

Genetic diversity was studied in wild forage species subjected to grazing along a rainfall gradient in West Niger, within the Sahel with aim of identifying adapted genotypes, which could be used to reclaim degraded land. Two legumes (*Alysicarpus ovalifolius* and *Zornia glochidiata*) and two grasses (*Brachiaria xantholeuca* and *Cenchrus biflorus*) were selected to relate phenotypic adaptation to genetic diversity in response to grazing and rainfall. Populations of each species were sampled from both heavily grazed and ungrazed sites along a rainfall gradient, approximating 200mm<sup>yr</sup><sup>-1</sup> to 800mm<sup>yr</sup><sup>-1</sup> rainfall isohyets. The adaptative phenotypic expressions to aridity and grazing of the populations from each of the species were characterised by morphological measures performed on the plants sampled in the field. These analyses were then compared with the results from genetic analyses using the PCR-based techniques of amplified fragment length polymorphism (AFLP) and random amplified polymorphic DNA (RAPD). Analyses of molecular data using cluster analysis (UPGMA), principal coordinates analysis (PCO), Mantel tests and an Analysis of Molecular Variance (AMOVA), revealed genotypic distinction between populations subjected to both differing aridity and grazing. The majority of the total genotypic variation sampled in all species occurred among individuals within a population. The significant morphological differentiation found among populations subjected to varying grazing and aridity stresses, determined through linear regression analyses, did not correlate significantly with the genotypic differentiation, as revealed by Mantel tests. The results suggest that grazing does not cause a loss of genetic diversity in the wild forage species studied, although with increasing aridity the impact of grazing on the genetic diversity of populations may increase.