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EFFECT OF SPRAY DRYING ON THE MICROENCAPSULATION OF THE BLUEBERRY NATURAL ANTIOXIDANTS

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INTRODUCTION

Phenolic compounds obtained from blueberry fruits have gained great attention due to their more effective bioactive roles in human health than whole berries [1,2]. However, they are sensitive to environmental conditions and are therefore susceptible to degradation affecting their effectiveness. Microencapsulation of these compounds by spray drying provides a solution to these problems. **The aim of this work was to study the effect of spray drying on the microencapsulation of the blueberry phenolic compounds to optimize the production of a powder rich in stable polyphenols.**

MATERIALS AND METHODS

Blueberry fruits → **Extraction with orbital agitation** (with acidified etanol; mass solvent to crushed fruits ratio: 4:2) → **Filtration** → **Spray Drying [3]**

VARIABLES

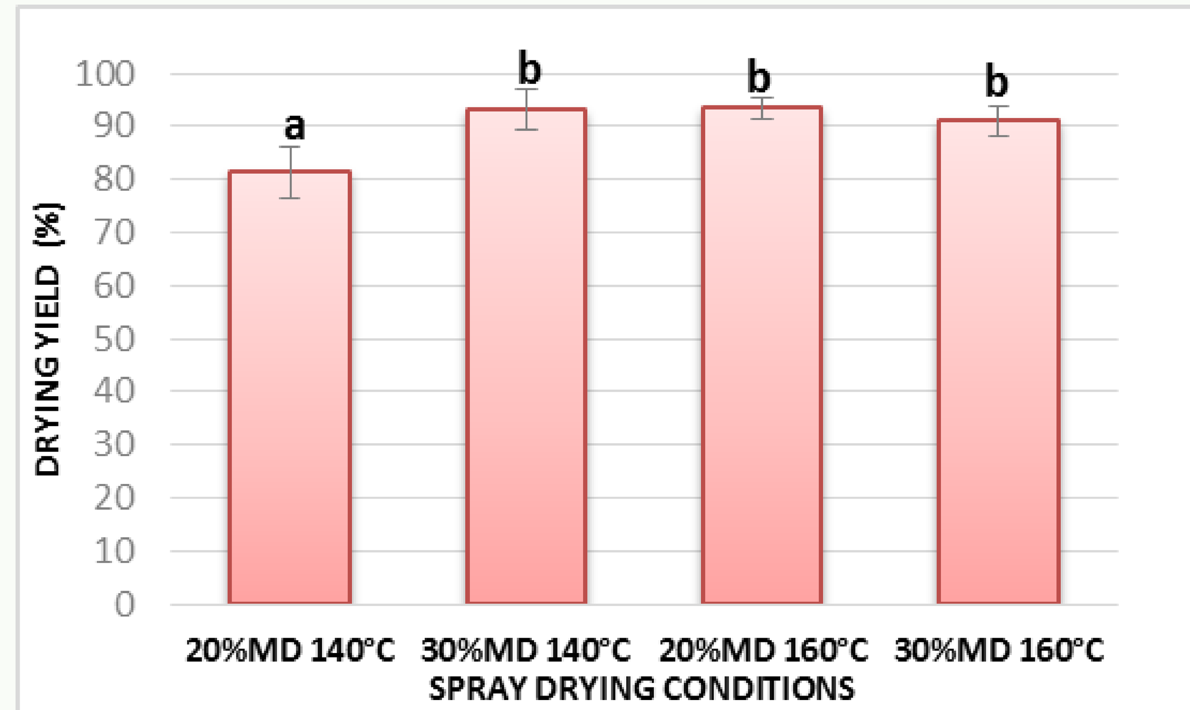
Encapsulating agent concentration	Inlet air temperature
Maltodextrix (14.7 ED) 20% w/v	140 °C
Maltodextrix (14.7 ED) 30% w/v	160 °C

DETERMINATIONS

- **Drying yield (%)**
- **Moisture content (%)**
- **Water solubility(%)**
- **Total phenolic content (TPC)**
- **Surface phenolic content (SPC)**
- **Encapsulation efficiency of phenolics (EE)**

RESULTS AND DISCUSSION

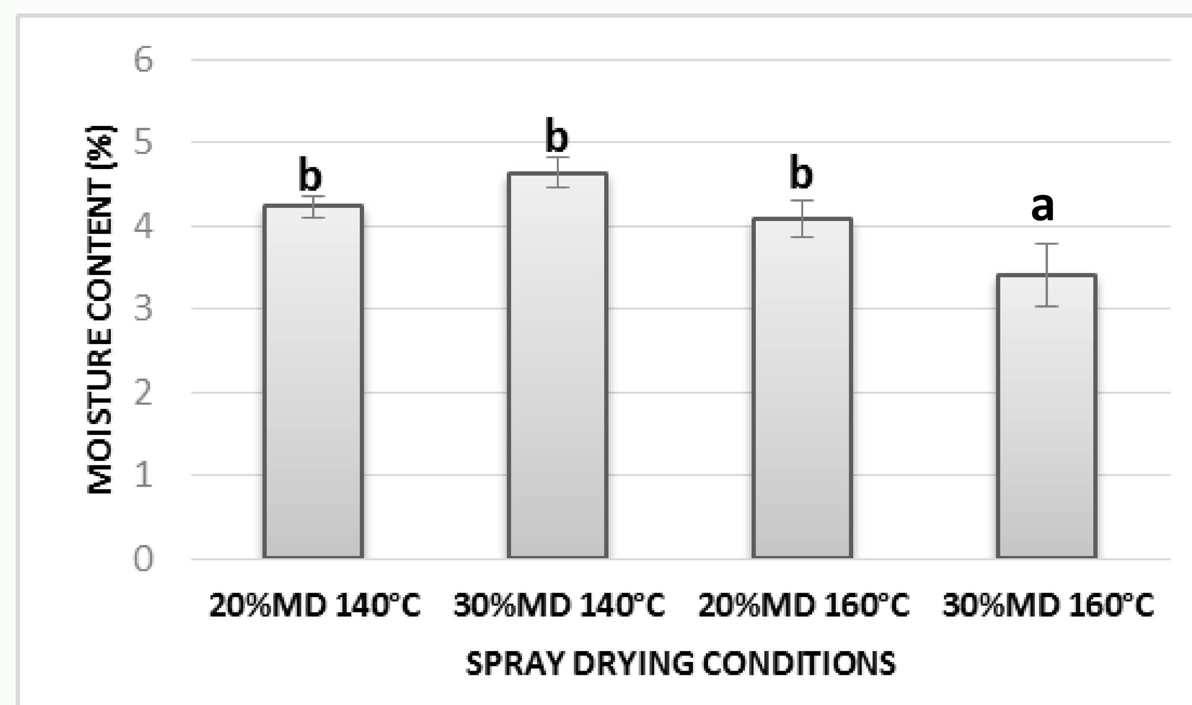
Drying yield under different spray drying conditions



Different letters indicate statistically significant differences ($p < 0.05$) among conditions.

All spray drying conditions exceeding the satisfactory level of 50 % for a laboratory scale spray dryer. Results showed that, with reduced inlet temperature (140 °C) and less concentration of the encapsulating agent (20%), there was a decrease in drying yield.

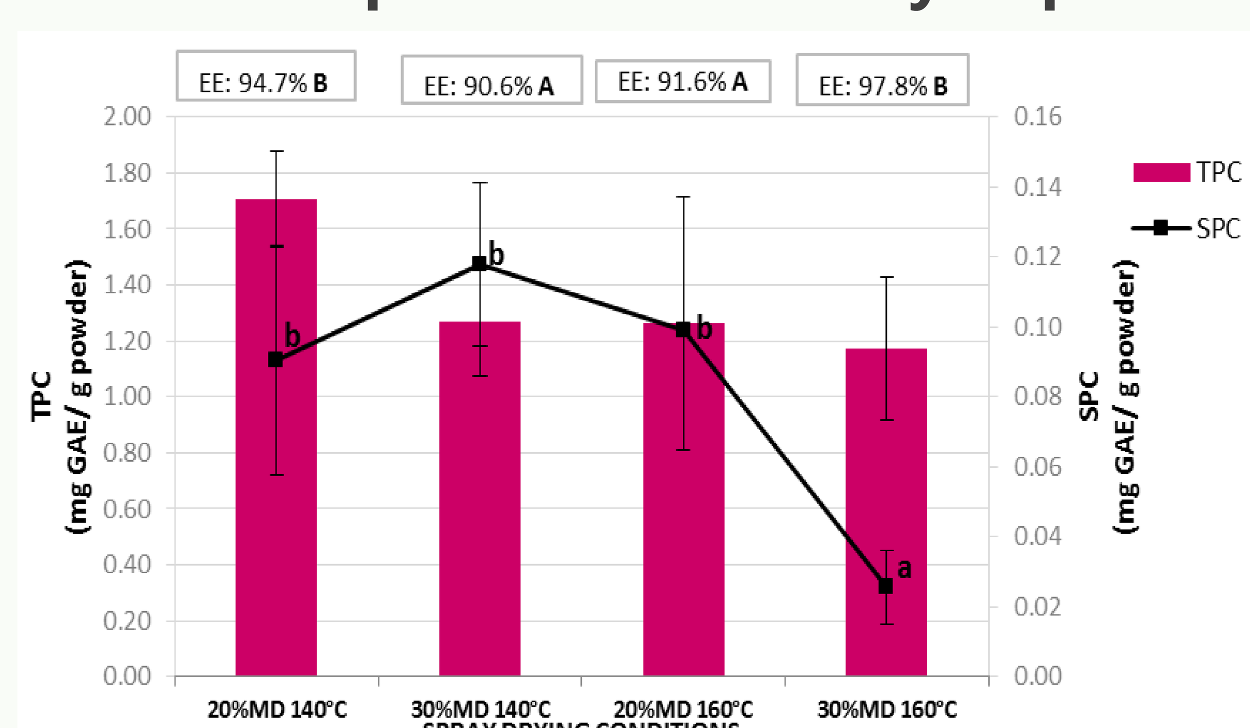
Moisture content and water solubility of powders



Different letters indicate statistically significant differences ($p < 0.05$) among conditions.

Decreased moisture was observed with the increase in drying temperature. This variable together with an increase in MD concentration gave the lowest moisture (30%MD 160°C). Water solubility of powders was higher than 98 % without differences among treatments (data not shown).

Total phenolic content, surface phenolic content, and encapsulation efficiency of phenolic compounds



Phenolic compounds were determined by Folin-Cioacalteu method. Different letters indicate statistically significant differences ($p < 0.05$) among conditions.

The inlet temperature and encapsulating agent concentration only influenced in the SPC. We observed the lower SPC at higher inlet temperature and higher encapsulating agent concentration. The higher values of EE were for 20%MD 140°C and 30%MD 160°C.

CONCLUSIONS

The spray drying conditions studied influenced on the drying yield, moisture content, SPC, and EE of phenolic compounds from blueberry extracts. The powders with the best characteristics were obtained with 30% w/v of maltodextrin at 160°C inlet temperature. This powders rich in blueberry polyphenols stabilized by microencapsulation produced by utilizing these optimum conditions have the potential to be used as functional food ingredients.

REFERENCES

[1] Prior, R.L. et al. Purified blueberry anthocyanins and blueberry juice alter development of obesity in mice fed an obesogenic high-fat diet. *J. Agric. Food Chem.* **2010**. 58, 3970–3976. **[2]** Prior, R.L. et al. Purified berry anthocyanins but not whole berries normalize lipid parameters in mice fed an obesogenic high fat diet. *Mol. Nut. Food Res.* **2009**. 53, 1406–1418. **[3]** Tolun, A. et al. Microencapsulation of grape polyphenols using maltodextrin and gum arabic as two alternative coating materials: Development and characterization. *J. Biotechnol.* **2016**. *239*, 23-33.