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THE INFLUENCE OF VELD FIRE ON AN *Acacia erioloba* COMMUNITY IN THE KALAHARI GEMSBOK NATIONAL PARK

P. T. VAN DER WALT*

Department of Research and Information
National Parks Board of Trustees
Private Bag X402
Skukuza
1350

E. A. N. LE RICHE

Kalahari Gemsbok National Park
Private Bag X5890
Gemsbokpark
8815

Abstract – The effect of a single fire during November 1976 on the survival of an *Acacia erioloba* community in the dry Nossob River valley in the Kalahari Gemsbok National Park was monitored at three sites from 1977 to 1982. Approximately one third of the trees in each site died on account of the fire, while almost 50% suffered varying degrees of fire damage. The most extensive fire damage occurred amongst fully grown trees.

Introduction

Veldfires are common seasonal phenomena in most southern African ecosystems (Trollope 1981). Even in dry zones like the southern Kalahari conservation areas with a mean annual rainfall of 233 mm, natural as well as man induced fires occur. Fires have been recorded during 1934, 1968 and 1974/5. Exceptionally high rainfall was experienced during the same period.

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* New Address
Directorate of Nature Conservation and Recreation Resorts
Private Bag 13306
Windhoek
9000

Every year, extended veldfires, mainly man induced, occur in the northern parts of the Kalahari system where the annual rainfall exceeds 500 mm, as is the case in Bushmanland and the Kavango regions of South West Africa.

In both conservation areas of the southern Kalahari *i.e.* the Kalahari Gemsbok National Park (KGNP) in the Republic of South Africa and the adjoining Gemsbok National Park (GNP) in the Republic of Botswana which in total covers an area of approximately 36 200 km^2, fire is not applied as a management tool in these areas. The motives for formulating a fire policy as described by Trollope (1981) do not apply to these areas. In general abnormal thickening of shrubs and accumulation of organic material do not occur in this ecosystem.

During November 1976, the Nossob River valley was harassed by a veldfire originating from the "binneveld" and covering a wide front. It extended from Jan se draai in the south to just south of Kwang Pan in the north. This report documents the short term influence of fire on the survival in a camelthorn tree (*Acacia erioloba*) community situated in the dry river valley. From records it is known that the Nossob River flows only once in about 50 years.

This study was undertaken for two reasons. Firstly because of the nutritional value of the trees in the Auob and Nossob River valleys and secondly, from an esthetic point of view, this area is important, as the main tourist routes follow the riverbed.

Method

Three sites were chosen along the Nossob River where recovery of *A. erioloba* trees was monitored for the period April 1977 to March 1982. The sites, with varying sizes, were located between the tourist road in the KGNP and the fire-break road that had been scraped on the GNP side after the fire, to prevent future damage in the Nossob River valley. The location of the three sites are: (a) 1,8 km upstream and north-west from Jan se draai windmill, (b) 2,1 km upstream from Dikbaardskolk windmill to 5,2 km to the north of that point and (c) from Kaspersdraai windmill upstream (north-west) for 3,1 km.

During April 1977 the number of burnt and unburnt *A. erioloba* individuals were recorded on each site. The burnt trees were classified into three categories; those that had been burnt to ashes; those totally dead, but still retaining its phenotypic growth form and those which were only partially mutilated. The latter group was divided into large, medium and small categories with an estimation of the percentage of dead material to fall into one of the following intervals: 0-25%, 25-50%, 50-75% and 75-100%. A number of trees with a reasonable chance to survive, were marked in order to monitor their recovery more specifically.

In succeeding years, every tree in the three plots was classified as either living or dead and categorized according to height and percentage of damage. The same applied to marked trees.

Results and discussion

In all three sites, nearly one third of the trees were killed (Fig. 1), while nearly 50% suffered from different intensities of burning. This implies that the *A. erioloba* communities in the rivers of the Kalahari are not particularly fire resistant.

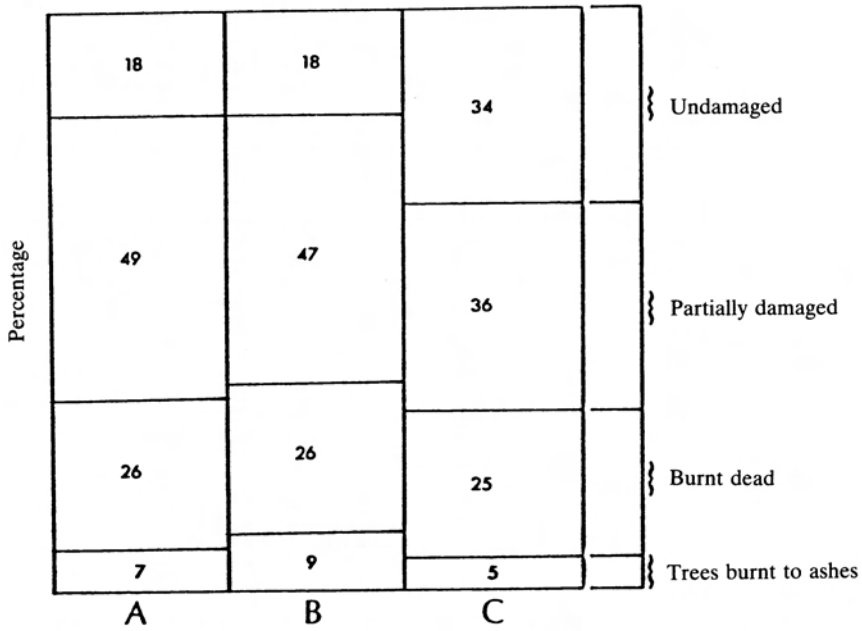

Fig. 1. Summary of the initial influence of a veldfire on an *Acacia erioloba* community at three sites (A, B and C) along the Nossob River valley in the Kalahari Gemsbok National Park. Data collected in November 1976.

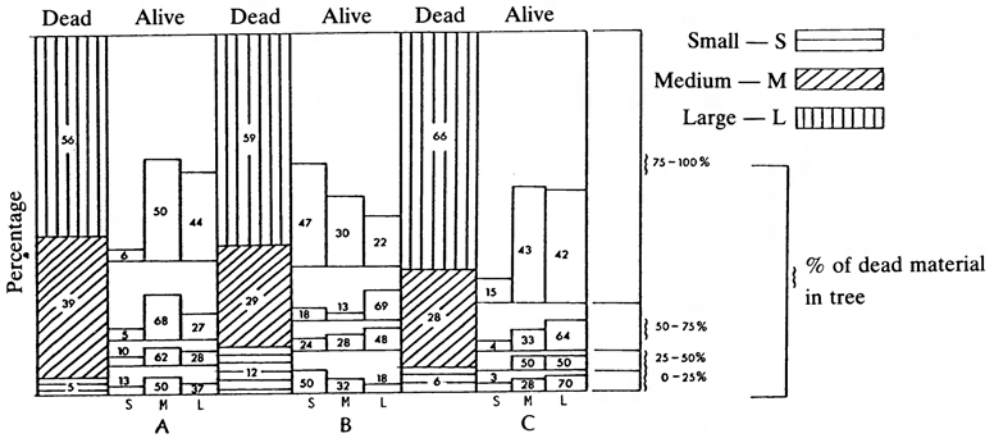

Fig. 2. Average influence of a fire (November 1976) on an *Acacia erioloba* community from 1977 to 1982 as determined at three sites (A, B and C) along the Nossob River valley in the Kalahari Gemsbok National Park. Trees, alive or dead, or partly alive (0-25%, 25-50%, 50-75% or 75-100%) are classified into large, medium and small for each of the sites.

Just how vulnerable older trees are to fire can be illustrated from the fact that a relatively high percentage of trees were burnt to ashes as well as the fact that none of the marked trees survived more than a year. The sensitivity to fire of trees growing in the riverbeds compared to those growing in the "binneveld", can be ascribed to the following reasons:

1. Trees in the river grow tall, up to 15 m, because of more favourable growth conditions.
2. The annual grass, *Setaria verticillata* which grows lusciously under the trees during high rainfall years, leaves a dense mass of highly inflammable organic matter.
3. The nest building activities of the tree rat (*Thallomys paedulcus*) often causes heavier side branches to break during commonly occurring whirlwinds and thus exposes the soft pith of the stem to fire. The nesting material as well as the thick bark of the trees are also highly inflammable.

From Fig. 2 it is clear that most of the dead trees fall in the large tree category and that the most severe fire damage was done to trees in the "large" and "medium" sized categories. Trees in the "small" category suffered severe damage only at Dikbaardskolk.

Furthermore the important influence of fire on the *A. erioloba* community can be illustrated by the fact that 75% of the living trees were killed. The smallest percentage of cases had less than 25% damage. If it is taken into account that only 18% of the trees in the first two plots and 34% in the third plot have been undamaged by fire (Fig. 1), it is clear that in this case fire has had a considerable impact on the *A. erioloba* community.

Considering the esthetic and biological importance of the *A. erioloba* community the question if such areas should be protected against hazards like fire, should receive high definite priority.

REFERENCE

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