



Milano, 8 september 2015

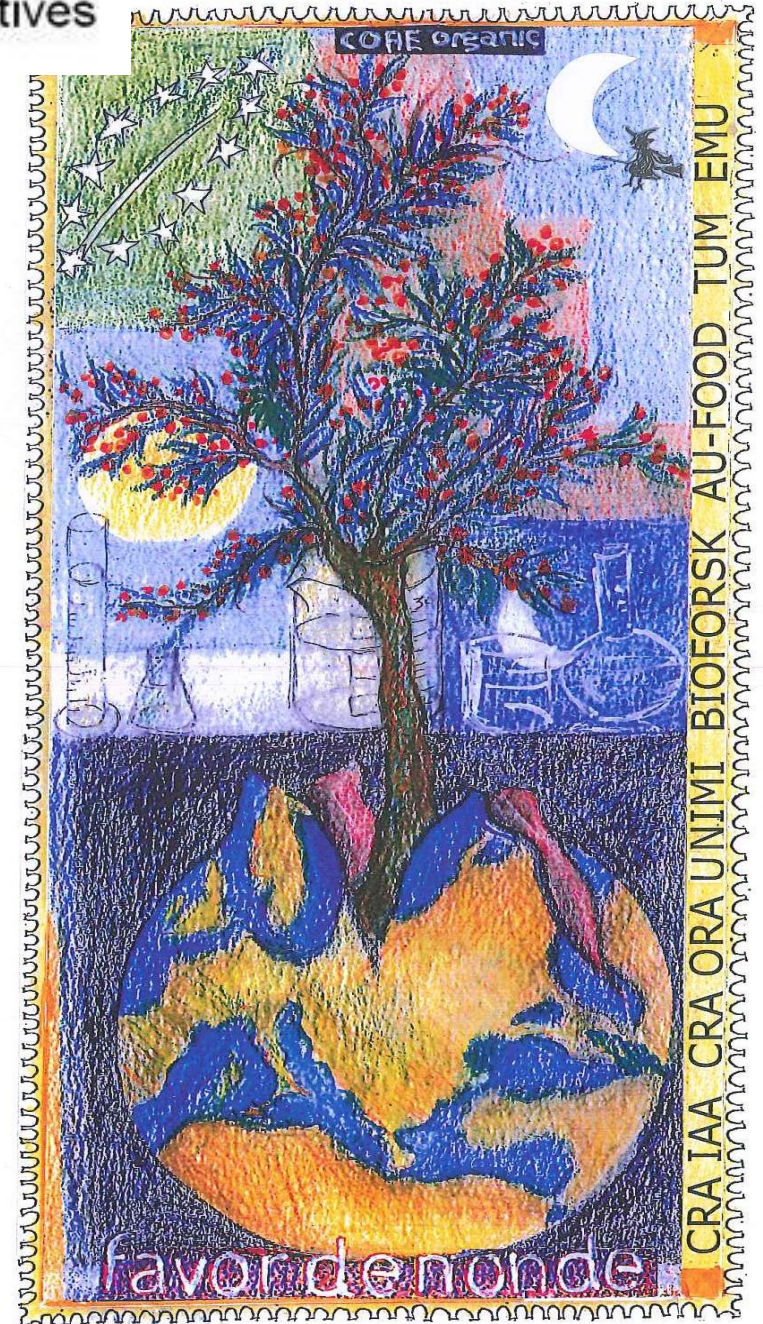
Drying, Juices and Jams of **Organic Fruit and Vegetables:** what happens to **Desired** and **Non- Desired** compounds?

FAVORDENONDE

CREA-IAA Milano (Italy)

Roberto Lo Scalzo, Coordinator

- Research Group:
- Valentina Picchi, Marta Fibiani,
Giulia Bianchi (Researchers),
- Fabio Lovati, Raffaele Lapignola
(Technicians)



Hystory and Coordination activities

The Project Idea started thanks to the collaboration with the Colleagues of CRA-ORA, Dr. Gabriele Campanelli (expert in organic agriculture) who introduced the link with Denmark (Prof. Ulla Kidmose) and Dr. Emidio Sabatini (expert in genetics), with his previous co-working with Prof. Wilfried Schwab (Germany);

The collaboration with Dr. Eivind Vangdal (Norway) started some years ago with our colleague Dr. Anna Rizzolo in the framework of post-harvest studies;

The participation of Prof. Ulvi Moor (Estonia) was due to a collaboration with Estonia University of Life Sciences for an Erasmus PhD Student (Prof. Vokk) within the CRA-IAA MIERI Project regarding small processing plants for organic and small-scale agriculture production;

The collaboration with Prof. Giovanna Speranza, UNIMI, Department of Organic Chemistry, started with several graduate thesis on interesting topics regarding the role of natural organic compounds in the quality of food products;

The Coordination of CRA-IAA started in this very interdisciplinary context;

Hence, an acknowledge is due to the CRA-IAA Director and all staff for the help and support.

Project: funding



CORE Organic is the acronym for
"Coordination of European Transnational Research in
Organic Food and Farming Systems".

As an ERA-NET action, it intends to increase cooperation between
national research activities by National Funding Bodies
(for Italy, represented by Italian Ministry of Agriculture).



*Ministero delle politiche agricole
alimentari e forestali*

DIPARTIMENTO DELLE POLITICHE COMPETITIVE, DELLA
QUALITÀ AGROALIMENTARE, IPPICHE E DELLA PESCA
DIREZIONE GENERALE PER LA PROMOZIONE DELLA QUALITÀ
AGROALIMENTARE E DELL'IPPICA
PQAI I

Unità di Ricerca per i processi dell'Industria
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Ufficio Ricerca e Sperimentazione
SEDE

DG PQAI
Prot. Uscita del 09/02/2015
Numero: **0007874**
Classifica:



Project: participants

Coordinator

Roberto Lo Scalzo, Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria, Research Unit of Food Technology

Partners

- Ulvi Moor, EMU Estonian University of Life Sciences, Estonia.

-Eivind Vangdal, BIOFORSK Bioforsk, Norway.

-Ulla Kidmose, AU-FOOD Aarhus University, Department of Food Science, Denmark.

- Wilfried Schwab, TUM Technische Universität München, Germany.

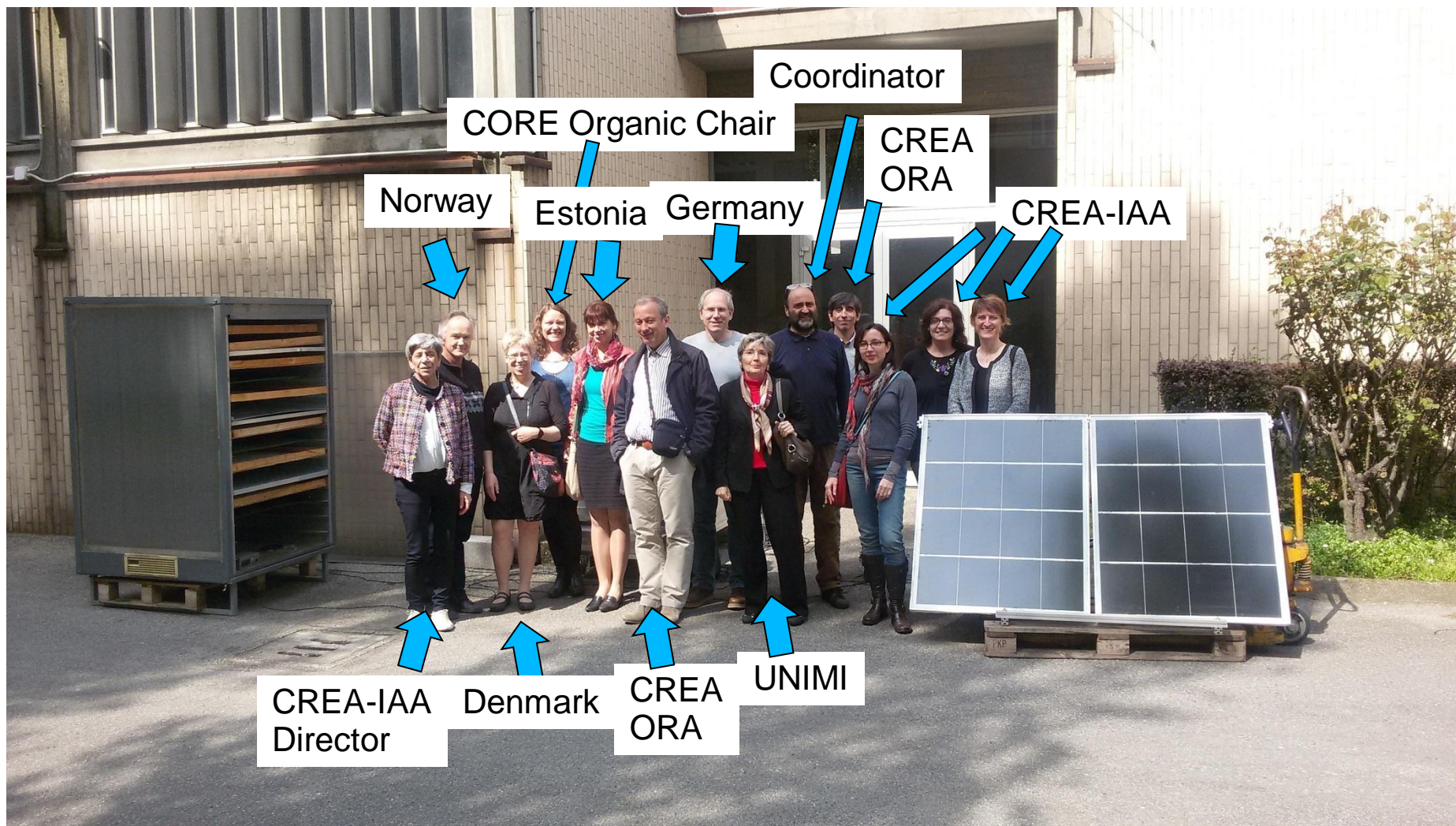
-Gabriele Campanelli, CREA-ORA Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Italy.

- Giovanna Speranza, UNIMI University of Milan, Department of Chemistry, Italy.

Main Objective:

The questions that the proposal attempt to resolve regard the presence of **positive** compounds (antioxidants and tastants, *desired*) and **negative** ones (mycotoxins and allergens, *undesired*) in the organic products that are subjected to processing in chains that are small and, consequently, adapted for local productions.

Project: persons

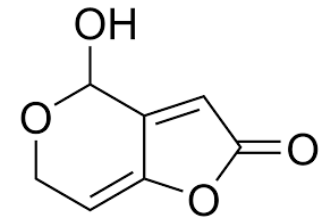


Project overview:

- Organic and conventional agricultural products, from diffused fruit and vegetables (apples, plums, tomatoes, sweet pepper);
- Processed products (juices, jams and drying);
- Advanced sensory studies;
- Desired compounds (antioxidants and positive tastants);
- Undesired compounds (allergens and mycotoxins).

Project: roles

Estonia



Quality indexes (desired) and patulin risk (undesired) in organic apple juice

Norway

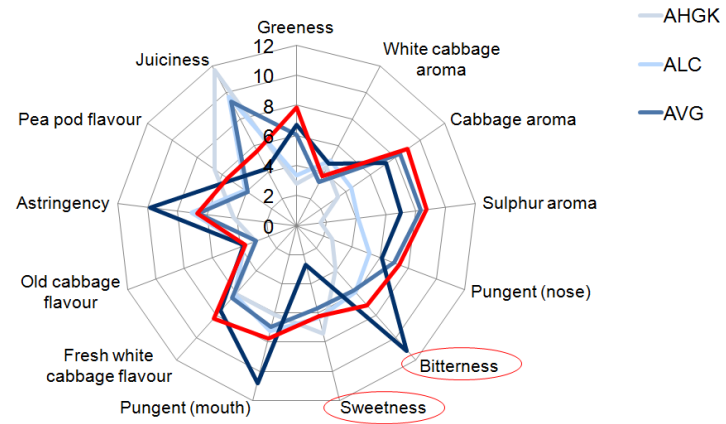


Organic apple and plums cultivation, quality indexes in different varieties (desired)

Denmark

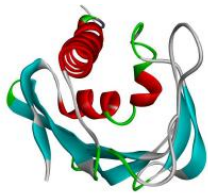


SENSORY PROFILE OF WHITE CABBAGE CULTIVARS



Advanced sensory studies and metabolomic analyses on small molecules important for the taste (desired)

Germany

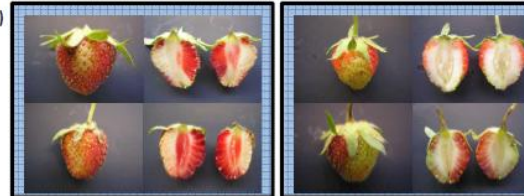


Bet v 1 protein



homologous protein (Fra 1.01E) from strawberry fruit

positive control (CHSi)



Fra a 1.01

negative control (pBI-intron)

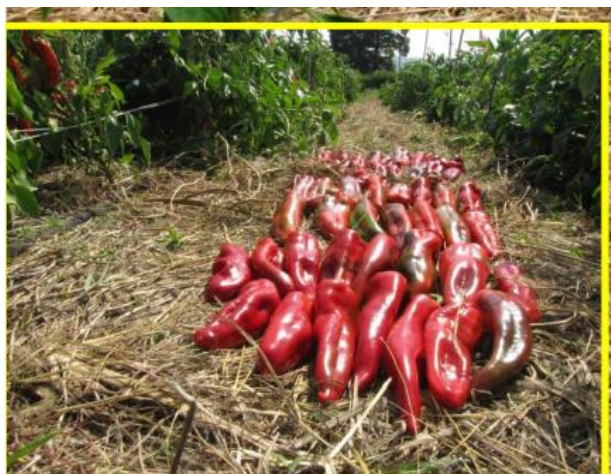


Fra a 1.03

Munoz et al., Molecular Plant 3 (2010) 113-124.

Allergens analyses on conventional and organic raw and processed products

Italy (CREA-ORA)

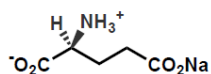


Consolidated expertise in organic experimental farming and use of innovative agronomic techniques. Processing of organic products.

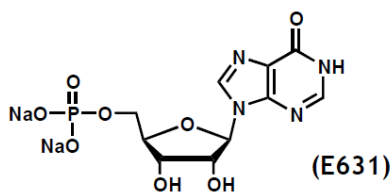
Italy (UNIMI)



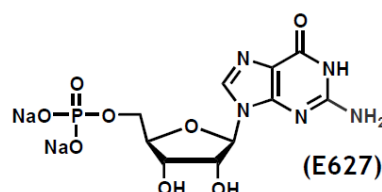
Umami substances



Monosodium glutamate (MSG) (E621)

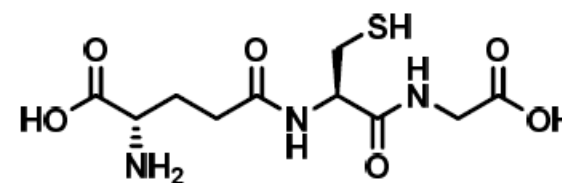


Inosine 5'-monophosphate disodium salt (IMP)



Guanosine 5'-monophosphate disodium salt (GMP)

Kokumi sensation



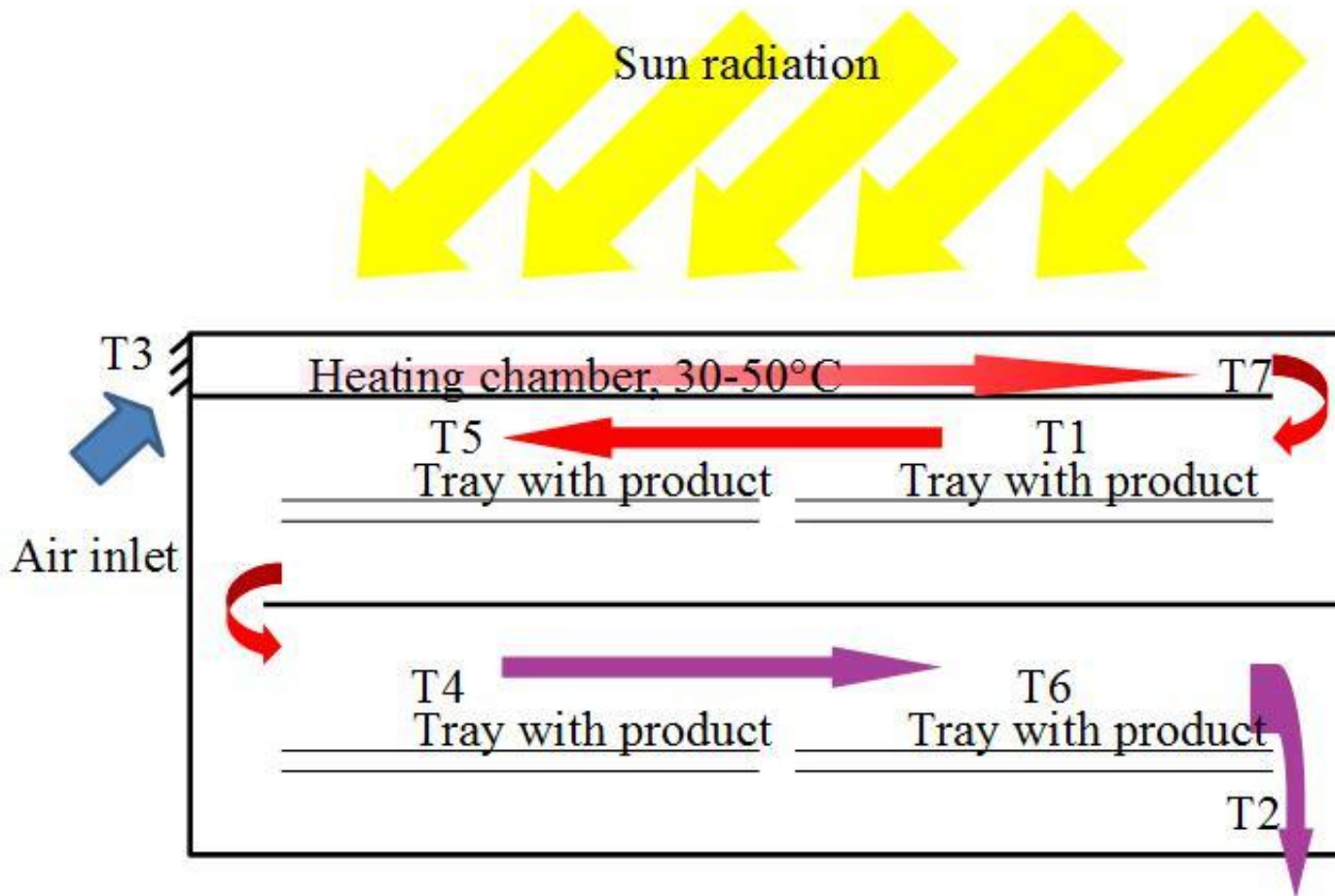
Glutathione
γ-glutamylcysteinylglycine
GSH

Studies on new “Umami” and “Kokumi” tastants in processed products from organic vegetables.

CREA-IAA activities

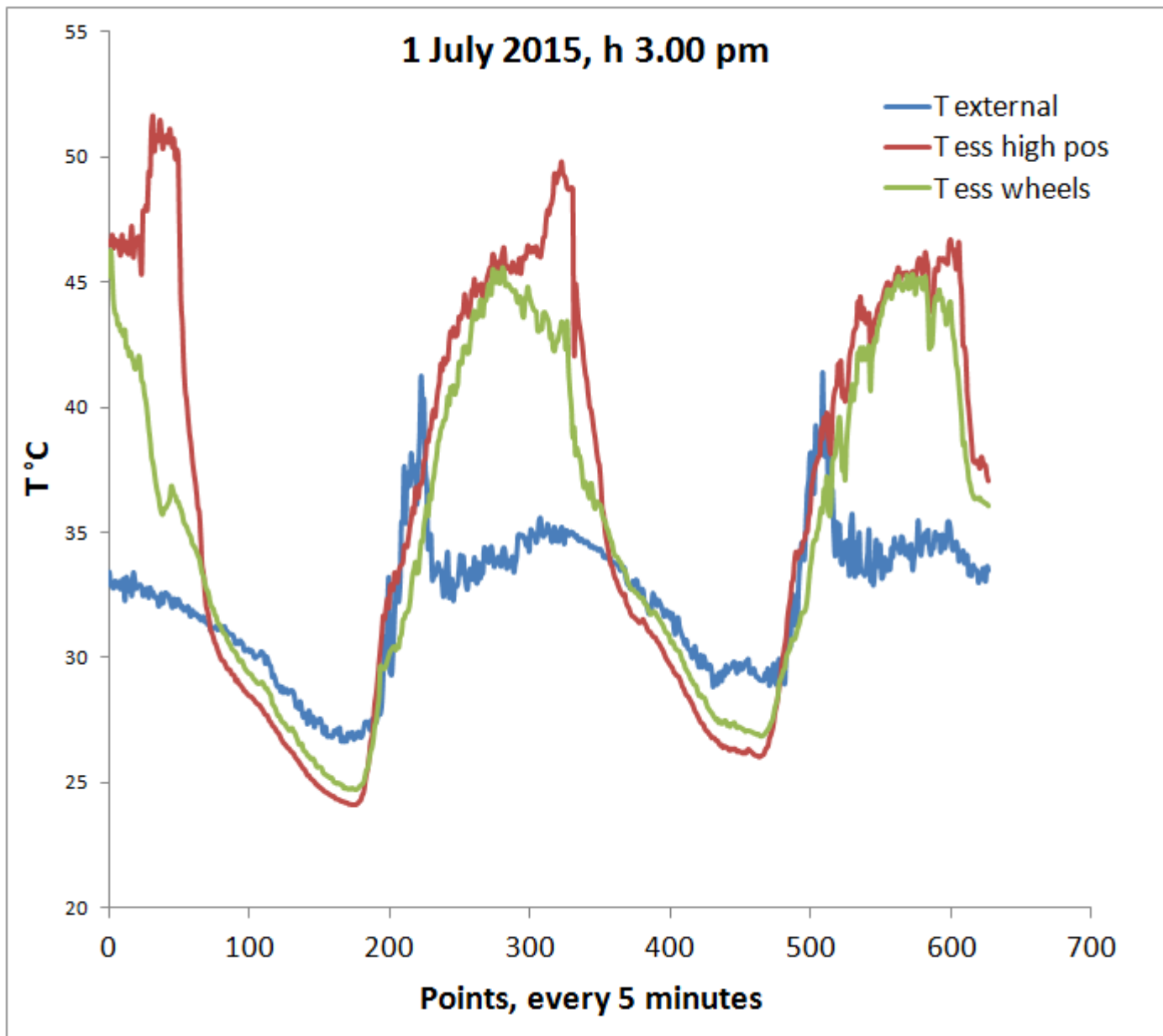
Processing by drying with a conventional system and an innovative solar dryer system manufactured by Termotend, Carpi (Modena, Italy)



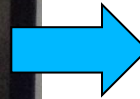
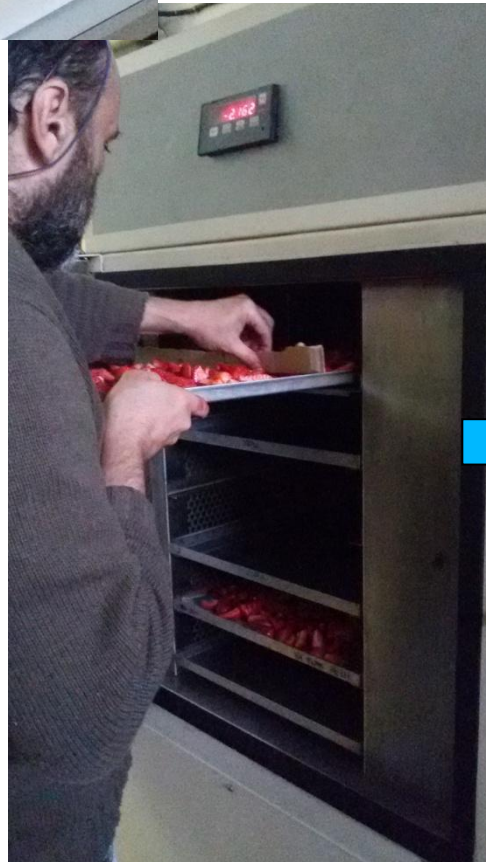


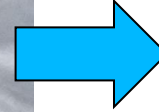
(Fan forced) air outlet,
Flow 0,3 m³/s

T* represents the location
of temperature probes



Strawberries





Tomato drying



Measurement of antiradical capacity

(Dr. Marta Fibiani)

Evaluation of the effect of vegetal matter
on some in-vitro generated free radical

A very useful technique to evaluate the presence
of free radicals is

EPR

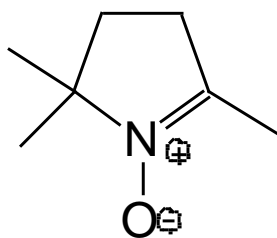
(Electron Paramagnetic Resonance)

based on paramagnetic properties of free radicals

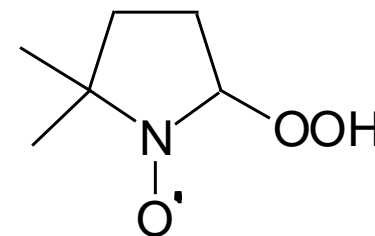
$$h\nu = g\beta H$$

The EPR spectroscopy is a DIRECT
method to evaluate the antiradical activity
of fruit and vegetables

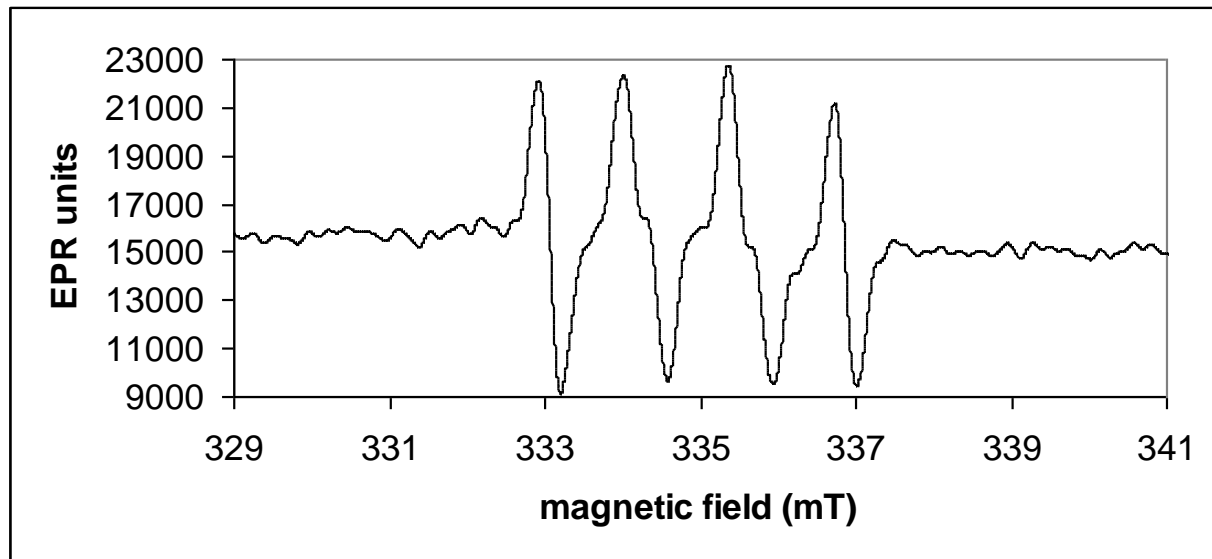
Superoxide anion
6,4 mM, 1', 25°C



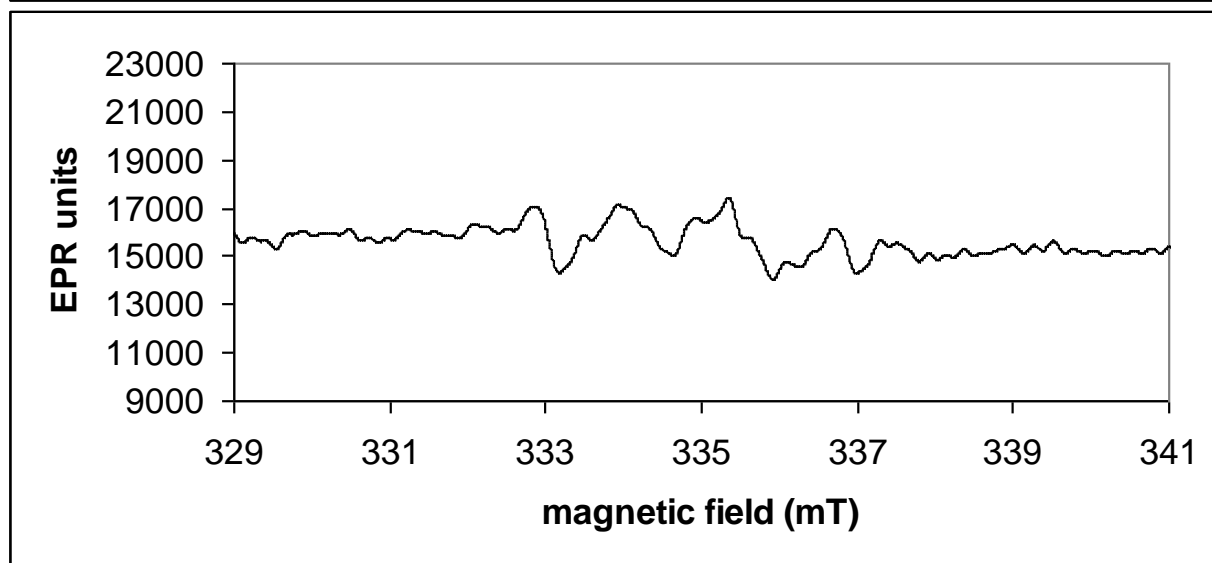
DMPO



DMPO-OOH[•]

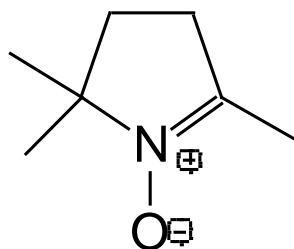


No scavenger



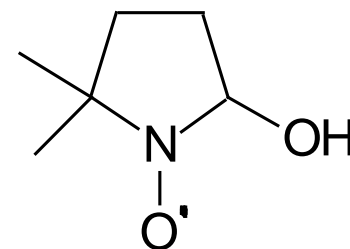
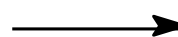
Gallic acid 0,3 mM

Hydroxyl Radical
2 mM, 1', 25°C

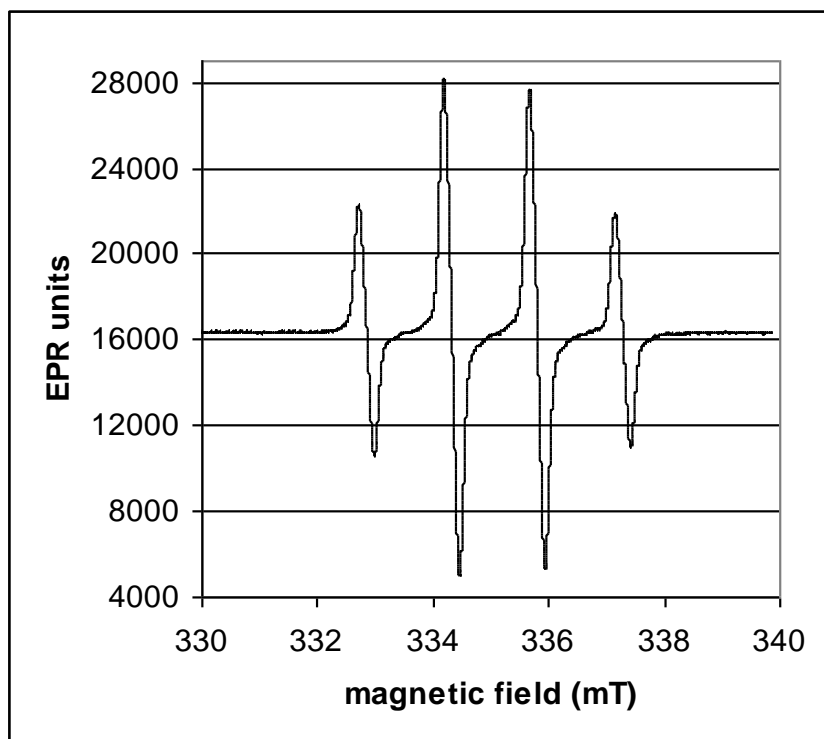


DMPO

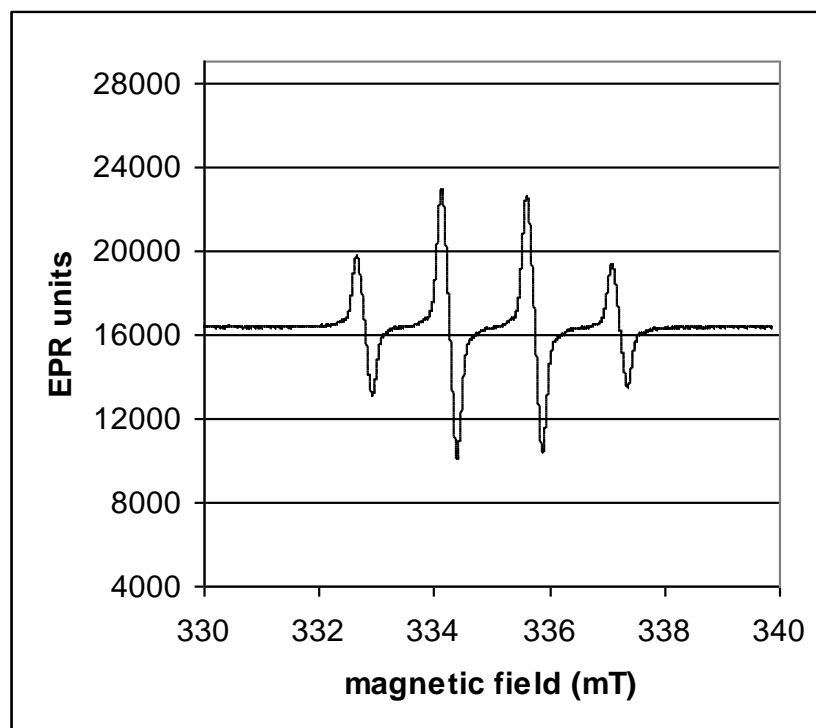
+ OH[•]



DMPO-OH[•]



No scavenger



Gallic acid 0,6 mM

Measurement of the redox-status

(Dr. Valentina Picchi)

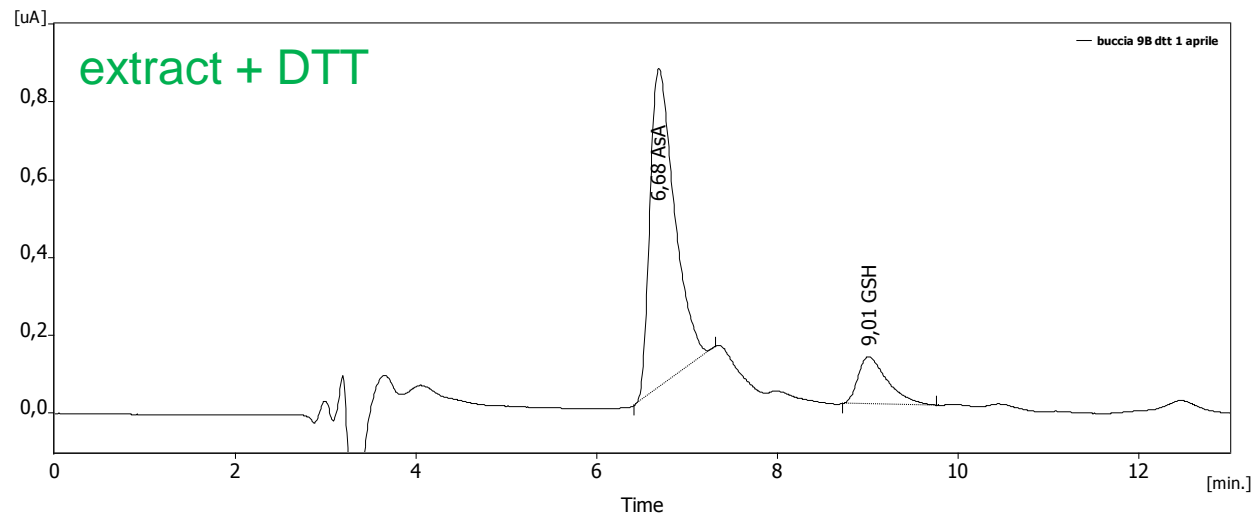
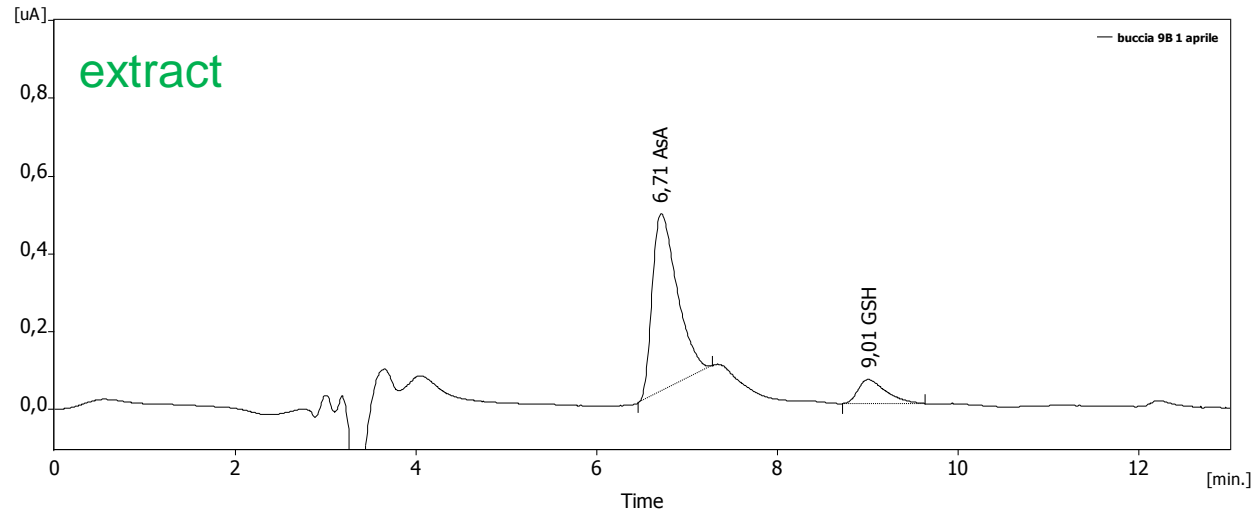
Determination of antioxidant metabolites
(**Ascorbic acid** and **Glutathione**)

by means of an
HPLC method with amperometric detection

The reaction with DTT (dithiothreitol) allows to evaluate the content of both the reduced and oxidized forms of Ascorbic and Glutathione

Important for the evaluation of the redox status and antioxidant capacity of the biological material under study

Example of HPLC-ECD chromatograms on apple peels extracts



Fast Blue BB assay for phenolics

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Original research article

Comparative analysis of strawberry total phenolics via Fast Blue BB vs. Folin–Ciocalteu: Assay interference by ascorbic acid

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^b Genetic Improvement of Fruits and Vegetables Laboratory, Beltsville Agricultural Research Center, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, MD 20705, United States

^c Residue Chemistry and Predictive Microbiology Research Unit, Eastern Regional Research Center, Agricultural Research Service, U.S. Department of Agriculture, Wyndmoor, PA 19038, United States

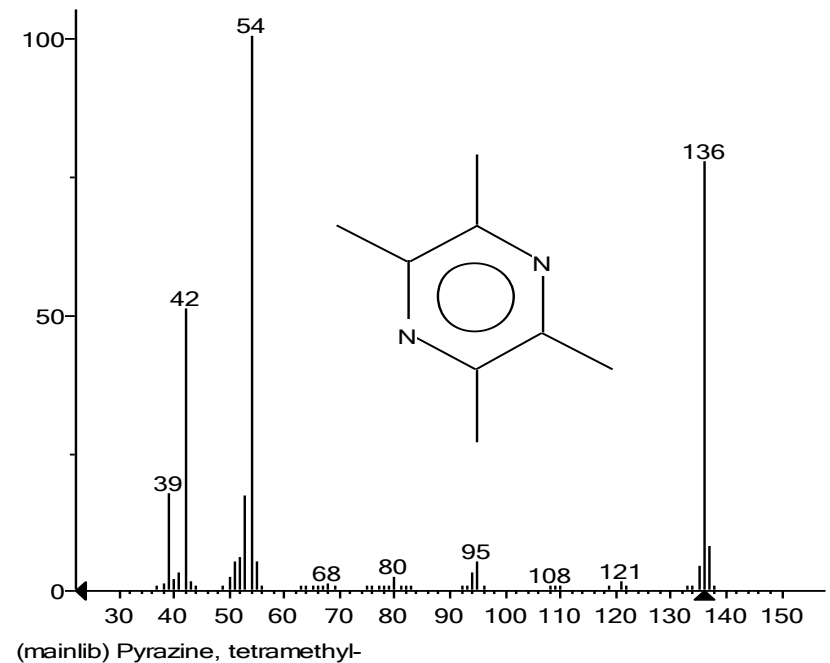
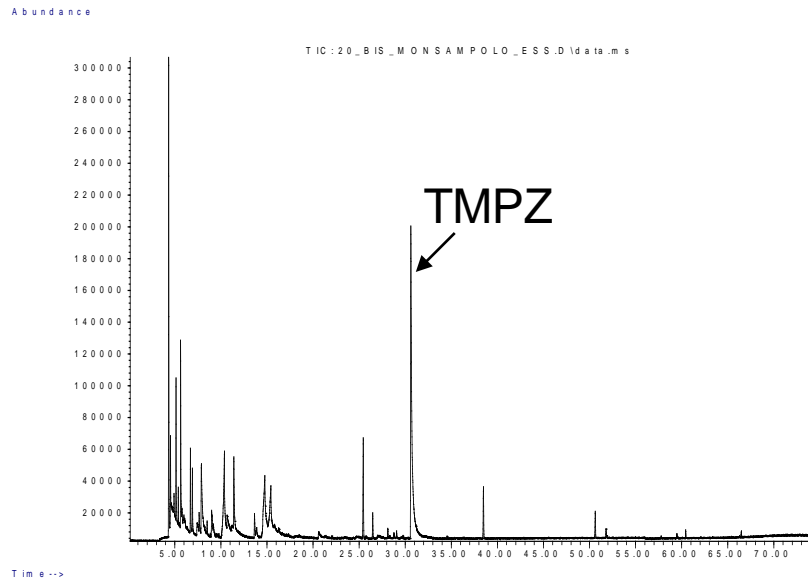
Possible new tastants

Volatile
compounds
(Dr. Giulia Bianchi)

*Dried sweet
red peppers*



In some dried peppers we have found by SPME-GC-MS the *tetramethylpyrazine*, well noted as flavouring agent with a pleasant nutty taste and as bioactive compound with functional properties. It seems to be produced by not-well known fermentation phenomena coupled with Maillard reaction due to drying processing.



Thanks for your participation