

CHAPTER 7

SOUTPANSBERG MOIST MOUNTAIN THICKETS

Introduction

In an overview of the vegetation of the Soutpansberg Conservancy and the Blouberg Nature Reserve (Chapter 4), the *Catha edulis–Flueggia virosa* Soutpansberg Moist Mountain Thickets were identified as a Major Vegetation Type. The detailed classification of this Major Vegetation Type is addressed in this chapter.

Detailed phytosociological studies have been conducted by numerous authors within the thicket vegetation of the Waterberg (Westfall *et al.* 1985; Henning 2002; Van Staden & Bredenkamp 2006), the Springbok Flats (Winterbach *et al.* 2000) and the north-western Bushveld (Van der Meulen 1979) of South Africa. These moist vegetation types along the high rainfall escarpments of the Limpopo and Mpumalanga Provinces have only been sampled in localised patches, such as areas of high conservation value and or high economic value (Du Plessis 2001). No efforts have yet been made to describe and classify the thickets of the SC.

Acocks (1953) considered the Soutpansberg Moist Mountain Thickets Major Vegetation Type as one of the many variants of the Sourish Mixed Bushveld (19) and the North–eastern Mountain Sourveld (8), but mapped the geographical area as Sour Bushveld (20). This Veld Type of Acocks is however, an oversimplification of the variety of distinct plant communities within this very heterogeneous landscape. Van Rooyen & Bredenkamp (1998) recognised the uniqueness of this region’s vegetation. However, without the necessary data, they too had to lump these communities under the broad term of Soutpansberg Arid Mountain Bushveld. Due to its association with the narrow intrusive basalt, tuff and diabase dykes, it is often difficult to map this Major Vegetation Type when dealing with coarse- or small-scale vegetation studies. The southern most ridge of the mountain with its large southern basalt slope is one of the few extensive and mapable areas with this Major Vegetation Type.

In order to place the Soutpansberg thicket syntaxonomically correct, it becomes necessary to compare and classify representative relevés from thickets found throughout southern Africa. Coetzee (1983) and Everard (1987) warned against the premature syntaxonomic classification of the vegetation of under-sampled regions or biomes. A syntaxonomic classification based on relevés from a single region, will only lead to artificial lumping of unrelated vegetation units. This will result in a syntaxonomic hierarchy with only very local significance and relevance, without representing the variation and relation to thickets of the entire sub-region (Coetzee 1983).

This thesis focuses on the lower syntaxonomic unit of association, avoiding classification into higher syntaxonomic units. This precaution was taken in order to avoid lumping the communities of clearly different classes into similar orders or alliances. This often happens when diverse vegetation types from geographically small or artificially delineated areas are classified as a single data set (Werger 1974; Coetzee 1983; Everard 1987; Du Plessis 2001).

The communities of the thickets, especially those of the *Acacietea karroo* (Du Preez 1991; Du Preez & Bredenkamp 1991) cause a great deal of confusion with regard to their syntaxonomic position. The cause of this confusion may be because these communities are often azonal or in a state of transition after some form of disturbance (Trollope 1974; Rossow 1983; Müller 1986; Bezuidenhout & Bredenkamp 1989; Bredenkamp *et al.* 1989; Kooij *et al.* 1990; Kooij *et al.* 1991; Du Preez & Bredenkamp 1991). There is no formal “Thicket Biome” recognised in the scientific literature (Lubke 1996). However, Everard (1987) classified and described this functional vegetation type as transitional between the Forest, Savanna and Grassland Biomes. Due to his low intensity of sampling, he refrained from identifying associations and alliances, keeping to the higher syntaxonomic units of orders and classes. This is of course not correct, as higher syntaxonomic units can only be formally classified if the lower units are known and typified. Everard (1987) states that more data are required before the variation within some of the thickets of the eastern Cape can be classified formally.

According to Du Preez & Bredenkamp (1991), Bezuidenhout *et al.* (1994) and Winterbach (1998), the *Acacia karroo*-dominated vegetation of the southern African grassveld, savanna and thickets should be classified as a separate syntaxonomical class. The high lying communities on clay along the southern slopes of the SC may be classified as part of this proposed class. The lower lying sub-tropical communities may belong to a different vegetation class, which includes all the subtropical transitional thickets. A holistic approach towards the syntaxonomic classification of southern African thickets is strongly recommended.

Vegetation classification

The analysis of the vegetation data resulted in the identification of four plant communities, classified into four syntaxonomic associations (Table 6). The plant communities of the *Catha edulis–Flueggia virosa* Soutpansberg Soutpansberg Moist Mountain Thickets Major Vegetation Type are classified as follows:

1. *Euphorbio ingentis–Cathetum edulis*

Classified under the *Acacietalia rehmanniana–tortilis* (Winterbach 1998; Winterbach *et al.* 2000).

2. *Bridelio micranthae–Carissetum edulis*

Classified under the newly proposed *Diospyrodetea mespiliformis* of the Lowveld rivers (Mostert *et al. in prep*).

3. *Cussonio natalensis–Acacietum karroo*

Classified under the *Acacietea karroo* (Du Preez & Bredenkamp 1991)

4. *Olea europaeae–Buddlejetum salviifoliae*

Classified under the *Panico maximi–Acacietea tortilis* described by Winterbach *et al.* (2000).

Table 6 Phytosociological table of the plant communities of the *Catha edulis*–*Flueggia virosa* Soutpansberg Moist Mountain Thickets Major Vegetation Type

Community number	1	2	3	4
Association number		1 1 1 1 1		
	3 3 3 3 5 5 5	5 5 5 5 5	6 6 6	4 5 5 5
	3 4 5 6 9 3 4 5	1 2 3 4 5	5 6 7	9 0 1 2
Diagnostic species of the <i>Euphorbio ingentis</i>–<i>Cathetum edulis</i>				
Species Group A				
<i>Euphorbia ingens</i>	1+ 1 1 + + + +			
<i>Ximenea americana</i> var. <i>microphylla</i>	+ + + 1 + + +			
<i>Gymnosporia senegalensis</i>	+ + + + 1 + +			
<i>Acacia rehmanniana</i>	+ 1 + + + + +			
<i>Sclerocarya birrea</i> ssp. <i>caffra</i>	+ + + + + +			
<i>Tarchonanthus camphoratus</i>	+ + + + + +			
<i>Dioscorea sylvatica</i>	+ + + + + +	+		
<i>Cussonia spicata</i>	+ + + + + +	+		
<i>Grewia flavescens</i>	1 1 + + +	+		
<i>Acacia caffra</i>	+ 1 + + +			
<i>Jasminum multipartitum</i>	+ + + + +			
<i>Aloe greatheadii</i> var. <i>greatheadii</i>	+ + + + +			
<i>Eragrostis superba</i>	+ + + + +			
<i>Maerua cafra</i>	+ + + + +			+
<i>Mystroxydon aethiopicum</i> ssp. <i>schlechteri</i>	+ + 1 r +	+		
<i>Combretum hereroense</i>	+ + + + +			
<i>Hibiscus meyeri</i>	+ + + + +			
<i>Gossypium herbaceum</i> ssp. <i>africanum</i>	+ + + + +			
<i>Euclea divinorum</i>	+ + + + +	+		
<i>Acacia nilotica</i> ssp. <i>kraussiana</i>	+ + + + +			
<i>Solanum panduriforme</i>	+ + + + +	+		
<i>Bothriochloa insculpta</i>	1 + + + +	+		
<i>Acacia gerrardii</i> var. <i>gerrardii</i>	1 1 + + +			
<i>Aloe marlothii</i> ssp. <i>marlothii</i>	+ 1 + + +			
<i>Euclea undulata</i> var. <i>undulata</i>	+ + + + +	+		
<i>Barleria gueinzii</i>	+ + + + +			
<i>Ximenea caffra</i> var. <i>caffra</i>	+ + + + +			
<i>Heteropogon contortus</i>	1 1 + + +			
<i>Grewia monticola</i>	+ 1 + + +	+		



<i>Gymnosporia tenuispina</i>	+	+	1			
<i>Heliotropium steudneri</i>			+	+	+	
<i>Cordia monoica</i>		+	+	+		
<i>Acacia tortilis</i> ssp. <i>heteracantha</i>			+	+		
<i>Solanum lichtensteinii</i>	+				+	
<i>Balanites maughamii</i> ssp. <i>maughamii</i>		r		+		
<i>Combretum imberbe</i>		+		+		
<i>Pristimera longipitiolata</i>		+	+		+	
<i>Pouzolzia mixta</i>	+		+			
<i>Barleria elegans</i>	+	+				
<i>Schotia brachypetala</i>				+	+	
<i>Alternanthera pungens</i>			+	+		
<i>Pavonia senegalensis</i>	+		+			
<i>Cephalaria pungens</i>		+		+	+	
<i>Acacia davyi</i>				+	+	
<i>Pterolobium stellatum</i>				+	+	
<i>Opuntia ficus-indica</i>	+	+				
<i>Vepris lanceolata</i>				+	+	
<i>Calodendrum capense</i>				+	+	
<i>Digitaria eriantha</i>		+		+		
<i>Sarcostemma viminale</i>	+		+			
<i>Vitex rehmannii</i>				r	+	+
<i>Brachylaena huillensis</i>	+		+		1	
<i>Grewia bicolor</i>	+	+				
<i>Lannea discolor</i>				+	+	

Diagnostic species of the *Bridelia micranthae*–*Carissetum edulis*

Species Group B

<i>Setaria megaphylla</i>				a	1	a	a	1		
<i>Bridelia micrantha</i>				a	1	a	+	1		
<i>Ekebergia capensis</i>			+	+	1	1	1	1		
<i>Christella guenziana</i>				+	+	1	r	1		
<i>Ficus sur</i>				1	+	1	1	+		
<i>Cyperus albostriatus</i>				+	+	+	+	+		
<i>Syzygium cordatum</i>				1	a	a	a			
<i>Rhus chirindensis</i>				1	1	+	+			
<i>Ficus sycomorus</i> ssp. <i>sycomorus</i>				1	1	1	+			
<i>Pyrenacantha grandiflora</i>				+	1	+	+			
<i>Panicum deustum</i>		+		+	1	+	1		+	
<i>Markhamia zanzibarica</i>				1	+	+	+		+	
<i>Podocarpus falcatus</i>				+	1	+	+			



<i>Bulbostylis burchellii</i>		+		+	+	+	+			
<i>Cyperus sphaerospermus</i>										
<i>Pavetta eylesii</i>						1	+	+	r	
<i>Acacia robusta</i> ssp. <i>clavigera</i>						+	1	+		
<i>Trema orientalis</i>						1	+	+		
<i>Diospyros villosa</i> var. <i>parvifolia</i>				+	+	1	+	+		
<i>Ziziphus rivularis</i>							+	+		
<i>Adenia digitata</i>							+	+		
<i>Verbena bonariensis</i>				+		+	+	+		
<i>Cyperus sexangularis</i>						+	+	+		
<i>Vernonia glabra</i>						+	+	+		
<i>Euclea natalensis</i> ssp. <i>natalensis</i>		+					+	+	+	
<i>Pycreus polystachyos</i>						+	+	+		
<i>Rhoicissus tomentosa</i>						+	+	+		
<i>Ficus burkei</i>						+	+	+		
<i>Ischaemum fasciculatum</i>							1	1		
<i>Euclea schimperi</i> var. <i>schimperi</i>				+		1		+		
<i>Celtis africana</i>						1		+		
<i>Hermannia depressa</i>				+			+	+		
<i>Rhus rehmanniana</i> var. <i>glabrata</i>						+	+			
<i>Persicaria attenuata</i>						+		+		
<i>Dietes grandiflora</i>						+		+		
<i>Dovyalis rhamnoides</i>						+		+		
<i>Ficus ingens</i> var. <i>ingens</i>						1		+		
<i>Asparagus virgatus</i>						+		+		
<i>Equisetum ramosissimum</i>						+		+		
<i>Fuirena pubescens</i>							+	+		
<i>Cyperus distans</i>						+		+		
<i>Ptaeroxylon obliquum</i>						+		+		
<i>Cyperus solidus</i>						+		+		
<i>Tecoma capensis</i>				+		+		+		
<i>Erythrina lysistemon</i>				+			+	+		
<i>Flacourtia indica</i>						+		+		
<i>Hexalobus monopetalus</i> var. <i>monopetalus</i>							+	+		
<i>Barleria ovata</i>						+		+		
Species Group C										
<i>Flueggea virosa</i> ssp. <i>virosa</i>		a	1	1	+	1	+	+	+	
<i>Rhus pentheri</i>		a	a	+	1	a	1	1	1	
<i>Carissa edulis</i>		1	+	+	+	1	1	1	1	
<i>Dichrostachys cinerea</i> ssp. <i>africana</i>		+	a	1	a	1	+	+	r	



<i>Peltophorum africanum</i>	1+ 1+++++ ++ +
<i>Senna petersiana</i>	+ ++ + + 1 1+++
<i>Berchemia zeyheri</i>	1 1 + 1++ +++ +
<i>Brachiaria deflexa</i>	+ 1 1 1 + a + +
<i>Plectroniella armata</i>	++++r+ ++ +
<i>Dovyalis caffra</i>	++++ + +++
<i>Capparis tomentosa</i>	+ +++ + + + +
<i>Heteropyxis natalensis</i>	1 1 ++++r a +
<i>Commelina benghalensis</i>	+ + +++++
<i>Urochloa mosambicensis</i>	+ + +++++
<i>Rhus pyroides</i>	+ + +++ +
<i>Rhus leptodictya</i>	+ ++ + + + +
<i>Coddia rudis</i>	+ + ++ + +
<i>Bridelia mollis</i>	+ ++++ + +
<i>Pappea capensis</i>	+ + + + + +
<i>Pellaea calomelanos</i> var. <i>calomelanos</i>	+ ++ + + +
<i>Mimusops zeyheri</i>	+ + + +
<i>Sansevieria hyacinthoides</i>	+ + + +
<i>Justicia flava</i>	+ + ++

Diagnostic species of the *Cussonia natalensis*–*Acacietum* karroo

Species Group D

<i>Solanum tettense</i> var. <i>renschii</i>	+ + 1++
<i>Cussonia natalensis</i>	+ +++
<i>Eragrostis rigidior</i>	+ +++
<i>Dicliptera heterostegia</i>	+ +++
<i>Psiadia punctulata</i>	++
<i>Scadoxus puniceus</i>	+ +

Species Group E

<i>Acacia ataxacantha</i>	+ 1 1 1 1 + 1 +
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Species Group F

<i>Panicum maximum</i>	b a b a a +++ + ++ 1 +++
<i>Acalypha glabrata</i>	+ + 1++++ 1+ ++ ++
<i>Dovyalis zeyheri</i>	+ ++ 1 ++ 1 1 1 1 1 + +
<i>Ehretia rigida</i>	+ + 1 1 1 + + +++
<i>Vangueria infausta</i> ssp. <i>infausta</i>	+ + + + +++
<i>Lippia javanica</i>	+ + + 1++
<i>Capparis fascicularis</i> var. <i>fascicularis</i>	+ + + ++



Diagnostic species of the *Olea europaeae*–*Buddlejetum salviifoliae*

Species Group G

<i>Olea europaea</i> ssp. <i>africana</i>		+				b a b b
<i>Buddleja salviifolia</i>						1 a a a
<i>Buddleja saligna</i>				r		a a 1 a
<i>Euclea crispa</i> ssp. <i>crispa</i>					+	1 a 1 1
<i>Allophylus africanus</i> var. <i>africanus</i>		+	+			+ 1 ++
<i>Canthium inerme</i>						+ + + +
<i>Scolopia zeyheri</i>						+ + + +
<i>Pavetta gardeniifolia</i>						+ + +

Species Group H

<i>Acokanthera oppositifolia</i>						+ + + + + + +
<i>Hyperacanthus amoenus</i>		+				+ + + + + +
<i>Clerodendrum glabrum</i> var. <i>glabrum</i>						+ + + + + +

Species Group I

<i>Diospyros lycioides</i> ssp. <i>sericea</i>		+				+ + + + +
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Species Group J

<i>Ziziphus mucronata</i> ssp. <i>mucronata</i>		+ + + + + + +		+ + 1 + +		+ +		+ + +
<i>Acacia karroo</i>		+ +		+ + r r		+ + +		+ a a b + + + +
<i>Zanthoxylum capense</i>		+ +		+ + +		1 + +		+ + + + +
<i>Grewia occidentalis</i> var. <i>occidentalis</i>		+ +		+ + + +		+ 1 + +		+ + + + +
<i>Gymnosporia buxifolia</i>		+ +		+ + +		+		+ + + + +
<i>Themeda triandra</i>		b a + 1 +		+ + +				a a a 1
<i>Dombeya rotundifolia</i> var. <i>rotundifolia</i>		1 1 + + 1 + + +		+ +				1 1 1
<i>Combretum molle</i>		+ + + + 1 1 1		+ +		+ +		+ + +
<i>Catha edulis</i>		a a 1 1 1 1 + 1						+ 1 a 1
<i>Rhoicissus tridentata</i> ssp. <i>tridentata</i>		+ +		+		+ + + +		1 1 a a
<i>Maytenus undata</i>		+		+ +		+		+ + + 1 1 1
<i>Pavetta schumanniana</i>				+ + +				+ + 1 1
<i>Canthium mundianum</i>				+ +				+ + +

Community description

***Catha edulis–Flueggia virosa* Soutpansberg Moist Mountain Thickets Major Vegetation Type**

The *Catha edulis–Flueggia virosa* Soutpansberg Moist Mountain Thicket Major Vegetation Type is a mixture of plant communities situated at a variety of different altitudes. The distribution of temperate and sub-tropical plant species reflects the gradient of plant communities up the southern slopes of the SC. While those communities along the warm and relatively humid foot slopes are quite tropical, the plant communities of clayey depressions along the cooler higher lying areas tend to contain many temperate species. The lower lying sub-tropical plant communities seem to be unique in their species composition and structure. The higher lying temperate communities compare with the Hillside scrub of the Transitional *Cymbopogon–Themeda* Veld (49) of the Pure Grassveld Types described by Acocks (1953). They share species such as *Acacia karroo*, *Acacia caffra*, *Grewia occidentalis*, *Ehretia rigida*, *Euclea crispa* subsp. *crispa*, *Olea europaea* subsp. *africana*, *Buddleja saligna*, *Buddleja salviifolia*, *Rhus pyroides*, *Tarchonanthus camphoratus*, *Diospyros lycioides*, *Ziziphus mucronata*, *Dombeya rotundifolia* and *Cussonia* species. These temperate clay communities of the SC also share some floristic links with the riverine woodland *Zizipho mucronatae–Acacietum karroo* described by Brown *et al.* (1998).

Environmental data

The *Catha edulis–Flueggia virosa* Soutpansberg Moist Mountain Thicket Major Vegetation Type is associated with soils of high clay content and relatively moist conditions along the southern slopes of the SC. Even during dry cycles, the moisture-laden air from the south–east ensures at least some orographic rain and mist during the summer months. The eutrophic clayey soils of this Major vegetation Type are derived from igneous basalt and diabase, as well as illuvial clays found in some of the valleys cutting through the mountain ridges. It is associated with the Shortlands Soil Form (MacVicar *et al.* 1991) of the Fa and Ib Land Types derived from basalt, tuff and narrow diabase intrusions or dykes of the Sibasa and Wyllies Poort Geological Formations. The fine-textured clayey soils have high water retention capabilities and tend to release less water to the vegetation than the surrounding sandy soils. High

water run-off and poor drainage capabilities result in high potential for soil erosion if vegetation is removed. The high crown cover of the woody layer and poorly developed field layer further enhance run-off and more soil erosion.

The vegetation structure can be described as low closed thickets (Edwards 1983), with no definite separation between the tree and shrub layers. The woody layer contains a mixture of trees and shrubs ranging from 1.5–4 m in height. A very high percentage canopy cover (>80%) blocks enough sunlight from reaching the understory to prevent the establishment of a dense field layer.

Diagnostic taxa

The *Catha edulis*–*Flueggia virosa* Moist Mountain Thicket Major Vegetation Type is characterised by a high diversity of trees and shrubs. Diagnostic species from the diverse associations within this Major Vegetation Type are presented in species group I (Table 1, Chapter 4) and include woody species such as *Grewia occidentalis* var. *occidentalis*, *Dovyalis zeyheri*, *Acalypha glabrata*, *Dombeya rotundifolia*, *Catha edulis*, *Rhus pentheri*, *Carissa edulis*, *Rhoicissus tridentata* subsp. *tridentata*, *Senna petersiana*, *Diospyros lycioides*, *Berchemia zeyheri*, *Dovyalis caffra*, *Heteropyxis natalensis*, *Capparis tomentosa*, *Acacia ataxacantha*, *Euclea undulata*, *Pavetta schumanniana*, *Acacia rehmanniana*, *Gymnosporia senegalensis*, *Acokanthera oppositifolia*, *Mystroxydon aethiopicum* subsp. *schlechteri*, *Rhus pyroides*, *Bridelia mollis*, *Clerodendrum glabrum* var. *glabrum*, *Ekebergia capensis*, *Allophylus africanus* var. *africanus*, *Tarchonanthus camphoratus*, *Maerua caffra*, *Cordia rudis*, *Lippia javanica*, *Jasminum multipartitum*, *Combretum hereroense*, *Acacia caffra*, *Euclea crispa* subsp. *crispa*, *Olea europaea* subsp. *africana*, *Bridelia micrantha*, *Buddleja saligna*, *Cussonia natalensis*, *Ficus sycomorus* subsp. *sycomorus*, *Scolopia zeyheri*, *Canthium inerme*, *Buddleja salviifolia*, *Podocarpus falcatus*, *Canthium mundianum*, *Ficus sur*, *Syzygium cordatum*, *Pavetta eylesii*, *Capparis fascicularis* var. *fascicularis* and *Acacia gerrardii* var. *gerrardii*.

Diagnostic succulent species include *Euphorbia ingens*, *Aloe greatheadii* var. *greatheadii*, *Sansevieria hyacinthoides* and *Aloe marlothii* subsp. *marlothii*.

The only diagnostic grass species within the field layer of this Major Vegetation Type are *Brachiaria deflexa*, *Eragrostis superba*, *Panicum deustum*, *Setaria megaphylla* and *Bothriochloa insculpta*.

Diagnostic forbs recorded include *Commelina benghalensis*, *Christella guenziana*, *Cyperus albostriatus*, *Solanum tettense* var. *renschii*, *Dicliptera heterostegia*, *Cyperus sphaerospermus*, *Bulbostylis burchellii*, *Barleria gueinzii*, *Pyrenacantha grandiflorus* and *Justicia flava*.

Dominant / prominent taxa

Dominant woody species of this Major Vegetation Type include *Grewia occidentalis* var. *occidentalis*, *Dovyalis zeyheri*, *Acalypha glabrata*, *Dombeya rotundifolia*, *Catha edulis*, *Rhus pentheri*, *Carissa edulis*, *Rhoicissus tridentata* subsp. *tridentata*, *Senna petersiana*, *Diospyros lycioides* subsp. *sericea*, *Berchemia zeyheri* (Species Group I), *Plectroniella armata*, *Peltophorum africanum* (Species Group J), *Flueggia virosa*, *Acacia karroo*, *Gymnosporia buxifolia*, *Themeda triandra* (Species Group K), *Dichrostachys cinerea* subsp. *africana*, *Ehretia rigida* (Species Group L), *Ziziphus mucronata* (Species Group P), *Zanthoxylum capense* (Species Group S), *Combretum molle* (Species Group U) and *Maytenus undata* (Species Group X).

Only a few shade tolerant grass and herbaceous species with generally low cover-abundance values were recorded within this Major Vegetation Type. Grass species include *Brachiaria deflexa*, *Panicum deustum*, *Setaria megaphylla* (Species Group I) and *Panicum maximum* (Species Group P).

The shaded conditions also favour fern species such as *Thelypteris gueinziana* (Species Group I) and *Pellaea calomelanos* var. *calomelanos* (Species Group T).

1. *Euphorbia ingentis*–*Cathetum edulis* ass. nov., hoc loco.

Nomenclatural type: Relevé 33 (holotypus)

Classified under the *Acacietalia rehmanniana*–*tortilis* (Winterbach 1998; Winterbach *et al.* 2000).

Alternative name: *Euphorbia ingens*–*Catha edulis* Low Thicket on southern slopes of the SC.

Environmental data

Most of the woody species are in the form of short trees or tall shrubs ranging from 1.5–4 m in height. The woody layer is well developed with a crown cover of 65–85%, resulting in a low closed thicket vegetation structure (Edwards 1983). No definite separation in the woody strata can be detected. The field layer is poorly developed under the dense shade of the tree and shrub layer. This association is situated along the warm and relatively humid sub-tropical southern foot-slopes of the SC. It is associated with the Shortlands Soil Form (MacVicar *et al.* 1991) of the Fa Land Type derived from basalt and tuff of the Sibasa Geological Formation (Botha 2004b; Patterson & Ross 2004b). The soil is fine-textured, clayey, relatively deep and rich in nutrients. Water penetration and drainage is poor, resulting high potential for soil erosion along these high rainfall steep (15–30°) southern slopes of the Soutpansberg. Surface rock cover is generally below 5%.

Diagnostic taxa

This association is characterised by the diagnostic species of species group A (Table 6). Woody species in this group include *Ximenia americana* var. *microphylla*, *Gymnosporia senegalensis*, *Acacia rehmanniana*, *Sclerocarya birrea* subsp. *caffra*, *Tarchonanthus camphoratus*, *Cussonia spicata*, *Grewia flavescens*, *Acacia caffra*, *Jasminum multipartitum*, *Maerua cafra*, *Myroxylon aethiopicum* subsp. *schlechteri*, *Combretum hereroense*, *Euclea divinorum*, *Acacia nilotica* subsp. *kraussiana*, *Acacia gerrardii* var. *gerrardii*, *Euclea undulata* var. *undulata*, *Ximenia caffra* var. *caffra*, *Grewia monticola*, *Gymnosporia tenuispina* and *Cordia monoica*.

Diagnostic succulent species include *Euphorbia ingens*, *Aloe greatheadii* var. *greatheadii* and *Aloe marlothii* subsp. *marlothii*.

Some of the diagnostic grass species include *Eragrostis superba*, *Bothriochloa insculpta* and *Heteropogon contortus*.

The diagnostic herbaceous species representing this Major Vegetation Type include *Dioscorea sylvatica*, *Hibiscus meyeri*, *Gossypium herbaceum* subsp. *africanum*, *Solanum panduriforme* and *Barleria gueinzii*.

Dominant / prominent taxa

The woody layer is a rich mixture of species and includes dominant species such as *Ximenia americana* var. *microphylla*, *Gymnosporia senegalensis*, *Acacia rehmanniana*, *Sclerocarya birrea* subsp. *caffra*, *Tarchonanthus camphoratus*, *Cussonia spicata*, *Grewia flavescens*, *Acacia caffra*, *Mystroxydon aethiopicum* subsp. *schlechteri*, *Combretum hereroense*, *Euclea divinorum*, *Acacia nilotica* subsp. *kraussiana*, *Acacia gerrardii* var. *gerrardii*, *Euclea undulata* var. *undulata*, *Ximenia caffra* var. *caffra* (Species Group A), *Rhus pentheri*, *Flueggea virosa* subsp. *virosa*, *Carissa edulis*, *Dichrostachys cinerea*, *Peltophorum africanum*, *Senna petersiana*, *Berchemia zeyheri*, *Plectroniella armata*, *Dovyalis caffra*, *Capparis tomentosa*, *Heteropyxis natalensis*, *Rhus leptodictya*, *Coddia rudis*, *Bridelia mollis*, *Pappea capensis* (Species Group C), *Acalypha glabrata*, *Dovyalis zeyheri*, *Ehretia rigida* (Species Group F), *Ziziphus mucronata* subsp. *mucronata*, *Acacia karroo*, *Zanthoxylum capense*, *Grewia occidentalis* var. *occidentalis*, *Gymnosporia buxifolia*, *Dombeya rotundifolia* var. *rotundifolia*, *Combretum molle* and *Catha edulis* (Species Group J).

Prominent succulent species include *Euphorbia ingens*, *Aloe greatheadii* var. *greatheadii* and *Aloe marlothii* subsp. *marlothii* (Species Group A).

The dense crown cover provided by the woody layer inhibits the development of a strong field layer. Some of the more frequent grass species recorded include *Bothriochloa insculpta*, *Eragrostis superba* (Species Group A), *Brachiaria deflexa* (Species Group C), *Panicum maximum* (Species Group F) and *Themeda triandra* (Species Group J).

Prominent herbaceous species include *Dioscorea sylvatica*, *Jasminum multipartitum*, *Hibiscus meyeri*, *Gossypium herbaceum* subsp. *africanum*, *Barleria gueinzii*, *Heliotropium steudneri* (Species Group A) and *Pellaea calomelanos* var. *calomelanos* (Species Group C). *Dioscorea sylvatica* is considered rare and threatened due to overexploitation (Von Maltitz *et al.* 2003).

The *Euphorbia ingentis*–*Cathetum edulis* along the warm and relatively humid subtropical southern foot-slopes of the SC compare floristically with numerous plant communities throughout the grassveld and savanna of South Africa. These include the Low Altitude Bushveld (6a) of the Zululand Thornveld (6) (Acocks 1953), Norite Black Turfveld (13b) of the Other Turf Thornveld (13) (Acocks 1953), *Rhus leptodictya*–*Acacia tortilis* Bushveld of the *Acacietalia rehmanniana*–*tortilis* (Winterbach 1998; Winterbach *et al.* 2000), *Dombeya rotundifolia*–*Panicum maximum* Sweet Rocky Community of the Waterberg area (Henning 2002), the *Pappea capensis*–*Acacia tortilis* community of the Nylsvlei Nature Reserve (Coetzee *et al.* 1976), the *Rhus leptodictya*–*Mimusops zeyheri* Termitatium Thickets of Marakele Nature Reserve (Van Staden 2002) and the woodlands on diabase dykes of the *Acacia tortilis*–*Carissa bispinosa* Woodland Alliance of the *Acacia tortilis*–*Panicum maximum* Woodland Order of the western Transvaal Bushveld (Van der Meulen 1979). These plant communities are associated with eutrophic, clayey mesic soils derived from unsaturated igneous parent material (Acocks 1953; Van der Meulen 1979; Winterbach *et al.* 2000). Typical species shared by these plant communities include *Acacia caffra*, *Acacia karroo*, *Acacia nilotica*, *Acacia tortilis*, *Rhus leptodictya*, *Rhus pyroides*, *Ziziphus mucronata*, *Ehretia rigida*, *Dichrostachys cinerea* subsp. *africana*, *Euclea crispa*, *Euclea undulata*, *Gymnosporia buxifolia*, *Dombeya rotundifolia* var. *rotundifolia*, *Pappea capensis*, *Ximenia americana* var. *microphylla*, *Aloe marlothii* subsp. *marlothii* and *Panicum maximum*.

2. *Bridelia micranthae*–*Carissetum edulis* ass. nov., hoc loco.

Nomenclatural type: Relevé 151 (holotypus)

Classified under the newly proposed *Diospyrodetea mespiliformis* of the Lowveld rivers (Mostert *et al. in prep.*).

Alternative name: *Bridelia micrantha*–*Carissa edulis* Tall Riverine Thicket

The *Bridelia micranthae*–*Carissetum edulis* include the azonal riverine forests and thickets of the SC. Unfortunately, the Sand River Gorge lost all of its riverine forests and thickets due to the destruction caused by the floods of 2000. These vegetation types could therefore not be sampled at the time of data gathering in the summer of 2002–2003. The riverine communities of the Sand River Gorge within the SC would have been part of the *Bridelia micranthae*–*Carissetum edulis* described here.

Environmental data

The moist conditions along the well-sheltered gorges give rise to lush growth of lianas, ferns, sedges and other hydrophilic herbaceous species. The woody layer is rich in species and includes many typical Lowveld riverine forest species. The closed canopy cover value of the riverine thickets produces dense shade on ground level, inhibiting development of a dense grass layer. According to the structural classification of Edwards (1983) the vegetation may be regarded as short thickets and tall forests. However, this classification is not very descriptive for the diversity within the gallery forests of the rivers and ravines of the Lowveld. The soils are mostly deep, alluvial and rich in organic matter.

Diagnostic taxa

The Riverine Thickets of the SC is characterised by the diagnostic species presented in species group B (Table 6). The woody layer is rich in species and includes many typical Lowveld riverine forest species such as *Bridelia micrantha*, *Ekebergia capensis*, *Ficus sur*, *Syzygium cordatum*, *Rhus chirindensis*, *Ficus sycomorus* subsp. *sycomorus*, *Pyrenacantha grandiflora*, *Markhamia zanzibarica*, *Podocarpus falcatus*, *Pavetta eylesii*, *Acacia robusta* subsp. *clavigera*, *Trema orientalis*, *Diospyros villosa* var. *parvifolia*, *Ziziphus rivularis*, *Euclea natalensis* subsp. *natalensis*, *Rhoicissus tomentosa*, *Ficus burkei*, *Euclea schimperi* var. *schimperi*, *Celtis africana*, *Rhus rehmanniana* var. *glabrata*, *Dovyalis rhamnoides*, *Ficus ingens* var. *ingens*, *Ptaeroxylon obliquum*, *Tecoma capensis*, *Erythrina lysistemon*, *Flacourtia indica* and *Hexalobus monopetalus* var. *monopetalus*.

The high canopy cover value of the riverine thickets produces dense shade on the ground, inhibiting development of a dense grass layer. Diagnostic grass species include *Setaria megaphylla*, *Panicum deustum* and *Ischaemum fasciculatum*.

The moist conditions along the sheltered gorges and ravines give rise to lush growth of lianas, ferns, sedges and other hydrophilic herbaceous species. Diagnostic sedges include *Cyperus albostriatus*, *Bulbostylis burchellii*, *Cyperus sphaerospermus*, *Cyperus sexangularis*, *Fuirena pubescens*, *Cyperus distans*, *Cyperus solidus* and *Pycneus polystachyos*. The fern *Christella guenziana* and fern-ally *Equisetum*

ramosissimum were recorded as diagnostic species. Diagnostic herbaceous species include *Adenia digitata*, *Verbena bonariensis*, *Vernonia glabra*, *Hermannia depressa*, *Persicaria attenuata*, *Dietes grandiflora*, *Asparagus virgatus* and *Barleria ovata*.

Dominant / prominent taxa

Dominant trees along the rivers

Bridelia micrantha, *Ekebergia capensis*, *Ficus sur*, *Syzygium cordatum*, *Rhus chirindensis*, *Ficus sycomorus* subsp. *sycomorus*, *Pyrenacantha grandiflora*, *Markhamia zanzibarica*, *Podocarpus falcatus*, *Pavetta eylesii*, *Acacia robusta* subsp. *clavigera*, *Trema orientalis*, *Diospyros villosa* var. *parvifolia*, *Ziziphus rivularis*, *Euclea natalensis* subsp. *natalensis*, *Rhoicissus tomentosa*, *Ficus burkei* (Species Group B), *Flueggea virosa* subsp. *virosa*, *Rhus pentheri*, *Carissa edulis*, *Peltophorum africanum*, *Senna petersiana*, *Berchemia zeyheri*, *Brachiaria deflexa*, *Plectroniella armata*, *Dovyalis caffra*, *Rhus pyroides* (Species Group C), *Acacia ataxacantha*, *Acalypha glabrata*, *Dovyalis zeyheri* (Species Group E), *Ziziphus mucronata* subsp. *mucronata*, *Acacia karroo*, *Zanthoxylum capense* and *Grewia occidentalis* var. *occidentalis* (Species Group J).

The grass layer is dominated by shade tolerant species, which include *Setaria megaphylla*, *Panicum deustum*, *Ischaemum fasciculatum* (Species Group B), *Brachiaria deflexa*, *Urochloa mosambicensis* (Species Group C), *Panicum maximum* (Species Group F) and *Themeda triandra* (Species Group J).

Prominent sedges include *Cyperus albostriatus*, *Bulbostylis burchellii*, *Cyperus sphaerospermus*, *Cyperus sexangularis*, *Fuirena pubescens*, *Cyperus distans*, *Cyperus solidus* and *Pycreus polystachyos* (Species Group B). Prominent ferns and fern allies include *Christella guenziana*, *Equisetum ramosissimum* (Species Group B) and *Pellaea calomelanos* var. *calomelanos* (Species Group C). Prominent herbaceous species include shade tolerant species such as *Adenia digitata*, *Verbena bonariensis*, *Vernonia glabra*, *Hermannia depressa*, *Persicaria attenuata*, *Dietes grandiflora*, *Asparagus virgatus*, *Barleria ovata* (Species Group B), *Commelina benghalensis*, *Sansevieria hyacinthoides* and *Justicia flava* (Species Group C).

Some weak floristic links with the *Mimusops zeyheri*–*Pappea capensis* Ravine Woodland and the *Ziziphus mucronata*–*Acacia karroo* Riverine Woodland of the Borakalalo Nature Reserve (Brown *et al.* 1995, 1997). The *Combretum erythrophyllum*–*Celtis africana* Forest Alliance described by Van der Meulen (1979), contain numerous species shared with the *Bridelio micranthae*–*Carissetum edulis* of the SC and many of the gallery forests of South Africa (Louw 1951; Edwards 1967; Werger 1973; Werger & Coetzee 1977; Coetzee 1983; Van Staden & Bredenkamp 2006). However, the riverine forests of the SC are rich in species, especially trees of a tropical nature (Mostert *et al. in prep.*). The riverine thickets and forests of the SC also share numerous species with the Sandveld Swamp Forest of the Soutpansberg Arid Northern Bushveld (Chapter 6). It may be argued that these two associations belong to the same syntaxonomic alliance or order, despite major differences in their primary ecological drivers. As can be seen from the vegetation damage caused by the 2000 floods in the Sand River Gorge, the riverine communities are prone to frequent mechanical disturbance and destruction. The swamp communities, however, are less frequently disturbed at such dramatic scales.

3. *Cussonia natalensis*–*Acacietum karroo* ass. nov., hoc loco.

Nomenclatural type: Relevé 65 (holotypus)

Classified under the *Acacietea karroo* (Du Preez & Bredenkamp 1991)

Alternative name: *Cussonia natalensis*–*Acacia karroo* Low Thickets along the southern slopes of the Soutpansberg.

Environmental data

The *Cussonia natalensis*–*Acacietum karroo* is situated below the lower reaches of the mistbelt along the southern slopes of the SC. The vegetation structure can be described as low thickets (Edwards 1983). It is associated with the Shortlands Soil Form (MacVicar *et al.* 1991) of the Fa and Ib Land Types derived from basalt and tuff of the Sibasa Geological Formation (Botha 2004b; Patterson & Ross 2004b). The soil is fine-textured, clayey, relatively deep and rich in nutrients. Water penetration and drainage is poor, resulting high potentials for soil erosion along these high rainfall southern slopes of the Soutpansberg. These highly eroded basalts create localised narrow plateaus, with which the *Cussonia natalensis*–*Acacietum karroo* is associated. Surface rock cover generally ranges from 5–15%.

Diagnostic taxa

This association is characterised by the diagnostic species of species group D (Table 6). The only diagnostic woody species recorded for this association is *Cussonia natalensis*. The only diagnostic grass species to be recorded was *Eragrostis rigidior*. Diagnostic herbaceous species include *Solanum tettense* var. *renschii*, *Dicliptera heterostegia*, *Psiadia punctulata* and *Scadoxus puniceus*.

Dominant / prominent taxa

The dominant species recorded for this association are strongly associated with heavy clays and include the woody species *Cussonia natalensis* (Species Group D), *Acacia ataxacantha* (Species Group E), *Panicum maximum*, *Acalypha glabrata*, *Dovyalis zeyheri*, *Ehretia rigida*, *Vangueria infausta* subsp. *infausta*, *Lippia javanica*, *Capparis fascicularis* var. *fascicularis* (Species Group F), *Acokanthera oppositifolia*, *Hyperacanthus amoenus*, *Clerodendrum glabrum* var. *glabrum* (Species Group H), *Ziziphus mucronata* subsp. *mucronata*, *Acacia karroo*, *Gymnosporia buxifolia*, *Rhoicissus tridentata* subsp. *tridentata* and *Maytenus undata* (Species Group J). The field layer is not very well developed.

The most dominant grass species include *Eragrostis rigidior* (Species Group D) and *Panicum maximum* (Species Group F).

A few prominent forbs include *Solanum tettense* var. *renschii*, *Dicliptera heterostegia*, *Psiadia punctulata* and *Scadoxus puniceus* (Species Group D).

There are many signs of historical overgrazing and crop cultivation along these eutrophic plateaus. These localised patches of arable land and sweet palatable grazing and browsing fodder within the surrounding sea of nutrient poor shallow quartzitic sandy soils, have been heavily utilised for as long as people and their livestock have occupied the Soutpansberg region. Heavy seasonal grazing pressures from herbivore game species may also form part of the natural system. However, the more recent settlement of people at these altitudes on a year round basis, has lead to severe over-utilisation and degradation of these isolated patches. The *Cussonio natalensis*–

Acacietum karroo may therefore very well be a pioneer sere or even a plagioclimax of what was once a grass dominated plant community (Bredenkamp *et al. in press*).

The *Cussonio natalensis–Acacietum karroo* compares to the species poor azonal *Panicum maximum–Acacia karroo* Veld (14f) of the Arid Sweet Bushveld (14) described by Acocks (1953). Du Preez & Bredenkamp (1991) classified similar riparian thicket communities of the southern and eastern Free State as the *Acacietea karroo*. Winterbach (1998) classified the similarly *Acacia karroo* dominated communities of the north-western savanna of South Africa into the *Rhus penteri–Acacia karroo* Microphyllous Forest of the *Crabbea hirsuta–Acacia rehmanniana* bushveld communities of the *Acacietalia rehmanniana–tortilis* of the *Panico maximi–Acacietea tortilis*. However, according to Du Preez & Bredenkamp (1991), Bezuidenhout *et al.* (1994) and Winterbach *et al.* (2000), the *Acacia karroo*-dominated vegetation of the southern African grassveld and savanna should be classified as a separate syntaxonomical class. The *Cussonio natalensis–Acacietum karroo* should therefore be classified as part of this *Acacia karroo*-dominated syntaxonomic class of *Acacietea karroo* (Du Preez & Bredenkamp 1991).

4. *Olea europaeae–Buddlejetum salviifoliae* ass. nov., hoc loco.

Nomenclatural type: Relevé 49 (holotypus)

Classified under the *Panico maximi–Acacietea tortilis* described by Winterbach *et al.* (2000).

Alternative name: *Olea europaea* subsp. *africana–Buddleja salviifolia* low thickets along the sheltered, high lying southern clay slopes of the Soutpansberg mistbelt

Environmental data

The *Olea europaeae–Buddlejetum salviifoliae* is situated within the lower reaches of the mistbelt along some of the more sheltered southern slopes of the SC. Annual precipitation is relatively high with relatively low desiccation of the surrounding environment, as can be inferred from the abundance of rock and bark lichens. The vegetation structure can be described as low thickets (Edwards 1983), with a well-developed woody layer and a poorly developed field layer. It is associated with the Shortlands Soil Form (MacVicar *et al.* 1991) of the Fa and Ib Land Types derived from basalt and tuff of the Sibasa Geological Formation (Botha 2004b; Patterson &

Ross 2004b). The soil is fine-textured, clayey, relatively deep and rich in nutrients. Water penetration and drainage is poor, resulting high potentials for soil erosion along these high rainfall southern slopes of the Soutpansberg. The A horizon is often totally eroded away, exposing the top of the well-structured B horizon at the surface. Slope ranges from 2–7°, and surface rock cover generally ranges from 10–25%.

Diagnostic taxa

This association is characterised by the diagnostic species of species group G (Table 6). The species in this group include *Olea europaea* subsp. *africana*, *Buddleja salviifolia*, *Buddleja saligna*, *Euclea crispa* subsp. *crispa*, *Allophylus africanus* var. *africanus*, *Canthium inerme*, *Scolopia zeyheri* and *Pavetta gardeniifolia*.

No diagnostic grass or herbaceous species were recorded during the fieldwork phase.

Dominant / prominent taxa

Olea europaea subsp. *africana*, *Buddleja salviifolia*, *Buddleja saligna*, *Euclea crispa* subsp. *crispa*, *Allophylus africanus* var. *africanus*, *Canthium inerme*, *Scolopia zeyheri*, *Pavetta gardeniifolia* (Species Group G), *Acokanthera oppositifolia*, *Hyperacanthus amoenus*, *Clerodendrum glabrum* var. *glabrum* (Species Group H), *Diospyros lycioides* subsp. *sericea* (Species Group I), *Ziziphus mucronata* subsp. *mucronata*, *Acacia karroo*, *Zanthoxylum capense*, *Grewia occidentalis* var. *occidentalis*, *Gymnosporia buxifolia*, *Dombeya rotundifolia* var. *rotundifolia*, *Combretum molle*, *Catha edulis*, *Rhoicissus tridentata* subsp. *tridentata*, *Maytenus undata*, *Pavetta schumanniana* and *Canthium mundianum* (Species Group J).

Themeda triandra (Species Group J) was recorded as the only prominent grass species for this association. No prominent herbaceous species were recorded.

The *Olea europaeae*–*Buddlejetum salviifoliae* share numerous species with the *Celtis africana*–*Osyris lanceolata* Kloof Forests (Westfall 1981, 1985), the *Podocarpus latifolius*–*Diospyros whyteana* Kloof Community (Henning 2002), and the *Olea europaea* subsp. *africana*–*Diospyros whyteana* Major Community (Van Staden 2002; Van Staden & Bredenkamp 2006) of the Waterberg Mountain Range, the *Rhus*

leptodictya–Olea europaea subsp. *africana* Bushveld of the *Rhus leptodictya–Acacia tortilis* Bushveld (Winterbach 1998) as part of the Springbok Flats, as well as the *Myrica serrata–Olea europaea* subsp. *africana* Hygrophilous Scrub of the *Leucosidea sericea–Buddleja salviifolia* Moist Shrubland of the southern and eastern Free State (Du Preez 1991; Du Preez & Bredenkamp 1991). Winterbach *et al.* (2002) classified the communities of the Springbok Flats into the *Acacienea nilotico–tortilis* of the *Panico maximi–Acacietea tortilis*, while Du Preez & Bredenkamp (1991) classified the communities of the Korannaberg into the *Rhoo burchellii–Buddlejion salignae* of the *Rhoetum erosae* described by Werger (1980). Typical species shared among these communities include *Olea europaea* subsp. *africana*, *Buddleja salviifolia*, *Euclea crispa* subsp. *crispa*, *Canthium inerme*, *Acokanthera oppositifolia*, *Grewia occidentalis* var. *occidentalis*, *Rhoicissus tridentata* subsp. *tridentata* and *Maytenus undata*. In view of its close floristic relationships with the savanna vegetation of the Waterberg area, it is proposed that the *Olea europaeae–Buddlejetum salviifoliae* of the SC be classified under the *Panico maximi–Acacietea tortilis* described by Winterbach *et al.* (2000). However, the syntaxonomic relationship between the *Rhoo burchellii–Buddlejion salignae* of the Free State (Du Preez & Bredenkamp 1991) and the *Olea europaea* subsp. *africana* dominated communities of the *Panico maximi–Acacietea tortilis* of the Limpopo Province is confusing, vague and seems to be an artificial separation of similar syntaxa. Earlier phytosociologists such as Werger (1974), warned against compiling a formal syntaxonomy too early, before adequate data over larger areas were available. It is recommended that the thicket biome of South Africa be reclassified syntaxonomically as an integrated unit, and not as separate geographical entities.

Ordination

The Soutpansberg Moist Mountain Thickets Major Vegetation Type is represented by a relatively diverse group of plant communities from diverse ecosystems. However, the vegetation structures the four described associations can all be regarded as thickets. These associations share numerous species, further strengthening their phytosociological grouping as a unit (Figure 9, Chapter 4). The woody layer is generally rich in species, while the field layer is poorly developed due to a lack of sunlight. Soils are clayey, eutrophic and relatively deep with relatively low surface rock cover. These thickets are confined to relatively moist areas, such as the southern slopes of the Soutpansberg and sheltered ravines. This Major Vegetation Type is relatively stable and less event-driven than those associations located along the northern ridges of the Soutpansberg. This may be due to the relatively high and predictable precipitation along the southern slopes and ravines of the SC.

The scatter diagram displays the distribution of relevés along the first and third ordination axes (Figure 10). The vegetation units are represented as groups and their distribution on the scatter diagram corresponds with certain physical environmental gradients. The first ordination axis (eigen value = 0.745) is represented by the x-axis and the third ordination axis (eigen value = 0.288) is represented by the y-axis. Some environmental gradients that may contribute to the observed separation of associations along the x- and y-axes include altitude, temperature, precipitation, soil moisture availability, slope, soil depth, soil texture, water drainage and air-moisture in the form of orographic mist and fog.

The right side of the x-axis represents the more temperate *Olea europaeae*–*Buddlejetum salviifoliae*, situated within the lower reaches of the mistbelt along some of the more sheltered southern slopes of the SC. Annual precipitation is relatively high due to moisture provided by seasonal orographic rain and mist. The soil is fine-textured, clayey, relatively deep and rich in nutrients. Slope ranges from 2–7°, and surface rock cover generally ranges from 10–25%. Water penetration and drainage is poor, resulting in the erosion of the thin A horizon to expose the underlying B horizon.

The middle of the scatter plot along the x-axis represents the more sub-tropical thickets of the southern foot slopes and terraces of the SC. These associations include the *Euphorbia ingentis*–*Cathetum edulis* and the *Cussonia natalensis*–*Acacietum karroo*. It falls below the mistbelt of the SC, and conditions are generally hot, humid and sub-tropical due to its low altitude. Water penetration is generally poor due to a sparse filed layer, moderate slopes and fine-textured soils.

The left side of the x-axis represents the highly sheltered ravines and gorges of the SC. Although precipitation may be less than for those associations to the right of the scatter plot, the accumulation of run-off water within this low laying landscape creates wet and moist conditions. The thickets and low forests of these sheltered drainage lines are dense, with very high canopy cover. The high canopy cover and sheltered position reduces desiccation of the surrounding environment. The undergrowth is generally lush with numerous ferns, orchids and lianas. The soils are rich in organic matter, mixed with rich alluvial silt, clay and sand imported from higher laying areas.

No significant environmental trends could be ascribed to the weak patterns of relevé distribution along the y-axis.

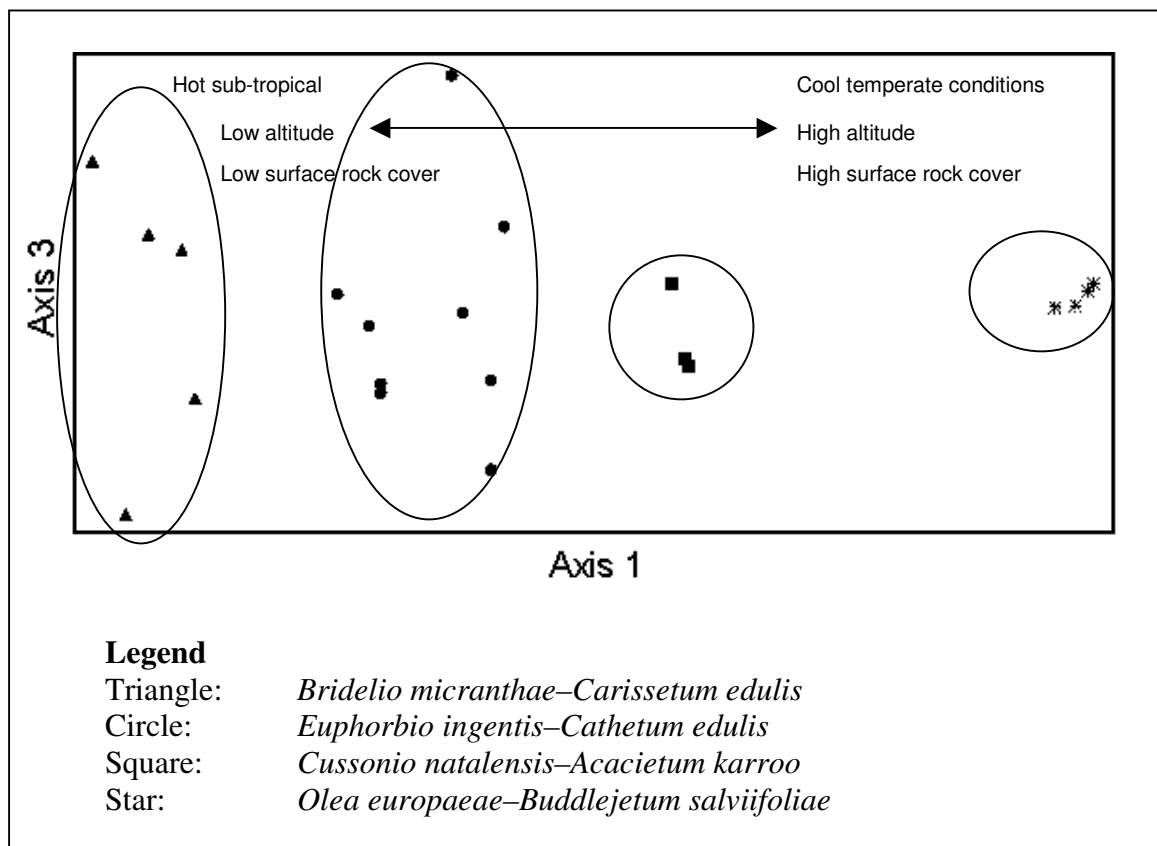


Figure 10 Relative positions of all the relevés along the first and third axes of the ordination of the *Catha edulis–Flueggia virosa* Soutpansberg Soutpansberg Moist Mountain Thickets Major Vegetation Type

Discussion

The communities associated with the *Catha edulis–Flueggia virosa* Soutpansberg Moist Mountain Thickets Major Vegetation Type contain numerous species indicating various degrees of disturbance in recent times. Du Preez (1991) and Du Preez & Bredenkamp (1991) found similar trends of encroachment and bush thickening within the *Acacia karroo* Riparian Thicket Vegetation Class (*Acacietea karroo*) of the southern and eastern Orange Free State grasslands. Very little is known about post-disturbance dynamics and recovery of subtropical transitional thicket communities (Everard 1987). Cowling (1984) considers subtropical transitional thicket to be stable but with low resilience. Thicket communities are vulnerable to overstocking and are slow to recover after disturbances (Aucamp & Barnard 1980). The nature of disturbances of the *Catha edulis–Flueggia virosa* Soutpansberg Moist Mountain Thickets associations include seasonal flooding, bush clearing and wood collection, over grazing, tilling and general disturbance due to human and livestock settlement.