

New approach to silviculture

Sir,

I enjoyed Euan Mason's article on New Approach to Silviculture (Nov 2002). He has two themes: one-hit pruning as a way of reducing cost; and natural regeneration as a way of obtaining high initial stocking cheaply and with no risk of toppling. The two issues need to be addressed separately.

First, one-hit pruning is definitely a good idea in certain situations. These are when the site index is high but the fertility level is medium or low, and where gorse is a major problem. Some foresters are still not aware that site index is a measure of height growth and is not necessarily related to basal area growth. Euan's model used a site index of 32 (ie high), but he did not specify the basal area level. Given medium or low fertility and a high stocking, you can prune to 6 m while maintaining a reasonable DOS (say <20 cm) in the lower part of the stem. DOS is further controlled if there is a vigorous understorey of, for example, gorse. If this is the case, pruning in three lifts can be extra-expensive because of the hindrance factor. Delaying the pruning will reduce the vigour and viciousness of the gorse.

Euan overstates the case for high initial stockings. Stocking makes little difference while trees are using up the empty space – its dramatic effect occurs after canopy closure. For example, at Tikitere Trials the trees had very similar diameter until age 10, despite the fact that

Euan Mason replies:

I welcome Piers comments. He's right about one-hit pruning, particularly when he states that DOS can be further controlled with a weed such as gorse. Extra trees work just as well as gorse at reducing DOS, however, so long as we delay thinning.

The 10 year stocking comparison at Tikitere, is a red herring. A graph in Knowles, Hawke & MacLaren's leaflet entitled "Agroforestry research at Tikitere" clearly shows that different stocking treatments began to diverge in mean dbh at about age 5.

During thinning there was a convergence, and then divergence resumed after canopy closure as he asserts. The initial divergence is consistent with a thorough analysis of juvenile growth in 15 Nelder spacing experiments that I conducted during my PhD studies. Those studies showed that initial spacing generally began to affect dbh between ages 4 and 5 even at stockings as low as 500 stems/ha.

In my article I proposed delaying thinning, which would lead to a strong control of DOS. Results from Tikitere, where thinning was applied early, cannot say anything much about this.

Some initial summaries from a spacing experiment at Port Levy where puning and thinning were delayed until the mean height was about 10 m are more relevant. The data are not yet all punched, but taking two plots planted with GF10 seedlings, I get mean DOS estimates of 31.7 cm at 833 stems/ha, and 20.2 cm at 2500 stems/ha. Clearly

stocking ranged from 2000 to 150 s/ha. Because stem diameter is linked to branch size, corewood and other wood quality attributes, we would not expect young trees with high initial stockings to be very different except in height and therefore taper. At Tikitere, there was a 3.3 m difference in height at age 10, across the range of stockings.

The next issue is the choice of regeneration as a means of obtaining high stockings cheaply. There are several major disadvantages that Euan does not mention. Regeneration eliminates the possibility of tree breeding, and a high selection ratio cannot compensate for that. Regeneration is very patchy, ranging from no trees in a given m² to more than 100. The "thinning at age 1" that Euan proposes is out of the question, because unless all green foliage is removed the trees will survive and is no different to a topping operation in a nursery. Also, trees continue to germinate and grow after age 1. No, to thin a densely stocked stand properly it must be done when the crown has started to rise so that there are no live branches at the base of the stem. Mechanical thinning is ineffective, given the patchy regeneration, so there is no alternative to a very expensive hand operation with a scrubcutter.

Lastly, regeneration is reliable only on certain sites (hot, dry, bare?) and so cannot be part of a general prescription.

Piers Maclaren

there may be a strong case for higher initial stocking and delayed pruning when thinning is also delayed. I'll await a fuller analysis of the experiment before making a stronger statement.

Natural regeneration can be patchy, as Piers asserts, but FRI reports from the 1960s record no structured natural regeneration research programme for radiata pine. Natural regeneration appears to have been pursued with a management-scale "trial and error" approach, along with some operational studies of seed production or methods of direct seeding.

In some cases regeneration was successful, while in other cases it was not. This doesn't rule out natural regeneration altogether. The logical approach is to discover what contributes to success and exploit that understanding.

I agree that this option implies managers would accept existing levels of genetic improvement in their plantations, but is using improved breeds a plantation grower's primary goal? If it is more profitable to improve wood quality through natural regeneration than to plant improved breeds on some sites, what's the problem? I agree that natural regeneration of radiata pine is unlikely to suit all sites, and careful research would identify which sites to apply it on and how to prepare them.

Euan Mason