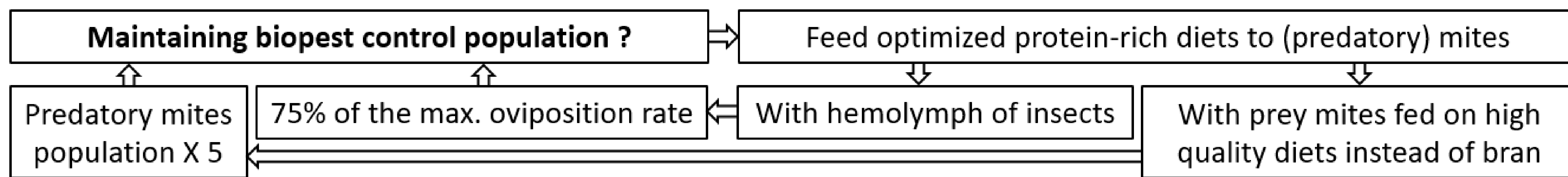


# Food from prey mites affects biological combat with predatory mites

Ada Leman<sup>a</sup>, Gerben Messelink<sup>a</sup> and Oriane Guérin<sup>b</sup>

<sup>a</sup>Wageningen University & Research, Business Unit Greenhouse Horticulture, PO Box 20, 2665 ZG Bleiswijk, The Netherlands

<sup>b</sup>Zetadec B.V., Agro Business Park 44, 6708 PW Wageningen, The Netherlands



## Background

Predatory mites are of high importance for the biological control of thrips, whitefly and spider mites, however they do not grow well in most ornamental plants in case of lack of food. This European project investigates whether predatory mites can be fed with encapsulated artificial diets to initiate a "standing army" of predatory mites.

## Goals

- The development of artificial diets based on the hemolymph of the black soldier fly (BSF) and mealworms.
- Encapsulating artificial diets to apply as liquid diets on crops.
- Optimizing the nutritional value of prey mites ("living capsules") for predatory mites.

## Results

### Diets for predatory and prey mites

- Artificial diets based on hemolymph of both BSF and mealworms proved to be very suitable for population development of the predatory mite *Amblyseius swirskii*. The average oviposition rate was 1.5 egg per day, which is close to the oviposition rate of 2 per day.
- Besides hemolymph, other high-quality proteins were also suitable for artificial diets (Figure 1).
- Direct application of liquid diets to plants resulted in phytotoxicity.
- Micro capsules with liquid diets were not suitable for consumption by predatory mites.
- The nutritional value of prey mites ("living capsules" for predatory mites) can be improved by optimizing their diets. When applied on plants, prey mites reared on protein-rich diets were found to contribute to a predatory mite population 5 times bigger than when prey mites are reared on bran (Figure 2).

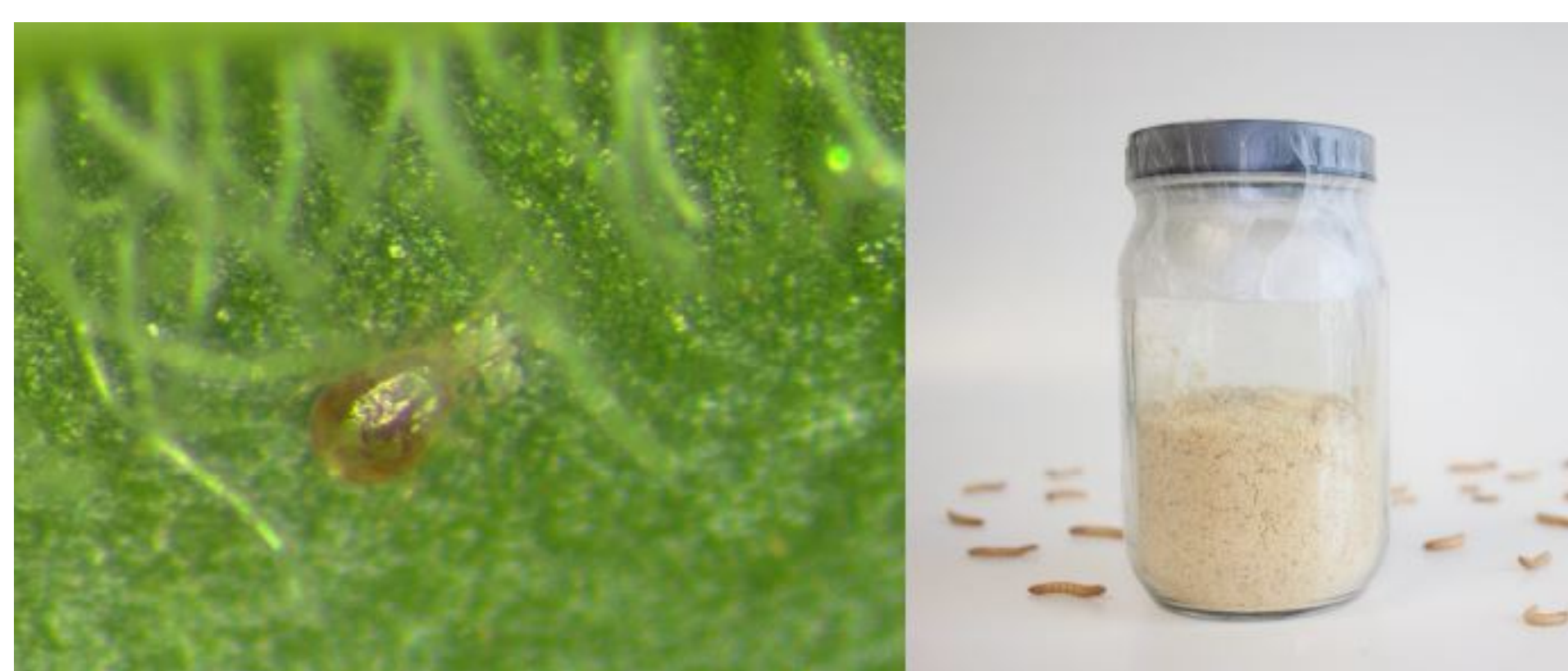


Figure 1: Left, the predatory mite *Amblyseius swirskii* turns dark brown when fed on a liquid diet based on mealworms. Right, Soy Protein Concentrate based diet with 20% insect (SPC).

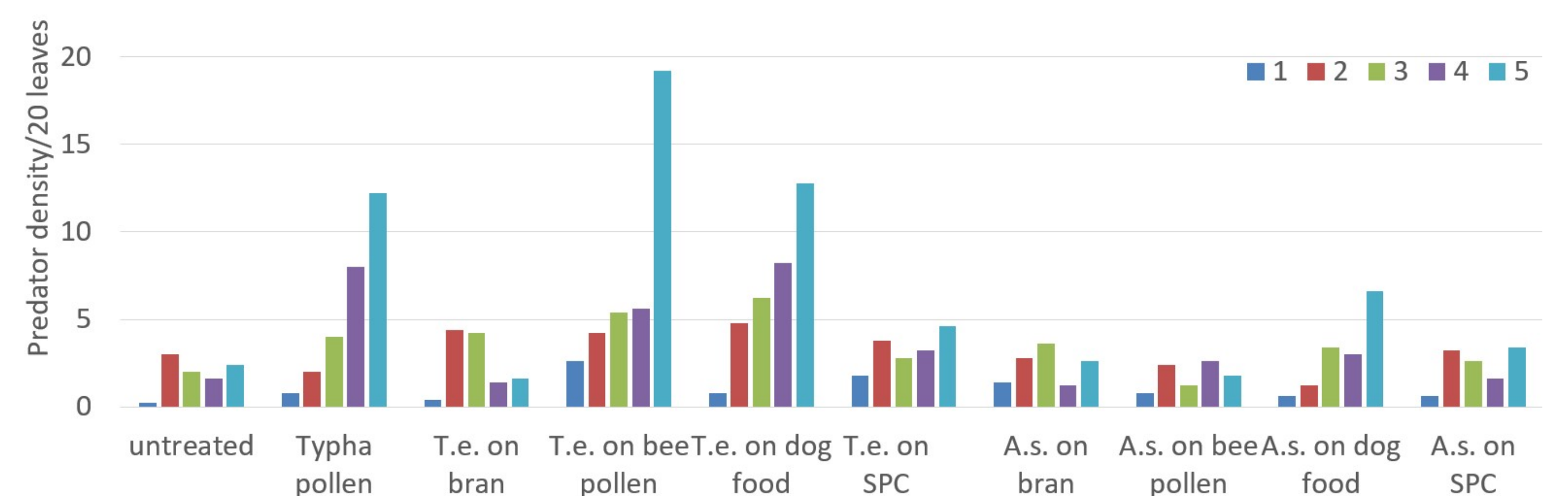


Figure 2: Population development per week of predatory mites reared on different diets, including prey mites as *Tyreophagus entomophagus* (T.e.) and *Acarus siro* (A.s.) reared on different diets.

## Control of thrips

In chrysanthemum (see Figure 3), it was assessed whether the control of thrips also improved when predatory mites are fed prey mites with a higher nutritional value. It turned out that the best feed at high thrip populations in the short term did not lead to a better thrips control, probably because the omnivorous pest thrips also feed themselves on these diets.



Figure 3: Set up of a greenhouse test to investigate the effects of prey mites on the control of thrips. Above right: the feed mite *Tyreophagus entomophagus* and bottom right: *Acarus siro*.

## Conclusions

- The establishment and population development of predatory mites in crops can be improved by feeding them with the right prey mites grown on a protein-rich diet.
- For the control of thrips, it is likely a better strategy to apply different types of feed in different stages of combat. In the start-up phase, high-quality food is desired, and at a later stage, it is safer to apply additional feed to maintain the population without the risk of stimulating the pests.

## Acknowledgements

This research was part of the Eurostars project "predmitefeed" with Dutch and Spanish partners. The Dutch part was financed by the Dutch Enterprise Agency The Netherlands (RVO).