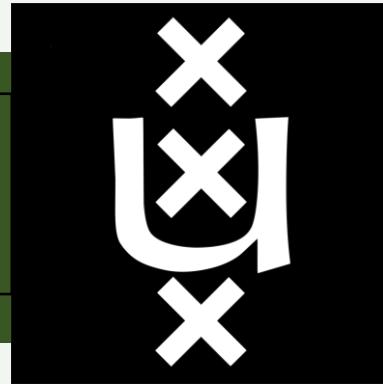


# The effect of basic substances on the population dynamics of mites



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## Introduction

- Agricultural crops suffer from pests and diseases. As a consequence, large amounts of crops are wasted each year due to these factors.<sup>1,2</sup>
- Pesticides are dangerous for the environment, alternatives are needed.
- Basic substances (EC No 1107/2009, Article 23) are safe to use, but their potential against pests is largely unknown.
- Tetranychus urticae* (two-spotted spider mite) and *Phytoseiulus persimilis* (predatory mite) will be the investigated predator-prey system.

## How do milk, chitosan and nettle extract affect *T. urticae* and *P. persimilis* and their population dynamics?



## Results

### 1) Survival experiment:

- Chitosan hydrochloride & stinging nettle extract:** No direct effect on spider mites and predators
- Cow milk:** Significantly affects both spider mites and predators by “gluing” them stuck to the leaves

### 2) Population dynamics experiment with milk:



Control +  
Predator

Milk +  
Predator

Control

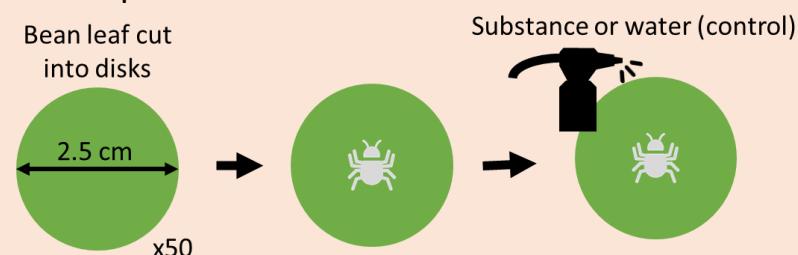
Milk

**Predators protect the plants, milk does not**

## Methods

### 1) Survival experiment: mites were directly sprayed with the basic substances or the control

For the spider mites:

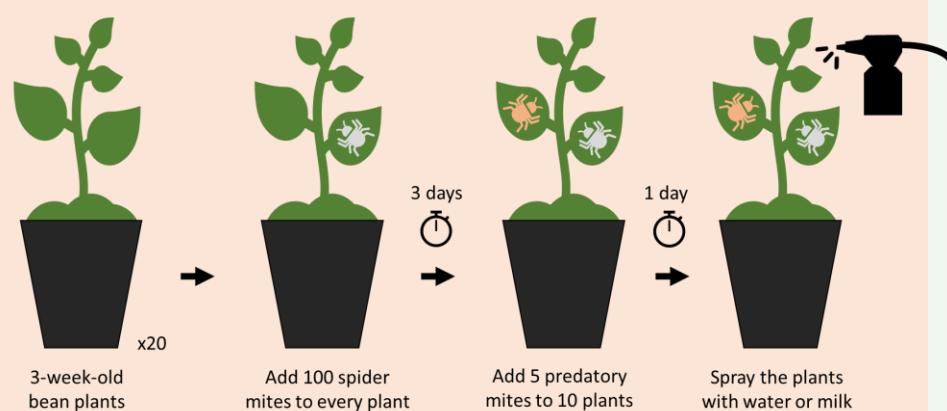


Same for the predators, but with some extra spider mites to provide food.

Observe survival after 24, 48 and 72 hours.

### 2) Population dynamics experiment with milk

**4 treatment groups:** 2 sprayed with water, 2 with milk  
2 treatment groups with only spider mites, 2 also with predators.



Count the spider mites, predators and leaves 2x a week for 3 weeks

**Cow milk, chitosan hydrochloride and stinging nettle extract are not able to protect crops against spider mites**

## Discussion

**Chitosan and stinging nettle extract had no effect at all.**

Chitosan is an elicitor, and here the mites were present before treatment. Stinging nettle extract might have an effect in higher concentrations than 3% v/v.<sup>3</sup>

**Milk had an effect when directly sprayed, but not when spraying whole plants**

Mites can hide on the under side of the leaves and not get glued to the leaf. And if they would have been sprayed directly, the predators would also die. When predators are also affected, treatment will not work.<sup>4</sup>

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2. Dierke, E. C., & Dethle, H. W. (2004). Safeguarding production—Losses in major crops and the role of crop protection. *Crop Protection*, 23(4), 275–285. <https://doi.org/10.1016/j.cropro.2003.10.001>  
3. Dąbrowski, Z. T., & Seredyńska, U. (2007). Characterisation of the two-spotted spider mite (*Tetranychus urticae* KOCH, Acari: Tetranychidae) response to aqueous extracts from selected plant species. *Journal of Plant Protection Research*, 47(2), 113–124.  
4. Janssen, A., & van Rijn, P. C. J. (2021). Pesticides do not significantly reduce arthropod pest densities in the presence of natural enemies. *Ecology Letters*, 00, 1–15. <https://doi.org/10.1111/ele.13819>