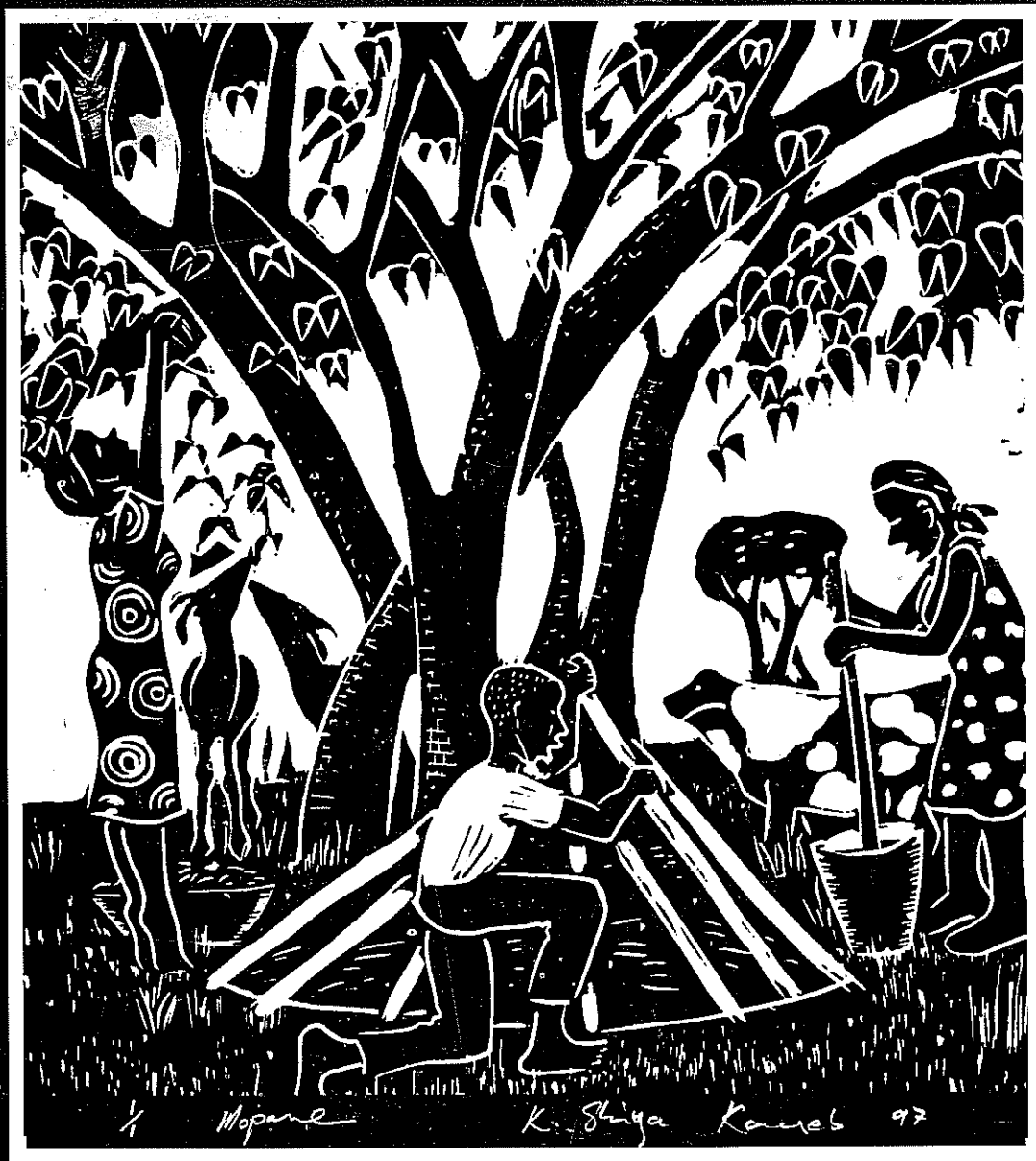


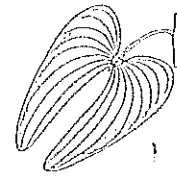
# Management of Mopane in Southern Africa

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

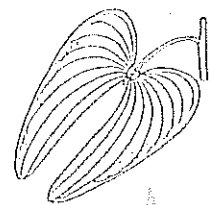
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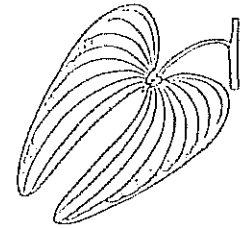
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CHAPTER SEVEN

# THE EXPLOITATION AND UTILIZATION OF MOPANE ROOT STEMS: A CASE STUDY FROM NORTHERN NAMIBIA



Walter Piepmeyer <sup>a</sup>

## ABSTRACT

Currently, subterranean stems of *Colophospermum mopane* (mopane) are being harvested in northern Namibia without any knowledge of an annual sustainable harvest volume. This study was carried out to determine the existing level of resource in the Outjo District of Namibia. At the current annual rate of exploitation, using a conservative estimate of 96,100 available tons, there are sufficient subterranean stems to provide for 104 years. This does not take into account the formation of new stems or the decay of existing subterranean stems.

**Keywords;** *Colophospermum mopane*, subterranean stems.

## INTRODUCTION

In Namibia, mopane (*Colophospermum mopane* (Kirk ex Benth.) Kirk ex J. Léonard), occurs in the north-western areas adjacent to the Namib Desert and as a small patch in the eastern Caprivi (Giess 1970, Mapaure 1994, Fig. A). Mopane occurs over an estimated area of 7.7 million ha in Namibia (Mapaure 1994). However, subterranean stems of mopane are only found in the northern Outjo district where mopane occurs as a shrubland (Fig. B). This shrubland occurs on mixed limestone and black turf soils. The subter-

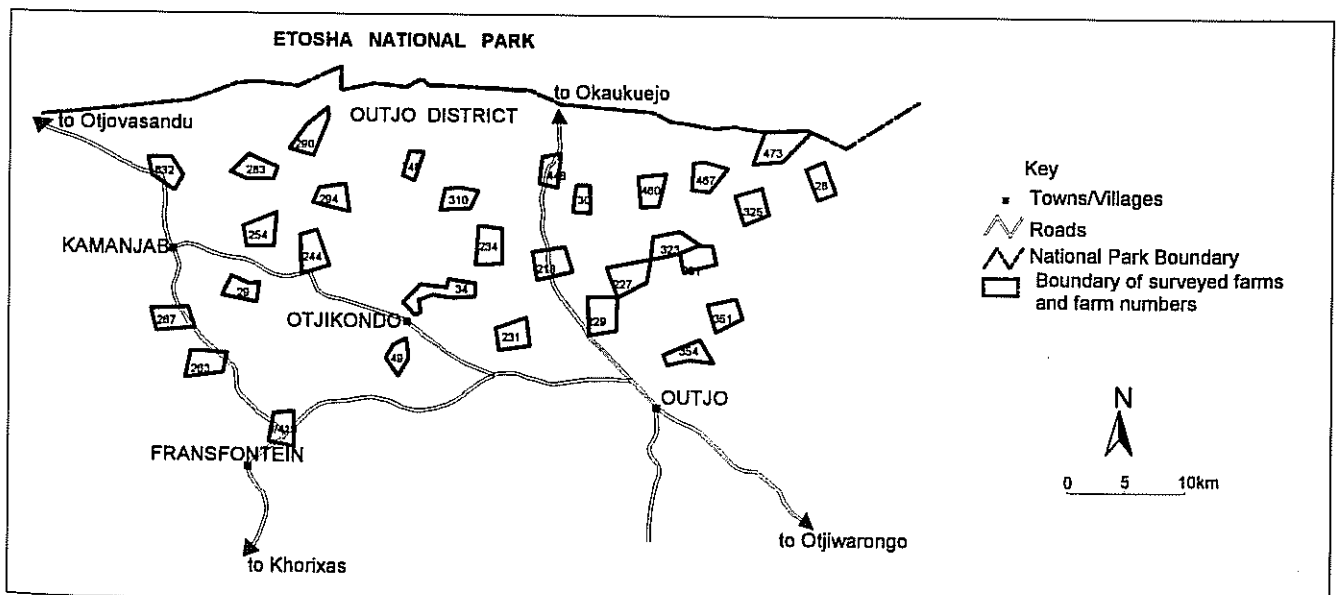
anean stems are presumably formed when the shoot is killed by frost, fire or drought, or these factors acting in combination, leading to stems continuing to grow horizontally under the soil surface until conditions favour shoot formation. Once these subterranean stems die off, the soil covering them is removed by wind or water, and they lie partially exposed. The exposed part decomposes leaving a multicoloured rough surface of sapwood and heartwood. At this stage these stems are collected, sandblasted and marketed as ornaments.

According to the Forest Act (Act 72 of 1968) of Namibia, mopane is classified as a protected species, requiring permits for commercial harvesting. The study was undertaken to determine the approximate sustainable yield of subterranean stems of mopane in the Outjo District. This will allow for the protection of the resource from over utilization.

## METHODS

The northern Outjo District was chosen for the survey as it has the highest occurrence of the subterranean stems and is also the area where commercial exploitation of subterranean stems is currently taking place. The study area comprises 333 commercial farms covering an area of 1,825,466

Fig.7.1: Map showing farms in Outjo district that were included in the mopane root survey



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**Table 7.1: Details of the farms surveyed and the mopane root resource in northern Namibia.**

<b>Farm Name</b>	<b>Farm No.</b>	<b>Area (ha)</b>	<b>Plots</b>	<b>live stems /plot (± SE)</b>	<b>sub.stems / plot (± SE)</b>
Rustig	632	6,062	30	126.3 ± 44.43	1.89 ± 0.51
Vryheid	269	3,599	18	46.78 ± 12.26	1.78 ± 0.60
Paderborn	263	5,095	25	30.11 ± 5.17	1.44 ± 0.85
Vaalwater	283	2,948	15	156.11 ± 37.61	2.78 ± 1.38
Sendeling	254	6,950	35	77.89 ± 18.24	3.67 ± 1.44
Uries Ekango	29	5,003	25	24.44 ± 5.52	1.56 ± 0.97
Orpheus	419	4,620	24	33.44 ± 9.02	1.89 ± 0.56
Uitkoms Oos	290	7,428	38	45.78 ± 14.40	2.44 ± 0.63
Welkom	294	2,841	14	47.00 ± 5.00	1.11 ± 0.35
Gruis	244	7,501	38	78.44 ± 19.28	1.44 ± 0.38
Verlos	305	2,654	13	47.56 ± 17.18	0.78 ± 0.36
Elandsput	34	5,929	30	30.78 ± 12.43	1.11 ± 0.35
Gewagd	49	3,905	20	82.67 ± 19.78	4.56 ± 0.97
Boshoek	310	5,464	27	40.78 ± 11.18	3.56 ± 0.96
Buschberg	234	7,887	38	60.22 ± 11.68	1.78 ± 0.86
Prosit	231	1,772	9	114.44 ± 19.77	0.89 ± 0.31
Vergenoeg	448	4,750	24	76.67 ± 11.17	6.11 ± 0.98
Tsobaas	218	3,973	20	90.22 ± 16.15	3.22 ± 1.08
Blaukranz	730	3,447	17	39.33 ± 5.02	1.67 ± 0.55
Hartebeesput	229	5,966	30	27.00 ± 15.91	0.56 ± 0.44
Goanab	227	3,214	16	119.11 ± 29.04	1.78 ± 0.78
Heimwee	460	6,285	31	53.89 ± 5.32	4.67 ± 1.45
Winnie	323	7,550	38	179.44 ± 38.23	1.11 ± 0.42
Sondernaa	467	3,452	17	83.89 ± 14.91	4.00 ± 0.76
Cunningham	331	6,190	31	65.44 ± 24.13	3.11 ± 0.77
Franklin	351	5,761	29	33.56 ± 8.11	0.44 ± 0.24
Mountbatton	354	3,143	16	63.89 ± 27.19	6.56 ± 1.83
Dempsey	325	6,421	32	92.22 ± 14.20	0.56 ± 0.29
Grensplaas	473	7,770	39	96.44 ± 13.93	6.00 ± 1.74
Patton	328	6,570	33	75.00 ± 27.06	6.56 ± 1.83
<b>Totals</b>		<b>154,150</b>	<b>772</b>		
<b>Average of all plots</b>				<b>70.55 ± 2.20</b>	<b>2.46 ± 0.11</b>

ha (Fig. 7.1). The survey area has an average rainfall of 350 mm in the west to 500 mm in the east and is utilized for livestock farming.

Thirty farms were selected randomly from the study area (Fig. 7.1) to provide an estimate of the available resource in the area. On each of these farms, five sample plots of 500 m<sup>2</sup> per 1,000 ha of farm area were chosen randomly. Cultivated lands, roads, areas within 600 m of watering points and areas where mechanical deforestation had taken place were avoided. The plots were 5 m x 100 m. All live mopane stems and all visible subterranean stems were recorded.

During the survey 1,053 subterranean stems were collected to determine average mass. A further 608 subterranean stems were randomly collected from a stockpile of subterranean stems at a commercial exploitation collection point on the farm Heimwee 460 in the Outjo District. This was carried out to allow comparison between the average mass of subterranean stems in the survey and the average mass obtained by the commercial collectors. In total 772 plots were established, giving a 0.002 % sample of the study area.

## RESULTS

Twenty-one of the 772 plots had no live mopane plants and 255 had no visible subterranean stems. The number of plots per farm varied from nine to thirty-nine and farm area from 1,772 ha to 7,887 ha (Table 7.1). The average of live stems and subterranean stems was consistent between plots.

The average mass of the subterranean stems collected in the survey was 1.07 kg, while those from the Heimwee stockpile had an average of 1.8 kg. Using the average 2.46 subterranean stems per plot, the calculated number of subterranean stems per hectare is 49.2.

## DISCUSSION

Only visible subterranean stems were recorded. There are likely to have been subterranean stems that are buried deeper and thus out of sight. All measurements and calculated estimates therefore refer to the visible resource at the time of the survey.

Using the calculated average subterranean stems per hectare of 49.2 and the survey average for subterranean stems of 1.07 kg, gives a total of 96,100 tons in the northern Outjo District. If one were to use the average mass of 1.8 kg from the Heimwee sample, this would go up to 161,663 tons, an increase of 65,563 tons (68 %). It is also important to remember that if the lower of the survey ranges is used there are only 91,802 tons compared to 100,397 tons when using the higher limits. The higher average mass for subterranean stems from the Heimwee stockpile can be accounted for by the lack of tools used for digging in the survey, thus avoiding the larger more firmly rooted ones, while tools were used in collections for the Heimwee stockpile. In a commercial collection tools are used to assist digging up the subterranean stems. It would thus not be an over estimate to use the higher average mass from the Heimwee stockpile.

At the current rate of N\$250 per ton paid to farmers for these subterranean stems and using the survey averages, there is a potential income of N\$24,025,000, providing the market could absorb such a large volume.

During the period 1 November 1995 to 31 October 1996, only 922 tons were officially marketed. At this annual rate of exploitation, using the average estimate of 96,100 tons, there would be sufficient subterranean stems for 104 years, but only a stock for 100 years, using the lower limits. This does not include any new formation or decay of the existing subterranean stems.

## CONCLUSIONS

At the current annual rate of exploitation of 922 tons, there is no immediate cause for concern regarding over utilization. However we do not know how old these subterranean stems are and why they are formed. It is recommended that the maximum annual exploitation rate be kept below 2,000 tons, ensuring supply for at least 50 years (using averages, and disregarding new growth and decay) and at the same time research be conducted on determining the age and rate of regeneration of subterranean stems in mopane.

## ACKNOWLEDGEMENTS

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