Chapter 6: The Open Thornveld Vegetation Type

The Open Thornveld Vegetation Type is present in the central and eastern part of the study area. This vegetation type is characteristic of the plains adjacent to the footslopes of the Drakensberg at altitudes lower than 1 500 m a.m.s.l (Figure 6.1). The topography conforms to undulating plains interspersed with open rocky hills. Rocks may be present on the soil surface and soils tend to be sandy or sandy-loam. Grasses dominate the vegetation and few individuals of woody species are noted in the different communities. The only woody species that occur frequently throughout the vegetation type are the trees *Acacia karroo* and *Acacia sieberiana*. The absence of other woody species, as well as the grass *Monocymbium ceresiiforme*, distinguishes this vegetation type from the Woodland- and High Altitude Mountain Vegetation Type. Species that generally dominate in the Open Thornveld Vegetation Type include the grasses *Hyparrhenia hirta, Themeda triandra, Cymbopogon excavatus, Eragrostis plana, Eragrostis, curvula* and *Eragrostis racemosa.*

By means of TWINSPAN and Braun-Blanquet procedures, the following communities were identified:

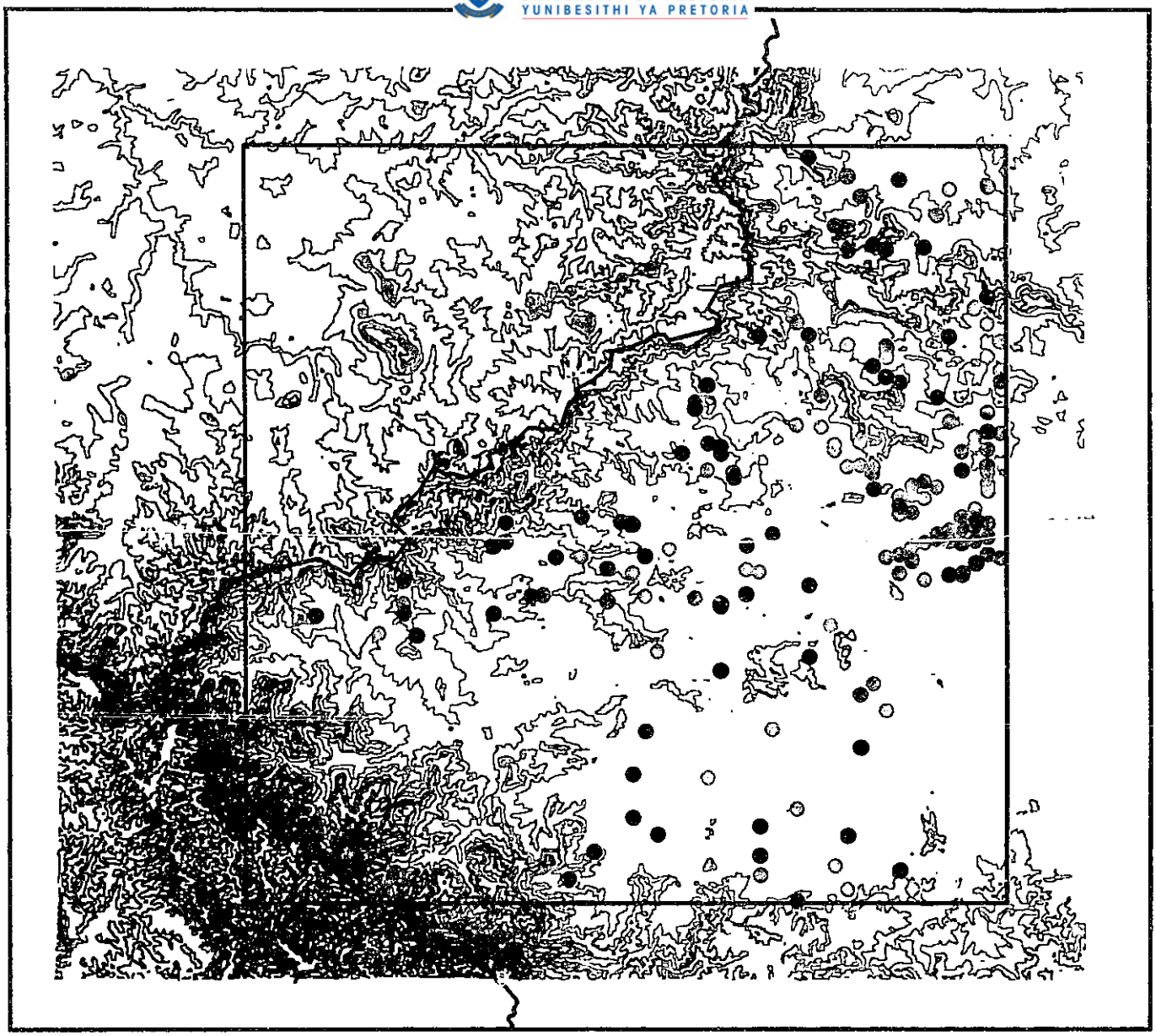
6.1 The *Hyparrhenia anamesa - Hyparrhenia dregeana* community (Table 6.1)

6.2 The *Trachypogon spicatus - Diheteropogon amplectens* community (Table 6.2)

6.3 The *Diospyros lycioides - Eragrostis chloromelas* community (Table 6.2)

6.4 The *Hyparrhenia hirta - Themeda triandra* community (Table 6.3)

The grasses *Hyparrhenia anamesa* and *Hyparrhenia dregeana* are diagnostic, with *Trachypogon spicatus, Diheteropogon amplectens* and *Diospyros lycioides* being characteristic species in the *Hyparrhenia anamesa - Hyparrhenia dregeana-*, the *Trachypogon spicatus - Diheteropogon amplectens-* and the *Diospyros lycioides - Eragrostis chloromelas* communities respectively.



Ladysmith
Gridlines 28° - 29°S and 29° - 30°E
KwaZulu-Natal Boundary
Sample plots of the Hyparrhenia anamesa - Hyparrhenia dregeana community
Sample plots of the Trachypogon spicatus and
Diospyros lycioides - Eragrostis chloromelas communities
Sample plots of the Hyparrhenia hirta - Themeda triandra community

Altitude

Altitude of the study area, contours 100m interval
750 - 1 100
1 100 - 1 450
1 450 - 1850
1 850 - 2 200
2 200 - 2 550
2 550 - 2 950
2 950 - 3 300

Figure 6.1: Distribution of the Open Thornveld Vegetation Type sample plots in the study area (contour interval 100m).

Sample plots of the Open Thornveld Vegetation Types are distributed over intensive areas in the study area and this is the main vegetation type of the study area. Acocks (1988) described this type of vegetation as the Southern Tall Grassveld (#65) (Figure 6.2) where *Themeda* and *Hyparrhenia* dominate. Altitude of Southern Tall Grassveld (#65) ranges from 600 to 1 350 m a.m.s.l., though below 1 050 m a.m.s.l. the vegetation is transitional to Valley Bushveld (#23). At altitudes above 1 050 m a.m.s.l. an open savanna with *Acacia sieberiana* in sourish mixed grassveld is found.

This vegetation type corresponds to the Natal Central Bushveld (Granger 1996) (#25), but vegetation composition suggests that this is a grassland with scattered trees, rather than bushveld (Figure 6.3). Sample plots are located in the Natal Central Bushveld (Granger 1996) (#25) as well as the North-eastern Mountain Grassland (Bredenkamp **et. al.** 1996c) (#43) which comprises the grasslands of the great escarpment mountains. Soils are mostly shallow, derived from a variety of rock types.

The Natal Central Bushveld (Granger 1996) (#25) covers a large portion of the KwaZulu-Natal midlands at altitudes of 600 to 1 350 m a.m.s.l. Soils are shallow, derived from mudstones and shales on duplex subsoils. Granger (1996) describes the vegetation as an open savanna, with scattered *Acacia sieberiana, Acacia karroo* and *Acacia nilotica.* The herbaceous layer is quite variable with secondary grassland, dominated by patches of *Hyparrhenia hirta.*

The Volksrust Formation and Beaufort Group are mostly represented in the area of this vegetation type, with some sample plots located on the Vryheid Formation (Figure 6.4). The Vryheid Formation is characterised by thick beds of yellowish to white, crossbedded sandstone and grit, which alternate with beds of soft, dark-grey, sandy shale and a few seams of coal. This formation follows on the Pietermaritzburg Shale Formation, from the southern part of KwaZulu-Natal northwards. Along the northern rim of the Basin it rests either on the Dwyka Formation or on an uneven floor of pre-Karoo formations.

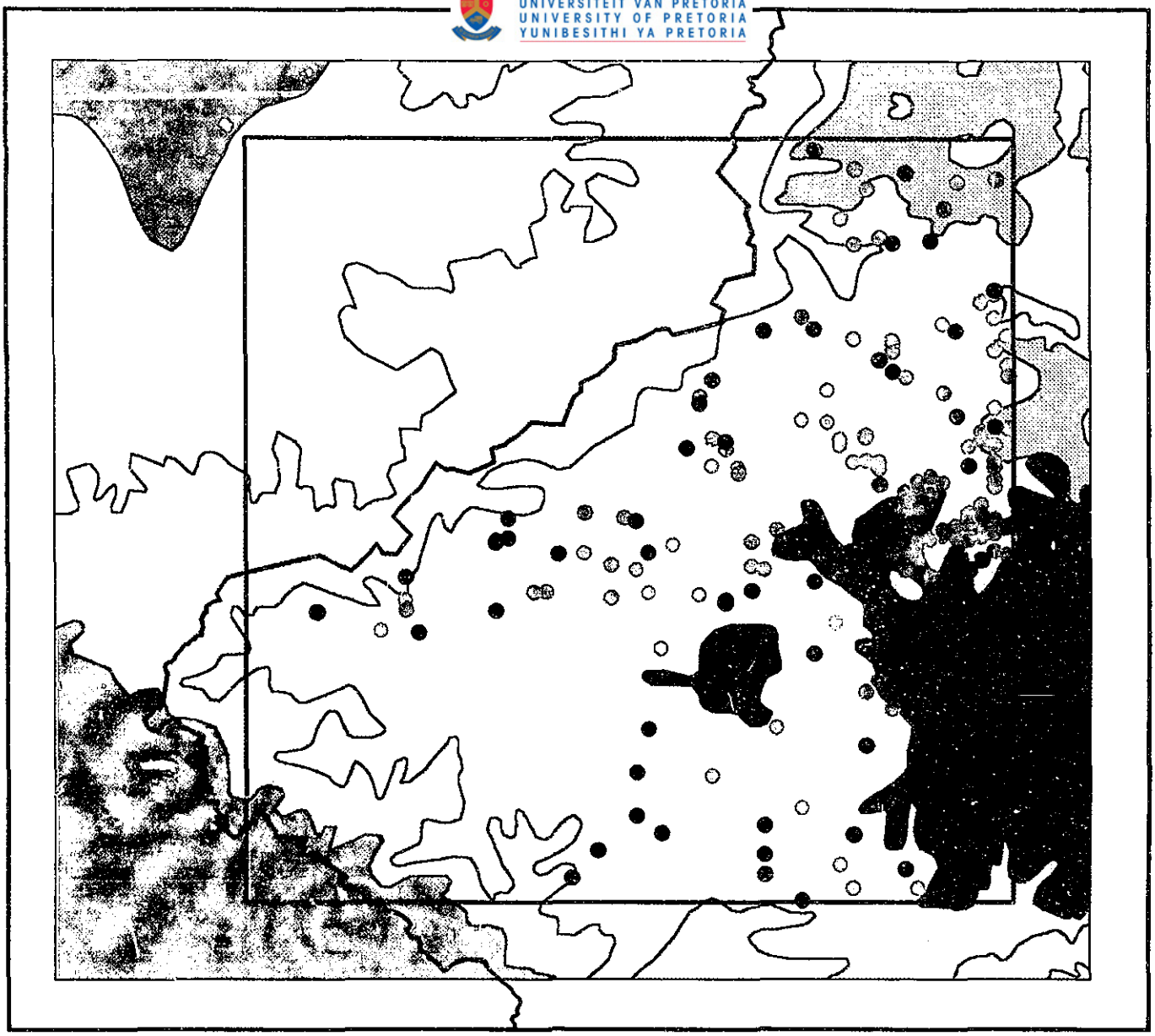


Figure 6.2: Distribution of the Open Thornveld Vegetation Type sample plots in Acocks Veld Types of the study area.

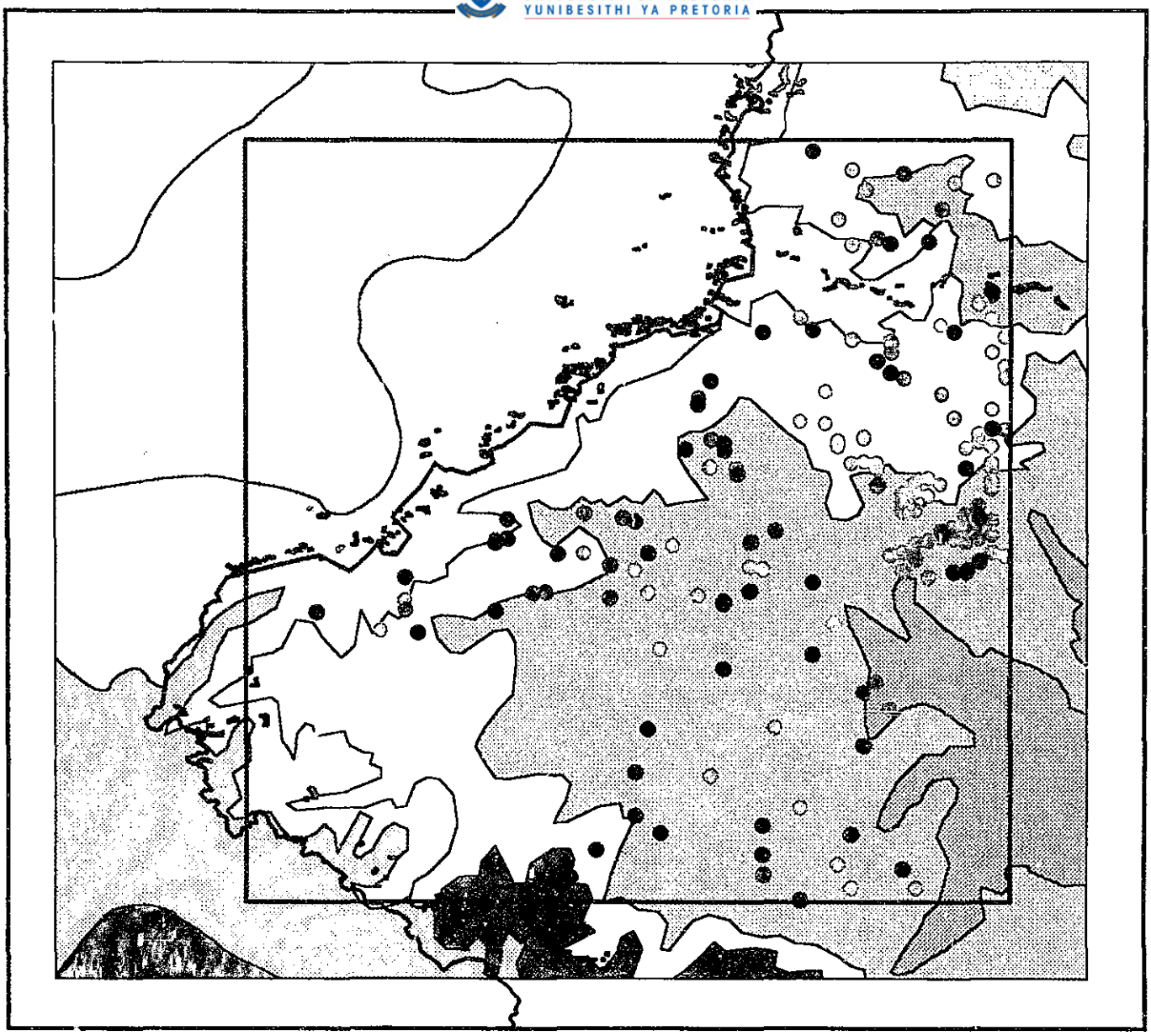


Figure 6.3: Distribution of the Open Thornveld Vegetation Type sample plots in Low and Rebelo Vegetation Types of the study area.

Like the Vryheid Formation, the Volksrust Shale Formation forms part of the Northern Facies of the Ecca Shale Formation. It extends from the southern part of KwaZulu-Natal, right round the northern rim of the basin, where it merges into the Tierberg Shale Formation. It follows conformably on the Vryheid Formation and consists of soft, bluish shale. The Beaufort Group covers the largest area in the Karoo and is composed of an alternation of arenaceous and agrillaceous sediments which are terrestrial deposits.

The main climate zones present in the Open Thornveld Vegetation Type include the 374, 385, 386 and 387 zones. The highest rainfall occurs in the 387 climate zone (908.5), with the most moderate temperatures (average maximum 26.5°C, average minimum 4.4°C) (Institute for Soil, Water & Climate 1994). The 387 climate zone is situated in the north-eastern part of the study area. The lowest occurs in the 386 climate zone, with 644,8 mm per annum. In the 386 climate zone, extreme temperature ranges are present, with the average maximum of 31.2°C and the average minimum 0.8°C. This climate zone is located in the eastern-central part of the study area.

6.1 The *Hyparrhenia anamesa - Hyparrhenia dregeana* community

The vegetation is an open savanna of tall grasses and *Acacia spp.* Sample plots are located in depressions on the footslopes of hills in close vicinity of streams. Various grasses and forbs present in the different variations indicate that the sample plots are located in disturbed areas. Soils are deep and well drained and rocks are absent. The Beaufort geological Group is predominantly represented (Figure 6.5). The grass *Hyparrhenia hirta* dominates and *Eragrostis plana,* with the forb *Helichrysum rugulosum* (Species group O) is also prominently present.

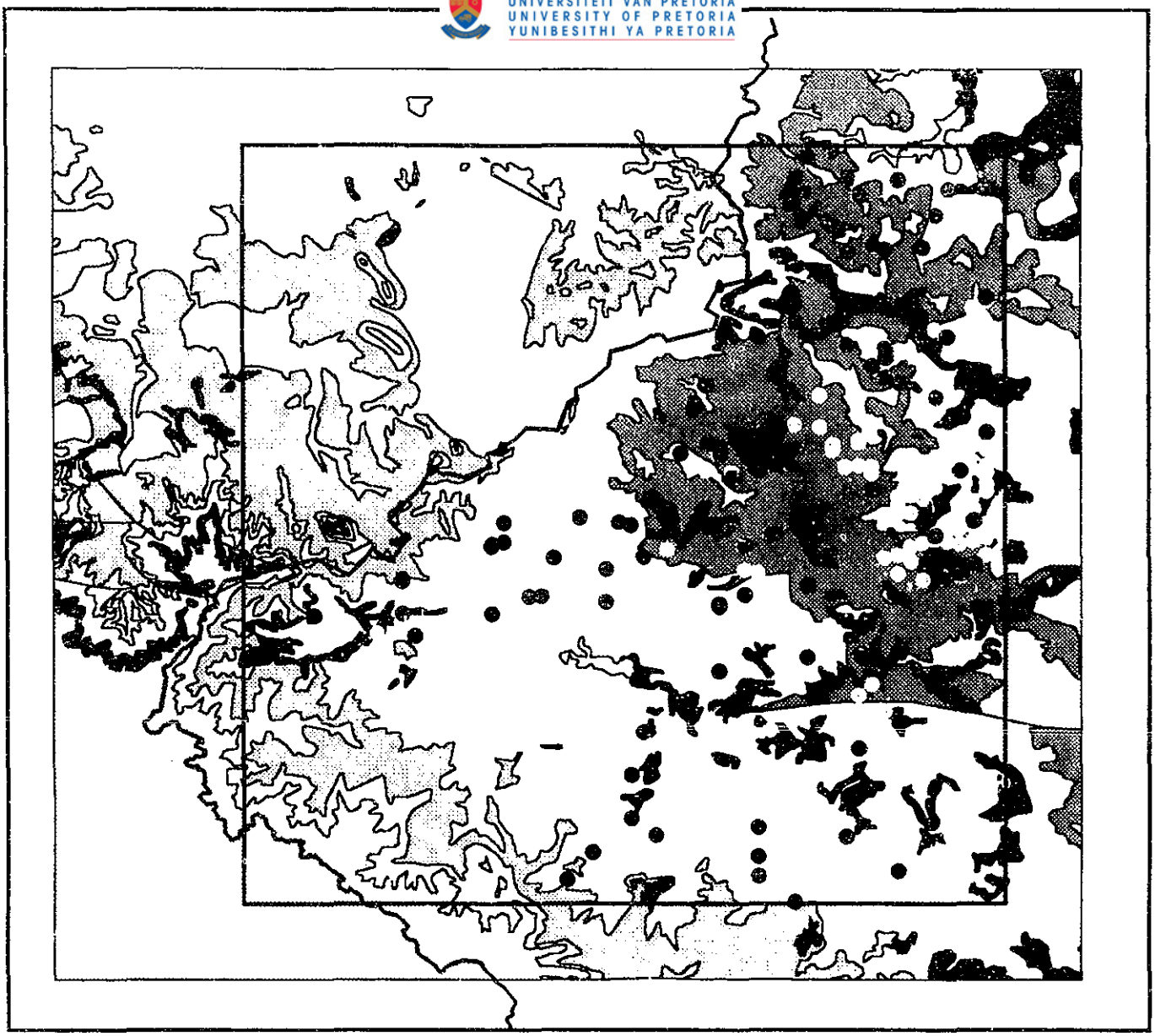


Figure 6.4: Distribution of the Open Thornveld Vegetation Type sample plots in the geological formations of the study area.

The presence of the diagnostic species *Hyparrhenia anamesa* and *Hyparrhenia dregeana* (Species group A) (Table 6.1) distinguishes this community from other communities in the Open Thornveld vegetation type. Various Veld Types (Acocks 1988) (Figure 6.6) and Vegetation Types (Low & Rebelo 1996) (Figure 6.7) are represented.

Two sub-communities and six variations were recognised by means of TWINSPAN classification and subsequent Braun-Blanquet procedures.

6.1.1 The *Hyparrhenia anamesa - Hermannia depressa* sub-community

Sample plots representing this sub-community are distributed throughout the study area and in close vicinity of streams. The variations of the *Hyparrhenia anamesa - Hermannia depressa* forms part of a moisture gradient with the *Eragrostis curvula - Melinis repens* variation on dry and the *Imperata cylindrica - Eragrostis plana* variation in moist conditions. Moisture- and degradation gradients were noted and these can be used to distinguish among the variations.

Various geological formations are present, but the Beaufort Group is predominantly found in the area of this plant community. Rocks are absent and soils are sandy-loam and deep. Careful management has to be applied to prevent vegetation degrading and soil erosion in this sub-community.

The vegetation corresponds to the Southern Tall Grassveld (#65), described by Acocks (1988) as an open savanna dominated by *Hyparrhenia hirta* and *Themeda triandra.* The *Hyparrhenia anamesa - Hermannia depressa* sub-community is characterised by the presence of species group B (Table 6.1). The grass species *Paspalum scrobiculatum* and *Eragrostis capensis* (Species group B) are associated with moist, disturbed areas. The grass *Hyparrhenia hirta* (Species group P) dominates in this sub-community, with *Eragrostis plana, Eragrostis curvula, Sporobolus africanus, Cymbopogon excavatus, Hyparrhenia anamesa* and the forb *Helichrysum rugulosum* (Species group P) also present.

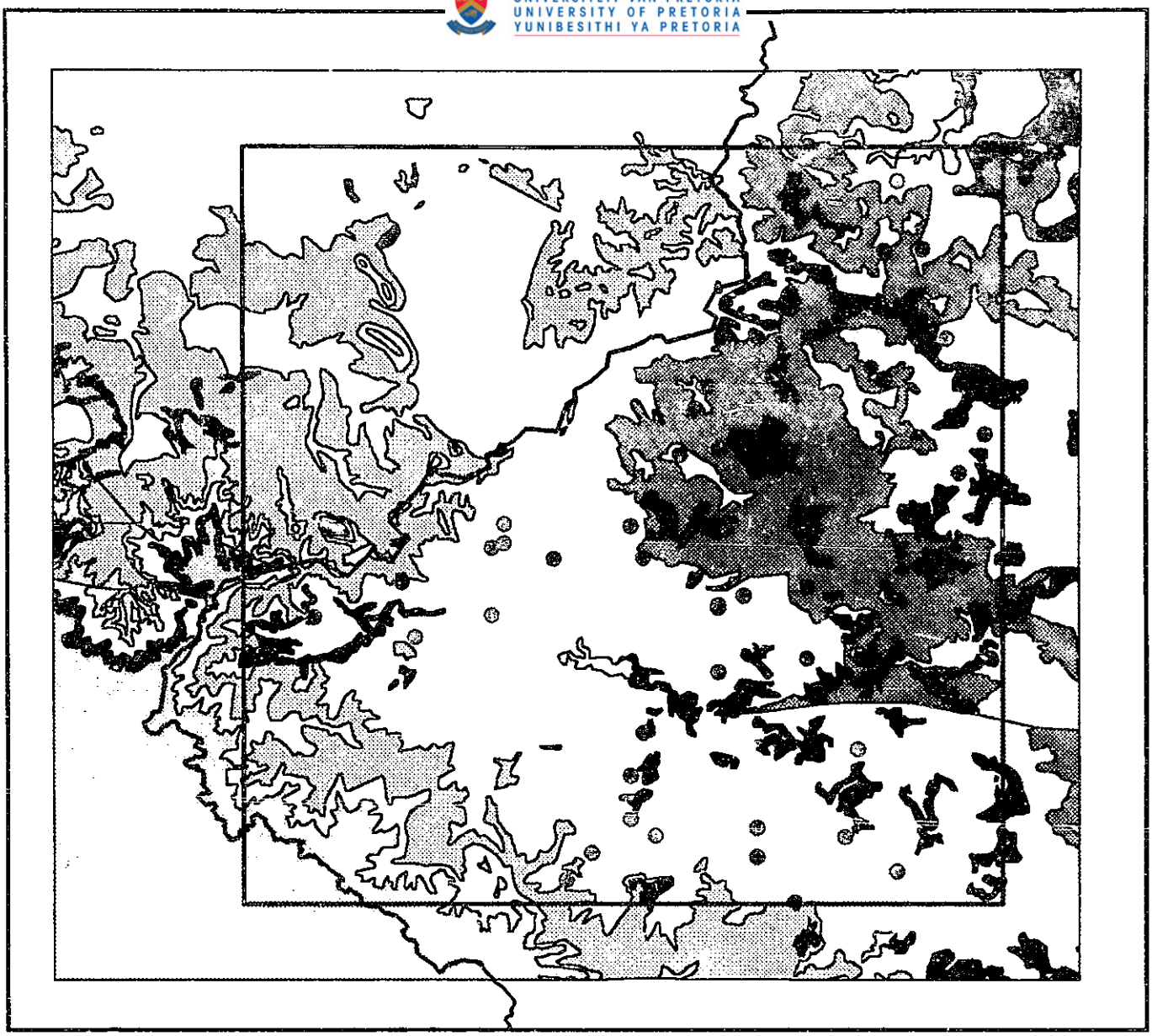
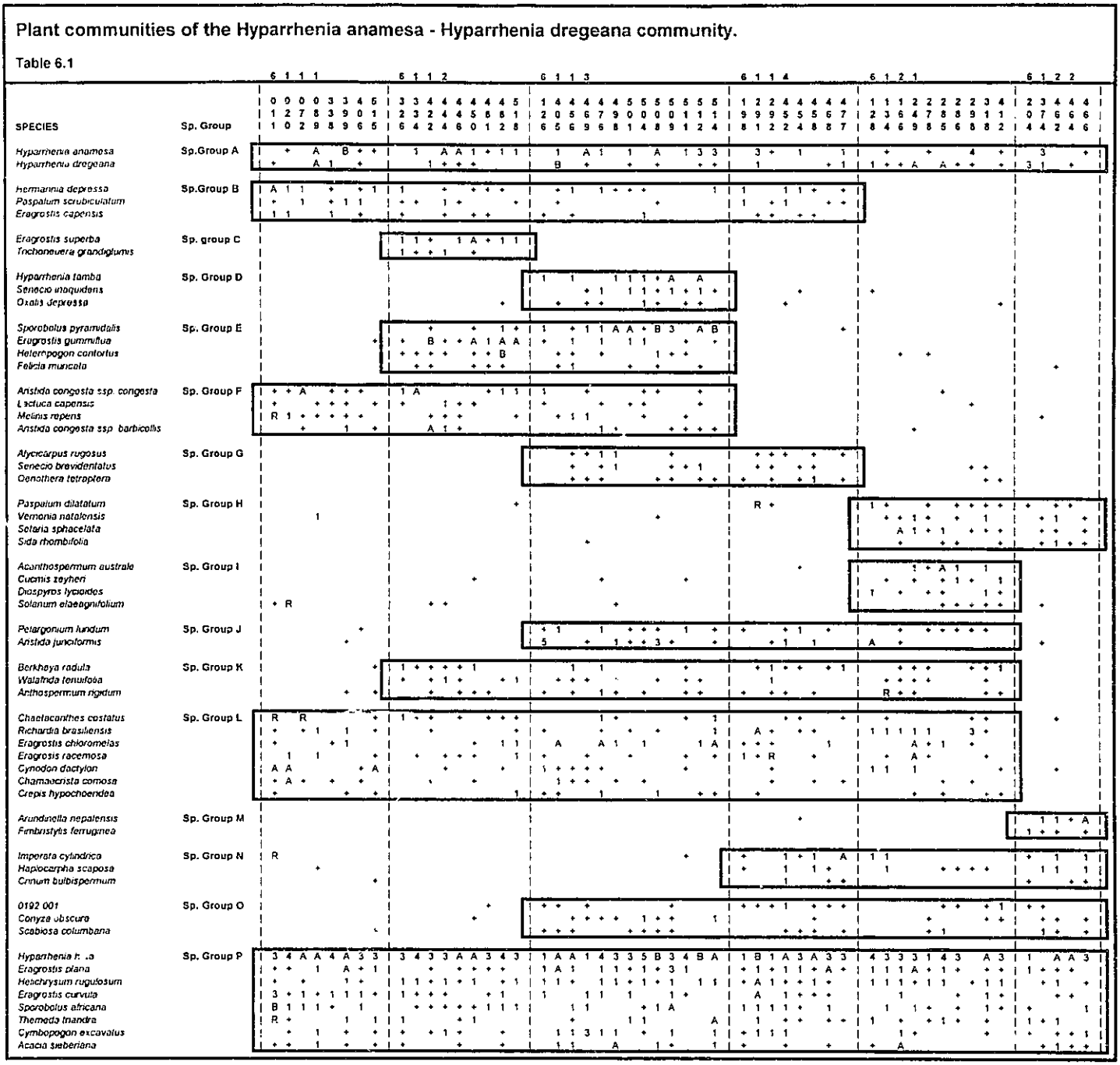
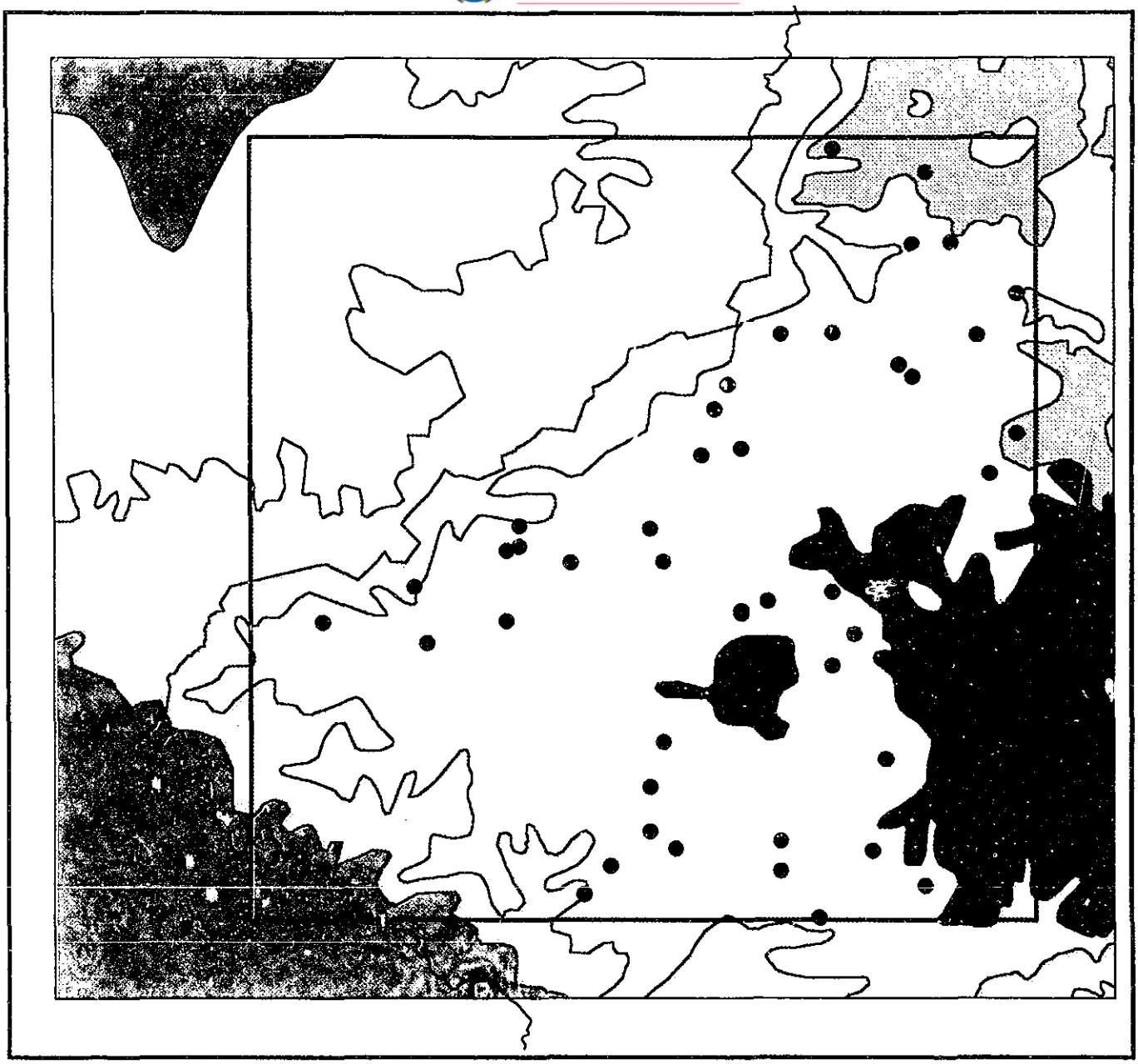


Figure 6.5: Distribution of the Hyparrhenia anamesa - Hyparrhenia dregeana community sample plots in the geological formations of the study area.

Plant communities of the Hyparrhenia anamesa - Hyparrhenia dregeana community.

Table 6.1

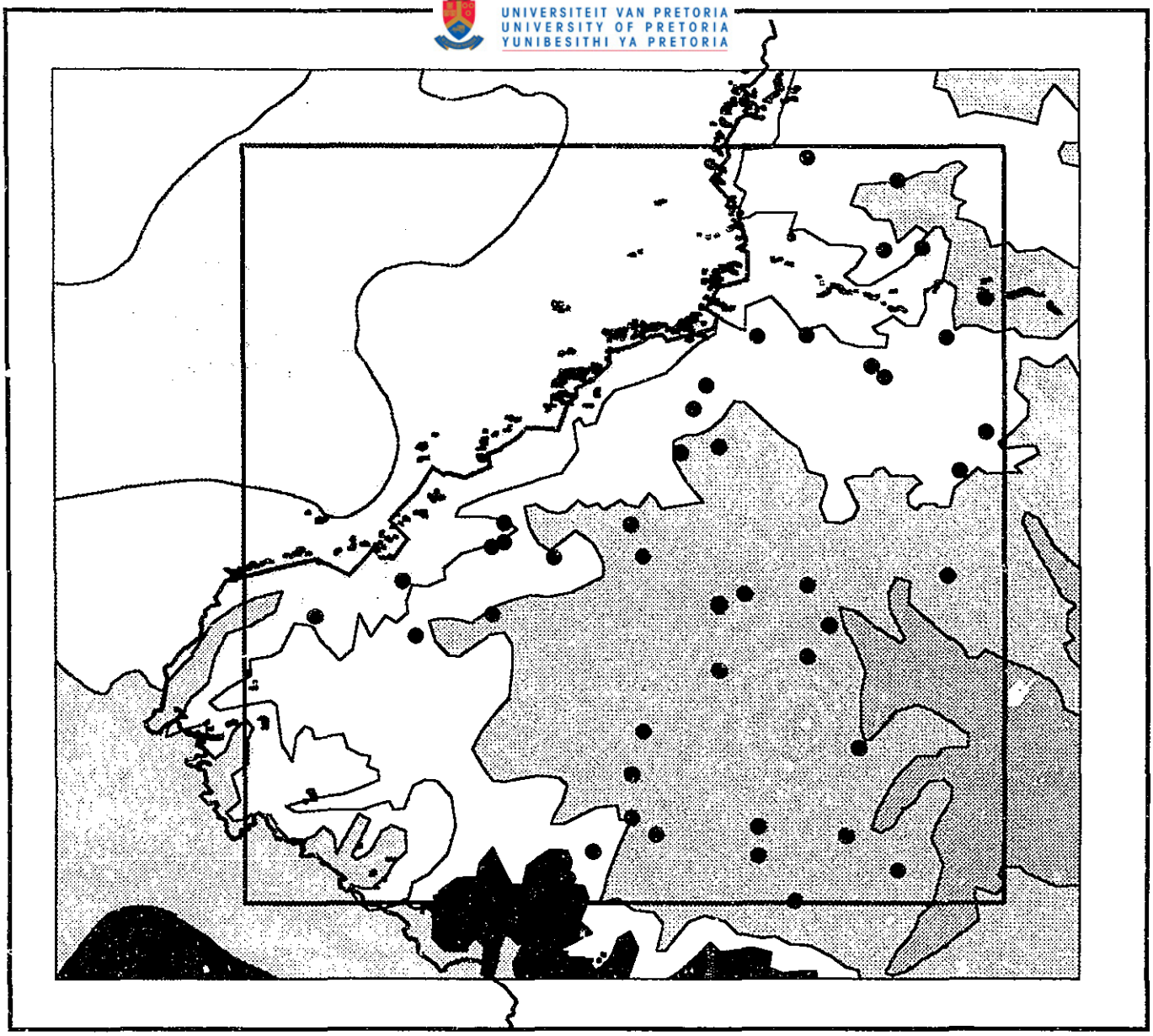




Ladysmith
Gridlines 28° - 29°S and 29° - 30°E
KwaZulu-Natal Boundary
Sample plots of the Hyparrhenia anamesa - Hyparrhenia dregeana community

Acocks Veld Types
Cymbopogon - Themeda Veld (Sandy) (#48)
Highland Sourveld and Dohne Sourveld (#44)
Highland Sourveld to Cymbopogon - Themeda Transition (Eastern Free State Highveld) (#49)
Natal Sour Sandveld (#66)
Southern Tall Grassveld (#65)
Themeda Veld to Cymbopopogon - Themeda Veld Transition (Patchy) (#53)
Themeda - Festuca Alpine Veld (#58)
Valley Bushveld (#23)

Figure 6.6: Distribution of the Hyparrhenia anamesa - Hyparrhenia dregeana sample plots in Acocks Veld Types of the study area.



Ladysmith
Gridlines 28° - 29°S and 29° - 30°E
KwaZulu-Natal Boundary
Sample plots of the Hyparrhenia anamesa - Hyparrhenia dregeana community

Low and Rebelo Vegetation Types
Afromontane Forest (#2)
Valley Thickets (#5)
Natal Central Bushveld (#25)
Moist Cool Highveld Grassland (#39)
Moist Cold Highveld Grassland (#40)
Wet Cold Highveld Grassland (#41)
Moist Upland Grassland (#42)
North-eastern Mountain Grassland (#43)
Afro Mountain Grassland (#45)
Alti Mountian Grassland (#46)

Figure 6.7: Distribution of the Hyparrhenia anamesa - Hyparrhenia dregeana community sample plots in Low and Rebelo Vegetation Types of the study area.

6.1.1.1 The *Eragrostis curvula - Melinis repens* variation

Sample plots representing this variation are found on the undulating footslopes and valley bottoms, near streams, distributed throughout the study area. No diagnostic species group characterises this variation, but the absence of species groups C, D, E and K (Table 6.1) distinguishes the *Eragrostis curvula - Melinis repens* variation from other variations in the *Hyparrhenia anamesa - Hermannia depressa* sub-community. The grass *Hyparrhenia hirta* (Species group P) dominates in this variation with *Aristida congesta* ssp. *congesta*, *Melinis repens* (Species group F), *Eragrostis curvula* and *Sporobolus africanus* (Species group P) also abundantly present.

The vegetation is an open savanna with scattered *Acacia sieberiana* shrubs and seedlings. According to Low and Rebelo (1996) this is secondary grassland with a variable herbaceous layer that is subjected to continuous grazing by game and cattle. This disturbed appearance is reflected in the presence of the mentioned grasses. Various climate zones and geological formations are encountered in the distribution area of this variation. Rocks are absent, soils are sandy-loam and deep.

6.1.1.2 The *Eragrostis superba - Eragrostis gummiflua* variation

The *Eragrostis superba - Eragrostis gummiflua* variation is characterised by species group C and is further distinguished from other variations in the *Hyparrhenia anamesa - Hermannia depressa* sub-community by the absence of species groups D, G, J and O (Table 6.1). As a result of more pronounced grazing pressure species such as the grasses *Eragrostis superba* (Species group B), *Eragrostis gummiflua* (Species group D), *Hyparrhenia anamesa* (Species group O) and the forbs *Chaetacanthus costatus* (Species group K) and *Helichrysum rugulosum* (Species group O) have become more prominent. The high cover abundance values of these species resulted in a more disturbed appearance of this variation than the *Eragrostis curvula - Melinis repens* variation.

The vegetation of the *Eragrostis superba - Eragrostis gummiflua* variation is described as sourish mixed grassveld on shallow topsoil that is prone to erosion. Careful management is therefore required to maximise the carrying capacity of the vegetation. This sub-

community falls in the 374 climate zone with an average rainfall of 720 mm per annum (Institute for Soil, Water & Climate 1994). On the undulating footslopes where this variation is found, no rocks are present and sandy-loam soils prevail. The geology conforms to the Beaufort Group.

6.1.1.3 The *Sporobolus pyramidalis - Hyparrhenia tamba* variation

The *Sporobolus pyramidalis - Hyparrhenia tamba* variation is similar to the *Eragrostis superba - Eragrostis gummiflua-* and *Eragrostis curvula - Melinis repens* variations, but it has been grazed severely. This is evident in the high occurrence of unpalatable grass species such as *Hyparrhenia tamba* (Species group D) (Table 6.1), *Sporobolus pyramidalis* (Species group E), *Eragrostis plana, Cymbopogon excavatus* and *Hyparrhenia anamesa* (Species group P), some of which also occur in the previous variations, but less prominent. The presence of various forb species is an indication of the high utilisation factor.

The average rainfall of 720 mm per annum is similar to that of the *Eragrostis superba - Eragrostis gummiflua* variation. Most of the sample plots representing this variation are located in the south of the study area on the Beaufort geological Group. Typically, rocks are absent and soils are sandy-loam, located on footslopes with little or no incline, close to streams, associated with moist conditions.

The *Sporobolus pyramidalis - Hyparrhenia tamba* variation is characterised by species group D, containing the diagnostic species *Senecio inaequidens* and *Oxalis depressa*. It is further distinguished from other variations by the presence of species groups E, F, G, J, K, O and the absence of species groups C and N (Table 6.1).

6.1.1.4 The *Imperata cylindrica - Eragrostis plana* variation

No diagnostic species group is identified for this variation, but it is distinguished from other variations by the absence of species groups C, D, E, F and the presence of species groups G, J, K, N and O (Table 6.1). Prominent species in this variation include the

grasses *Hyparrhenia hirta, Eragrostis plana* and *Sporobolus africanus* and the forb *Helichrysum rugulosum* (Species group P). The presence of the species *Imperata cylindrica* (Species group N) and *0192 001* (Species group O) indicate seasonal wetland conditions. Sample plots of this variation are situated nearby streams on deep sandy-loam soils from various geological formations. Rocks are absent.

Utilisation varies and the species present indicate the moist conditions that prevail. Similar to other variations in the *Hyparrhenia anamesa - Hermannia depressa* sub-community, the sample plots occur on disturbed areas that require careful management to prevent further degradation.

6.1.2 The *Hyparrhenia dregeana - Paspalum dilatatum* sub-community

Sample plots representing this sub-community are distributed through the central and northern part of the study area and are also situated nearby streams, associated with wet conditions. The dominant Beaufort Geological Group weathers to deep sandy-loam to clayey soils. The *Hyparrhenia dregeana - Paspalum dilatatum* sub-community is distinguished from the *Hyparrhenia anamesa - Hermannia depressa* sub-community by the presence of species group H as well as the absence of species groups B to G (Table 6.1). Utilisation is high and evidence of degradation and disturbances are noted.

The *Hyparrhenia dregeana - Paspalum dilatatum* sub-community is divided into two variations.

6.1.2.1 The *Hyparrhenia dregeana - Richardia brasiliensis* variation

This variation is characterised by species group I and is distinguished from the *Arundinella nepalensis - Fimbristylis ferruginea* variation by the presence of species groups J, K and L as well as the absence of species group M (Table 6.1). Prominent species include the grasses *Paspalum dilatatum, Setaria sphacelata* (Species group H), *Hyparrhenia hirta, Eragrostis plana* and *Hyparrhenia dregeana* (Species group P) as well as the forbs *Richardia brasiliensis* (Species group L) and *Helichrysum rugulosum*

(Species group P). Utilisation is severe and the presence of various forbs such as *Acanthospermum australe* and *Solanum elaeagnifolium* (Species group I) indicates degradation.

Characteristically no rocks are present and soils are sandy-loam and deep. Various geological formations and climate zones are represented in the distribution area of this variation.

6.1.2.2 The *Arundinella nepalensis - Fimbristylis ferruginea* variation

Sample plots representing this variation are likewise located nearby streams in the central part of the study area. The moist conditions that prevail are indicated by the presence of species group L (Table 6.1), consisting of the grass *Arundinella nepalensis* and the sedge *Fimbristylis ferruginea.* This variation is relatively poor in species. A degree of heavy utilisation by cattle was noted, with areas showing signs of degradation.

This variation occurs on the Beaufort Group geological formation. Rocks are absent and the soils are sandy-loam and deep. The 384 climate zone occurs in this variation with an average rainfall of 850 mm per annum. Prevailing moist condition resulted in the absence of species present in species groups I, J, K and L. Various forbs, usually associated with slightly drier conditions are present. This distinguishes this variation from the *Hyparrhenia dregeana - Richardia brasiliensis* variation.

6.2 The *Trachypogon spicatus - Diheteropogon amplectens* community

Sample plots of this community are located on the footslopes of hills where the slope is less than 5°, but some plots are located on crests and slopes of hills where rockiness may be as high as 40%. This community represents the Southern Tall Grassveld (Acocks #65) (1988) (Figure 6.9) and is distinguished by the absence of the grass species *Hyparrhenia anamesa, Hyparrhenia dregeana* and the woody species *Diospyros lycioides.* The presence of the grass species *Trachypogon spicatus* distinguishes this community from the *Hyparrhenia hirta - Themeda triandra* community.

Sample plots of this community are distributed throughout the study area, but are generally present at altitudes lower than 1 500 m a.m.s.l (Figure 6.8). Various climate zones and geological formations are represented in the distribution area of this community. Where present, rocks may cover up to 40% of the area, but soils are generally deep and sandy. Sub-communities are recognised on the basis of presence and absence of species. It is difficult to correlate the sub-communities with environmental factors.

Intensive grazing has caused degradation in this vegetation and this is evident in the high degree of unpalatable grass species and various forbs as well as bare soil, trampling of soil and the overall appearance of a short grassveld. This intensive grazing has resulted in a different species composition from that of other communities in the Open Thornveld Vegetation Type and also resulted in a change in species prominence.

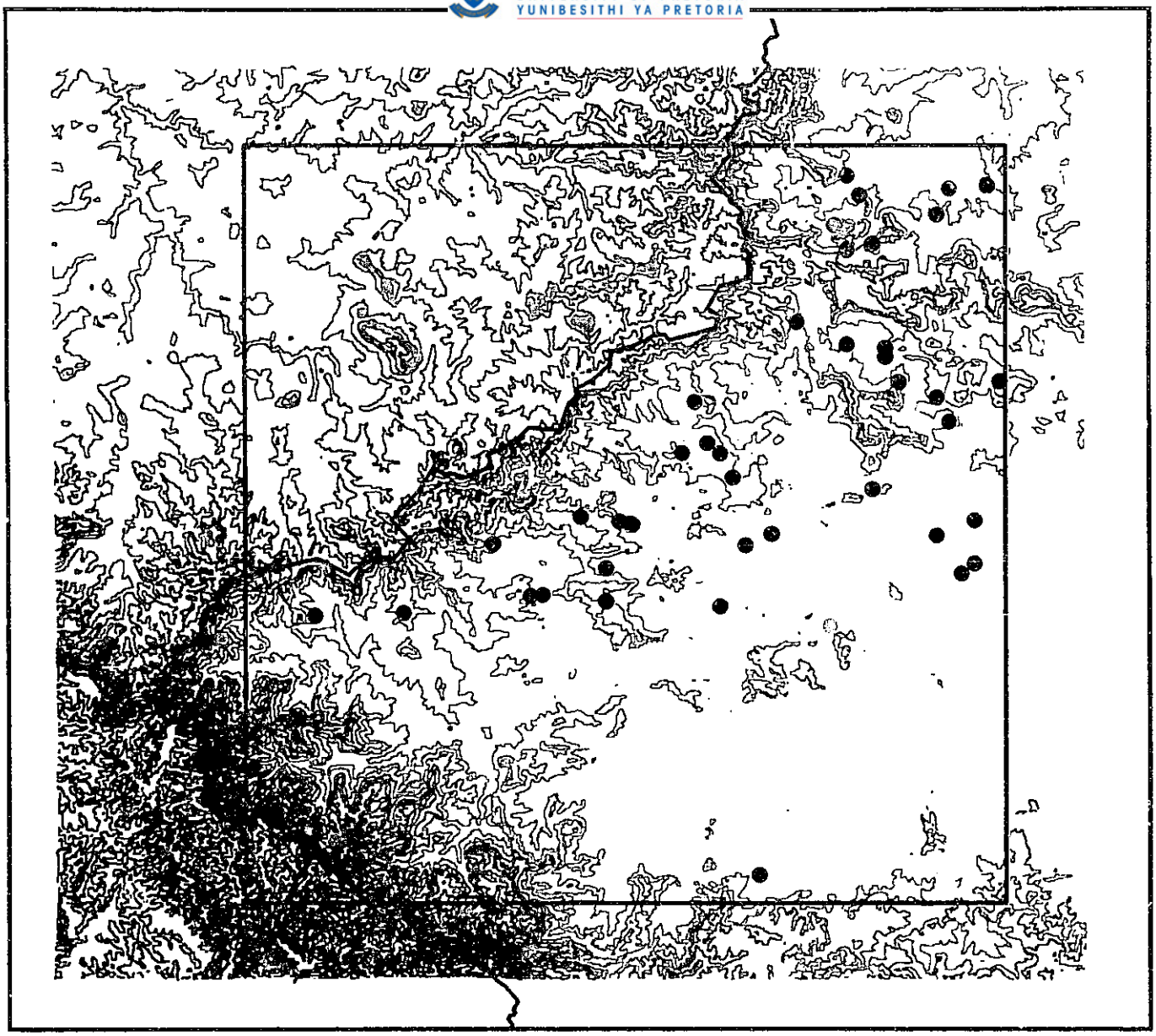
Classification of the relevès by means of Two Way Indicator Species Analysis (TWINSPAN) and subsequent refinement by Braun Blanquet procedures resulted in the recognition of the following sub-communities (Table 6.2):

6.2.1 The *Hermannia depressa* - *Anthospermum rigidum* sub-community

6.2.2 The *Diheteropogon amplectens* - *Phyllanthus parvulus* sub-community

6.2.3 The *Hypoxis iridifolia* - *Eragrostis racemosa* sub-community

This community is distinguished from the *Diospyros lycioides* - *Eragrostis chloromelas* community by the presence of characteristic species groups A, B, C and D as well as the absence of species group I (Table 6.2). Intensive grazing is a prominent factor in this community and the presence of various forbs gives an indication of degradation. The vegetation is grassveld, that appear short, mainly as a result of a high grazing pressure, with forbs well represented in the herbaceous layer.



Ladysmith
Gridlines 28° - 29°S and 29° - 30°E
KwaZulu-Natal Boundary
Sample plots of the Trachypogon spicatus and Diospyros lycioides - Eragrostis chloromelas communities

N

Altitude

Altitude of the study area, contours 100m interval
750 - 1 100
1 100 - 1 450
1 450 - 1850
1 850 - 2 200
2 200 - 2 550
2 550 - 2 950
2 950 - 3 300

Figure 6.8: Distribution of the Trachypogon spicatus - Diheteropogon amplectens and Diospyros lycioides communities sample plots in the study area (contour interval 100m).

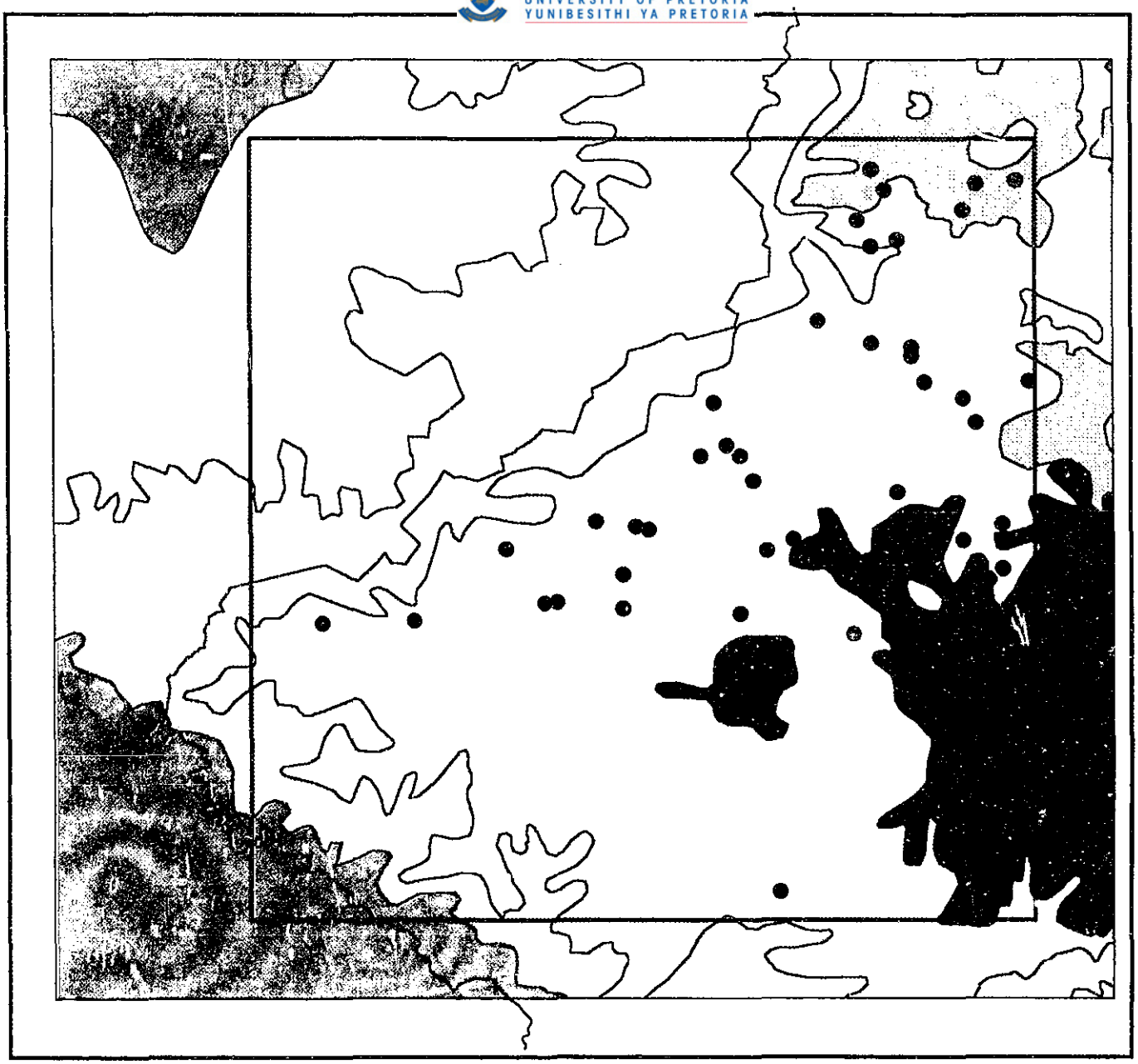
Sample plots are distributed in the northern and central eastern part of the study area over various climate zones as well as geological formations (Figure 6.10). Rocks are generally absent, but on the crests and slopes of hills, rockiness of the soil surface can be as high as 40%. Where rocks are absent, soils are deep and sandy. The reaction of vegetation to different grazing pressures and different management regimes probably resulted in different variations of sub-communities.

6.2.1 The *Hermannia depressa - Anthospermum rigidum* sub-community

Sample plots of this variation are located on the slopes and footslopes of rocky hills in the central to eastern part of the study area. Various forb species are present because of intensive utilisation, but they are not dominant. This is an indication of degradation and the vegetation appears as a short grassveld, often as a result of grazing pressure.

Prominent forb species include the species of species group L, *Helichrysum rugulosum* and *Hermannia depressa* (Species group O) (Table 6.2). This variation is characterised by the presence of the woody species *Acacia karroo* (Species group B). The *Hermannia depressa - Anthospermum rigidum* sub-community is dominated by grass species such as *Diheteropogon amplectens, Trachypogon spicatus* (Species group A), *Hyparrhenia hirta, Cymbopogon excavatus* and *Themeda triandra* (Species group P).

This sub-community occurs in various climate zones and on geological formations and represents the Southern Tall Grassveld (Acocks #65).



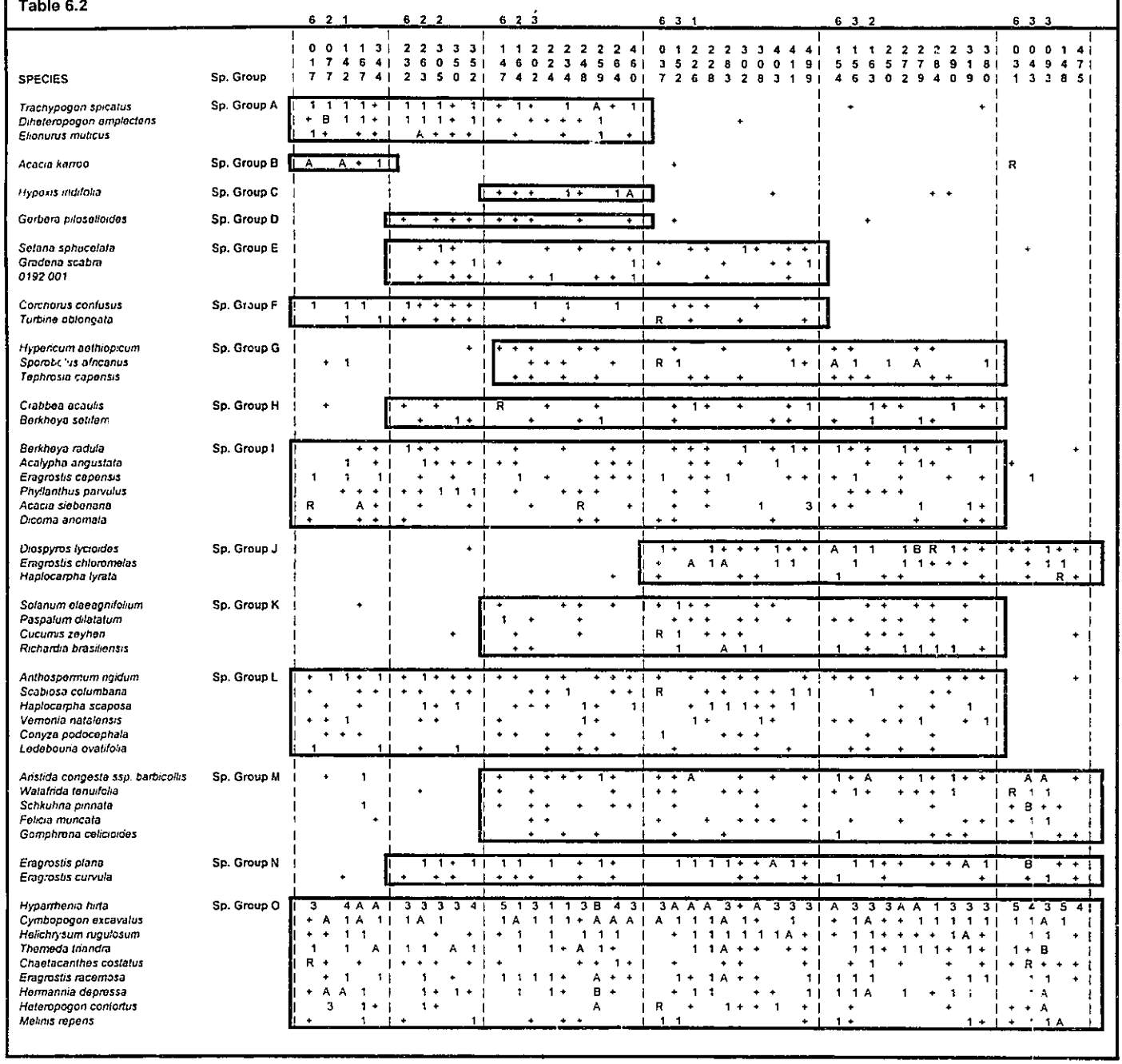
Ladysmith
Gridlines 28° - 29°S and 29° - 30°E
KwaZulu-Natal Boundary
Sample plots of the Trachypogon spicatus and Diospyros lycioides - Eragrostis chloromelas communities

Acocks Veld Types
Cymbopogon - Themeda Veld (Sandy) (#48)
Highland Sourveld and Dohne Sourveld (#44)
Highland Sourveld to Cymbopogon - Themeda Transition (Eastern Free State Highveld) (#49)
Natal Sour Sandveld (#66)
Southern Tall Grassveld (#65)
Themeda Veld to Cymbopopogon - Themeda Veld Transition (Patchy) (#53)
Themeda - Festuca Alpine Veld (#58)
Valley Bushveld (#23)

Figure 6.9: Distribution of the Trachypogon spicatus - Diheteropogon amplectens and Diospyros lycioides - Eragrostia chloromelas communities sample plots in Acocks Veld Types of the study area.

Plant communities of the Trachypogon spicatus - Diheteropogon amplectens and Diospyros lycioides - Ergrostis chlorc melas communities.

Table 6.2



6.2.2 The *Diheteropogon amplectens - Phyllanthus parvulus* sub-community

The presence of species groups D, E, H, N as well as the absence of B, C, G, K and M (Table 6.2) distinguish this sub-community. Prominent species include the forbs *Corchorus confusus, Turbina oblongata* (Species group F), *Acalypha angustata, Phyllanthus parvulus* (Species group I), *Anthospermum rigidum* (Species group L) and the grasses *Diheteropogon amplectens, Elionurus muticus* (Species group A), *Eragrostis curvula* (Species group N), *Hyparrhenia hirta* and *Themeda triandra* (Species group O). Similar to the *Hermannia depressa - Anthospermum rigidum* sub-community, intensive utilisation of the vegetation resulted in short grassland with forbs prominent in the herbaceous layer.

6.2.3 The *Hypoxis iridifolia - Eragrostis racemosa* sub-community

This sub-community occurs in various climate zones and on geological formations. Sample plots of this variation are located on the slopes and footslopes of rocky hills. Rocks are present and the cover can be as high as 40%.

The presence of species group C characterises the *Hypoxis iridifolia - Eragrostis racemosa* sub-community. The absence of species group B and the presence of G, K and M (Table 6.2) distinguish it from other sub-communities. As other sub-communities in the *Trachypogon spicatus - Diheteropogon amplectens* community, the vegetation has been utilised intensively and this is noted in the presence of the numerous forb species present in species groups G, I, L and M. The grasses *Hyparrhenia hirta, Cymbopogon excavatus* and *Eragrostis racemosa* (Species group P) are the dominant species in this sub-community.

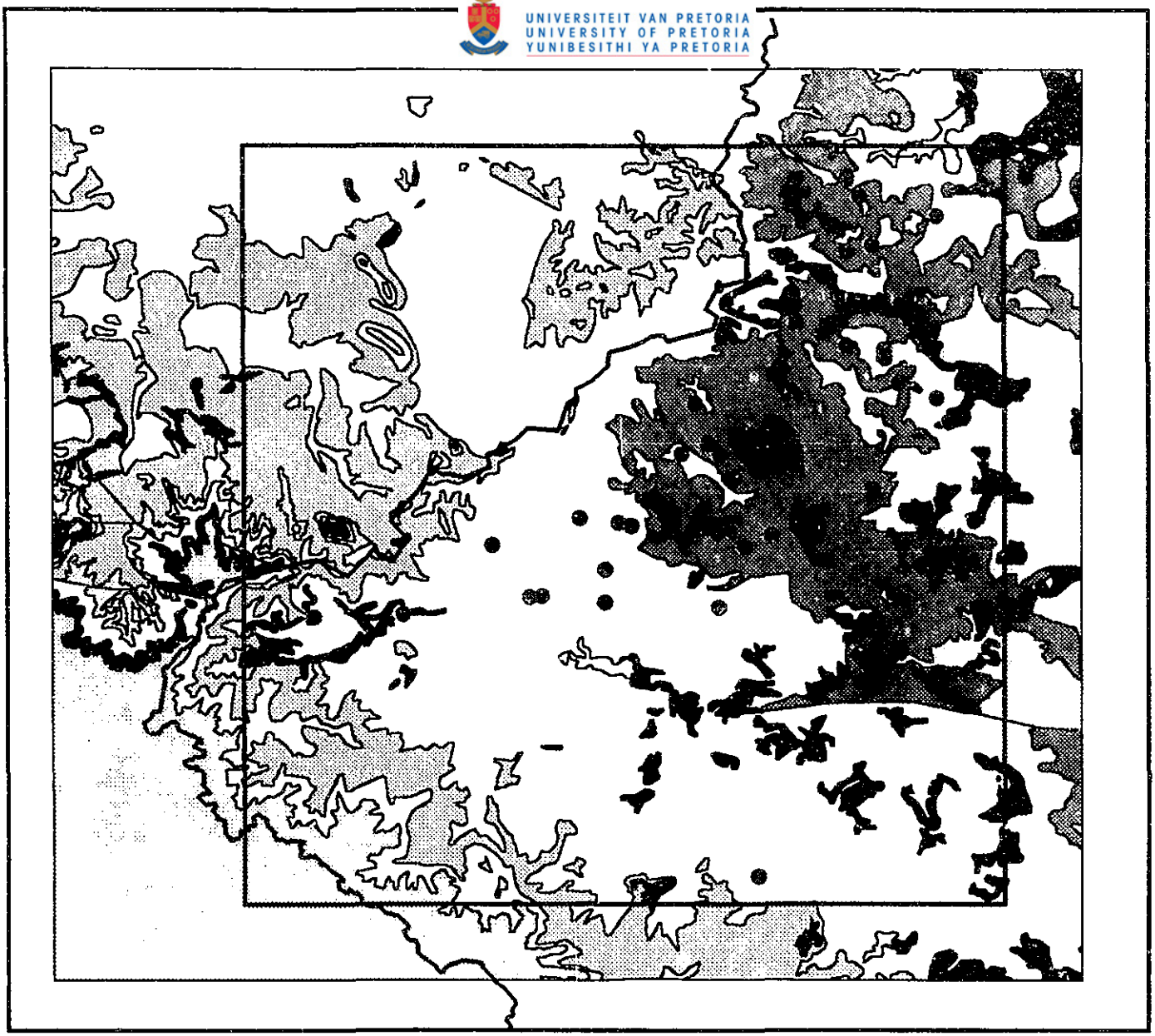


Figure 6.19: Distribution of the Trachypogon spicatus - Diheteropogon amplectens and Diospyros lycioides - Eragrostis chloromelas communities sample plots in geological formations of the study area.

6.3 The *Diospyros lycioides - Eragrostis chloromelas* community

The *Diospyros lycioides - Eragrostis chloromelas* community is characterised by the presence of species group J and is distinguished from the *Trachypogon spicatus - Diheteropogon amplectens* community by the absence of species groups A, B, C and D (Table 6.2). Sample plots of this community are situated in the northern and central parts of the study area. Intensive grazing has had a pronounced effect on the vegetation. An appearance of a short grassveld with many forbs in the herbaceous layer is noted.

Prominent species in this community include the grasses *Eragrostis chloromelas* (Species group J), *Aristida congesta* ssp. *barbicollis* (Species group M), *Eragrostis plana* (Species group N), *Hyparrhenia hirta, Cymbopogon excavatus, Themeda triandra, Eragrostis racemosa* (Species group O) and the forbs *Helichrysum rugulosum, Chaetacanthus costatus* and *Hermannia depressa* (Species group O).

Habitat factors are similar to that of the *Trachypogon spicatus - Diheteropogon amplectens* community and the distribution of sample plots are therefore indicated on Figures 6.8, 6.9 & 6.10. As a result of the presence and absence of species three sub-communities were recognised, namely:

6.3.1 The *Eragrostis plana - Themeda triandra* sub-community

6.3.2 The *Diospyros lycioides - Aristida congesta* ssp. *barbicollis* sub-community

6.3.3 The *Hyparrhenia hirta - Melinis repens* sub-community

6.3.1 The *Eragrostis plana - Themeda triandra* sub-community

The intensive grazing pressure on this vegetation resulted in a variety of forbs being prominent in this sub-community. These include *Crabbea acaulis* (Species group H), *Berkheya radula* (Species group I), *Solanum elaeagnifolium* (Species group K), *Anthospermum rigidum, Scabiosa columbaria, Haplocarpha scaposa* (Species group L), *Helichrysum rugulosum* and *Hermannia depressa* (Species group O). The grazing pressure is also evident in the presence of unpalatable grass species such as *Eragrostis chloromelas* (Species group J), *Eragrostis plana* (Species group N) and *Cymbopogon*

excavatus (Species group O). The woody species *Diospyros lycioides* (Species group J) is also prominent. The vegetation is heavily grazed grassland with short grass and forbs being prominently present.

This sub-community occurs in various climate zones and on geological formations. Sample plots of this variation are located on the footslopes and in close vicinity of rocky hills, distributed throughout the study area. Rocks are generally absent and soils are sandy and deep.

6.3.2 The *Diospyros lycioides - Aristida congesta* ssp *barbicollis* sub-community

Sample plots of this variation are located on the footslopes of rocky hills and are distributed in the northern and central part of the study area. The *Diospyros lycioides - Aristida congesta* ssp. *barbicollis* sub-community is distinguished from other sub-communities by the presence of species groups G to L and the absence of A to F (Table 6.2). Various climate zones and geological formations are represented.

The effect of intensive grazing is also evident in this sub-community and bare soil, erosion, trampling of the soil as well as the presence of unpalatable grass species and forbs are noted. Prominent grasses include *Eragrostis chloromelas* (Species group J), *Aristida congesta* ssp. *barbicollis* (Species group M), *Eragrostis plana* (Species group N), *Hyparrhenia hirta, Cymbopogon excavatus* and *Themeda triandra* (Species group O). The forbs *Berkheya radula* (Species group I), *Richardia brasiliensis* (Species group K), *Anthospermum rigidum, Vernonia natalensis* (Species group L), *Helichrysum rugulosum* and *Hermannia depressa* (Species group O) have high cover values.

6.3.3 The *Hyparrhenia hirta - Melinis repens* sub-community

Similar to other sub-communities, utilisation is severe and various forbs and unpalatable grass species are represented. Rocks are generally absent and sample plots are located on footslopes of rocky hills.

Prominent species in this sub-community include the grasses *Eragrostis chloromelas* (Species group J), *Aristida congesta* ssp. *barbicollis* (Species group M), *Hyparrhenia hirta, Cymbopogon excavatus, Melinis repens* (Species group O) and the forbs *Schkuhria pinnata, Gomphrena celicioides* (Species group M), *Helichrysum rugulosum* and *Chaetacanthus costatus* (Species group O). The absence of species groups A to I as well as K and L distinguishes this sub-community from others in the *Diospyros lycioides - Eragrostis chloromelas* community (Table 6.2).

6.4 The *Hyparrhenia hirta - Themeda triandra* grassland community

This community is open grassland plains close to rocky hills, dominated by a few species. It is the most intensively utilised community in the study area and like other communities in the Open Thornveld Vegetation Type, few woody species occur in the *Hyparrhenia hirta - Themeda triandra* grassland community. It is characterised by species group Q, consisting of species that are found widely spread throughout the study area (Table 6.3).

Different sub-communities are recognised as a result of absence of species as well as differences in dominance of certain species, rather than the presence of diagnostic species groups. Grasses are dominant in this community, especially *Hyparrhenia hirta, Themeda triandra* and *Cymbopogon excavatus*, with the woody species *Acacia sieberiana* (Species group I) and *Acacia karroo* (Species group M) lending an appearance of an open savanna to most of the sub-communities.

Low species diversity is characteristic of this community, which may be a result of previous utilisation, but present over-utilisation and subsequent degradation is noted in only a few sub-communities. This community (Figure 6.11) represents the Southern Tall Grassveld (#65) described by Acocks (1988). It is an open savanna of *Acacia sieberiana* in sourish mixed grassveld, dominated by *Hyparrhenia hirta*. This corresponds to a combination of North-eastern Mountain Grassland (Bredenkamp **et. al.** 1996c) (#43) and Natal Central Bushveld (#25) described by Granger (1996) as predominantly a grassland area with patches of forest occurring in sheltered ravines, gorges and valleys of the

escarpment (Figure 6.12).

Various geological formations are represented, the Beaufort Group and Volksrust Formation are predominant in the distribution area of this community (Figure 6.13). Climate zones present include mainly the 386, 387 and 385 zones. Average rainfall per annum varies between 644.8 mm (climate zone 386) and 908.5 mm (climate zone 387), usually as thunderstorms during the summer season. These climate zones are located in the central eastern part of the study area (Institute for Soil, Climate and Water 1994).

Classification of the relevès by means of Two Way Indicator Species Analysis (TWINSPAN) and subsequent refinement by Braun-Blanquet procedures resulted in the recognition of the following sub-communities and variations (Table 6.3):

6.4.1 The *Aloe marlothii - Conyza podocephala* sub-community

6.4.2 The *Diheteropogon amplectens - Tristachya leucothrix* sub-community

6.4.3 The *Helichrysum rugulosum - Anthospermum rigidum* sub-community

6.4.4 The *Eragrostis gummiflua - Vernonia oligocephala* sub-community

6.4.4.1 The *Eragrostis gummiflu - Eragrostis plana* variation

6.4.4.2 The *Eragrostis racemosa - Eragrostis capensis* variation

6.4.4.3 The *Sporobolus pyramidalis - Crabbea hirsuta* variation

6.4.5 The *Cyperus obtusiflorus - Abildgaardia ovata* sub-community

6.4.6 The *Acacia karroo - Themeda triandra* sub-community

6.4.7 The *Acacia karroo - Aristida bipartita* sub-community

6.4.8 The *Paspalum dilatatum - Eragrostis plana* sub-community

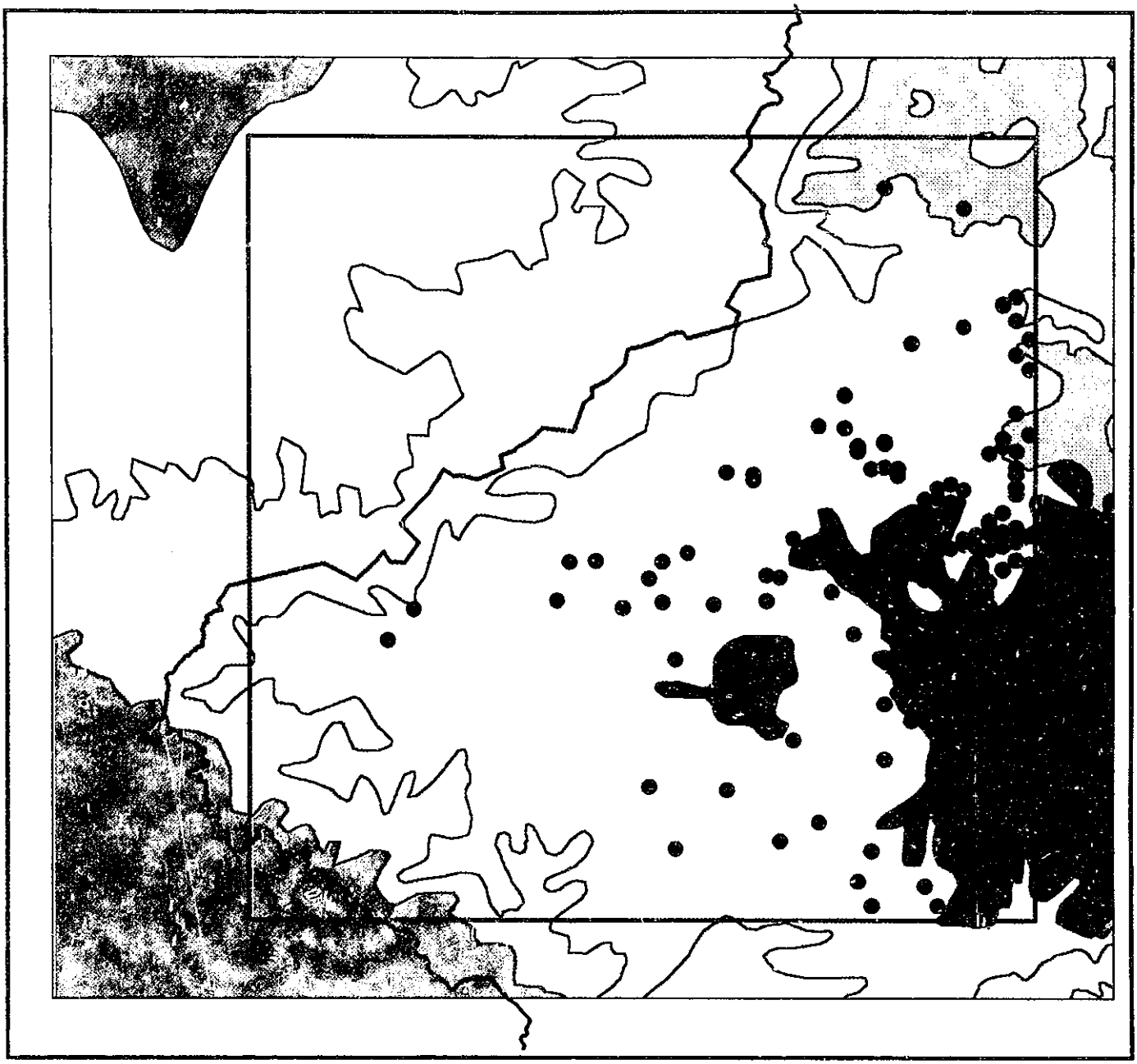
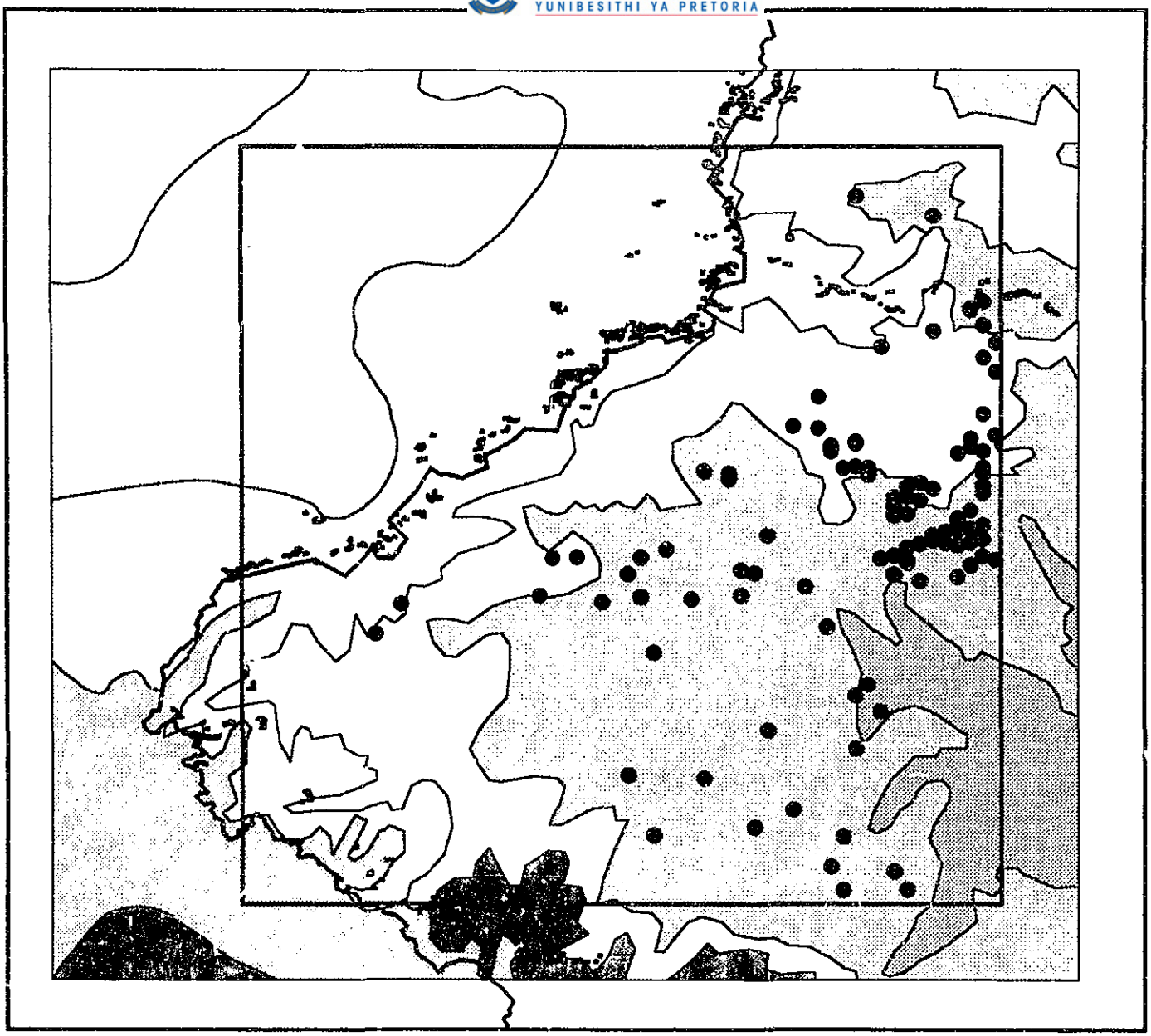


Figure 6.11: Distribution of the Hyparrhenia hirta - Themeda triandra community sample plots in Acocks Veld Types of the study area.



Ladysmith
Gridlines 28° - 29°S and 29° - 30°E
KwaZulu-Natal Boundary
Sample plots of the Hyparrhenia hirta - Themeda triandra community

Low and Rebelo Vegetation Types
Afromontane Forest (#2)
Valley Thickets (#5)
Natal Central Bushveld (#25)
Moist Cool Highveld Grassland (#39)
Moist Cold Highveld Grassland (#40)
Wet Cold Highveld Grassland (#41)
Moist Upland Grassland (#42)
North-eastern Mountain Grassland (#43)
Afro Mountain Grassland (#45)
Alti Mountian Grassland (#46)

Figure 6.12: Distribution of the Hyparrhenia hirta - Themeda triandra community sample plots in Low and Rebelo Vegetation Types of the study area.

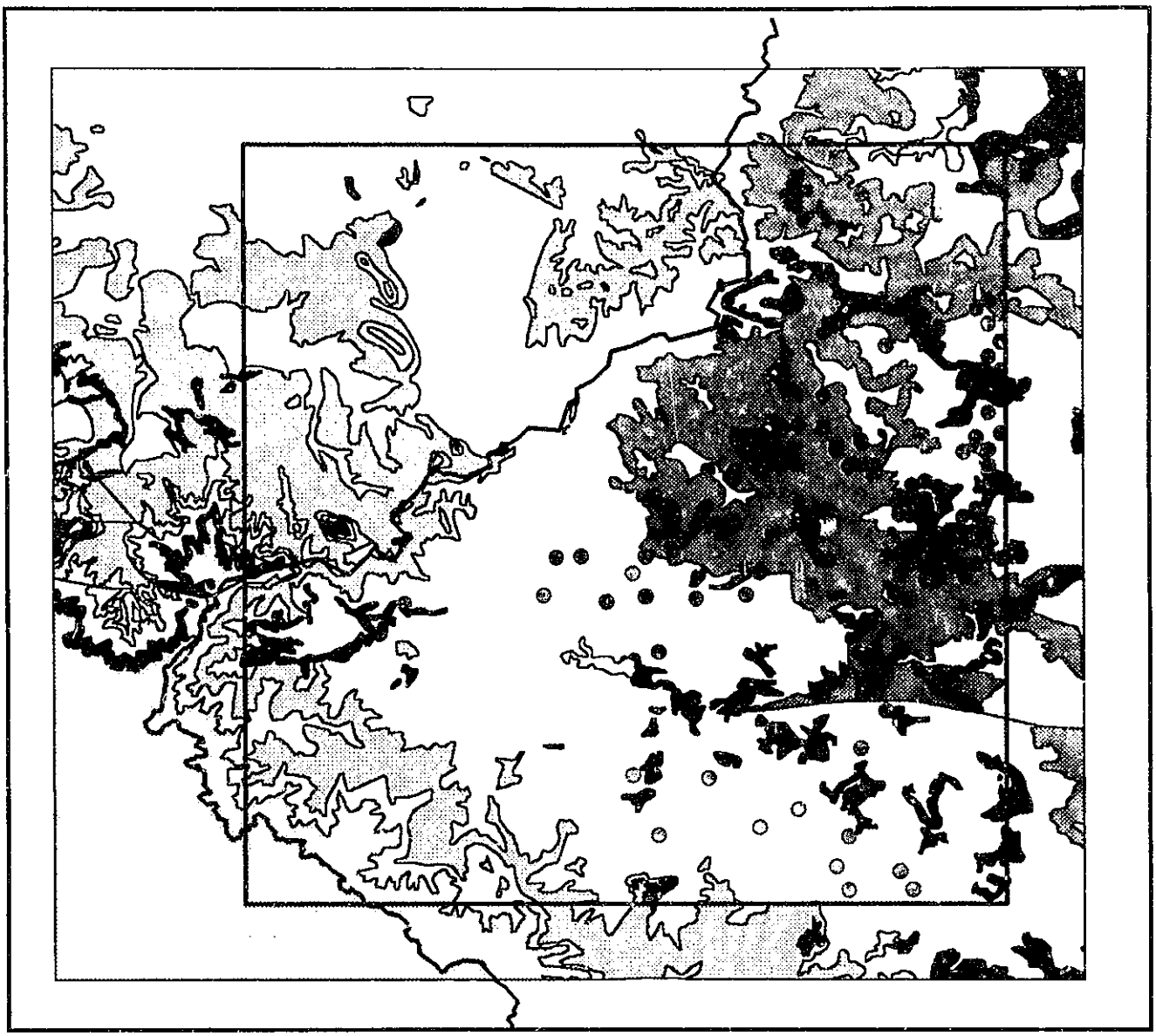
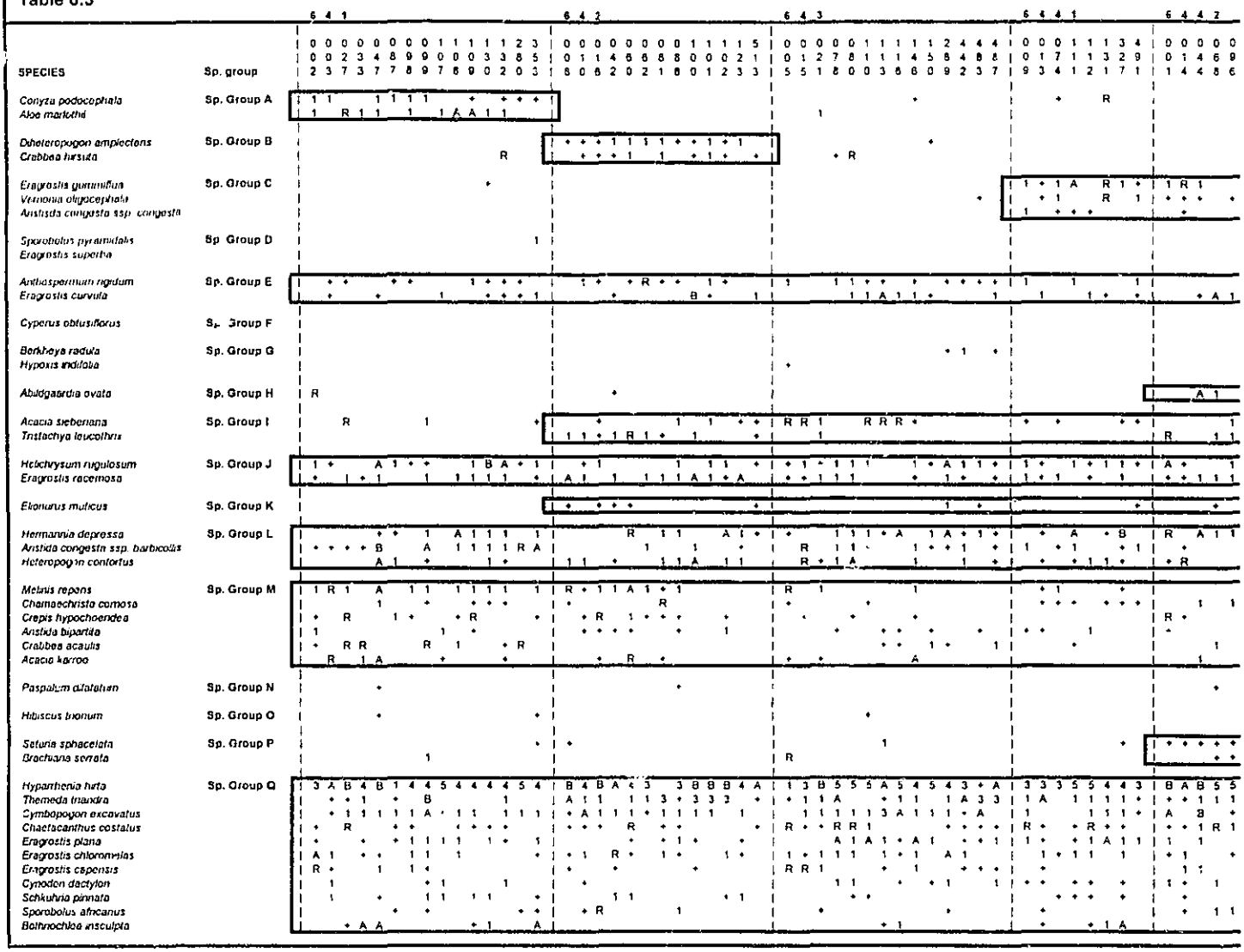
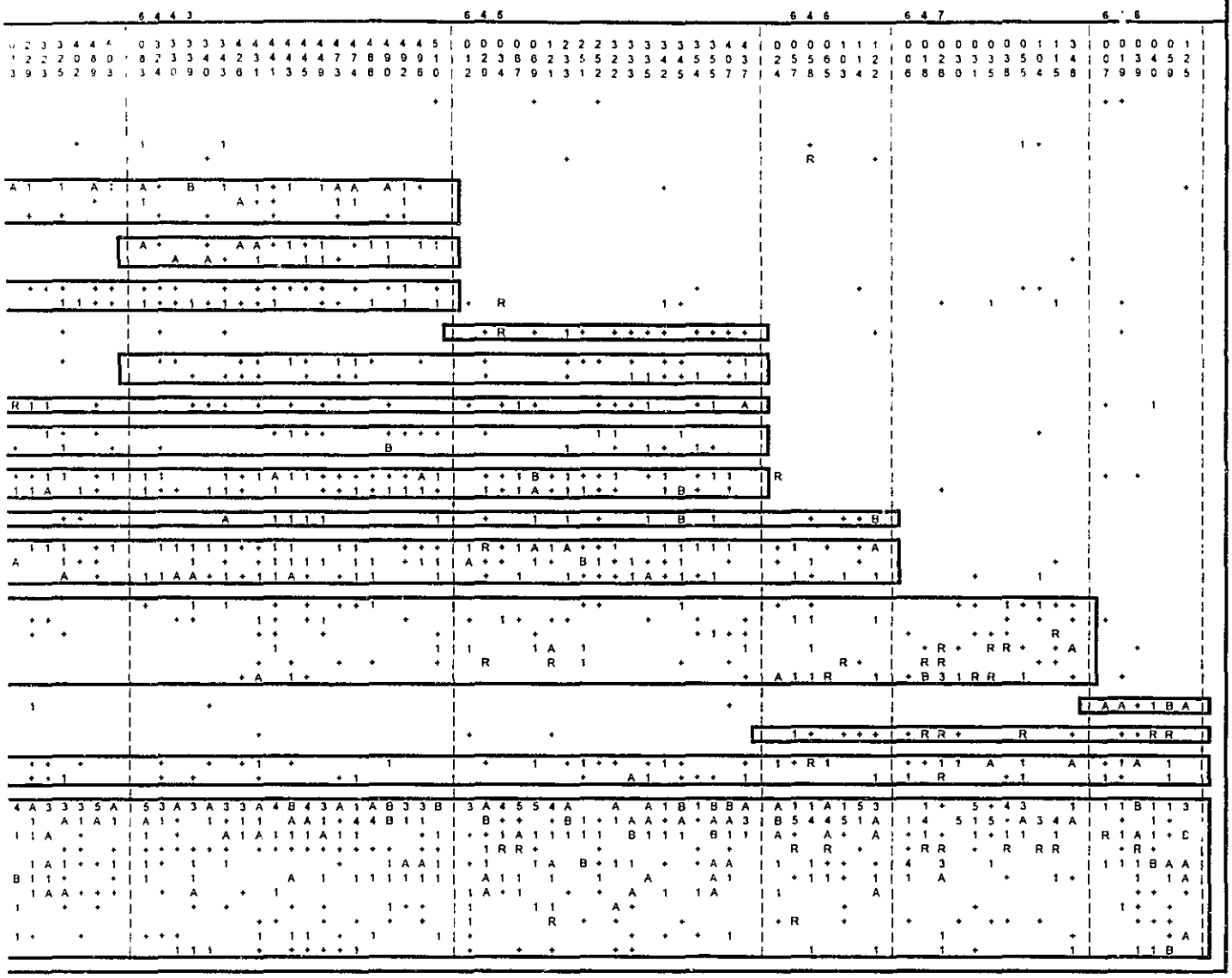


Figure 6.13: Distribution of the Hyparrhenia hirta - Themeda triandra community sample plots in geological formations of the study area.

Plant communities of the Hyparrhenia hirta - Themeda triandra community

Table 6.3





6.4.1 The *Aloe marlothii - Conyza podocephala* sub-community

This sub-community is characterised by species group A (Table 6.3), consisting of the forb *Conyza podocephala* and the woody succulent *Aloe marlothii*, the presence of which gives a characteristic physiognomic structure to the sub-community. These species are also found in various other communities and vegetation types in the study area.

Other species that are prominent include the grasses *Aristida congesta* ssp. *barbicollis* (Species group L), *Melinis repens* (Species group M), *Hyparrhenia hirta, Cymbopogon excavatus* (Species group Q) and the forb *Helichrysum rugulosum* (Species group J). Utilisation in this sub-community is more severe than in other sub-communities and this is indicated by the presence of the characteristic species. Rocks are generally absent, but the soil is shallow and sandy.

6.4.2 The *Diheteropogon amplectens - Tristachya leucothrix* sub-community

Sample plots representing this sub-community are situated in the central eastern part of the study area on crests and footslopes of rocky hills. Species group B is characteristic of the *Diheteropogon amplectens - Tristachya leucothrix* sub-community and it is further distinguished from other sub-communities by the absence of species groups A, C, D, F, G, H, N, O and P (Table 6.3).

Various geological formations are present in the distribution area of this sub-community. Climate zones 386 and 387 are represented, with average annual rainfall of 644.8 and 908.5 mm per annum, respectively (Institute for Soil, Water and Climate 1994). The rockiness of the soil of this sub-community separates it from other sub-communities (average 30 %). The characteristic grass species, *Diheteropogon amplectens* indicates shallow, rocky soils (Van Oudtshoorn 1991). Dryness as well as a high utilisation factor is evident.

6.4.3 The *Helichrysum rugulosum - Anthospermum rigidum* sub-community

No characteristic species group is identified for this sub-community, but is recognised by the absence of species groups A, B, C, D, F, G, H, N, O and P (Table 6.3). Prominent grasses include *Eragrostis racemosa* (Species group J), *Aristida congesta* ssp. *barbicollis* (Species group L), *Hyparrhenia hirta, Themeda triandra, Cymbopogon excavatus, Eragrostis plana* and *Eragrostis chloromelas* (Species group Q). The forbs *Anthospermum rigidum* (Species group E), *Helichrysum rugulosum* (Species group J), *Hermannia depressa* (Species group M) and *Chaetacanthus costatus* (Species group A) have high cover values.

This is a tall grassveld and the presence of *Acacia sieberiana* seedlings (Species group J) is an indication of bush encroachment, probably as a result of the severe grazing of sub-community. The *Helichrysum rugulosum - Anthospermum rigidum* sub-community is located in the eastern part of the study area. This sub-community represents a transition from the Southern Tall Grassveld (Acocks #65) to the Valley Bushveld (Acocks #23). This is also indicated by the location of sample plots in the North-eastern Mountain Grassland (Bredenkamp **et. al.** 1996c) (#43) and Natal Central Bushveld (#25), described by Granger (1996)

6.4.4 The *Eragrostis gummiflua - Vernonia oligocephala* sub-community

Sample plots of this sub-community are distributed in the central, eastern and southern parts of the study area on the footslopes of rocky hills. Various climate zones are represented in this distribution area. The presence of the characteristic grass species *Eragrostis gummiflua* is associated with water logged soils of the Beaufort Group Geological Formation. Characteristically, rocks are absent and deep soils were noted.

Species group C characterises the *Eragrostis gummiflua - Vernonia oligocephala* sub-community (Table 6.3). Prominent species in this sub-community include the grasses *Eragrostis gummiflua* (Species group C), *Eragrostis racemosa* (Species group J), *Hyparrhenia hirta, Themeda triandra, Cymbopogon excavatus, Eragrostis chloromelas*

(Species group Q) and the forbs *Helichrysum rugulosum* (Species group J), *Hermannia depressa* (Species group L) and *Chaetacanthus costatus* (Species group Q).

Refinement of results obtained from TWINSPAN by means of Braun-Blanquet procedures resulted in the recognition of three variations.

6.4.4.1 The *Eragrostis gummiflua - Eragrostis plana* variation

This variation is characterised by the absence of a diagnostic species group, and is distinguished from other variations in the *Eragrostis gummiflua - Vernonia oligocephala* sub-community due to the absence of species groups D, G and H, as well as the absence of the grasses *Eragrostis capensis* and *Sporobolus africanus* (Species group Q) (Table 6.3). Species that are prominent in this sub-community include the grasses *Eragrostis gummiflua* (Species group C), *Hyparrhenia hirta, Themeda triandra, Cymbopogon excavatus, Eragrostis plana* (Species group Q) and the forb *Helichrysum rugulosum* (Species group J).

Sample plots representing this sub-community is situated on the plains in the central eastern part of the study area. Rocks are absent and soils are deep and sandy. This sub-community represents a transition between dry sub-communities, for instance the *Aloe marlothii - Conyza podocephala* and *Helichrysum rugulosum - Anthospermum rigidum* sub-communities and sub-communities located in areas with a higher moisture regime. Veld condition is generally good.

6.4.4.2 The *Eragrostis racemosa - Eragrostis capensis* variation

No characteristic species group is recognised for this variation. The presence of species group H and the absence of D and G (Table 8.1) distinguish this variation from other variations in the *Eragrostis gummiflua - Vernonia oligocephala* sub-community. Moist conditions are evident in the presence of the sedge species *Abildgaardia ovata* (Species group H), which is absent from the drier sub-communities and variations. Other prominent species include the grasses *Eragrostis gummiflua* (Species group C),

Eragrostis racemosa (Species group J), *Hyparrhenia hirta, Themeda triandra, Eragrostis plana, Eragrostis capensis* (Species group Q) and the forbs *Helichrysum rugulosum* (Species group J), *Hermannia depressa* (Species group L) and *Chaetacanthus costatus* (Species group Q).

Various geological formations and climate zones are found in the distribution area of this variation. Sample plots are distributed in the central, central eastern and southern parts of the study area. The vegetation of this variation is located in areas that are grazed more intensive than the *Eragrostis gummiflua - Eragrostis plana* variation. Evidence of this utilisation is noted, but vegetation is found to be in a good condition. Rocks are absent and soils are deep and sandy.

6.4.4.3 The *Sporobolus pyramidalis - Crabbea hirsuta* variation

Similar to variations 6.3.4.1 and 6.3.4.2, rocks are absent and soil deep and sandy in the *Sporobolus pyramidalis - Crabbea hirsuta* variation. The Beaufort geological Group is present in this area with greenish-grey, bluish-grey or red and purple mudstone, which is inclined to weather into blocks.

Sample plots are located in the central and southern parts of the study area. The vegetation of this grassveld plains is transitional to vegetation in moist areas of the Valley Bushveld (Acocks #23), but little or no woody elements are present. The characteristic species group D is evidence of a disturbed condition that prevails in this variation, also present in various other communities and vegetation types. The grass layer is dominant with *Sporobolus pyramidalis* (Species group D), *Eragrostis gummiflua* (Species group C), *Eragrostis racemosa* (Species group J), *Heteropogon contortus* (Species group L), *Hyparrhenia hirta, Themeda triandra* and *Cymbopogon excavatus* (Species group Q) present as prominent species.

The vegetation is grazed intensively and is in a more degraded condition than the *Eragrostis racemosa - Eragrostis capensis* variation. This is evident from the presence

of forb species *Berkheya radula* and *Hypoxis iridifolia* (Species group G) as well as the presence of unpalatable species such as *Sporobolus pyramidalis* (Species group D), *Eragrostis gummiflua* (Species group C) and *Bothriochloa insculpta* (Species group Q). In some sample plots *Acacia sieberiana* seedlings (Species group I) as well as the grass *Bothriochloa insculpta* (Species group Q) are present, also indicating degradation and bush encroachment.

6.4.5 The *Cyperus obtusiflorus - Abildgaardia ovata* sub-community

This sub-community is characterised by the presence of the sedge *Cyperus obtusiflorus* (Species group F) and is distinguished from other sub-communities by the presence of species groups G, H, I, J, K, L, M and the absence of species groups A, B, C, D, E, N and O (Table 6.3). The presence of *Cyperus obtusiflorus* and *Abildgaardia ovata* is an indication of moist conditions that prevail in this sub-community. Other prominent species include the grasses *Eragrostis racemosa* (Species group J), *Hyparrhenia hirta, Themeda triandra, Cymbopogon excavatus* (Species group Q) and the forbs *Helichrysum rugulosum* (Species group J) and *Hermannia depressa* (Species group L).

Rocks are absent and deep, sandy soils prevail. Various geological formations and climate zones are present in the distribution area of this sub-community. Sample plots are distributed in the central and central eastern parts of the study area. The vegetation is grassveld and because of intensive grazing the grassveld appears short and degradation is evident in some sample plots.

6.4.6 The *Acacia karroo - Themeda triandra* sub-community

This sub-community represents vegetation that is usually present at a high moisture regime, but is located in areas with a low average rainfall (644.8 mm per annum, climate zone 386) (Institute for Soil, Water and Climate 1994). Here it is normally found on flat plains with dolerite rocks and deep soils with high clay content.

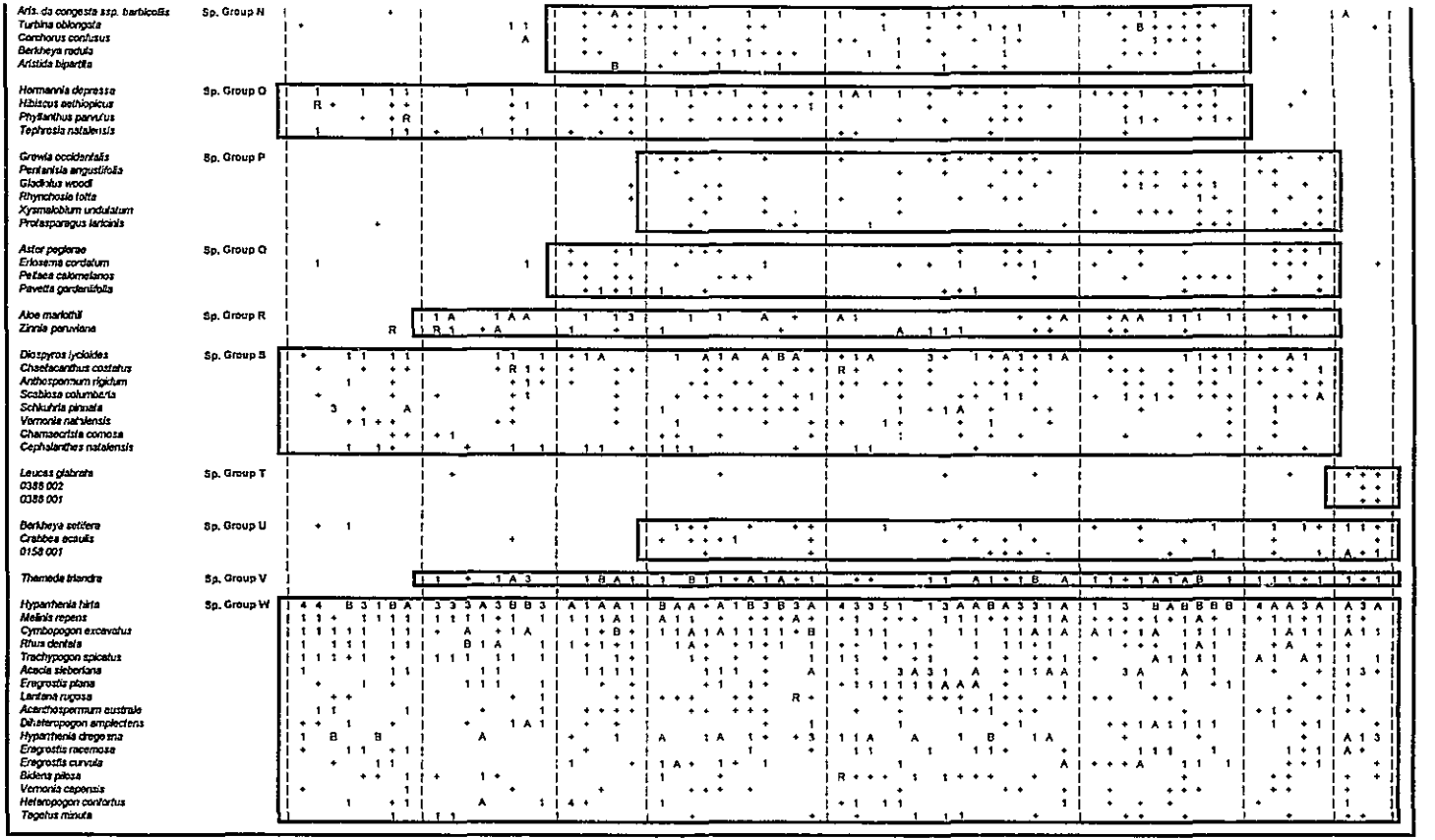
Acacia karroo seedlings and trees (Species group M) are abundantly found in this sub-community and are an indication of high soil clay content. No characteristic species group is identified. The species composition of this sub-community is similar to the Southern Tall Grassveld (#65), but described by Acocks (1988) as being part of the Valley Bushveld (#23). Prominent species include the grasses *Setaria sphacelata* (Species group O), *Hyparrhenia hirta, Themeda triandra, Eragrostis plana, Eragrostis chloromelas* (Species group Q) and the forb *Hibiscus trionum* (Species group O). Sample plots of this sub-community are located in the eastern part of the study area and the presence of the grass *Setaria sphacelata* (Species group P) is further indication of the high moisture content of the soil.

The high abundance of *Themeda triandra* (Species group Q) gives an indication of veld in a good condition, although signs of intensive grazing are noted.

6.4.7 The *Acacia karroo - Aristida bipartita* sub-community

No characteristic species group is recognised, but this sub-community is distinguished from other sub-communities by the absence of species groups A to L as well as the presence of species group O (Table 6.3). Although the rainfall is low (386 climate zone, average 644.8 mm per annum) (Institute for Soil, Water and Climate 1994), sample plots are situated nearby streams that are temporarily flooded during the raining season. The soils are clayey (vertic) soils, explaining the presence of a high percentage of *Acacia karroo* trees, shrubs and seedlings (Species group M). Rocks were noted in some of the sample plots.

A high utilisation was noted, resulting in absence or low percentage of those palatable grass species that are found to be dominant or prominent in other sub-communities. The presence of large bare areas of ground gives an indication of degradation. The dominant grass in this sub-community is *Themeda triandra* (Species group Q) and a decrease in the dominance of *Hyparrhenia hirta* (Species group Q) was noted.


Aris. da congesta ssp. barbicollis
Turbina oblongata
Cenchorus confusus
Berkheya radula
Aristida bipartita
Sp. Group N
Hermannia depressa
Hibiscus aethiopicus
Phyllanthus parvulus
Tephrosia natalensis
Sp. Group O
Grewia occidentalis
Pentarrhinia angustifolia
Gladiolus woodii
Rhynchosia totta
Xysmalobium undulatum
Protasparagus laricinus
Sp. Group P
Aster peglerae
Eriosema cordatum
Pelaea calomelanos
Pavetta gardeniifolia
Sp. Group Q
Aloe marlothii
Zinnia peruviana
Sp. Group R
Diospyros lycioides
Chaetacanthus costatus
Anthospermum rigidum
Scabiosa columbaria
Schkuhria pinnata
Vernonia natalensis
Chamaecrista comosa
Cephalanthes natalensis
Sp. Group S
Leucas glabrata
0388 002
0388 001
Sp. Group T
Berkheya setifera
Crabbea acaulis
0158 001
Sp. Group U
Themeda triandra
Sp. Group V
Hyparrhenia hirta
Melinis repens
Cymbopogon excavatus
Rhus dentata
Trachypogon spicatus
Acacia sieberiana
Eragrostis plana
Lantana rugosa
Acanthospermum australe
Dichrocephala integrifolia
Hyparrhenia dregeana
Eragrostis racemosa
Eragrostis curvula
Bidens pilosa
Vernonia capensis
Heteropogon contortus
Tagetes minuta
Sp. Group W

6.4.8 The *Paspalum dilatatum - Eragrostis plana* sub-community

Sample plots representing the vegetation of this sub-community is associated with a high moisture regime in the soil. These areas are temporarily inundated and located near streams or rivers, resulting in the presence of the characteristic grass species *Paspalum dilatatum* (Species group N). The *Paspalum dilatatum - Eragrostis plana* sub-community is distinguished by the absence of species groups A to M (Table 6.3).