POLYPHENOLIC CONTENT DURING CALLUS GROWTH OF TOMATO INTROGRESSION LINES

MINUTOLO M., DI MATTEO A., CHIAIESE P., ERRICO A.

Department of Soil, Plant, Environmental and Animal Production Sciences, University of Naples Federico II, Via Università 100, 80055 Portici, Italy

polyphenols, antioxidants, callus culture, Solanum pennellii, Solanum lycopersicum

Among plant secondary metabolites, antioxidants such as polyphenols have an important roles for food industry to preserve products quality. In addition, often them are involved in human health to prevent cancer and boost immune system. In vivo growing plants are not able to satisfy the high demand of antioxidants because their production is mainly regulates by several stress and does not accumulate them for long time in plants organs. An alternative to produce those secondary metabolites is in vitro plant callus and cell culture. Our aim, is to investigate how change the content of total polyphenols during callus growth of Solanum lycopersicum, S. pennellii and selected introgression lines (IL7-3, IL10-1 and IL12-4) from petioles and leaf explants. Callus cultures were successfully obtained on Murashige and Skoog (MS) basal medium salt, supplemented with 2,4-dichlorophenoxy acetic acid (2,4-D) and 6-benzylamino purine (BAP) and sucrose 3% (w/v). Frequencies of callus and polyphenols content were scored at 0, 15, 30, 45 and 60 days of in vitro culture. The formation of callus and its proliferation is explants and genotype dependent. In S. pennellii and IL7-3 callus was detected at early stages of growing, and a higher percentage of callus was observed from petioles explants. In all genotypes tested, the induction of callus from leaf was slower than petioles. At early phase of callus in vitro culture, the frequencies of callus from leaf explants seems to be negatively correlated to polyphenols content, that its always higher in leaf than in petioles explants. The higher polyphenols concentration in leaf explants confirms the findings out observed in vivo growing plants [Minutolo et al., 2008, ISBN 978-88-900622-8-5]. At exponential phase of callus growth the polyphenols content was found to be higher than the first stages in all genotypes and explants assayed.

The data obtained from this study in comparison to our previous studies performed on distribution of antioxidants in whole tomato plant [Minutolo et al., 2008, International PSE Symposium on Natural Products in Cancer Therapy, 23-26/09/08, p. P15], suggest the possibility to produce a high accumulation of polyphenols in vitro callus cultures rather than field-grown plant tissues of tomato. Further efforts will focus on elucidating genetic mechanisms controlling polyphenols accumulation through transcriptomic approach to add insights toward strategies to increase their production.