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Reserve mobilization during germination of jackfruit (*Artocarpus heterophyllus* Lam) seeds

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SUMMARY

Jackfruit seeds (*Artocarpus heterophyllus*) are recalcitrant and start germination immediately after harvesting as a continuum of development. Germination and reserve mobilization studies were conducted on fresh jackfruit seeds without storage up to 50 days of seedling growth. Starch was found abundant reserve stored in the cotyledons. Both α - and β -amylases were very active in the ungerminated seeds and during germination there was continuous depletion of starch content as a result of the increased amylase activity. Metabolism of soluble carbohydrates during germination was unique in jackfruit seeds because loss of viability was under the control of soluble and insoluble carbohydrates status prevailing during germination associated metabolism of seeds which were categorized as recalcitrant.

Key words : Jackfruit seeds, Germination, Reserve mobilization, Amylase, Sugars, Starch

In recalcitrant seeds, development and germination are in continuum and immediately after shedding germination-associated metabolic changes occur. Berjak *et al*., (1989). Farrant *et al.* (1993) opined that it is difficult to identify the switch from reserve accumulation to the germination-associated reserve mobilization. Developmental aspects and desiccation sensitivity of recalcitrant seeds have been reviewed by Finch-Savage (1996) and Pammenter and Berjak (1999). Although germination potential is taken as an index or marker in the manifestation of desiccation sensitivity, storage behaviour and longevity of recalcitrant seeds, metabolism during germination and seedling development phase is not well documented in recalcitrant seeds.

Jackfruit seeds are recalcitrant (Chin *et al*., 1984; Fu *et al*., 1993; Chandel *et al*., 1995; Smith *et al*., 2001; Peran *et al*., 2004) and starch rich (Sheela, 2007). The main objective of this paper is to analyse the distribution of metabolites in Jackfruit seeds during germination. The other objective is to elucidate the hydrolysis and interconversion of metabolizable carbohydrates in the cotyledon and embryonic axis of Jackfruit seeds.

MATERIALS AND METHODS

Jackfruits (*Artocarpus heterophyllus* Lam.) for the present study were collected from a specific tree growing at Chathannur Village in Kollam District, Kerala state during 2004-2006. Fruits ripened on the mother plant were collected manually and brought to the laboratory. Fruits were cut open and seeds were collected, depulped and washed thoroughly in distilled water to remove any trace of perianth or aril. Washed seeds were wiped with clean towel and surface sterilised by wiping with a clean towel wetted with 80% ethyl alcohol and kept for germination studies. Sixty fresh seeds in duplicate were kept for germination in Petri plates lined with filter paper in darkness. Samples were collected at the interval of 2, 5, 10, 20, 30, 40 and 50 days after germination / seedling growth. Four seeds / seedlings each collected on sampling days were decoated, separated the cotyledons and axis. Samples of all biochemical analysis were taken from the pooled tissue. For dry weight determination of seedling parts, the samples were kept in hot air oven at 100^0C for one hour and then at 60^0C till weight became constant. Random sampling procedure was followed for each estimation. All experiments were repeated a minimum of 6 times using seeds of fruits collected from the same tree and during same period of two consecutive years for reproducibility of results.

Analysis of starch:

The method of Pucher *et al.* (1948) described by Whelan (1955) was used to extract and estimation of starch was done according to Montgomery (1957). The optical density of the solution was measured at 540 nm using Systronics Colorimeter. Soluble starch procured from Merck Chemical Company was used as standard.

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