Productive Reclamation of saline Soils with *Distichlis spicata* var. yensen-4a

M. R. Sargeant[1], M. E. Rogers[2], and R. E. White[3]

[1] NyPa Australia, Tatura, Vic.
[2] Agriculture Victoria, Department of Natural Resources and Environment, Tatura, Vic.
[3] Institute of Land and Food Resources, The University of Melbourne, Parkville, Vic.

ABSTRACT

Distichlis spicata var. yensen-4a (NyPa Forage) is a salt tolerant grass developed in Arizona. A study is being conducted at Undera in northern Victoria to investigate its suitability for Australian conditions and its ability to reclaim saline soils. Small plots of *D. spicata* var. yensen-4a were established in spring 2000 and will be compared with the other salt tolerant grasses *Puccinellia ciliata, Paspalum vaginatum* and *Leptochloa fusca.* Measurements to determine the relative usefulness of these grasses in reclamation and for forage will include dry matter production, protein and ash content, and dry matter digestibility. Measurement of soil unsaturated hydraulic conductivity were taken at establishment and on completion of the study to determine whether the growth habits of these grasses have had any beneficial effects on water infiltration.

KEY WORDS

Leptochloa fusca, NyPa forage, Paspalum vaginatum, Puccinellia ciliata, salinity, salt grass.

INTRODUCTION

It has been estimated that there are 2.5 million hectares of saline soils within Australia. The National Dryland Salinity Program has predicted that this area could increase to at least 15 million hectares in the next few decades. The challenge is to find ways to improve the productive capacity of these saline lands for agriculture. One potential solution to this challenge is using this saline land for the production of forage. Production of forage on highly saline soils is now possible due to the development of a halophytic grass *Distichlis spicata* var. yensen-4a (NyPa Forage). Previous research conducted in Western Australia has shown that *D. spicata* var. yensen-4a can grow well in dryland farming systems where soils are saline. Work in Spain and the United States of America has also shown that *D. spicata* var. yensen-4a performs well under irrigation with saline water over a wide range of soil types. It has been suggested that *D. spicata* var. yensen-4a may also have an advantageous effect on soil hydraulic properties. It has been observed that rhizomes from the plant only have a life span of two years. Suggestions have been made that these decaying rhizomes have created a lattice network throughout the soil (biopores) which improves the hydraulic properties particularly of heavy clay soils. This study will evaluate the performance of *D. spicata* var. yensen-4a and other salt tolerant grasses in the field under irrigation with saline water.

MATERIALS AND METHODS

A field experiment was established at the Serial Biological Concentration site (SBC) at Undera in the Goulburn Valley, northern Victoria. Predominantly an irrigated dairying region, this area has an annual rainfall of 460 mm. Thirty two plots were planted in the spring 2000 to four different grasses; *D. spicata* var. yensen-4a*, Puccinellia ciliata, Leptochloa fusca* and *Paspalum vaginatum*. Both *D. spicata* var. yensen-4a *and P. vaginatum* were raised by vegetative means while the *L. fusca* and *P. ciliata* were grown from seed. All these grasses were potted up into 50 mm diameter pots in a hothouse, hardened up outside, and then planted into the field plots with a spacing of 20 cm between plants. At the time of planting, fertiliser was incorporated at the rate of 20 kg P/ha, and 18 kg N/ha.

The plots were irrigated during summer, with water from the SBC ponds. Half of the plots will be irrigated with saline water with an EC of 18 dS/m, while the other half will be irrigated with water of 28 dS/m.

Measurements to be conducted throughout the trial will include dry matter production, protein and ash content, and dry matter digestibility.

Unsaturated hydraulic conductivities (at -20 mm pressure head) were measured with a disc permeameter before the grasses were sown, and will be measured again upon the completion of the trial to determine if there have been any significant changes in hydraulic conductivities due to the growth of the grasses. Soil cores were also taken to measure bulk densities, and will be measured again at the completion of the trial.

RESULTS

Initial hydraulic conductivities of the topsoil (0-15 cm) ranged from 7 mm/hr to 107 mm/hr, while the mean was 33 mm/hr. The pH_{H2O} of the topsoil of the plots were between 6.43 and 7.85, with a mean of 6.98. Subsoil pH_{H2O} were generally more alkaline than the topsoil. Initial topsoil electrical conductivities have varied between 10.4 dS/m and 27.5 dS/m (measured in 1:5 soil:water extracts converted to EC_e (saturated extract) on the basis of texture). The bulk densities of the topsoil ranged between 1.04 $g.cm^{-3}$ and 1.41 gcm^{-3}.

CONCLUSION

The initial evaluation of the site has been completed and the plots have been found to contain a saline clay soil with an alkaline pH trend with depth and variable hydraulic conductivity. Results on the performance of the different grasses under these conditions will be presented.

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