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plants MDPI

André Caeiro[1,*], Filipa Ventura[2], Sandra Correia[2], and Jorge Canhoto[2]

[1] Center for Functional Ecology, Department of Life Sciences, University of Coimbra, 3000-456 Coimbra, 4 Portugal
[2] Full Affiliation, Address. Department of Life Sciences, University of Coimbra, 3000-456 Coimbra, Portugal

* Corresponding author: afcaeiro91@gmail.com

Abstract: Tamarillo (Solanum betaceum Cav.) is a Solanaceae tree cultivated for its edible fruits. Under specific stimuli, indirect somatic embryogenesis originates distinct calli: embryogenic (EC) and non-embryogenic (NEC). Both types proliferate, but only EC originates somatic embryos. The presence of secondary metabolites is known to influence induction and embryogenic competence. The objective of this work is to study of some of these compounds on SE.

Leaf segments from in vitro clones were cultivated on solid Murashige and Skoog medium supplemented with sucrose (26 mM) and picloram (20 µM). Phenolic acid influence was tested using caffeic acid (896 and 448µM), flavonoid were assayed with rutin (197.5 and 98.75µM). Anthranilic acid, an amidobenzoic acid, was also tested (1164.8 and 582.4µM). Additionally, previously induced EC and NEC lines were grown in liquid medium with the highest concentrations of each compound.

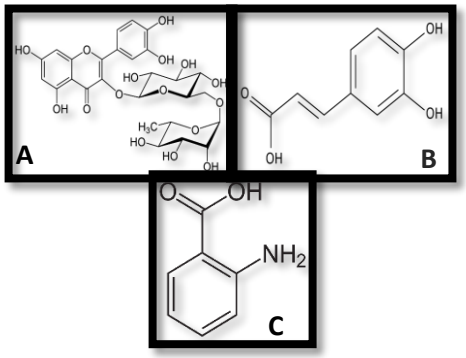
Results showed highest induction rates (>90%) in the control and when rutin and caffeic acid were tedted, whereas lower concentrations inhibit dedifferentiation. In contrast, the compounds seem to inhibit growth of established calli without affecting protein, phenolic acids and flavonoid levels, measured by spectrophotometric methods. Anthranilic acid completely inhibited both induction and calli growth.

The results seem to present a correlation of some secondary metabolites with dedifferentiation and a tendency to inhibit growth of established calli, probably related to metabolic effects. Further studies are underway to further characterize the dose-response relation of these compounds and molecular mechanism underlying this phenotypic effect.

Keywords: *Calli*; embryogenic competence; flavonoids; phenolic acids.

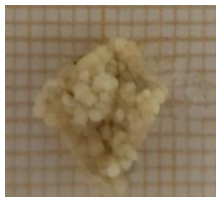
Changes of secondary metabolites during Tamarillo somatic embryogenesis

Control | Rutin (A) | Caffeic acid (B) | Anthranilic acid (C)

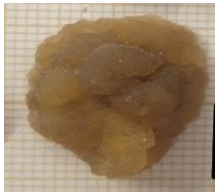


Dedifferentiation rates

Callus multiplication

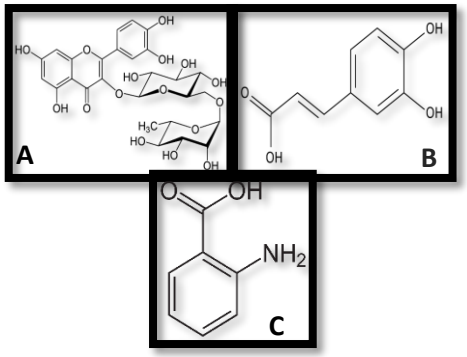


Embryogenic Callus (EC)



Non embryogenic Callus (NEC)

SE induction



Growth rates;
Phenolic acid and flavonoid quantification

- A and B influence deddiferentiation in dose-response
- Callus multiplication is hampered by both compouns
- C inhibits both phases

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Introduction

- Tamarillo (*Solanum betaceum* Cav.) is a Solanaceae tree indigenous to South America
- It is grown globally for its fruits
- There are several propagation and cloning techniques for this plant
- Somatic embryogenesis (SE) is one of these methodologies
- SE is complex phenomena influenced by several factors
- One of this factors is the influence of certain secondary metabolites

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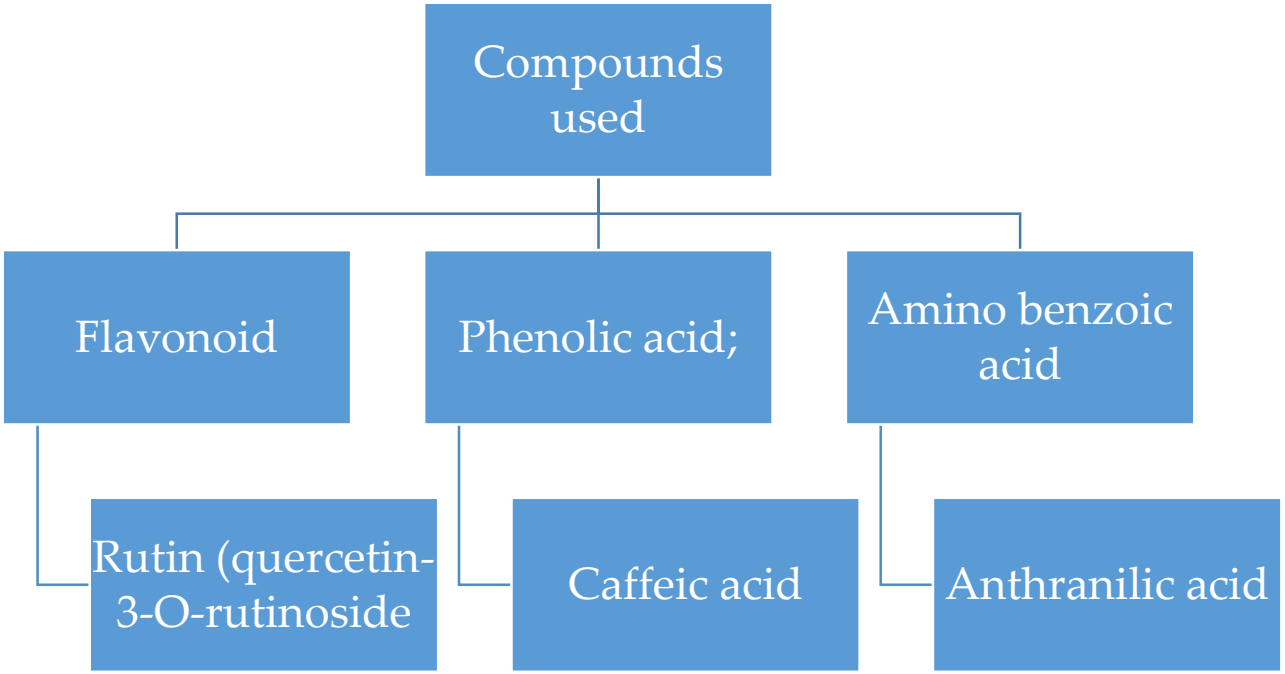
Objectives

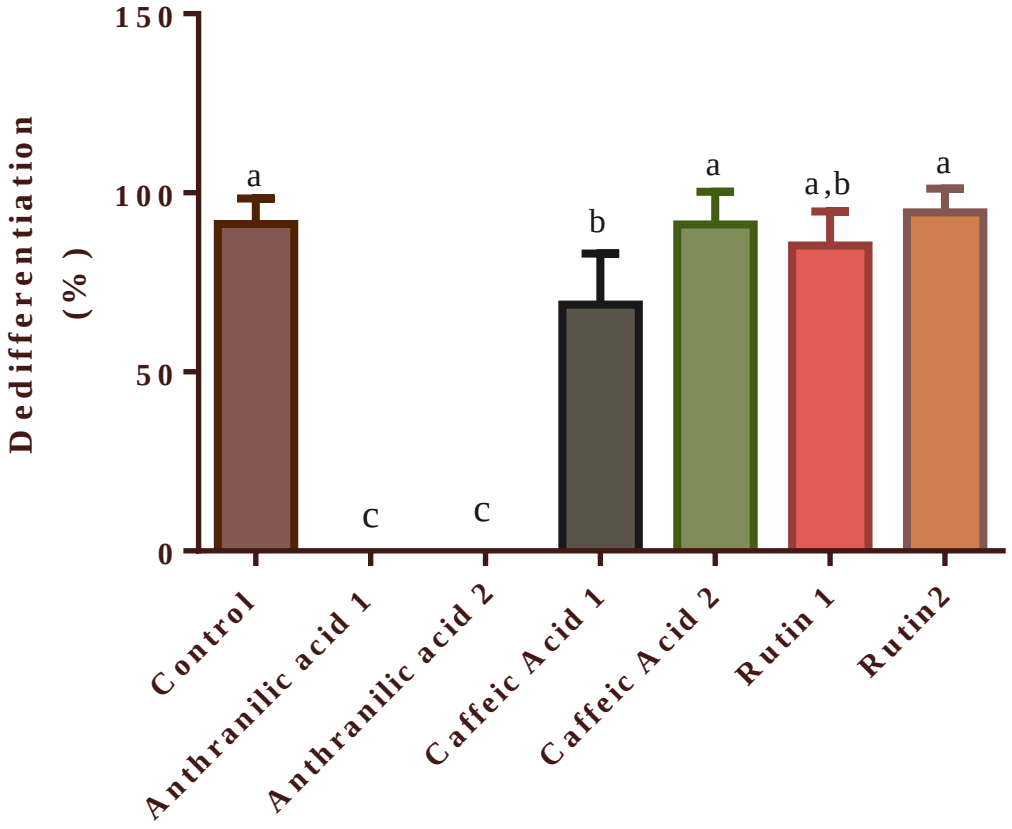
To study the influence of secondary metabolites in two SE phases:

- Induction phase (measurement of dedifferentiation rates);
- Multiplication of EC and NEC.



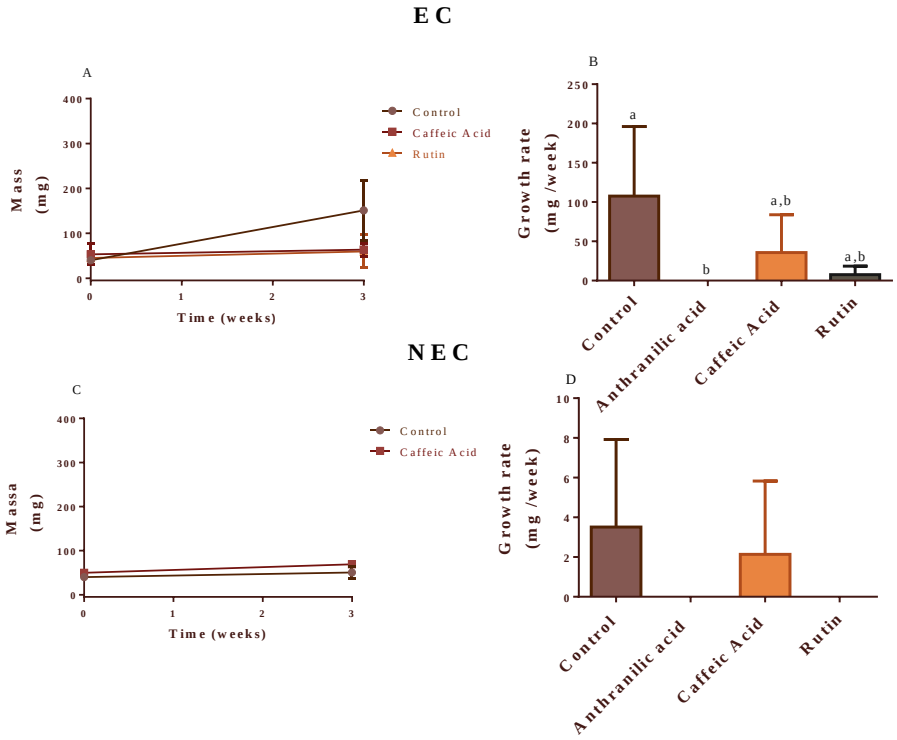
Results

- Anthranilic acid inhibits deddiferentiation;
- Higher concentration of rutin and caffeic acid tend to lower dedifferentiation
- Lower concentrations are indistinguible from control



Results

- Anthranilic acid inhibits growth completely;
- Caffeic acid inhibits growth for both types of *callus*
- Rutin inhibits NEC growth completely and EC severely



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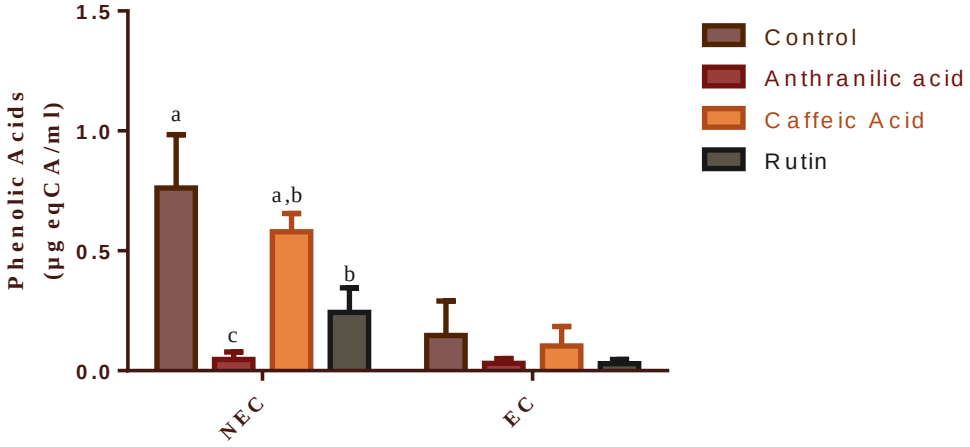
Results

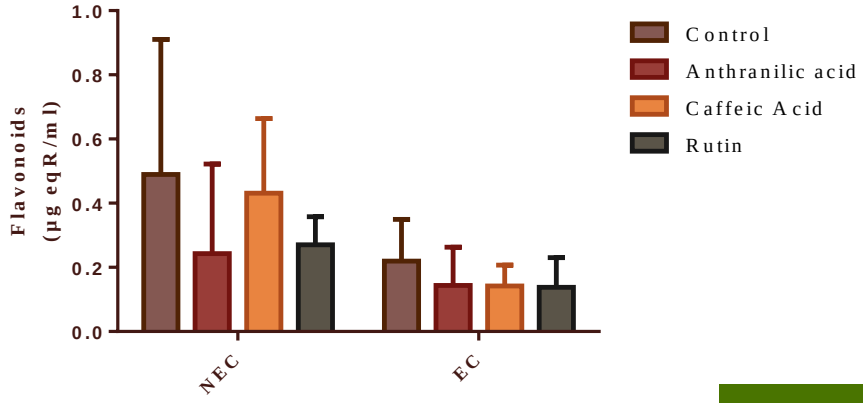
- Phenolic and flavonoids intracellular concentrations seems to be independent from the extracellular medium content

- Some of the lower results (antranilic acid) are possibly due to the low concentration of cells (growth severely affected)

A



B



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Conclusions

- Influence of flavonoids and phenolic acid in dedifferentiation appears to be dependent on dose
- All compounds tested seem to inhibit callus multiplication
- Different compound should be tested in future assays
- Quantification methods in the future should be more sensitive

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