

MAJOR PROBLEM - BUSH SPECIES AND DENSITIES IN NAMIBIA

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SUMMARY

Information on the extent of bush encroachment is largely based on estimates which are not always reliable and are often conflicting. The original estimated area affected by bush encroachment within the commercial farming sector is in the order of 8 million hectares. It can however be accepted that in the commercial farming sector the area north of 23° latitude is to a greater or lesser extent affected by bush encroachment. The total area concerned is therefore in the order of 17,5 million hectares. Various maps have been compiled indicating the encroacher species and numerous estimates have been made of bush densities in the different areas. Field surveys indicated that within a vegetation type, bush densities can vary from 2900 bush per hectare to 21 400 bush per hectare. In order to compile an accurate map of the extent of bush encroachment, extensive surveys will have to be conducted in the field.

INTRODUCTION

Not only is the extent of bush encroachment enveloped in a certain amount of obscurity but also losses in terms of animal products as a result of increased bush density. The actual decrease in the carrying capacity of rangeland as a result of bush encroachment cannot be measured as it is practically impossible to determine the natural density of bush under different environmental conditions. The actual annual losses in animal products due to this decrease in carrying capacity of the rangeland is also difficult to estimate. The natural density of bush in the different bushveld types is not known, nor can the deterioration of the sward be assessed accurately. It is however an indisputable fact that the production per unit area can be improved materially by the effective control of bush (Van der Schyff, 1956).

Information on the extent of bush encroachment is largely based on estimates which are not always reliable and are often conflicting (Van der Schyff, 1956). Van Niekerk & Bester (1979) originally estimated the area subjected to bush encroachment in the order of 8 million hectare, of which 5,3 million hectares are seriously infested (National Reclamation Strategy, 1988). Other estimates of the degree of bush encroachment in Namibia are in the order of 15 million hectares, representing almost 50 percent of the commercial farming area of 34,89 million hectares (Adams & Werner, 1990; Quan, Barton & Conroy, 1994). Depending on the degree of encroachment, carrying capacities have declined between 20 and 90 percent (Van Niekerk, 1980; National Reclamation Strategy, 1988). The increase in grass production that have been reported, vary between 50 percent to 200 percent. (Joubert, 1966; Loubser & Kotze, 1967 and Van Niekerk & Kotze, 1977).

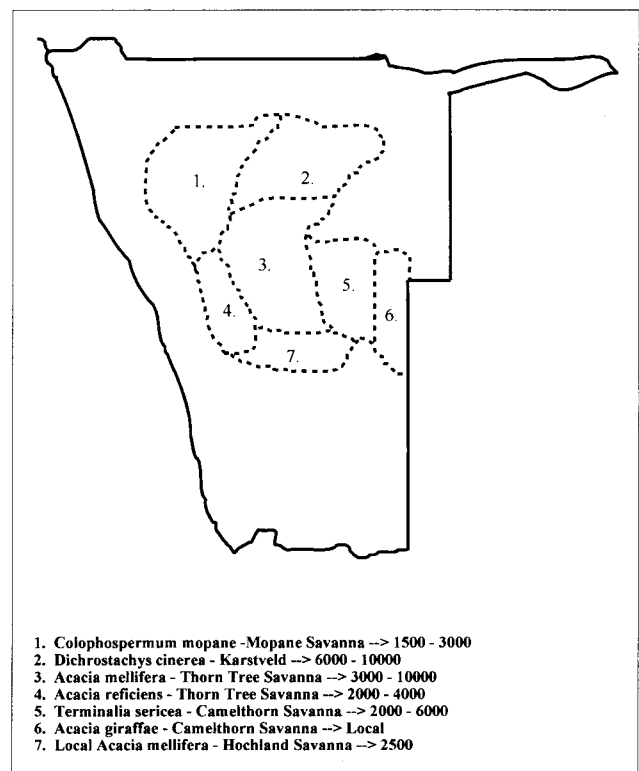
Dichrostachys cinerea (sickle bush) and *Acacia mellifera* (black thorn) have the ability to change a vegetation type, consisting of various species to predominantly either black

thorn or sickle bush thickets. These two species can therefore be regarded as aggressive encroachers. Other species which can be regarded as local encroachers are *Terminalia prunioides* (purple-pod terminalia), *Terminalia sericea* (silver terminalia), *Colophospermum mopane* (mopane), *Acacia erubescens* (blue thorn), *Acacia fleckii* (blade thorn) and *Acacia reficiens* (false umbrella thorn).

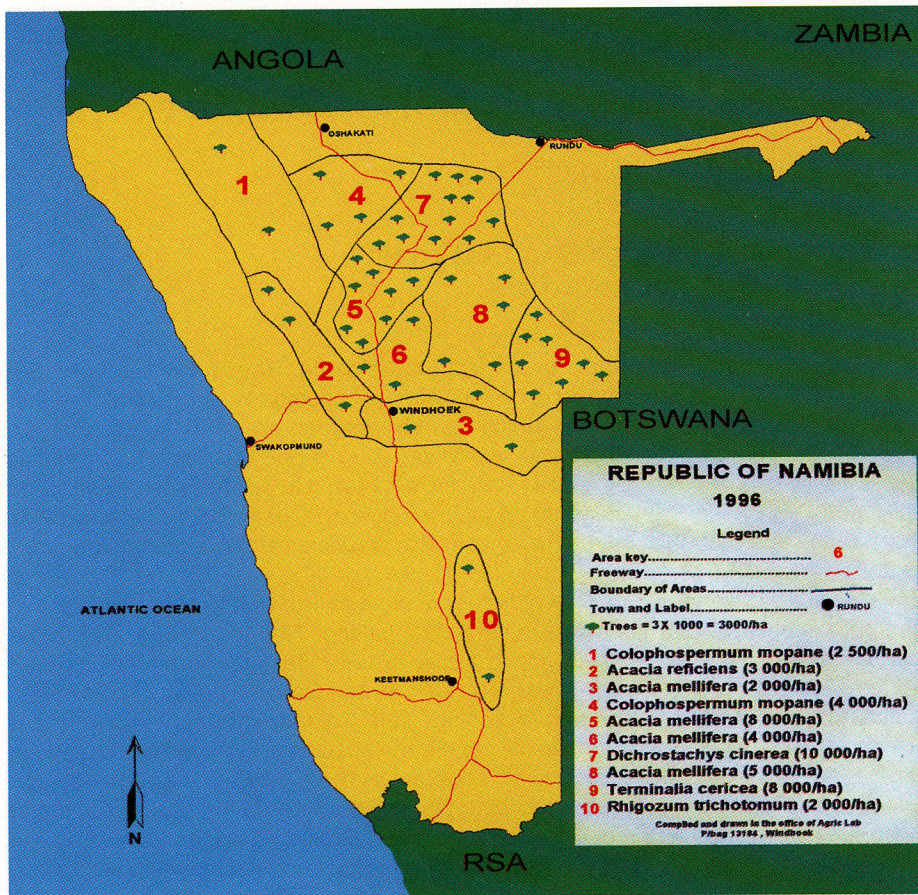
It is not only thorny species like Acacias that increase in numbers in natural rangeland. Non-thorny species may be equally and in certain areas under specific conditions even more dangerous (Van der Schyff, 1956). In Namibia *Terminalia sericea* and *Colophospermum mopane* are examples of non-thorny species which tend to increase in numbers or coppice in their original habitat through injudicious chopping or burning. Although not a major problem, the fodder bush *Grewia flava* (Brandy bush) also has the ability to form thickets and suppress grass growth.

Maps of the distribution of the major problem: - bush species and estimated densities in the commercial farming sector

Bester & Van Wyk (1981) compiled a map indicating the distribution of the major problem - bush species and the densities of the bush in the different areas where they occur. In map 1 seven different problem areas with the different species which tend to encroach, have been identified. The map is based on the vegetation map of Giess (1971). The



MAP 1: BUSH THICKENING IN NAMIBIA



MAP 2: MAJOR PROBLEM BUSH SPECIES AND DENSITIES

assumption is that the dominant bush species of the different vegetation types have the ability to increase in numbers and become a problem. Bush densities allocated to the different problem areas were based on actual surveys and estimates of bush densities, to determine the dosage of herbicide that should be applied during the aerial application of Tordon 225. The total area concerned (determined with a planimeter) is approximately 19,7 million hectares (Table 1). The two aggressive encroachers namely *Acacia mellifera* and *Dichrostachys cinerea* comprise an area of 9,2 million hectares.

Map 2 indicates ten areas with different densities of bush (Bester 1996). The total area of concern is 17,5 million hectares. This figure represents the whole commercial farming sector north of 23° latitude. The total area comprised by the high and medium cattle production area, erosion area and the mixed sheep and cattle farming area as indicated in the map of the homogenous farming areas of Namibia (Anon, 1979), corresponds with above mentioned area and calculates to 17,8 million hectare. It would therefore be safe to say that in the commercial farming sector approximately 17,5 million hectares are to a greater or lesser extent encroached by bush. This area does not include the communal farming sector and the area in the south where *Rhigosum trichotomum* (driedoring) is a problem species.

Various maps of the areas concerned with problem bush species have been compiled and estimations of the extent of bush encroachment have been made. Lubbe & Slater (1985) compiled a map similar to the map of Bester & Van Wyk (1981). They identified five major problem areas which totaled eight million hectare (Table 1). Erkkila & Siiskonen (1992) compiled a map of the major problem bush species which tend to encroach. They modified the map of Lubbe and Slater (1985), identifying *Acacia hereroensis*, which is

common to the Hochland savanna, as the major problem species in the west (Area 4 - Map 1). Quan, Barton & Conry (1994) also compiled a map indicating the regions of the country which are most susceptible to bush encroachment. Kambatuku (1994) quotes Marsh (1990) who estimates a surface area of 14 363 hectares which is encroached with bush densities of 1500 bush per hectare and more. Estimates of the total surface area affected by bush encroachment in selected commercial farming districts are presented in Table 2.

Van der Schyff (1956) justly states that, the extent of bush encroachment and losses in terms of animal products as a result of increased bush density is enveloped in a certain amount of obscurity. Large areas of the Thorn Tree savanna are subjected to the natural die back of black thorn. Range condition in these areas with regard to the herba-ceous layer has not necessarily improved for the better, making it difficult to relate losses in animal production due to bush encroachment with range

condition. Current herbaceous composition is related to spatio-temporal variation in the interplay of contingent factors (Mentis, Grossman, Hardy O'Connor & O'Reagain, 1989). Rainfall has an over-riding influence on annual grass production (Bester, 1993) and composition (O'Conner, 1985), therefore carrying capacity and animal production will inevitably vary from one year to another.

Surveys recently conducted by Bester & Reed (1997) in the

TABLE 1: ESTIMATED AREA AFFECTED BY BUSH ENCROACHMENT IN THE COMMERCIAL FARMING SECTOR.

PROBLEM AREAS	1	2	3	4	5	6	7
Areas infested (million ha) (Bester, 1981)	4,9	3,4	5,8	1,1	1,1	1,2	2,2
Area infested (million ha) (Lubbe & Slater, 1985)	0,5	2,0	4,0	0,5	1,0	-	-

TABLE 2: ESTIMATED AREA AFFECTED BY BUSH ENCROACHMENT IN SELECTED COMMERCIAL FARMING DISTRICTS (ANON, 1986).

District	Size (ha) (x1000)	Estimated infestation (percentage)	Total bush infestation ha (x1000)
Grootfontein	2 565	80	2 052
Tsumeb	894	90	805
Otjiwarongo	1 955	75	1 466
Outjo	2 628	50	1 314
Okahandja	1 432	50	716
Gobabis	4 039	50	2 020
Omaruru	850	30	255
Total	14 363	68	8 628

vicinity of Tsumeb indicated bush densities varying between 2900 bush per hectare to 21 400 bush per hectare. These surveys also indicated that in a natural stand, *Terminalia prunioides* is the dominant bush species over large areas in the Karstveld. *Dichrostachys cinerea* and *Acacia mellifera* dominate on those areas that have previously been disturbed. Surveys conducted by Bester and Calitz in the same area indicate variations in bush densities and composition within a camp (Bester, 1993).

CONCLUSION

Composition of the bush and bush densities does not only vary within a vegetation type but also in camps on a farm. Extensive surveys will therefore have to be conducted in order to compile an accurate map of the actual extent of bush encroachment in Namibia. Accurate assessment of the deterioration of the sward in the different vegetation types will be needed in order to be able to estimate the losses in animal production due to a decrease in carrying capacity. Bench mark sites in the different vegetation types can be used to estimate the potential of an area and the present situation can be measured against these bench mark sites. These estimates based on the potential will not necessarily be correct and can vary from one year to another. Rainfall has an over-riding influence on annual grass production and therefore carrying capacity and animal production will vary from one year to another. Where bushes have died back due to the fungus *Phoma glomerata*, grass composition and production has not necessarily improved for the better.

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