Ecology of Herbaceous Legumes in the Fortescue River Valley Floodplain, Western Australia

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Introduction In the Fortescue floodplain herbaceous legumes (HL) are mainly taxa of Papilionaceae (with one Mimosaceae) that fail to develop woody stems and branches . Historical data from Curtin University (MRC) studies suggest that vegetation condition is primarily dependent on the unpredictable (though seasonal) influence of cyclonic rainfall and consequential flooding (Fox *et al* ., 2006) . Biomass production is known to increase with the presence of legumes in both pastures and native ecosystems . Holm (*et al* ., 2002) suggests that productivity is more useful than diversity for determining the condition of arid ecosystems/pastures . Therefore , understanding the role of HL in the productivity of arid floodplains may enhance effective pastoral management .

Materials and methods Between 1992 and 1994 , 60 plots were established across the Fortescue floodplain to record information on vegetation dynamics . These plots were spread across Ethel Creek (22°53′56″S , 120° 01′19″E) , Roy Hill (22°37′18″S , 120° 55′23″E) and Marillana cattle stations (22°38′S , 119°24′E) . The mean annual rainfall (1907—2006) at Ethel Creek is 276 mm . The predominant vegetation types are Coolibah (*Eucalyptus victrix*) woodlands with a grassy understorey and open grasslands , both with cracking clay (vertosols) soils . Plant density and cover have been recorded since studies began in 1992 , at least bi-annually . In 2006 assessments were conducted in May (post summer) and August (winter) . Each plot is 20×25 m with angle iron pickets on each corner . The first transect (0-25 m) runs north-south along the eastern boundary . The second transect (26-50 m) runs parallel to transect 1 through the plot centre . Quadrats of 1×1 m are assessed sequentially . All live plants are identified with density (no . of stems in the m^2) and estimated percentage cover is recorded . The mean cover (%) and density (stems/m^2) are then calculated for each species within each plot .

Results Total biomass of the floodplain is highly correlated to available moisture with an extreme very low mean cover of all plots in April 2005 of ＜0 .5% and ～65% cover by May 2006 (data not shown) . In total , some 21 taxa of HL have been recorded (1992-2006) . Herbaceous legumes have occurred at all 60 plots , but have not always been recorded at a particular assessment . Early in the study , herbaceous legumes were small contributors and grasses were mainly annual (Figure 1) . *Cullen cinereum* is the most important HL accounting for a mean proportion of 62 .8% of total HL cover for 2006 .

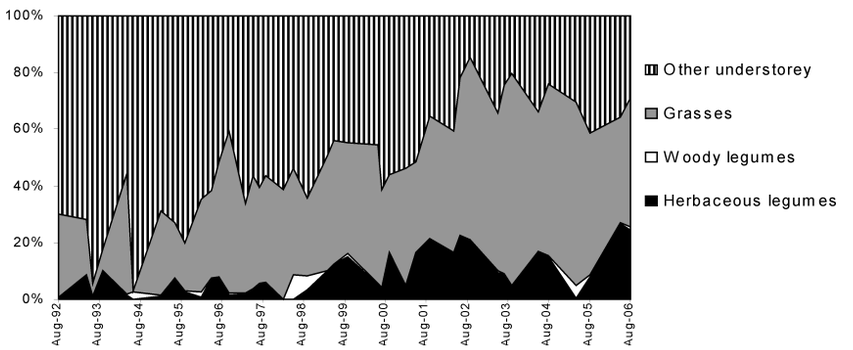

Figure 1 *Proportion of understorey cover (%) from 1992-2006 of all plots assessed .*

Conclusions Increased growth of legumes has followed regionally higher rainfall across the study period . Legume growth may also be contributing indirectly to an increase in grass biomass through nitrogen fixation and increased ground cover . This is assumed to be contributing to overall improved floodplain productivity . It may be concluded that the pasture condition of the Fortescue floodplain has generally improved through the duration of the study . Research into patterns of herbaceous legume growth would confirm if and how these species actively contribute to enhanced productivity .

References

Fox , J .E .D . & Edwards , T .E . 2006 . Annual report to BHP Billiton . Mulga Research Centre , Curtin University .
Holm , A .M . , Bennett , L .T . , Loneragan , W .A . & Adams , M .A . 2002 . Relationships between empirical and nominal indices of landscape function in the arid shrubland of Western Australia . *J . Arid Environ* . 50 , 1-21 .