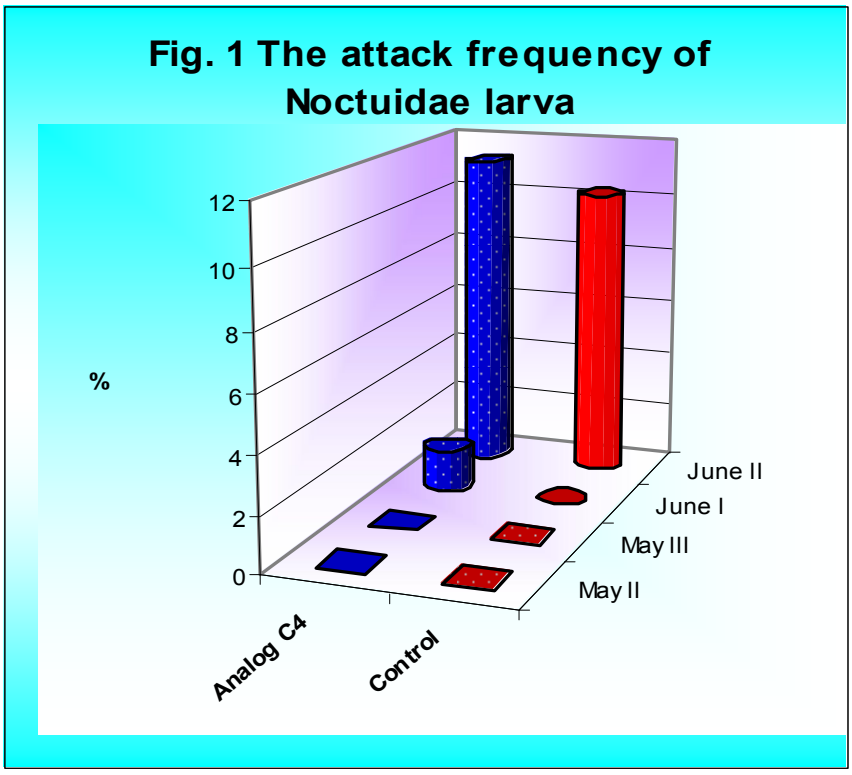

Fig. 2 The attack frequency of *Noctuidae* larva

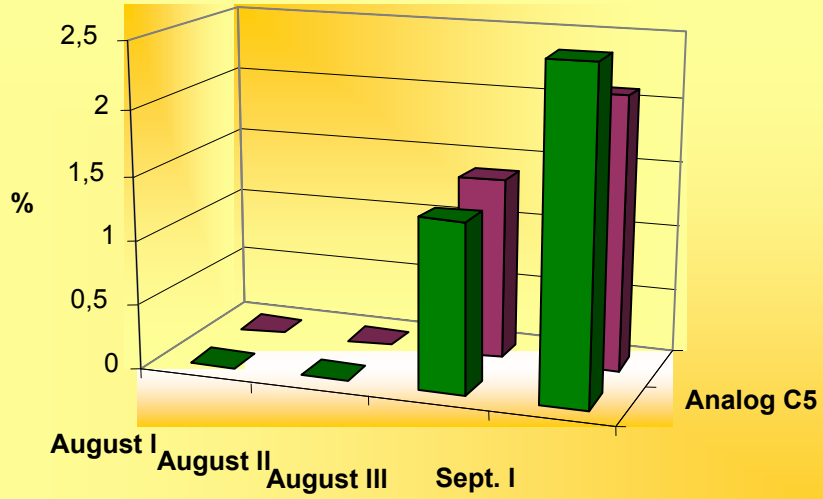

Fig. 3 The attack frequency (AF%) of *Noctuidae* larva