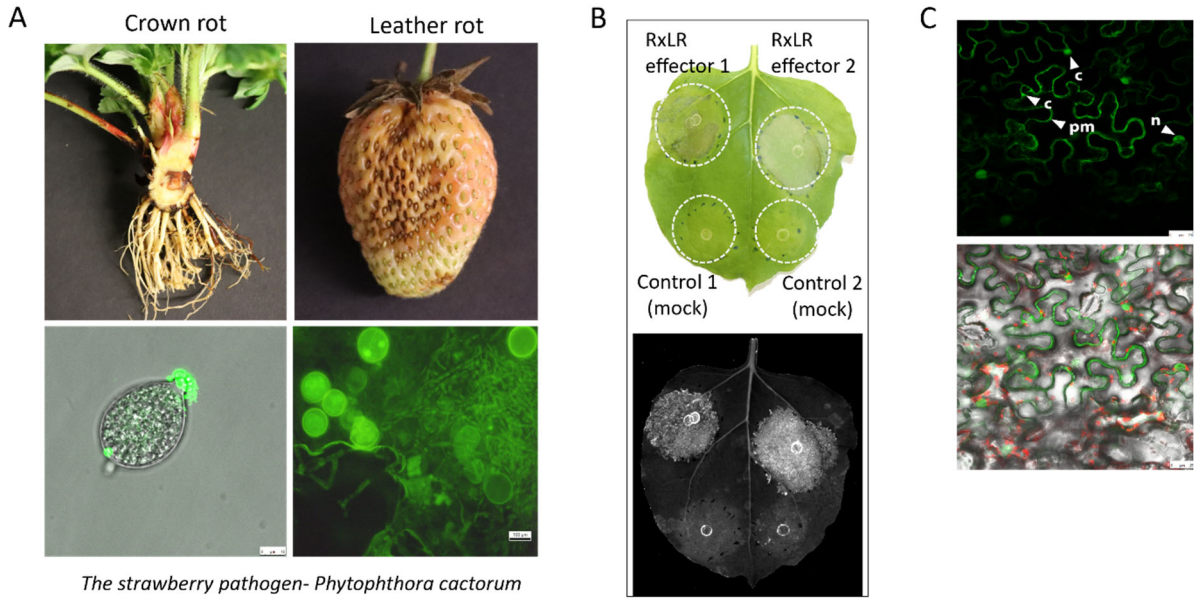
Bachelor or Master thesis BIOVIT 2023/24

Topic/Title (Norwegian): RxLR effektorproteiner fra *Phytophthora cactorum* og deres funksjon under infeksjon

Topic/Title (English): Function of RxLR effector proteins from *Phytophthora cactorum* during infection

Picture



The strawberry pathogen- Phytophthora cactorum

The strawberry-*Phytophthora cactorum* pathosystems. A) Crown rot and leather rot of strawberry (upper panel) caused by the devastating plant pathogenic oomycete *Phytophthora cactorum* (lower panel). B) Functional characterization of RxLR effectors of *P. cactorum* in *Nicotiana benthamiana*. C) Subcellular localisation study of plant proteins using confocal microscopy.

Summary (Describe the topic/thesis, type of thesis work: field work, laboratory work, literature study)

The oomycete *Phytophthora cactorum* causes two destructive diseases- crown rot and leather rot in strawberry (Figure 1A). The crown rot cause yield losses up to 40 % in the Norwegian strawberry fields, while the leather rot affects the postharvest processing of strawberry fruits, especially for the jam production. Like other oomycete pathogens, *P. cactorum* infect host plants by secreting diverse effector proteins that may facilitate the infection. Many effector proteins such as RxLRs enter different compartment within the plant cell. Some of these effectors interact with host proteins to promote infection, while some are being recognised by plant resistance proteins and initiate a hypersensitive response (or cell death response) to stop the pathogen growth (Figure 1B). Understanding the virulence function of these effectors is essential for future disease control in strawberry. In our previous studies, we identified several RxLR effectors of *P. cactorum* through transcriptome and genome sequencing (Gogoi et al. 2023) and established methods to functionally characterise effector proteins using the model plant *Nicotiana benthamiana*. We want to investigate this further with an aim to identify host proteins that interacts with the effector proteins of *P. cactorum*.

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The thesis

We are looking for a master student who is interested in basic science within an applied context. The student will be involved in studying RxLR effectors of the strawberry pathogen *P. cactorum*: localisation of these protein in the plant cell and/or finding their interacting protein partners within the plant. The project will give training in use of molecular biology techniques, such as PCR, cloning, bacterial transformation, sequencing, western blot analysis, protoplast transformation of strawberry and confocal microscopy.

Subject area (keywords): Plant science, molecular biology, and molecular plant pathology

Language thesis (Norwegian and/or English): English

Bachelor or Master thesis: Master thesis

Credits: 60 credits

Project period: 1 year

Project/company: The thesis will be part of the large-scale interdisciplinary researcher project 'FragDef - Fragaria defence mechanisms and domestication of wild resistance genes' jointly funded by The Research Council of Norway and NIBIO (Norwegian Institute of Bioeconomy Research). Location: NIBIO, Division of Biotechnology and Plant Health, Department of Molecular Plant Biology, Ås.

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