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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 compounds 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.

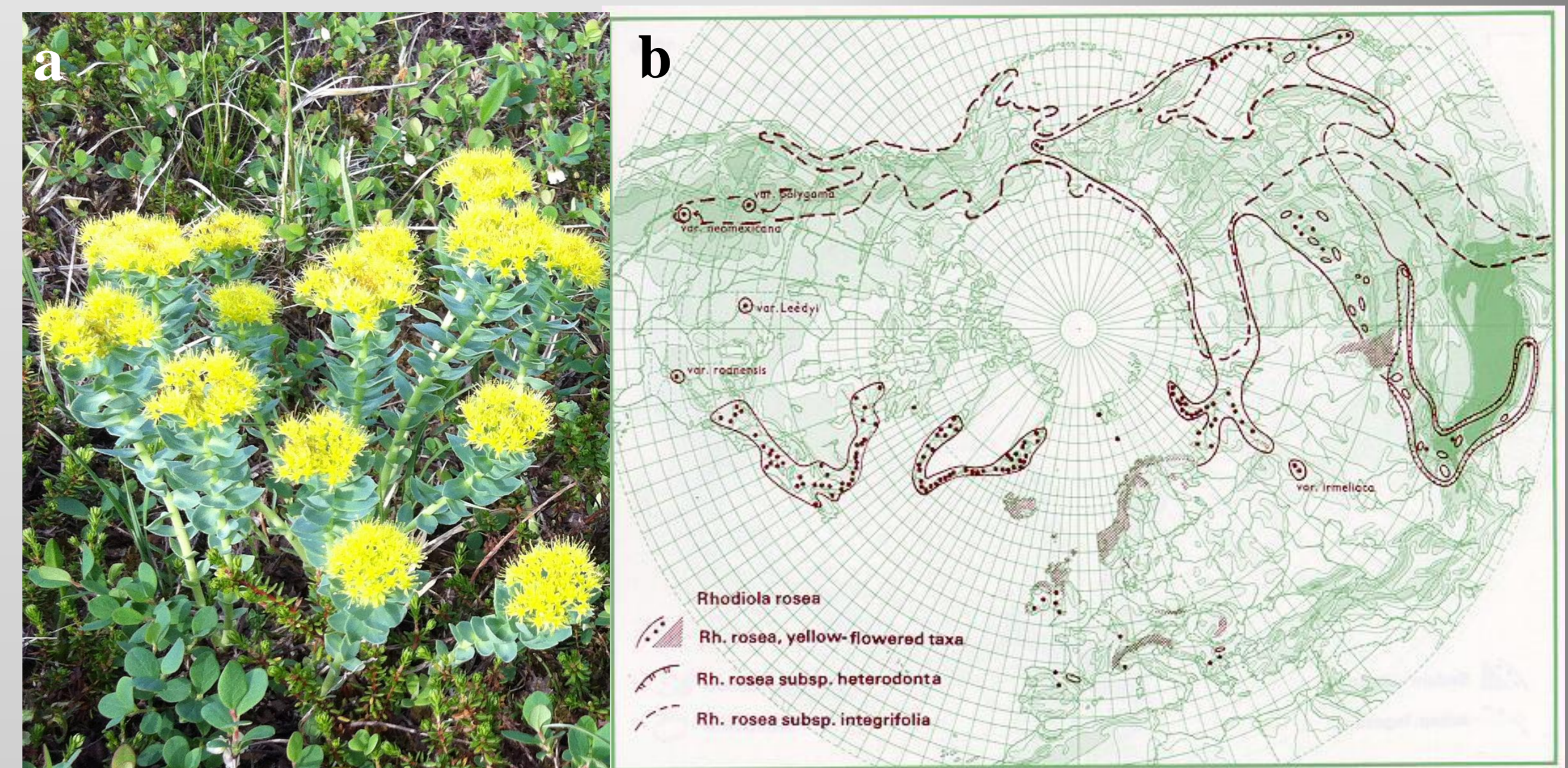


Figure 1. *Rhodiola rosea*. a) plant habitus b) geographical distribution of *R. rosea*

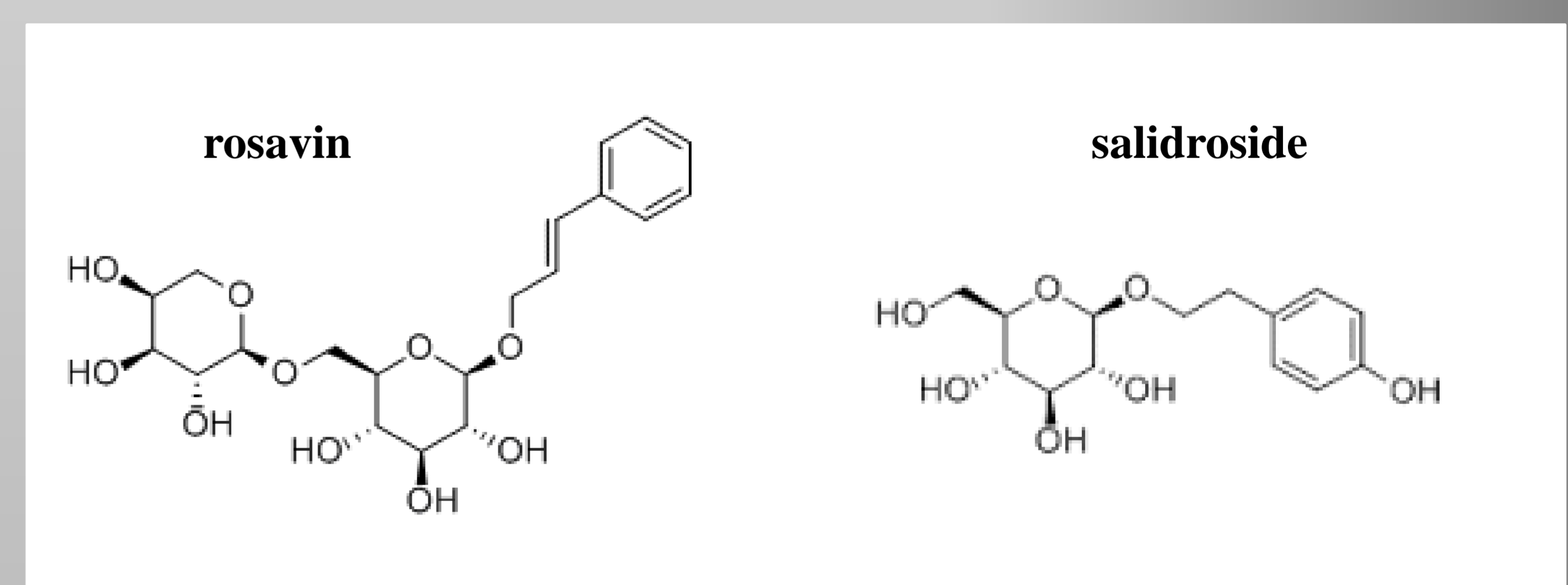
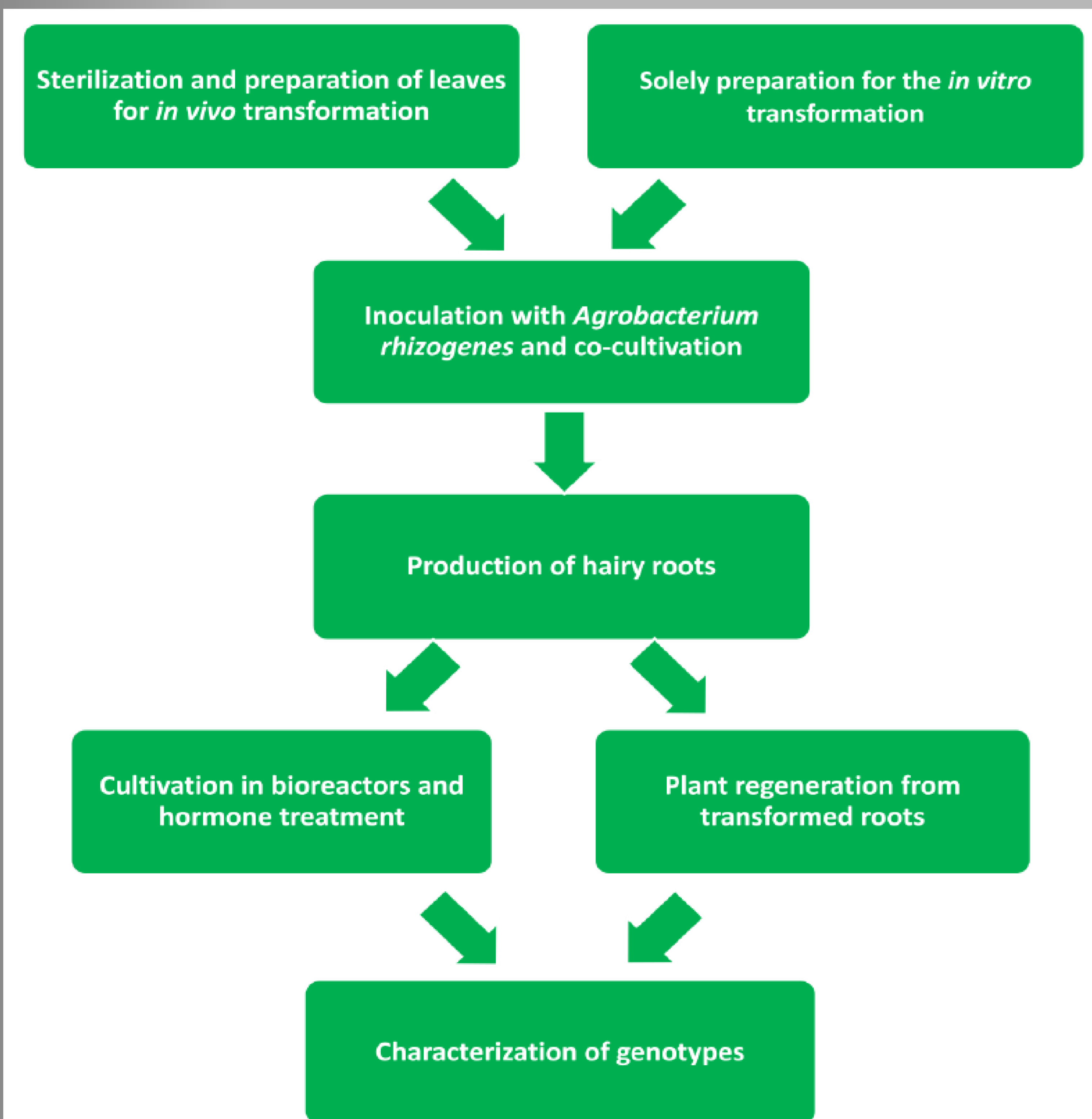


Figure 2 Structures of important secondary metabolites in *R. rosea*



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

References:

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- 4) Britton, M.T. et al., 2013. Chapter 14 THE ONCOGENES OF AGROBACTERIUM TUMEFACIENS AND AGROBACTERIUM RHIZOGENES. *Springer*, pp.523–563.

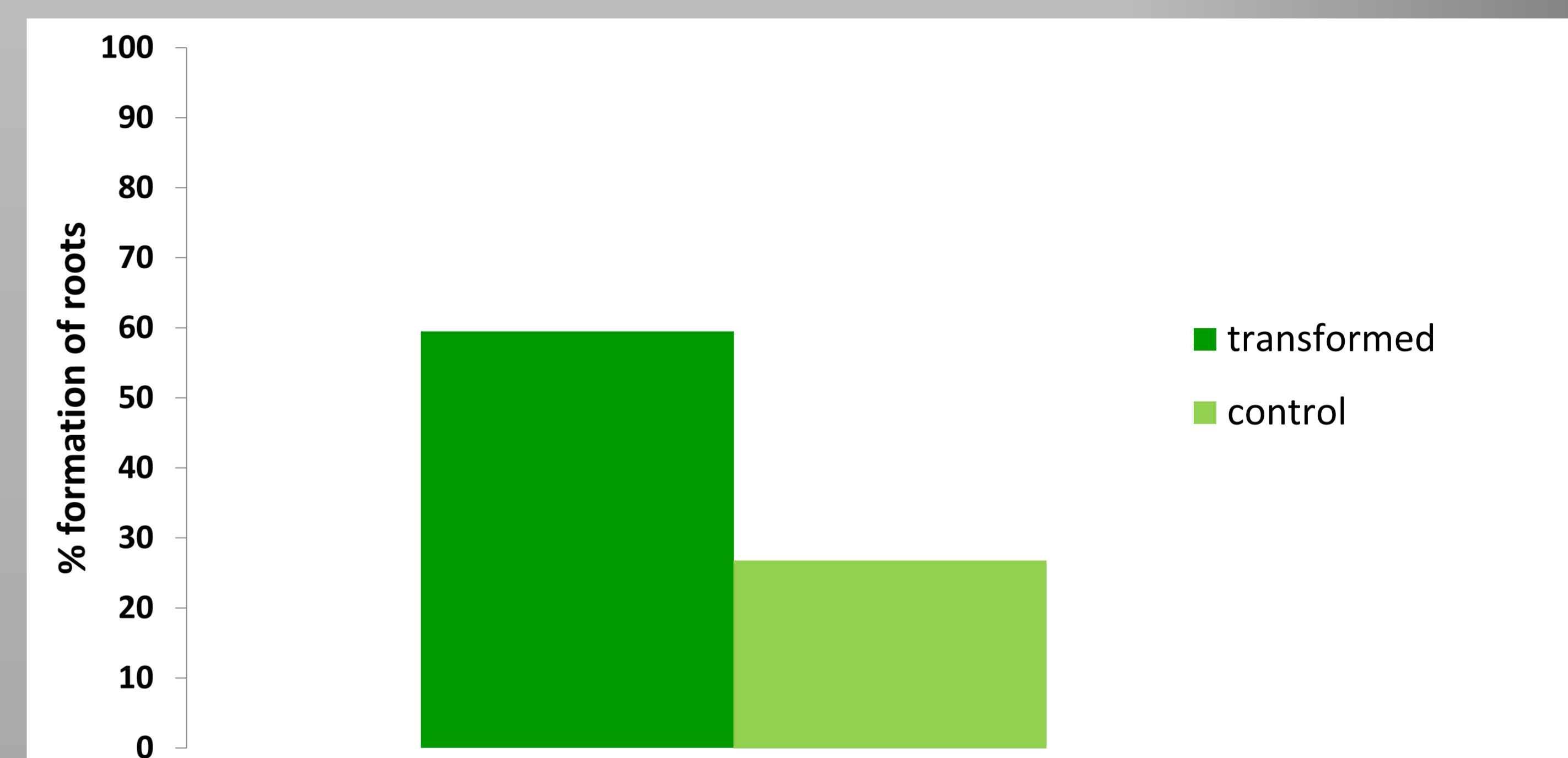


Figure 3. Root formation following transformation. *R. rosea* was subjected to *A. rhizogenes* (transformed, n=74) or MYA (control, n =71).

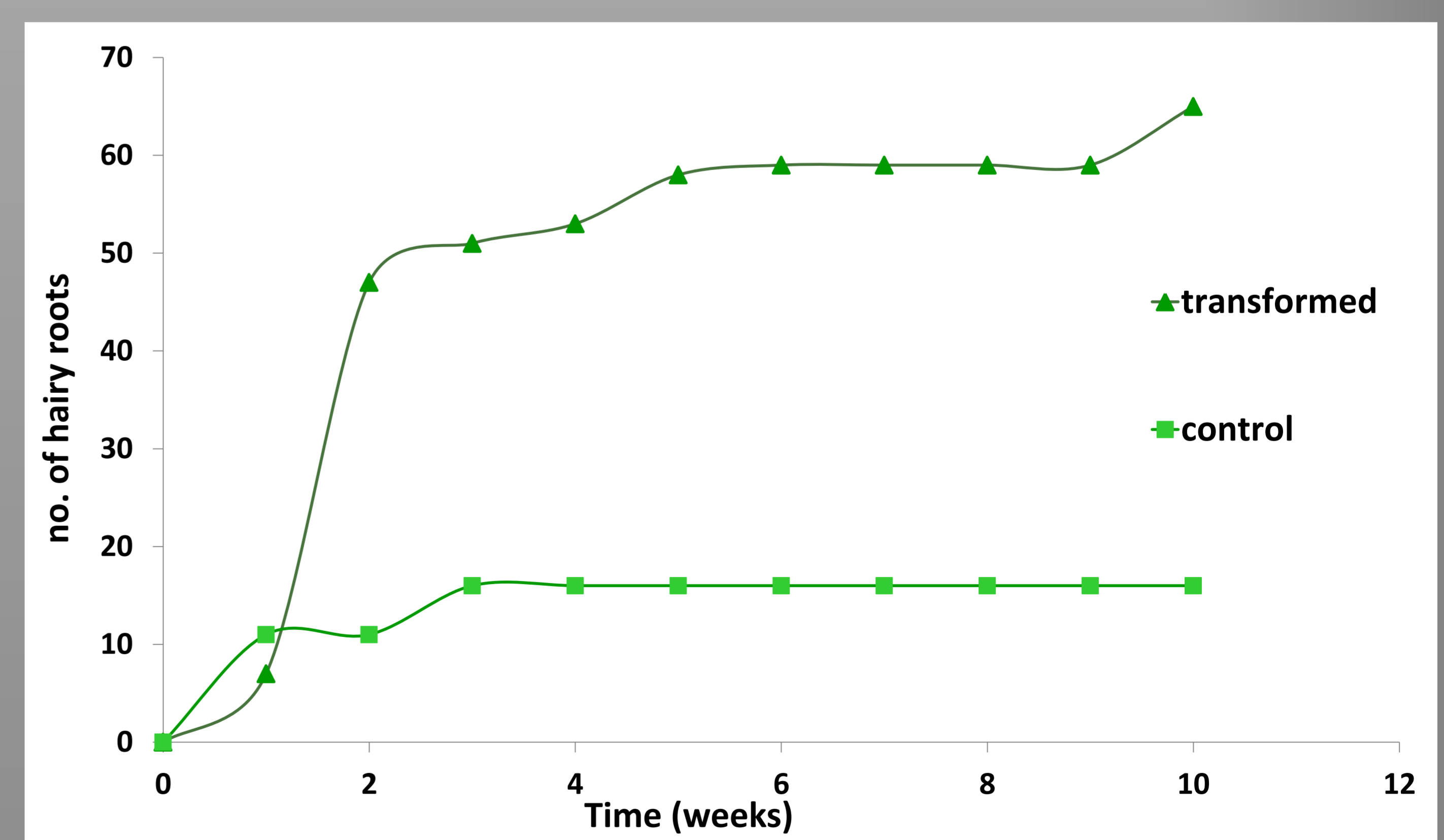


Figure 4 Hairy root development. *R. rosea* was subjected to *A. rhizogenes* (transformed, n=74) or MYA (control, n =71)

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).