Effects of developmental status and dehydration rate on characteristics of water and desiccation-sensitivity in recalcitrant seeds of *Camellia sinensis*

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Abstract

The effect of rate of dehydration was assessed for embryonic axes from mature seeds of *Camellia sinensis* and the desiccation sensitivity of axes of different developmental stages was estimated using electrolyte leakage. Rapidly (flash) dried excised axes suffered desiccation damage at lower water contents (0.4 g H_2O (g DW)$^{-1}$) than axes dried more slowly in the whole seed (0.9 g H_2O (g DW)$^{-1}$). It is possible that flash drying of isolated axes imposes a stasis on deteriorative reactions that does not occur during slower dehydration. Differential scanning calorimetry (DSC) of the axes indicated that the enthalpy of the melting and the amount of non-freezable water were similar, irrespective of the drying rate.

Very immature axes that had completed morphogenesis and histodifferentiation only were more sensitive to desiccation (damage at 0.7 g H_2O (g DW)$^{-1}$) than mature axes or axes that were in the growth and reserve accumulation phase (damage at 0.4 g H_2O (g DW)$^{-1}$). As axes developed from maturity to germination, their threshold desiccation sensitivity increased to a higher level (1.3−1.4 g H_2O (g DW)$^{-1}$). For the very immature axes, enthalpy of the melting of tissue water was much lower, and the level of non-freezable water considerably higher, than for any other developmental stage studied.

There were no marked correlations between desiccation sensitivity and thermal properties of water. Desiccation sensitivity appears to be related more to the degree of metabolic activity evidenced by ultrastructural characteristics than to the physical properties of water.

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