

# **Role of protein and ferulic acid in the emulsification properties of sugar beet pectin**

## **Abstract**

The ability of sugar beet pectin to stabilize 20% w/w limonene oil-in-water emulsions has been investigated. The size of the oil droplets as determined by laser diffraction measurements decreased from about 15  $\mu\text{m}$  to about 6  $\mu\text{m}$  when the pectin concentration increased from 0.05% to 2% w/w but leveled off thereafter, suggesting complete coverage of the oil droplets by the polymer at this optimum concentration. Isotherms for the adsorption of pectin, protein, and ferulic acid were constructed. The adsorption capacities at the oil–water interface of  $\sim 1.4$  and  $\sim 0.2$   $\text{mg}/\text{m}^2$  for protein and ferulic acid, respectively, compared to  $\sim 9.5$   $\text{mg}/\text{m}^2$  for pectin revealed that the adsorbed fractions of the pectin sample were rich in protein (14.7%) and ferulic acid (2.1%) given that there were only 2.7% protein and 1.06% ferulic acid present in the whole pectin sample. Direct measurements on the adsorbed fraction recovered from the oil droplets via desorption with SDS confirmed that it contained 11.1% protein and 2.16% ferulic acid. The results suggest that one or both of these two functional groups adsorb onto the surface of the oil droplets and stabilize the emulsions. High molecular mass fractions adsorbed preferentially onto oil droplets during emulsification. As compared to those made with gum arabic, the emulsion samples made with sugar beet pectin samples exhibited similar (or even slightly higher) stability.