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“Filling gaps and removing traps  
for sustainable resource management”

## Observations on Seed Embryo and Germination, Seedling Morphology and Development of *Vitellaria paradoxa* (C.F.Gaertn.)

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### Abstract

The pyrophytic features and high longevity of shea tree (*Vitellaria paradoxa*) make it an excellent species for combating desertification and mitigating climate change in sub-Saharan Africa. In this study, our aim was to describe precisely the cotyledon morphology, seedling development process and seedling morphology that account for cryptohypogeal germination of the species. To identify the embryonic axis, fresh and partially dry seeds were deshelled and their distal ends transversely cut off. Cut seeds were immersed in 1.0 % tetrazolium chloride (TTC) solution for 24 hours and kept in the dark for staining. To study cotyledon morphology, 50 seeds were deshelled, air-dried for 3-5 days and split open from the distal end. Another batch of 50 seeds were sown directly. The sprouted seeds or seedlings were sampled at 5-day intervals and their cotyledonary tubes sectioned to observe morphological and anatomical features. To study seedling development, 180 seeds were classified into three groups based on their sizes and then sown on seedbeds in randomized complete block design with 60 in each of the 3 replicates. The TTC solution stained the proximal ends of only the fresh seeds. Morphologically the seed bears a cotyledonary raphe, which lies vertically with distally schizocotylous and proximally syncotylous cotyledons. Seed size significantly ( $P < 0.05$ ) affected the various stages of seedling development. Large seeds sprouted earlier (7 days) followed by seedling emergence within 61 days, while small seeds sprouted almost a week later (12 days) with seedling emergence within 75 days. The location of the embryos at the proximal ends cause germinating seeds to produce long cotyledonary tubes which bury the plumules deep into the soil as a protection against bushfires. This germination study will enhance nursery establishment for plantation development of *V. paradoxa*.

**Keywords:** Cotyledon, cryptohypogeal, establishment, germination, pyrophytic, seedling emergence, shea, *Vitellaria paradoxa*