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Non-invasive imaging of lipid in plants and seeds

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Humans experience and visually explore their environment in three dimensions (3-D). New technological developments in field of nuclear magnetic resonance imaging (MRI) have allowed this natural 3-D approach to be implemented in lipid research. The success of MRI relies on its unique capability to capture chemical, structural or dynamic parameters while being a non-invasive technology. This gives MRI the potential to monitor physiological processes occurring in living organisms. We explain how MRI-tools can be applied for visualization of lipid distribution in living plant/seed and describe the associated advantages and challenges of various analytical modes. Various lipid maps and 3-D models of seeds and fruits are included (animated images) to exemplify recent cutting-edge advances in the field. The importance and prospects of the imaging of lipids in living plants, as well as the integration of lipid imaging with other emerging techniques, are outlined to provide an impetus for future research in the area. Unfortunately NMR/MRI use in daily practice is, in contrast to those in the medical field, still limited. Understanding the problems and solving some of the issues will enable MRI to become a tool in plant science that is as effective and popular as desired. A road map is provided for what should ideally be done next and which problems should be solved. We believe that MRI developments in different fields of plant science will drive the emergence of new applications in lipid research that are still somewhat unpredictable.

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Effects of temperature and packaging materials on the oxidative properties of palm oil during storage

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Changes in oxidative properties and storage stability of palm oil stored in three packaging materials under three storage conditions were evaluated. Freshly produced palm oil was filled into metal cans, white plastics, glass bottles and stored in direct sunlight (35±1°C), closed cupboard (27±1 °C) and refrigerator (5±1 °C) for 120 days. Oxidative properties, such as peroxide value, acid value, iodine value, saponification value and free fatty acid content were determined at monthly intervals. The iodine values decreased from 10.93 g/g to an average of 0.02 g/g for metal can, white plastic and glass bottle. The peroxide values slightly increased from 0.61 to 6.17 meq/kg, 3.12 meq/kg and 3.91 meq/kg in the metal can, white plastic and glass bottle respectively. Acid values increased from 9.92 mg/KOH/g to 88.48 mg/KOH/g, 31.54 mg/KOH/g and 75.84 mg/KOH/g for the same packaging material. Free fatty acid increased from 4.96% to 44.24%, 15.77% and 37.92% palmitic acid. Saponification values increased from 10.21 to 105.10 mg/g and 36.05 mg/g. Iodine values decreased from 10.93 to 1.04 g/g, 3.09 g/g, 1.95 g/g for metal can, white plastic and glass bottle respectively. Most of the samples stored inside the closed wooden cupboard (27±1 °C) were in fairly good condition, while the samples stored in the refrigerator were still wholesome for consumption at the end of the 120 days storage. Hence palm oil was best preserved in white plastic container under refrigerating condition of storage.

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