Effects of a bifenthrin-treated net on the natural enemies *Aphidius colemani* (Haliday) and *Adalia bipunctata* L. in a cucumber crop in central Spain. Semi-field experiments

F. Amor[1], A. Garzón[1], M. Fernández[1], I. Morales[1,2], A. Fereres[2,3], G. Smagghe[4], P. Medina[1,2], P. Bengochea[1], E.Viñuela[1,2]

[1]Crop Protection Unit. School of Agricultural Sciences (ETSIA). Technical University of Madrid (UPM). 28040-Madrid. Spain
[2]Control of insect vectors in sustainable agriculture (IVAS). Associated Unit CSIC-UPM
[3]Crop Protection Department. Agricultural Sciences Institute, CSIC. Serrano 115 bis, 28006 Madrid. Spain
[4]Laboratory of Agrozoology, Department of Crop Protection, Faculty of Bioscience Engineering, Ghent University, Ghent, Belgium

I. Introduction

Insecticide-treated nets have been used since years against mosquitoes vector of malaria.

In agriculture, the use of physical barriers could be a useful tool to prevent pest access to crops and impede disease transmission to plants.

However, insecticide-treated nets must be carefully evaluated because they could diminish air flow, increase temperature and humidity and decrease light transmission, which may affect plant growth, pests and natural enemies.

As biological control is considered a key factor in Integrated Pest Management (IPM) nowadays, the potential negative effects of insecticide-treated nets on natural enemies need to be studied carefully.

II. Objective

In this work, the effects of a bifenthrin-treated net (3.6 g/Kg) (supplied by the company Intelligent Insect Control, IIC) on natural enemies of aphids were tested on a cucumber crop in Madrid (Central Spain).

III. Materials & Methods

Three identical nethouses "tunnel type" (8 m long x 6.5 m width x 2.6 m high) were used following a split-plot design with 3 replicates.

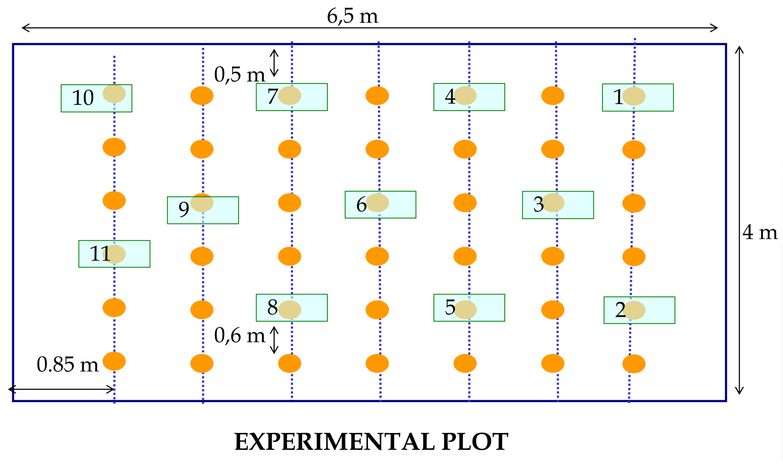
Each nethouse was divided in two experimental plots (4 m long x 6.5 m width) separated by a vertical net. An untreated (control) or bifenthrin-treated net (mesh= 10 x 10 threads/cm^2) was placed in each experimental plot along the lateral (4 m long x 2 m high). The rest of the nethouse was covered by a standard commercial net.

42 cucumber plants (*Cucumber sativus* L. "Ashley") were transplanted in each experimental plot. Two days after transplanting, 3 *Aphis gossypii* Glover/marked plant were inoculated. Afterwards, natural enemies were released when aphid population was settled.

10 *A. colemani* adults/m^2 were released in the center of each experimental plot.

10 *A. bipunctata* L3 larvae/m2 were released in each experimental plot (22/marked plant).

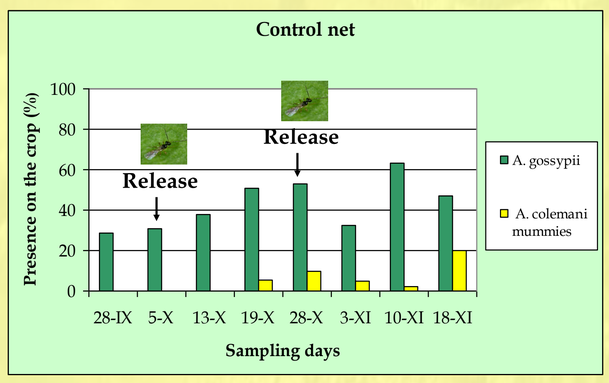
Weekly sampling was done determining the presence or absence of the pest and the natural enemies (NE) in the 42 plants/experimental plot, as well as the number of insects in the 11 marked plants (3 leaves were randomly chosen per marked plant).

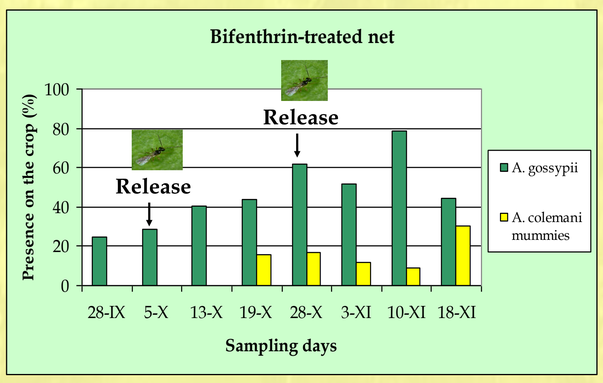


EXPERIMENTAL PLOT

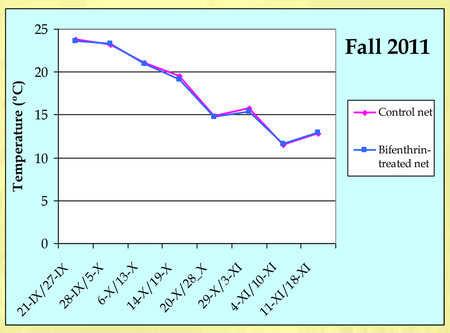
IV. Results

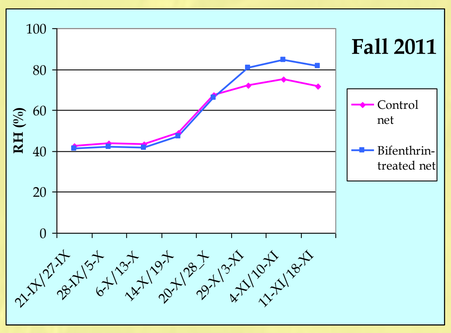
In spite of the presence of *A. colemani* mummies on the crop, the number per marked plant was too low to determine the effect of the bifenthrin-treated net on the parasitoid.



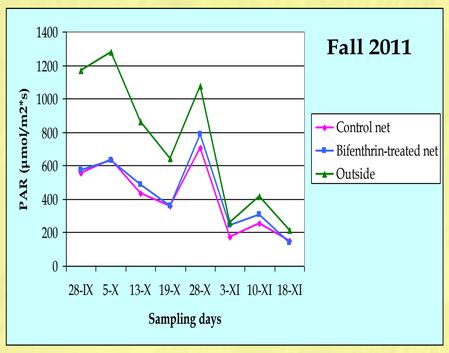


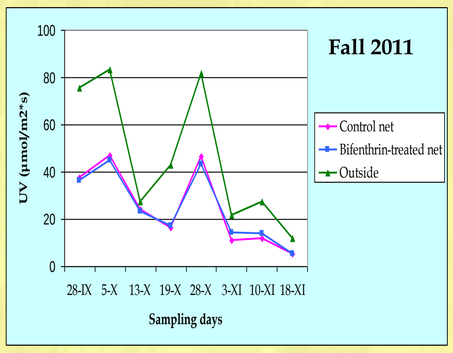
A. bipunctata was not found on the crop and only a short term control of aphid population was observed.

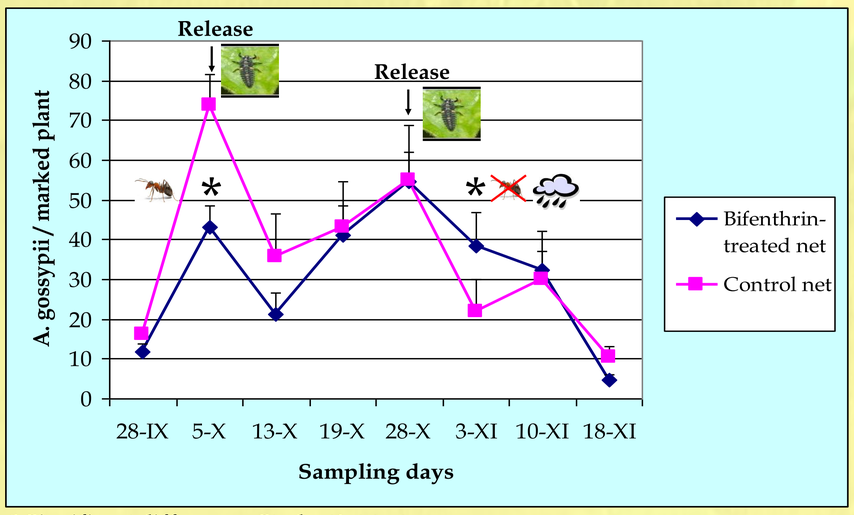




Enviromental conditions were not affected by the bifenthrin-treated net.







*** Significant differences-Student´s t-test**

On the second sampling (5-X), the significant increase of the aphid population in the control net was related to the presence of ants in one of the control experimental plot.

On the sixth sampling (3-XI), the significant decrease of the aphid population in the control net was related to the absence of ants due to the rainy conditions. In this way, *A. bipunctata* was able to decrease significantly the aphid population in the control experimental plot infested by ants.

V. Conclusions

PEST

Neither the number of aphids/plant nor its distribution was affected by the bifenthrin-treated net when they were inoculated on the crop.

Ants were able to favour the increase of aphid population.

NATURAL ENEMIES

Natural enemies were not affected by the bifenthrin-treated net.

However, results were not conclusive and further studies are needed because:

-*A. bipunctata* did not settle on the crop.

-*A. colemani* population was too low to draw a conclusion about the effect of the bifenthrin-treated net on the parasitoid.

A. bipunctata L3 larvae were attacked by ants, reducing their predatory capacity.