Survival and vigour of ultra-dry seeds after ten years of hermetic storage

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Summary

Seeds of carrot, groundnut, lettuce, oilseed rape and onion were stored hermetically in laminated aluminium foil packets in four environments (dry or ultra-dry moisture contents combined factorially with temperatures of 20°C or -20°C), replicated at several sites. After ten years’ hermetic storage, seed moisture content, equilibrium relative humidity, viability (assessed by ability to germinate normally in standard germination tests) and vigour were determined. After a decade, the change in seed moisture content of samples stored at -20°C was small or nil. Except for groundnut and lettuce (where loss in viability was about 8 and 3%, respectively), no loss in viability was detected after 10 years’ hermetic storage at –20°C. In all cases, there was no difference in seed survival between moisture contents at this temperature (P > 0.25). Comparison of seed vigour (root length and rate of germination) also confirmed that drying to moisture contents in equilibrium with 10-12% r.h. had no detrimental effect to longevity when stored at -20°C: the only significant (P < 0.05) differences detected were slightly greater root lengths for ultra-dry storage of four of the six seed lots. Seed moisture content had increased after a decade at 20°C (generally to the level in equilibrium with ambient relative humidity). Hence, sub-zero temperature storage helped maintain the long-term integrity of the laminated aluminium foil packets, as well as that of the seeds within.

Introduction

There is considerable practical and theoretical value in determining as precisely as possible the extent to which seed moisture content can be reduced by desiccation yet still increase subsequent longevity in air-dry storage. Different approaches to this subject have been developed in the UK (Ellis, Hong and Roberts, 1988) and the USA (Vertucci and Roos, 1990).

The term “ultra-dry” seed storage was introduced by the International Board for Plant Genetic Resources (IBPGR, 1992), now the International Plant Genetic Resources Institute (IPGRI), for seed banks conserving plant genetic resources, in response to results which quantified the response of seed longevity to a very wide range of seed storage

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