

Natural grasslands on slopes of the Garrawillie Creek subcatchment, Liverpool plains, New South Wales

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Total species composition and abundance in natural grasslands of the Garrawillie Creek subcatchment in the western portion of the Liverpool Plains were studied using the nested quadrat technique. Sites were selected on either NW or SE slopes and on soils formed from either Garrawilla Volcanics or phonolite scree at the base of the Bulga Complex endogenous lava domes. Each compound series of subquadrats was eight in number and measured 2, 4, 8, 16, 32, 64, 128 and 256 m². Data were collected between the end of January and the end of April 1996.

Results and discussion

From the 16 sites studied cluster analyses revealed six distinct grassland associations which

were named according to the visually dominant grass species:

- Dominant grass : *Dichanthium affine* Slender bluegrass

Associated dominant grass species :

⇒ *Bothriochloa macra*/B. *decepiens*, *Aristida ramosa*

⇒ *Bothriochloa macra*, *Panicum* sp.

⇒ *Enneapogon gracilis*, *Aristida ramosa*

⇒ *Stipa scabra*, *Chloris truncata*

Sites in subgroups a and b were on phonolite scree and sites in subgroups c and d on Garrawilla

Volcanics. Four sites were on SE slopes and 2 on NW slopes. Site altitudes ranged from 410 to 460 m asl.

- Dominant grass : *Bothriochloa macra*/*B. decipiens* Red grass/pitted bluegrass

Associated dominant grass species :

⇒*Aristida ramosa*, *Dichanthium affine*, *Stipa scabra*

⇒*Aristida ramosa*, *Stipa scabra*

All sites were on Garrawilla Volcanics at intermediate altitudes of 435 to 440 m asl. Two sites were on SE slopes and one on a NW slope.

- Dominant grass species: *Aristida ramosa* Wire grass

Associated dominant grass species :

⇒No other dominant grass species

⇒*Bothriochloa macra*/*B. decipiens*, *Digitaria divaricatissima*, *Stipa scabra*

Sites were on NW slopes on Garrawilla Volcanics at intermediate altitudes of 435 to 440 m asl.

- Dominant grass species: *Eriochloa pseudoacrotricha* Early spring grass

Associated dominant grass species :

⇒*Chloris ventricosa*, *Dichanthium affine*, *Aristida ramosa*

⇒*Chloris truncata*, *Bothriochloa decipiens*, *Aristida ramosa*

Sites were on NW slopes on phonolite scree at an altitude of 420 m asl.

- Dominant grass species: *Sporobolus creber* Slender rat's tail

- Associated dominant grass species :

⇒*Bothriochloa decipiens*, **Eragrostis curvula*, *Chloris truncata*,

Digitaria divaricatissima

⇒*Dichanthium affine*, *Bothriochloa macra*/*B. decipiens*, **Eragrostis curvula*

Sites were on SE and NW slopes on phonolite scree at altitudes of 430 m asl.

- Dominant grass species: *Stipa aristiglumis* Plains grass

Associated dominant grass species :

⇒*Stipa verticillata*, **Urochloa panicoides*, **Eragrostis cilianensis*

Based on the high number of annuals (15) and exotics (22) at the site this grassland is regarded as a depauperate association. It was on a SE slope on Garrawilla Volcanics at the lowest altitude of 380 m asl.

Numbers of species in the grasslands ranged from 31 to 47. The lower numbers occurred in grasslands where either *Aristida ramosa* (wire grass), *Urochloa panicoides* (liverseed grass), *Lomandra filiformis* (wattle mat-rush) or *Carthamus lanatus* (saffron thistle) dominated areas within the quadrat. The most pronounced *Aristida ramosa* dominance occurred at a site where *Tribulus terrestris* (cathead) formed almost continuous ground cover.

Association 2, dominated by *Bothriochloa macra*/*B. decipiens*, even in close proximity to annual cultivation, displayed high stability and high inertia with number of annuals low at 2 to 6 and exotics 4 to 11. In contrast the *Stipa aristiglumis* association appeared to be characterised by very low stability and low inertia such that only a depauperate representative was studied.

The grasses *Sporobolus creber* and *Chloris ventricosa* were only found on the lighter textured soils on the phonolite scree. *Danthonia caespitosa* was only identified on the heavier textured more fertile soils on the Garrawilla Volcanics. On the lighter textured soils *Bothriochloa macra* showed a preference for SE slopes and *Bothriochloa decipiens* showed a preference for NW slopes.

Knowledge of the history of land management over the last 20 to 40 years at each of the grassland sites led to construction of a state and transition model as depicted in Figure 1.

Conclusions

Detailed study of different grassland associations within a portion of a small subcatchment area indicates that grasslands are very dynamic and respond to a wide range of environmental and management factors. The characteristics of a particular grassland are influenced by the attributes of and the interactions among the species present. Thus any study of the occurrence of individual species will probably have limited application to grassland management plans.