Abundance, structure and uses of Baobab (*Adansonia digitata* L.) populations in Omusati Region, Namibia

F. Munyebvu *, I. Mapaure, E.G. Kwembeya

Faculty of Science, Department of Biological Sciences, University of Namibia, P. Bag 13301, 340 Mandume Ndemufayo Ave. Windhoek, Namibia

ABSTRACT

The baobab (*Adansonia digitata* L.) tree has multiple uses and is highly valued in Southern Africa, particularly in the rural communities where people depend on this resource for their livelihoods. However, few studies have been conducted on the usefulness of this high value plant species in Namibia. The aim of this study was to document the biology and local uses of baobab populations in Outapi and Onesi sites in Omusati Region, Namibia. A comparison of densities, distribution patterns, structure, phenology, stem conditions and uses of baobabs between the two sites was done.

Road transects were used to identify focal trees which in turn were used to determine the placement of circular plots. In each plot, diameter at breast height (dbh) of adult and sub-adult trees, height of adults, sub-adults and saplings and their stem conditions, number of fruits on each fruiting baobab tree, occurrence data and the land-use types where baobabs occurred were recorded.

The results revealed significant differences in the dbh-size and height classes between the two study sites. The bell-shaped distribution curve in dbh size-classes in the two sites suggests poor recruitment. The results revealed that Onesi villagers made more use of the baobab tree than Outapi urban residents. Some of the common uses of baobabs in both study sites included the use of baobab fruit for human consumption and the use of the baobab bark and leaves as livestock fodder. Additionally, the people of Outapi and Onesi use the baobab fruit and bark to treat certain ailments such as cold, flu and diarrhea.

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1. Introduction

The baobab (*Adansonia digitata* L.) tree has multiple ecological and socioeconomic uses, particularly in the rural areas of Africa where local communities heavily rely on indigenous resources for survival. It is among the nine global species of baobab in the genus *Adansonia* namely *Adansonia gibbosa* A. Cunn., *Adansonia grandidieri* Baill., *Adansonia madagascariensis* Baill., *Adansonia rubrostipa* Jum. & H. Perrier, *Adansonia perrieri* Capuron, *Adansonia suarezensis* H. Perrier., *Adansonia za* Baill. (Sidibe & Williams, 2002), as well as *Adansonia kilima* sp. nov. that was discovered in Limpopo Province, South Africa (Pettigrew et al., 2012).

Baobab products particularly seed oil and fruit pulp are increasingly being commercialized and exported around the world which has led to increased pressure on this resource (Sidibe & Williams, 2002). Sustainable management of this species is vital to avoid over-exploitation. In order to institute sustainable harvesting regimes of this species, there is a need to fully understand its biology (Venter & Witkowski, 2010). According to Gouwakinnou et al. (2009), better management decisions

can be based on the use of population structures in investigating the demographic health of harvested populations together with information related to patterns of use and harvest. Therefore, this study was aimed at understanding the population structure of the baobab, including its abundance and uses in order to improve management practices in Omusati Region, Namibia.

2. Materials and methods

2.1. Study sites

This study focused on two sites in the Omusati Region, namely Outapi and Onesi, where significant populations of wild baobabs thrive (Fig. 1). The sites were selected based on the differences in human population densities, land-use patterns and rainfall regimes. Outapi comprises mainly of an urban centre which is the capital and economic hub of Omusati Region and has the highest population density in the Region (Government of Namibia [GRN], 2011). (See Table 1.)

The region is within a semi-arid climatic zone (Mendelsohn et al., 2000). Rainfall varies greatly from year to year (Kangombe, 2010) and is restricted to the summer months (November to April). Subsistence farming is practiced by the majority of people in the Region. In the

* Corresponding author.
  E-mail address: rutendomunyebvu@yahoo.com (F. Munyebvu).
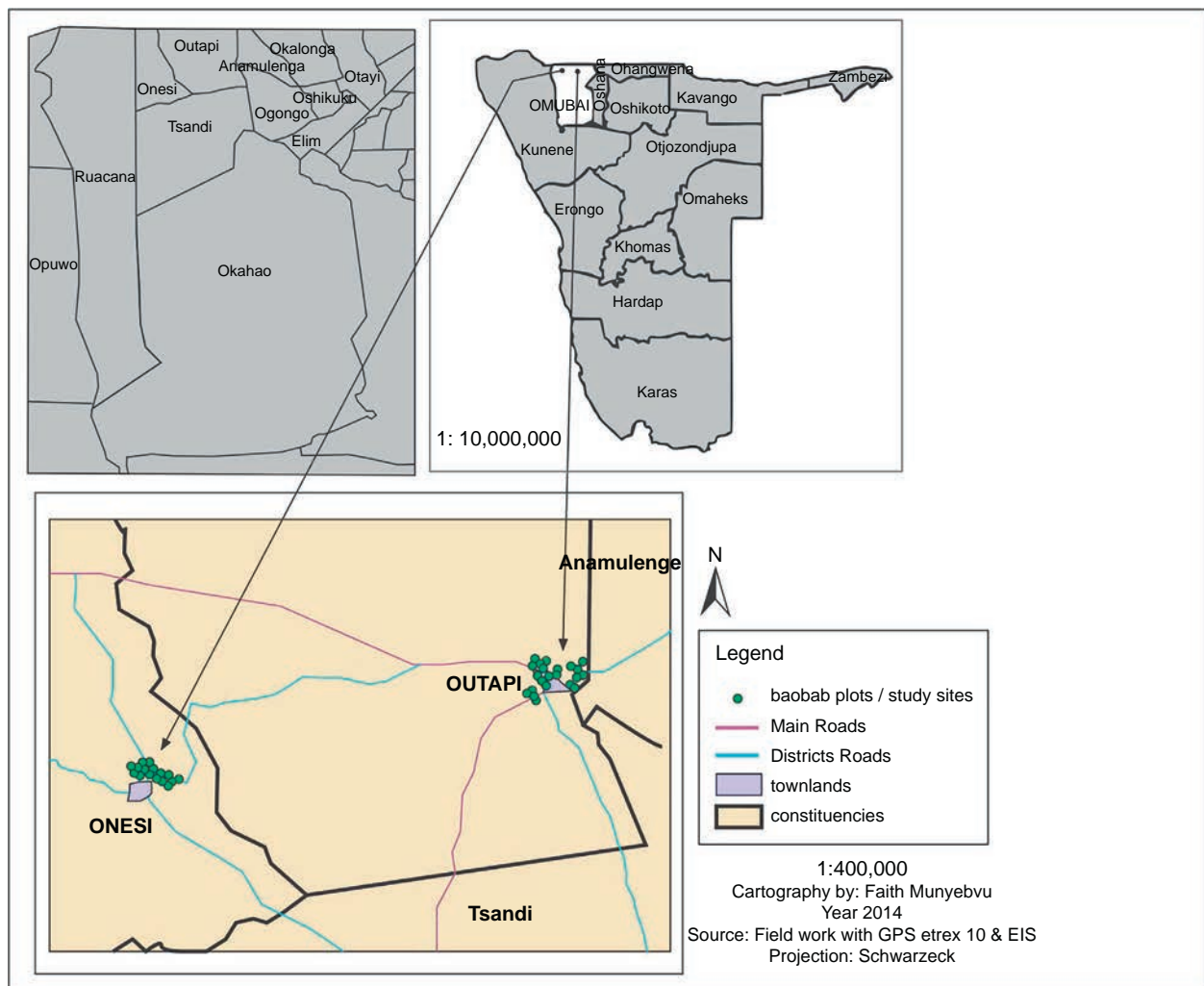
Fig. 1. Location of study area and the position of sampled baobab individuals in Omusati region.

villages, each household has a fence (barbed wire and/or brushwood) around crop-fields, homesteads and exclusive grazing areas allocated by the Traditional Authority (Mendelsohn et al., 2000). Other farming practices include large-scale subsistence farming and commercial farming on privately owned land (Mendelsohn et al., 2000).

2.2. Study species

Adansonia digitata has medicinal properties and numerous uses of various plant parts (Dhillion & Gustad, 2004; Wickens & Lowe, 2008). It is an important source of income, especially in the dry season and

Table 1
Characteristics of the two study sites where *Adansonia digitata* is distributed in Omusati region.

	Outapi	Onesi
Population	37,000	13,200
Area	985.5 km^2	601.9 km^2
Main settlement type	Urban	Rural
Main vegetation	Woodland, palm savanna	Woodland, bush mopanesavanna
Rainfall	~550–600 mm	~250–300 mm
Main soil types	Cambisols	Arenosols

Government of Namibia [GRN] (2011); Mendelsohn et al. (2000).

during times of drought (Sidibe & Williams, 2002; Duvall, 2007). The baobab is a deciduous, tropical fruit tree which ranges between 6 and 10 m in diameter for adult trees (Wickens, 1982; Chadare et al., 2009) that can reach up to 23 m in height.

The African baobab occurs naturally in most sub-Saharan countries and is especially associated with the drier parts of savanna. In West Africa, *Adansonia digitata* is found in Mali, Benin, Senegal, the Ivory Coast, Cameroon and Burkina Faso while in East Africa, the plant is found in countries such as Kenya, Uganda and Tanzania. In southern Africa, the species is commonly found in Malawi, Zimbabwe, Mozambique and South Africa especially in the warm parts of the Limpopo Province (Sidibe & Williams, 2002). Baobabs also occur in Botswana, Angola and Zambia. In Namibia, sizeable populations of mature baobabs occur in the north-western parts and smaller populations in the far north-eastern parts. Specifically, baobabs in Namibia occur mainly in parts of Kunene, Omusati, Zambezi, Kavango West and Kavango East Regions.

2.3. Experimental design and sampling

Sampling of baobabs was done in the eastern area of Outapi including within the nearby villages of Omusjii and Oukwa and the town area of Ombalantu as well as in the eastern villages of Onesi namely Oshima, Ohalumbele and Oshihau. (Fig. 1).

Road transects were used to sample baobabs in the two sites by purposely finding the next available road to gain access to the next focal tree following an approach by Mpofu et al. (2012) and Munondo