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Wax-based oleogels in cookies: a promising strategy for replacing conventional solid fats

Oleogelurile pe bază de ceară în biscuiți: o strategie promițătoare pentru înlocuirea grăsimilor solide convenționale

Replacing conventional solid fats in cookies is one of the most practical ways to reduce saturated and trans fats in bakery products without compromising processability or eating quality. Unlike highly aerated or laminated systems, cookies tolerate moderate changes in the lipid phase, making them an effective model for evaluating wax-based oleogels as functional fat replacers. Current evidence shows that oleogels structured with beeswax, sunflower wax, rice bran wax, and carnauba wax can transform liquid oils into semi-solid systems with strong oil-binding capacity while markedly improving the nutritional profile of the final product. Their main advantage is lipid reformulation. In wax-structured systems based on unsaturated oils, unsaturated fatty acids can reach about 89–92%, while saturated fatty acids decrease to 8.5–10.2%, compared with conventional shortening systems containing about 47.2% unsaturated and 52.8% saturated fatty acids.

At the same time, cookie functionality can be preserved when the crystal network is properly optimized. In shortening-based comparisons, sunflower wax and beeswax oleogels produced softer cookies than the control, with hardness values of 31.85 and 36.89 versus 47.12, while maintaining equal or better sensory acceptance. In margarine-based comparisons, wax–oil oleogels showed no significant textural disadvantage. In butter-based systems, full replacement with a sunflower oil–carnauba wax oleogel produced nearly identical hardness (15.12 vs 14.91 N), although slight oil exudation during storage may still occur. Overall, wax-based oleogels are especially promising in cookies because they combine nutritional improvement with technological performance. The next step is a controlled comparative study of beeswax-, sunflower wax-, rice bran wax-, and carnauba wax-based oleogels versus shortening, margarine, and butter, focusing on dough rheology, spread ratio, hardness, oil migration, oxidative stability, and sensory acceptance.

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