

Optimization of slow-drying conditions for improving short-term storage of cacao (theobroma cacao) seeds

ABSTRACT

The specific condition with slow-drying mechanisms of cacao seeds may prove to be a possible break through in improving the short-term storage of this recalcitrant species. This study aimed to evaluate the effect of storage conditions on the changes of physiological, microstructural and soluble sugars associated with slow-drying mechanisms in cacao seeds. Seeds from ripened cacao pods (PBC 123) were demucilaged, placed in zip-lock polyethylene bags and stored at 14 and 16EC (40 and 80% RH), RT (25EC) and control (freshly extracted seeds). In this study, seeds at RT and 16EC, 40% RH showed a similar germination percentage as the control. Thus, it shall be convenient for the storability up to 12 days. The SEM micrographs proved that the mild dehydration in seeds of both treatments caused the least cells' morphological changes, which leads to lesser cell damage. However, seeds at RT reduced their storability due to 8-10% of germination occurrence during storage. Along with the results, seeds of both treatments maintained much lesser soluble sugars. The higher soluble sugars at the first 4 days after storage for seeds at 16EC, 40% RH than RT, reflected the negative feedback through the altered metabolisms during storage. Lesser respiration rate with more efficiency in utilizing seed reserves further leads to higher seedling performances for both treatments. This study recommended 16EC, 40% RH as the alternative storage condition for cacao seeds in at least 12 days due to their storability, least cells' damages and altered metabolisms.