

Mechanisms of Seed Ageing in Coffee

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SUMMARY

The biochemical and physiological basis of the intermediate seed storage behaviour was examined by investigating the effects of equilibrium drying under relative humidities (RH) of 9-81% and of storage at 20 or 5 °C on coffee seed viability and antioxidant, lipid and sugar status. Slow drying induced a significant decrease in the concentrations of the pools of two major antioxidants, glutathione and ascorbate, and an increase in the free fatty acid (FFA) content of seeds, independent of the RH employed. Seeds stored at 81% RH and 20 °C lost their viability very rapidly and showed an extensive loss and oxidation of antioxidants, an accumulation of FFA, and a selective loss of phospholipids, in particular phosphatidylethanolamine (PE). Interestingly the changes in PE content were not due to fatty acid de-esterification and the increase in FFA levels resulted from neutral lipid hydrolysis. Decreasing the storage temperature to 5 °C considerably slowed both the loss of seed viability, the level of oxidative stress as well as the rates of lipid hydrolysis. After 1 year under 45% RH/5 °C, the loss of seed viability (40%) was found to be due to imbibitional damage and could be circumvented by pre-humidifying or pre-heating seeds before sowing.