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**Physiological Effects of the *in Vitro* Culture on Explants
Belonging to *Solanum* Genus**

Daniel Cruceriu¹, Imola Erdely-Molnar¹, Zorita Diaconeasa²,
Adriana Aurori¹, Carmen Socaciu² and Elena Rakosy-Tican¹, ✉

A large variety of secondary metabolites are responsible for specific defense mechanisms against stress factors in plant tissues. Among them, phenols and thus flavonoids play an important role, due to their strong antioxidant activity and the fact that their quantity is rapidly increasing if a specific stressful factor appears in the environment. In this context, we evaluated the physiological effects of the *in vitro* culture on explants, by quantifying the total polyphenolic content (TPC), the total flavonoid content (TFC) and the antioxidant activity (AA), both under *in vitro* and *ex vitro* conditions. Our experiments were performed on 2 closely related species of potato: the wild species *S. bulbocatanum* and the potato commercial cultivar *S. tuberosum* 'Rasant' and on two somatic hybrids between them, obtained through protoplast electrofusion. The Folin-Ciocalteu method, the aluminum chloride colorimetric method and the ABTS assay were used to determine the TPC, TFC and AA respectively. Our results prove that both TPC and AA are increasing under optimized *in vitro* conditions, but TFC is lower under the same set of conditions. Therefore, we can state that the *in vitro* conditions represent a stressful factor for the plantlets based on the TPC and AA quantification, but also that flavonoids are a special part of the phenolic compounds, taking into consideration

¹ "Babeș-Bolyai" University, Plant Genetic Engineering Group, Clinicilor str. 5-7 Cluj-Napoca Romania.

² University of Agricultural Sciences and Veterinary Medicine, str. Calea Mănăștur 3-5 Cluj-Napoca Romania.

✉ **Corresponding author: Elena Rakosy-Tican**, "Babeș - Bolyai" University, Plant Genetic Engineering Group, Cluj-Napoca, Romania,
E-mail: arina5744@yahoo.com

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their opposite behavior. This divergence might be explained by corroborating 2 different facts: 1) flavonoids are primarily involved in photo-protection against UV solar radiation and 2) UV-B radiation, the major trigger in flavonoid biosynthesis was absent in the growing room, but present under *ex vitro* normal day light.

Acknowledgements: E R-T and I E-M are grateful for the financial support of the Romanian Ministry of Education and research project CNCS PNII-ID-PCE-2011-3-0586.