Studies on the Establishment and Early Persistence of Six Native Grasses on the Central Tablelands

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As traditional fertilizer and pasture improvement regimes becomes increasingly difficult to maintain, landholders, are turning to native grass species as an alternative to introduced species (Lodge 1994, Simpson 1994). Despite this increasing interest, information on the establishment requirements and early growth characteristics of our more productive native species on the Central Tablelands is seriously lacking.

Work is being done on the productivity, management and identification of native grass species in Victoria, (Mitchell 1996), on the Northern Tablelands of NSW, (Whalley 1990) and the slopes and plains of NSW. However, comparatively less work has been carried out on the Central Tablelands, where large areas of land are unsuited to conventional pasture improvement systems.

Materials and methods

Research into the establishment of six native grass species, red grass *(Bothriochloa macra)*, hill wallaby grass *(Danthonia eriantha)*, wallaby grass *(Danthonia racemosa)*, common wheat grass *(Elymus scaber)*, weeping grass *(Microlaena stipoides)*, and kangaroo grass *(Themeda triandra)*, and one exotic species cocksfoot (*Dactylis glomerata* Var. Porto), commenced in 1997. Seed of each of the native grass species was collected from sites within a 50 kilometre radius of Bathurst NSW. Germination tests were carried out to assess the viability of collected seed proir to sowing.

The study sites at Black Springs, Wisemans' Creek and Glanmire, were established to provide a range of soil and environmental conditions in the Bathurst district. At each site, a randomised split block layout with two times of sowing, (May and November 1997) was used. The effects of seedbed preparation (with/without plant cover), on the establishment and persistence of each of the species was studied within each time of sowing, using a factorial design. There were three replicates of each treatment giving a total of 96 plots per site.

Each site was fenced, and individual plots (1.2 m x 1 m) were pegged. May sown plots were sprayed with glyphosate in mid March and early May before sowing. The November plots were prepared in a similar manner. Bare soil treatments were cleared by raking off dead plant material. Five furrows 20cm apart were made using a single tyne garden implement. Seed was dropped into the furrows at a depth of approximately 1cm, and lightly covered with soil.

Results

Germination of common wheat grass, hill wallaby grass and wallaby grass began within 7 - 14 days of sowing, followed by weeping grass and cocksfoot. Red grass and kangaroo grass did not germinate until January 1998, 9 weeks after the spring sowing, following rain in January.

The germination of grass species appears to be affected by temperature when moisture supply is adequate. Differences between seedbed preparation on plant establishment was slight, although dead litter helped retain moisture and buffer temperature fluctuations. The growth of all species was retarded

Table 1: Tolerance of May sown grass species to frost and insect attack.

Species	Germination	Frost Tolerance/ Temperature	Blue Oatmite tolerance	Grasshopper tolerance
Cocksfoot	14-21 days	Mod to High	Moderate	Moderate
Wheat grass	7-14 days	Mod to High	Not affected	High
Hill wallaby grass	7-14 days	High	Not affected	High
Kangaroo grass	30 weeks	Low	Not affected	Moderate
Red grass	30 weeks	Low	Not affected	Moderate
Wallaby grass	7-14 days	High	Moderate	Moderate
Weeping grass	14-21 days	Mod to High	Moderate	Low

by the dry seasonal conditions. There were differential effects of species to insect attack and frost (Table 1).

All species had set seed by January 1998, with hill wallaby grass and, to a lesser extent wallaby grass and weeping grass, having two seedings within that time, whilst kangaroo grass and red grass did not produce seed heads until March.

The two warm season perennials, red grass and kangaroo grass established better than all other species following sowing in November. Some seed of common wheat grass and weeping grass established, but seedling growth was poor. Weeping grass seems to be particularly prone to attack from grasshoppers.

Conclusions

Germination rates and survival showed marked species variance, common wheat grass had the highest germination and survival rate, followed by hill wallaby grass, weeping grass (high germination rate but high mortality due to grasshopper attack), cocksfoot, and wallaby grass (poor survival). Red grass and kangaroo grass had relatively good germination after rain fell in January 1998, and the majority of seedlings survived the dry conditions of February and March.

Temperature appears to be the major factor influencing the establishment of the grass species, with cool conditions favouring the establishment of common wheat grass, the two wallaby grasses and weeping grass. Red grass and kangaroo grass required higher temperatures for germination.

Preliminary results would suggest that an autumn sowing, providing adequate moisture is present, is more suited to the establishment and persistence of the yearlong green perennial grasses. Although the two warm season perennials did not germinate until late spring/early summer they appeared not to have suffered by germinating six months after sowing. Weed control must be recognised as a major factor in the establishment and persistence of sown grass species.

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