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Comparative study of the antioxidant activity of leaves and flowers of *Tagetes campanulata* Griseb.

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INTRODUCTION

Tagetes campanulata Griseb. belongs to the group of plants commonly known as '*virreinas*' ('viceroy's wife'). It is a native species that grows along the west region of Argentina from Bolivia until the Province of San Luis (Zuloaga, 1999).

The flavonoids, secondary metabolites of the plants, display a variety of biological functions, such as strong scavengers of free radicals (Heim *et al.*, 2002).

The complement of flavonoids from leaves and flowers of *T. campanulata* was determined in our laboratory (Abdala, 1999). Leaves: quercetin 3-*O*-diglucoside, quercetin 3-*O*-glucoside, luteolin, luteolin 7-*O*-glucoside, quercetagetin 3,5,6,7,3'-pentamethyl ether, quercetagetin 3,6,3',4'-tetramethyl ether. Flowers: quercetagetin, quercetagetin 7-*O*-glucoside, quercetagetin 3-*O*-g1ucoside, quercetin, quercetin 3-*O*-diglucoside, patuletin and patuletin 7-*O*-glucoside.

The occurrence of some dihydroxylated nuclei in compounds as quercetin, or its glycosides in the extracts of leaves and flowers of *T. campanulata,* whose activity like free radical scavenging have been proved, makes interesting the study of them as antioxidants (Heim *et al.*, 2002). The ethanolic extract of leaves and flowers of *T. campanulata* was used, and the results are discussed in the present work.

MATERIALS AND METHODS

Preparation of the sample.

0.1 g of the total extract of leaves and flowers of *T. campanulata* was weighed (Department Tafi del Valle: Quebrada del Barón, 20-III.84, J.A. González s/n; Dept. *ibid*: before the infiernillo, 20-III-86, J.A. González), obtained according to the conventional methodology used in our laboratory (Abdala, 1999), and was dissolved in 20 ml of 80% EtOH to obtain a mother solution of 1:200 concentration, successive dilutions being performed: dilution 1 = 2.7 mg/mL; dilution 2 = 2.3 mg/mL; dilution 3 = 1.5 mg/mL and dilution 4 = 0.5 mg/mL.

Assay of the antioxidant capacity.

The used method is based on *beta*-carotene decolouration by the action of peroxides originated during the heat-induced linoleic acid oxidation. Measurements were carried out at 470 nm in a Beckman DU 7500 equipment, according to Igile *et al.* (1994) and modifications (Park *et al.*, 2001). It was compared with a control without extract. The graph contemplates the percentage absorbance regarding the initial absorbance *vs* time.

RESULTS AND DISCUSSION

The control, without the extract of flowers and leaves of *T. campanulata* diminishes its absorbance in a very marked way after the first two hours, then keeps constant until the end of the measurement (Fig. 1 and 2). The difference of absorbance decrease of *beta*-carotene, between the mother extract and dilutions, with the course of time, diminishes in a proportional way to the concentration in both extracts.

That is to say that in all cases the antioxidant action is appreciated, being major in the most concentrated extracts.

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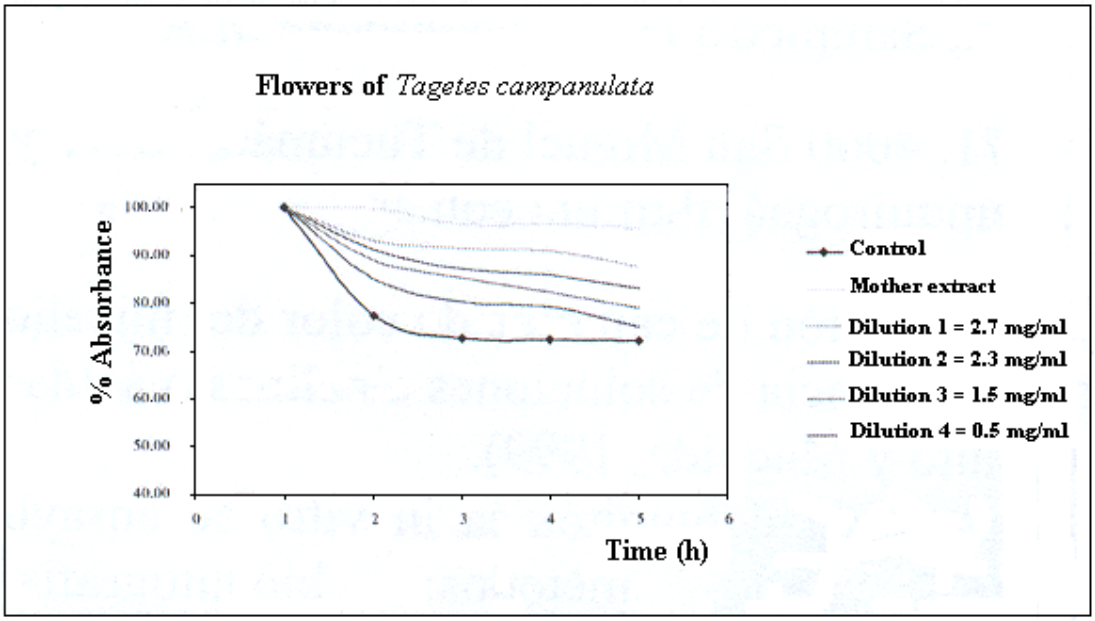

Figure 1. Antioxidant activity of flowers of *Tagetes campanulata*.

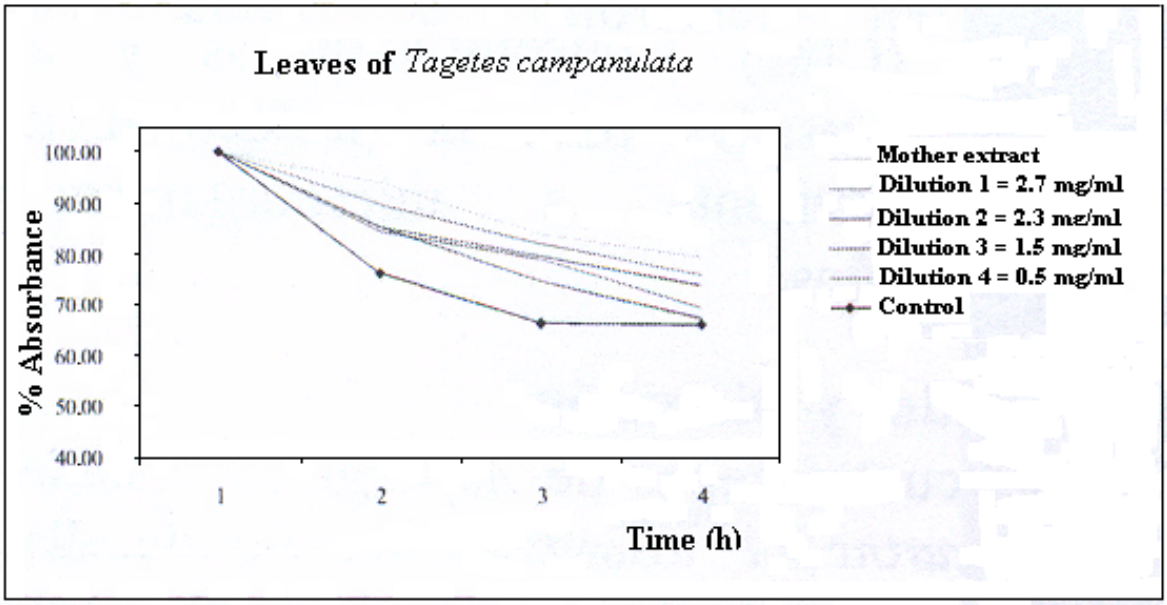

Figure 2. Antioxidant activity of leaves of *Tagetes campanulata*.

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CONCLUSIONS

The flowers of *Tagetes campanulata* show antioxidant activity in the order of 75%, which is evidently related with the occurrence of flavonoids dihydroxylated in ring B, as quercetagetin, quercetin, patuletin and their glycosides.

The leaves of *Tagetes campanulata* show antioxidant activity, in the order of 60%, what is related with the occurrence of flavonoids dihydroxylated in ring B, as luteolin, quercetin and their glycosides.

The lowest antioxidant activity of leaves regarding flowers is probably due to the occurrence of polymethoxylated quercetagetin in its flavonoid content (quercetagetin 3,5,6,7,3'-pentamethyl ether, quercetagetin 3,6,3',4'-tetramethyl ether). The absence of free OH groups in the molecule of these compounds diminishes its antioxidant capacity.

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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