

Plantation productivity in saline landscapes

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Abstract

Trees are planted in saline landscapes for environmental and economic benefit. The amount and concentration of salt to which tree roots may be exposed in saline soils varies with location of trees in the landscape, salt load in the soil regolith, management practices (e.g. how saline water irrigation is applied and opportunities for leaching by rainfall), the extent of lateral subsurface flow of water, and the degree to which saline soil water and groundwater are used by trees. Tree growth is progressively decreased at higher soil and groundwater salinities. The extent of this reduction is dependent on the tolerance of different species to salinity and associated stresses, such as waterlogging. There are good opportunities for producing genetically-improved planting stock with enhanced productivity in saline soils. The use of improved germplasm, coupled with appropriate establishment techniques and management practices, is required to sustain adequate plantation productivity on saline soils. Saline watertables are more likely to be lowered by planting trees in discharge areas if trees are planted at an appropriate scale and can reduce recharge and/or use groundwater directly. In addition, groundwater salinity (electrical conductivity) should be less than 5–10 dS m⁻¹ and depth less than about 5 metres. Opportunities to lower the watertable beneath a plantation will be greater if lateral flows from surrounding areas to the plantation are relatively small. However, if the aim is to maximise the use of groundwater by trees for improved tree growth and environmental outcomes, then lateral flow from the surroundings would be an advantage.

Introduction

Reforestation in target areas of agricultural landscapes is widely recognised as one option for mitigating land and water degradation, including salinisation. Soil and water salinity are constraints for establishing trees in both dryland and irrigated areas. The amount and concentration of salt to which trees may be exposed in saline soils varies with location of trees in the landscape, salt load in the soil regolith, site and stand management practices, and the extent to which saline soil water and groundwater are used by trees. Saline soils are also prone to waterlogging and sodicity. Effects of salinity on tree growth are influenced by these factors.

This chapter deals with:

- extent and nature of salinity in the Murray–Darling Basin;
- tree planting options for managing salinity;
- effect of salinity on plantation growth and water use in saline soil and above shallow, saline groundwater;