



The College of Graduate Studies and the College of Food and Agriculture
Cordially Invite You to a

PhD Dissertation Defense

Entitled

DATE FRUIT FIBER VARIABILITY IN COMPOSITION, TISSUE DISTRIBUTION AND CONTRIBUTION TO
HARDNESS OF DATE FRUITS (*Phoenix dactylifera* L.)

by

Navomy George

Faculty Advisor

Dr. Afaf Kamal-Eldin, Department of Food Science
College of Food and Agriculture

Date & Venue

11:00 AM

Thursday, 15 April 2021

Access Link: https://teams.microsoft.com/l/meetup-join/19%3ameeting_YzRkMmNkZTUtYWYyNi00YmU4LTk2ZTgtMjM5YWJiNDJhYzcx%40thread.v2/0?context=%7b%22Tid%22%3a%2297a92b04-4c87-4341-9b08-d8051ef8dce2%22%2c%22Oid%22%3a%2288964e2d-df04-4e71-95bb-d9f5ed9b99ba%22%7d

Abstract

Date fruit (*Phoenix dactylifera* L.) is a major desert crop and is an integral part of the United Arab Emirates. This study is on the various aspects of dietary fiber of ten Emirati date varieties. The main objective of this dissertation is to analyze the content and composition of mature date fruits and to study their microstructure. The aspects of biomineralization with particular importance to silica phytoliths and lignification are also studied. Finally, the date fruit dietary composition and microstructure are related to the textural attributes of the fruit. Uppsala method of dietary fiber analysis (AOAC 994.13) is used to analyze the dietary fiber content and composition, along with Fourier transforms infrared spectroscopy. Light and scanning electron microscopic (SEM) methods are used to study the fruit microstructure, depositions of phytoliths (plant silica), and calcium oxalate crystals. Lignification and silicification pattern in various fruit tissues are observed by staining techniques and SEM. Finally, the date fruit fiber content and microstructure are correlated with date fruit texture. The total dietary fiber content in the date fruits analyzed is in the range of 5.2%–8.3%. Lignin is the major determinant of dietary fiber content in dates. Softer fruits contained lower levels of lignin, whereas increased lignin content was observed in harder fruit varieties. The light and SEM work revealed the heterogeneity and complexity in the silica phytoliths and the lignified structures in date fruits. Apart from their independent existence in the fruit tissue, a small proportion of lignin and silica seemed to co-exist as partners in the spiral coils of the tracheid phytoliths. Lignin, arabinoxylan, galactomannan, and pectin were found to correlate significantly with fruit hardness.

Keywords: Date fruit, *Phoenix dactylifera*, dietary fiber components, lignin, texture, microstructure, silica, xylem vessels, sclereids, phytoliths.