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Miscellaneous notes

DESCRIPTIVE ECOLOGICAL ACCOUNT OF INTENSIVE SPRING FLOWERING OF EPHEMERAL VEGETATION IN THE BOSHOF AREA, ORANGE FREE STATE, SOUTH AFRICA

INTRODUCTION

A farmer, Mr B. Slabbert alleged that he had never before experienced vernal communities showing such intense flowering in the Boshof area as during spring 1988. The two authors visited the area in October 1988. The ephemeral vegetation was still in full bloom and a total of five sites were inspected. The key questions researched were: 1, which species were forming these communities; 2, what were the ecological conditions and the structure of the communities; 3, what could be the possible causes of the phenomenon?

THE STUDY AREA

The Boshof District is situated in the Orange Free State, South Africa. The approximate altitude of the study sites is 1 200 m a.s.l. and Figure 1 indicates their location.

Geology, soils and climate

The mostly shallow Hutton Form soils are overlying sediments (sandstone, siltstone, shales) of the Dwyka and Ecca strata and dolerites of the Karoo Supergroup. Sometimes a calcareous hardpan was present.

The climate of Boshof is typically semi-arid, with very hot summers and mild to cold winters. The hottest months are December, January and February and the coldest months June and July. Table 1 gives rainfall figures measured at Boshof.

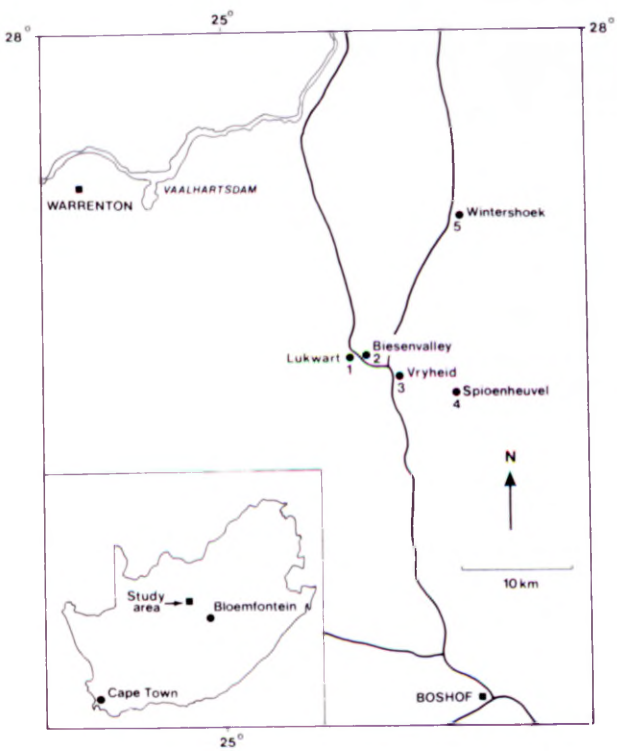

FIGURE 1.—Map indicating the positions of the five study sites

Phytogeography

According to Rutherford & Westfall (1986), the area falls into the Savanna Biome. They define savanna as vegetation with a herbaceous, usually graminoid layer, and an upper layer of woody plants forming a widely spaced to closed canopy cover. The area is part of Veld Type 16, Kalahari Thornveld (Acocks 1988).

METHODS

Five sites were subjectively chosen and studied along the Christiana-Boshof and Spioenheuvel-Warrenton roads, on the Farms Biesenvalley, Kareekloof, Spioenheuvel and Wintershoek (Figure 1). At each site a collection of the flowering plants, notes on vegetation structure, composition and soils were made. Plants were identified at the Botanical Research Institute and plant names follow Gibbs Russell *et al.* 1985, 1987. Background information was obtained from the extension officer Mr Nolly van Rensburg and from the farmer, Mr Basie Slabbert.

RESULTS

Site 1

The first site (Figure 1) was situated on the side of the Warrenton road at Biesenvalley Farm on a slightly raised landscape on an upper pediment slope with shallow, red soils of the Hutton Form and probably belonging to the Mangano Series (N. van Rensburg pers. comm.). This type of soil has fine sand in the B21 horizon and a clay content between 6% and 15%. The slope is gentle and occasional dolerite cropped out at the surface. Occasional termitaria were also present. capacity is 13 ha per large stock unit. This community is classed 'sweet Fires are rare in this

TABLE 1.—Rainfall (in mm), preceding the flowering, for the station at Boshof Prison. The mean averages over 53 years are given. Source: Department of Agricultural Development, Kimberley

	1986	1987	1988	Mean
Jan.	58,0	73,3	34,0	72,4
Feb.	37,0	90,0	450,0	57,1
Mar.	82,0	45,5	116,1	69,0
Apr.	22,5	36,5	183,0	43,5
May	0	2,5	0	20,7
Jun.	8,8	0	10,8	5,3
Jul.	0	10,5	0,2	7,4
Aug.	17,0	6,0	0	10,1
Sep.	15,0	102,6	29,5	18,6
Oct.	76,0	24,6	116,0	36,4
Nov.	48,0	52,8	30,0	52,5
Dec.	21,0	20,0	82,0	55,3
Total	385,3	464,3	1051,6	448,3

is classed 'sweet veld', a grassland with occasional trees (mainly *Acacia* spp.). The community had an estimated total cover of 25%, comprising a lower, grass-dominated layer, with a conspicuous layer, up to 0,25 m tall, mainly formed by *Lobelia erinus* (Figure 2) and *Wahlenbergia denticulata*, and an emergent layer of grasses up to 0,8 m tall. In the shrub layer, *Acacia tortilis* was present with a very low cover value. Grasses present were *Eragrostis superba, E. lehmanniana, Themeda triandra, Aristida congesta, A. vestita, Heteropogon contortus* and *Cenchrus ciliaris*. In Table 2 all recorded species are listed.

Site 2

The second site was situated on a flat bottomland. The red soils belong to the Hutton Form and probably to the Shorrocks Series (N. van Rensburg pers. comm.). These soils are about 0,5 m deep, have a high clay content of 15% to 35% and an eutrophic B21 horizon. The usual vegetation is a sweet grassveld. This community showed an estimated total cover of 20%, a low grass layer of up to 0,03 m, a layer dominated by *Lobelia erinus* up to 0,25 m and a layer up to 0,5 m tall together with a shrub layer up to 4 m tall with an estimated cover of only 1%. It is known that these areas were pure grassveld before, and the colonizing of the area by *Acacia* species is a recent phenomenon. The dominant and most conspicuous plant was *Lobelia erinus*. The same grasses as in Site 1 were present, but in a poorer condition, owing to overgrazing. All species recorded are listed in Table 2.

Site 3

This site was situated on the Farm Kareekloof (owner Mr Botha), a flat bottomland, nearby a pond. The vegetation cover was uneven, varying from very dense to absent in patches. This could be related to local overgrazing. There were only a few *Acacia* spp. shrubs, and these were widely spaced. Among the flowering plants *Lobelia erinus, L. angolensis* and *Wahlenbergia denticulata* were the most common. All species recorded are listed in Table 2.

Site 4

This site, on the farm Spioenheuvel, near the dwellings of Mr Slabbert, is usually covered with sweet grassveld. It is situated on a flat bottomland, with a soil belonging to the Hutton Form and to the Mangano Series. It is a sand with about 8% clay and has a depth of 0,3 m to 0,6 m. It is basic in reaction with calcrete layers at variable depth.

The vegetation of the site consists of a dense forbland, with occasional trees such as *Acacia erioloba* and *Rhus lancea*. Total estimated cover was 45% with a lower forb layer of 0–0,3 m (with 20% cover) and a higher layer from 0,03–0,5 m (15% cover). The dominating species, giving the blue colour to this vegetation, was *Wahlenbergia androsacea*. Species of *Homeria, Lobelia, Felicia* and *Nidorella* were also recorded. Grasses present were *Anthephora pubescens, Stipagrostis uniplumis, Eragrostis lehmanniana* and *Schmidtia pappophoroides*. All species recorded are listed in Table 2.

We were informed that this site had not been ploughed before, but was only utilized for grazing.

Site 5

This site was situated on the roadside from Christiana to Boshof, on the Farm Wintershoek of Mr van Wyk. The usual vegetation is that of a sweet veld. The soils are similar to Site 4. A strong woody element is prevalent in

TABLE 2.—Table of taxa (names after Gibbs Russell *et al.* 1985, 1987) found on the five sites

Plant taxa	Site No. 1	2	3	4	5
Acacia tortilis subsp. *heteracantha*	+	+	+	+	+
Acacia spp.	+	+	+	+	+
Lobelia erinus (blue form)	+	+	+	+	
Homeria pallida	+	+	+	+	
Wahlenbergia denticulata (purple form)	+	+	+		
Gazania krebsiana subsp. *arctotoides*	+	+	+		
Felicia muricata subsp. *muricata*		+	+	+	
Eragrostis lehmanniana	+	+		+	
Arctotis venusta	+	+		+	
Wahlenbergia androsacea	+			+	+
W. undulata		+	+		+
Sutera aurantiaca	+	+			
Eragrostis superba	+	+			
Themeda triandra	+	+			
Aristida congesta	+	+			
A. vestita	+	+			
Heteropogon contortus	+	+			
Cenchrus ciliaris	+	+			
Wahlenbergia denticulata (white form)		+	+		
Sebaea pentandra var. *pentandra*	+			+	
Hermannia cf. *H. coccocarpa*		+			+
Gnaphalium filagopsis		+		+	
Lobelia erinus (white form)	+				
Convolvulus ocellatus var. *ornatus*	+				
Geigeria filifolia	+				
Lactuca capensis	+				
Lobelia angolensis		+			
Osteospermum muricatum subsp. *muricatum*		+			
Lotononis marlothii		+			
Denekia capensis		+			
Salvia stenophylla		+			
Bergia anagalloides		+			
Walafrida saxatilis		+			
Pentzia incana		+			
Aptosimum procumbens var. *elongatum*			+		
Chrysocoma ciliata			+		
Vahlia capensis			+		
Sutera caerulea				+	
Acacia erioloba				+	
Rhus lancea				+	
Anthephora pubescens				+	
Stipagrostis uniplumis				+	
Schmidtia pappophoroides				+	
Trachyandra saltii var. *saltii*				+	
Senecio consanguineus				+	
Helichrysum argyrosphaerum				+	
H. dregeanum				+	
H. lineare				+	
Lasiopogon glomerulatus				+	
Chamaesyce prostrata				+	
Nidorella resedifolia subsp. *resedifolia*				+	
Medicago laciniata				+	
Stachys spathulata				+	
Galenia acutifolia				+	
Melolobium microphyllum					+
Hermannia tomentosa					+
Heliotropium ciliatum					+
Salvia runcinata					+

FIGURE 2.—Site 1 with abundant herbaceous vegetation with occasional shrubs of *Acacia* spp. (e.g. *Acacia tortilis*, *A. karroo* and *A. erioloba*). The dominant flowering species in this area were *Lobelia erinus* and *Wahlenbergia denticulata* (1988.10.11).

this community, represented by patches of *Acacia* spp. No structural data were gathered from this site. The species giving the blue colour to the vegetation was *Wahlenbergia androsacea*. Other species recorded are listed in Table 2.

DISCUSSION

The preceding descriptions give an idea of the structure and species composition of the vegetation. All species found forming the communities are typical of the area. The number and the degree of development and flowering was extraordinary. It can be proposed that the unusually conspicuous flowering could be related to several factors. The very high rainfall of 450 mm in February, 116mm in March and 183 mm in April 1988 allowed abundant water storage in the soil which was then available in spring for plant growth. The February rainfall surpassed the mean annual rainfall. The increased water availability promoted high germination and establishment rates of dormant seeds. The additional spring rains during September 1988 of 29,5 mm maintained the soil moisture at high levels. Overgrazing resulted in reduced competition from perennial plants. Species such as *Lobelia erinus* and *Wahlenbergia androsacea* are able to germinate and grow during periods of relatively low temperature when grasses are still mainly dormant. In this way there is little or no competition for environmental resources by grasses.

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