The physical environment and plant communities of the Messina Experimental Farm

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A description of the climate, geology and plant communities of the study area is presented. The result of a TWINSPAN classification of 149 relevés was refined by Braun-Blanquet procedures. Eight plant communities of which one is divided into three variations, were distinguished. A hierarchical classification, ecological interpretation and vegetation map delineating the extent of the plant communities, are presented. An agro-ecological quantification of the woody vegetation was done in each plant community.

'n Beskrywing van die klimaat, geologie en plantgemeenskappe van die studiegebied word aangebied. Die resultaat van 'n TWINSPAN klassifikasie van 149 relevés is met behulp van Braun-Blanquet prosedures verfyn. Agt plantgemeenskappe, waarvan een in drie variasies verdeel word, is onderskei. 'n Hiërargiese klassifikasie, ekologiese interpretasie en 'n plantegroeikaart wat die ligging van die plantgemeenskappe aandui, word aangebied. 'n Agro-ekologiese kwantifisering van die houtagtige plantegroei is in elke plantgemeenskap gedoen.

Keywords: Braun-Blanquet, classification, Mopani veld, TWINSPAN, vegetation types

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Introduction

Vegetation types are the result of a specific set of environmental factors and therefore constitute different habitats. Ungulates exhibit a heterogeneous distribution since they display varying degrees of habitat selectivity, which coincides with the distribution of vegetation types (Hirst 1975). Different vegetation types represent habitats of varying quality in terms of benefits, such as food, and costs, such as predators. Habitat quality can, therefore, be expected to affect an individual's ability to survive and reproduce, which means it is unlikely that evolution will leave habitat selection to chance (Melton 1987).

In the vicinity of the Messina Experimental Farm only broad-scale vegetation classifications have been conducted (Louw 1970; Acocks 1988). As a prerequisite for a study on habitat selection by large herbivores, an inventory of the climate, geology and vegetation of the Messina Experimental Farm was undertaken. A sound knowledge of the ecology of an area is furthermore essential for the implementation of an efficient range- and wildlife management programme (Edwards 1972; Bredenkamp & Theron 1978; Le Roux *et al.* 1988; O'Reagan & Turner 1992; Bredenkamp *et al.* 1993). The delineation of homogeneous vegetation units and agro-ecological quantification of the woody vegetation will, therefore, also provide a sound basis for the determination of carrying capacity, for the monitoring of trends in veld conditions, and to assist in planning the location and construction of roads and water holes.

Study area

The Messina Experimental Farm is situated along the Limpopo River between 22°12' and 22°18' S and 29°50' and 29°57' E, 20 km west of the town of Messina. According to Acocks (1988) the study area falls within the northern block of the Mopani Veld veld type, where *Colophospermum mopane* is the dominant plant species. The study area covers 6 991 ha at an altitude that ranges from 460 to 639 m above sea level. Numerous seasonally dry drainage lines dissect the study area and drain into the Limpopo River.

Climate

Climatic data were obtained from the Macuville weather station (No. 0809706X), which is situated on the Messina Experimental Farm. Mean monthly temperatures and rainfall data are presented in Figure 1. The mean annual rainfall (1 July – 30 June) is 357 mm (66-year period from 1927/28 to 1993/94). The highest total annual rainfall of 616 mm was recorded in 1952/53 and the lowest, 82 mm, in 1982/83. The coefficient of variation for the total annual rainfall is 36% and indicates a high frequency of droughts. Rainfall is erratic, consisting mainly of thunder showers. Seventy five percent of the total annual rainfall is recorded in the period November – March (Figure 1). On average, 49 days with >0.1 mm rain/day occur per year. The rainy season reaches a peak during December–January–February when, on average, 57 mm/month is recorded (Figure 1).

The mean daily maximum temperature varies from 25°C in July to 34°C in January. The absolute maximum and minimum temperatures recorded were 44°C in January and –3°C in July, respectively. Winters can be regarded as moderate and frost seldom occurs.

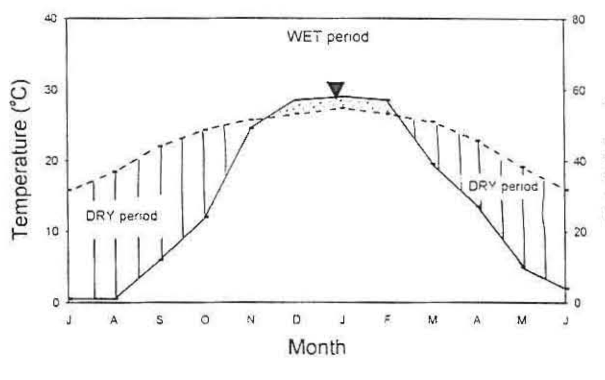

Figure 1 Mean monthly temperatures (---) and rainfall (—) recorded at Macuville weather station for the 66-year period from 1927/28 to 1993/94).

Evaporation according to a Class A evaporation pan is high with a mean monthly maximum evaporation of 299 mm in January and a mean monthly minimum of 130 mm in June. The mean annual evaporation is 2683 mm, which greatly exceeds the mean annual rainfall.

Geology

The study area is situated within the Central Zone of the Limpopo Belt. The Limpopo Belt is a classic late Archaean high-grade gneiss terrane which straddles the border between South Africa and Zimbabwe and consists of distinct crustal domains or 'zones' (Van Reenen *et al.* 1992a). The Limpopo Belt is situated between what are commonly termed the Rhodesian and Kaapvaal cratons and consists of a linear zone of highly metamorphosed and multiply deformed rocks (Barton 1983). The Central Zone of the Limpopo Belt is characterized by a supracrustal succession termed the Beit Bridge Complex (SACS 1980). The supracrustal Beit Bridge Complex is composed of leucocratic quartzo-feldspathic gneiss, metasedimentary gneiss including metapelitic gneiss, marble, calc-silicate rocks, quartzite and magnetite quartzite (Van Reenen *et al.* 1992b). The rocks classified as the Beit Bridge Complex are amongst the oldest in southern Africa (SACS 1980).

Bulai granite and Granite-gneiss are the dominant parent material underlying the Messina Experimental Farm (Geological map 1957). Sections of the study area are characterized by dome-shaped bulai granite hills or outcrops, that reach up to 60 m above the surroundings.

Methods

By using 1:50000 black-and-white stereo aerial photographs, the study area was stratified into 30 relatively homogeneous physiographic–physionomic units. Physiographic unit refers to terrain form, including slope, aspect and rockiness, and physionomic units are distinguished by the structure and cover of the vegetation. Relevés were compiled for 149 sample plots, randomly located within these units and with a minimum of four sample plots per unit. Cover-abundance values were estimated for all plant species in a 10 m × 20 m sample plot, by using the Braun-Blanquet cover-abundance scale (Westhoff & Van der Maarel 1978). In accordance with Bredenkamp *et al.* (1993), scale unit 2 was divided as follows: 2A, covering >5–12% of the sample plot area; 2B, covering >12–25% of the sample plot area.

Environmental parameters, collected at each sample site, included the following:

(i) Altitude (metres above sea level taken from a 1:50000 topocadastral map);
(ii) Slope, measured with an abney level;
(iii) Stone cover, as a percentage of the soil surface covered by stone, subjectively estimated for each sample site;
(iv) Termites, visual signs of termite activity or inactivity;
(v) Utilization by herbivores, subjectively estimated by judging the perceived degree of utilization of plant material and recording the presence or absence of herbivore tracks and pellet groups.

Two-way indicator species analysis (TWINSPAN) (Hill 1979) was applied to the floristic data set in order to derive a first approximation of the vegetation types. Refinement of this classification was done by means of Braun-Blanquet procedures [see also articles by Bredenkamp *et al.* (1989; 1993); Kooij *et al.* (1990); Fuls *et al.* (1992a; 1992b)]. Specimens were identified by the National Herbarium and taxa names conform to those of Arnold and De Wet (1993). Plant community names refer to either a diagnostic or prominent species as well as a conspicuous species. The Edwards (1983) system was used to classify the vegetation structurally.

Evapotranspiration Tree Equivalent (ETTE) and leaf dry mass (DM) was calculated for the woody vegetation in each plant community, using the quantitative description technique of Smit (1989a; 1989b). The calculation of the ETTE (1 ETTE = 500 cm^3 leaf material, Smit 1989a) and leaf DM, all depends upon the relationship between the spatial volume of a tree and its true leaf volume and true leaf DM, respectively, taking into account differences in leaf densities. Different regression equations were used to estimate leaf volume and leaf DM for microphyllous species and for broad-leaved species [see also article by Smit and Swart (1994)]. Leaf volume and leaf DM was estimated from all rooted live woody plants within four randomly placed transects (50 m × 4 m) in each plant community. Along with total leaf DM per hectare, stratified estimates of the leaf DM per hectare below 1.5 m and 2.4 m, respectively, were also calculated. These heights represent the general browsing heights of the boer goat (*Capra hircus*, Mentis 1981), impala (*Aepyceros melampus*), kudu (*Tragelaphus strepsiceros*) and eland (*Taurotragus oryx*) (Skinner & Smithers 1990). For management purposes the identified *Hyphaene coriacea – Eragrostis rotifer* short sparse woodland and *Monechma divaricatum – Colophospermum mopane* low forest (see results), are regarded as the same management unit and were therefore sampled as one.

Results

Classification

In total, 183 species were recorded with an average of 47 species per relevé. From the final phytosociological table (Table 1) eight plant communities, of which one is divided into three variants, were identified. The distribution of the different plant communities is shown in a vegetation map (Figure 2), and a digital planimeter was used to determine the approximate area covered by each plant community. An ecological key indicating the relationship between each plant community and its characteristic environmental parameters is presented in Figure 3.

Description of plant communities

1. *Hyphaene coriacea – Eragrostis rotifer* short sparse woodland

This community is restricted to the seasonally dry drainage lines which dissect the study area (Figure 2). The community covers only 1.2% of the study area. Species group A (Table 1) is diagnostic for this community. The most conspicuous diagnostic species is *Hyphaene coriacea*, a member of the palm family that often reaches 5–7 m in height. *Combretum imberbe* is the only other diagnostic tree species (species group A, Table 1). Diagnostic grass species include *Chloris virgata*, *Eragrostis rotifer*, *Setaria verticillata* and *Urochloa mosambicencis* (species group A, Table 1). *Hybanthus enneaspermus* is a diagnostic forb in this community. The multi-stemmed bushy shrub, *Securinega virosa*, although present only with low constancy, is also considered as diagnostic in this community. Other conspicuous tree species are *Acacia nigrescens* and *A. tortilis*. Perennial grass species, including *Panicum maximum*, are often found in this plant community.

2. *Monechma divaricatum – Colophospermum mopane* low forest

This low forest community is associated with the banks of the seasonally dry drainage lines and calciferous ridges (Figure 2). It covers 10.4% of the total study area. Species group B (Table 1) is diagnostic for this community. *Ximenia americana*, a shrub that reaches 3 m in height, is the only diagnostic woody species in this community. The community contains no diagnostic grass species and *Monechma divaricatum*, *Vernonia cinerascens* and *Barleria senensis* are diagnostic forbs (species group B, Table 1). Conspicuous of this community is the high cover-abundance of *Colophospermum mopane* (species group P, Table 1). *Enneapogon cenchroides* is conspicuous in this plant community and *Cenchrus ciliaris* is present with a low constancy and abundance.

Table 1 Phytosociological table of the Messina Experimental Farm

Community number	1	2	3	4	5	6.1	6.2	6.3	7	8
Releve number	0001	11000000101110000110	000000	0001100000000000000000010	00010000001111100000001000	0101111	00000001111011100000011	1111111010100	000110101000000	000101001
	3332	24212233222220299140	333344	1122101001311112991220020	4453469455233345445674687	8080111	87789240000914477066933	4014444518068	655336061575767	888291793
	1026	53208978740121356643	463513	8163963782956797894054542	45002119129341283674392534	2647013	58002101894778956929068	0251567547541	776570382829167	968848339
Species group A										
Combretum imberbe	++++	R R						+		
Chloris virgata	++ +									
Eragrostis rotifer	++++									
Hyphaene coriacea	++++									
Setaria verticillata	++++	R	+ RR					+		
Urochloa mosambicensis	++							+		
Securinega virosa	+ R	R +								
Hybanthus enneaspermus	+++					+	+ +	+		++++
Species group B										
Monechma divaricatum	+	++++++++ ++ + + + + +	+	+						
Ximenia americana		+ + ++ R	R		+		+	+	+ R	+
Vernonia cinerascens		+ ++ +			+		+			
Barleria senensis		+ + + +		+			+ +		+ +	
Species group C										
Pupalia lappacea	++++	+++ + + +++ +	+		+			+	+ + + +	++
Cenchrus ciliaris	++	R+R + R R R			R R		+	R	R	++ +
Species group D										
Commiphora pyracanthoides		+	++ +++	R R +						
Eragrostis aspera			R R							
Species group E										
Mariscus rehmannianus	+		++	+ +++++++ +++ + +++	++ + ++ + ++ +++			+	++	
Digitaria velutina	+ +		+ R	+ R R R R R	RRR++ R R + R +	+ +		+		+
Species group F										
Commicarpus fallacissimus	+	++ ++++++ + +	+ ++++	+ ++++ + +++ + ++ ++	++ +++ ++ ++ +		+ +	+		+ ++
Maerua parvifolia		+ + R + + +	+ ++	+++ + + +++R + ++ +	+ + + + R+ +		+ + R R++ +		+	+
Leucas sexdentata		+ + + + + ++	+ ++	++ ++ ++ ++ ++ ++	+++		+ + ++	+ ++		
Species group G										
Acacia tortilis	++++	+ R +	R ++	RR R RRR+R R	+ ++ + RR +	R		+1 +	R	
Monechma tettensis	++++	+ + ++ + +	++++	++ ++ +++ ++++ +++ +	++ ++++++ ++ ++ +		+ +	+ +	+	+++
Species group H										
Chamaecrista absus			+ +	++ +++++++ ++ ++ + +++	++ + +++ + +	++ ++++	+ ++ + +++ ++ ++ +	+	+ +	
Geigeria acaulis			++ +	++ + +++ ++++ + +	++ + ++ + + + + +	+ ++	+ ++ + +++ + ++ +	+		
Adansonia digitata			R	R R R +	1R ++ ++ +R +	R	+ R R + +	R		+
Eragrostis biflora	++		R +	R + R +	+ + + R + R	R	R RR + R	R +		++
Species group I										
Tinnia rhodesiana						1 + 1 +			R	
Aristida scabrivalvis						+ + +				
Species group J										
Blepharis diversispina				+	++++		++ +++++ +	++++ + +	+	+
Schmidtia pappophoroides		++				R	R ++ +R+ +R	RR R+		1
Abutilon austro-africanum	+	+ +		+	+	+ +	+ + +	++++ +		++ +
Aristida stipitata							+ + +	+ +		
Species group K										
Eragrostis porosa	+1++	++++++ +1+++	++1++1	++++11111+1+111++11++ +	11++1+1++++++ +R+1+ ++ 1 +		+11+ 1+ 1++1+++++1+11	++ + ++ ++1	+ + +	+ +
Tribulus terrestris	++++	++++ +++ +++ ++++++1	++++++	+1++++++++1++1 ++++1++ +1+	+ ++++ +++++++++ +++++ + +	+	++ ++++ ++ ++ + ++ +	+ ++++ + +	+ +	
Eragrostis lehmanniana	++++	+++ ++1+ ++++	+++ +	+ + 1+++ + +++	+++++R+ ++ +++++ + ++ ++	+++1+++	+ + ++1++ ++1++ ++++	1+1++1 11+ +	+	+
Aristida congesta barbicollis		+++ +1	++++++	++++++++++++++++ +++ +++	++++++++++++++ +++++ +	+	+++++ +++ ++ ++ +++++	+++ +++ +		
Indigofera nebrowniana		+ + + + +	++ +	+ +1+++1++ + ++ ++++1+	++ + ++ +++++ + + +		++ + + ++ +	++ + + +	+	
Heliotropium steudneri	+	+ + +	+	+ + + + + + + ++	+ + + ++++ + +	++ +	++ ++ + ++++ ++ + +	++ + +		
Ocimum canum	++++	+ + +++ ++	++++	+ + +++	+ ++ + ++ + +	+ +	+ + + + ++ +	+ +++ +	+	
Hermbstaedtia odorata	+	++ ++ + +++ +		+ + ++++ +	++ +	+++	+ + +	+++ +	+	
Species group L										
Tricholaena monachne	++ +	R							+ ++'A + 1'	
Commiphora merkeri						1	+ R		+ ++ R1 RR	

Table 1 Continued

Community number	1	2	3	4	5	6.1	6.2	6.3	7	8
Relevé number	0001	11000000101110000110	000000	0001100000000000000000010	00010000000111110000001000	0101111	00000001111011100000011	1111111010100	000110101000000	000101001
	3332	24212233222220299140	333344	1122101001311112991220020	44534694552333345445674687	8080111	87789240000914477066933	4014444518068	655336061575767	888291793
	1026	53208978740121356643	463513	8163963782956797894054542	45002119129341283674392534	2647013	58002101894778956929068	0251567547541	776570382829167	968848339
Blepharis subvolubilis					+		+	+	+ + + +	+
Chenopodium cristatum								+	+ + +	+
Raphionacme sp.					+				R + +	
Ochna inermis		+		R	+ +	+		+	+ + +	
Bothriochloa insculpta									+ + +	
Cassia abbreviata							R		+ R	
Euphorbia guerichiana									++	
Stapelia sp.								R	R +	
Ledebouria sp.					+				+ +	
Species group M										
Setaria saggitifolia	++++			R	RR + +	++ +		R	R	+ 111
Markhamia acuminata					+	R	+ R		R	+++++
Ficus tettensis										+++++ R R
Aristida meridionalis							+ + R R+ + +	1		11+++ +
Lonchocarpus capassa	+							+		++++
Berchemia discolor										+ ++
Barleria affinis						+		+		+ + +
Croton gratissimus								+		Λ +
Steganotaenia araliacea										R ++
Rhoicissus revoilii					R+		+ R	+	R	1 +
Albizia harveyi							+			+ +
Hexalobus monopetalus										+1
Xanthocercis zambesiaca										+1
Setaria sphacelata										++
Bridelia mollis										-++
Species group N										
Gardenia resiniflua					R+ +	+ + +	+ R + R'		++ +++ +++ +	+++ +++ +
Panicum maximum	1Λ++	+	R	R	R++		+ +++	+	+ RR R+	1++Λ1111+
Combretum mossambicense	R	R			+ ++		+	+	++ + + + + +	++ +++
Digitaria eriantha					R		R R	R +	R++	1+ +++++
Danthoniopsis dinteri					1	+ Λ +			1 1+ +	B ++ +
Acacia senegal var. leiorhachis				+	+ R	+ +	+	+ + +	+ ++R+ +	++
Bidens pilosa			+		+ +		++ +	+	+ + +	+ +
Species group O										
Kirkia acuminata			R		+ 1 1 +11ΛΛ + 11+1 +1+	++++++1	+++1 ++ ++++++ ++ ++	+ +1 +R	1+11++ +1+++R1	+ + +++
Chamaesyce neopolycnemoides		+ +	+	+ + + +	+ ++ + +++	+ ++ +	+++ ++++ + + +	++	++ ++ +++++++	+ +++
Indigofera heterotricha		+		+ + + +	+ + ++ + + + + +++	++++++	+++ + ++ ++	+	+++++ + + + ++	
Jatropha spicata		+	++ +	++ ++	++ +++++ + + + + ++++++ +	+	++++ + + + +	+ + +	+ + + +	+
Justicia protracta		+		+	+++ ++ + +++++ + + ++	+	+ + + + + + +	+ + +	+++ + + ++++++	+
Sterculia rogersii				R	+ RR + ++ R +++	+ +	++R ++ + +	R	+++ + + +	+++ + +
Commiphora tenuipetiolata				+	+ + +++ + 1	1++1+1+	+++ +1 +	+ +	1Λ+111 Λ 1+1+1	+ +
Solanum coccineum		+ + + ++		+	+ + + +++ + + +	++	+ ++ ++ ++++	+++ ++	++ + + +	+ +++
Barleria sp.					+ ++ ++		+ ++ +	+ +	++++ 1++++	
Corbichonia decumbens		+		+ + +	++ + + + + +	+ + ++	+ + ++ + ++	+ + +	+++ +++++++	+ ++ +
Sesamum triphyllum	+	+	+ ++	+ + ++	+ +	+ ++++	+ ++ + + ++ ++	+ + +	++	+++ +
Acacia erubescens					+	R1 +	+ ++ ++ ++	+ +	+ +++ +1+ +	++
Barleria lancifolia	+ +		+ +	+ + +	+ + +		+ + ++ + +	+	+ ++	++++++ +
Species group P										
Colophospermum mopane	+ ++	Λ3BΛΛBBBBB433BΛBBB1B	111111	ΛΛΛΛΛΛΛΛΛΛBBΛΛΛΛB3B1B1ΛΛ1	+111+11+ 1+1+1+1+Λ1++111Λ1Λ	1ΛΛΛΛΛΛ	ΛΛΛ11B1BΛΛΛΛ1+1ΛΛΛ1111Λ	BΛ1B3+31B Λ1Λ	++1+1+B+Λ+Λ1Λ+Λ	+++
Terminalia prunioides	+	1+++++++1+++++1+++1+	++++1+	1+1+ 1++++1+++++++++++++	++++++++++++++++++++++1+++++	1+++1 +	++++ ++++++++++++++++++	+ ++R ++1+++	++++++ ++++ +	+ +
Aristida congesta congesta	+	++++++ +R1++++	ΛΛ1111	ΛΛ1Λ1BBB3B+BΛΛΛΛ+1BΛΛ+BΛ+	111111ΛΛ11111++++11 +++1+1	1+ +11+	++++1+11++11+++++B1ΛΛ++	Λ+B++++++1 1++	++R++++1++R+	+
Tragus berteronianus	++	+++++++++ ++ +++++++	+ ++++	+B+1111111+11+++111Λ+11+	+++1+++ R++++ ++++++++++	++ ++++	+ +++++11+1+++++++++++Λ1	11+++++++ 1++	R+++ +1++ ++	+
Aptosimum lineare	+	+++++ + + + ++++	++ +++	++++++++++++ +++++ + +++	+++++++++++++++++++++1++++	+++++++	++++++++++++++++++++++++	+ ++++++++++	++ ++ + +++	+
					+++	++++++	++++++ +++++++++++++ +	++++++ +++++	+++ ++++ +++	
Melhania rehmannii	+++	++++ +++ ++ +++ + +	++++++	+++++++ ++++ + +++++++++	+ +++++ ++ +++++ ++ +++++	+++++++	++ ++ ++++++++++++++ ++	+++++++++ ++	++++++++++++++ +	
Dicoma tomentosa		++++++ + +++	++++	+++ + ++++++++++++++++++	+ +++++++ ++ +++++ +++++++	++++ ++	+++++ + ++++++ + +++	+ ++ + + +++	++ +++++1+++++	++
Boscia albitrunca		++ ++++ + + +	+++++	++ +++++++++ + + +++	+++++++++++++ +++++ ++++++	++++++	+++++ +++++++++ +++++	+++ +++ +++	++ + +++ ++	+ +
Hermannia boraginiflora	+	+++ + +++	+ +	++ ++ ++++++ + ++++++	+ + ++++++++ ++++ + ++ + +	+ +++	111R+++++ +111 +R++1	+1 1+Λ+ ++++	+ 1 + 1 + +	+ +
Stipagrostis uniplumis	++++	R+R1++1+ + ++1+	++ +	+++1+R + + ++++ 1+	+ ++ ++++++ +++ ++++++	+ ++++	++ +++ +++++ ++ +++++	++ +++	+++++ + +++++ +	+
Ipomoea magnusiana	+	++ + + +	++	+ + ++++ +++ ++++ +	++++++ +++++ +++++ + + +	++ ++ +	+ ++ ++++ ++ ++ +	+	+ + + +++	
Kohautia cynanchica	++	+	+ +	+ + + + ++ +	++ +++++++ ++ +	+	+ + ++ + +	+ ++ +	+ + + + + + +	+
Indigofera trita var. subulata	+	+++ +++++++ + +	++ +	+ + + + ++ + +	+ + ++ + ++	+ + +	+ + ++ +	+ ++ ++	++ ++ ++ +	
Limeum sulcatum	++	+ + + +	+ +	+ ++ + + + +	++ + ++ + ++ ++		+ +		+ +	+
Boerhavia coccinea	+		+	+	++ + + + + +	+	+ + ++ +	+ ++	+ + +	
Rhigozum zambesiacum		++ + R R	+ ++	+1 + + ++ ++++	R + +	++	+ ++ ++ +	+ +	++++++ + + + ++	+ +
Neuracanthus africanus	+	+++ + + +	+ +	+ ++ + ++ +++ +	+ + ++ + ++ +++ + + +	+++++++	+ + + ++++++ + +	+ + ++	+ ++ + +	+
Pavonia burchellii	+	+ ++ +	+ +	+ +++ + + + +	++ + ++	+++ +++	+++++ + +++ ++ + + +	+ + + +	+ + + + +	+
Phyllanthus maderaspatensis		+	+	+ ++ + ++ +	+ + ++ +++ + + ++	+++++	+ + + ++ ++	+ ++	++ +	+ +
Kyllinga alba	+		+ +	+ + + + + +	+++ + +	+ +	++ +		+ +	+
Megalochlamys kenyensis		+ + +	+	+ + + + +	+ + ++ ++ + +	+ + +	+ + +	+ +	+ + +	
Pavonia columella	+	++ +	++	+ + +	+ + ++ ++	++++	+ + + ++ ++	+ + +	+	
Calostephane divaricata	+	++ +++ + + +	+++ +	+++ +++ + +++ ++++ +	++++++ +1++++++ + ++ ++				+ +++ +++++++	+

Table 1 Continued

Community number	1	2	3	4	5	61	62	63	7	8
Releve number	0001	11000000101110000110	000000	0001100000000000000000000010	0001000000011111000000001000	0101111	000000011110111000000011	1111111010100	000110101000000	000101001
	3332	24212213222220299140	333344	11221010013111129912 20020	4453469455233345445674687	8080111	87789240000914477066933	1401444518068	655336061575767	888291793
	1026	53208978740121356643	463513	8163963782956797894054542	45002119129341283674392534	2647013	58002101894778956929068	0251567547541	776570382829167	968848339
Bulbostylis hispidula	++	++++ ++	+++++	+ + + +++ +	+++++++ + + + ++ + ++	+++	++++ + ++ + +++++	++++ +++	+ + +	++
Dichrostachys cinerea	+ ++	+ ++ + + + + + +	++++++	++++ +++++++++++ +++++++	++++++ + ++++++ + ++ + +++	++ ++ +	+ +++ ++ ++ + +R	+R + + R+	++R +	+
Cleome angustifolia	+ ++	++++ + + ++++++++++	+ + +	++++++ +++ +++++++++++++	+ +1+++++++ + + +	++ ++ +	+ +++ ++ ++ + +	+ + +	+ +	
Commicarpus fallacissimus		++R+ ++ R R+R+++++	+++++	++++++++ ++++++R+++++++	1+1+1+++1+++ 1+1++ ++ +++	1+ +111	+++ ++ + ++++++	+++++ ++++	+ 1 R	
Species group Q										
Enneapogon cenchroides	1111	BBAA1AAAB33BB1ABA33+	11A111	11A1B11A++11B111BAA1A+1+1	1A1A1AA1AA1AABBB1AAB BB3BAB1	BAAB11A	BBABAB1ABA1AAA1AA+AA1BA	11+1A1 AA11BA	1AB11A11AAAAA11	++++++111
Brachiaria deflexa	+ 1+	+++++1++++ R 1+++++1	++++++	++++++++1+++++++++++1+++	++++++++++++++++++++++ ++++++1	11+1111	+++++++++++++++++++++++++	++++1+11+1+++	111111+111+1++1	++++ ++1
Combretum apiculatum		+R+ +++ ++++++	1A111A	1++ +1+1111+++11++++1++1++	111111111111111A1111 11AA11A	A1BAAA1	A1111R1 1A1++11111111A1	+11+ A11+A1	+11111+111A11+1	++++ 11++
Grewia bicolor	+	+++++ +++++++++++++	++++	+++++++++++++++ ++ +++++	++++++++++++++++++++++ +1+++++	+++1111	++ ++ ++++++++++++++++	++++++ ++++++	+++++++++++++++	+ ++
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Ptycholobium contortum	+ ++	+++++++++++ ++++++++	++++++	+++++++ ++++++++++++ +++	+++++++++++ +++ ++ + +++++++	+++++	+++++++++ +++++++++++++	++ ++++++ +++	+ +++++ + +++	+ + ++
Kyphocarpa angustifolia	+	+++ +++ ++ +++++ +	+++ +	++++++++++++++++++++++ ++	+ +++++++++++ + ++ ++++++	+++++++	++++++++++++++++++++++ ++	++ ++++++++	+++++++++++++++++	++ +
Tephrosia purpurea	++++	++ +++ + + +++	++++++	+ +++++++ +++++ + +++++	++++++++++1 +++++++++ ++++++	+++++++	+++++ + ++++++++++ ++++	+ + + +++	++++++++++ ++ +	+ + + +
Evolvulus alsinoides		+ ++++++	++++++	+++++++ +++++++++++++	+++++ +++++1+++++ + + +++++++	+++++++	+++++ +++++++ +++++++++	++++ ++ +++	+++++++ ++++++	++
Hibiscus micranthus	++++	+++ +++++ +++++++ +	+ ++++	+++ +++ +++++ ++++++ ++ +	++++ +++++ + +++ + ++ ++	+ ++	+++++ ++ ++ + ++ ++++	++ ++ +++	+ ++++++ +++ +	++ + +++
Seddera capensis	+	++++++ +++++++ + ++	+ ++	++ ++ ++++++ ++ ++ ++	++ + + +++++++++++ + ++++++	++++ +	++++ + + +++ ++ ++++	+ +++++ + +	+++++ + ++++++	+ ++ ++
Gisekia africana	++++	++++++++++ ++++++ +	+ ++	+++ + + ++++ + +++++ +	+ + +++++++ +++ + ++	+ + +++	+ + ++++++++++++ ++	++ + + ++	++ ++ +++ + +++	++ +++
Acalypha petiolaris	++ +	+++ + +++ +++ +++	+++++	+++ +++++++++++++++ +	++++ + + +++ ++	++++++	+ +++++++++++++ +++	+ +++ +++	++ + ++ +++	+++++++ +
Grewia flava	++	+ + + +++ ++	++++	+ ++ ++++ ++++ +++ + ++	1++ ++ +++++++ ++++1 1++++ +	+ + +	++ ++++ +++ + +++++	+++ ++ +++ ++	++++1++++++++ +	++++
Achyranthus sicula	++++	+ +++ ++ + ++++	++ +	++ +++++++ ++ ++ +++ +	++++ +++++ + +++++++ +++ +	+ +++	+++ +++ +++ + ++ + +	++ ++ + +++	++ + ++ ++ +	++++++++++
Amaranthus schinzianus	+ +	++++ + +++++++++ +	++ +	++++++++++ +++++ ++++++++	++ ++ +++++ ++++++ ++ ++	++++	+ +++++ +++ + ++++ ++	+ + + +	+ + + + +	+ ++++
Commiphora mollis		+ + +	+++ +	1+ ++ 11+R ++++ 1++ +	+++ ++11+ ++ ++++++ + + +	++++1+1	+++ R+ +++ +++++++ +++	++ + +++ +R+	R++++ + + + ++	1+++ +
Phyllanthus niruri	+ +	+++ + ++ ++	++ +	+ +++ +++ + ++++ ++++ +	+++ +++++ + + + ++ ++ +	+++++++	+ +++ + ++++ + ++ ++	+ + +++	+ + ++++++ ++	++ ++++
Grewia villosa		+ + + + ++++ +	+ +	R + + R + +	+ +R++++ + + ++ +R	R	+ + + +	+	+ +	+ +
Leucas glabrata	+++	+ B +	+ ++ +	++++ + + ++ + +	+ + +++++ +++ +++ +	+++ +	+ + + + ++	+	+ + +	++ ++
Grewia monticola		+ +	+	+ + + +	++ +++++++ + ++ + ++	++ 1+1	+ + + + ++ ++ ++	++ ++ +	+ + + + +	+ ++
Lannea schweinfurthii		+ + +		+ + + + + ++ +++	+ +++++++ + +	+	R +++ + ++ + + + +	R+ R +	+ + R	+++++
Protasparagus suaveolens		+ + +	+ +	++ + + +	+ ++++++ ++ ++ + ++ + +		+ ++ + ++ +	+ + +	++++ + ++ +++	+ +++
Waltheria indica	+ +		+ ++	+ + + ++ +	++ ++ + ++++++ + +	++	+ ++ + + ++ +++ ++	+ + +++	+ + + +	++++
Commelina benghalensis		+ ++	+ +	+ + + ++ +	+ + ++++++ +++++++++ +++ ++	++++ +	+ + +++++ + ++	+ + ++	++++ ++ + + +	++++ +++
Grewia flavescens	+ ++	+ + + + + + ++	+++++	+ R+ R +++	++ +++++++++++ R +++ ++ + ++	+	+ +++++ ++ + + +	+ + +	++ ++++ + + +	++++1+
Acacia nigrescens	+11+	R+ + R	+R R	+ + R	+ +R +	+ +	+ RR + R + + +	+ + R	R + +1 +	++ +
Rhynchosia totta	+++	+ + +++		+ +	+ + +++	+ +	+ + + ++ + +	+ + +	+ + ++	+ ++ +
Acrachne racemosa	+ +	R	+	R R	R + R + + A	1+ A	1++++ ++++ 11+++R +++	R + +	R R R1R+ +	++1 +1+ +
Sclerocarya birrea		+ ++	R+	+++ +++ +	+1++++ R +	+	++++ ++ + +	+ + +	+ 1+ R	+ R+ +
Commiphora edulis		+ +	+	+ + + +	++ 1 ++ ++ ++ +	+ ++	+ + + + R++ + R+	++	+++++ + + + +	+++ +
Dropetium capense		+R	R + ++	++ R	+ +++++ + + +++ + ++	+++++ +	+ +++R+ + + ++++ R+	+ R ++R+++	++1+++++ +++ ++	+++++
Melinus repens	++++	+ ++ +		R R + R R +R R	RR+R+ ++ +++ R R		+ RR R	+		
Commiphora africana		R	+	R + R	+		+ +	++ +	+	++ +
Priva africana	+	+ ++		+	++ + +		+ + ++		+	+
Sericorema remotiflora		+		++++ + +	+		+	+	+ + ++	
Cyphostemma sp.			+		++ + +					
Species group R										
Abutilon grandiflorum							+		+	+
Barleria affinis										+
Berchemia zeyheri										+
Brachiaria nigropedata					+		R			+
Cordia monoica		+			R					
Datura ferox	+									
Euphorbia ingens					+ +	R			R	
Cissus quadrangularis							R			+
Ficus abutilifolia					R					
Grewia tenax					R	R				R+
Heteropogon contortus					+			+	+	
Portulaca oleracea					+ +					+
Protasparagus setaceus										+
Schotia brachypetala									R	
Sesamothamnus lugardii									R	
Sporobolus panicoides										+
Vangueria infausta										+
Ziziphus mucronata									+	
Acanthaceae							R			
Blainvillea gayana										
Boerhavia cordobensis		+						+		
Chamaecrista sp.							+		+	+
Corallocarpus bainesii		+								+
Aeschenomene indica	+									
Enneapogon desvauxii		+			+ +		+	+		
Geigeria burkei	+									
Protasparagus nodulosus	+	+							R	
Hoodia lugardii					+					
Tephrosia villosa	+									+
Tragia dioica										

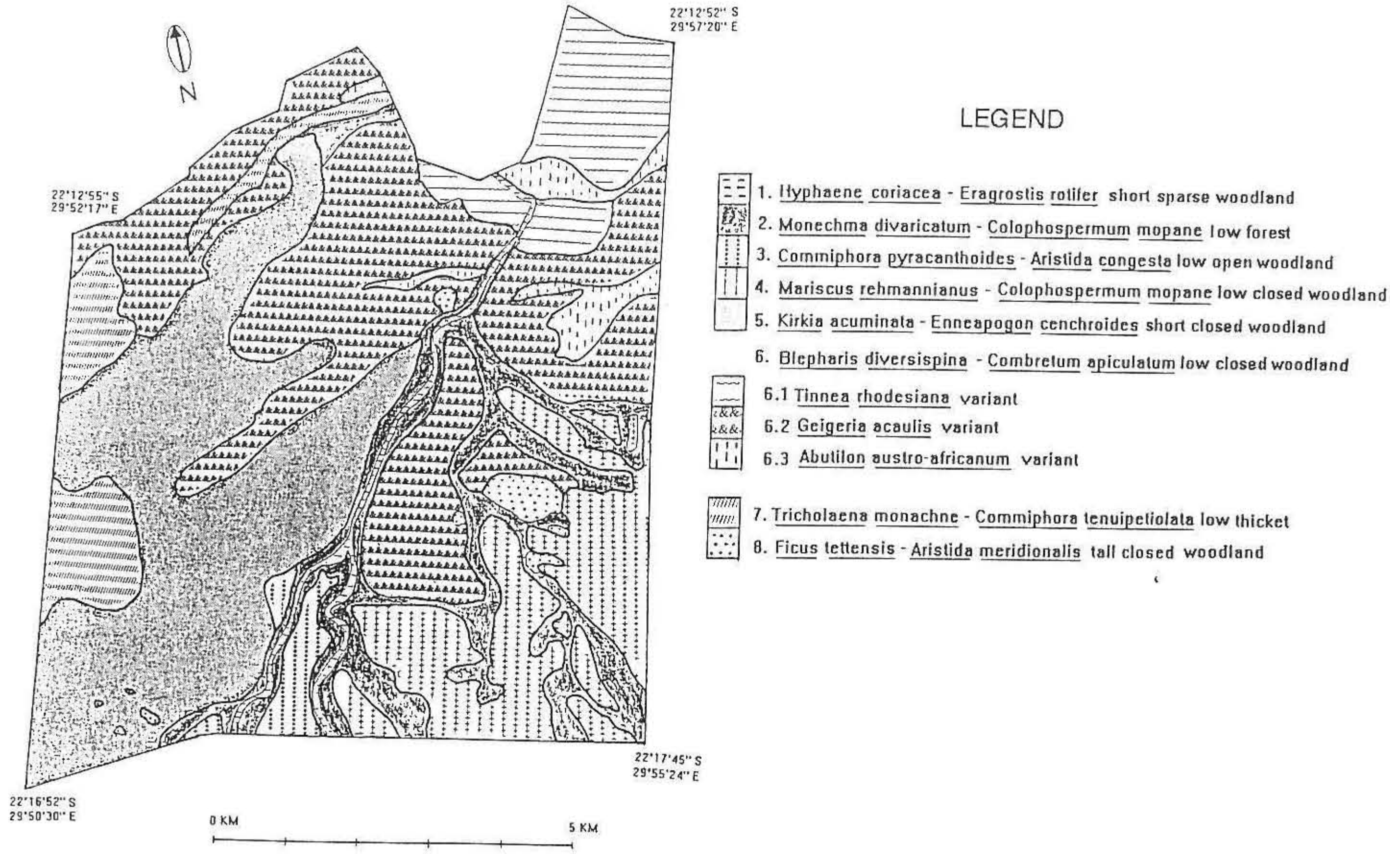

Figure 2 Vegetation map of the Messina Experimental Farm.

The ETTE per hectare is 6 616 and total leaf DM is 1 675 kg ha^{-1} (Figures 4 & 5). Despite ETTE per hectare and total leaf DM per hectare being lower than in plant communities 7 and 8, the leaf DM per hectare below 1.5 m and leaf DM per hectare below 2.4 m in the *Hyphaene coriacea – Eragrostis rotifer* short sparse woodland / *Monechma divaricatum – Colophospermum mopane* low forest is higher than in any of the other plant communities (Figure 5). This is due to the dense stand of short-growing *Colophospermum mopane* trees that is characteristic of the *Monechma divaricatum – Colophospermum mopane* low forest community.

3. *Commiphora pyracanthoides – Aristida congesta* low open woodland

Species group D (Table 1) containing two species, is diagnostic for this community. This community covers 1.7% of the study area. *Commiphora pyracanthoides* subsp. *pyracanthoides* is a diagnostic shrub in this community (species group D, Table 1). *Eragrostis aspera* is a diagnostic graminoid, although present with only low constancy and abundance (species group D, Table 1). *Combretum apiculatum* (species group Q, Table 1) is present with a high constancy and abundance.

The ETTE per hectare (4 935) and total leaf DM (1 224 kg ha^{-1}) is the lowest in this community (Figures 4 & 5), but leaf DM per hectare below 1.5 m and 2.4 m is still higher than in plant community 8 (Figure 5).

4. *Mariscus rehmanianus – Colophospermum mopane* low closed woodland

This community is situated on even terrain with a slope of 0–1° (Figure 3). It covers 13.1% of the study area. This community can be differentiated from plant community 5 by the absence of species group O (Table 1), while species group E is restricted to plant communities 4 and 5. Species that are prominent in this community include the shrub *Maerua parvifolia* (species group F, Table 1), and the forb *Mariscus rehmannianus* (species group E, Table 1). The dominant *Colophospermum mopane* (species group P, Table 1) is present with a high constancy. *Tragus berteronianus* is conspicuously present and occurs with a high cover-abundance (species group P, Table 1). *Aristida congesta* subsp. *congesta* (species group P, Table 1), occurs with a high constancy and abundance. This variant is moderately to severely over-utilized by herbivores and termites.

The ETTE per hectare (5 395) and total leaf DM (1 307 kg ha^{-1}) are slightly higher than in the *Commiphora pyracanthoides – Aristida congesta* low open woodland (Figures 4 & 5).

5. *Kirkia acuminata – Enneapogon cenchroides* short closed woodland

This widespread community in the western section of the study area (Figure 2), covers the undulating plains with a slope of 0–2° (Figure 3). It covers the largest part of the study area (30%). This community may be differentiated from plant community 4 by the presence of species group O (Table 1), while species group E is restricted to these two communities. *Kirkia acuminata* (species group O, Table 1) is a conspicuous woody species with a high constancy and abundance in this community. *Adansonia digitata* (species group H, Table 1), occurs scattered throughout this community. *Jatropha spicata* and *Justica protracta* (species group O, Table 1) are conspicuous forbs in this community, which is heavily utilized by herbivores.

The ETTE per hectare is 5 622 and total leaf DM is 1 334 kg ha^{-1} (Figures 4 & 5). Although total leaf DM per hectare is higher than in plant community 4, leaf DM per hectare below 1.5 m and leaf DM per hectare below 2.4 m are lower (Figure 5).

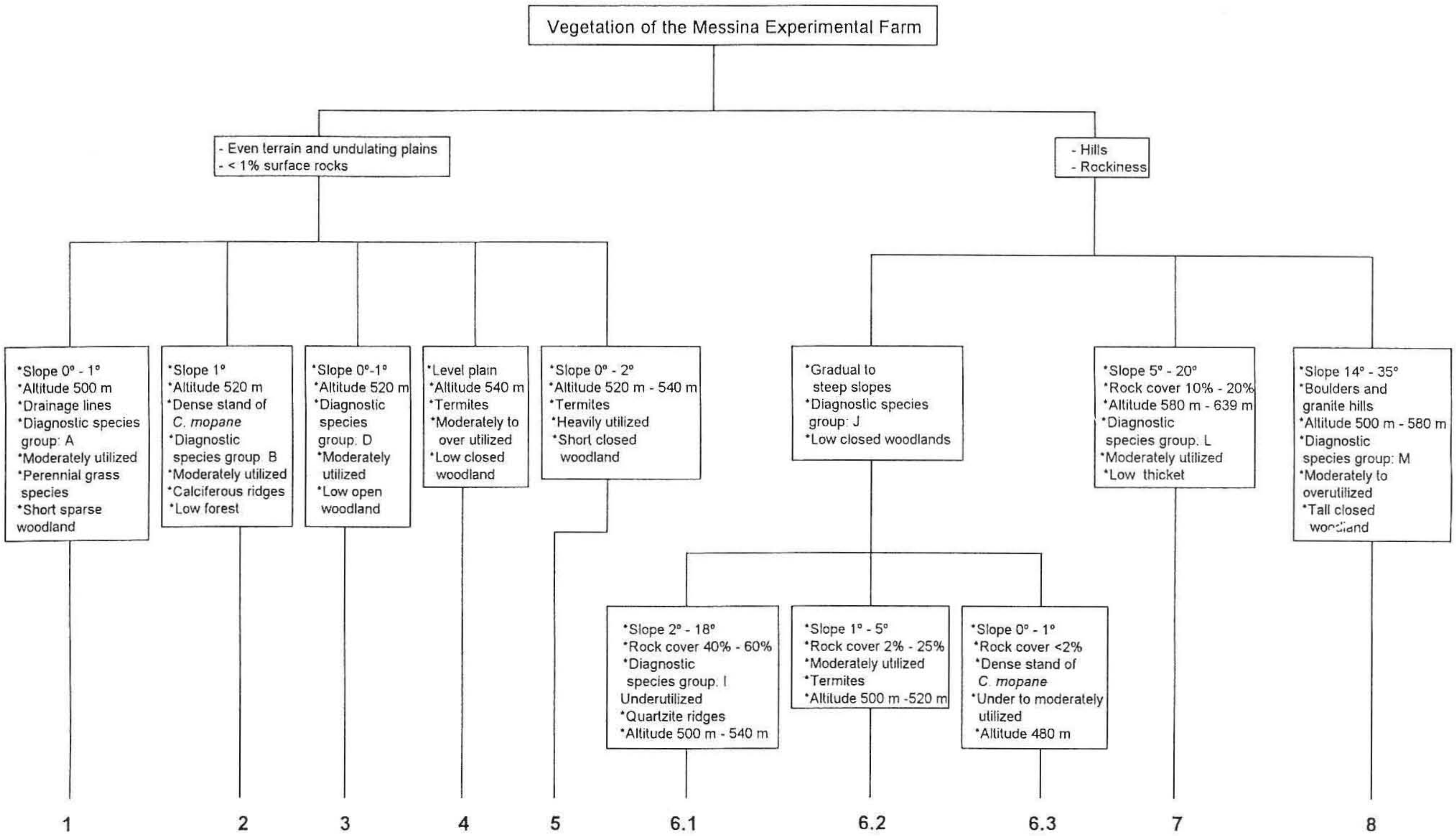

Figure 3 Ecological key indicating the relationship between each plant community (identified in Table 1) and its characteristic environmental parameters.

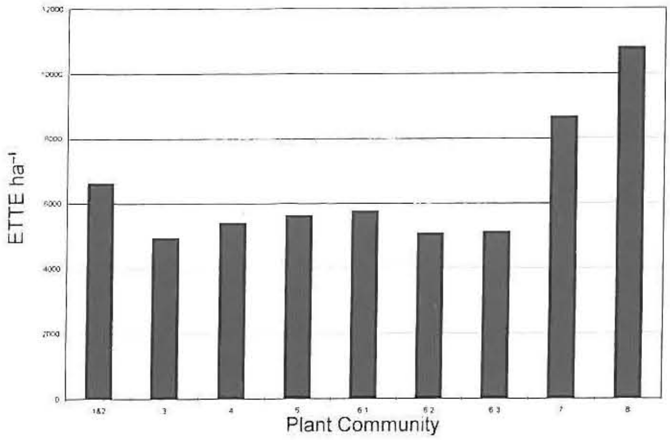

Figure 4 Evapotranspiration tree equivalents (ETTE) for the plant communities in the study area.

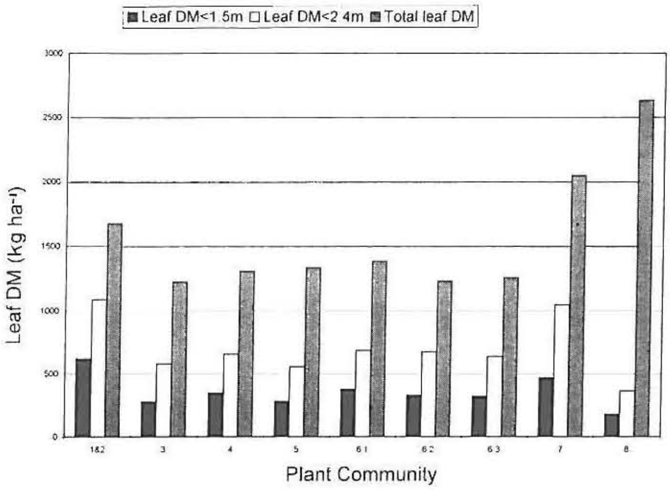

Figure 5 Estimates of the total leaf DM per hectare, with subdivision into height stratums, for the plant communities in the study area.

6. *Blepharis diversispina* – *Combretum apiculatum* low closed woodland

This community is restricted to broken, mountainous terrain (Figure 2). *Aristida stipitata* and *Schmidtia pappophoroides* are diagnostic graminoids for this plant community, although with a low constancy and abundance (species group J, Table 1). *Abutilon austro-africanum* and *Blepharis diversispina* are diagnostic forbs (species group J, Table 1). *Combretum apiculatum* and *Commiphora* species are the most conspicuous trees in this community (Table 1).

The community is divided into three variants.

6.1 *Tinnea rhodesiana* variant

This variant is only found on the rocky ridges in the north-eastern corner of the study area and it occurs on steep slopes of 2–18°, at an altitude of 500–540 m above sea level (Figures 2 & 3). The variant covers 7.1% of the study area. A high rock cover of 40–60% is typical of this variant (Figure 3). Species group I (Table 1) is diagnostic for this community. *Tinnea rhodesiana*, a small shrub, and the graminoid *Aristida scabrivalvis* are the diagnostic species. The rocky slopes inhibit herbivores and consequently this variant is underutilized by grazing herbivores.

The ETTE per hectare is 5 753 and total leaf DM is 1 385 kg ha^{-1} (Figures 4 & 5). This is slightly higher than in the other two variants of the *Blepharis diversispina* – *Combretum apiculatum* low closed woodland community (Figures 4 & 5).

6.2 *Geigeria acaulis* variant

This variant is associated with moderate slopes of 1–5° at an altitude of 500 m above sea level and covers 25.7% of the study area (Figures 2 & 3). The rock cover varies from 2 to 25% (Figure 3). This variant has no diagnostic species group. The simultaneous presence of species group H and J (Table 1) is characteristic, while the absence of species group I (Table 1) differentiates it further from the *Tinnea rhodesiana* variant. *Geigeria acaulis* and *Chamaecrista absus* (species group H, Table 1) are two conspicuous forbs in this community. *Stipagrostis uniplumis* (species group P, Table 1), a perennial graminoid, is present in this community with a relative high cover-abundance. *Sclerocarya birrea* (species group Q, Table 1), a medium-sized tree, is prominent in this variant. The variant is moderately utilized by grazing and browsing herbivores.

The ETTE per hectare is 5 068 and total leaf DM is 1 231 kg ha^{-1} (Figures 4 & 5). This is slightly lower than in the *Abutilon austro-africanum* variant except for leaf DM per hectare below 2.4 m, which is higher (Figures 4 & 5).

6.3 *Abutilon austro-africanum* variant

This variant is found in the low-lying areas between the hills at an altitude of 480 m above sea level and covers 3.2% of the study area (Figures 2 & 3). Rock cover is less than 2% (Figure 3). The variant has no diagnostic species group. It is differentiated from the *Tinnea rhodesiana* and *Geigeria acaulis* variants by the presence of species group J (Table 1) and the absence of species groups H and I (Table 1). Conspicuous in this variant is the high cover-abundance of *Colophospermum mopane* (species group P, Table 1). The graminoid *Eragrostis lehmanniana* has a constant high cover-abundance (species group K, Table 1) and *Aristida stipitata* (species group J, Table 1) is locally conspicuous. This variant is moderately utilized by herbivores.

The ETTE per hectare is 5 114 and total leaf DM per hectare is 1 257 kg ha^{-1} (Figures 4 &5).

7. *Tricholaena monachne* – *Commiphora tenuipetiolata* low thicket

This community is found on the higher-lying areas in the western section of the study area (Figure 2), and covers 6.3% of the study area. The altitude of this community ranges from 580 to 639 m above sea level and includes the highest point in the study area (Figure 3). Species group L is diagnostic for this community (Table 1). *Tricholaena monachne* with a high constancy and *Bothriochloa insculpta* are the diagnostic graminoids (species group L, Table 1). *Commiphora merkeri*, *Ochna inermis* and *Cassia abbreviata* are diagnostic woody species (species group L, Table 1), the latter species with a low constancy and abundance. Although not diagnostic, *Commiphora tenuipetiolata* (species group O, Table 1) is prominent in this community with a high cover-abundance and high constancy.

The ETTE per hectare is high at 8 663 and total leaf DM is 2 046 kg ha^{-1} (Figures 4 & 5). Although ETTE per hectare and total leaf DM per hectare is higher than in the *Hyphaene coriacea* – *Eragrostis rotifer* short sparse woodland / *Monechma divaricatum* – *Colophospermum mopane* low forest, leaf DM per hectare below 1. 5 m and 2.4 m are lower (Figures 4 & 5).

8. *Ficus tettensis* – *Aristida meridionalis* tall closed woodland

This plant community is associated with the dome-shaped granite hills. The community covers 1.3% of the study area. Species group M (Table 1) is diagnostic for this community. Diagnostic graminoids are *Setaria saggitifolia*, *Setaria sphacelata* and *Aristida meridionalis* (species group M, Table 1). The community is characterized by many diagnostic woody species. *Ficus tettensis*, *Markhamia acuminata* and *Lonchocarpus capassa* (species group M, Table 1) are the most conspicuous diagnostic woody species. Other diagnostic woody species include *Berchemia discolor*, *Croton gratissimus*, *Steganotaenia araliacea*, *Rhoicissus revoilii*, *Albizia harveyi*, *Hexalobus monopetalus*, *Xanthocercis zambesiaca* and *Bridelia mollis* (species group M, Table 1). Together with the *Hyphaene coriacea – Eragrostis rotifer* short sparse woodland, this is the only community where *Colophospermum mopane* (species group P, Table 1) occurs with a low constancy and abundance. A conspicuous browseline indicates severe utilization of this community by browsing herbivores.

The ETTE per hectare and total leaf DM are the highest of all the communities, namely 10 803 and 2 046 kg ha^{-1}, respectively (Figures 4 & 5). Despite this, the community has the lowest leaf DM per hectare below 1. 5 m and 2.4 m (Figure 5).

Discussion

The vegetation in the study area is relatively homogeneous (species groups P & Q, Table 1). Despite this the classification obtained by TWINSPAN (Hill 1979) and refined by Braun-Blanquet procedures, resulted in vegetation units that are easily distinguishable in the study area and which can be related to the stratified units and environmental factors observed (Figure 3). Plant communities 5–8 are related through species group O (Table 1), and community 5 relates to communities 1–4 through species groups F, G and K (Table 1).

Except for the *Hyphaene coriacea – Eragrostis rotifer* short sparse woodland and the *Ficus tettensis – Aristida meridionalis* tall closed woodland, which in total covers 2.5% of the study area, *Colophospermum mopane* is very prominent in all the plant communities described (species group P, Table 1). Where *Colophospermum mopane* occurs it is nearly always the sole dominant of a woodland community (Werger & Coetzee 1978). Mopani woodland mainly occurs in the more or less flat and wide valley bottoms of the large rivers of southern Africa, the Limpopo, Zambezi, Luangwa, Shire, Save, Okavango and Cunene, and on the adjacent wide plains at altitudes between 100 and 1 200 m (Werger & Coetzee 1978).

In an ecological study of the Mopani Veld north of the Soutpansberg, Louw (1970) placed the Messina Experimental Farm in the *Colophospermum – Combretum – Commiphora* community. The mixed occurrence of *Colophospermum mopane* with other woody species, especially *Combretum* and *Commiphora* species, is characteristic of this community and the community is relatively species-rich (Louw 1970).

The plant communities described in this paper show floristical relationships with the *Colophospermum mopane – Commiphora glandulosa – Seddera capensis* open tree savanna, described by Van Rooyen (1978) in the Pafuri area of the Kruger National Park. Conspicuous woody species that are shared by these communities are *Colophospermum mopane, Kirkia acuminata, Adansonia digitata, Combretum apiculatum, Commiphora glandulosa, Grewia bicolor* and *Terminalia prunioides*. Conspicuous graminoids that are shared by these communities are *Enneapogon cenchroides* and *Aristida congesta* as well as the forbs *Hibiscus micranthus* and *Neuracanthus africanus*.

The following protected species in Transvaal according to Ordinance 12 (1983), were encountered: *Adenium obesum, Adansonia digitata, Hoodia currorii* subsp. *lugardii* and one species of the genus *Stapelia*.

The identified plant communities, associated environmental characteristics and quantitative information on the woody vegetation provide a sound ecological basis for estimating carrying capacity, monitoring trends in veld condition and interpreting ungulate habitat preferences in the study area.

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Short Communication / Kort Mededeling

First report of the white rotting fungus *Phanerochaete chrysosporium* in South Africa

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Morphological and preliminary biochemical characterization of a white rotting fungus isolated from the Knysna indigenous forest (strain KKP10) indicates that this strain belongs to *Phanerochaete chrysosporium* Burds. This isolate was characterized by its lack of clamp connections, rapid growth rate and high optimum temperature for growth. A description of the basidiocarp and culture is presented in this note. *P. chrysosporium* strain KKP10 showed strong lignolytic activity on indicator plates. To the best of our knowledge, we are the first to report the presence of *P. chrysosporium* in South Africa.

Morfologiese en voorlopige biochemiese karakterisering van 'n witvrot swam wat in die Knysna inheemse woud geïsoleer is (isolaat KKP10) dui daarop dat hierdie isolaat *Phanerochaete chrysosporium* Burds. is. Hierdie isolaat word deur die afwesigheid van gespeverbindings, 'n vinnige groeitempo en 'n hoë optimale groeitempo gekenmerk. Die basidiokarp asook die kultuur word beskryf. *P. chrysosporium* ras KKP10 het sterk lignolitiese aktiwiteit op indikatorplate getoon. Na die beste van ons wete is hierdie die eerste aanmelding van *P. chrysosporium* in Suid-Afrika.

Keywords: *Phanerochaete chrysosporium*, white rot, basidiomycete.

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White rotting fungi are of interest to the pulp and paper industries for the selective removal of lignin or hemicellulose from wood. Lignin degradation by fungi is usually associated with biopulping, whereas hemicellulose degradation by fungi is termed biobleaching. Lignolytic fungi have also been used to make lignocellulolytic substrates more accessible as animal fodder (Eriksson *et al.* 1990). Due to the ability of many of these white rotting fungi to degrade aromatic carbons, they are also of interest in bioremediation (Bumpus *et al.* 1985). Amongst all the fungal species involved in wood degradation, the basidiomycete *Phanerochaete chrysosporium* Burds. (anamorph: *Sporotrichum pruinosum* J.C. Gilman & E.V. Abbott) has been most extensively used as a model organism to study enzymes involved in lignin biodegradation. However, to date this fungus has only been isolated in Europe, North America and Asia (Stalpers 1984; Eriksson *et al.* 1990). In this note we present the isolation, description and preliminary biochemical characterization of a strain of *Phanerochaete chrysosporium*. This strain (strain KKP10) was isolated from a decayed wood sample collected from the indigenous forest in Knysna. To the best of our knowledge, we are the first to report the presence of *P. chrysosporium* in South Africa.

***Phanerochaete chrysosporium* Burds.** (Burdsall & Eslyn 1974; Burdsall 1981).

The specimen examined was isolated in Knysna, Western Cape province, on 27 October 1994 and was designated strain KKP10.

Growth on malt extract agar (1.5%) at 25°C: 75 mm radius in 7 days. Optimal temperature: 38–40°C. Mat very thin, white to cream-coloured, advancing zone appressed, even, hyphae distant, odour insignificant.

Marginal hyphae hyaline, thin-walled, 3.0-4.0 µm wide, with few septa, lacking clamp connections. Cells multinucleate. Crystals absent. Aerial hyphae hyaline, 3.0–4.5 µm wide, thin- to thick-walled, septate, without clamp connections. Conidiophores simple or typically branched. Branching racemose, each branch forming a terminal blastoconidium (Figure 1A). Blastoconidia from branched conidiophores hyaline, subglobose to ellipsoidal or ovoid, 3.5–4.5 × 7.0–8.0 µm. Chlamydospores terminal or intercalary, hyaline, 12.0–20.0 µm diameter, with granular contents and thick walls. Arthroconidia hyaline, cylindrical or rather irregular, thin-walled. Submerged hyphae hyaline, 4.0–6.0 (–7.5) µm wide, thin- to thick-walled.

Basidiomata broadly effused, membranous; cystidia present (Figure 1B), 3.0–4.0 × 20.0–40.0 µm, cylindrical, thin-walled, smooth, obtuse at apex, septate only at base, lacking clamp connections, protruding up to 50 µm; basidia clavate, hyaline, thin-walled, lacking clamp connections, 4-sterigmate (Figure 1C), sterigmata 2 µm long; basidiospores 3.0–4.0 × 4.0–5.0 µm, depressed ovoid, hyaline, thin-walled, not reacting with Melzer's reagent.

Species code (Stalpers 1978): (1), 5, 13, 14, 18, 19, (25), 30, 31, 37, 48, 50, 52, 53, 54, (55), 57, 80, 82, 84, 85, 86, 87, (88).

Phanerochaete species are described as follows: basidioma resupinate, pelliculose to waxy; hyphae simple-septate; basidia