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Influence of pectin-whey protein complexes and **surfactant** on the yield and microstructural properties of date powder produced by spray drying

Running title: Date powder production with the aid of biopolymers

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Abstract

Date powder is a promising choice for replacement of white sugar in food formulation, especially due to its natural nutritious substances. In this research, for the first time, the impact of biopolymer complexes on microstructural properties of date powder was studied. So, effects of different concentrations of whey protein concentrate (WPC), pectin, and Tween 80 as well as pH values and temperatures on properties of date powder obtained by spray drying were surveyed through Taguchi approach. Drying yield and color of date powders were measured and microstructural characteristics of date powder were assessed by Fourier transform infrared, differential scanning calorimetry, and scanning electronic microscopy to detect critical changes, e.g. new emerging bonds, ascribed to different drying variables. High drying yield of 70% was achieved when WPC maximized and pH value kept at 5.0. Fourier transform infrared analysis revealed that the temperature of 170°C and WPC level of 10% played crucial role in obtaining distinctive structure and hydrogen bonds between pectin and WPC of date powder. While glass transition temperatures of date powders were varied between **32.5 and 55.8°C**, higher glass transition temperatures seemed to be due to thermal shields caused by either film formation of WPC (in some treatments) or more protein-polysaccharide complex formation (in other treatments). **Considering all parameters, 1% surfactant, 5% pectin, 10% WPC at drying temperature of 170°C and pH value of 8.5 were determined as optimum values.**

Keywords: Date powder; **Spray drying**; Taguchi design; Biopolymer complexes.

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