Proceedings of the XLIX Italian Society of Agricultural Genetics Annual Congress
Potenza, Italy – 12/15 September, 2005
ISBN **88-900622-6-6**

Oral Communication Abstract – 4.04

CROSS-TALK BETWEEN CAROTENOID BIOSYNTHESIS AND FRUIT RIPENING IN TOMATO (*SOLANUM LYCOPERSICUM*)

G. DIRETTO*, C. ROSATI**, R. TAVAZZA*, P. PALLARA**, B. CAMARA***, N. SCHAUER****, A.R. FERNIE****, S. IMANISHI*****, G. GIULIANO*

*) Ente per le Nuove tecnologie, l'Energia e l'Ambiente (ENEA), Biotechnology Unit, Casaccia Research Centre, PO Box 2400, Roma 00100AD, Italy
**) Ente per le Nuove tecnologie, l'Energia e l'Ambiente (ENEA), Biotechnology Unit, Trisaia Research Centre, 75026 Rotondella (MT), Italy
***) CNRS, Plant Molecular Biology Institute, 67084 Strasbourg Cedex, France
****) Max-Planck Institut fur Molekulare Pflanzenphysiologie, Am Mühlenberg 1, 14476 Golm, Germany
*****) National Institute of Vegetable and Tea Science (NIVTS), Ano, Mie 514-2392, Japan

tomato, carotenoids, ripening

Carotenoids are isoprenoid pigments involved in many fundamental physiological and biochemical functions in bacteria, plants and animals, such as light harvesting and photoprotection from excess light energy; moreover, they colour many flowers and fruits, probably to attract animals and to protect reproductive structures by high light intensity. Carotenoids also play a crucial role in human health by improving normal vision and by preventing degenerative diseases like cancer. Climacteric tomato fruits, accumulate the linear carotene lycopene. Non-climacteric pepper fruits accumulate instead xanthophylls (oxygenated carotenoids), for which a key biosynthetic step is β-carotene hydroxylase (βChy). We produced transgenic tomato plants overexpressing pepper βChy under the control of the tomato *Pds* promoter, involved in lycopene biosynthesis. Ripe transgenic fruits show an extensive, and unexpected, alteration in carotenoid content, accumulating β-carotene (the βChy *substrate*) and no xanthophylls. Most interestingly, transgenic fruits also show an extensive alteration of signals involved in the control of fruit ripening (such as ethylene biosynthesis), and of the resulting ripening phenotypes. Overall, our data seem to challenge the commonly accepted model for ripening, according to which ripening *signals* (among which ethylene) located early in the signalling pathway, control ripening through the action of *effector* genes (among which carotenoid biosynthesis genes) and suggest that some of the putative effector genes may be themselves involved in the signalling pathway controlling ripening.

References

Alexander L. and Grierson D. (2002). Ethylene biosynthesis and action in tomato: a model for climateric fruit ripening. J. Exp. Bot. 53 (377), 2039-2055
Giuliano G. et al. (2000). Metabolic engineering of plant carotenoids. Trends in Plant Science 5, 406-409.