

Feasibility of Hemp Seed Oil Oleogels Structured with Natural Wax as Solid Fat Replacement in Margarine

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Abstract

Cold-pressed hempseed oil (HSO) is known to have many health benefits due to many phytochemicals and high polyunsaturated fatty acids content. In this study, HSO oleogels were prepared with 3, 5, and 7% natural waxes including sunflower wax (SW), rice bran wax (RBW), beeswax, and candelilla wax to evaluate their potential as solid fat replacements in margarines and spreads. Firmness, crystal structures, and melting properties of these oleogels were evaluated. In general, wax-based HSO oleogels except for RBW-HSO oleogels had lower firmness and weaker crystal network than the corresponding soybean oil (SBO) oleogels. In contrast, RBW-HSO oleogels had similar firmness, comparable or stronger crystal network, and higher melting and crystallization enthalpies compared to those of SBO oleogels. After removing polar compounds from HSO, waxes except for RBW provided oleogels with greater firmness, higher melting and crystallization enthalpies, and stronger crystal network. Therefore, it was concluded that polar compounds negatively affected the physical properties of wax-HSO oleogels but not those of RBW-HSO oleogels. Margarine samples were prepared with SW- and RBW-HSO oleogels, and their firmness and melting properties were examined. The firmness of these margarines indicated that wax-HSO oleogels may achieve the firmness of commercial spreads with less than 3% wax while the firmness of stick margarines cannot be achieved even with 7% wax. Although the properties of wax-HSO oleogels should be further improved, they showed potential as solid fat replacements in margarines and spreads.

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