MRI-Food (UR OPAALE, IRSTEA) is a multidisciplinary research team focused on the development and applications of Nuclear Magnetic Resonance (NMR) relaxometry and imaging (MRI) methods for the characterisation of structure and processing of bio-products. The research team has an expertise in NMR and MRI applied to horticulture products.

TITLE: Water status in plant tissues measured by MRI

ABSTRACT: Spatially resolved measurements of multi-exponential transversal relaxation time spectra by MRI make it possible to provide quantitative data about water status and distribution in cell compartments in intact fruit tissues. However, the influence of water content on relaxation parameters is not completely explained, as relaxation times depend on water content and also on diffusive exchanges of water molecules between cell compartments through semi-permeable membrane. Consequently, to date, there is no quantitative method allowing estimation of the water content and the amount of water in different cell compartments of plant tissues. The objective of this thesis is to study both the effects of water content and diffusional exchanges of water molecules between cell compartments on the relaxation parameters in order to allow measurements of water content by MRI. Water content and status of fruit tissues will be varied by subjecting fruits to different drying conditions. Multi-exponential relaxation times corresponding to cell compartments and the apparent diffusion coefficient will be measured on intact fruits by MRI.

The experimental part of the project will be mainly performed on 1.5 T Siemens MRI system. A 4.7 T Bruker MRI system will potentially also be used.

The candidate should be physicist or engineer. A Master's degree or equivalent is required.

Thesis supervisors: Maja Musse and François Mariette

The application, consisting of the letter of motivation and the CV can be sent by e-mail to maja.musse@irstea.fr