

A synecological account of the Suikerbosrand Nature Reserve.

II. The phytosociology of the Ventersdorp Geological System*

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ABSTRACT

The vegetation of the Ventersdorp Geological System of the Suikerbosrand Nature Reserve is analysed and classified according to the Braun-Blanquet method. Descriptions of the plant communities include description of habitat features, the identification of differentiating species groups as well as the listing of prominent and less conspicuous species for the tree, shrub and herbaceous layers. The habitat features that are associated with differences in vegetation include altitude, aspect, slope, rockiness of soil surface, soil depth and soil texture.

RÉSUMÉ

COMPTE-RENDU SYNÉCOLOGIQUE DE LA RÉSERVE NATURELLE DU SUIKERBOSRAND. II. PHYTOSOCIOLOGIE DU SYSTÈME GÉOLOGIQUE DE VENTERSDORP

La végétation du système géologique de Ventersdorp dans la Réserve Naturelle du Suikerbosrand est analysée et classée selon la méthode de Braun-Blanquet. Les descriptions des communautés végétales incluent la description des caractéristiques d'habitat, l'identification de groupes d'espèces qui se différencient ainsi que le catalogue des espèces en vue et des espèces moins apparentes dans les strates arborées, arbustives et herbacées. Les caractéristiques d'habitat associées à des différences dans la végétation comprennent l'altitude, l'aspect, la pente, la nature rocheuse de la surface du sol, la profondeur et la texture du sol.

INTRODUCTION

The first part of the account of the synecology of the Suikerbosrand Nature Reserve dealt with the phytosociology of the Witwatersrand Geological System (Bredenkamp & Theron, 1978), while this, the second and final part, deals with the phytosociology of the Ventersdorp Geological System.

THE STUDY AREA

The Ventersdorp System occupies the western part of the Reserve and covers approximately 8 000 ha (60%) of the Reserve (Fig. 1). This system is volcanic in origin (Du Toit, 1954) and includes a chain of mountains with vast, undulating grassland plateaux, 1 800 m to 1 900 m above sea level and flat grassland plains at the foot of the mountains, 1 500 m to 1 650 m

above sea level. Rocky outcrops are found scattered on the plateaux. The north-, northwest- and northeast-facing slopes of the mountains are mostly gentle and covered with grassland. The south-facing slopes, on the contrary, are steep, especially where cliffs of andesitic lava are exposed. These steep, usually rocky slopes are mostly covered with dense bush (Fig. 2). The plateaux are drained by a number of kloofs, some of which cut deeply into the mountains resulting in steep slopes, characteristically covered with woody vegetation. The lower valleys in the bigger kloofs are sheltered and contain deep, fertile clayey soils of alluvial and colluvial origin. The soils of the study area however, are, mostly fairly shallow with a sandy clay or sandy clay loam texture.

The climate of the area was described in Part I of this account (Bredenkamp & Theron, 1978).

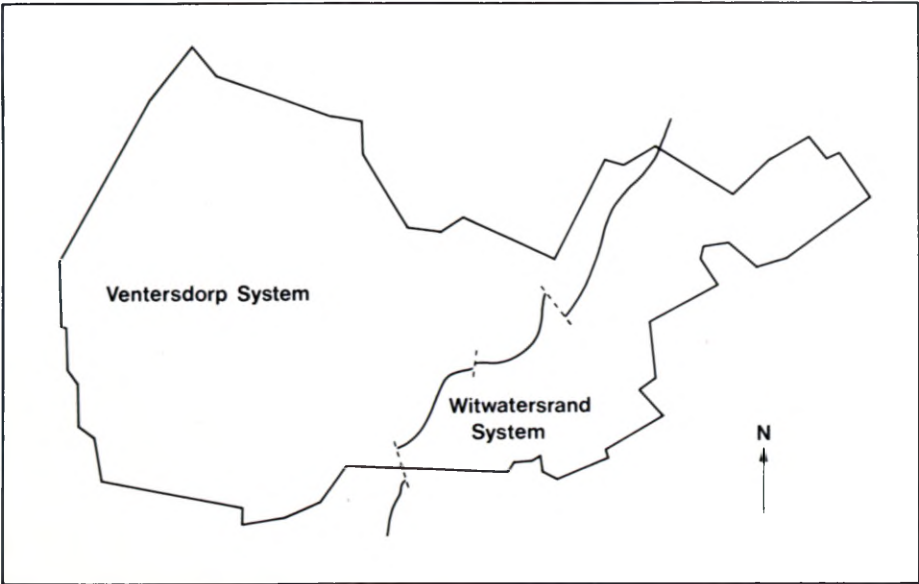


FIG. 1.—A simplified geological map of the Suikerbosrand Nature Reserve.

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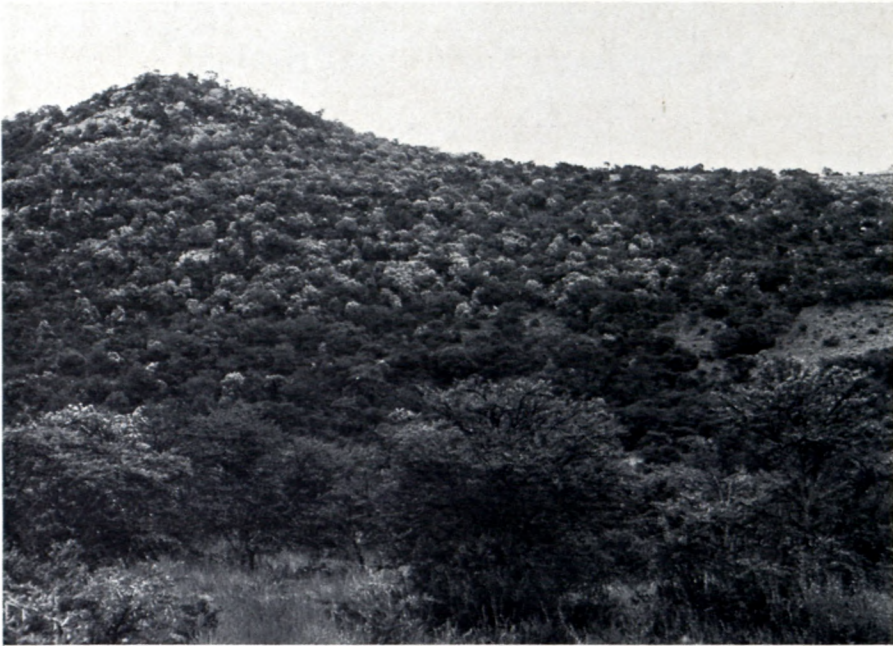


FIG. 2.—Dense bush on south-facing slopes of the Venterdorp System mountains.

METHODS

The methods applied are those used by Bretenkamp & Theron (1978). Thirteen different physiographic and physiognomic units represented in the study area were delineated on aerial photographs. One hundred and ninety three sample plots were divided *pro rata* on an area basis among the thirteen units (Table 1), and were placed at random within these units.

THE PLANT COMMUNITIES

The floristic composition of plant communities is represented in phytosociological Tables 2 & 4 and the prominent species in each community are indicated in Tables 3 & 5. The symbol “P” indicates species covering at least 5% of the area represented in the relevés in at least 25% of the relevés representing a community, while “p” indicates species covering at least 1% of the area represented in the relevés, in at least 50% of the relevés representing a community. The symbol “t” in Tables 2 & 4 equals the symbol “r” in normal Braun-Blanquet tables.

The vegetation may be divided into two major communities:

The *Euclea crispa*—*Rhoicissus tridentata* Bush and Savanna Communities (Tables 2 & 3) and

The *Trachypogon spicatus*—*Themeda triandra* Grassland Communities (Tables 4 & 5).

1. *Euclea crispa*—*Rhoicissus tridentata* Bush and Savanna Communities

These communities are found in the kloofs and valleys and on the foothills and slopes of the mountains within the study area and their floristic composition is represented in Table 2. This vegetation is characterized by the large *Rhoicissus tridentata* species group (Table 2) with *Euclea crispa* as the most prominent species (Table 3) and is divided into five principal communities described under 1.1, 1.2, 1.3, 1.4 and 1.5.

1.1 *Rhus pyroides*—*Leucosidea sericea* Bush and Savanna Communities

These communities include the dense forests in the kloofs, as well as the isolated patches of forest and savanna on the steep south-facing slopes of the mountains. All these communities are characterized by the *Rhus pyroides* species group (Table 2), with *Euclea crispa* and *Rhus pyroides* very prominent.

Two communities each with two variations are distinguished:

1.1.1 *Rhus pyroides*—*Rhamnus prinoides* Forest (Fig. 3).

This dense forest vegetation is characterized by the *Rhamnus prinoides* species group (Table 2) and is mainly found in the sheltered kloofs within the

TABLE 1.—The distribution of the 193 sample plots in the 13 physiographic-physiognomic units

	Physiographic-physiognomic units												
	Bush and savanna						Grassland						
	Kloof	Flats	Slopes				Plateaux		Slopes				Flats
			*N	S	E	W	Rocky	Not rocky	N	S	E	W	
Number of sample plots.....	10	9	19	21	20	11	11	21	11	20	13	7	20

* N=north-facing, etc.

TABLE 3.—Prominent species in the *Euclea crispa*—*Rhoicissus tridentata* Bush and Savanna Communities

Plant species	Community numbers												
	1.1.1a	1.1.1b	1.1.2a	1.1.2b	1.2	1.3.1	1.3.2	1.3.3a	1.3.3b	1.4	1.5.1	1.5.2	1.5.3
<i>Celtis africana</i>	P	p							p	P			
<i>Myrsine africana</i>	P	P		P									
<i>Rhamnus prinoides</i>	p	P											
<i>Diospyros lycioides</i>	p												
<i>Leucosidea sericea</i>	P												
<i>Ehrharta erecta</i>		P											
<i>Galopina circaeoides</i>		p		P									
<i>Protea caffra</i>			p	P									
<i>Buddleja salviifolia</i>			p										
<i>Cymbopogon marginatus</i>			P		P								
<i>Tristachya hispida</i>				P									
<i>Brachiaria serrata</i>				P									
<i>Harpochloa falx</i>				p									
<i>Senecio isatideus</i>				p									
<i>Hyparrhenia hirta</i>				P							p		
<i>Rhus pyroides</i>	P	P	P	P					p	P			
<i>Maytenus heterophylla</i>			p		P					p			
<i>Trachypogon spicatus</i>				P	P		P						
<i>Heteropogon contortus</i>						P							
<i>Canthium mundianum</i>							P						
<i>Pavonia burchellii</i>							p						
<i>Felicia filifolia</i>							p						
<i>Aloe marlothii</i>					p			P					
<i>Heteromorpha arborescens</i>	P							P	P				
<i>Buddleja saligna</i>							P	P	P				
<i>Rhus leptodictya</i>							p	p	P				
<i>Maytenus polyacantha</i>						p	P	P					
<i>Canthium gilfillanii</i>						P	P	P	P				
<i>Rhoicissus tridentata</i>						P	P	P	P				
<i>Eustachys mutica</i>													P
<i>Acacia caffra</i>								P	P	P			P
<i>Tarchonanthus camphoratus</i>								P		P			
<i>Euclea crispa</i>	P	P	p	p	P	P		P	P	P			
<i>Ziziphus mucronata</i>													
<i>Teucrium capense</i>											p		
<i>Aristida congesta</i>												p	
<i>Cynodon dactylon</i>										p			P
<i>Acacia karroo</i>											P	P	P
<i>Asparagus suaveolens</i>				P	P	P	p		P		P	P	P
<i>Themeda triandra</i>							p		P		P	P	P
<i>Eragrostis curvula</i>							p		P				
<i>Isoglossa grantii</i>	P	p					P	P				p	

Explanation of "P" and "p" in text.



FIG. 3.—*Rhus pyroides*—*Rhamnus prinoides* Forest in a kloof.

study area, but isolated patches are found on steep south-facing slopes. According to the Fosberg (1967) classification, this community is an evergreen broad sclerophyll forest (1A1/6).

Two variants are distinguished:

(a) *Rhus pyroides*—*Rhamnus prinoides*—*Cassinopsis ilicifolia* Variant

This variation is characterized by the presence of the *Dolichos falciformis* species group and is negatively associated with the *Acacia karroo* species group (Table 2). It occurs in sheltered moist kloofs on sandy loam soils at an altitude of 1 740–1 770 m.

The total canopy cover of the vegetation is 90–95% and an average of 28 species was recorded per relevé.

The tree stratum is 8–10 m tall and has a canopy cover of 70–90%. *Euclea crispa* (100%)*, *Rhus pyroides* (100%), *Diospyros lycioides* (100%) *Leucosidea sericea* (80%), *Rhamnus prinoides* (80%), *Heteromorpha arborescens* (80%), and *Celtis africana* (80%) are prominent trees (Table 3). *Cassinopsis ilicifolia* (80%), *Buddleja salviifolia* (60%), *Olea africana* (60%), *Cussonia paniculata* (40%) and *Maytenus heterophylla* (40%) are also often present.

A definite shrub stratum, 2 m tall and with a canopy cover of 30–50% is dominated by *Diospyros lycioides* (100%) and *Myrsine africana* (Table 3), both forming very dense thickets locally. Other shrubs include *Diospyros whyteana* (80%), *Psoralea polysticta* (80%), *Grewia occidentalis* (60%) and *Calpurnia intrusa* (40%). *Artemisia afra* (60%) and *Felicia filifolia* (40%) are conspicuous in less dense patches.

Lianes are well represented in the tree and shrub strata, with *Rhoicissus tridentata* (100%), *Dolichos falciformis* (100%), *Clematis brachiata* (80%), *Rubia petiolaris* (40%) and *Asparagus africanus* (40%) often present.

The herbaceous layer is fairly open, with 20–50% canopy cover, and is mostly less than 0,2 m tall, but prominent individual shrublets of *Isoglossa grantii* (40%) and *Clutia hirsuta* (40%) may be up to 1 m tall. *Galopina circaeoides* (100%), *Ehrharta erecta* (80%), *Senecio isatideus* (80%), *Achyranthes aspera* (80%), *Argyrolobium rupestre* (60%), *Carex spicato-paniculata* (40%), *Bromus leptoclados* (40%) and other species are present.

(b) *Rhus pyroides*—*Rhamnus prinoides*—*Acacia karroo* Variant

This variation occurs in drier kloofs, on clay loam soils at an altitude of less than 1 740 m. It is characterized by a negative association with the *Dolichos falciformis* species group, but the presence of some species of the *Acacia karroo* species group (Table 2). An average of 27 species was recorded per relevé, and the total canopy cover for this community is 80–95%.

The tree stratum is often 10 m tall, with a canopy cover of 50–90%. *Euclea crispa* (100%), *Rhus pyroides* (89%), *Celtis africana* (78%) and *Rhamnus prinoides* (78%) are prominent trees (Table 3). Other trees include:

<i>Heteromorpha arborescens</i>	67%	<i>Fagara capensis</i>	33%
<i>Acacia karroo</i>	67%	<i>Cussonia paniculata</i>	33%
<i>Maytenus heterophylla</i>	67%	<i>Pittosporum viridiflorum</i>	22%
<i>Olea africana</i>	56%	<i>Rhus leptodictya</i>	22%
<i>Buddleja salviifolia</i> ...	56%	<i>Ziziphus mucronata</i>	22%
<i>Leucosidea sericea</i>	44%		

* In the following treatment where the symbol % follows the name of a species, the figures indicate the constancy of that species in the community.

A well-defined shrub stratum, 2 m tall and with a canopy cover of 40–60% occurs in this community. Prominent shrubs include *Rhus pyroides* (89%), *Myrsine africana* (78%), *Acacia karroo* (67%) and *Buddleja salviifolia* (56%) (Table 3). Other conspicuous shrubs include *Asparagus suaveloens* (56%), *Diospyros whyteana* (44%), *Grewia occidentalis* (44%), *Lantana rugosa* (33%), *Calpurnia intrusa* (33%), *Rubus rigidus* (22%), *Lippia javanica* (22%) and *Diospyros austro-africana* (22%).

Lianes often present in the tree and shrub strata include *Rhoicissus tridentata* (89%), *Clematis brachiata* (78%), *Rubia petiolaris* (44%), *Dolichos falciformis* (22%), *Asparagus aethiopicus* (22%), *A. africanus* (22%) and *A. asparagoides* (22%).

The herbaceous layer varies considerably. It is mostly up to 0,5 m tall, and the canopy cover varies from 5%, where the upper strata are dense, to 70%, where the upper strata are more open. Prominent herbs include *Ehrharta erecta* (100%), *Galopina circaeoides* (78%) and *Isoglossa grantii* (78%) (Table 3) but *Achyranthes aspera* (78%) and *Teucrium capense* (67%) are locally conspicuous. Other herbs which may be present include:

<i>Eragrostis curvula</i>	44%	<i>Argyrolobium rupe-</i>	
<i>Themeda triandra</i>	33%	<i>stre</i>	22%
<i>Solanum rigescens</i>	33%	<i>Cuscuta campestris</i>	22%
<i>Cheilanthes ecklonia-</i>		<i>Asplenium adian-</i>	
<i>na</i>	33%	<i>tum-nigrum</i>	22%
<i>Hyparrhenia hirta</i>	22%	<i>Commelina erecta</i> ...	22%
<i>Eragrostis pseudoscle-</i>		<i>Solanum retroflexum</i>	22%
<i>rantha</i>	22%	<i>Oxalis depressa</i>	22%
<i>Chlorophytum bow-</i>		<i>Senecio isatideus</i> ...	22%
<i>keri</i>	22%		

1.1.2 *Rhus pyroides*—*Protea caffra* Savanna

This community is characterized by the *Berkheya setifera* species group (Table 2), and can further be distinguished from the *Rhus pyroides*—*Rhamnus prinoides* Forest by the presence of the *Brachiaria serrata* species group. It occurs on south-facing slopes, mostly at fairly high altitudes of more than 1 700 m above sea level. The vegetation is an evergreen broad sclerophyll shrub savanna (1K1/2) of Fosberg (1967).

Two variants are distinguished:

(a) *Rhus pyroides*—*Protea caffra*—*Chrysanthemoides monilifera* Variant

This variation occurs on very steep (often more than 20°) rocky south to southeast facing slopes, and is distinguished from the *Rhus pyroides*—*Protea caffra*—*Harpochloa falx* Variant by the absence of the *Harpochloa falx* species group (Table 2).

An average of 34 species was recorded per relevé and the total canopy cover of the vegetation varies between 60% and 90%.

The trees are up to 6 m tall, and grow singly or in groups to form scattered bush thickets. Although *Rhus pyroides* (80%), *Euclea crispa* (80%) and *Maytenus heterophylla* (80%) are the most prominent trees (Table 3), *Protea caffra* (40%) is conspicuous in this community. Other trees which are often present in this community include *Leucosidea sericea* (60%), *Buddleja salviifolia* (60%) and *Celtis africana* (40%).

Although many shrubs occur in this community, their total canopy cover never exceeds 30%. *Diospyros lycioides* (100%) and *Myrsine africana* (60%) are the most prominent shrubs. Other shrubs include *Cassine aethiopica* (60%), *Rhus eckloniana* (40%), *Canthium gilfillanii* (40%), *Diospyros whyteana* (40%), *Felicia*

filifolia (40%), *Psoralea polysticta* (40%) and *Celtis africana* (40%).

The lianes *Rhoicissus tridentata* (100%) and *Clematis brachiata* (100%) are constantly found in the tree and shrub strata.

The herbaceous layer is often up to 1 m tall, and has a canopy cover of up to 80%. The tall *Cymbopogon marginatus* (80%) is generally conspicuous, but *Eragrostis curvula* (40%) and especially *Hyparrhenia hirta* (40%) are locally prominent (Table 3). Other herbaceous plants which occur in at least two of the five relevés representing this community include:

Pellaea calomelanos...	80%	Hibiscus aethiopicus	
Rubia petiolaris.....	80%	var. ovatus.....	60%
Cheilanthes hirta.....	80%	Helichrysum mico-	
Berkheya setifera.....	60%	neifolium.....	40%
Chrysanthemoides		Koeleria cristata....	40%
monilifera.....	60%	Senecio isatideus....	40%
Rhus discolor.....	60%	Argyrolobium rupes-	
Athrixia elata.....	60%	tre.....	40%
Brachiaria serrata....	60%	Tephrosia capensis..	40%
Setaria nigrirostris....	60%	Themeda triandra....	40%
Crabbea acaulis.....	60%	Aloe davyana.....	40%
Ledebouria margi-		Indigofera hiliaris...	40%
nata.....	60%		

(b) *Rhus pyroides*—*Protea caffra*—*Harpochloa falx* Variant

This variation occurs in scattered patches on southwest-facing slopes that are not as steep as those of the previous community.

The *Harpochloa falx* species group (Table 2) is characteristic of this community. An average of 44 species was recorded per relevé and the total canopy cover of the vegetation is more than 90%.

The canopy of the tree stratum is often less than 10%, and *Protea caffra* (100%), *Rhus pyroides* (75%) and *Euclea crispa* (75%) are the most prominent trees (Table 3). Individuals of *Rhus leptodictya* (50%), *Celtis africana* (50%) and *Cussonia paniculata* (50%) are found scattered in this community.

Shrubs are poorly represented but *Rubus rigidus* (100%) is constantly present and forms impenetrable thickets locally. *Rhus eckloniana* (100%), *Diospyros lycioides* (100%), *Myrsine africana* (75%) and *Lippia javanica* (50%) are usually small inconspicuous shrublets.

The herbaceous layer is well defined, up to 0.7 m tall, and is usually very dense with a canopy cover of 70–90%. *Trachypogon spicatus* (100%) dominates the herbaceous layer, while *Harpochloa falx* (100%), *Brachiaria serrata* (100%), *Senecio isatideus* (75%), *Tristachya hispida* (75%), *Hyparrhenia hirta* (75%) and *Themeda triandra* (50%) are locally very conspicuous (Table 3). In spite of the relatively low canopy cover of *Berkheya setifera* (100%), *Rhus discolor* (100%) and *Aster peglerae* (100%) they are constantly present and very conspicuous. The following other herbs were present in at least two of the relevés representing the community:

Schistostephium cra-		Eragrostis curvula...	75%
tae gifolium.....	100%	Rubia petiolaris.....	75%
Cheilanthes hirta....	100%	Pentania prunelloi-	
Helichrysum miconei-		des.....	50%
folium.....	75%	Indigofera zeyheri...	50%
Monsonia attenuata..	75%	Argyrolobium ru-	
Setaria nigrirostris...	75%	pestre.....	50%
Tephrosia capensis...	75%	Ledebouria sp.....	50%
Phyllanthus parvulus	75%	Acalypha punctata..	50%
Aristea woodii.....	75%	Achyranthes aspera	50%
Becium obovatum....	75%	Crabbea acaulis.....	50%
Vernonia natalensis..	75%		

1.2 *Euclea crispa*—*Maytenus heterophylla*—*Setaria nigrirostris* Savanna

This community is situated on north-facing slopes of kloofs at an altitude of 1 740–1 800 m. Scattered trees and shrubs occur, but the herbaceous layer is dense and well defined. The vegetation is an ever-green broad sclerophyll shrub savanna (1K1/2) of Fosberg (1967). The community is characterized by the *Vernonia oligocephala* species group (Table 2). The simultaneous presence of the *Phyllanthus parvulus* and *Brachiaria serrata* species groups, as well as *Aloe marlothii* (Table 2) is another characteristic feature of this community. The total canopy cover of the vegetation is 60–90% and an average of 33 species was recorded per relevé.

The tree stratum is sparse, with a canopy cover of less than 20%. The trees are 3–4 m tall. *Aloe marlothii* (66%), *Euclea crispa* (66%) and *Maytenus heterophylla* (66%) are the most prominent trees (Table 3), while *Ziziphus mucronata* (66%) and *Cussonia paniculata* (66%) are often present.

The shrub stratum is also sparse, but its canopy cover is locally as high as 25%. As in the case of the tree stratum, the most prominent species are *Aloe marlothii* (100%), *Euclea crispa* (100%) and *Maytenus heterophylla* (100%), but *Rhus eckloniana* (100%), *Diospyros lycioides* (66%), *Lippia javanica* (66%) and *Lantana rugosa* (66%) are also common.

The herbaceous layer is well defined, up to 0.5 m tall and has a canopy cover of 60–80%. *Hyparrhenia hirta* (100%) and *Themeda triandra* (66%) are the most prominent species, but *Trachypogon spicatus* (66%) and *Cymbopogon marginatus* (66%) are also very conspicuous (Table 3). Other herbs present in at least two of the three relevés representing this community include the following:

Setaria nigrirostris....	100%	Becium obovatum...	66%
Vernonia oligocephala	100%	Diheteropogon am-	
Aloe davyana.....	100%	plectens.....	66%
Pellaea calomelanos..	100%	Pentania angusti-	
Ledebouria marginata	100%	folia.....	66%
Athrixia elata.....	66%	Hypoxis rigidula....	66%
Brachiaria serrata....	66%	Anthospermum ri-	
Chaetacanthus bur-		gidum.....	66%
chellii.....	66%	Elephantorrhiza ele-	
Phyllanthus parvulus	66%	phantina.....	66%

1.3 *Euclea crispa*—*Maytenus polyacantha*—*Canthium gilfillanii* Bush and Savanna Communities

These communities include the dense bush and open savannas which mostly occur on north-, west- and east-facing slopes of the mountains in the western part of the study area. The *Maytenus polyacantha* species group (Table 2) is characteristic of these communities, and a prominent feature of it is that *Maytenus polyacantha* and *Canthium gilfillanii* locally form impenetrable thickets.

Three communities are distinguished and described under 1.3.1, 1.3.2 and 1.3.3.

1.3.1 *Maytenus polyacantha*—*Heteropogon contortus* Savanna

This community (Fig. 4) is mostly found on rocky slopes of less than 22° between 1 600 and 1 700 m above sea level. Rocks cover 21–60% of the soil surface. The vegetation of relevés 36, 40, 73 and 75, situated on somewhat steeper slopes, included species from the *Buddleja saligna* and *Aloe marlothii* species groups (Table 2). An affinity with the *Acacia caffra*—



FIG. 4.—*Maytenus polyacantha*—*Heteropogon contortus* Savanna.

Aloe marlothii Bush, normally found on the steeper slopes, is thus indicated.

The community is characterized by the *Heteropogon contortus* species group (Table 2). The trees and shrubs often occur in scattered bush clumps. The vegetation is an evergreen broad sclerophyll scrub (1B1/4) of Fosberg (1967). The total canopy cover varies from 60–95% and an average of 35 species was recorded per relevé.

The tree stratum is up to 5 m tall with a canopy cover of 5–40%. This stratum is often dominated by *Canthium gilfillanii* (94%) and *Euclea crispa* (89%) (Table 3). These two trees often form groups of dense thickets. Other trees present in this community include *Fagara capensis* (78%), *Cussonia paniculata* (61%), *Celtis africana* (44%), *Dombeya rotundifolia* (44%), *Maytenus heterophylla* (39%), *Ehretia rigida* (27%), *Rhus leptodictya* (22%) and *Ziziphus mucronata* (22%).

The shrub stratum has 10–40% canopy cover, with *Maytenus polyacantha* (78%) the most prominent shrub (Table 3). *Canthium gilfillanii* (94%) and *Euclea crispa* (89%) are also often very prominent (Table 3), in which case it becomes difficult to differentiate between the tree and shrub strata. Other shrubs include:

<i>Fagara capensis</i>	72%	<i>Maytenus hetero-</i>	
<i>Diospyros lcyoides</i> ..	72%	<i>phylla</i>	39%
<i>Cassine aethiopica</i>	67%	<i>Grewia occidentalis</i>	22%
<i>Rhus eckloniana</i>	56%	<i>Pavetta assimilis</i> ...	22%
<i>Isoglossa grantii</i>	44%	<i>Tarchonanthus cam-</i>	
<i>Myrsine africana</i>	44%	<i>phoratus</i>	22%
		<i>Carissa bispinosa</i> ...	17%

The liane *Rhoicissus tridentata* (100%) is constantly prominent in the tree and shrub strata, while *Rubia petiolaris* (50%) and *Clematis brachiata* (33%) are locally present.

The herbaceous layer is well developed, 0,5 m tall, with canopy cover often up to 80%. *Heteropogon contortus* (89%) and *Themeda triandra* (89%) are the most prominent species (Table 3), but *Elionurus muticus* (94%) is also very conspicuous. *Commelina africana* (72%) and *Ruellia cordata* (61%) are well

represented in the shade of the dense bush clumps. Other herbs present in this community include:

<i>Aloe davyana</i>	89%	<i>Hyparrhenia hirta</i> ...	39%
<i>Ledebouria</i> sp.....	72%	<i>Trachypogon spi-</i>	
<i>Rhynchelytrum seti-</i>		<i>catus</i>	33%
<i>folium</i>	67%	<i>Cymbopogon margi-</i>	
<i>Eustachys mutica</i>	61%	<i>natus</i>	33%
<i>Brachiaria serrata</i> ...	61%	<i>Setaria nigrirostris</i> ..	28%
<i>Pellaea calomelanos</i> ..	61%	<i>Cheilanthes hirta</i>	28%
<i>Eragrostis curvula</i>	56%	<i>Gerbera viridifolia</i> ..	22%
<i>Kalanchoe paniculata</i>	50%	<i>Rhynchosia totta</i> ...	22%
<i>Sida dregei</i>	50%	<i>Senecio oxyriifolia</i> ..	22%
<i>Chaetacanthus bur-</i>		<i>Crassula rubicunda</i>	22%
<i>chellii</i>	44%		

1.3.2 *Euclea crispa*—*Maytenus polyacantha*—*Scolopia zeyheri* Bush

This community occurs in dense, isolated patches on steep northeast- and northwest-facing slopes at an altitude of 1 645–1 690 m. These dense bush clumps are examples of evergreen broad sclerophyll scrub (1B1/4) of Fosberg (1967) and are characterized by the *Canthium mundianum* species group (Table 2), and the prominence of *Euclea crispa* (100%) (Table 2). An average of 22 species was recorded per relevé and the total canopy cover is 70–90%.

The tree stratum is 3–4 m tall and is very dense, with a canopy cover of 60–90%. Together with the very prominent *Euclea crispa* (100%), *Canthium mundianum* (75%), *C. gilfillanii* (75%) and *Rhus leptodictya* (75%) are also prominent trees (Table 3). Other trees include *Scolopia zeyheri* (100%) and *Dombeya rotundifolia* (100%).

The shrub stratum covers 20–40% and is dominated by *Euclea crispa* (100%), *Canthium mundianum* (75%), *C. gilfillanii* (75%), *Felicia filifolia* (100%) and *Maytenus polyacantha* (75%). Other shrubs include *Scolopia zeyheri* (100%), *Lippia javanica* (75%) and *Lantana rugosa* (50%).

Rhoicissus tridentata (100%) is a prominent liane in the tree and shrub strata.

Owing to the dense tree and shrub strata, the herbaceous layer is poorly developed, often not taller than 0,2 m and with a canopy cover of only

5–10%. Conspicuous species present in this layer include:

<i>Commelina africana</i> ...	100%	<i>Trachypogon spica-</i>	
<i>Aloe davyana</i>	100%	<i>tus</i>	50%
<i>Eustachys mutica</i> ...	75%	<i>Themeda triandra</i> ...	50%
<i>Elionurus muticus</i> ...	75%	<i>Eragrostis curvula</i> ...	50%
<i>Pavonia burchellii</i> ...	50%	<i>Kalanchoe panicula-</i>	
<i>Hyparrhenia hirta</i> ...	50%	<i>lata</i>	50%

1.3.3 *Euclea crispa*—*Buddleja saligna*—*Acacia caffra* Bush

These communities are mostly found on steep, rocky slopes (more than 22°), at an altitude of 1 660–1 770 m. The dense vegetation ranges from Fosberg’s (1967) deciduous thorn savanna (1I2/3) to microphyllous deciduous thorn scrub savanna (1K2/5), and is characterized by the *Buddleja saligna* species group (Table 2).

Two variations are recognized:
(a) *Acacia caffra*—*Aloe marlothii* Variant (Figs 5 & 6)

This variation is situated on steep, rocky north-, northwest- and northeast-facing slopes, where more

than 60% of the soil surface is covered by large rocks. The *Aloe marlothii* species group (Table 2) is characteristic of this variant. The total canopy cover is 60–95% and an average of 25 species was recorded per relevé.

The trees of this variation are up to 10 m tall and the canopy cover of the tree stratum is 30–80%. The most conspicuous trees are *Aloe marlothii* (87%), *Acacia caffra* (80%), *Rhus leptodictya* (93%), *Tarchonanthus camphoratus* (53%) and *Buddleja saligna* (53%) (Table 3). Other trees include *Dombeya rotundifolia* (73%), *Euclea crispa* (73%), *Fagara capensis* (67%), *Canthium gilfillanii* (53%), *Acacia karroo* (47%), *Ziziphus mucronata* (47%) and *Celtis africana* (47%).

The canopy cover of the shrub stratum is 10–50%. *Maytenus polyacantha* (87%), *Aloe marlothii* (87%) and *Isoglossa grantii* (80%) are the most prominent shrubs in this community (Table 3). The large patches of *Maytenus polyacantha* forming impenetrable bush

FIG. 5.—Dense *Acacia caffra*—*Aloe marlothii* Bush on steep north-facing slopes (a); *Acacia karroo*—*Teucrium capense* Savanna in the valley (b); and *Berkheya setifera*—*Koeleria cristata*—*Pentanisia prunelloides* Grassland on the south-facing slopes (c).

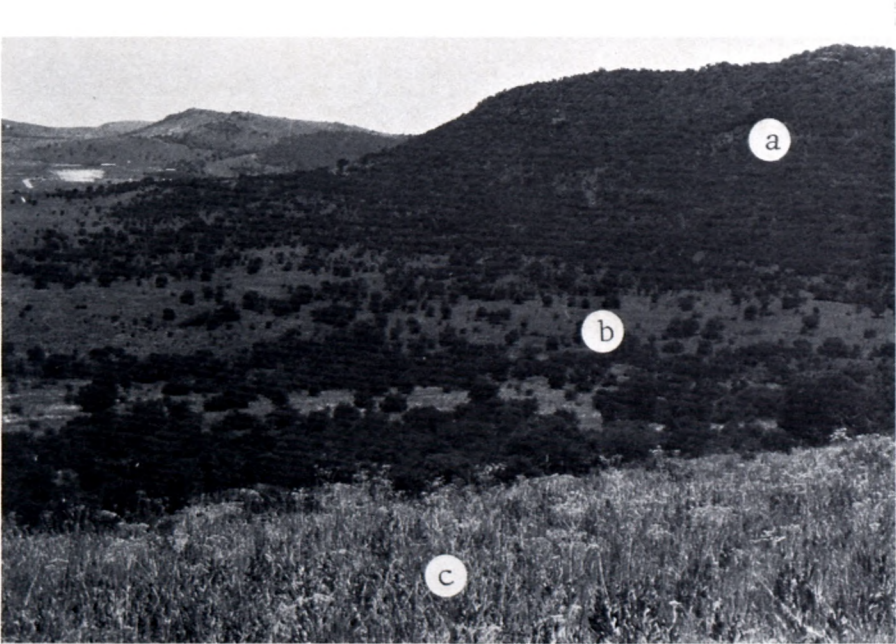


FIG. 6.—*Acacia caffra*—*Aloe marlothii* Bush.



thickets are a conspicuous feature of this vegetation. Other shrubs include the following:

<i>Euclea crispa</i>	73%	<i>Canthium gilfillanii</i>	53%
<i>Felicia filifolia</i>	73%	<i>Asparagus suaveo-</i>	
<i>Dombeya rotundifo-</i>		<i>lens</i>	53%
<i>lia</i>	73%	<i>Ehretia rigida</i>	47%
<i>Lippia javanica</i>	60%	<i>Opuntia sp.</i>	40%
<i>Tarchonanthus cam-</i>		<i>Diospyros lycioides</i>	40%
<i>phoratus</i>	53%		

The lianes *Rhoicissus tridentata* (93%) and *Dioscorea sylvatica* (47%) are often found in the tree and shrub strata.

The herbaceous layer varies considerably as a result of the local variation in the canopy cover of the tree and shrub strata. The canopy cover of the herbaceous layer is as low as 5% under the denser woody layer, but may be up to 50% where the upper layers are more open. Herbaceous plants often present in this community include:

<i>Eragrostis curvula</i>	80%	<i>Pellaea calomelanos</i>	47%
<i>Eustachys mutica</i>	73%	<i>Ledebouria sp.</i>	40%
<i>Aristida junciformis</i> ..	67%	<i>Sida dregei</i>	33%
<i>Commelina africana</i> ..	67%	<i>Ruellia cordata</i>	27%
<i>Themeda triandra</i>	60%	<i>Aloe davyana</i>	27%
<i>Kalanchoe paniculata</i>	53%		

(b) *Euclea crispa*—*Buddleja saligna* Variant

This variation is situated on rocky south- and east-facing slopes with large rocks covering 21–60% of the soil surface. The variation is distinguished from the *Acacia caffra*—*Aloe marlothii* Bush by the absence of the *Aloe marlothii* species group as well as the absence of *Acacia karroo* (Table 2). An average of 27 species per relevé was recorded and the total canopy cover varies from 70 to 80%.

The tree stratum is up to 8 m tall and has a canopy cover of 50–70%. The most prominent species include *Buddleja saligna* (86%), *Euclea crispa* (86%), *Rhus leptodictya* (86%), *Canthium gilfillanii* (71%), *Acacia caffra* (57%) and *Heteromorpha arborescens* (43%) (Table 3). Other trees include *Fagara capensis* (71%), *Ziziphus mucronata* (57%), *Celtis africana* (57%), *Olea africana* (43%), *Cussonia paniculata* (43%) and *Rhus pyroides* (29%).

The shrub stratum has a 20–50% canopy cover and is mainly composed of the following species:

<i>Felicia filifolia</i>	86%	<i>Fagara capensis</i>	71%
<i>Euclea crispa</i>	86%	<i>Maytenus polyacan-</i>	
<i>Grewia occidentalis</i> ..	86%	<i>tha</i>	57%
<i>Asparagus suaveolens</i>	71%	<i>Diospyros whyteana</i>	57%
<i>Canthium gilfillanii</i> ..	71%	<i>Myrsine africana</i>	57%
<i>Diospyros lycioides</i> ..	71%	<i>Ehretia rigida</i>	29%
<i>Isoglossa grantii</i>	71%		

Lianes found in the woody strata include *Rhoicissus tridentata* (100%), *Asparagus aethiopicus* (57%) and *Dioscorea sylvatica* (29%).

The herbaceous layer is normally poorly represented, but *Themeda triandra* (71%), *Eustachys mutica* (57%) and *Eragrostis curvula* (43%) are fairly abundant locally (Table 3). Other herbs include *Commelina africana* (71%), *Ledebouria sp.* (71%), *Kalanchoe paniculata* (57%), *Aloe davyana* (57%), *Sida dregei* (57%) and *Pellaea calomelanos* (43%).

1.4 *Acacia caffra*—*Teucrium capense* Savanna

This community occurs on rocky south- and west-facing slopes of the Holhoek Kloof. The vegetation varies from the microphyllous deciduous thorn shrub savanna (1K2/5) to the evergreen broad sclerophyll forest (1A1/6) of Fosberg (1967). The

combination of *Acacia caffra*, *Rhus pyroides*, *Teucrium capense*, *Cynodon dactylon*, *Ehrharta erecta* and *Tarchonanthus camphoratus* is characteristic of this community (Table 2). The total canopy cover of the vegetation is 60–90% and an average of 28 species was recorded per relevé.

In the open areas the trees are up to 6 m tall, with a canopy cover of 50–60%, but in denser areas the canopy cover may be as high as 80% and the trees are up to 12 m tall. The most prominent trees include *Acacia caffra* (100%), *Rhus pyroides* (75%), *Euclea crispa* (75%), *Celtis africana* (75%), *Ziziphus mucronata* (75%), *Tarchonanthus camphoratus* (75%) and *Maytenus heterophylla* (75%) (Table 3).

The shrub stratum covers 10–30% and the most prominent shrubs include *Maytenus heterophylla* (75%) and *Felicia filifolia* (75%) (Table 3). Other shrubs which may be present are *Diospyros lycioides* (75%), *Asparagus suaveolens* (75%), *Lippia javanica* (75%), *Isoglossa grantii* (50%) and *Ehretia rigida* (50%).

The canopy cover of the herbaceous layer is only 15–40%, but the layer may be up to 1 m tall owing to tall *Cymbopogon validus* (75%) and *C. marginatus* (50%). *Eragrostis curvula* (25%) is locally prominent (Table 3). Other herbs often found in this community include *Achyranthes aspera* (100%), *Ledebouria sp.* (100%), *Ehrharta erecta* (75%), *Aristida congesta* (75%), *Solanum rigiscens* (75%), *Pellaea calomelanos* (50%) and *Pavonia burchellii* (50%).

1.5 *Acacia karroo*—*Teucrium capense* Savanna Communities (Fig. 5)

These open Savanna Communities occur at relatively low altitudes, on clay loam soils, in sheltered valleys and often along dry stream banks. These communities are characterized by the *Acacia karroo* species group (Table 2). *Acacia karroo* is by far the most prominent species in this community, which corresponds to the deciduous microphyll thorn savanna of Fosberg (1967). Three variations are distinguished and described under 1.5.1, 1.5.2 and 1.5.3.

1.5.1 *Acacia karroo*—*Teucrium capense*—*Conyza podocephala* Savanna

This variation is situated on fairly rocky northeast-, south- and southwest-facing slopes of less than 9°, usually at the foot of adjacent rocky hills. The *Conyza podocephala* species group (Table 2) is characteristic of this variation. An average of 30 species was recorded per relevé and the total canopy cover of the vegetation is 60–80%.

The tree stratum is up to 6 m tall with 20–40% canopy cover. *Acacia karroo* (100%) is the most prominent tree (Table 3). *Rhus pyroides* (50%), *Euclea crispa* (50%), *Celtis africana* (50%) and *Ziziphus mucronata* (50%) are locally present (Table 2).

The shrub stratum has a 5–20% canopy cover and is composed of *Acacia karroo* (100%), *Diospyros lycioides* (100%), *Asparagus suaveolens* (100%), *Lippia javanica* (75%), *Euclea crispa* (50%), *Felicia filifolia* (50%) and *Lantana rugosa* (50%).

The herbaceous layer is well developed with 50–70% canopy cover. *Eragrostis curvula* (100%) is often the most conspicuous species in the herbaceous layer (Table 3), but *Themeda triandra* (75%), *Hyparrhenia*

COMMUNITIES		2.1 Rhynchelytrum setifolium-Monocymbium cerasiiforme Grassland		2.2.1 Berkheya setifera-Rhynchelytrum setifolium Grassland		2.2 Berkheya setifera-Koeleria cristata-Pentanisia prunelloides Grassland		2.3 Berkheya setifera-Rhynchelytrum setifolium Grassland		2.2.4 Berkheya setifera-Digitaria diagonalis Grassland		2.3.1 Elionurus muticus-Triandra-trachypogon apiculatus Grassland		2.3.2 Elionurus muticus-Themeda triandra-Teucrium capense Grassland		2.3.3 Elionurus muticus-Themeda triandra-Dracopis curvula Grassland	
RELEVÉ NO.	297 113 110 298 299 300	1 870 1 870 1 840 1 870 1 860 1 830	P P P P P P	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
ALTITUDE (m)	1 870 1 870 1 840 1 870 1 860 1 830	1 870 1 870 1 840 1 870 1 860 1 830	P P P P P P	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
ASPECT PLATEAUX (P), FLATS (V)	P P P P P P	P P P P P P	P P P P P P	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
SLOPE	110° 110° 110° 110° 110° 110°	110° 110° 110° 110° 110° 110°	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240
ROCKINESS OF SOIL SURFACE (0-5 = 20% INTERVALS)	3 3 3 3 3 3	3 3 3 3 3 3	3 3 3 3 3 3	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
SOIL DEPTH (mm)	100 100 100 100 100 100	100 100 100 100 100 100	100 100 100 100 100 100	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
SOIL TEXTURE 2 = SANDY, 3 = SANDY LOAM, 4 = CLAY LOAM	2-3 2-3 2-3 2-3 2-3 2-3	2-3 2-3 2-3 2-3 2-3 2-3	2-3 2-3 2-3 2-3 2-3 2-3	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
NO. OF SPECIES	14 25 25 28 23 24	14 25 25 28 23 24	14 25 25 28 23 24	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
VEGETATION	14 25 25 28 23 24	14 25 25 28 23 24	14 25 25 28 23 24	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
Average height (m)	0,3 52,8	0,3 52,8	0,3 52,8	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
Average canopy cover (%)	52,8 78,3	52,8 78,3	52,8 78,3	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	150 130 250 250 250 250	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3	240 240 240 240 240 240	110° 110° 110° 110° 110° 110°	3 3 3 3 3 3
DIFFERENTIAL SPECIES OF THE RHYNCHELYTRUM SETIFOLIUM-MONOCYBIUM CERESIIFORME GRASSLAND																	
MONOCYBIUM CERESIIFORME LEONOTIS MICROPHYLUM CRASSULA SETULOSA SUTERA CARULEA SELAGINELLA DREGII STREPTOCARPUS VANDELEURII URSINIA NANA SUBSP. LEPTOPHYLLA SENECIO OXYRIPIDIFOLIUS OLDENLANDIA HERBACEA																	
DIFFERENTIAL SPECIES OF THE THEMEDA TRIANDRA-BERKHEYA SETIFERA-RHUS DISCOLOR GRASSLAND COMMUNITIES																	
BERKHEYA SETIFERA RHUS DISCOLOR MONSONIA ATTENUATA DIGITARIA DIAGONALIS																	
SPECIES COMMON TO COMMUNITIES 2.1 AND 2.2.1																	
RHYNCHELYTRUM SETIFOLIUM CYMBOPOGON MARGINATUS RHUS ECCLONIANA PELLAGA OLIOCEPHALA ATHRIXIA ELATA PELAGONIUM LURIDUM HELIORHYZUM ADSCENDENS RAPHIONACME HIRSUTA CHEILANTHES HIRTA CYPERUS RUPESTRIS																	
DIFFERENTIAL SPECIES OF THE BERKHEYA SETIFERA-RHYNCHELYTRUM SETIFOLIUM GRASSLAND																	
VERNONIA GALPINII CHRYSANTHEMIDES MONILIFERA																	
DIFFERENTIAL SPECIES OF THE BERKHEYA SETIFERA-KOELERIA CRISTATA-PENTANISIA PRUNELLOIDES GRASSLAND																	
KOELERIA CRISTATA PENTANISIA PRUNELLOIDES SCHISTOSTEPHIUM CRATAEGIFOLIUM HARPOCHLOA PALM HELIOTRICHON TURGIDULUM																	
DIFFERENTIAL SPECIES OF THE BERKHEYA SETIFERA-HYPARRHENIA HIRTA GRASSLAND																	
HYPARRHENIA HIRTA																	
DIFFERENTIAL SPECIES OF THE ELIONURUS MUTICUS-TRIMEDA TRIANDRA GRASSLAND																	
ELIONURUS MUTICUS HELIORHYZUM RUGULOSUM ERAGROSTIS CHLOROMELAS VERNONIA OLIOCEPHALA NIDORELLA ANOMALA SIDA DREGII LIPPIA JAVANICA SETARIA FLABELLATA																	
DIFFERENTIAL SPECIES OF THE ELIONURUS MUTICUS-TRIMEDA TRIANDRA-TEUCRIUM CAPENSE GRASSLAND																	
SENECIO ASPERULUS TEUCRIUM CAPENSE BULBINE ABYSSINICA FELICIA MURICATA																	
SPECIES OF HIGH ALTITUDES																	
VERNONIA NATALENSIS TRISTACHYA HISPIDA BECIUM OBOVATUM PENTANISIA ANGSTYFOLIA SENECIO CORONATUS CYMBOPOGON EXCAVATUS HYPOXIS RIGIDULA BULBOSTYLIS BURCHELLII INDIGOPEA ZEYHERII LITONONIS CALYCA HELIORHYZUM MICOCEPHALUM PHYLLANTHUS PARVULUS CAREX SPICATO-PANICULATA HELIORHYZUM NUDIFOLIUM BENSIA BIFLORA LITONONIS FOLIOSA SENECIO AFFINIS																	
COMMON SPECIES. ABSENT ON VERY ROCKY AREAS																	
ACALYPHA PUNCTATA BRACHIARIA SPICATA CRABBEA ACAULIS TEPHROSIA CAPENSIS KOPATIA AMATHIBICA HERMANIA DEPRESSA ANTHOSPERMUM RIGIDUM ERAGROSTIS CAPENSIS AJUCA OPHRYDIS ERAGROSTIS CURVULA SENECIO INORNATUS SETARIA NIGRISTRIKIS RHYNCHOSIA TOTTA INDIGOPEA HILARIS HIBISCUS ARTHIOPICUS VAR OVATUS THESTUM TRANSVAALENSE IPOMOEA CRASSIPES CHAETANTHUS BURCHELLII ASTER PEGLERAE																	
COMMON SPECIES																	
TRACHYPOGON SPICATUS THEMEDA TRIANDRA ERAGROSTIS RACEMOSA HETEROPOGON COMPTONIS DIETHELOPSIS AMPTICEPS ALOE DAVIANA SILENE BURCHELLII LEDEBOURIA MANGINATA IPOMOEA OMANEYI MICROCHLOA CAPPA SENECIO ISATIDUS ANDROPOGON SCHIMMIS CYANOTIS SPECIOSA ANDROPOGON APPENDICULATUS PACHYCARPUS SCHIMMIS GERBERA VIRIDIFOLIA CONYZA PODOCEPHALA RHYNCHOSIA JACOTETTII SENECIO OTTHOMAEFLORUS DIOSPYROS LYOIDEIS PLEIOSPOA CAJANIFOLIA SENECIO ERUBESCENS LEDEBOURIA OVATIFOLIA ASCLEPIAS STELLIFERA SOLANUM INCANUM ANTHRICUM FASCICULATUM CUSCUTTA PANICULATA ELEPHANTORRHIZA ELEPHANTINA PEUCEDANUM MAGALISMONTANUM BERKHEYA ZEYHERII CRASSULA RUBICUNDA ASTER HARVEYANUS EULOPHIA CLAVICORNIS HAPLOCARPHA SCAPOSA																	
OTHER SPECIES																	
RHYNCHOSIA ADENODES STRIGA ELEGANS ARISTEA WOODII TUBERINA ORONGATA STRIGA BILABATA POLYGALA HOTPENTOTTA EUCLEA CRIPA EUCOMIS CLAVATA PILOSELLOIDES HIRSUTA SIDA CHRYSAMPA LEDEBOURIA SP. 982 ARISTIDA DASYDESMIS ALSUCA SETOSA ARISTIDA JUNCIFORMIS DIGITARIA MONOACTYLUS BULBOSTYLIS TRICHOBASIS WALLENBERGIA UNULATA SCARISIA COLUMBARI HYPOXIS MULTICEPS LOTUS DISCOLOR MAYTENS HETEROPHYLLA LACTUCA CAPENSIS SENECIO CONSANGUINEUS ARTEMISIA AFRA SOLANUM PANDURIFORME DICOMA ZEYHERII RHUS PYROIDES TEPHROSIA ELONGATA SENECIO VENOSUS VERNONIA SUTHERLANDII ERIOSEMA CORDATA POLYGALA REPANDII BABIANA HYPOGEA COMMELINA AFRICANA GNIDIA GYMNOSTEGIA AGAPANTHUS CAMPANULATUS CYPERUS OBUSIFLORUS CYNODON DACTYLOM MYRSINE AFRICANA HYPERICUM AETHIOPICUM SUBSP. SOMDERI RHODISSUS TRIDENTATA BERKHEYA PINNATIFIDA INDIGOPEA OSCURA PSORALEA POLYSTICTA ZIZIPHUS ZEYHERIANA GNIDIA CAPITATA GACANTIA KREISIANA ARGYROLOBIMUM RUPESTRE ARCTOTIS ARCTOTOIDES ADROMISUS OMBRATICOLA CORVOLVULUS NATALENSIS BERKHEYA SEMINIVA GLADIOLUS SP. ZALUZIANSKYA KATHARINAE PANICUM NATALENSIS SCHIZACHYRIUM SANGUINEUM EUPHORBIA CLAVARIIFORMIS VAR. TRUNCATA PYGMAEOTHRANUS ZEYHERII LOUDETIA SIMPLEX HELIORHYZUM SUBULIFOLIUM DICLIS REPTANS EUPHORBIA EPICYPARISSIAS HYPOXIS GALPINII STROBILUS VILGARIIS IPOMOEA BATHYCOLPOS RHYNCHOSIA NERVOSA ARISTIDA BIPARTITA OSTEOSPERMUM MURICATUM FELICIA FILIFOLIUS HYPOXIS ROOPERI																	

hirta (75%) and *Teucrium capense* (100%) are locally abundant. Other species include:

<i>Conyza podocephala</i> 100%	<i>Pollichia campestris</i> 50%
<i>Hermannia depressa</i> 100%	<i>Osteospermum muricatum</i> 50%
<i>Helichrysum rugulosum</i> 75%	<i>Helichrysum nudifolium</i> 50%
<i>Crabbea acaulis</i> 75%	<i>Eragrostis chloromelas</i> 50%
<i>Solanum incanum</i> 75%	<i>E. racemosa</i> 50%
<i>Heteropogon contortus</i> 50%	<i>Setaria</i> sp. 50%
<i>Elionurus muticus</i> * 50%	

1.5.2 *Acacia karroo*—*Teucrium capense*—*Felicia muricata* Savanna

This variation is usually situated on flat, rockless areas on black clay soils, and is characterized by the *Albucca setosa* species group (Table 2). The area was previously overgrazed and trampled. Surface erosion occurs on large areas while more severe donga erosion is found locally. An average of 23 species was recorded per relevé and the vegetation has a total canopy cover of 60–80%.

The tree stratum is up to 8 m tall with a canopy cover of 20–60%. This stratum is mostly fairly open, but denser thickets appear locally. *Acacia karroo* (100%) is the most prominent species (Table 3) but *Ziziphus mucronata* (57%), *Euclea crispa* (28%) and *Rhus pyroides* (28%) are also present in this variation.

The open shrub stratum has a canopy cover of 10–20% and consists mostly of younger individuals of *Acacia karroo* (100%).

Local bush encroachment of *Acacia karroo* may become a serious problem as a result. Other shrubs present in this variation include *Asparagus suaveolens* (100%), *Pavonia burchellii* (100%), *Isoglossa grantii* (86%), *Lantana rugosa* (71%), *Felicia filifolia* (57%), *Maytenus polyacantha* (43%), *Lippia javanica* (43%) and *Grewia occidentalis* (29%).

The herbaceous layer is often up to 0.8 m tall and is often well developed with a canopy cover of up to 70%. *Eragrostis curvula* (100%) and *Themeda triandra* (71%) are conspicuous (Table 3). However, many bare patches are present in this community where the herbaceous layer has a canopy cover of only 20%. The pioneer species *Felicia muricata* (86%), *Aristida congesta* (86%), *Cynodon dactylon* (71%), *Aristida junciformis* (43%) and *Conyza podocephala* (29%) are conspicuous here. Other herbs include (Table 2):

<i>Teucrium capense</i> 100%	<i>Achyranthes aspera</i> 43%
<i>Albucca setosa</i> 100%	<i>Commelina africana</i> 43%
<i>Delosperma mahonii</i> 71%	<i>Kalanchoe rotundifolia</i> 29%
<i>Bulbine narcissifolia</i> 57%	<i>K. paniculata</i> 29%
<i>Talinum caffrum</i> 57%	<i>Hypoxis rooperi</i> 29%
<i>Setaria flabellata</i> 57%	<i>Antizoma</i> sp. 29%
<i>Sida dregei</i> 57%	

1.5.3 *Acacia karroo*—*Acacia caffra*—*Teucrium capense* Savanna

This variation is found on rocky slopes of 8–17° on the hills adjacent to the *Acacia karroo*—*Teucrium capense*—*Felicia muricata* Savanna. This community is differentiated from the other variations of the *Acacia karroo*—*Teucrium capense* Savanna by the absence of the *Conyza podocephala* and *Albucca setosa* species groups (Table 2). An average of 22 species was recorded per relevé and the total canopy cover of the vegetation is 60–70%.

The tree stratum is up to 6 m tall and has a canopy cover of 20–60%. *Acacia karroo* (80%) is the most prominent species in this fairly open savanna, but

local bush encroachment of *A. karroo* results in dense bush thickets. *A. caffra* (40%) is locally also prominent (Table 3) and other trees present include *Ziziphus mucronata* (60%), *Celtis africana* (60%) and *Euclea crispa* (40%).

The shrub stratum is usually fairly open, with 10–20% canopy cover, and is dominated by *Acacia karroo* (80%). *Asparagus suaveolens* (80%) is also conspicuous in this stratum (Table 3). Other shrubs include *Lippia javanica* (80%), *Diospyros lycioides* (60%), *Felicia filifolia* (60%), *Isoglossa grantii* (40%), *Maytenus polyacantha* (40%) and *Ruellia cordata* (40%).

Rhoicissus tridentata (60%) is often found scrambling in the tree and shrub strata.

The herbaceous layer has a canopy cover of 40–60%, and is often up to 1 m tall. *Eustachys mutica* (40%) and *Cynodon dactylon* (80%) are often prominent (Table 3). The high canopy cover of the hardy pioneer species *Aristida congesta* (100%), *Cynodon dactylon* (80%), *Sida dregei* (60%), *Eragrostis pseudosclerantha* (60%) and *Aristida junciformis* (40%) is an indication of previous mismanagement of this vegetation. Other herbs include the following:

<i>Eragrostis curvula</i> 100%	<i>Pavonia burchellii</i> 60%
<i>Themeda triandra</i> 60%	<i>Delosperma mahonii</i> 40%
<i>Elionurus muticus</i> 60%	<i>Aloe davyana</i> 40%
<i>Teucrium capense</i> 60%	<i>Eragrostis chloromelas</i> 40%
<i>Achyranthes aspera</i> 60%	

2. *Trachypogon spicatus*—*Themeda triandra* Grassland Communities

The communities of this grassland are summarized in Table 4. These communities cover the high altitude plateaux and low altitude flats, but also occur on gentle rockless slopes. This grassveld is characterized by the *Trachypogon spicatus* species group (Table 4) often with *Trachypogon spicatus*, *Themeda triandra* and *Heteropogon contortus* as the most prominent species. Three major communities are distinguished and are described under 2.1, 2.2 and 2.3.

2.1 *Rhynchelytrum setifolium*—*Monocymbium cerasiiforme* Grassland

This community occurs on very shallow soils on the rocky outcrops sporadically distributed at altitudes of 1 830–1 870 m, on the mountain plateaux. Large rocks cover more than 80% of the soil surface and the soil and vegetation are restricted to small patches between the rocks. The canopy cover of the vegetation is often less than 50% and the vegetation corresponds to Fosberg's (1967) seasonal orthophyll short grass (1M2/1). An average of 23 species was recorded per relevé.

This community is characterized by the *Monocymbium cerasiiforme* species group (Table 4), while the presence of the *Rhynchelytrum setifolium* species group, which is also present in the *Berkheya setifera*—*Rhynchelytrum setifolium* Grassland, is also an important feature of this community. Another important characteristic of this community is its negative association with the *Acalypha punctata* species group, which occurs in all the other *Trachypogon spicatus*—*Themeda triandra* Grassland communities represented in the study area.

A scanty shrub stratum is represented by a few dwarfed shrubs. The only woody species which is fairly constantly present is *Rhus eckloniana* (86%). Small individuals of *Euclea crispa*, *Maytenus heterophylla*, *Myrsine africana*, *Diospyros lycioides* and *Rhoicissus tridentata* are locally present.

* *Elionurus muticus* (= *E. argenteus*)

TABLE 5.—Prominent species in the *Trachypogon spicatus*—*Themeda triandra* Grassland Communities

Plant species	Community number							
	2.1	2.2.1	2.2.2	2.2.3	2.2.4	2.3.1	2.3.2	2.3.3
<i>Cymbopogon marginatus</i>	P							
<i>Rhynchelytrum setifolium</i>	P							
<i>Berkheya setifera</i>		P	P		P			
<i>Hyparrhenia hirta</i>				P				
<i>Rhus discolor</i>					p			
<i>Digitaria diagonalis</i>					p			
<i>Elionurus muticus</i>						p	p	p
<i>Eragrostis chloromelas</i>						p	p	
<i>Eragrostis racemosa</i>						p		p
<i>Eragrostis curvula</i>								p
<i>Themeda triandra</i>	p	P	P	P	P		P	P
<i>Trachypogon spicatus</i>			P	P	P	P		P
<i>Heteropogon contortus</i>		P			P	P		P

Explanation of "P" and "p" in text.

The herbaceous layer is dominated by *Rhynchelytrum setifolium* (100%) and *Cymbopogon marginatus* (100%), but *Themeda triandra* (86%) is often locally abundant (Table 5). Other species include the following:

<i>Monocymbium cere-</i>		<i>Diheteropogon am-</i>	
<i>siiforme</i>	100%	<i>plectens</i>	57%
<i>Pellaea calomelanos</i> ..	100%	<i>Cheilanthes hirta</i> ...	57%
<i>Crassula setulosa</i>	86%	<i>Oldenlandia herba-</i>	
<i>Sutera caerulea</i>	86%	<i>cea</i>	43%
<i>Streptocarpus vande-</i>		<i>Pelargonium luridum</i>	43%
<i>leurii</i>	86%	<i>Trachypogon spica-</i>	
<i>Ursinea nana</i> subsp.		<i>tus</i>	43%
<i>leptophylla</i>	86%	<i>Eragrostis racemosa</i>	43%
<i>Senecio oxyriifolia</i> ...	86%	<i>Ipomoea ommaneyi</i> .	4%
<i>Leonotis microphyl-</i>		<i>Microchloa caffra</i> ...	43%
<i>lum</i>	71%	<i>Raphionacme hirsu-</i>	
<i>Selaginella dregei</i>	71%	<i>ta</i>	43%

2.2 *Themeda triandra*—*Berkheya setifera*—*Rhus discolor* Grassland Communities

These grassland communities are situated on the plateaux (Fig. 7) and adjacent slopes, and are characterized by the *Berkheya setifera* species group. Other

important features of these communities are the presence of the *Vernonia natalensis* species group and the high canopy cover and constancy of many species of the family Asteraceae (Table 4). The vegetation corresponds to a seasonal orthophyll tall grass (1L2/1) of Fosberg (1967). Four different communities are distinguished and described under 2.2.1, 2.2.2, 2.2.3 and 2.2.4.

2.2.1 *Berkheya setifera*—*Rhynchelytrum setifolium* Grassland

This community is usually found on the fairly rocky patches, scattered on the plateaux. Rocks cover 20–60% of the soil surface and the soils are seldom deeper than 300 mm. The vegetation is up to 1 m tall, and usually very dense; canopy cover is often as high as 95%. An average of 32 species was recorded per relevé.

The *Vernonia galpinii* species group (Table 4) characterizes this community, and the *Rhynchelytrum setifolium* species group, also characteristic of the *Rhynchelytrum setifolium*—*Monocymbium ceresiiforme*



FIG. 7.—*Themeda triandra*—*Berkheya setifera*—*Rhus discolor* Grassland on the undulating plateaux.

Grassveld on the rocky outcrops, is likewise an important feature of this community.

Low-growing shrubby plants such as *Rhus eckloniana* (53%), *Athrixia elata* (47%), *Chrysanthemoides monilifera* (47%) and *Elephantorrhiza elephantina* (20%) are found scattered in this community, but they are inconspicuous, because they are dwarfed by the dense, tall-growing herbaceous layer.

Themeda triandra (80%) is often the most prominent species. *Rhynchelytrum setifolium* (93%), *Berkheya setifera* (80%) and *Heteropogon contortus* (47%) are also conspicuous (Table 5), while *Eragrostis racemosa* (80%), *Tristachya hispida* (60%) and *Rhus discolor* (53%) are locally abundant. Other species include the following:

Brachiaria serrata...	100%	Ipomoea crassipes...	33%
Acalypha punctata...	73%	Bulbostylis burchellii...	33%
Cymbopogon marginatus...	73%	Lotononis foliosa...	33%
Vernonia galpinii...	60%	Diheteropogon amplexifolius...	33%
V. natalensis...	60%	Aloe davyana...	33%
Pentanisia angustifolia...	60%	Pelargonium luridum...	27%
Senecio coronatus...	60%	Helichrysum nudifolium...	27%
Kohautia amatymbica...	60%	Ledebouria marginata...	27%
Anthospermum rigidum...	60%	Cyanotis speciosa...	27%
Trachypogon spicatus...	60%	Eragrostis curvula...	20%
Lotononis calycina...	53%	Setaria nigrirostris...	20%
Monsonia attenuata...	47%	Silene burchellii...	20%
Bewsia biflora...	47%	Microchloa caffra...	20%
Tephrosia capensis...	47%	Andropogon schirensis...	20%
Senecio obovatum...	40%	Pleiospora cajanifolia...	20%
Hypoxis rigidula...	40%	Cussonia paniculata...	20%
Crabbea acaulis...	40%	Aster harveyanus...	20%
Ajuga ophrydis...	40%	Turbina oblongata...	20%
Chaetacanthus burchellii...	40%	Gnidia capitata...	20%
Helichrysum adscendens...	33%		

2.2.2 Berkheya setifera—Koeleria cristata—Pentanisia prunelloides Grassland (Fig. 5)

This very dense grassland occurs on south-facing slopes that are mostly steeper than 10° and usually occur at altitudes of more than 1 700 m. Large rocks are locally present, but never prominent. The community is characterized by the *Koeleria cristata*

species group (Table 4). The vegetation is up to 1 m tall with 60–95% canopy cover. A few scattered individual shrublets of *Rhus pyroides*, *Artemisia afra*, *Cussonia paniculata*, *Athrixia elata* and *Psoralea polysticta* are dwarfed by the very dense herbaceous layer.

The grasses *Themeda triandra* (87%) and *Trachypogon spicatus* (87%) are very prominent (Table 5) and cover large areas. *Berkheya setifera* (73%), *Vernonia natalensis* (73%) and *Rhus discolor* (93%) are locally conspicuous. *Harporchloa falx* (53%), *Aster peglerae* (33%), *Digitaria diagonalis* (47%), *Setaria nigrirostris* (33%) and *Helictotrichon turgidulum* (33%) are less constantly present, but are locally abundant. Other species present include:

Acalypha punctata...	93%	Tristachya hispida...	47%
Koeleria cristata...	87%	Cymbopogon excavatus...	57%
Brachiaria serrata...	89%	Hibiscus aethiopicus var. ovatus...	47%
Pentanisia prunelloides...	67%	Hypoxis rigidula...	40%
Kohautia amatymbica...	67%	Tephrosia capensis...	40%
Schistostephium crataegifolium...	60%	Heteropogon contortus...	40%
Crabbea acaulis...	60%	Silene burchellii...	40%
Senecio inornatus...	60%	Senecio isatideus...	40%
Becium obovatum...	53%		
Indigofera zeyheri...	53%		
Helichrysum micronaeifolium...	53%		

2.2.3 Berkheya setifera—Hyparrhenia hirta Grassland

This community occurs at altitudes of 1 740–1 870 m on moderate to steep (3°–16°) north-, east- and west-facing slopes (Fig. 8). The vegetation is up to 1.5 m tall and has a canopy cover of 90–95%. An average of 26 species was recorded per relevé.

Individual shrubs of *Rhus eckloniana*, *Athrixia elata*, *Lippia javanica*, *Elephantorrhiza elephantina* and *Ziziphus zeyherana* are found scattered in the dense herbaceous layer.

The constant high canopy cover of *Hyparrhenia hirta* (100%) (Table 4) is characteristic for this community. Other prominent species are *Trachypogon spicatus* (100%) and *Themeda triandra* (58%).



FIG. 8.—*Berkheya setifera*—*Hyparrhenia hirta* Grassland on moderate north-facing slopes.

Other species present include the following:

Acalypha punctata...	84%	Indigofera zeyheri...	53%
Berkheya setifera...	79%	Pentanisia angustifolia...	53%
Brachiaria serrata...	79%	Tristachya hispida...	47%
Crabbea acaulis...	74%	Tephrosia capensis...	47%
Senecio coronatus...	74%	Eragrostis racemosa...	47%
Diheteropogon amplexifolius...	63%	E. capensis...	42%
Cymbopogon excavatus...	63%	Hermannia depressa...	42%
Setaria nigrirostris...	63%	Helichrysum miconeifolium...	42%
Rhus discolor...	58%	Bulbostylis burchellii...	42%
Vernonia natalensis...	58%	Lotononis calycina...	36%
Becium obovatum...	58%	Senecio affinis...	36%
Heteropogon contortus...	53%	Aloe davyana...	36%
Kohautia amatymbica	53%	Ipomoea crassipes...	36%

2.2.4 Berkheya setifera—Digitaria diagonalis Grassland

This community is restricted to the less rocky areas of the plateaux, at altitudes of 1 780–1 870 m. Large single rocks occur sparsely in this community.

The presence of the *Berkheya setifera* species group combined with the absence of the *Rhynchelytrum setifolium*, *Vernonia galpinii*, *Koeleria cristata* and *Hyparrhenia hirta* species groups (Table 4) is characteristic of this community. The vegetation is 1 m tall and has a canopy cover of 80–95%. An average of 26 species was recorded per relevé.

Themeda triandra (100%) and *Trachypogon spicatus* (75%) are the most prominent species, but *Berkheya setifera* (100%), *Rhus discolor* (88%), *Digitaria diagonalis* (63%) and *Heteropogon contortus* (75%) are locally conspicuous (Table 5).

Other species include the following:

Acalypha punctata...	100%	Setaria nigrirostris...	38%
Brachiaria serrata...	88%	Ipomoea crassipes...	38%
Eragrostis racemosa...	75%	Andropogon schirensis...	38%
Kohautia amatymbica	75%	Eulophia clavicornis	38%
Senecio coronatus...	75%	Helictotrichon turgidulum...	25%
Diheteropogon amplexifolius...	63%	Elionurus muticus...	25%
Helichrysum miconeifolium...	63%	Senecio asperulus...	25%
Vernonia natalensis...	63%	Indigofera zeyheri...	25%
Tristachya hispida...	63%	Lotononis foliosa...	25%
Becium obovatum...	50%	Senecio inornatus...	25%
Pentanisia angustifolia...	50%	Indigofera hilaris...	25%
Cymbopogon excavatus...	50%	Chaetacanthus burchellii...	25%
Lotononis calycina...	50%	Ledebouria marginata...	25%
Crabbea acaulis...	50%	Cyanotis speciosa...	25%
Monsonia attenuata...	38%	Gerbera viridifolia...	25%
Senecio affinis...	38%	Turbina oblongata...	25%
Ajuga ophrydis...	38%	Helichrysum adscendens...	25%
Eragrostis curvula...	38%		

2.3 Elionurus muticus—Themeda triandra Grassland Communities

These grassland communities occur on the relatively low altitude flats and on the undulating hills at the foot of the mountains, and also in the lower parts of the mountain slopes. They are characterized by the *Elionurus muticus* species group (Table 4). Most parts correspond to seasonal orthophyll tall grass (1L2/1), but several patches appear to be seasonal orthophyll short grass (1M2/1) of Fosberg (1967). Three communities are distinguished and described under 2.3.1, 2.3.2 and 2.3.3.

2.3.1 Elionurus muticus—Themeda triandra—Trachypogon spicatus Grassland

This community occurs at altitudes of 1 600–1 750 m, on the lower parts of the mountain slopes, and clearly represents a transition between the

Themeda triandra—*Berkheya setifera*—*Rhus discolor* Grassland Communities of the higher altitudes and the remainder of the *Elionurus muticus*—*Themeda triandra* Grassland Communities of the relatively low altitudes. This is illustrated by the combination of the *Elionurus muticus* species group typical of the low altitude communities, with the *Vernonia natalensis* species group, typical of the high altitude communities (see Table 4). The vegetation is up to 0.5 m tall with 60–95% canopy cover. An average of 32 species was recorded per relevé.

The shrubs *Diospyros lycioides*, *Cussonia paniculata*, *Maytenus heterophylla*, *Leucosidea sericea*, *Cassine aethiopica*, *Euclea crispa* and *Rhoicissus tridentata* occur on rocky outcrops scattered throughout the community.

The most prominent grasses in this community are *Trachypogon spicatus* (94%), *Elionurus muticus* (94%), *Heteropogon contortus* (82%), *Eragrostis racemosa* (88%) and *Eragrostis chloromelas* (41%) (Table 5).

Other species present include:

Tephrosia capensis...	94%	Thesium transvaalense...	47%
Acalypha punctata...	88%	Hyparrhenia hirta...	41%
Brachiaria serrata...	82%	Indigofera zeyheri...	41%
Hermannia depressa	70%	Helichrysum nudifolium...	41%
Crabbea acaulis...	65%	Ajuga ophrydis...	41%
Helichrysum rugulosum...	59%	Aloe davyana...	41%
Nidorella anomala...	59%	Chaetacanthus burchellii...	41%
Pentanisia angustifolia...	59%	Vernonia oligocephala...	35%
Themeda triandra...	53%	Sida dregei...	35%
Vernonia natalensis...	53%	Becium obovatum...	35%
Kohautia amatymbica	53%	Hypoxis rigidula...	35%
Anthospermum rigidum...	53%	Helichrysum miconeifolium...	35%
Tristachya hispida...	47%	Carex spicato-paniculata...	35%
Cymbopogon excavatus...	47%	Senecio inornatus...	35%
Bulbostylis burchellii	47%	Rhynchosia totta...	35%
Phyllanthus parvulus	47%		
Eragrostis capensis...	47%		
Setaria nigrirostris...	47%		
Hibiscus aethiopicus var. ovatus...	47%		

2.3.2 Elionurus muticus—Themeda triandra—Teucrium capense Grassland

This grassland occurs on the relatively low altitude (1 580–1 660 m) flats at the foot of the mountains, and is usually situated adjacent to the *Acacia karroo*—*Teucrium capense* Savanna Communities (1.5 above). It probably represents a transition between these Savanna Communities and the *Elionurus muticus*—*Themeda triandra*—*Eragrostis curvula* Grassland (2.3.3 below).

The *Elionurus muticus*—*Themeda triandra*—*Teucrium capense* Grassland is characterized by the *Senecio asperulus* species group (Table 4). The total canopy cover of the vegetation is 60–95%. An average of 21 species was recorded per relevé.

A conspicuous feature of this community is the absence or low constancy of *Trachypogon spicatus*, *Acalypha punctata*, *Brachiaria serrata*, *Diheteropogon amplexifolius*, *Aloe davyana*, *Ajuga ophrydis* and *Eragrostis capensis*, which are all constantly present in the other *Trachypogon spicatus*—*Themeda triandra* Grassland Communities. The presence of pioneer species such as *Helichrysum rugulosum* (88%), *Senecio asperulus* (75%), *Hermannia depressa* (75%), *Anthospermum rigidum* (75%), *Felicia muricata* (50%) and *Conyza podocephala* (38%), as well as the local surface erosion present in this community, suggest that this vegetation has resulted from previous mismanagement.



FIG. 9.—Donga erosion in *Elionurus muticus*—*Themeda triandra*—*Eragrostis curvula* Grassland.

Shrubs that occur scattered in this community include the following: *Acacia karroo*, *Diospyros lycioides*, *Ziziphus mucronata*, *Ehretia rigida*, *Canthium gilfillanii*, *Euclea crispa*, *Asparagus suaveolens*, *Grewia occidentalis*, *Rhus leptodictya* and *Rhoicissus tridentata*.

The herbaceous layer is up to 1 m tall with *Themeda triandra* (100%) the most conspicuous species. *Eragrostis chloromelas* (63%) and *Elionurus muticus* (100%) are locally very abundant (Table 5).

Other species present include the following:

<i>Sida dregei</i>	88%	<i>Ledebouria ovatifolia</i>	38%
<i>Setaria flabellata</i>	75%	<i>Rhynchosia totta</i>	25%
<i>Teucrium capense</i>	75%	<i>Hibiscus aethiopicus</i>	
<i>Bulbine abyssinica</i>	75%	var. <i>ovatus</i>	25%
<i>Crabbea acaulis</i>	75%	<i>Microchloa caffra</i> ...	25%
<i>Lippia javanica</i>	63%	<i>Solanum incanum</i> ...	25%
<i>Heteropogon contortus</i>	63%	<i>Striga elegans</i>	25%
<i>Eragrostis racemosa</i> ..	50%	<i>Aristida dasydesmis</i> ..	25%
<i>Hyparrhenia hirta</i>	38%	<i>A. junciformis</i>	25%
<i>Tephrosia capensis</i> ...	38%	<i>Arctotis arctotoides</i> ..	25%
<i>Trachypogon spicatus</i>	38%	<i>Albuca setosa</i>	25%
<i>Thesium transvaalense</i>	38%		

<i>Crabbea acaulis</i>	79%	<i>Anthericum fasciculatum</i>	29%
<i>Acalypha punctata</i> ...	79%	<i>Sida dregei</i>	21%
<i>Hyparrhenia hirta</i>	79%	<i>Ipomoea crassipes</i> ..	21%
<i>Brachiaria serrata</i> ...	64%	<i>Pachycarpus schinzianus</i>	21%
<i>Eragrostis capensis</i> ...	57%	<i>Senecio othonniiflorus</i>	21%
<i>Senecio inornatus</i> ...	50%	<i>Ledebouria ovatifolia</i>	21%
<i>Eragrostis chloromelas</i>	43%	<i>Asclepias stellifera</i> ..	21%
<i>Setaria flabellata</i>	43%	<i>Hypericum aethiopicum</i> subsp. <i>sonderi</i>	21%
<i>Ajuga ophrydis</i>	43%	<i>Ziziphus zeyherana</i>	21%
<i>Indigofera hilaris</i>	43%		
<i>Aloe davyana</i>	43%		
<i>Thesium transvaalense</i>	43%		
<i>Microchloa caffra</i>	36%		
<i>Nidorella anomala</i>	29%		

DISCUSSION

As was pointed out by Coetzee (1974) and Bredenkamp & Theron (1976; 1978), the polythetic nature of the Braun-Blanquet method provides a very natural classification of vegetation, where plant communities are closely related to a specific set of environmental conditions. This is again emphasized in the present study.

Habitat conditions strongly associated with differences in vegetation include altitude, aspect, slope, rockiness of the soil surface, soil depth and soil texture.

Closely related communities are grouped into larger units, which may be of great practical value in a management programme.

Although the communities are arranged into a hierarchical system, the data obtained in this study are not sufficient to determine character species or to ensure correct ranking of the syntaxa represented in the Bankenveld (Acocks, 1975).

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2.3.3 *Elionurus muticus*—*Themeda triandra*—*Eragrostis curvula* Grassland

This grassland occurs on the undulating hills and flats at the foot of the mountains, at altitudes of 1 640–1 800 m. Surface erosion and more severe donga erosion occur locally in this community (Fig. 9). The presence of the *Elionurus muticus* species group together with the absence of the *Senecio asperulus* and *Vernonia natalensis* species groups is characteristic for this community (Table 4). The most prominent species include *Themeda triandra* (93%), *Eragrostis curvula* (86%), *Elionurus muticus* (86%), *Eragrostis racemosa* (79%), *Heteropogon contortus* (79%) and *Trachypogon spicatus* (64%).

Other species present in this community include the following:

<i>Hermannia depressa</i>	93%	<i>Chaetacanthus burchellii</i>	29%
<i>Anthospermum rigidum</i>	79%	<i>Andropogon appendiculatus</i>	29%
<i>Tephrosia capensis</i> ...	79%		

UITTREKSEL

Die plantegroei van die Sisteem Ventersdorp van die Suikerbosrandnatuurreseervaat is volgens die Braun-Blanquet-metode bestudeer en geklassifiseer. Beskrywings van plantgemeenskappe sluit beskrywings van habitateienskappe, totale floristiese samestelling, lyste van differensiële spesiegroepe asook prominente spesies in die boom-, struik- en kruidstratums in. Habitat-eienskappe wat met verskille in die plantegroei geassosieerd is, is hoofsaaklik hoogte bo seespieël, aspek, helling, klipperigheid van die grondoppervlak, grond-diepte en grondtekstuur.

Die produk van die klassifikasie is natuurlike plant-gemeenskappe. Die range van sintaksa is nie bepaal nie, omdat kennis van die plantegroei van die Bankenveld (Acocks, 1975) onvoldoende is.

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