

Metabolite profiles during seed development of *Cyclamen persicum* as a basis for the optimization of somatic embryogenesis

Carina Köllen¹, Nicolas Heinzel², Hardy Rolletschek² and Traud Winkelmann¹

1 Leibniz Universität Hannover, Institute of Horticultural Production Systems, Section Woody Plant and Propagation Physiology, Herrenhäuser Str. 2, 30419 Hannover, traud.winkelmann@baum.uni-hannover.de

2 IPK Gatersleben, Department of Molecular Genetics, Research Group Heterosis, Corrensstr. 3, 06466 Gatersleben

The seed development of *Cyclamen persicum* is special in comparison to other dicotyledonous plants. Normally, the endosperm is a transient tissue which is largely reabsorbed by the embryo during late seed development. In *Cyclamen* the endosperm persists upon seed maturity and makes up about 95% of the whole seed. It delivers nutrients, protects from mechanical pressure and controls growth and germination of the zygotic embryo. Seeds are used commercially to propagate *Cyclamen*. The only efficient vegetative propagation system is via somatic embryogenesis. Somatic embryos undergo similar development stages as zygotic embryos. In contrast, somatic embryos lack the endosperm and the seed coat. They receive all nutrients from the in vitro culture medium. The aim of this study was to identify and quantify primary metabolites during seed development in order to later adapt the differentiation and maturation media for the somatic embryos.

Seeds were harvested 3, 5, 7, 9, and 11 weeks after self-pollination (WAP). For each stage, metabolites have been measured via hydrophilic interaction liquid chromatography coupled with mass spectrometry (HILIC-ESI-MS/MS). The first data evaluation revealed five metabolite profiles: constant, increasing and decreasing concentrations over time as well as concentration optima at 5 and 7/8 WAP, respectively. Arginine, γ -aminobutyric acid and raffinose accumulated with increasing seed age which could indicate their importance for maturation and desiccation tolerance. However, the energy metabolism decreased from 3 to 11 WAP. Many amino acids accumulated at 5 WAP. This coincided with the change from liquid to cellularized endosperm and the end of the differentiation of the torpedo shaped embryo. Asparagine, glutamic acid and glutamine belonged to the most abundant amino acids in *Cyclamen* seeds. Quantitatively, sucrose was the most frequent metabolite. The data evaluation of macro- and micronutrients, phytohormones and lipids is in progress.