

# Magnetic resonance is used to evaluate food quality

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The device performs physical and chemical analyses of fruit, grains, olive oil, milk and meat, among other products. Credit: Fine Instrument Technology

The applications and benefits of nuclear magnetic resonance (NMR) in medicine are well known, but the technology is also used in other areas, such as agribusiness, where its applications include quality analysis of seeds and other products of animal and plant origin. NMR has recently reached the retail commerce sector, where it expedites the assessment of meat and fruit quality by supermarkets.

Fine Instrument Technology (FIT), a Brazilian company based in São

Carlos (São Paulo State, Brazil), has developed a low-field NMR [device](#) that takes a few seconds to perform chemical and physical analyses of fruit, grains, olive oil, milk and meat, among other products. "The technology is different from that used in NMR devices for medical applications," says Daniel Consalter, one of FIT's managing partners.

The device, called SpecFIT, uses low-field NMR and does not produce images. It measures the sugar content of fruit, for example, in terms of the fade duration of an incident radio frequency pulse, which is then compared digitally with information in a database that translates the measurement into the chemical composition of the product.

The Magnetic Resonance Laboratory at Embrapa Instrumentation, a partner organization, supplied the "template" for evaluation of food products. The same technology can be used to analyze beef in terms of fat content, moisture, tenderness, flavor and succulence. In 2014, the company obtained funding from the São Paulo Research Foundation (FAPESP) Small Business Innovative Research Program (PIPE) to develop a small-scale NMR spectroscopy and imaging system mainly to supply research institutions. The first version was launched in 2015.

FIT is developing low-cost transportable commercial equipment for physical and chemical analyses of agricultural and [food products](#). The project is in progress with André de Souza Carvalho and Embrapa's Luiz Alberto Colnago as co-principal investigators. The outcome will be the SpecFIT Food system, scheduled for launch at the end of 2017. The system will consist of a low-field NMR device with an antenna or probe, a radio transceiver, and a computer.

The NMR device sends a radio signal to the sample. The signal is captured by an antenna inserted into the sample, producing a radio signal that is digitized, analyzed and converted into product quality information. "The faster the signal from a piece of fruit disappears, the

sweeter it must be, since signal fade is proportional to the viscosity of the water in the fruit, which in turn depends on the amount of sugar," Colnago explains.

FIT used the same technology in developing a device that analyzes the oil content of dende palm and seeds without having to dehydrate them first. "In the conventional approach, the measurement of oil content in samples requires an extraction method that can take up to 48 hours and entails the use of solvents and heat. With the new [technology](#), the entire procedure takes no more than three minutes, including sampling, weighing and measuring," Consalter says.

Provided by FAPESP

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