Phalaris Absorbs more Soil Moisture at Depth than Perennial Ryegrass

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Introduction

The effect of water stress on soil water depletion in established *Phalaris aquatica* L. cv Sirosa (phalaris) and *Lolium perenne* L. cv Victorian (perennial ryegrass) field swards grown under cut (simulated grazing) and mature, full-leafed situations was investigated at the Agricultural Research and Veterinary Centre, Orange, NSW.

Method

The two species were either irrigated frequently to potential evaporation, or non-irrigated (allowed to dry out). Soil moisture was measured with a neutron moisture meter, in access tubes that had been placed in the grass swards. During the installation of the access tubes, the cored soil was recovered for each 10 cm depth, washed, and soil root densities for phalaris and perennial ryegrass determined in the profile.

Results

The greatest mass of roots occurred in the top 10 cm of the profile, especially for irrigated perennial ryegrass swards, but root densities below the top 10 cm were similar for all swards.

Water deficit developed more quickly and to a greater extent in the perennial ryegrass swards than for phalaris. Cutting swards slowed the rate at which water deficit occurred (Figure 1).

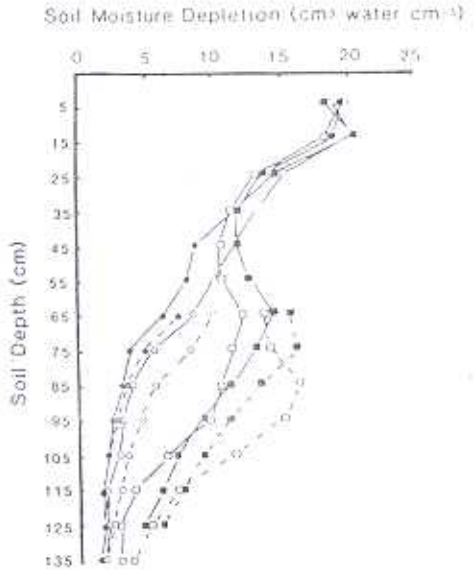

Figure 1: Soil water depletion after 32 (—) and 40 (- - -) days drying for cut (□ ○) and mature (■ ●) phalaris (□ ■) and perennial ryegrass (○ ●)

For the top 60 cm of soil, there was little difference in soil water uptake between the species and cutting treatments after 32 days drying (Figure 1). However, for the next 70 cm, phalaris swards used more than twice the soil water that ryegrass swards did (Figure 1). During the final week of the study, phalaris swards continued to remove moisture from below 80 cm whereas perennial ryegrass absorbed very little (Figure 1).

Discussion

Cutting swards affected the rate at which plants could transpire and the resulting slower rate of stress enabled the simulated grazed swards to remove more soil moisture at depth than swards with a high leaf area. The leaves in these swards were able to continue transpiring for a longer time, providing a longer period of favourable conditions for plant and root activity. This would enable an increase in water uptake, delaying the onset of moisture stress and allowing more effective use of soil moisture in the grazed swards.