

The Horizon of Forest Biotechnology

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The three components of forest biotechnology (vegetative propagation, genomics, genetic engineering) are progressing erratically. Great strides are being made on vegetative propagation of forest trees through somatic embryogenesis to the point that commercial pine plantations are being established by use of the technology. In like vein, the technology has evolved in the mechanization of genomics that will allow the genome of conifers to be mapped in a quarter of the time that it took to gene map the human genome. That phenomenon will occur despite the size of the genome of loblolly pine, for example, being about seven times that of the human genome.

Genetic engineering of forest trees is progressing by fits and starts. A few years ago there was optimism that commercial plantations of forest trees would soon be dotting the landscape both in the United States and abroad. So far the only forest tree to be planted commercially is black poplar (*Populus nigra*) in China. Occupying an area of uncertain size, the species has been engineered with a *Bacillus thuringensis* gene that gives resistance to insect attack. Other genetically engineered trees, even those for which the technology has been perfected, are nowhere near being ready for commercialization because of environmental concerns about their potential adverse affects on the environment. It is my prediction that genetically engineered trees for value-added products will pave the way for commercial plantations of forest trees. The value added products will include those engineered for gene conservation of threatened and endangered species, pharmaceuticals, contaminated soils, carbon sequestration, pulping and bleaching and, most importantly, for energy production.