Norway grants

The National Centre for Research and Development

# Physical means to control diseases and pests

- Overhead sprinkling
- UV light
- Warm steam

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Arne Stensvand, NIBIO

Photo: E. Fløistad

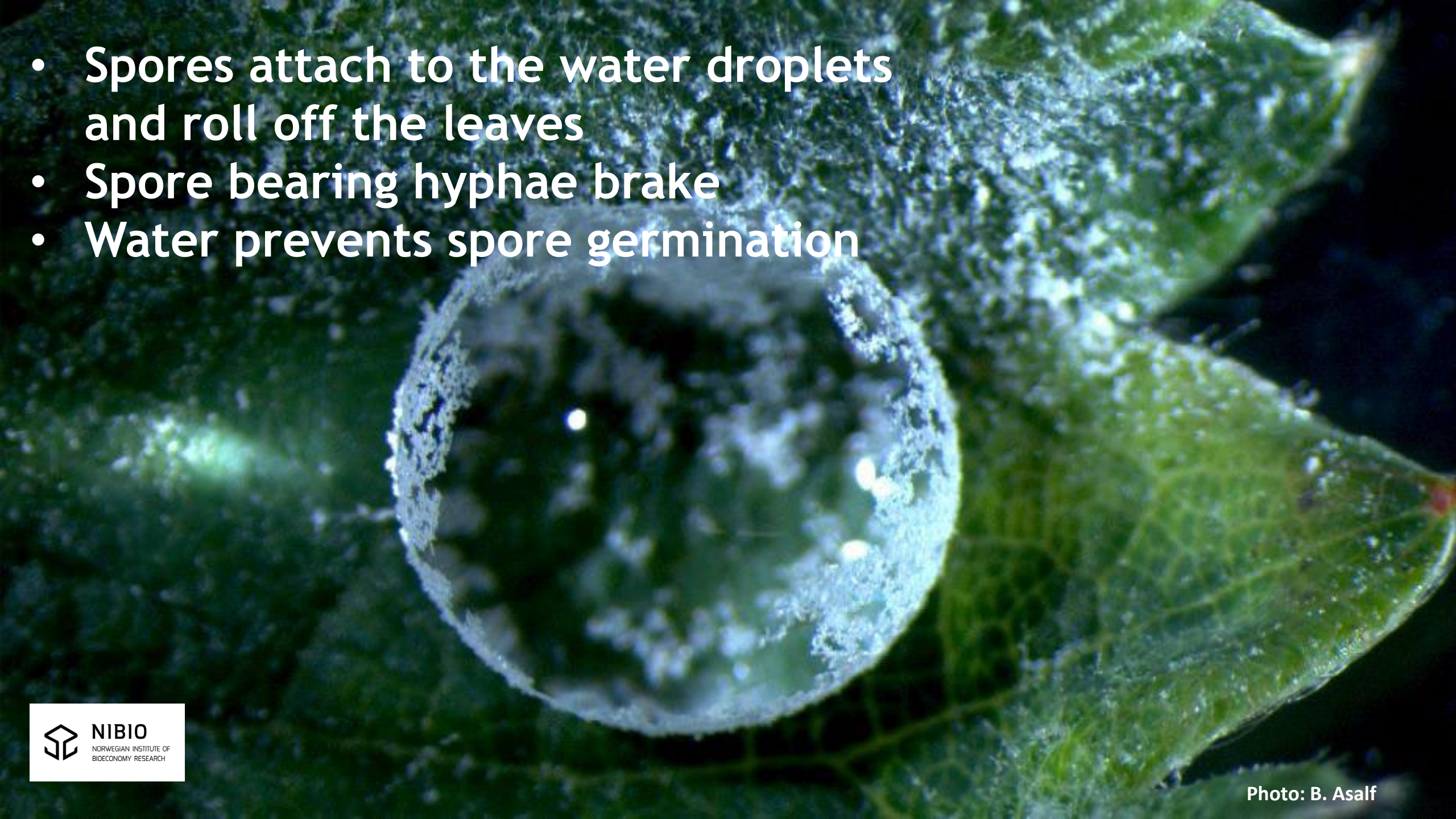
# Sprinkler-irrigation

Installed i many plastic tunnels; secures good plant establishment, effective against powdery mildew and two-spotted spider mites

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Photo: A. Stensvand


Sprinkler irrigation 1 min. 4 times daily in periods with warm, sunny weather
From a trial in Florida
NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH
Photo: R. Onofre



- Spores attach to the water droplets and roll off the leaves
- Spore bearing hyphae brake
- Water prevents spore germination

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

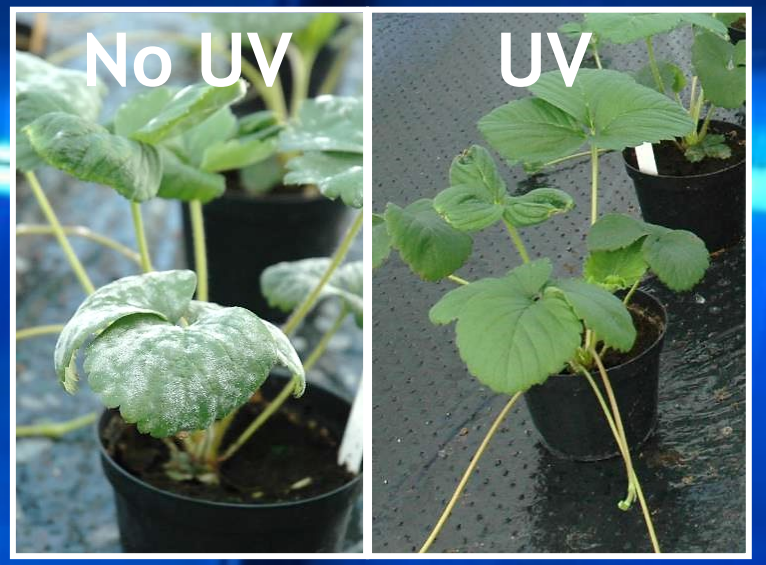
Photo: B. Asalf

Must avoid this

Plan to follow up with implementation of the sprinkler-irrigation in 2022; will work with a certified plant producer

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Photo: A. Stensvand




# UV < 300 nm reduce powdery mildew, two-spotted spider mites, some effect against grey mould; treatment during night

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Photo: R. Onofre

Demonstration trials in a high plastic tunnel in northern Norway in 2021, will be followed up in 2022

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Photo: A. Stensvand

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Photo: A. Stensvand

Will use a vertical light array in 2022 – to treat flowers and fruit hanging down from the trays

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Eventually the grower(s) will use a robotised UV unit

Photo: A. Stensvand

# Field day with growers and advisors in August 2021

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

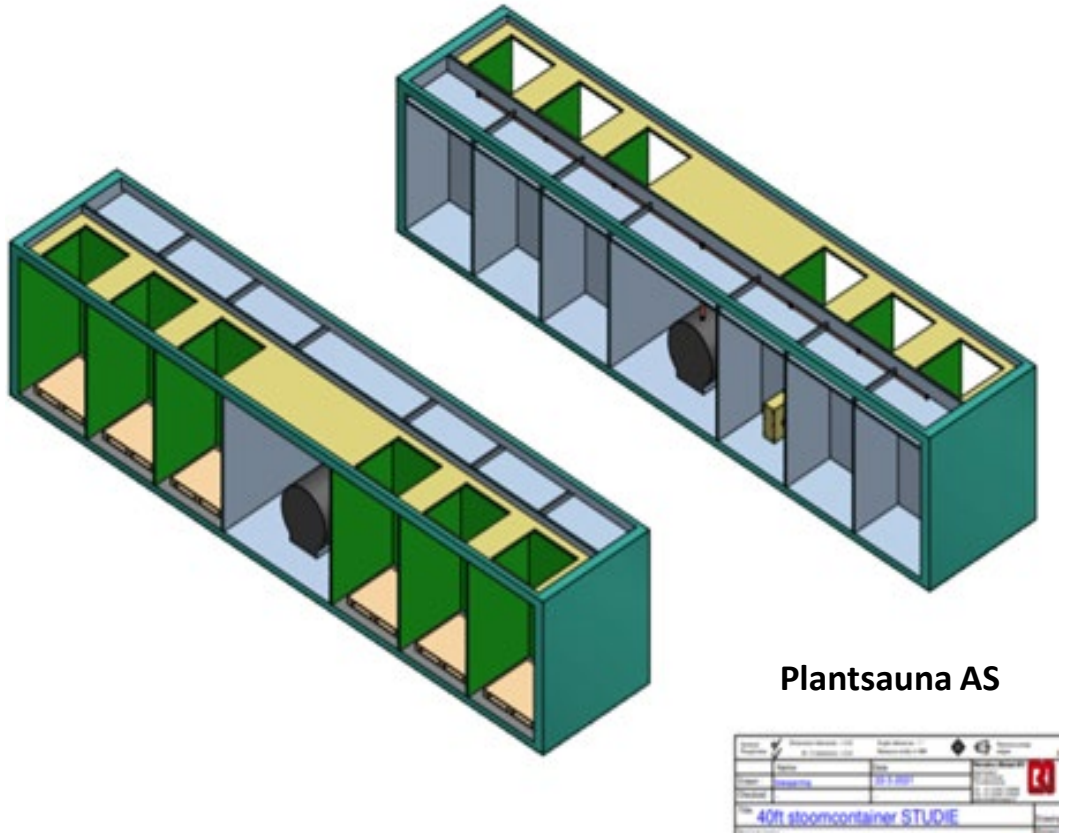
Photo: A. Stensvand

# The Plant Sauna - steam treatments



A small research unit with a steam boiler

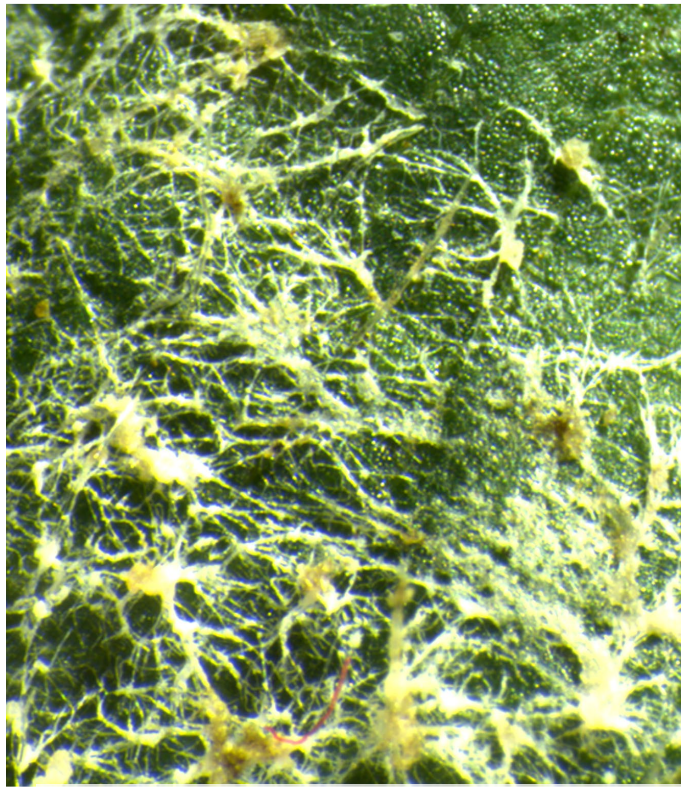

1st generation commercial size unit



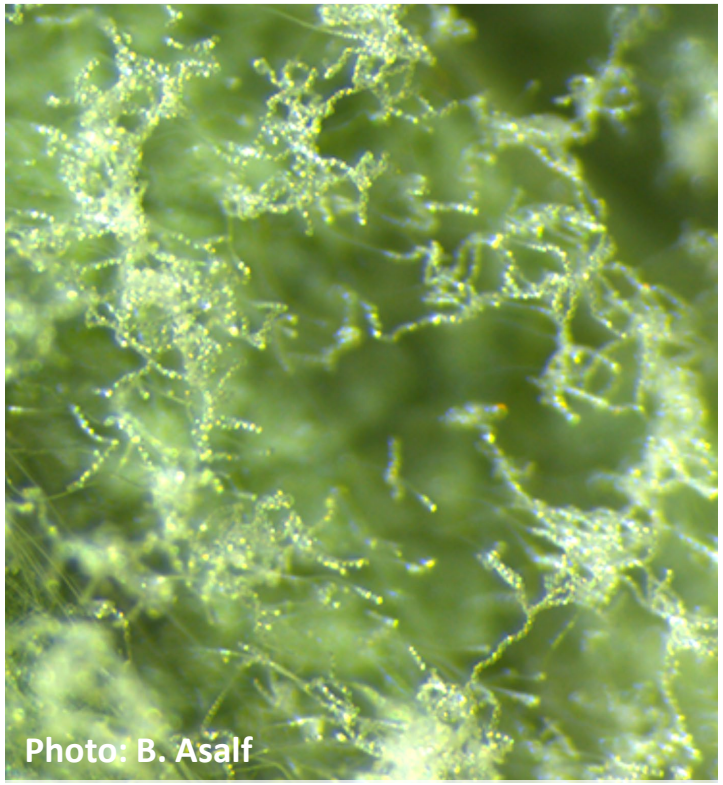

2nd generation commercial size unit

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

# Plant Sauna treatments of transplants



Dead powdery mildew after 2 or 4 hrs at 40-44°C




Spore producing powdery mildew on untreated plants

- Completely kills powdery mildew and strawberry mite
- Strongly reduces bacterial leaf blight, grey mould, crown rot and others
- Limited effect on two-spotted spider mite

Previous trials showed that warm steam treatments had no negative effect on tray plants in Norway and bare root plants in Florida, but trials with bare root plants in Norway in 2021 were not successful; will be followed up

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Photo: B. Gahatraj


Photo: A. Stensvand


New shoots emerging after treatment in the Plant Sauna


Trials with raspberry shoots in the Plant Sauna in 2022:

- Kills dormant stages of the raspberry leaf and bud mite and raspberry aphid
- If plants are dormant, treatments OK



Root mass of four raspberry cultivars in the Plant Sauna in April 2022; no negative effect on emerging of new cuttings

Goal: Be able to eradicate red root rot (*Phytophthora rubi*) and black root rot (*Cylindrocarpon* spp.)

Photo: A. Stensvand

In a collaboration with Agroscope in Switzerland, we will follow up the testing of tolerance to steam treatments of dormant long cane raspberry plants

Tests will start in early June

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

**Many collaborators:**

Vinh Hong Le, Nina Trandem, Nina S. Johansen, Anita Sønsteby (NIBIO)

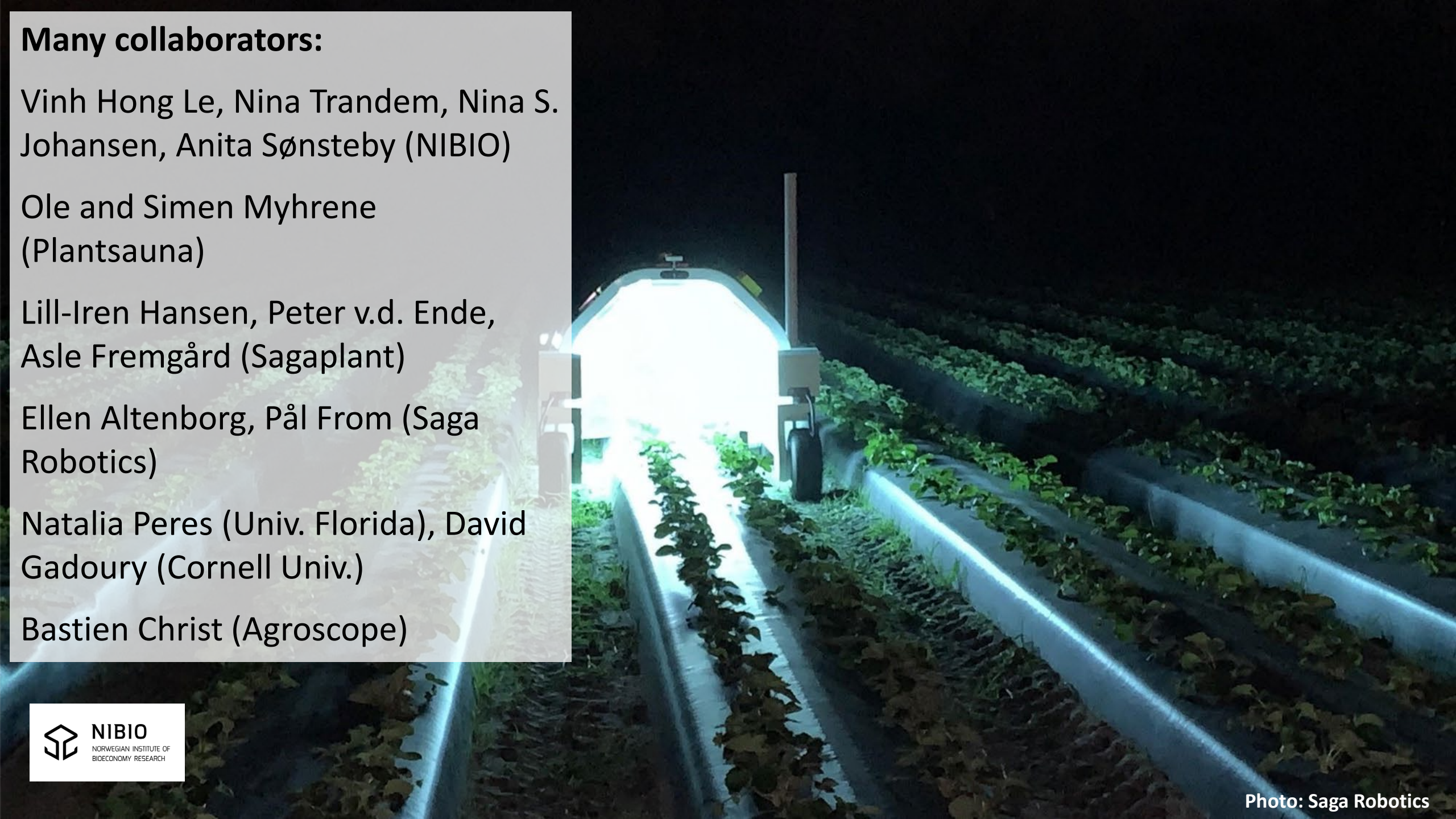
Ole and Simen Myhrene (Plantsauna)

Lill-Iren Hansen, Peter v.d. Ende, Asle Fremgård (Sagaplant)

Ellen Altenborg, Pål From (Saga Robotics)

Natalia Peres (Univ. Florida), David Gadoury (Cornell Univ.)

Bastien Christ (Agroscope)



NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Photo: Saga Robotics

The project is implemented under the Norwegian Financial Mechanism for 2014-2020 „Working together for a green, competitive and inclusive Europe”.

Projekt jest realizowany w ramach Norweskiego Mechanizmu Finansowego na lata 2014-2020 „Wspólnie działamy na rzecz Europy zielonej, konkurencyjnej i sprzyjającej integracji społecznej”.

*Thanks!*