



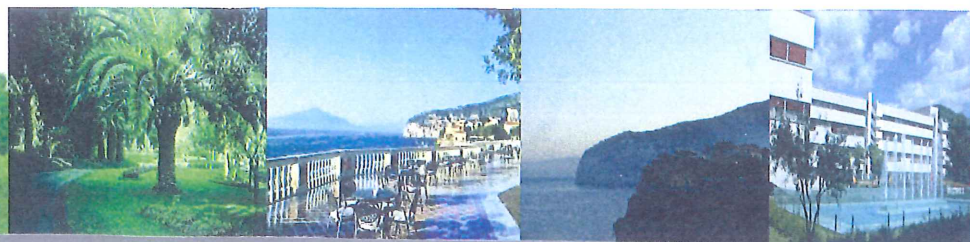
PlantEngine
COST Action FA1006

Book of Abstracts

Final Conference

**Challenges and prospects in PNP
metabolic engineering and production**

**Sorrento, Italy
April 15th-17th, 2015**



Session I Posters
Capturing secrets from nature

Potentially neuroactive amines in kiwifruits.

Commissio M. Avesani L, Bianconi M, Ceoldo S, Zoccatelli G, Guzzo F.
Department of Biotechnology, University of Verona.

e-mail: linda.avesani@univr.it

The beneficial effects of a diet rich in fruits and vegetables on human health are generally recognized. The protective effect of a diet rich in fruit and vegetable on cardiovascular diseases and some kind of cancer has been shown in many investigations, including the large scale study using the data coming from the EPIC (European Prospective Investigation into Cancer and nutrition) initiative (Crowe *et al.*, 2011) and the very recent investigation of Oyeboode and coworkers (2014). The earlier investigation inspired the launch of various national campaign such as "5-a-day" campaign in UK, France and Germany, the "Fruit and Veggies-more matters" in USA, and the "Go for 2+5" in Australia.

Some very recent investigation highlighted also a positive association between fruit and vegetable consumption and enhanced mood, happiness, psychological well-being feeling (White *et al.*, 2013, Carr *et al.*, 2013; Blanchflower *et al.*, 2012) and decreased depression (Tsai *et al.*, 2001).

However, similar reports referred on specific fruits or vegetables are very rare. Carr and coworkers (2013) reported a specific positive association between the consumption of two kiwifruits per day and less fatigue, more vigour and overall enhanced mood state, while Lin and coworkers (2011) found that kiwifruits seems to improve sleep onset, duration, and efficiency in adults. The precise molecule(s) responsible for these activities have not been yet identified; White and Carr speculated that the observed kiwi fruit effects could be due to the high content of vitamins (mainly vitamin C, D, E), folates, carotenoids, flavonoids, omega-3-fatty acids and micronutrients, while Lin and coworkers' speculatively attributed the observed effect on vitamins, antioxidants and serotonin, which has been previously detected in this fruit.

Recently, in a project aimed to the metabolomics characterization of kiwifruits, we found that beside the presence of vitamin C and various different polyphenols, an interesting cocktail of metabolites, which potentially could be involved in the psychoactivities of this fruit, have been detected. This phytochemical complex included tryptophan, tryptamine,

serotonin, N-acetyl serotonin and melatonin, i.e. the complete biosynthetic pathway for the production of phyto-melatonin. The putative gene responsible for tryptamine production in kiwifruit was identified and it was characterized by phylogenetic comparison with that of other plant species and by its heterologous expression in *Nicotiana benthamiana*.

References:

- Crowe FL, Roddam AW, Key TJ, Appleby PN, Overvad K, Jakobsen MU, et al. Fruit and vegetable intake and mortality from ischaemic heart disease: results from the European Prospective Investigation into Cancer and Nutrition (EPIC)-Heart study. *European Heart Journal*. 2011 May 2;32(10):1235-43.
- Oyeboode O, Gordon-Dseagu V, Walker A, Mindell JS. Fruit and vegetable consumption and all-cause, cancer and CVD mortality: analysis of Health Survey for England data. *Journal of Epidemiology & Community Health*. 2014 Sep 1;68(9):856-62.
- White BA, Horwath CC, Conner TS. Many apples a day keep the blues away - Daily experiences of negative and positive affect and food consumption in young adults. *British Journal of Health Psychology*. 2013 Nov;18(4):782-98.
- Carr A, Bozonet S, Vissers M. A Randomised Cross-Over Pharmacokinetic Bioavailability Study of Synthetic versus Kiwifruit-Derived Vitamin C. *Nutrients*. 2013 Nov 11;5(11):4451-61.
- Blanchflower DG, Oswald AJ, Stewart-Brown S. Is psychological well-being linked to the consumption of fruit and vegetables? *Social Indicators Research*. 2013;114(3):785-801.
- Tsai AC, Chang T-L, Chi S-H. Frequent consumption of vegetables predicts lower risk of depression in older Taiwanese – results of a prospective population-based study. *Public Health Nutrition*. 2012 Jun;15(06):1087-92.
- Lin H-H, Tsai P-S, Fang S-C, Liu J-F. Effect of kiwifruit consumption on sleep quality in adults with sleep problems. *Asia Pacific Journal of clinical nutrition*. 2011;20(2):169.