Management of Mopane in Southern Africa

Proceedings of a workshop held at Ogongo Agricultural College, northern Namibia, 26th to 29th November 1996

Edited by Charlotte Flower, Grant Wardell-Johnson and Andrew Jamieson

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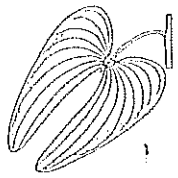
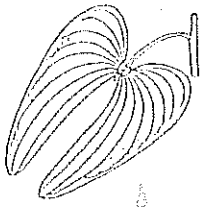
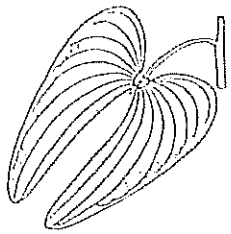




CHAPTER EIGHT

COMPARATIVE ANALYSIS OF CHEMICAL AND TRADITIONAL METHODS OF SEED TREATMENT OF MOPANE IN MOÇAMBIQUE



Natasha Ribeiro [a]

ABSTRACT

Attacks on the seeds of *Colophospermum mopane* (mopane) by the seed borer (*Araecerus* spp.) have been observed in the field and under storage conditions. There is an urgent need to evaluate an efficient low cost treatment. A study has commenced which will compare traditional with chemical treatments to recommend a more effective and low cost treatment for the storage of mopane seeds.

Keywords; *Colophospermum mopane*, Moçambique, seed borer.

INTRODUCTION

Moçambique covers an area of 784,755 km^2 extending from Tanzania in the north (10° 30' S) to South Africa in the south (26° 26' S). It is bounded by Malawi, Zambia, Zimbabwe, South Africa and Swaziland in the west and by the Indian Ocean in the east.

Seven broad vegetation types can be identified for Moçambique (Bandeira *et al.* 1994, DNFFB 1995), with about 78 % of the country being covered by woody vegetation. Miombo woodland is the largest community, occupying about two thirds of the country, principally north of the Limpopo river. *Colophospermum mopane* (Kirk ex Benth.) Kirk ex J. Léonard, commonly known as mopane, also forms a widespread woodland type and mopane woodland is the second most widespread vegetation type. Other important vegetation types include undifferentiated woodland, coastal mosaics, halophytic vegetation dominated by succulent creeping plants of *Arthrocnemum* sp., *Salicornia* sp., bushes of *Triplex* sp., *Suaeda monoica* as well as *Acacia nilotica* and grass species and swamp forests. Mangrove and intertidal forests are prominent on the coastline.

Mopane woodland occurs between the Limpopo and the Save rivers in the western part of the Gaza province and a small area of Maputo and Manica. In the north, mopane occurs in the Zambezi valley. Although it usually occurs as a pure stand, mopane woodlands also include other species such as *Commiphora* sp., *Terminalia prunioides, Combretum apiculatum, C. imberbe* and *Acacia exuvialis.* Mopane woodlands and the forest resources in Moçambique are subject to great human-induced pressures. This is reinforced by the gaps in the strategies and policies of the forestry sector. The promotion of community forests and the sustainable management of the resources that involves the participation of all forest users are the priorities of this sector. Some NGOs, such as CEAR (Comissao Espanhola de Ajuda aos Refugiados), work with people that live in the mopane woodland, mainly those which have returned to their region of origin after a long period of war. These NGOs focus on the management and use of resources by communities.

There are no current studies on mopane management in Moçambique. However, new strategies and policies of the forestry sector include investigations of forest resources. These include the creation of a National Institute of Forest Research and a Seed Production Centre. The collection and storage of forest seeds, a contribution to the management and sustainable use of forest resources, studies on biomass, management of the resources by the community of the Zambezi valley and forest regional inventory (SADC) are all seen as priorities.

The Forest Research Centre has developed studies to evaluate the viability and germination success of mopane, as well as possibilities for the effective storage of seeds. However problems of seed storage have arisen because of heavy infestations by pests (*Araecerus* spp.). There is a need to evaluate low cost and environmentally friendly treatments *versus* chemical ones. Different storage conditions have to be tested and the most efficient, lowest cost and most environmentally friendly recommended for storage cost reduction. An Honours project will be carried out addressing these issues in 1997 at the Eduardo Mondlane University and the Forest Research Centre.

The general objective of this research is to evaluate ten treatments of the viability of the seeds to reduce the cost of the storage of mopane seed. There are three specific objectives; to determine the most effective treatments including physical, chemical and natural treatments, to assess the

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effect of treatment on the viability of the seeds and to recommend the most efficient method in terms of pest control and seed viability (Rombe and Massango 1996).

METHODS

The study will be carried out between January and December of 1997 in the Department of Forestry of the Eduardo Mondlane University and the Forest Research Centre in Gaza province (fieldwork) and Maputo (laboratory work).

To fulfil the proposed objectives, the seeds of mopane will be collected in Mabalane, in the province of Gaza, where pure stands of mopane can be found. The seed collected will be mixed, then separated into treatments. Ten treatments for seed storage will be assessed during the same period of time (about three months). Each treatment will have 100 g of seeds kept in appropriate receptacles and two pairs of insects will be inserted per receptacle. The treatments will include; sand (equivalent to the weight of 100 seeds), wood ash (*Eucalyptus camaldulensis*, mopane; weight of 100 seeds), insecticide for fumigation (Dichlorvos, 0.5 ml/m^3), treated raw neem leaves (10 and 50 g), neem seed extract (10 and 30 g), tobacco leaves extract (raw); *E. camaldulensis* leaves, temperature (10 °C) and a control (blank treatment). The treatments will be replicated four times and then experimentally tested for two and three month periods. The loss of seed weight and the number of insects will be measured once per week, during this period.

Seed viability after treatment will be assessed by germination tests under laboratory and field conditions. A completely randomized design will be used for the laboratory experiments while a randomized block design will be used for evaluating germination in the field. ANOVA will be used to detect differences of variances between treatments. Pest identification will be made with the collaboration of the University of Tuscia in Italy.

The determination of the most efficient and environmentally friendly treatment for seed borer control under storage, the reduction of the costs of seeds storage and a better knowledge of the mopane seed borer biology and habits in Moçambique are expected outputs from this research.

ACKNOWLEDGEMENTS

I am thankful to Romana Rombe and Henrique Massango, for the opportunity to participate in the workshop and to present this project and the editors of the workshop proceedings for their editorial comments.

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ISSUES RAISED DURING PARTICIPANTS' DISCUSSION

Natasha Ribeiro

Is the experiment related to a programme of raising mopane in plantations or direct sowing of mopane in the forest?
They would like to embark on a planting programme of seedlings.

What losses in viability have been experienced, and what are the germination rates?
Up until now they only have a qualitative indication that they are losing a lot of seed due to infestation. The presenter did not have any information on germination rates.

What are the experiences of other countries with plantations of mopane?
We may need to discuss whether plantations need to be developed. Alternatively, should we focus on management?

This is a storage pest, but the infestation starts in the field. The loss of viability comes from borers attacking the embryo. A weekly loss of weight may not necessarily be a useful parameter to measure; most important is the loss in viability. To investigate seed pests, we need to collect seeds at different stages of ripening and see which is the dominant pest in the area and whether they are affecting the embryo and therefore germination.

Pedro Mangue[b]

Approximately how much of Moçambique is mopane woodland?
78 % of Moçambique is natural forest and the country has an area of 800,000 km^2. Mopane woodland is estimated at 5,000,000 ha.

Do [traditional] herbalist use mopane as herbs?
No. Herbs grow underneath the mopane.

Aren't there any donkeys?
Very few. People use cattle-drawn carts to transport their products and water. An NGO has introduced sledges, which have become problematic as they leave tracks on the ground. The presenter was very surprised to see so many donkeys in Namibia.
[It was commented that these sledges have been outlawed in

Zimbabwe because of the erosion that they cause].

What is the average rainfall?
400 - 600 mm per year.

What types of crops are grown in Moçambique?
Maize, millet, sweet potatoes along the river and pumpkins.

Do you have any idea how much woodland has been damaged?
People only started cutting mopane in 1992. So the woodlands are not yet very degraded but it is foreseen in the future. They have been cutting on one side of the rail road as the other is mined.

[b] Pedro Mangue gave a brief overview of the mopane resource and its management in Moçambique. He did not submit a written paper and Natasha Ribeiro covered some of the points in her introduction. However, discussion related to Mangue's presentation is included here.
Pedro Mangue, Forestry Research Centre, INIA, P O Box 3658, Maputo, Moçambique

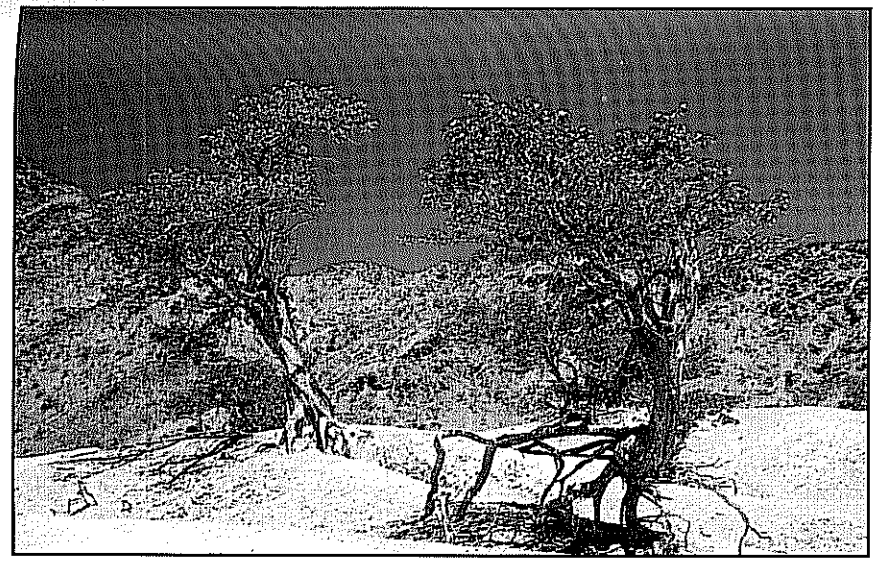
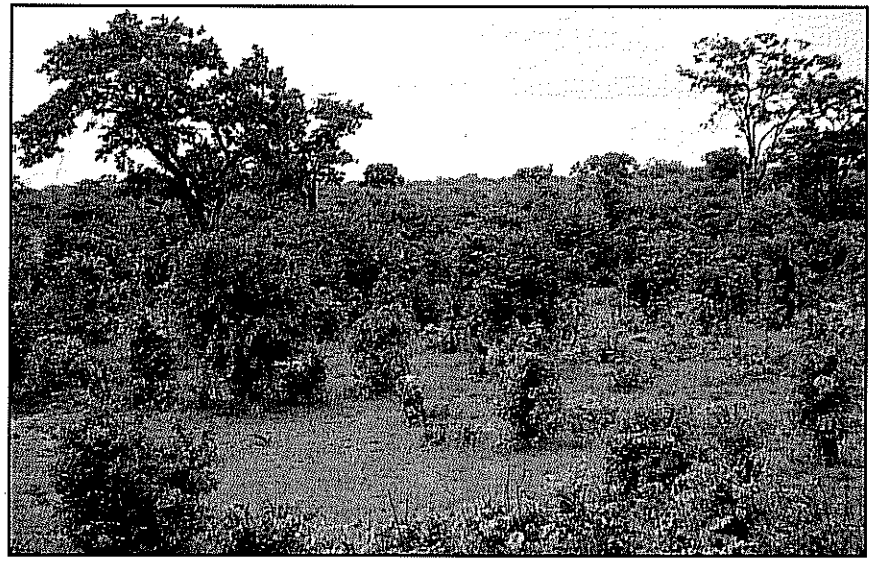


Plate 9: Mopane as a survivor, growing in alluvial wash area, north-western Namibia.

Plate 10: Elephant (*Loxodonta africana*) damage to mopane woodland, Kwange National Park, Zimbabwe. Note the vigorous coppicing.



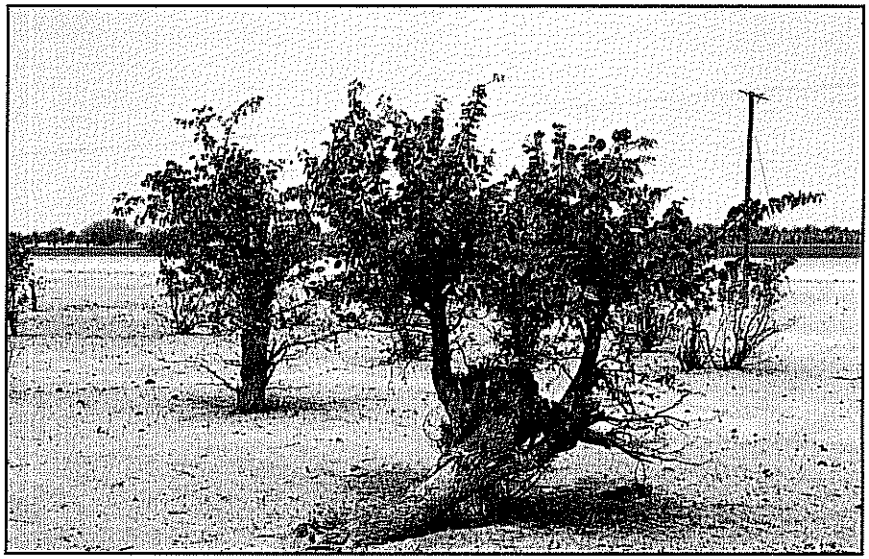
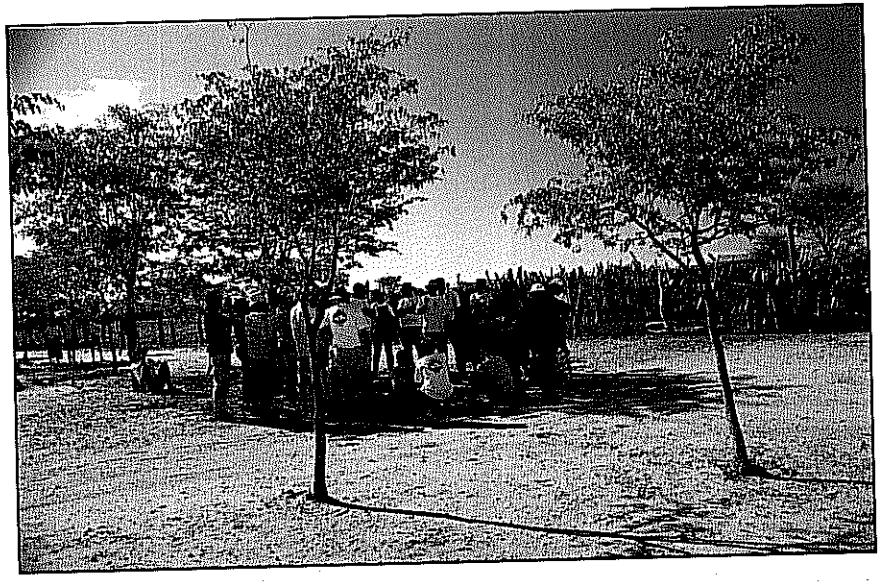


Plate 11: Mopane reshooting after cutting, in northern Namibia.

Plate 12: Cutting mopane foliage as fodder for livestock, in northern Namibia.

Plate 13: Two farmers applying treatments at the DoF / DAPP mopane coppice management trial at Ombalantu, northern Namibia (Andrew Jamieson).

Plate 14: Participants of the workshop visiting the farm and homestead of Mr. Pineas Aindongi, in Onangholo, northern Namibia.



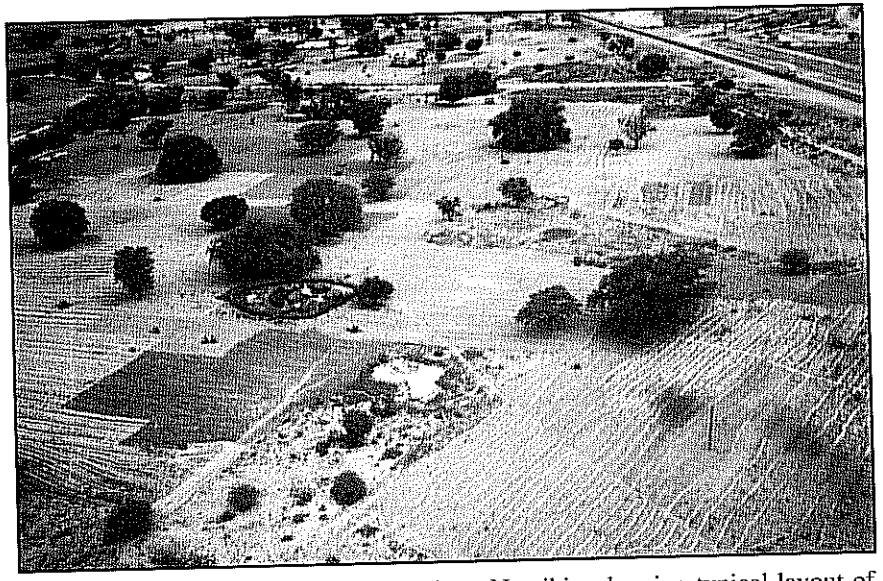


Plate 15: Aerial view of farms in northern Namibia, showing typical layout of the homesteads, tree clearance patterns as well as retention of large fruit trees, such as *Berchemia discolor.*

Plate 16: Managed mopane trees at the farm of Mrs Lahja Taipopi, Onangholo, northern Namibia.