

The contribution of genetically engineered eucalyptus in a global demand perspective and sustainable production

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Abstract: The growth of the world's population, together with climate change, demands a more constrained use of resources, coupled with effective, science-based efforts, to achieve a low-carbon and more sustainable economy. Science and technology are essential for the development of improved products and resources, derived from renewable raw materials. Biotechnology is now being used in plantation forest trees to accelerate selection gains. Furthermore, bioinformatics and genomics tools, coupled with traditional gene transformation and new gene editing technologies are used increasingly to source and introduce genetic changes into renewable plantation trees to develop pest and disease resistance, drought resistance and heat tolerance to enhance the resilience of these species in the face of abiotic and biotic threat, resulting from climate perturbation. Additional technologies to change wood properties are, being evaluated, to enable more efficient use of processing chemicals with lowered energy. FuturaGene, Suzano's biotech division is developing GM trees to provide ways to enhance and protect yield and modify wood properties whilst overcoming limitations of classical genetic breeding such as: yield enhanced eucalyptus which could reduce forest footprint and potentially sequester higher amounts of carbon; eucalyptus tolerant to the herbicide glyphosate, an efficient and environmentally safe alternative for competitive weed control, precluding damage to sensitive young plantlets caused by drift, reduction in operating costs and improvement in operational working conditions using mechanized applications; Bt eucalyptus, which has demonstrated efficiency to control caterpillars (key defoliating pest) from day one of infestation, before any damage is visible, obviating the requirement for intensive, post-facto spraying, a significant environmental boost. As renewable plantations cover extensive areas, GM enhanced trees could be a significant factor in the mitigation of greenhouse gas emissions, lowering of chemical load in the environment, enhancing carbon sequestration and lowering chemical and energy input in the post-harvest industrial processing of renewable wood products.

Keywords: GM (genetic modified) trees, biotechnology, global demand, future trends