Purple cactus pear fruit could have a double application, as a natural colorant due to its betalains content, and as an antioxidant providing health benefits. The aim was to compare the effect of Capsul and K4484 as encapsulating agents for purple cactus pear pulp on the microencapsulation efficiency (ME), the recovery percentage (RP) of betalains and polyphenols, and the yield. The microencapsulation was carried out by spray drying using a Büchi 290 dryer. A $2^2$ central composite design + star was used considering as independent variables the pulp/encapsulating agent (EA) ratio (1:1-5:1) and the drying temperatures (120 to 210°C) (12 experiments). The EA were Capsul and K4484. In RSM the desirability function was used to optimize multiple responses. The selected response variables corresponded to those with a higher R-squared statistic, being for Capsul systems, the ME and RP of betacyanins, ME of polyphenols and yield and for K4484 systems, the ME of betaxanthins, RP of polyphenols and yield. The optimized variables for the drying process were found to be for microparticles with Capsul 2:1 and 133°C and for K4484 2.3:1 and 219°C. The microparticles obtained under optimal conditions with Capsul showed 100% of betalains and polyphenols ME; 54% betacyanins, 71% betaxanthins and 117% polyphenols of RP and 10.5% of yield. Whereas, those with K4484 showed: 100% of betacyanins and polyphenols ME; 98% of betaxanthin, 65% betacyanins, 79% betaxanthins and 140% polyphenols of RP and 6.4% of yield. These results showed that although RP was better with K4484, the yield reached higher values with Capsul.

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