

Bachelor or Master thesis BIOVIT 2026-2028

Topic/Title (Norwegian)

FriskAgurk: Bærekraftig plantehelse i moderne veksthusagurkproduksjon – Arbeidspakke 4: Klimadata og modellering for å oppnå bedre bekjempelse av trips

Vi vil bruke data fra gartnerienes klimastyringsanlegg sammen med observasjoner av trips og rovmidd for å identifisere faktorer som kan justeres for å gi bedre tripsbekjempelse.

Topic/Title (English)

HealthyCucumber: Sustainable plant health management in modern greenhouse cucumber production – Work Package 4: Environmental data and models to achieve better thrips control.

We will use data from the greenhouses' climate control systems together with observations of thrips and predatory mites to identify factors that can be adjusted to improve thrips control.



Young cucumber crop with emerging thrips damage on leaves.

Photo: Nina Svae Johansen



Predatory mite attacking a thrips larvae

Photo: Koppert Biological Systems

Summary

Thrips are economically important pests in Norwegian greenhouse cucumber production and can cause significant quality and yield loss. The last years, many growers who have installed LED-lighting and modified their climate control program to save energy, have reported unsatisfactory biological control of thrips, particularly when elevated CO₂-concentration (eCO₂) are used to optimize yield.

Thrips are mainly controlled by predatory mites. Temperature and humidity strongly influence several biological and behavioural parameters that determine thrips and



predatory mite population dynamics and the predator-prey interactions. Life history parameters and temperature and humidity driven population and predator-prey models are published from studies performed at the temperature and humidity range occurring in commercial cucumber production.

The effect of growth lighting and eCO₂ on thrips and predatory mites is less studied. LED lamps differ from the traditionally used HPS lamps in their emission spectral profile. Spectral distribution and intensity of light have been shown to affect thrips phototactic response, diel flight activity, physiology and biology, and the combined effect of light intensity, day-length and temperature can affect the interaction between thrips species and their predators. It is also suggested that eCO₂ at concentrations used in cucumber production to optimize yield favour host plant selection, food uptake, growth and development of thrips due to changes in the plants' chemical content and release of volatile compounds, and thrips reared at eCO₂ developed thicker cuticle. These effects may in turn change the numerical response of the predators relative to their prey and interfere with prey finding and killing.

Energy-saving measures alter the greenhouse environment and will inevitably influence the performance of thrips and predatory mites in the cucumber crop. As the different species respond distinctly to the different environmental factors, environmental changes can affect the outcome of the traditionally used biological thrips control program. The overall effect of altered environment on the predator-prey interaction in commercial cucumber greenhouses is not known and needs investigating to understand how the environmental control and/or the biocontrol program can be adjusted to maintain good thrips control.

A master thesis will consist of obtaining and compiling existing knowledge about the effect of climate on thrips and predators accompanied by data collection from laboratory experiments and/or commercial greenhouses and modelling of the interaction between thrips, predators, plant growth and greenhouse climate.

The student will develop skills and education in literature review, experimental design, data collection and analysis, modelling and scientific writing for research on biological control of pests in greenhouses.

Subject area Agricultural entomology, biological control, modelling

Language thesis Norwegian and/or English

Thesis Bachelor or Master

Credits 15, 30 or 60 ECTS

Project period Multiple options within the period 2026-2028

Project/company NIBIO and NMBU

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