

Antioxidant activity and phenolic content of extracts from different *Pterospartum tridentatum* populations growing in Portugal

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INTRODUCTION

Pterospartum tridentatum L. Willk. is an European endemic Leguminosae and known as *carqueja* in Portugal. This small shrub is very common in the mountains of the north of Portugal. Bioactive compounds, such as alkaloids and flavonoids, have been identified in aqueous extracts of those plants [1]. Plants synthesize antioxidant compounds, as secondary products, which are mainly phenolic compounds serving in plant defense mechanisms to counteract reactive oxygen species (ROS) in order to avoid oxidative damage. Researchers are looking for natural antioxidants as alternative to synthetic antioxidants.

Some authors refer the use of *Pterospartum tridentatum* in popular medicine and culinary uses. This plant is an underexploited natural source of compounds with biological activity, which should be fully characterized aiming to its valorization.

The aim of the present study was to evaluate the total phenolic content and antioxidant activity of aqueous extracts of *Pterospartum tridentatum* samples, collected in three locations in Portugal, at different vegetative stages.

MATERIALS & METHODS

Samples of the aerial parts of *Pterospartum tridentatum* were collected at different vegetative stages: dormancy period (end of January) and flowering period (in May), in three locations in Portugal: Orvalho, Gardunha mountain and Malcata mountain. Aqueous extractions were performed by refluxing during 2 hours in a Clevenger apparatus. The extract solutions were freeze-dried and a solid extract was recovered.

The antioxidant activity of the solid extracts was determined by the radical scavenging activity method using 2,2-diphenyl-1-picrylhydrazyl radical (DPPH). The total phenol content (TP) of the extracts was evaluated by spectrophotometric method and expressed as gallic acid equivalents (mg/g of dry-mass). All trials were carried out in triplicate. The data were subjected to one-way analysis of variance (ANOVA) and the differences between means were measured using Duncan's Test through STATISTICA, Version 7 (Copyright © StatSoft, Inc.), *p* values < 0.05 were considered to be significant.

RESULTS & DISCUSSION

The influence of the seasonal variation in the yield and composition of the extracts was evaluated, in order to select the most appropriate harvest season. The extraction yields presented some differences with the harvest period and the highest yield extraction was

obtained in the flowering period, using flowers (19.4g/100g plant dry mass in Gardunha mountain) and the lowest extraction yield was also obtained in the same period but using stems (11.3 g extract/100 g plant dry mass in Malcata mountain). The extraction yield was always higher than the commonly used herbs [2].

The 2,2-diphenyl-1-picrylhydrazyl radical (DPPH) is widely used to evaluate the antioxidant capacity of extracts from different plant materials. The stem extracts showed significant differences between the dormancy and the flowering period. At flowering stage a higher antioxidant activity was observed in the flower extracts.

The total phenolic content of *Pterospartum tridentatum* (ranged from 270.7 to 402.9 mg gallic acid equivalents per g dry matter) show very high levels at any time of harvest. The highest value occurred in the dormancy period in Malcata mountain and are superior to other species previously studied, like *Harpephyllum caffrum* in leaf and stem bark and *Sclerocarya birrea* in stems [3]. They also contain much more phenolic compounds when comparable with results in *Carissa opaca* [4] or in Australia herbs and spices like *Tasmannia pepper* leaf, anise myrtle and lemon myrtle [5]. Plants with high levels of phenolic compounds have demonstrated a high antioxidant activity of plants extract.

From preliminary experiments, it is anticipated a significant antimicrobial activity of the solid extracts against bacteria and fungus (data not shown).

CONCLUSION

The studied *Pterospartum tridentatum* aqueous extracts present a high extraction yield, an appreciable level of total phenolic compounds and a significant antioxidant activity. The results foresee a high potential for the utilization of this plant or its extracts as a new source of safe natural antioxidants and preservatives for the food industry with consequent health benefits for consumers. From the results, it can be conclude that the plants can be harvested at all seasons of the year, which presents an advantage from an industrial point of view.

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