

grassland. It can therefore be concluded that disturbed subtropical grassland result in a state of reduced indigenous plant diversity and requires intervention.

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Effects of developmental status on the success of cryopreservation of germplasm from non-orthodox seeds

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Zygotic germplasm of plant species producing desiccation-sensitive seeds can be conserved in the long-term only by cryopreservation (usually of excised embryonic axes). However, for most species studied shoots do not develop after excision, with callus production or greening misleadingly being recorded as survival after cryopreservation. This study investigated the effect of developmental status on *in vitro* development and cryopreservation survival of embryonic axes of *Trichilia dregeana*, *T. emetica* and *Strychnos gerrardii*. Embryonic axes were excised from mature seeds immediately after harvesting, and after storage under hydrated conditions for different periods. *Trichilia dregeana* and *T. emetica* axes did not develop shoots unless they were excised with attached cotyledon segments. Following short-term storage, however, the excised axes developed shoots after complete cotyledon excision. *Strychnos gerrardii* axes developed normally without attached cotyledon segments, with percentage germination increasing with seed storage time. The highest post-cryopreservation survival of *T. dregeana* axes was achieved when seeds had been stored for three months, while the seed storage period did not affect post-thaw survival of the axes of *T. emetica* or *S. gerrardii*. Only *S. gerrardii* explants produced shoots after cryopreservation, whereas the surviving embryonic axes of *T. dregeana* and *T. emetica* regenerated only as non-embryogenic callus. Thus, the successful cryopreservation of the germplasm of the species tested, depends on numerous species-specific factors, some still to be elucidated.

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A protocol for the production of adventitious shoot explants for cryopreservation of *Ekebergia capensis* using a temporary immersion system (RITA®)

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Ekebergia capensis is an indigenous species that produces recalcitrant seeds which cannot be stored in the long-term. The shoot apical meristem of excised embryonic axes sustains lethal damage upon excision from the cotyledons, although adventitious buds can be induced to form at the wound sites. The phenomenon of shoot apex necrosis, which appears common when axes of tropical species are excised, prompted research on the potential of alternative explants for cryopreservation of recalcitrant-seeded species. The present contribution reports protocol development for the production of adventitious shoots from intact root explants of *Ekebergia capensis*. Roots produced by *in vitro* germination of excised embryonic axes, were placed in a temporary immersion bioreactor (RITA®) containing liquid media supplemented with the cytokinin, BAP. After 24 h, the roots were plated on standard semi-solid germination medium. After 4 weeks, adventitious shoots were produced from the root explants. The adventitious shoots produced in this manner were cultured on elongation medium for further development. Once shoots were sufficiently large, they were rooted on medium supplemented without auxin or only a low IBA level. Seeds used came from two locations *viz.* Port Elizabeth (33° 30' S) and Mtunzini (28° 22' S), and explants showed provenance-related differences in response. This work has important implications for the storage of species that produce recalcitrant seeds as it provides a

potential strategy for the production of an alternate source of explants that can be used for the cryopreservation.

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What don't we know about *Sclerocarya birrea* subsp. *caffra*?

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Sclerocarya birrea subsp. *caffra* (marula) is a well known woody species. There is a large body of literature on many aspects of its biology, ecology and uses. Reviews on aspects of marula biology and use conclude that much is known about the fruit and its uses, but information on natural marula populations is fragmentary. Little is known about the regeneration ecology of this species in its natural habitat. In addition, minimal references to the crown and stem dimensions of individuals of marula of known or estimated age, or to rates of growth appear in the existing literature. No published accounts on the allocation patterns in terms of defence and storage can be found either. A major concern is the lack of information on the response of marula to disturbance which is a major moulding force in savanna ecosystems. Without this knowledge, sustainable management of savanna ecosystems becomes a difficult task. Thus, a reliable interpretation of the life history strategy of this extremely important indigenous savanna tree cannot yet be made. A study has been initiated to address some of these knowledge gaps. The study will assess the growth rates and adaptive growth responses of natural populations and detailed growth experiments will be initiated to assess allocation patterns from germination. The study aims to obtain a more detailed understanding of the life history strategy and underlying allocation physiology of this species, as well as predictive capacity for its future dynamics.

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Head-space volatiles of Marula (*Scelerocarya birrea*, subspecies *caffra*)

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Of all fruit trees indigenous to South Africa, the marula has received most attention in terms of domestication and commercialization. Several products such as beer, juice, jam and jelly have been developed and successfully marketed, the most recent being a marula liqueur. Despite the traditional and commercial uses the flavour constituents remain poorly studied. Headspace volatiles of the fruit pulp and the whole fruits were investigated using solid phase micro-extraction (SPME) and GC-MS. The two major compounds in the fruit pulp are α -caryophyllene (91.3%) and α -humulene (8.3%). Thirty volatiles representing 88.7% of the total composition were identified in the headspace of the intact fruits. Heptadecene (16.1%); benzyl 4-methylpentanoate (8.8%), benzyl butyrate (6.7%), (Z)-13-octadecenal (6.2%) and cyclo-pentendecane (5.7%) were present in levels higher than 5%. The major alcohol detected in the head-space of the whole intact fruits was (Z)-3-decen-1-ol (8.6%).

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Vegetation mapping and description of Ogongo Agricultural Farm and surrounds

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