

The influence of desiccation and rehydration on the survival of polyembryonic seed of *Citrus suluensis* cv. limau madu

Abstract

A study was carried out to investigate the influence of desiccation and freezing followed by various presowing rehydration procedures on the desiccation sensitivity of the seed of *Citrus suluensis* cv. limau madu. The freshly harvested seeds of limau madu were desiccated under a broad range of relative humidity (RH) to various equilibrium water contents ($\text{g H}_2\text{O g}^{-1} \text{ dw}$). The desiccated and desiccated–frozen seeds were either directly sown under germination conditions or subjected to presowing rehydration procedures: seed preheating, prehumidification and osmoconditioning. The hydrated and desiccated seeds were sown in controlled germination conditions and the survival was evaluated 4–6 weeks after sowing. The results showed that desiccation progressively reduced the percentage of normal seedling of the seeds of limau madu and the viability is almost lost at water contents below $0.08 \text{ g H}_2\text{O g}^{-1} \text{ dw}$. The estimated desiccation sensitivity was substantially high ($\text{WC}_{50} = 0.143 \text{ g H}_2\text{O g}^{-1} \text{ dw}$) when the desiccated seeds were rapidly rehydrated (uncontrolled rehydration). In contrast, seed prehumidification, preheating and osmoconditioning (controlled rehydration procedures) markedly enhanced normal seedling percentages decreasing the estimated values of WC_{50} (between 0.08 and $0.127 \text{ g H}_2\text{O g}^{-1} \text{ dw}$). While the rapidly rehydrated desiccated–frozen seeds were almost killed at water content of $0.15 \text{ g H}_2\text{O g}^{-1} \text{ dw}$, prehumidification and preheating have noticeably increased percentage of frozen seeds survival at the same water content. However, at water content of $0.21 \text{ g H}_2\text{O g}^{-1} \text{ dw}$ preheating significantly ($P < 0.05$) increased percentage of normal seedling of the frozen seeds. Seed desiccation markedly reduced the percentages of germinated seeds with multiple seedlings. Seed controlled rehydration remarkably increased the survival of polyembryos. The beneficial effect of seed controlled rehydration on the survival of the desiccated seeds was pronounced at medium water contents (0.08 – $0.25 \text{ g H}_2\text{O g}^{-1} \text{ dw}$).