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Assessing the effects of spray-drying and freeze-drying on the functional compounds recovery and physical properties of Braziling ginseng powders

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Abstract
Brazilian ginseng (Pfaffia glomerata) is a native plant from Brazil traditionally used in folk medicine to treat several diseases, as nutritional supplement for athletes. Its properties are associated to the steroid beta-ecdysone present in the Brazilian ginseng roots. Recently, inulin-type polysaccharides, also named fructooligosaccharides (FOS) were found in Brazilian ginseng, which are considered prebiotic compounds. The aim of this study was to evaluate the preservation of functional compounds in the powdered Brazilian ginseng extract and to characterize its physical properties.The results showed that the beta-ecdysone and FOS contents of Brazilian ginseng powders were preserved after the drying processes and the physical properties of powders enables its use as instant tea or functional ingredient.

Key words:
Functional food, prebiotic, Brazilian ginseng

Introduction

Functional foods are foods or nutrients whose ingestion leads to important physiological changes in the body that are separate and distinct from those associated whit their role as nutrients (FDA, 2004). Brazilian ginseng roots (BGR) contain the steroid beta-ecdysone, which is the main compound related to its bioactive properties. Recently, inulin-type polysaccharides, also named fructooligosaccharides (FOS) were found in Brazilian ginseng, which are considered prebiotic compounds. In light of the important functional properties of BGR, it can be explored as matrix to develop functional beverages, as pure instant tea or mixed with other extracts and even as a functional ingredient to be added in food products.

Results and Discussion

Brazilian ginseng (BGR) powder yield obtained by spray-drying (SD) and freeze-drying (FD) processes was 45 ± 1% and 95 ± 7%, respectively. Beta-ecdysone and FOS contents of the BGR powders were not affected by the both SD and FD processes (Table 1).

Table 1: Beta-ecdysone and FOS content (g/ 100 g extract) of BGR powder before and after spray-drying (SD) and freeze-drying (FD).

	Before drying	SD	FD
Beta-ecdysone	0.9 ± 0.1	1.0 ± 0.2	1.1 ± 0.2
Total FOS	19 ± 3	19± 1	19± 1
GF2	5 ± 1	4.70 ± 0.03	4.65 ± 0.04
GF3	6 ± 2	6.3 ± 0.1	6.1 ± 0.1
GF4	8 ± 2	8.3 ± 0.3	7.8 ± 0.4

FD is well known as a protective drying method able to preserve even thermosensitive compounds due to the low temperatures applied during the process, while SD commonly causes a reduction on the bioactive compounds content, such as volatile compounds found in teas, due to the high temperatures used. However, the results obtained in this study suggested that the bioactive compounds present in the BGR extract were stable at 180 °C used during the SD process (Nadeem et al., 2011).

The physical properties of the BGR powders are shown in Table 2. The drying processes did not affect the physical properties of the BGR powders, excepted the water activity and wettability. The moisture content of the BGR powders (around 3%) is well within the moisture level of <5%, which is needed for good stability and effective packaging and storage of powders (Sinija & Mishra, 2008). The other parameters evaluated were in agreement with those reported in literature for dried powders.

Table 2: Characterization of BGR powder produced using spray-drying (SD) and freeze-drying (FD) processes.

	SD	FD
Moisture content (%)	3.2 ± 0.5	3 ± 1
Water activity	0.43 ± 0.02	0.35 ± 0.04
Hygroscopicity (%)	15.3 ± 0.5	15 ± 2
Wettability (s)	150 ± 25	66 ± 5
Solubility (%)	89 ± 7	90 ± 7

Conclusions

The results showed that the BGR functional properties were not affected by the drying processes (SD and FD) used. BGR powders can be used to prepare instant teas or as functional ingredient to add prebiotic functionality to food products.

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