

Title Role of nitrogen and carbohydrates in cutting propagation of ornamentals and perspectives of its non-destructive controlling in global young plant chains

Author S. Zerche, D. Lohr, K.T., Haensch, M.R. Hajirezaei, E. Meinken and U. Druège

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Abstract

Advanced ornamental flower growers adapted adventitious root formation (ARF) as a basic physiological process for an identical reproduction of various plant genera to provide millions of young plants in accordance to the demand of a global horticultural market. Root formation in shoot tip cuttings relies on a balanced accumulation of nitrogen and carbohydrates in metabolite pools or as mineral nitrogen which endorse signals or provide resources for root development in basal stem tissues. Interacting environmental factors such as light and nitrogen for stock plants, dark cold exposure of cuttings and light conditions during ARF may reduce or promote ARF. To answer the question which parameters regulate and determine the development of ARF, soluble and insoluble carbohydrates and nitrogen-containing compounds such as amino acids, proteins, amino-N, nitrate-N, amide-N, insoluble protein-N, and total nitrogen were investigated in *Petunia hybrida* using enzymatic assay, HPLC and Kjeldahl-N. Increase of nitrogen supply to donor plants led to an enhanced total nitrogen allocated to the N-compounds. Dark exposure of the cuttings resulted in a decrease of carbohydrates and insoluble protein while mobile nitrogen accumulated in amino-N, amino acids, asparagine, arginine and soluble proteins. Early rooting events and setting of ARF were stimulated by both, raise in nitrogen absorption and dark treatment, suggesting that balanced nitrogen and carbon fluxes are critical for survival, signalling and resource relocation during ARF. Also, rooting responses of other genera indicate a critical role of nitrogen and carbohydrates. Up to date, a lack of methods for direct measurements of internal quality parameters impedes a broad use of this knowledge within the young plant industry. Therefore, perspectives of a joined project¹ will be discussed that explores genotype and environmental responses of nitrogen and carbohydrates in supply chains of growers while its main objective is to adapt their non-destructive measurements using near-infrared spectroscopy (NIRS).