

This thesis presents the applications of NMR spectroscopy in the area of metabolomics. NMR-based metabolomics, in conjunction with chemometric analysis have been used in this thesis on a variety of biological samples to emphasize the versatility and practical applicability of NMR-based metabolomics. The first study attempts to identify correlations between obesity and diabetes by analyzing serum samples from obese and diabetic human subjects. The next few studies signify the applications of NMR-based metabolomics in the area of plant science. The studies include analysis of different aspects of plant physiology including plant response to different stresses (chemical and mechanical), metabolite cycling due to circadian rhythm and metabolite profiling for the identification of medicinally significant plant secondary metabolites. The thesis finally showcases the role played by NMR-based metabolomics in understanding different aspects of insect physiology including evolution of insect immune response and dispersion and the ability of insects to sequester cytotoxic compounds in their body parts. The thesis also shows the potential of NMR- based methods for identifying adulteration in herbal medicines, thereby suggesting its utility in industrial quality control methods. The thesis has been organized into nine chapters, which are briefly described below