Chapter 6

Growth and silvicultural management of irrigated plantations

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Abstract

The productivity of plantation forests is highly dependent on available water. Opportunities for growing plantations under irrigation in special circumstances have been variously explored, often as a way of reusing wastewater. Sources of water include river water and groundwater, and municipal, industrial and agricultural wastewaters. Productivity is potentially high using nutrient-rich low-salinity irrigation on better soils (mean annual increment up to 40 $m^3\ ha^{-1}\ year^{-1}$), but the quality of available sites and irrigation waters is such that production is typically half this, and as little as 5 $m^3\ ha^{-1}\ year^{-1}$. Species suitable for commercial irrigated plantation forestry are *Eucalyptus grandis* and *Pinus radiata* over longer rotations for pulpwood, poles, posts and sawlogs on slightly to moderately saline sites; *E. globulus* for pulpwood production over moderate rotations on slightly saline sites; and *E. camaldulensis* and *E. occidentalis* grown at high stocking over short rotations for biomass production as a source of bioenergy on moderately to severely saline sites. Silvicultural management of irrigated plantations to achieve their potential productivity requires close and timely attention to irrigation quantity and scheduling, avoidance of soil salt accumulation, choice of improved genotype, and weed control and tree nutrition. Productive irrigated plantations can be managed with pruning and thinning for high-value timber production.

Introduction

Planting of trees in environments such as those in the Murray–Darling Basin on a significant scale is likely to occur only where there is clear prospect of a commercial return and/or where the environmental benefits can be valued (Manderson *et al.* 1990; Ferguson and Kirby 1992). In productive irrigated agricultural areas, trees may play a role by increasing groundwater discharge directly through increased evapotranspiration (Vertessy *et al.* 2000) or as part of various water management schemes (TFPRC 1992). The stimulus for much of the research into the productivity and sustainability of irrigated forestry arose from the potential for land-based beneficial use of wastewaters. These include agricultural drainage water (Till 1973) and groundwater pumped from agricultural protection and salt interception schemes (Heuperman 1988), as well as municipal and industrial wastewaters (Dillon 2000), as an alternative to simple disposal to water bodies.

Commercial wood production is highly dependent on growth rates and silvicultural management of planted forests. However, to identify the best species to plant, it is necessary to first determine the objectives for growing trees. Species differ in their potential to provide products