Use of the adsorption and coating techniques to increase the load of polyphenols from pomegranate extract encapsulated by ionotropic gelation

SILVEIRA M. (1), ALMEIDA F. (1), ALVIM I. (2), PRATA A. (1)
1 UNICAMP, Campinas, Brazil
2 ITAL, Campinas, Brazil

The instability of polyphenols under certain processing conditions such pH and temperature or presence of oxygen and metal ions impacts their functionality and nutritional value and represents the greater challenge for their application in food matrices. In this work, ionotropic gelation was employed to produce beads of pectin (P) for encapsulation of pomegranate extract (PE), aiming to improve its stability, retention and to control its release. Several strategies were tested to improve the retention of the hydrophilic extract: the addition of starch (PS) as a filler - mixtures of P and (PS) were realized in previously defined combinations, two methodologies for PE entrapment: the mixture of PE with the biopolymer solution (L) before produce the beads, and by adsorption (AD) of PE into blank pectin-starch beads, and finally, the complexation of the bead's surface by chitosan (1% w/w). The total phenolic content (TPC) and release percentage in water were evaluated as indicators of retention. The L-beads showed TPC about 3 times lower (P: 923.09 ± 29.90 and PS: 994.23 ± 34.80 mg of gallic acid equivalent/100g sample) than AD beads (P: 2541.69 ± 74.77 and PS: 2960 ± 26.92mg of gallic acid equivalent/100g sample). In the coating process, there was a loss of phenolics in the chitosan solution and the TPC of all particles was reduced by about 30-40% for both formulations. But the coating helped to reduce the release from PS beads. A reduction of about 8 and 20% was observed for L-beads (72.99% ± 2.65 to 66.90% ± 3.28) and for AD beads (84.81% ± 6.58 to 68.57 ± 4.89), respectively. However, P beads showed a higher percentage of release when coated. In general, the starch favored greater retention of phenolics and the coating provided a reduction in the release rate for these formulations. New tests with process adjustments during the coating can minimize losses, making the encapsulation technique studied viable for the production of foods enriched with polyphenols.