

# Plant species density on unimproved pastures in steep hill country of western Victoria

Z. N. Nie<sup>1</sup>, P. E. Quigley<sup>1</sup>, F. Cameron<sup>1</sup>, and L. Thomas<sup>2</sup>

<sup>1</sup>Department of Primary Industries, Pastoral and Veterinary Institute, Hamilton, VIC;

<sup>2</sup>Department of Primary Industries, Ararat, VIC

## Introduction

Steep hill country is a major source of recharge for the groundwater systems in western Victoria. Ground cover by herbaceous plants in these areas is generally low, particularly in summer and autumn. This is associated with major environmental threats, such as water and nutrient runoff and excessive deep drainage. The main reason for this problem is the widespread replacement of native/perennial vegetation with introduced exotic annual species. Therefore, it is critical to increase the proportion of deep-rooted perennials, particularly native grasses, for their high water use and the ability to grow in summer. Knowledge of the current species densities on the steep hill country is important in developing appropriate management systems to increase the content of desirable species.

## Methods

A survey was conducted on a 3-ha, south-facing steep slope near Ararat, western Victoria, in October 2002, prior to imposing grazing treatments. Three blocks, each with 8 treatment plots were located on the top, mid, and bottom of the slope. Two plots were chosen randomly from each block, and flora species that occurred within the plots were identified and recorded. Where plants were difficult to identify, they were marked and identified after flowering. Plant population density was measured by collecting 10 80-mm-diameter turf plugs per plot. Plants or tillers of native grass, other perennial grass, annual grass, onion grass, and legumes were counted and recorded from each turf plug. Plant density (PD) of each species category was estimated as  $PD = MPN/A$ , where MPN is the mean plant or tiller numbers per turf plug and A is the plug area.

## Results

There were a total of 46 plant species in the 3-ha survey area, including 26 native species and 20 exotic species. Most species occurred occasionally (abundance < 5%) along the slope, and silver grass (*Vulpia bromoides*) was the dominant species. In terms of species abundance, most native species were grasses, such as *Austrodanthonia* spp., *Austrostipa* spp., *Elymus scaber*, and *Microlaena stipoides*. Despite the occurrence of a large number of native species, the density of those species was much lower than that of annual grass (Table 1). Native grass accounted for only 23% of the total plant density, whereas annual grass (predominantly silver grass) and onion grass dominated the sward (over 65% of the total plant density). Most

species appeared to have higher density on top of the slope except perennial grasses (predominantly fog grass, which prefers wet conditions).

## Conclusion

Although pastures in the steep hill country of western Victoria are degraded and dominated by annual species, they still contain a wide range of flora species, including a large number of native species on some of the steep slopes. With over 30% of native and other perennial grasses in the sward, there is an opportunity to lift the density and composition of these species through appropriate management systems, such as deferred grazing, without the need for major pasture renovation.

Table 1. Density (tillers for grasses or plants for onion grass and legume per m<sup>2</sup>) of some plant functional groups at different locations on the slope and their proportion (%) of the total plant population density in October 2002.

Slope	Native grass	Perennial grass	Annual grass	Onion grass	Legume
Top	4,390	540	9,560	2,100	280
Mid	1,730	1,520	4,420	1,370	130
Bottom	2,030	1,650	4,720	1,420	70
Proportion	23%	10%	52%	14%	1%