F.11. MULTIVARIATE ANALYSIS OF PHYSICOCHEMICAL AND ANTIOXIDANT PROPERTIES OF ENCAPSULATED JOSTABERRY EXTRACT

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Abstract. Bioactive compounds in biopolymer matrices exhibit an emerging process that enhances stability and protects sensitive components from adverse environmental conditions, while ensuring controlled release of bioactive compounds. Encapsulation of josta extracts in wall materials, such as polysaccharides, can enhance physicochemical stability and preserve the biological potential and antioxidant activity of phytochemicals, while improving handling and storage. The aim of this study was to apply principal component analysis (PCA) and Person correlation (r) to determine the relationship between samples of microparticles from josta extract using combinations of biocompatible carrier agents: maltodextrin-nutrose (resistant dextrin)-pectin (MNPJ) and maltodextrin-nutrose-sodium alginate (MNAJ) and quality attributes, such as biological value, antioxidant potential, physicochemical properties and color parameters, during lyophilization and dark storage (12 months, $MNPJ_{12}$ and $MNAJ_{12}$) under ambient conditions. The first two principal components, PC1 and PC2, accounted for 88.0% and 11.5% of the total variance, respectively. It was highlighted that some parameters are closely associated, presenting extremely significant correlations ($p < 0.05$), such as: total soluble solids and hygroscopicity, solubility, oil holding capacity, titratable acidity, fat content ($r = 1.00$); hue angle and red-green component ($r = 0.97$), chroma ($r = 0.94$); pH and luminosity ($r = 0.98$), ash content ($r = 0.94$), moisture content ($r = 0.92$), bulk density and yellow-blue component ($r = 0.99$). PC1 was closely

associated with total soluble solids, oil holding capacity, titratable acidity, hygroscopicity, solubility, fat content, chroma, red-green component, brightness, pH, ash content, while PC2 was closely associated with bulk density, yellow-blue component, moisture content and hue angle. According to the PCA plot, depending on the biopolymer matrix and the storage time of the microparticles, the closest to each other are: MNPJ and $MNPJ_{12}$, which are located in the center, on the left of the plot, MNAJ and $MNAJ_{12}$ are also positioned in the center, but on the right of the PCA. Both PCA components distinguish MNPJ and $MNPJ_{12}$ from MNAJ and $MNAJ_{12}$, indicating an inverse correlation between microcapsules having different biopolymer matrix. The first component PC1 distinguishes MNPJ, $MNPJ_{12}$ from MNAJ, $MNAJ_{12}$, while the second component PC2 distinguishes MNPJ, MNAJ from the microcapsules $MNPJ_{12}$, $MNAJ_{12}$. Regarding the correlations of the microcapsules with the analyzed characteristics, it seems that MNPJ and $MNPJ_{12}$ are rather related to hygroscopicity, solubility, fat content, titratable acidity, oil holding capacity, total soluble solids, moisture content, red-green component, chroma, hue angle; MNAJ and $MNAJ_{12}$ are related to pH, moisture content, brightness and ash content. The yellow-blue component and bulk density are eliminated from all the analyzed samples. The microencapsulation of jostaberry phytochemicals represents an effective strategy for preserving the antioxidant potential of BACs during processing and storage.

Keywords: principal component analysis, maltodextrin-nutrose (resistant dextrin)-pectin, maltodextrin-nutrose-sodium alginate, jostaberry extract.

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