

## Spinach Lipid Extract as an Alternative Flow Aid for Fat Suspensions

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**Abstract :** Chocolate is a material composite with a high fraction of solid particles dispersed in a fat phase largely composed of cocoa butter. Viscosity properties of chocolate can be manipulated by the amount of fat - increased levels of fat lead to lower viscosity. However, a high content of cocoa butter can increase the cost of the chocolate and instead surfactants are used to manipulate viscosity behaviour. Most commonly, lecithin and polyglycerol polyricinoleate (PGPR) are used. Lecithin is a natural lipid emulsifier which is based on phospholipids while PGPR is a chemically produced emulsifier which based on the long continuous chain of ricinoleic acid. Lecithin and PGPR act to lower the viscosity and yield stress, respectively. Recently, natural lipid emulsifiers based on galactolipid as the functional ingredient have become of interest. Spinach lipid is found to have a high amount of galactolipid, specifically MGDG and DGDG. The aim of this research is to explore the influence of spinach lipid in comparison with PGPR and lecithin on the rheological properties of sugar/oil suspensions which serve as chocolate model system. For that purpose, icing sugar was dispersed from 40%, 45% and 50% (w/w) in oil which has spinach lipid at concentrations from 0.1 - 0.7% (w/w). Based on viscosity at 40 s<sup>-1</sup> and yield value reported as shear stress measured at 5 s<sup>-1</sup>, it was found that spinach lipid shows viscosity reducing and yield stress lowering effects comparable to lecithin and PGPR, respectively. This characteristic of spinach lipid demonstrates great potential for it to act as single natural lipid emulsifier in chocolate.

**Keywords :** chocolate viscosity, lecithin, polyglycerol polyricinoleate (PGPR), spinach lipid

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