

Genetically Modified Trees in Chile: A New Forest Conflict

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**By Lorena Ojeda D.

El Hacha (The Axe) is a song written by Patricio Manns and performed by Inti Illimani on their release ArriesgarÃ© la piel; its final lines refer to deforestation: "The forest comes before Man, but desert follows him". Without a doubt, deforestation has seriously affected the balance of forest ecosystems worldwide, making understandable the fear that paralyzes those who are aware of this issue; fear that is expressed in different ways, such as in this song. A second phenomenon negatively affecting the survival of forests is the creation of extensive single-crop forest plantations, and in particular, current concerns about new plantations of genetically modified trees.

To understand the negative effects of extensive single specie tree farming, we must take into account that countries in the southern hemisphere in general and southern Chile in particular suffer from a destructive process that is advancing from the North. Over time, forests have been greatly impacted by the incremental spread of agriculture and livestock, cutting for firewood, and the felling and replacement of native forest with pine and eucalyptus plantations, which have led to topsoil degradation and acacia and blackberry invasions. As a result, animal habitat has been lost and the countryside has been altered. Social problems have arisen as well, including the forced migration of people who find themselves surrounded by huge plantations of single-crop introduced tree species and the transformation of the process of the restitution to Mapuche communities of traditional lands into a matter for the courts.

The first plantations of Pinus Radiata (Monterey Pine) were established in Chile in 1920. From that date on the forward march of this single-crop cultivation has gone unhindered and in recent decades, the result has been environmental change and degradation. Among the many changes are: environmental homogeneity, evident in the vast and monotonous landscape vistas of unchanging color and architecture; biodiversity reduction and changes in the mechanisms that regulate its component parts; increasing vulnerability from pest invasions and the indiscriminate application of pesticides to control them; and the use of prime agricultural land for cultivating tree plantations, resulting in the underutilization of this important natural resource.

Genetic engineering techniques have been used to achieve optimum production results in both agriculture and forest cultivation, including the genetic manipulation of commercially important plants. These issues have gone largely unreported to the public. People might know a little bit about genetically modified foods, but the development of Genetically Modified Organisms (GMOs) in the forestry industry is far less well known.

The first genetically modified (GM) trees were planted in Belgium in 1988. In Chile, projects have been in development since the mid-1990s exploring the use of biotechnology in trees for industrial and commercial ends, which focus primarily on exotic species (pine and eucalyptus), with the goal of improving productivity. These projects have public sector support from such institutions as INFOR - Forestry Institute, (part of the Ministry of Agriculture), Fundacion Chile (Chile Foundation), and the

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Universities of Concepcion, Austral and Frontera, as well from the private sector -Bioforest (controlled by Bosques Arauco). Several million dollars have been paid out from the national treasury.

The following are some of the risks involved with planting these trees:

- a) Long-term unforeseen changes in the altered or "guest". genome.
- b) Genetic contamination when plantations or test stands of transgenic trees are planted near their native forest relatives. The probability for genetic contamination is high.
- c) Changes in productivity and soil degradation (trees modified for rapid growth are harvested in less time and use the soil more intensively, thus there is greater demand for water and fewer opportunities for the nutrients to recycle).
- d) Possible effects on human health include resistance to antibiotics and increased allergies.

In 2000, the New Zealand horticultural institute Hort Research won a contract from the Chile Foundation (a governmental body) to provide technical assistance in exchange for financing the development of a transgenic *Pinus radiata* (Monterey Pine), one resistant to the moth that attacks its buds. The goal is to "optimize the use of this natural resource to increase its productive capacity".

The Chilean government takes a positive view of these practices and partnerships. In its presidential announcement, made in March 2004 at the inauguration of the first Global Biotechnology Forum, the spread of these new trends nationwide was referred to, opening the door for the creation of a Biotechnology Center in Chile.

According to an article by Dr. María Isabel Manzur published in October 2000, the planting of genetically modified trees in Chile is in its initial phases, but some projects working with transgenic pine and eucalyptus are already underway:

1. Bioforest, subsidiary of Forestal Arauco, located in the VIII Region. Its research program is centered on improving pine and eucalyptus through cloning techniques. The company also works in biological pest control.
2. Genfor, S.A., a partnership between the Chile Foundation, Sylvagen of Canada and Interlink of the United States, created in 1999 with the support of CORFO (Ministry of Manufacturing Development). It utilizes technology for improving cloning (somatic embryogenesis) and the creation of genetically modified *Pinus radiata*, soon to be planted in test fields.
3. INIA IX Region (Institute of Farming and Animal Husbandry Research), together with the Universities of Chile and Católica, CINVESTAV Irapuato Labs of Mexico, Department of the Ministry of Agriculture (SEREMI) of Chile's IX Region, Agrícola Mar Rojo, the Afodegama Foundation and Indes Salus, are collaborating on a seed transgenesis development project to enhance resistance to the apple tree scab.
4. Royal Dutch/Shell in Chile and Uruguay: Production of a GM eucalyptus tree with a different type of lignin, making its removal easier for the pulp and paper industry.

One incentive for establishing tree plantations in general and transgenic trees in particular is the market for "carbon credits" which are part of the Kyoto Protocol's Clean Production Mechanisms (CPMs) that were recently accepted at the United Nation's 10th Framework Convention on Climate Change, held last December in Buenos Aires, Argentina. Chile is not averse to the idea of carbon credits, according to INFOR's Jorge Urrutia, who stated that CPMs could turn into a very good opportunity for the forestry sector.

It is important to recognize that Chile could become one of the countries with the greatest number of genetically modified commercial tree plantations without the legal and environmental safeguards to control them; (currently, the release of transgenic crops are not subject to environmental impact studies). One of 4 demands sought by the Foundation for Sustainable Societies (Fundación Sociedades Sustentables) - that the planting of GM trees should be subject to Law 19.300, which requires an environmental impact study - stems from this issue. The other demands seek a

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moratorium on GM plantations, the development of a national policy for genetically modified trees, and an assessment of risks to human and environmental health. I see no option but to join these demands.

We must act first, understanding that the reasons used to justify GM plantations are lies; that genetically modified trees will not reduce pressure on the remaining native forest, roll back climate change, solve the problem of pollution from the pulp and paper industry, or reduce the use of pesticides.

In conclusion, 2 facts about the paper industry underscore the issue of tree plantations in general and genetically modified trees in particular:

1. International pulp and paper industry earnings are basically guaranteed by the resources handed to them in the form of subsidies by southern hemisphere nation governments. Furthermore, these countries run the risk of dependence on a raw material subject to sharp price swings, with a high probability of lower prices in the short term, an argument against the tremendous increase, day by day, of these plantations.
2. The majority of all the paper produced worldwide is consumed by developed countries, with 40% of the total destined for packaging, and that doesn't even take into account that most of the paper destined for writing and printing is used for marketing and publicity.

These facts raise the following questions: Are we prepared to pay the costs of these export models? Is it worth suffering the social and environmental impacts caused by plantations to obtain these products? Are we truly informed about the amount of national resources being used to finance the research and establishment of genetically modified trees?

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*GM Genetically Modified

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