



Seed behaviour in *Phoenix reclinata* Jacquin, the wild date palm

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Abstract

Despite the importance of the palm family, *Areaceae*, little has been systematically documented about the seed behaviour of the many species. The post-harvest seed behaviour of *Phoenix reclinata*, the highly utilized wild date palm species distributed along the eastern seaboard of Africa, is investigated in the present study. While both embryo and endosperm water concentration declined as the seeds of *Phoenix reclinata* matured, they remained relatively high: this is a characteristic of (but not confined to) non-orthodox seeds. The ultrastructure of embryo cells, and the finding that negligible water uptake was required for the initiation of germination, were in keeping with the possible non-orthodox nature of the seeds. A developmental study revealed that between the acquisition of full germinability and complete pre-shedding maturity, germination performance appeared to be constrained, suggesting the presence of an inhibitor. Pre-treatment by soaking, mechanical or acid scarification had no significant promotory effect on either rate or totality of germination of mature *P. reclinata* seeds, while use of water transiently at 100°C was highly deleterious. However, germination of partially dehydrated seeds was initiated sooner if they had been soaked or scarified. Mature *P. reclinata* seeds tolerated dehydration to a mean embryo water concentration of 0.40 g g⁻¹ (dry mass basis; dmb), but at 0.14 g g⁻¹, both rate and totality of germination were adversely affected. However, viability of seeds dehydrated to the mean embryo water concentration 0.40 g g⁻¹ declined during storage for 16 weeks. It is concluded that *P. reclinata* seeds are non-orthodox, and are best categorized as showing intermediate post-harvest behaviour.

Keywords: *Areaceae*, intermediate, orthodox, palm, *Phoenix reclinata*, post-harvest behaviour, recalcitrant seeds

Introduction

There are around 200 genera of palms worldwide (Uhl and Dransfield, 1987), of which only 19 are native to Africa and five to South Africa (Tuley, 1995). Wherever palms occur, they are very heavily utilized, leading to the estimation that half the species could face global extinction within the next 50–100 years (Smith *et al.*, 1993), and consequently to the need for establishment of extensive conservation projects (Maunder *et al.*, 2001). However, such projects will require knowledge of palm seed storage behaviour and germination characteristics, which is presently lacking (Davies and Pritchard, 1998a).

Seeds are categorized as orthodox or non-orthodox in post-harvest behaviour, based upon the degree of desiccation they will tolerate. Additionally, there are various species with seeds that are relatively desiccation tolerant, although less so than orthodox types. Such seeds, which may be chilling sensitive, especially after dehydration, have been described as exhibiting intermediate storage behaviour (Hong and Ellis, 1996). Although this categorization of seed types is considered an over-simplification (Pammenter and Berjak, 1999), it will be used here for convenience.

It is generally recommended (e.g. Wicht, 1969; Donselman, 1982; Meerow, 1991) that palm seeds should be planted fresh, as viability is lost within a relatively short time. According to Broschat (1994) seeds of many palm species lose viability within 3–6 weeks of harvest, due to the deleterious effects of desiccation.

Various procedures promote palm seed germination, including removal of the fruit tissue (Rauch *et*

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