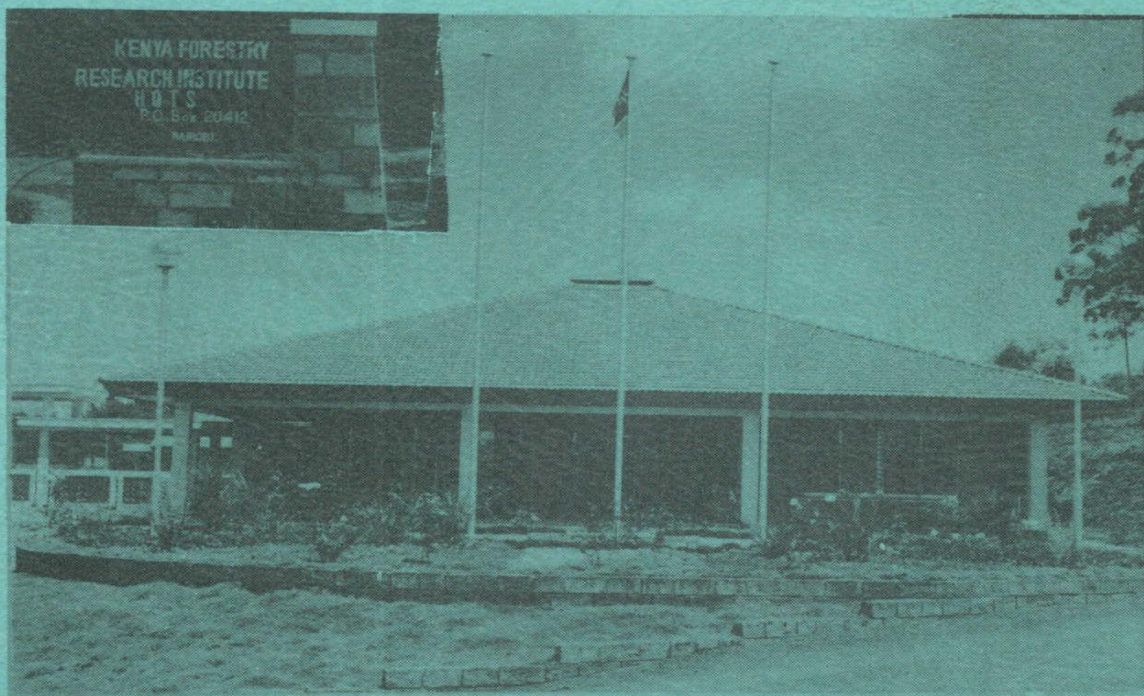




KENYA FORESTRY RESEARCH INSTITUTE

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COLLECTION, PROCESSING AND GERMINATION OF *MELIA VOLKENSII* SEEDS

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Collection, Processing and Germination of *Melia Volkensii* seeds

Introduction

Melia volkensii, Gurke, locally known as Mkau (Kamba), Makowe (Taita), Bamba (Boran), Baba (Somali), and Maramarui (Samburu), is a potentially useful tree species growing in semi-arid areas of Kenya. It grows mainly in Embu, Samburu, Isiolo, Marsabit, Meru, Kitui, Machakos, Taita Taveta, Wajir and Kilifi Districts. It is a fast growing tree that coppices readily after cutting. The tree is used for production of building material, fence posts, firewood, charcoal and its large fruits, twigs and leaves make good fodder. The tree has medicinal values.

Seeds of *M. volkensii* fail to germinate when placed under normal conditions of air, moisture and warm temperature. The seed dormancy therefore constitutes a problem for nursery management. The procedures outlined in this paper are intended to provide guidance to all those involved in raising seedlings of *M. volkensii*.

Fruit Development

Trees at the same site may flower and fruit at different times of the year. Also, fruits at different stages of development occur on the same branches.

This complicates the process of seed collection, as ripe fruits must be distinguished from immature unripe ones. Although relationship between fruit maturity and seed germination is poorly understood in this species, immature fruits should be avoided. It is therefore, recommended that only mature fruits should be used in raising seedlings for planting.

Stages of fruit maturation are identified by external morphological characteristics. These are colour, structure, texture and size. Generally, mature fruits are large and partially or completely covered with cork. External appearance may vary from yellowish-green to

greyish-green depending on the state of cork deposition. When fruits at different stages of development occur on the same branch, the oldest are the ones situated farthest from the branch tip. However, during fruit collection caution must be exercised because the features described above are not universal and may vary from tree to tree within sites and between sites. Trees seed twice a year between March and August.

Seed Collection

M. volkensii seedlings will take about 3–4 months in the nursery to reach plantable size (about 30–50 cm in height and root collar of about 8 mm in diameter). To allow sufficient time for fruit collection, processing, after-ripening, seedling growth and stress resistance induction: seed should be collected 2 months before sowing. The correlation between storage conditions and duration, and seed viability has not been conclusively investigated. For this reason, planning of seedling production must not be based on seeds stored for longer than two years.

Quantity Estimation

One kilogram of dry stony endocarp contains about 4480 seeds. A stony endocarp (figure 1b) has five cells called locules. On each locule is a minute opening or micropylar orifice and one seed. Two seeds per locule have also been observed. Usually one to four ovules abort, so that approximately 53% are single seeded, 34% two-seeded, 10% three-seeded, 2% four-seeded and the remaining 1% is five-seeded.

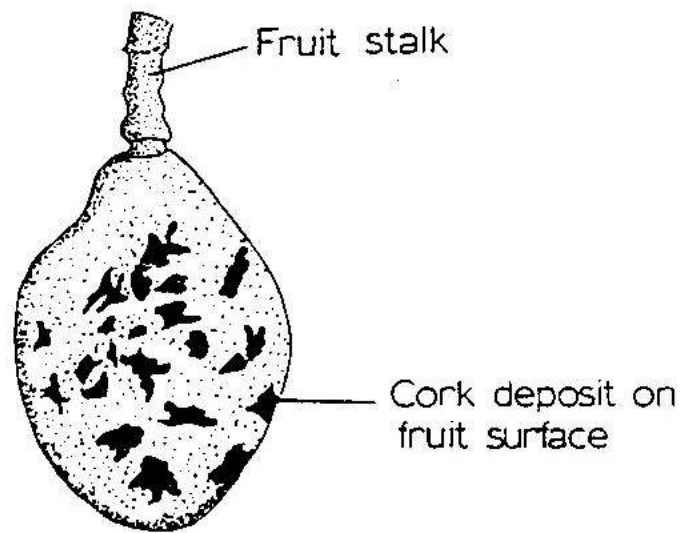
The total number of seeds that can be extracted from one kilogram of endocarps (about 4480 seeds) does not take into account damage arising from extraction or the proportion of viable seeds.

For germination to occur in nature, mechanical restraint (stony endocarps and seed coats) must be overcome either by mechanical or biological forces, such as extreme temperatures, dry winds, water, micro-organisms, ingestion by animals, etc. These cause the endocarps and seed coats to deteriorate. In nature this process may take a long time, like two to three years.

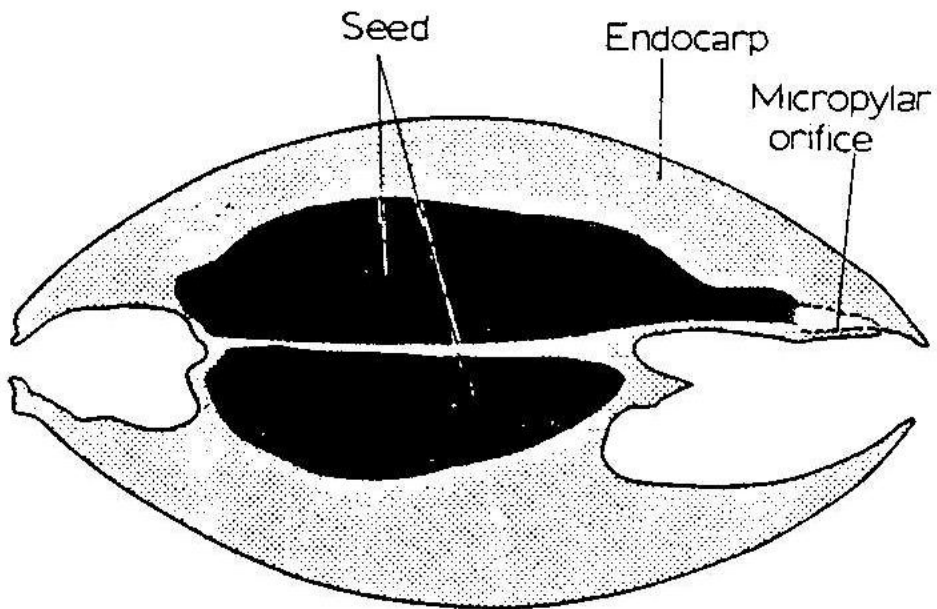
Seed Extraction

The procedure of extraction is illustrated by (figure 2).

1. Place a dry endocarp horizontally on a firm table or a large wooden stump with a horizontal surface (figure 2a).
2. Place a sharp pocket knife-blade mid-way across the endocarp and hit lightly with a hammer until a crack develops around the endocarp (Figure 2b). The knife blade must not penetrate deeper than the endocarp wall, otherwise seeds will be damaged.
3. Gently push and twist the knife blade into the crack (figure 2b). This is aimed at separating the two endocarp pieces in order to expose the seeds.
4. Remove seeds from the cells or locules.
5. Examine and discard mechanically damaged seeds. *M. volkensii* seed contains about 45% fats and 31% proteins. Damaged seeds are therefore a prime target for diseases that cause rotting during germination.



(a) Mature fruit of *M. volkensii*



(b) Stony Endocarp

Fig.1. Fruit and stony endocarp of *M. volkensii*

Seed Scarification

1. Break the caruncle off the seed (figure 2c).
2. Soak seeds in cold water for 24 hours to soften them.
3. Use a sharp razor-blade to cut a longitudinal slit from the centre of the seed to the micropylar end of the seed (figure 2d). Only integuments (black) and the endosperm (white) are to be cut (figure 2c). Avoid contamination from one seed to the other by cleaning the razor blade in 'Jik' or hot water in between cuts. Also, this could be minimized by a supply of many new blades. Blades sterilized with hot water must not be used for cutting while they are still hot.

Sowing

1. Place seeds directly into nursery containers preferably 10 cm layflat by 15 cm tubes long, $\frac{3}{4}$ filled with moist well drained soil medium. The remaining $\frac{1}{4}$ is to be filled with pure sand. It is in this $\frac{1}{4}$ where the seeds (normally 2) are to be placed.
2. Cover seeds with moist sand. The root collar of newly germinated seedlings has a constriction (figure 2e). This constriction should always be below the soil surface otherwise the seedling would fail to grow upright.
3. Germination will depend on seed quality and appropriate scarification.
4. During the first two weeks after germination, the seedlings prefer light and shading may not be necessary. Over-watering should be avoided.

Fig. 2. Seed extraction and pre-germination treatment for *M. volkensii* Gurke

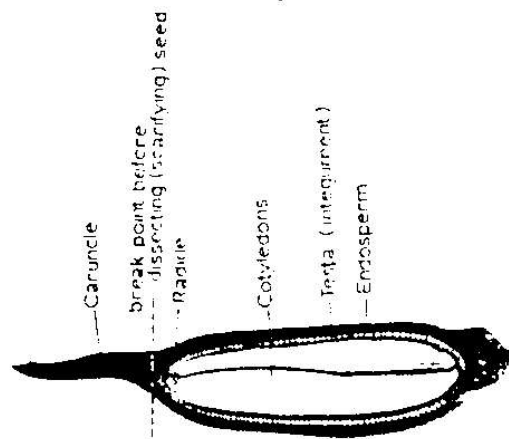


Fig. 2c. A mature seed of *M. volkensii* showing the caruncle and the position from which it has to be broken before scarification

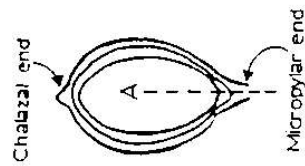


Fig. 2d. Position to be cut on the seed before sowing

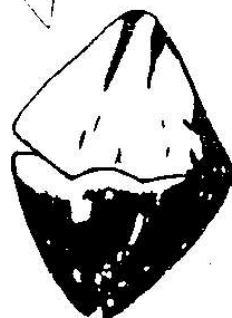


Fig. 2b. Crack in stony endocarp

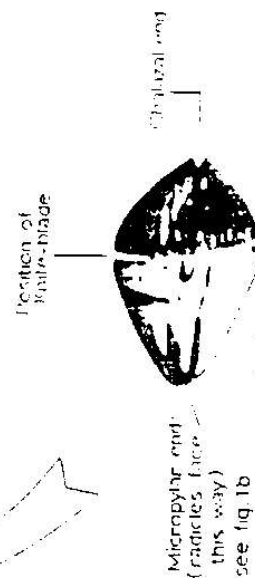


Fig. 2a. Stony endocarp indicating position of knife-blade

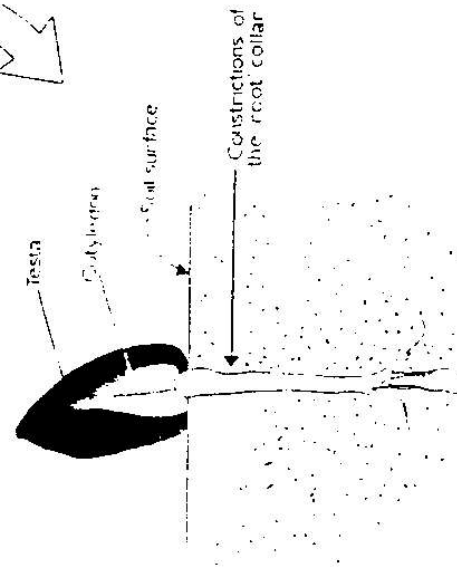


Fig. 2e. A seedling of *M. volkensii* showing the position of root collar