Transformation of Rhodiola rosea with rol-genes from Agrobacterium rhizogenes to enhance the production of bioactive compounds and analyses of key genes in their pathways
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Transformation of *Rhodiola rosea* with *rol*-genes from *Agrobacterium rhizogenes* – a platform to enhance production of the secondary metabolites salidroside and rosavin

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Key result

~60 % of the transformed explants developed hairy roots

Introduction

*Rhodiola rosea* L. (Fig. 1a) also known as roseroot is an arctic alpine plant distributed on the Northern hemisphere1 (Fig. 1b). The plant contains among others the secondary metabolites rosavinoids and salidroside2 (Fig. 2). These composites are active compounds that have been used for centuries to alleviate depression, stimulate the memory and as anti-fatigue and anti-inflammatory agents. Transformation with root oncogenic loci (*rol*) genes from *Agrobacterium rhizogenes* leads to development of hairy roots at the infection site3. Transformed hairy roots have, for several plant species, been shown to contain higher contents of secondary metabolites compared to wild type4.

Objectives

- To obtain hairy roots of *R. rosea* containing *rol*-genes for future sustainable production of valuable bioactive compounds in bioreactors.
- To enhance the level of bioactive compounds *in planta*.
- To regenerate plants from transformed roots.

Experimental design. The structure of the workflow behind the experiment for cultivation and regeneration of the putatively transformed hairy roots.

![Diagram of experimental design](image)

Figure 1. *Rhodiola rosea*. a) plant habitus b) geographical distribution of *R. rosea*

Figure 2. Structures of important secondary metabolites in *R. rosea*

Figure 3. Root formation following transformation. *R. rosea* was subjected to *A. rhizogenes* (transformed, n=74) or MYA (control, n =71).

Figure 4. Hairy root development. *R. rosea* was subjected to *A. rhizogenes* (transformed, n=74) or MYA (control, n =71).

![Graph of hairy root development](image)

Preliminary results

- Approximately 60 % of the transformed explants developed hairy roots (Fig. 3).
- Collectively the transformed explants developed hairy roots faster than the controls (Fig. 4).

References:


