

An autecological study of the Marula (*Sclerocarya birrea*) in the Kruger National Park with specific reference to the relative impact from elephants and fire.

by

Olga Sanet Jacobs

Submitted in partial fulfillment of the requirements for the degree of
Magister Scientiae (Wildlife Management)

in the

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Faculty of Biological, Agricultural and Information Sciences
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Supervisor: Prof. W. van Hoven
Co-supervisor: Prof. G.J. Bredenkamp

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Dedicated to my mother

“It’s funny how those once so close and now gone, still so effect our lives.....”



ABSTRACT

The South African National Parks expressed the need to implement autecological studies on specific rare indicator plant species to determine habitat requirements and sensitivity to disturbances. Previous vegetation studies in the Kruger National Park have shown a dramatic decline in the density of large trees in four major vegetation units of the Park. *Sclerocarya birrea* subsp. *caffra* (marula), one of the preferred tree species of elephant (*Loxodonta africana*), is considered as one of the more sensitive tree species in the Kruger National Park. The current damaged condition and reduction of mature marula trees in the Kruger National Park gave rise to a study on the marula population. There is a strong possibility that the problem is complex - elephants are probably killing the large marula trees by debarking them or pushing them over, while fire is preventing young trees from becoming established. The severe impact that elephants have on marula populations has been documented in private protected areas in the South African Lowveld, and the inclusion of the effects and interaction of fire in this study is the general recognition that elephants and fire can have a highly significant impact on vegetation structure. This study, therefore, focused on the marula population structure, with specific reference to the impact of elephants and fire in four major landscapes of the Kruger National Park.

Results of this study indicated that regeneration has been taking place uniformly throughout the landscapes, but that a combination of factors is preventing successful recruitment into the upper canopy. It is further indicated that diversity of vegetation plays an important role in determining herbivory pressure, and consequently influencing the marula population structure. The marula population in the *Colophospermum mopane* shrubveld has become virtually extinct, while the marula populations throughout the rest of the landscapes does not appear to be in a sustainable condition. More than half of the population surveyed suffered predominantly damage due to elephant activity in the form of bark stripping and felling, and elephants appear to play a role in changing the structure of the adult marula tree. The results also indicated that the lower canopy structure (individuals <2 m) was greatly affected by fire, whereas density was unaffected. The lower canopy generally responded to the interaction between frequency and season of burn, and not to the main effects of season or frequency.

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NOTES TO AUTHORS

Journals used for submission of manuscripts

South African Journal of Wildlife Research (In prep.):

- The status and population structure of the marula (*Sclerocarya birrea* subsp. *caffra*) in the Kruger National Park
- The impact of the African elephant on marula (*Sclerocarya birrea* subsp. *caffra*) trees in the Kruger National Park

African Journal of Range & Forage Science (In press):

- The effect of different fire treatments on the population structure and density of the marula (*Sclerocarya birrea* subsp. *caffra*) in the Kruger National Park

“Instructions to authors” followed throughout the thesis

Manuscript: 1 mm margin on all sides of the sheet and in 1.5 line spacing. All pages are numbered sequentially.

Title: Brief and sufficiently informative.

Abstract: Concise, informative and not exceeding 150 words.

Additional index words: Up to five additional index words which are not included in the title, listed in alphabetical order.

Introduction: Outlines the problem in general and clearly state the study objectives.

Intermediate section: Study Area, Methods (Data collection, Data Analysis), Results, Discussion, Acknowledgement, References.

References: If the author’s name forms part of a sentence, only the year of publication is enclosed in parentheses. If work by two authors is cited, both names are provided and separated by an ampersand. If work by more than two authors are cited for the first time, all the names are provided. Thereafter, only the first author’s name is listed followed by the abbreviation *et al.*, a space, and the year of publication. References to several works, each by a different author, at a given point in the text, are separated by semi-colons and enclosed in a single pair of parentheses, and arranged chronologically, then

alphabetically. Only publications to which reference has been made in the text is listed alphabetically according to authors (upper case) and chronologically under each author, with the year of publication. Journal titles are abbreviated italicised.

Section headings: Headings are prepared as follows: major headings are in lower case, centered and bolded; second-order headings are in lower case, left justified and bolded; third-order headings are in lower case, left justified and italicised.