
Forestry corporations and GM tree research

GM trees are not a result of evolution. They are the result of decisions taken at institutional and corporate levels for their development and deployment. Companies, research institutions and universities work together closely on this. Companies fund university research departments, and influence what type of research is carried out.

Although there are numerous actors working on GM trees, some are clearly more important than others. Most of the research is being carried in a relatively small number of countries, among which the most prominent are the USA, Canada, Japan, New Zealand, Australia, Chile, United Kingdom, and China.

Some of the major forestry corporations are directly involved in the research. For instance, three giant forestry companies (International Paper, Westvaco and Fletcher Challenge) formed in 1999 a joint venture with Monsanto called ArborGen, which became the world's biggest GM tree company. Monsanto pulled out of ArborGen six months after it was formed. In January 2000, Genesis Research and Development, New Zealand's biggest biotechnology company, joined the joint venture. Genesis and Fletcher Challenge had been working together for five years on herbicide tolerant GM eucalyptus, poplar and pine. In 2001, Rubicon (a New Zealand company) bought Fletcher Challenge's biotechnology operations and took over its commitments to ArborGen. Westvaco has since merged with Mead Paper Company to form Meadwestvaco. In April 2003, Genesis announced a new plant science subsidiary, AgriGenesis Biosciences, which takes over Genesis' involvement in ArborGen.

ArborGen currently has 51 field trials of GM poplar, eucalyptus, pine and sweetgum (*Liquidambar styraciflua*) in the US. ArborGen's scientists have genetically manipulated trees to have less lignin, to grow faster and straighter, to be sterile or to be resistant to disease or herbicide.

Another important company involved in GM trees is New Zealand-based Horizon2 which was formed in March 2003 from a merger of Carter Holt Harvey Forest Genetics and Rubicon's Trees and Technology. Carter Holt Harvey is a New Zealand timber firm, which is 50 per cent owned by International Paper.

Chilean-based company GenFor is a joint venture between Chilean technology think tank Fundación Chile and Cellfor (Canada). The company was partly financed by the Chilean Development Agency and has established research agreements with Chilean forestry industry giants Arauco and Mininco. The companies provide GenFor with their top specimens, GenFor supplies the technology to "improve" them and earns the right to market the results of the research.

GenFor's main research focus is GM radiata pine which makes up 80 per cent of Chile's plantations. GenFor's researchers aim to create a GM pine resistant to the European shoot-tip moth (*Ryacionia buoliana*), a pest which is seriously affecting the 1.5 millions hectares of Radiata pine plantations in that country.

GenFor's partner Cellfor has entered into collaborations with a series of universities, including Oxford, Purdue, British Columbia, Alberta and Victoria. Cellfor has also worked with the Institute of Molecular Agrobiolology in Singapore and SweTree Genomics in Sweden.

In addition to its research on insect resistant GM radiata pine, GenFor is working on increasing the level of cellulose and reducing the amount of lignin in radiata and loblolly pine (*Pinus taeda*).

In the U.S. several pulp and paper companies, including Weyerhaeuser, International Paper, MacMillan Blodel, Aracruz Cellulose and Potlatch Corporation have funded research at Oregon State University's Tree Genomics, Biotechnology, and Breeding Programme, which is working on GM trees for herbicide tolerance, sterility, resistance to fungus and insects and reduced lignin.

Some forestry companies also carry out their own research. Such are the cases of Aracruz Cellulose in Brazil and Japanese companies Oji Paper and Nippon Paper Industries.

Aracruz, the world top producer of bleached eucalyptus pulp produced from its huge plantations in Brazil is currently carrying out GM tree laboratory research but, according to company officials is not yet conducting either field trials or commercial plantations.

Nippon Paper, Japan's largest paper manufacturer has developed a GM salt-tolerant eucalyptus tree. It is also working on GM poplar trees which would be resistant to polluted environments. In 1995, Nippon signed an agreement with Zeneca to work on modifying lignin in pulp trees and in 2001 had developed a GM eucalyptus tree which produced 20 per cent less lignin, 10 per cent more cellulose and five per cent more pulp than non-GM eucalyptus trees.

Oji Paper is one of the largest pulp and paper companies in the world. The company has an active research programme into GM trees. Oji Paper's scientists are working on GM trees with reduced lignin, GM trees which can tolerate salty soils and GM eucalyptus that can grow in acidic soils.

All the above illustrates forestry companies' involvement in GM trees. They want to be able to plant trees in any type of environment and to ensure their fast growth; they want to accommodate plantation wood to their industrial processes (e.g. with less lignin for pulp production); they want their monocultures to be insect-resistant and herbicide-tolerant; they want them to be sterile. In sum, their aim is to manipulate nature to adapt it to their long-term economic objectives, regardless of the uncertainties and risks that this involves.