

# THE EFFECT OF WATERLOGGING ON THE PERFORMANCE OF PERENNIAL PASTURE

S.E. Maher, R.L. Greenslade and C.L. Noble

Institute of Sustainable Irrigated Agriculture, Ferguson Rd, Tatura, Vic 3616

The effect of waterlogging on the performance of perennial pasture has been the focus of a study conducted at the Institute of Sustainable Irrigated Agriculture, Tatura, since 1992. One objective of the project was to assess the effect of inundation on the performance of perennial pasture when inundation occurred repeatedly during the summer irrigation season.

## MATERIALS AND METHODS

Experimental field plots (8x6 m) on a Lemnos loam, duplex, Red-brown earth, sown to a perennial ryegrass (*Lolium perenne*)/white clover (*Trifolium repens*) mixed pasture, were used to apply inundation treatments (6 hours (h), 18 h, 30 h, 54 h and 126 h) at each irrigation, during two consecutive irrigation seasons (1993/94-1994/95). Pasture was irrigated with channel water when class A pan evaporation minus rainfall reached 50 mm. Measurements of soil-water oxygen concentration were taken during inundation and following removal of surface water, using poly samplers buried at 5 depths (to 40 cm). Soil solution sample collection followed the procedure outlined elsewhere (1). Pasture yield and quality was assessed monthly, by taking four quadrat cuts (25x25 cm) from each plot and calculating dry matter production and species composition. Plots were then mown to a constant height.

## RESULTS AND DISCUSSION

Pasture yield and clover content was higher in plots that were inundated for 18 and 30 hours, than six hours at each irrigation. When inundation exceeded 30 hours however, significant declines in yield and clover content occurred. Cumulative pasture production (Nov 1993 to May 1994) was reduced by approximately 15% and 35% by the 54 h and 126 h treatments, respectively. The soil-water oxygen concentration in the 30 h treatment declined to a low of 0.09 mol/m<sup>3</sup> prior to drainage, compared to 0.03 mol/m<sup>3</sup> in the 126 h treatment. Aeration following removal of surface water was slower in the 54 h and 126 h treatments. The topsoil (0-20 cm) of the 30 h treatment re-aerated quickly such that hypoxic conditions (0.05-0.11 mol/m<sup>3</sup> (2)) did not exceed two days. In the 54 h treatment hypoxic conditions persisted for 3-4 days. Together these results suggest a tolerance to rootzone soil hypoxia of approximately three days. Where this is exceeded declines in pasture production and quality (clover content) may occur.

## ACKNOWLEDGMENTS

This project was funded through the Murray-Darling Basin Commission Drainage Program and the Victorian State Salinity Program.

## REFERENCES

1. Blackwell, P.S. 1983. J. Soil Sci. 34, 271-275.
2. Noble, C.L. and Rogers, M.E. 1994 In: Handbook of Plant and Crop Stress. (Ed M. Pessarakli) (Marcel Dekker). pp. 473-496.