Economics of Clonal Forestry

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Abstract

The economics of deploying tested clones is favourable in countries like Brazil and South Africa where the cost of vegetative propagation is low, growth rates are high, and the rotation age is less than 8 years. Short rotations allow foresters to calculate realized volume gains from clonal deployment as well as realized economic returns. In contrast, realized genetic gains from block-plot trials that are 25 to 75 years old are typically not available. Therefore, for some species, estimates of future gains and stumpage prices are made in order to justify establishing clonal plantations.

In South Africa, a cutting might cost EU 0.02 more than a pine seedling while a eucalyptus cutting might cost EU 0.05 more than a seedling. The difference between seedlings and cuttings of conifers in Ireland or Sweden might be EU 0.09 per plant. In the United States, the price difference between a pine seedling and stock produced from tissue culture might be EU 0.24 and in New Zealand this difference might be EU 0.17.

Tables showing the "break-even" price of clonal planting stock have been generated to aid those interested in evaluating the economics of a clonal program. When the rotation age, spacing, discount rate, and expected cash flow values are known, then an upper limit for planting stock cost can be determined. For example, if the rotation age is 7 years, the spacing is 2,000/ha, the discount rate is 5% and the value of one hectare of plantation is increased by EU 1,000 at harvest, then a "break-even" price for the cost of clonal planting stock would be EU 0.35 (over and above that paid for open-pollinated stock). Therefore, if the cost of a seedling is EU 0.22, then the "break-even" cost of clonal stock would by EU 0.57 each. If nurseries can sell clonal stock for this price (or less), then clonal deployment would make a least a 5% return on investment (ROI).

When long harvest rotations are considered, the time value of money (along with increased biological risks) typically reduces the financial viability of clonal deployment. For example, with a 40-year harvest, the break-even cost of clonal stock (see above) is reduced to EU 0.07 each. If clonal stock costs more than EU 0.29 (i.e. EU 0.22 + 0.07), then clonal deployment for a 40-year rotation would not produce a 5% ROI.

In situations where the cost of producing clonal stock is higher than the projected "break-even" price, some organizations have either reduced the initial stocking rate or have planted a mixture of seedlings and clones. One such planting scheme involves a "triad" pattern that involves planting every third row with clonal stock. The adjacent two rows of seedlings are removed during thinnings which leaves the center, clonal-row for the final harvest. Another system involves planting a clone as every fourth tree (within each row). Seedlings in the stand are removed during thinning, leaving an essentially pure clonal plantation at a stocking of about 20% of the initial planting density (assuming 20% mortality).