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

Master Thesis Defense

Entitled

BIOCHEMICAL CHARACTERIZATION OF DATE PALM (PHOENIX DACTYLIFERA L) SEEDS MAINTAINED AT MICRO GRAVITY IN OUTER SPACE (ISS)

By

Shamma AlDhaheri

Faculty Advisor

Dr. Shyam Kurup , Integrative Agriculture Department

College of Agriculture and Veterinary Medicine

Data &Venue

12 June 2023

Building F3, Room #21

2 pm – 4 pm

Abstract

The UAE's vision to reach space dates back to 1976, when Sheikh Zayed bin sultan Al Nahyan met with the NASA Apollo group, which was the first attempt to put the UAE in space science. Now UAE is one of the top countries executing space missions and research. The current research focuses on the biochemical characterization of date palm seeds maintained at microgravity in outer space (ISS). The research methodology involves biochemical analysis of seeds maintained at two different environmental conditions, viz., microgravity and gravity. Ninety seeds were sent to ISS with 10-15 seeds each of the following varieties: Lulu, Navadoor, Majdool, Sukari, Mesalli andNabtat Saif through the space vehicle launched by NASA, USA. Copies of the same seeds from the above varieties were maintained at zero gravity for accurate comparison in analysis. The seeds sent to ISS were maintained at micro gravity situation for a period of six months, while the other group was maintained under normal gravity on the earth'ssurface. Germination studies showed loss of viability in the microgravity seeds while seeds stored at gravity commenced germination on the 7th day in the germination mediawith 100% germination. Biochemical analysis showed significant changes in protein content in microgravity seeds compared to gravity seeds, where a significant decrease in protein content was recorded. In our experiment, CAT activity was at the same level in both microgravity and gravity seeds, with no significant differences between the seeds from different environments. In the case of proline content in Mesalli seeds under gravity was significantly high in comparison to Lulu and Majdool verities. It was interesting to note that the space exposed seeds of all the varieties showed a significant decrease in proline content. With respect to α-amylase activity in Lulu seeds under gravity situation, the activity was significantly high in comparison to Majdool and Mesalli. However, in the space-traveled seeds in all the varieties, there was nosignificant reduction in α-amylase activity. Space farming is a big step forward in accomplishing food security, and in that context, the current research assumes greater significance. This research throws light on the fate of different metabolites under microgravity conditions in monocot species like the date palm and how best it can be suitably regulated in subsequent space missions to retain viability.

Keywords: Date palm, ISS, chemicals, gravity, microgravity, protein, enzymes,proline.