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Teak in Tanzania

I. Overview of the context

This paper reports on the main teak stands currently existing in Tanzania, based on information obtained directly on the sites visited throughout the country and also gathered from published accounts. The private Kilombero Valley Teak Co. Ltd. (KVTC) teak planting project, due to its particular characteristics, is discussed more extensively in a second (following) paper (BEKKER *et al.*, 2003).



Photo 1:

A 37-year-old Plus Tree in the Longuza provenance trial.
Photo O. Monteuis.

RÉSUMÉ

LE TECK EN TANZANIE I. LE CONTEXTE

Le teck (*Tectona grandis*) a été initialement introduit en Tanzanie à la fin du XIX^e siècle, par les Allemands, sous forme de graines provenant de la région de Calcutta, en Inde. Jusqu'à la première guerre mondiale, d'autres provenances de graines du Sud de l'Inde ont enrichi la base génétique originelle. Il a ensuite fallu attendre 1965, avec la mise en place du fameux test de provenances de Longuza, connu sur le plan international, pour l'introduction de nouvelles origines. Plusieurs origines ont disparu à ce jour. Cet article renseigne sur la situation des parcelles de tecks existant actuellement en Tanzanie. Celles-ci sont principalement gérées par le programme national tanzanien de graines d'arbres forestiers, qui a mis en place en 1996 le verger à graines clonal de teck de Kiroka, dans le district de Morogoro. La plupart des plantations de tecks en Tanzanie se trouvent au pied des collines de la chaîne montagneuse de l'est du pays ainsi que dans les plaines bien drainées de l'intérieur qui ont une pluviosité suffisante, où les conditions environnementales conviennent au teck. Du fait de ses particularités, le projet privé de plantations de tecks de la vallée du Kilombero (Kilombero Valley Teak Co. Ltd ou KVTC, en abrégé) a fait l'objet d'un article spécial.

Mots-clés : teck, adaptabilité, origine, plantation, parcelle, Tanzanie.

ABSTRACT

TEAK IN TANZANIA: I. OVERVIEW OF THE CONTEXT

Teak (*Tectona grandis*) was first introduced into Tanzania by the Germans in the late 19th century through seeds originating from the Calcutta region of India. This first introduction was completed by other provenances from South India until the First World War. Unfortunately, no further introductions and only little planting took place subsequently until the establishment in 1965 of the internationally renowned Longuza provenance trial, which has been noticeably depleted since then. This paper reviews the status of the existing teak stands mainly monitored by the Tanzanian National Tree Seed Programme, which set up the Kiroka teak clonal seed orchard in the rural district of Morogoro in 1996. Most of the teak stands in Tanzania are found in the foothills of the eastern mountain ranges and in well drained low-lying areas of sufficient rainfall inland where the conditions are suitable for teak. The private Kilombero Valley teak planting project, due to its particular characteristics, constitutes the topic of a special joint paper.

Keywords: teak, adaptability, origin, planting, stand, Tanzania.

RESUMEN

LA TECA EN TANZANIA I. CONTEXTO

La teca (*Tectona grandis*) la introdujeron los alemanes por primera vez en Tanzania a finales del s. XIX, en forma de semillas procedentes de la región de Calcuta (India). Hasta la primera guerra mundial, la base genética inicial se fue enriqueciendo con otras procedencias de semillas del sur de la India. Posteriormente, hubo que esperar hasta 1965, con la implantación del famoso test de procedencias de Longuza, conocido internacionalmente, para que se introdujeran nuevos orígenes. Actualmente, algunos orígenes ya han desaparecido. Este artículo informa sobre la situación de las parcelas de tecas que existen en la actualidad en Tanzania. Dichas parcelas están gestionadas principalmente por el programa nacional tanzano de semillas de árboles forestales, que estableció en 1996 la huerta de semillas clonales de teca de Kiroka, en el distrito de Morogoro. La mayoría de las plantaciones de teca en Tanzania se encuentran al pie de las colinas de la cadena montañosa del este del país y en las llanuras bien drenadas del interior con suficiente pluviosidad, en las que las condiciones medioambientales son favorables para la teca. Debido a sus peculiaridades, el proyecto privado de plantaciones de tecas del valle del Kilombero (Kilombero Valley Teak Co. Ltd o KVTC, en siglas) fue objeto de un artículo especial.

Palabras clave: teca, adaptabilidad, origen, plantación, parcela, Tanzania.

Introduction

Teak (*Tectona grandis*) is currently the most prized high-value timber due to its technological characteristics as well as the durability and the aesthetic value of its wood. This attractiveness accounted for teak plantation establishment, which started some 150 or even 400-600 years ago (introduction into Java) outside of its native countries, which are limited to Laos, Thailand, Myanmar (ex Burma) and India (WHITE, 1991).

Teak was first introduced into Tanzania by the Germans in the late 19th century, more precisely in the Dar Es Salaam and Mhoro sites in 1898 (MALENDE, TEMU, 1990), through seeds originating from the Calcutta region of India (MADOFFE, MAGHEMBE, 1988; MTIKA, 1996). This first introduction was completed by other provenances from South India (Travancore, Kerala State) and Myanmar (Burma at that time) until the First World War (WOOD, 1967). Unfortunately, no further introductions and only little planting took place subsequently until 1950-1960.

Sites suitable for teak in Tanzania are found in the foothills of the eastern mountain ranges and in well drained low-lying areas of high rainfall inland.

Although Wood's inventory (1967) made in the mid 1960's indicated four main seed stands in Kihuhwi, Bigwa ("Holy ghost Mission plantation"), Mtibwa and the Rau Forest Reserve, the National Tree Seed Programme seems to concentrate its activities on teak genetic resources on the following sites: Kihuhwi, Longuza (provenance trial), Mtibwa (stand), Kiroka, Longuza Forest Reserve and Mtibwa Forest Reserve.



Figure 1. Physical map of Tanzania showing the approximate location of Kihuhwi, the Longuza stands (1), the Mtibwa stand and the Kiroka clonal seed orchard (2), the Nambiga teak trial plot and the KVTC project (KVTC).

Kihuhwi

Kihuhwi stand: latitude 5°12' S; longitude 38°39' E; altitude: 257 m; annual rainfall: 1 307 mm; date of establishment: 1906-1910; seed origin: South Myanmar (Tennasserim), South India (Travancore, Kerala State) and possibly others.

19.4 ha of the initial area of 26.3 ha have been converted into seed stands with a current density of 200 trees/ha, under the management of the National Tree Seed Project. Seeds are currently collected in bulk and all progenies are mixed from the ground. Superior trees, unevenly distributed, can be used as Candidate Plus trees for clonal plantations, or individual seed collection, provided that the poorest ones are culled in order to reduce contamination by pollen from trees of inferior genetic quality.

Longuza

Longuza provenance trial (photos 1 and 2): latitude 4°55' S; longitude 38°40' E; altitude: 180 m; annual rainfall: 1 500 mm.

The Longuza provenance trial, established in 1965, has gained an international reputation due to the scientific paper published by MADOFFE and MAGHEMBE (1988), who observed after 17 years that:

- "All provenances grew remarkably well and gave yields comparable to site quality I and II reported in the literature for India, Central America and the Caribbean" – the situation has changed since then, especially in Costa Rica where intensive teak culture systems have developed lately, resulting in high growth rates, at least in the first stages.
- "Both stem straightness and self pruning were satisfactory for all provenances".
- "Buttressing, forking and fluting were rare to non-existent".
- The local seed sources (currently used by the Kilombero Valley planting project) scored on average the best results and had the best rankings.



Photo 2:
The Longuza provenance trial.
Photo O. Monteuiis.

Since that time, the plots have been intensively thinned. According to Mr Singo, Head of the Morogoro Zonal Tree Seed Centre, who accompanied us during the visit, most of the remaining trees are from Coimbatore provenance – which no longer exists. Some of these trees displayed superior features that may warrant their selection as Candidate Plus trees for clonal propagation (some showed epicormic shoots which may help for this purpose) or as seed producers, provided that relevant measures such as roguing can be taken.

Mtibwa

Mtibwa stand: latitude 6°00' S; longitude 37°40' E; altitude: 457 m; annual rainfall: 1 205 mm; date of establishment: 1961 from local seed sources, Bigwa and possibly others according to WOOD (1967).

The current density of this 80 ha seed stand is 266 trees/ha. More intensive thinning should reduce contamination by pollen from undesirable trees of inferior quality in order to give more space and maximize the

gain from superior individuals, unevenly distributed. The latter could also be used as Candidate Plus Trees for clonal plantations.

Kiroka

The Kiroka clonal seed orchard (photo 3) was established in 1996 in the rural district of Morogoro: latitude 6°44' S, longitude 37° 45' E, altitude 300 m, annual rainfall: 872 mm. 32 of the best trees of the Coimbatore provenance set up in the Longuza provenance were selected then clonally propagated by grafting to be planted according to a suitable layout at a spacing of 7 x 7 m (200-210 trees/ha) on 10 ha. The aim is to produce large quantities of genetically improved seeds with the additional option of producing clones through cuttings for clonal plantations (MTRKA, 1996). Some of the 6-year-old grafts were already flowering and bearing fruits.

According to MALENDE and TEMU (1990) the largest teak plantation areas in Tanzania some 15 years ago were the Longuza and Mtibwa forest reserves.



Photo 3:
Kiroka clonal seed orchard.
Photo O. Monteuis.

Longuza Forest Reserve

Longuza Forest Reserve: latitude 5°02 to 5°10'S; longitude 38°40' to 38°43'E; altitude: 150 m; annual rainfall: 1 770 mm. The plantations were set up by age classes, using mostly Kihuhwi seed source, beginning in 1958 (WOOD, 1967) and continuing until 1992 (MOSHI, 2000) when planting was stopped due to insufficient funding. The annual planting target was 120 ha in 1968, with a total area amounting to 240 ha at that time. Today the plantation area covers 1 709 ha. The mean annual increment (MAI) is estimated to be 10 m³/ha/year and the total standing volume is estimated to be 417 m³ with a density of 300 trees/ha to be ultimately lowered to 250 trees/ha.

Mtibwa Forest Reserve

Mtibwa Forest Reserve: latitude 6°8'S; longitude 37°39'E; altitude: 460m; annual rainfall: 1 166 mm. Plantation by age classes started in 1961 and is documented until 1967 (WOOD, 1967). At that time the total area amounted to 430 ha, with an annual planting target of 80 ha to reach around 1 240 ha in 1987 (MALENDE, TEMU, 1990). The plantation was established mainly with seeds from Mtibwa, Bigwa and Trinidad, presumed to be of Tennasserim (South Myanmar) provenance (WOOD, 1967) origins. Predictions (MALENDE, TEMU, 1990) established that given these conditions, a rotation age of 60 years is adequate with a maximum MAI of about 14 m³/ha/year, and will yield approximately 600 m³ of wood/ha, of which 400 m³ should be millable (veneer logs and sawlogs).

Additional stand

In addition, the Nambiga teak plot (photo 4) planted in 1962 further southwest than the above-mentioned teak locations, although less documented, is worth mentioning as it may be a good reference for the private KVTC planting project located nearby, whose particular characteristics constitute the topic of a special joint paper. It derived most likely from the same local Tanzanian seed source which gave rise to healthy and good-performing trees overall, especially in terms of height and diameter. This small stand, no larger than 1 to 2 ha at most, appears quite uniform overall, although some individuals look superior in particular with respect to clear bole length and straightness in the absence of flutes at the base. Flute formation, which can already be reliably assessed at this age, was

observed to be much less pronounced than in teak stands visited in other countries. Surprisingly, at this age, branching did not seem to be a noticeable handicap. Self pruning seemed to work well (it is highly unlikely that the branches had been removed artificially) giving rise to tall, branchless, clear boles. Even in the crown, branch diameter appeared to be quite acceptable for teak.

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Photo 4:

Nambiga teak plot.
Photo O. Monteuis.

