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Responses of fluted pumpkin (*Telfairia occidentalis* Hook. f.; Cucurbitaceae) seeds to desiccation, chilling and hydrated storage

S.A. Ajayi [a,b,*], P. Berjak [b], J.I. Kioko [b], M.E. Dulloo [c], R.S. Vodouhe [d]

[a] *Seed Science Laboratory, Department of Plant Science, Obafemi Awolowo University, Ile-Ife, 220001, Nigeria*
[b] *School of Biological and Conservation Sciences, University of KwaZulu-Natal, Durban 4041, South Africa*
[c] *International Plant Genetic Resources Institute (IPGRI), Rome, Italy*
[d] *IPGRI West and Central Africa, c/o IITA Benin Research Station, Cotonou, Benin*

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Abstract

The responses of fluted pumpkin (*Telfairia occidentalis* Hook f.) seeds to chilling and hydrated storage at 6, 16, and 25 °C, and excised axes to fast flash-drying or slow dehydration, were investigated. Flash- and slow-drying initially enhanced germination by 20% and 7%, respectively, which was sustained despite further water loss to 0.45 g g^{-1} when axes were flash-dried, but not when slowly dried. Of the seeds stored at 6, 16, and 25 °C, 3.3%, 40%, and 88%, respectively, were discarded within 4 weeks after storage because of germination or fungal proliferation. Nevertheless, axis germination of the non-visibly contaminated seeds after 4 weeks storage at 25 °C was precluded *in vitro* by vigorous fungal proliferation, underscoring the role of the internal fungal inoculum in obviating seedling establishment. In the case of the seeds stored at 6 °C, germinability was lost within 4 weeks, suggesting their chilling-sensitivity. Ultrastructural evidence revealed marked damage associated with chilling, while the ultrastructure of seeds surviving storage for 4 weeks at 25 °C was indicative of enhanced metabolic activity. The results reveal that fluted pumpkin seeds are recalcitrant, being both desiccation- and chilling-sensitive, and that even short-term storage in the hydrated state appears to be unachievable in practice.

Keywords: Chilling- and desiccation-sensitivity; Fluted pumpkin; Fungal proliferation; Recalcitrant; Hydrated storage

1. Introduction

The fluted pumpkin (*Telfairia occidentalis* Hook f.), a member of the Cucurbitaceae, is a strong climber and short-term perennial (Odiaka and Schippers, 2004), dioecious and diploid – $2n=20$ (Okoli, 1987, 1988). Fruits are large, weighing up to 20 kg, and containing 80 seeds on average (Schippers, 2000). The plant is native to Nigeria and also found in the moist coastal areas of West Africa but rarely occurs naturally in East Africa (Akoroda, 1990a,b; Robinson and Decker-Walters, 1997). Leaves, stems, seeds, and roots have high food value and provide a source of oil and raw material for a variety of products (Akubue et al., 1980; Egbekun et al., 1998; Giami and Isichei, 1999; Akwaowo et al., 2000, Giami et al., 2003).

Fluted pumpkin can be propagated only by seeds, but their availability for planting is a major problem and cannot satisfy the widespread interest in the cultivation of the plant (Odiaka and Schippers, 2004). The seeds are difficult to conserve during the intervening period between fruit harvesting at the end of one season and seed planting at the beginning of the next. Because of this short storage life span, Akoroda (1986) classified the seeds as recalcitrant, although the water concentration was not quantified.

Seeds attain maximum physiological quality in terms of germination, vigour and storage reserve accumulation 9 weeks after fruit set, after which vivipary and seed rot set in (Adetunji, 1997) the extent of which is related to the duration of fruit storage after harvesting (Ajayi, unpublished data). The present study reports the first attempt to quantify the responses of fluted

* Corresponding author. Seed Science Laboratory, Department of Plant Science, Obafemi Awolowo University, Ile-Ife, 220005, Nigeria.
E-mail address: sajayi@oauife.edu.ng (S.A. Ajayi).

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