SUMMARY

A phytosociological synthesis of Mopaneveld

by

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MAGISTER SCIENTIA (Botany)

One of the most critical shortcomings with regard to vegetation utilisation and conservation in southern Africa, is the lack of in-depth knowledge of the ecology of the various vegetation types. Mopaneveld is one of the largest savannas of Africa. However, knowledge of this extensive vegetation type is still limited to local-scale studies within the different *Colophospermum mopane*-hosting countries. The major aim of this study was to analyse existing phytosociological data from Mopaneveld over its entire distribution range. This holistic view of Mopaneveld vegetation contributes to the better understanding of large-scale vegetation continua, which contains identifiable plant communities along environmental gradients. Furthermore, provides a better understanding of ecological processes within this vegetation type, which occupies vast areas over a considerable variation in environmental parameters.

Compatible vegetation data were collected and captured in a TURBOVEG database. Known methods to analyse large vegetation data sets were considered. These methods could however not be applied successfully to the synthesis of the Mopaneveld because all suitable data were not processed to describe plant communities yet. A new method to treat large vegetation data sets was proposed. This method is based on the synthesis of raw data material by means of basic phytosociological principles. The complete data set was analysed by TWINSPAN procedures in MEGATAB. Results are presented in synoptic tables. Although the synoptic presentation limits the number of relevés, the number of species remains high. A reduced synoptic table was constructed to accommodate the need for a clear presentation of results in a reduced format. The

method was critically evaluated after which was concluded that the method is only a step in the direction of new methodology in meta-analysis.

A literature review on *Colophospermum mopane* was prepared in order to provide sufficient information on this plant species, which dominates the woody strata of the Mopaneveld through most of its distribution range. Lists of known described plant communities and vegetation types within the Mopaneveld are provided in two appendices. Mopaneveld occurs in eight African countries, which include Angola, Namibia, Botswana, Zambia, Zimbabwe, Malawi, Mozambique and South Africa. A summary on the Mopaneveld in these hosting countries is provided to contribute to the knowledge of Mopaneveld vegetation of its total distribution range.

TWINSPAN classification and subsequent refinement by procedures of the new approach, resulted in the identification of seven vegetation types and six major plant communities in the Mopaneveld of South Africa, Zimbabwe and Namibia. Due to special interest in the Mopaneveld of the South African Lowveld, a synthesis of this vegetation type was prepared separately. Four major plant communities were identified from this procedure of which two are described in this dissertation.

This synthesis revealed interesting notes on the dynamics of Mopaneveld vegetation. Results from the synthesis provided information on the probability that the Mopaneveld is an event-driven system and its dynamics can be explained by non-equilibrial models of vegetation change.

OPSOMMING

'n Fitososiologiese sintese van Mopaneveld

deur

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Voorgelê ter gedeeltelike vervulling van die vereistes vir die graad

MAGISTER SCIENTIA (Plantkunde)

Een van die grootste tekortkominge in bewaring en grondgebruik in suidelike Afrika is die gebrek aan in-diepte kennis van die ekologie van verskillende plantegroeitipes. Mopaneveld is een van die grootste savannas in Afrika. Kennis van hierdie uitgestrekte plantegroeitipe is nietemin beperk tot plaaslike studies binne die verskillende lande waarin *Colophospermum mopane* voorkom. Die primêre doel van hierdie studie was om bestaande fitososiologiese data van Mopaneveld oor die totale verspreiding daarvan te analiseer. Hierdie holistiese benadering van Mopaneveld plantegroei dra by tot 'n beter oorsig van grootskaalse plantegroeikontinua wat identifiseerbare plantgemeenskappe bevat langs omgewingsgradiënte. Verder voorsien hierdie studie ook in 'n beter oorsig van ekologiese prosesse binne die Mopaneveld, wat 'n groot area beset oor 'n merkwaardige variasie in omgewingsparameters.

Bruikbare plantegroeidata was versamel en in 'n TURBOVEG databasis gestoor. Bekende metodes was oorweeg vir die analise van die groot datastel. Hierdie metodes kon egter nie suksesvol toegepas word in die sintese van die Mopaneveld nie aangesien nie alle data geprosesseer en die plantgemeenskappe daarvan opgeskryf is nie. 'n Nuwe metode oor die hantering van 'n groot datastel is daarom voorgestel. Die metode is gebaseer op die sintese van roudatamateriaal volgens basiese fitososiologiese beginsels. Die totale datastel was geanaliseer in MEGATAB deur die gebruik van TWINSPAN prosedures. Resultate word voorgestel in sinoptiese tabelle. Die sinoptiese voorstellings beperk die aantal relevés, nietemin bly die aantal spesies hoog. A verkorte sinoptiese tabel is daarom saamgestel sodat resultate duidelik

voorgestel kan word. Die metode was krities ondersoek waarna beslis is dat die voorgestelde metodiek slegs beskou kan word as die eerste stap in die rigting van nuwe metodiek in meta-analise.

'n Literatuuroorsig van *Colophospermum mopane* is voorberei vir die weergee van nuttige inligting oor die spesie wat die houtagtige komponent van Mopaneveld domineer. Lyste van plantgemeenskappe en plantegroeitipes binne Mopaneveld wat reeds beskryf is, is voorsien. Mopaneveld kom voor in agt Afrika-lande, wat Angola, Namibië, Botswana, Zambië, Zimbabwe, Malawi, Mosambiek en Suid-Afrika insluit. 'n Opsomming oor die Mopaneveld van hierdie lande is gegee ter gedeeltelike bydrae tot kennis oor Mopaneveld plantegroei, oor die totale verspreidingsgebied.

TWINSPAN klassifikasie en die verfyning daarvan op grond van die nuwe metode, het gelei tot die identifisering van sewe plantgroeitipes en ses hoofplantgemeenskappe in die Mopaneveld van Suid-Afrika, Zimbabwe en Namibië. 'n Afsonderlike sintese van die Suid-Afrikaanse Laeveld Mopaneveld was voorberei. Vier hoof plantgemeenskappe was identifiseer waarvan twee beskryf is in hierdie verhandeling.

Hierdie sintese het verder interessante opmerkings oor die plantegroeidinamika van Mopaneveld opgelewer. Resultate van die sintese het bygedra tot die versterking van spekulasies dat die Mopaneveld gedryf word deur gebeurtenisse. Die dinamika kan met ander woorde voorgestel word deur nie-ekwilibrium modelle vir plantegroeiverandering.

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