

Stabilization of a functional refreshment from mango nectar and yacon (*Smallanthus sonchifolius*) through spray drying encapsulation

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ABSTRACT:

Background: Yacon syrup (YS) may be implemented as a functional sweetener because of its concentration of fructooligosaccharides (FOS), sugars resistant to enzymatic hydrolysis in the human digestive tract. Additionally, health benefits related to the consumption of FOS have been reported, such as preventing constipation and reducing blood sugar and lipid levels in diabetic patients. Yacon is a tuber from South American Andes region, and its nutraceutical effects have been researched.

Objective: The effect of YS as sweetener in a Mango Nectar (MN) stabilized through SD and encapsulated with maltodextrin and Arabic gum (AG) was evaluated as a natural and alternative beverage for diabetic patients.

Methods: A sequential experimental design was used. Firstly, mangoes were characterized into 3 ripening stages, evaluating pH, TSS, WC, WA, and TTA. Then, 4 formulations of MN with YS with concentrations of 33.3, 66.6, and 99.9% yacon-to-juice ratio were evaluated according to the quantity of TSS, which were analyzed over the acceptance of untrained judges. Later on, the formulation with the best acceptance was chosen and evaluated based on the performance of the encapsulation of components through SD using maltodextrin and AG with a 30% concentration and tricalcium phosphate (TP) with a 0.15% concentration. Lastly, the encapsulation process with maltodextrin with a 30% concentration was analyzed at temperatures of 100, 105, 110, and 130°C over the rehydration, evaluating WA, TSS, and Vitamin C.

Results: The mango with 12°Brix was selected for the formulation. The YS addition to MN generated significant differences ($p < 0.001$) in the flavor because of the concentration, with the addition of a 33.3% enhancing the flavor. As a result, the 33.3% concentration was selected for further testing. The final stage showed significant differences in the performance of the process, WA, TTA, TSS, and Vitamin C. Similar results were obtained regarding these components after

the rehydration of the MN 5 days after storage. The retrieval of Vitamin C was not affected by the temperature, suggesting a favorable encapsulation.

Conclusion: The YS represents a potential nutraceutical sweetener, which may be used with concentrations around 33.3% over Tommy MN. The process of encapsulation through SD generates a product that is stable in storage and easily reconstructed.

Key words: fructooligosaccharides, inulin, micro-encapsulation, spray drying, yacon