

EFFECT OF SPRAY DRYING CONDITIONS ON THE PHENOLIC CONTENT OF MASTIC TREE LEAF EXTRACT

LJEKARNA
ZADAR

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INTRODUCTION

Mastic tree (*Pistacia lentiscus* L.) is a dioecious evergreen shrub of Anacardiaceae family, widely distributed in the Mediterranean region. It has been a highly valued plant in traditional medicine due to its health benefits and the presence of various bioactive compounds (BAC) such as pigments, fatty acids and polyphenols. However, mastic tree leaves are considered as a rich source of phenolic acids and flavonoids, mainly represented by hydroxybenzoic acids and flavonols. Hence, mastic tree has the potential use in the food industry as well as in the pharmaceutical and cosmetic industries. Polyphenols are sensitive to environmental factors which can cause their degradation and loss of their functions. In order to preserve their biochemical functions, a microencapsulation procedure could be applied. The most commonly used microencapsulation technique for the protection of BAC is spray drying.

AIM

Determine of total phenols (TP) in extracts and powder obtained by spray drying

Evaluate a retention of phenolic compounds in spray-dried mastic tree leaf extract obtained under different spray drying conditions (temperature 120-180 °C; wall to core ratio 1:20, 1:25 and 1:30).

MATERIALS & METHODS

ULTRASOUND ASSISTED EXTRACTION

Ethanol

30, 50 °C

10, 15, 20 min

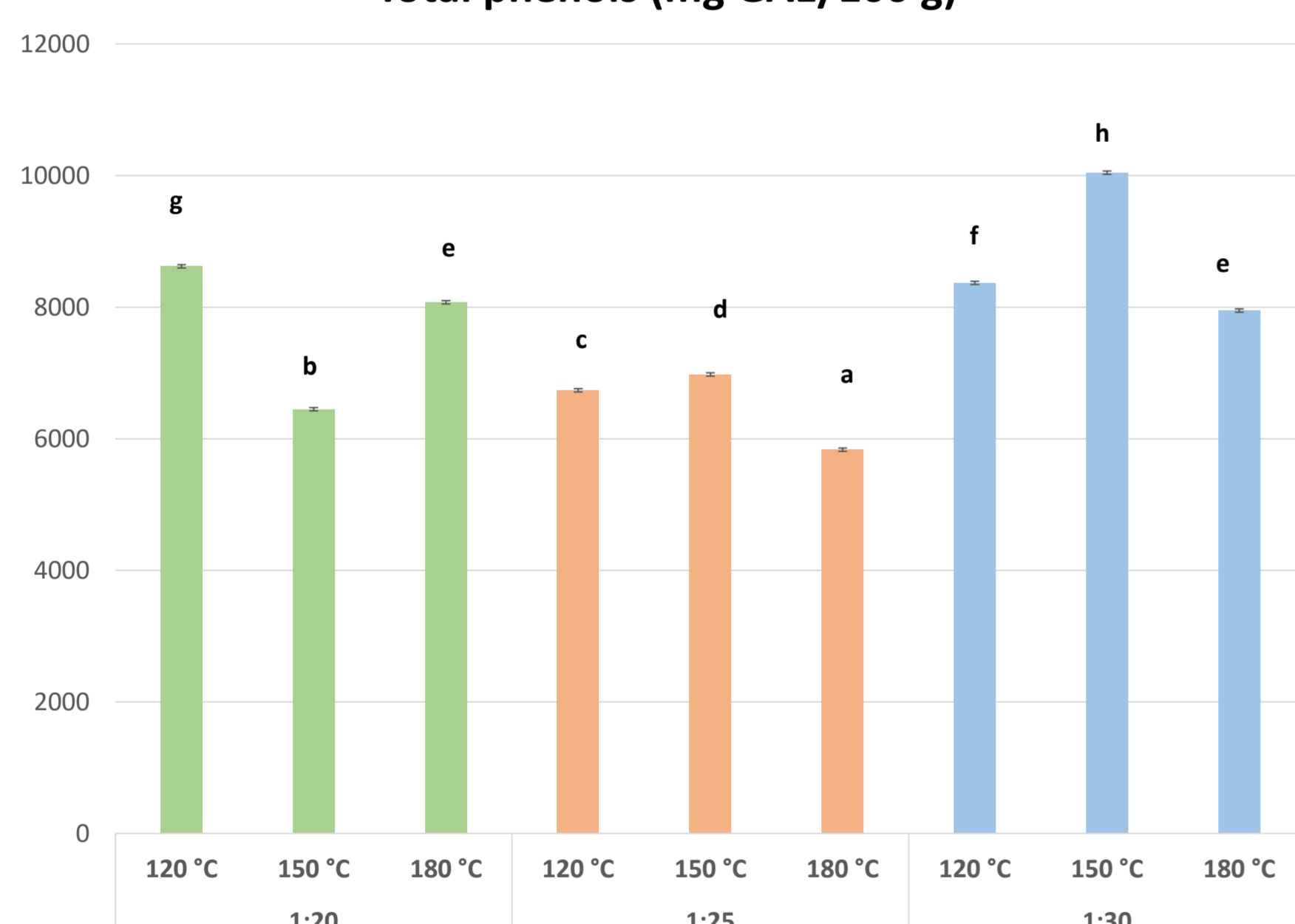
SPRAY DRYING

20 1
25 1
30 1
CARRIER (g) to EXTRACT D.M. (g)
RATIO

120 °C
150 °C
180 °C

RESULTS AND DISCUSSION

Total phenols (mg GAE/100 g)



| Spray drying conditions | N | Total Phenols (mg/100 g d.m.) |
|--------------------------------|---|-------------------------------|
| Extracts d.m. to carrier ratio | | p<0.01* |
| 1:20 | 6 | 7714.04 ± 14.55 ^b |
| 1:25 | 6 | 6515.33 ± 14.55 ^a |
| 1:30 | 6 | 8786.87 ± 14.55 ^c |
| Temperature (°C) | | p<0.01* |
| 120 | 6 | 7908.13 ± 14.55 ^e |
| 150 | 6 | 7824.13 ± 14.55 ^b |
| 180 | 6 | 7283.98 ± 14.55 ^a |

In the powders obtained by drying the mastic tree leaf extract, the concentrations of total phenols (TP) was determined from 6737.16 to 10046.23 mg GAE/100 g s.tv, i.e. in relation to the initial extract in the powders obtained by drying the mastic tree leaf extract was in the range of 28.07 to 42.60%.

The highest concentration of TP was quantified in the sample dried at a temperature of 150 °C, with a ratio of carrier and dry matter of 30:1, while slightly lower concentrations were determined in all other samples. Namely, the role of the carrier is to capture the active substances in the polymer matrix in order to protect it from adverse environmental conditions (Bhusari and Kumar, 2014). Therefore, the low carrier concentration insufficiently protects the encapsulated material during spray drying. The results of research conducted by Bhusari and Kumar, (2014) show that powders obtained by spray drying of tamarind fruit pulp at higher carrier concentrations had a higher content of phenolic compounds. The same trend with a larger carrier addition was noted in the study by Ahmed et al. (2010) indicating that the increase in total phenolic content may be due to carrier interference with phenolic compounds. Probably a higher carrier concentration has a positive effect on the retention of phenolic compounds during spray drying because a matrix is formed in which the polymer forms a three-dimensional network containing encapsulated material (Tonon et al., 2010).

According to the results of multivariate analysis of variance (MANOVA) on TP concentration, the ratio of the extract dry matter and the carrier as well as the drying temperature had significant influence. In the combined influence of the ratio of MD to dry matter of the extract, MANOVA showed that the content of carriers has a statistically significant effect on the retention of phenolic compounds, i.e. the higher content of carrier, the more significant the difference between the concentrations of phenolic compounds.

CONCLUSIONS

- ✓ The retention of phenolic compounds relative to the initial extract in powders obtained by drying the mastic tree leaf extract ranged from 28.07 to 42.60 %
- ✓ The increase in the ratio of carrier in the drying of mastic tree extract by spraying affected the increase in the concentration of TP
- ✓ Results of statistical analysis showed that carrier ratio as well as applied temperature has influence of TP content in powder obtained by spray drying

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Acknowledgement: This work was supported by the project "Bioactive molecules of medical plant as natural antioxidants, microbicides and preservatives" (KK.01.1.1.04.0093), co-financed by the Croatian Government and the European Union through the European Regional Development Fund—Operational Programme Competitiveness and Cohesion (KK.01.1.1.04.).