INFLUENCE OF THE SPATIAL DISTRIBUTION OF ARTIFICIAL MICROHABITATS (AM) ON NEOSEIULUS CUCUMERIS PREDATORY MITE

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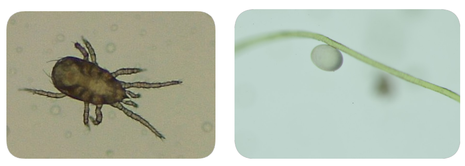
Introduction

Predatory mites are natural enemies commercialized for augmentative biological control programs. However, their survivorship and their establishment in crops can be compromised at low prey density (Messelink et al., 2014).

Goal

Provide artificial microhabitats (AM) to *Neoseiulus cucumeris* predatory mite in order to reproduce the egg-laying site function.



Photos by Lucas Etienne, 2019.

Questions

1. Oviposition preference between cotton and wool?
2. Dispersion level of the AM?
3. Location of the AM on a plant?

Material & Method

1. Oviposition preference

Laboratory

26 replicates. Petri dish with 150 *N. cucumeris* pregnant females fed with pollen. Choice between 2 AM (7 mg each):

- 1 big patch of *wool*
- 1 big patch of *cotton*

2. Dispersion level

Laboratory

13 replicates. Petri dish with 150 *N. cucumeris* pregnant females fed with pollen.
3 levels of wool dispersion (7 mg each):

- *1 woven* patch
- *1 big frayed* patch
- *10 small frayed* patches

3. Location on a plant

Greenhouse

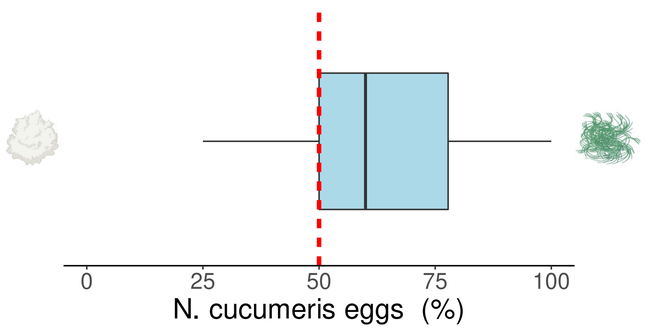
11 replicates. Pepper plant with 40 *N. cucumeris* pregnant females fed with pollen.
3 locations of frayed wool AM on the plant (7 mg each):

- *1 big* patch *bottom* leaf
- *4 small dispersed* patches
- *1 big* patch *upper* leaf

Results

1. Oviposition preference

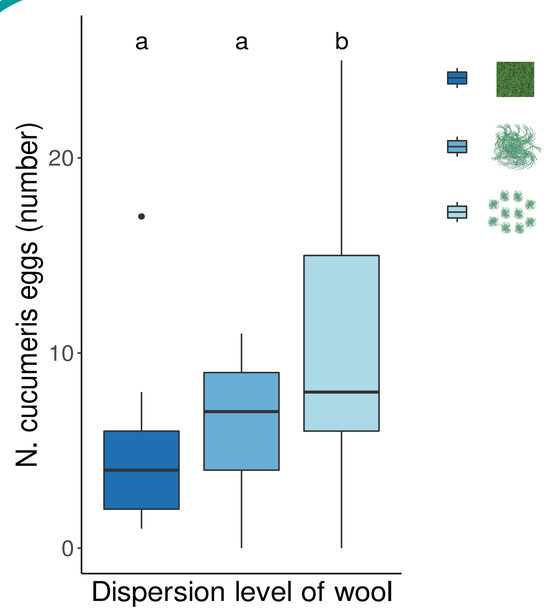
Laboratory



Oviposition preference in wool rather than cotton (p-value = 0.003).

2. Dispersion level

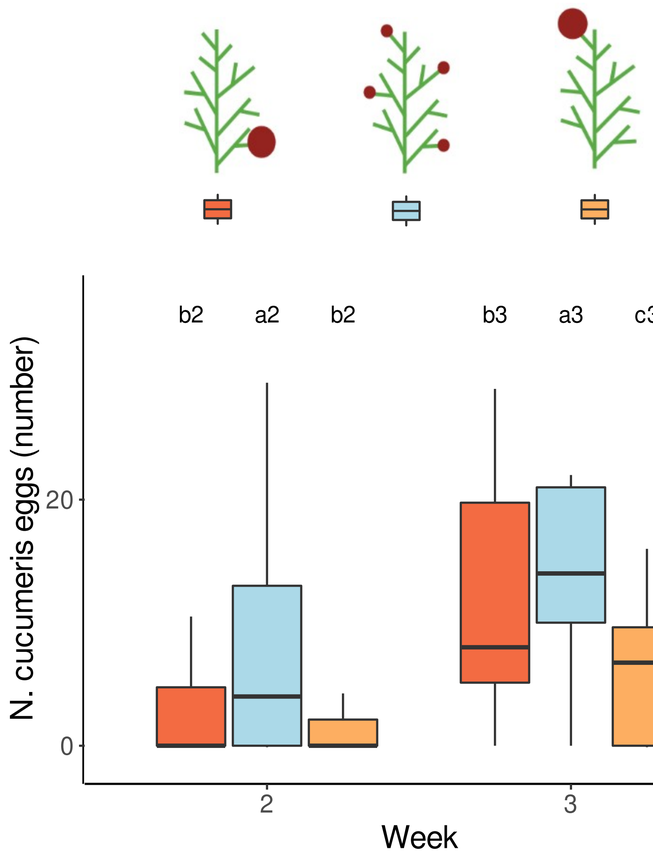
Laboratory



Higher oviposition when AM is dispersed (p-value= 2.42e-06).

3. Location on a plant

Greenhouse



Photos by Lisa Capponi, 2018.

- Interaction between time and location treatment (p-value=1.248e-05).
- Higher oviposition in 4 small dispersed patches treatment.

Conclusion

- Cotton-based AM are known to shelter eggs of predatory mites (Roda et al. 2001 ; Pekas and Wäckers, 2017). In our study, *N. cucumeris* preferred to lay eggs in wool rather than cotton.
- *N. cucumeris* oviposition behaviour was more stimulated with small dispersed AM than with aggregated ones in laboratory conditions as in Liu et al. (2018) and also in greenhouse conditions.

- "Predator-In-First" strategy is a sustainable pest management option for growers specifically engaged in pepper productions (Kumar et al. 2020). In this context, using dispersed AM may enhance phytoseiid species before pest establishment and improve their control efficiency in greenhouses.
- Industrial developments are needed to improve AM implementation in greenhouses conditions

References:

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