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Microencapsulation of blackberry pulp extract (Rubus fruticosus) cv.TUPY by spray drying

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Abstract

The blackberry (Rubus fruticosus) cv. Tupy is a fruit rich in anthocyanins and phenolic compounds, which has high antioxidant activity. However, its short shelf life, due to its fragility and high postharvest respiration rate, consists of an enormous challenge for the agri-food industries. Application of microencapsulation by spray drying is a technique to maintain or increase the stability of the blackberry pulp bioactive compounds and to prolong its shelf life. The objective of this research work was to obtain pulp blackberry in powder microencapsulated with mixture of starch arrowroot and gum arabic (1:1) by spray drying process. A central composite rotatable design (CCRD), with 11 experimental runs, was performed to evaluate the effects of input air temperature (100 - 150 ℃) and encapsulating agent concentration (1:0.5 - 1:2 proportion of blackberry pulp solids: encapsulant), having as responses: drying process yield, moisture content, water activity, hygroscopicity, ascorbic acid content, color, anthocyanins content and antioxidant capacity. The increased proportion of blackberry pulp solids: encapsulant resulted in increased yield drying process. This variable had a significant influence on decrease of anthocyanins content of the blackberry pulp powders. The independent variables showed significant effects on the respective responses: drying process yield, water activity, hygroscopicity, color, ascorbic acid content and anthocyanins content.

Key words:

Powder, anthocyanins, antioxidant capacity.

Introduction

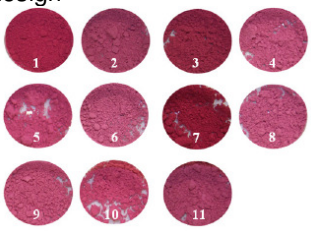
Blackberry fruits have a rich source of bioactive compounds such as anthocyanins and phenolic compounds, which has high antioxidant activity[1]. However, the use of its beneficial effects is limited, because these bioactive compounds exhibit instability when exposed to high temperature, light, oxygen, etc., changing their functional and antioxidant properties[2]. Microencapsulation techniques such as spray drying are applied to protection of bioactive compounds against adverse external environment conditions[3]. In this context, the objective of this research work was to study the influence of process parameters in spray drying of blackberry pulp, evaluating the drying process yield, moisture content, water activity, hygroscopicity, ascorbic acid content, color, anthocyanins content and antioxidant capacity of resultant powders.

Results and Discussion

The drying tests were conducted following an experimental design using mixture of arrowroot starch/gum arabic (1:1, w/w) as encapsulating agent. A central composite design with 11 runs was developed to study the effects of variables of dryer inlet air temperature (100-150 ℃) and concentration of encapsulating agent in relation to the total solids present in blackberry pulp (1:05 - 1:2 w/w). Spray drying of the samples was performed in a laboratory spray dryer (Model B191, Büchi, Flawil, Switzerland) equipped with dual fluid atomizer nozzle with an orifice of 0.5 mm diameter, using the following process conditions: air flow 19 m3/h; pressurized air flow of 0.6 m3/h; feed mass flow of 0.2 kg/h.

Resultant powders presented moisture content values lower than 6% and water activity below 0.4, indicating a possible microbiological stability. The run 8 and the central point runs presented the highest drying process yield values (53.17 to 56.95%), which were significantly different ($p < 0.05$) of the other runs. The increased proportion of blackberry pulp solids: encapsulating agents resulted in increased yield of blackberry pulp drying process and and less hygroscopic powders. On the other hand, this variable had a significant influence on decrease of anthocyanins content and ascorbic acid. Runs 3 and 7 were the ones which showed the highest anthocyanins contents (~70 mg/100g de powder) and the most preserved color parameters in relation of fresh blackberry, when compared to powders of other tests (Fig 1). Drying air temperature and proportion of blackberry pulp solids: encapsulating agents presented no significant influence on moisture content, C* and h° color parameters and antioxidant capacity for blackberry pulp powders.

Figure 1. Blackberry powders microencapsulated for the experimental design



Conclusions

The independent variables showed significant effects on the respective responses: drying process yield, water activity, hygroscopicity, ascorbic acid content, color and anthocyanins content.

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[1] Wang, S.Y.; Lin, H. S. Journal of Agricultural and Food Chemistry, **2000**, 48. 140-146.

[2] Silva, G.J.F.; Constant, P.B.L.; Figueiredo, R.W.; Moura, S. M. Alim. Nutr., Araraquara, **2010**, 21, 3, 429-436.

[3] Shahidi, F.; Han, X. Q.Food Science and Nutrition, 1993, 33, 6,501-547.