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2008 : December 2008 - Author Commentaries : Alessandra Bendini

AUTHOR COMMENTARIES - 2008

December 2008


Alessandra Bendini

 Featured Scientist from *Essential Science Indicators*SM

According to a recent analysis of Essential Science Indicators from *Thomson Reuters* data, the work of Dr. Alessandra Bendini has entered the **top 1%** in the field of Agricultural Sciences with the highest percent citations. Her current record in this field includes 32 papers cited a total of 257 times between January 1, 1998 and August 31, 2008.

Dr. Bendini is a researcher in the Department of Food Science at the University of Bologna in Cesena, Italy.

In the interview below, she talks with ScienceWatch.com about her highly cited work.

SW: Your interest in agricultural sciences moved in the direction of improving the analytical techniques for the detection of minor compounds in food and in particular in olive oil?

Yes, it is true. In all these years, my mentor has always been Prof. Giovanni Lercker, a world expert in the field of lipid oxidation and chromatographic techniques. My interest in the analysis of minor compounds started during my thesis project, performed under Dr. Tullia Gallina Toschi's supervision, when I applied an online LC-GC analytical method to detect the presence of steradienes in olive oil to evidence non-genuine samples. Then I used the same analytical technique to measure the linear unsaturated hydrocarbons in spice samples treated with γ -rays or microwaves.

Afterwards my postdoc research activity was particularly focused on other minor compounds known for their antioxidant power and naturally present in vegetable matrices: molecules with phenolic or polyphenolic structure. For example, I studied the relationship between phenolic composition and radical scavenging activity of phenols in beverages such as green and black teas, in apple peel and pulp in fruits produced according to both organic and integrated agriculture methods, in traditional balsamic vinegars and especially in virgin olive oils. In particular for the articles on apple and vinegar I was invited to collaborate on developing the antioxidant assays by Dr. Fabio Chinnici who also works in my Department. The paper developed in collaboration with Dr. Chinnici titled "Radical scavenging activities of peels and pulps from cv. golden delicious apples as related to their phenolic composition" (*J. Agr. Food Chem.* 52[15]: 4684-89, 28 July 2004) is now one of my most-cited articles.

"...the protection of the quality and genuineness of virgin olive oil is always one of the main topics of our research group."

SW: Several of your highly cited papers are on phenols and polyphenols in olive oil. I note that these are papers on application of different analytical techniques, with the emphasis on extraction and detection methods.

The identification and quantification of the individual phenols of virgin olive oil are of great interest because several agronomic and technological parameters can affect phenolics' presence in virgin olive oil, and, as a consequence, affect the resistance to oxidation of oil during storage, the sensory and health properties, and, therefore, the quality. The variety of extraction techniques, chromatographic conditions, and methods of detection and quantification have contributed to differences in literature-reported levels of phenols of virgin olive oil.

Thanks to a strict collaboration with the Spanish research group from the University of Granada and in particular with Dr. Alegria Carrasco-Pancorbo, and to the harmony among researchers in my group, especially Dr. Lorenzo Cerretani, with whom I have worked closely for several years, I was able to compare the performance of different liquid-liquid and solid-phase extraction methods and of chromatographic (HPLC) and electrophoretic (CE) approaches also using highly sensitive and diagnostic detectors like APCI-MS and ESI-MS.

SW: What do you find to be the most challenging aspect of your phenol research?

I think that the work carried out so far on the identification of single molecules in the phenolic fraction of virgin olive oil is very interesting, but many compounds are still unknown so a further effort needs to be made in this direction. For example, we started working on the oxidation forms of phenols that can be present in high quantities as a consequence of incorrect storage conditions of virgin olive oil. On this subject, we have proposed that the setting up of a parameter based on the ratio between oxidized/non-oxidized forms of phenols could be particularly useful as a freshness index for this product.

"The identification and quantification of the individual phenols of virgin olive oil are of great interest because several agronomic and technological parameters can affect phenolics' presence in virgin olive oil..."

In the last five years I have acquired skills in the sensory analysis of virgin olive oil. I have studied the correlations between volatile and phenols components and olfactory and taste attributes, respectively, and I think that it is extremely fascinating to understand how these minor compounds and sensory quality vary depending on several agronomic and technological variables.

SW: What interested you in this line of research, and particularly in working with olive oil?

Well, my co-workers and I are studying the aspects linked to the transfer of polar phenols in origin present in olives in virgin olive oil and its stabilization in the micro-emulsion of water in oil. We hope to clarify how, due to a temperature variation during storage/distribution phases of virgin olive oil (temperature close to 0°C or 40°C in winter or summer respectively), the phenolic fraction changes in composition and in protection activity towards lipid oxidation.

SW: Which other aspects of your research are you developing or hoping to develop in the near future?

Certainly, another hot topic of interest to us is the setting up of analytical methods able to detect the presence of mild deodorized olive oil. This illegal treatment represents the most important fraud in the olive oil sector due to both the difficulty in identifying the reliable markers and the large economic interest.

Finally, thanks also to collaborations with other researchers, we are exploring the potential applications of rapid analytical technique such as DSC, FT-NIR, FT-IR, and an electronic nose for the rapid analysis of quality and genuineness of virgin olive oil. In fact, the protection of the quality and genuineness of virgin olive oil is always one of the main topics of our research group. ■

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Alessandra Bendini's current most-cited paper in *Essential Science Indicators*, with 30 cites:

Carrasco-Pancorbo A, *et al.*, "Evaluation of the antioxidant capacity of individual phenolic compounds in virgin olive oil," *J. Agr. Food Chem.* 53(23): 8918-25, 16 November 2005. Source: *Essential Science Indicators* from Thomson Reuters.

Keywords: phenolic compounds, virgin olive oil, analytical techniques, antioxidants, apple peel, fruit

pulp, HPLC, capillary electrophoresis, sensory analysis.

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