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Antioxidant capacity of aromatic spices of Mendoza

Claudia Amadio, Mónica Zimmermann, Rosa Medina and Susana Miralles

Facultad de Ciencias Agrarias, Universidad Nacional de Cuyo, Almirante Brown 500, (5505) Chacras de Coria, Mendoza, Argentina.e-mail: camadio@fca.uncu.edu.ar

INTRODUCTION

The socalled lipidic oxidation is a term used to describe the complex chemical changes that occur due to lipid interaction with reactive oxygen species (ROS) (Chung *et al.*, 2005), which leads to the formation of free radicals, hydroperoxides, and other deterioration products (aldehydes, ketones, acids and alcohols).

The use of synthetic additives has allowed to avoid or to limit the aforementioned alterations. Recently, consumer rejection to uptake these compounds has promoted the search of natural systems, which also have potential beneficial effects on health. The antioxidant properties of a number of spices (clove, sage, oregano, rosemary, and thyme) in ground pork, mayonnaise and salad dressings are being studied from the fifties (Chipault, 1956).

These properties seem to be related with their content of phenolic compounds (Sánchez-Moreno González, 2002). These compounds possess an aromatic ring with one or more hydroxyl groups as substituents, and occur in many plants showing varied functions. Phenolic substances are proned to be water soluble and very often, they are combined with sugars forming glycosides. Among natural phenolic compounds, of which more than thousand structures are known, flavonoids are the most widespread, following them in importance monocyclic phenols, phenylpropanoids and phenolic quinones (Martin and Salmoral, 1999).

Polyphenols have different specificity for ROS, which arise from oxidative processes, *via* one or more mechanisms according to their particular properties, one of them being free radical-scavenging.

Nowadays, essential oils and a variety of plant extracts are obtained for incorporation in food in order to inhibit some deterioration reactions, and to satisfy the growing demand of natural products (Sánchez-Moreno González, 2002).

The aim of this work was to determine the concentration of phenolic compounds and the free radical inhibition capacity of essential oils from *Origanum x applii* (OA), *Origanum x majoricum* (OM), and *Acantholippia seriphioides* (T) as well as the oleoresins of the latter and of *Origanum vulgare* (Ov).

METHODOLOGY

* Phenolic compounds were determined by the technique of Folin-Ciocalteu (Zoecklein *et al.,* 2001), expressing the results in mg/L equivalent to gallic acid / kg dry spice extract.

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* The free radical scavenging power was determined by 1,1-diphenyl-2-picrylhydrazyl (DPPH) technique (Oktay *et al.,* 2003), using 200 ppm BHT (butylhydroxytoluene) and TBHQ (*ter*-butylhydroquinone), and 1mM and 10 mM ascorbic acid as standards, expressing the results as micromol/l DPPH and as % inhibition.

* Statistical analysis: Anova was applied to the values obtained for an *alpha* = 0.05.

RESULTS AND DISCUSSION

* Significant differences were determined with respect to the amount of polyphenols (Fig. 1). In decreasing order: essential oil of T, OA, OM, oleoresin of Ov. With regard to the oleoresin of T its polyphenol content could not be determined by this technique.

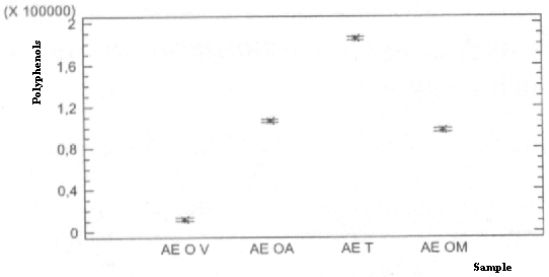

Figure 1. Polyphenols concentration of the studied samples (AEOV, oleoresin of *Origanum vulgare*; AEOA, essential oil of *Origanum x applii*; AET, essential oil of *Acantholippia scriphioides*; AEOM, essential oil of *Origanum x majoricum*).

* The DPPH content of extracts was always less than that of BHT (Fig. 2). There were not significant differences between results corresponding to BHT and to OM essential oil; and to Ov and T oleoresins (OR).

The essential oils of OA and T exhibited the best values of free radical scavenging power that showed no significant differences with those corresponding to the use of TBHQ or both ascorbic acid doses.

Regarding the free radical inhibition percent, the Ov oleoresin didn't perform any effect under the assay conditions (Fig. 3). The essential oils of OA and T showed an average inhibition higher than 90% as ascorbic acid and TBHQ.

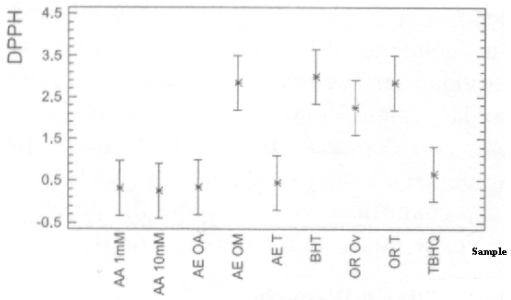

Figure 2. DPPH content of the studied extracts (AA, ascorbic acid; OROV, oleoresin of *Origanum vulgare*; AEOA, essential oil of *Origanum x applii*; AET, essential oil of *Acantholippia seriphioides*; AEOM, essential oil of *Origanum x majoricum*; ORT, oleoresin of *Acantholippia seriphioides*; BHT, butylhydroxytoluene; TBHQ, *ter*-butylhydroquinone).

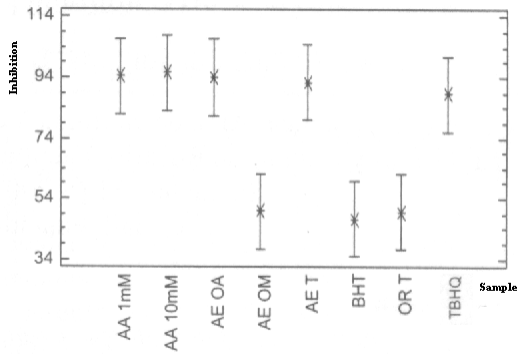

Figure 3. Free radical inhibition % of the studied samples (AA, ascorbic acid; OROV, oleoresin of *Origanum vulgare*; AEOA, essential oil of *Origanum x applii*; AET, essential oil of *Acantholippia seriphioides*; AEOM, essential oil of *Origanum x majoricum*; ORT, oleoresin of *Acantholippia seriphioides*; BHT, butylhydroxytoluene; TBHQ, *ter*-butylhydroquinone).

CONCLUSIONS

The essential oils of *Origanum x applii* and of *Acantholippia seriphioides* owing to their content in polyphenols and their free radical scavenging power show the best antioxidant capacity of the spices studied.

Note: This study was presented at the 'I Reunión de Biotecnología aplicada a plantas medicinales y aromáticas' (First Biotechnology Meeting on Medicinal and Aromatic Plants), Córdoba, Argentina, 2006.

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