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Oxidative and interfacial behavior of native oil bodies from walnut

Jeanne Kergomard^{1,2}, Véronique Vié², Gilles Paboeuf², Nathalie Barouh¹, Bruno Barea¹, Pierre Villeneuve¹, Olivier Schaffer³, Timothy Wooster³, Claire Bourlieu^{1*}

¹ INRA-CIRAD Montpellier 1253 IATE, France; ² IPR Institute of Physics, Rennes University 1, France; ³ NRC, Lausanne, NESTLE, Switzerland

ABSTRACT: Oil bodies (OB) are the natural form of storage of triglycerides (TG) in seeds. OB consists in a TG core stabilized by a phospholipid and proteins (oleosins) monolayer membrane. Some oleoproteaginous seeds, such as walnut, contain high levels of polyunsaturated fatty acids (PUFA) and yet remain quite stable to oxidation over storage and present nutritional interest. Moreover, the trend towards vegetal-based food products has renewed the interest for preserving and understanding the functionalities of OB. In this context, the objective of our study was to elucidate walnut OB's oxidative behavior and its interfacial reactivity. Walnut OB were characterized either included in a complex matrix (*i.e.* under the form of walnuts "milk") or isolated (*i.e.* under the form of aqueous dispersion). The walnut OB oxidation was investigated by setting up accelerated storage tests (PV, TBARS). Biophysical tools (tensiometry, ellipsometry, atomic force microscopy...) were used to characterize the interfacial behavior of native dispersed OB in comparison with oxidized OB. It was established that walnuts OB were stable to oxidation on the short term (few days). This phenomenon is related to the "assembly effect" of OB and to their unsaponifiable content. The stability of lipid dispersion was higher under "milk" form due to a complex "matrix effect". Interfacial adsorption of objects was marked by OB unfolding and protein-TG domains formation. Oxidation phenomenon modified the physical integrity of the objects, which resulted in a different interfacial organization. Altogether, this study unveiled the interesting stability of OB and their specific interfacial reactivity opening the way to interesting food applications of these natural lipoproteic assemblies.

KEYWORDS: walnut, vegetal, oil bodies, oxidation, interfacial behaviour