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Poster Abstract - F.12

CHARACTERIZATION OF FLAVONOIDS AND ANALYSIS OF FUNCTIONAL COMPETITION BETWEEN ANTIOXIDANTS IN TOMATO FRUIT SYNTHESISING RESVERATROL

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There is a growing interest in producing food plants with increased amounts of antioxidants because of their potential health benefits. In particular polyphenolic secondary metabolites, such as flavonoids and stilbenes, have a great antioxidant activity, important both for plant physiology and human nutrition.

With the aim of generating plants and fruits with increased antioxidant capacity and a wider range of potential health benefits, the tomato flavonoid route was modified through the over-expression of the grape stilbene synthase cDNA under constitutive promoter (G. Giovinazzo *et al.*, 2005) and a tissue specific, TomLoxB, promoter (Beaudoin and Rothstein, 1997). The expression of the StS gene in tomato tissues caused the synthesis of new compounds, identified as *trans*-resveratrol and *trans*-resveratrol-glucopyranoside which have a different tissue specificity, both depending on the promoter used and on the amount of precursors present in different tissues.

In order to verify the metabolic impairment, the amounts of soluble phenolics (i.e. chlorogenic acid) flavonoids (i.e. naringenin) and flavonols (i.e.rutin, and quercetin), in both transgenic and wild type fruits tissues at different stages of maturity, were compared.

The results indicate that the stilbenes and the flavonoids found in transgenic plants are present as conjugates. Recent studies suggest that the degree of glycosilation may have an impact on the ability of these compounds to be absorbed at the intestinal level (J.M. Gee *et al.*, 2000). Hence the structure of the stilbenes synthesized in the transformed tomato plants is of considerable interest from a nutritional point of view.

Since the free radical scavenging capabilities of resveratrol are well known, we wanted to analyse whether its presence in tomato fruit affected the level and/or the metabolism of other antioxidants naturally present in tomato. The synthesis of resveratrol affects the other antioxidants in different ways, in particular ascorbate and glutathione were increased in the transformed tissues. The alteration of ascorbate and glutathione seem to be proportional to the amount of the resveratrol accumulated in the different tissues. Interestingly, the transformed fruits also had higher activities of ascorbate peroxidase, a key enzyme for ROS removal in plant cells, and lower levels of lipid peroxidation. The alteration induced by the presence of resveratrol on cell metabolism is discussed.

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