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Biochemical aspects of desiccation induced viability loss in *Myristica malabarica* Lam. seeds

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SUMMARY

Desiccation sensitivity of recalcitrant seeds of *Myristica malabarica* was studied by exposing freshly collected mature seeds to room temperature 28± 2°C, and 60%RH.)Moisture content and germination rate were reduced uniformly and viability (72%) was retained up to 6 days when the moisture content was reduced to one half. Electrolyte leakage and lipid peroxidation showed linear increase while formozan intensity was reduced gradually until the loss of viability. Peroxidase and polyphenoloxidase were more active up to 4th day of desiccation compared to the control whereas, drastic reduction in the activity of these enzymes was observed coinciding with loss of viability. Even though *Myristica malabarica* seeds contained only 27% moisture content and were considered as moderately recalcitrant because these seeds were highly sensitive to desiccation and the loss of viability begans after one day and ends within 7-8days. The desiccation sensitivity appeared to be due to manifold electrolyte leakage and lipid peroxidation and comparatively reduced enzymatic protection expressed as peroxidase and polyphenol oxidase against free radicals formed due to desiccation stress.

Key words : *Myristica malabarica*, Viability loss, Desication

Desiccation sensitivity is the well documented characteristic of recalcitrant seeds (Lin and Chen, 1995; Farrent *et al*., 1996; Finch-Savage, 1996; Pammenter and Berjack, 1999). Viability loss in recalcitrant seeds is the synergistic effect of a large number of metabolic processes. These include mechanical stresses upon the removal of water which cause structural changes at sub cellular (Drew *et al*., 2002; Hilhorst *et al*., 2004) cellular (Kozeko and Troyan, 2000) and tissues levels (Liang and Sun, 2000). Alterations in the membrane structural integrity and function due to desiccation are well documented and reflected by the increased leakage of ions, sugars and proteins (Chaithanya and Naithani, 1994; Finch-Savage *et al*.,1996). The breakdown of metabolic co-ordination in cells may initiate uncontrolled free radical attack and decrease enzymic and non-enzymic protein protection against such oxidative damages (Leprince *et al*., 1990, Hendry *et al*., 1992; Hendry, 1993 Pammenter *et al*., 1994, Pammenter and Berjack, 1999). An important process of viability loss during desiccation of recalcitrant seeds is the formation of free radicals and highly reactive oxygen species which are synthesised as a result of impaired oxidative metabolism (Chaithanya and Naithani, 1994; Come and Corbineau, 1996; Leprince *et al*., 1999, Pammenter and Berjack,1999;Greggains *et al*., 2001). A number of protective enzymes like peroxidase, polyphenol oxidases and super oxide dismutase against the highly reactive free radicals have been reported in recalcitrant seeds (Chaithanya and Naithani, 1994; Finch-Savage *et al*., 1996).

Myristica malabarica is an endemic tree of Western Ghats in peninsular India, a major floristic component in *Myristica swamps*. The riparian climate is suited for the easy germination of the recalcitrant seeds, of *Myristica malabarica* Anilkumar *et al*. (2002) reported the desiccation and chilling sensitivity of moderately recalcitrant seeds of this taxon. The present study highlights the effects of desiccation on metabolism, leading to loss of viability. The investigation includes the analysis of moisture content, germinability, measurements of electrical conductivity, lipid peroxiation, reduction of tetrazolium chloride, and assay of scavenging enzymes like peroxidase and polyphenol oxidase during desiccation.

MATERIALS AND METHODS

Fully mature seeds of *Myristica malabarica* were collected from *Myristica swamps* of evergreen forest of Kallar in Southern Western Ghats, Kerala, India. Harvesting maturity of seeds were inferred when some

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