Chemical Characterization of Mediterranean herbs and spices: assessment of antioxidant and bioactivity.

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Introduction

Herbs and spices are well-known for their antioxidant activity and medicinal properties (Kurian ,2012). Various Mediterranean herbs are abundant in phenolic compounds. These compounds are the key components for the antioxidant activity (Lampe ,2003). The main aim of this research is to analyse the chemical characterization of the selected Mediterranean herbs and spices and to test their antioxidant and bioactivity. Antioxidants are very important since they prevent the formation of any harmful free radicals. The radical scavenging activity of the hydroalcoholic fraction will be measured using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2′-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) diammonium salt radical cation assay (ABTS assay)

Research Objectives and Hypotheses

The main objectives for this research are :

- To sample and collect Mediterranean herbs and spices.
- To quantify the different classes of compounds present within the plant extracts
- To quantify the antioxidant activity of the plant extracts against free radicals.

Project Summary

The following is a summary for this research project:

- A selection of herbs and spices grown in the Maltese islands were sampled during the testing phase. The plant material were dried at low temperatures in the absence of UV light to prevent degradation of the phytoactive components. The dried plant material was ground into a powder and subjected to various extraction procedures.
- An exhaustive solvent extraction procedure was employed whereby the plant material was defatted using organic solvents which would remove lipid soluble waxes and other lipophilic compounds. The plant material was dried under vacuum to remove residual organic solvents and subjected to a second extraction procedure using a hydroalcoholic mixture to extract hydrophilic compounds.
- The methanol-crude extract were prepared by drying 5ml from the reconstituted 10ml portion under the nitrogen evaporator and the other 5ml will be extracted for three times by petroleum ether.
- The samples will then undergo various colorimetric assays such as total phenolic, flavonoid and ortho diphenolic content.

Methodology

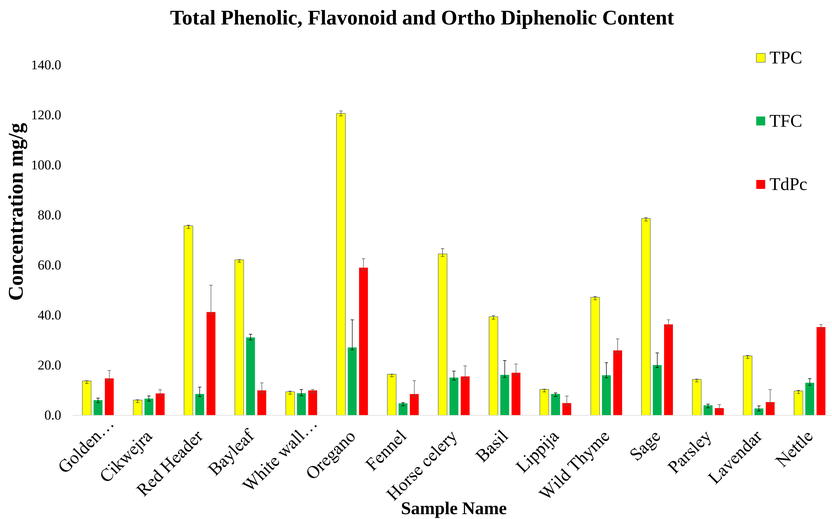
The fresh samples are oven dried for one week at 37^0C prior to any analyses and then grinded down into a fine powder for further analyses.

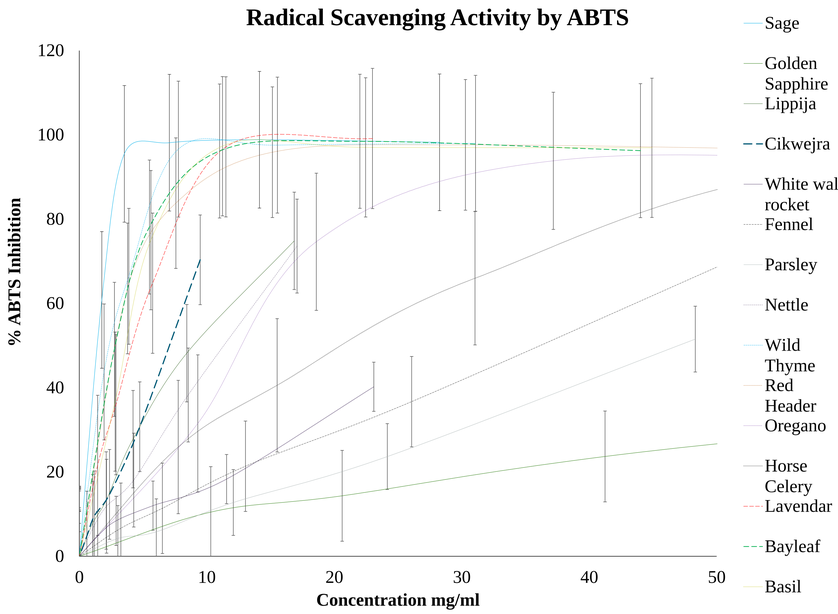
Maceration extraction using a solid :liquid ration of 1:5 the extraction was carried out 3 times to ensure maximum recovery of phytochemicals

The methanolic fractions are then dried under reduced pressure by a rotary evaporator and reconstituted with 10ml of methanol. This will then be divided into two 5 ml portions.

After drying under a gentle stream of nitrogen the samples underwent various colourimetric assays such as TPC,TFC and TdPc assays.

Results





Conclusion

From the bar graphs shown, the sample that contained the most flavonoid content was Bayleaf, whilst Lavender, contained the lowest flavonoid content. Oregano exhibited the highest phenolic content value whilst Chicory showed the lowest phenolic content. The plant that exhibited the most ortho-diphenolic content was also Oregano, whilst Parsley exhibited the least. Since Oregano had the highest phenolic content value, it also contained a low IC_{50} value when analysed by the ABTS colourimetric assay, meaning that it has a very high antioxidant activity.

References

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