

Comments for APHIS meeting.
From Ron Sederoff.

First, thank you for the opportunity to speak at the recent meeting. A few brief comments. First, regulation of Agricultural Biotech has been excessive and burdensome. Regulation of genetically modified trees should not make the same errors. Fundamentally the issue of product and process underlies the problem. Gene splicing has been the trigger for regulation rather than the novelty or the potential for risk to human health or the environment. It is easy to enforce, but has the logical flaw that equivalent products may be alternatively restricted or unregulated. It is generally agreed that the process should not be the basis for regulation, but it is the process for triggering regulation.

What has been considered acceptable practice for forest management and introduction of species for horticulture and forestry has been unregulated. Herein lies a dilemma. Either this has been a major mistake, and should have been under stringent regulation due to the potential effects on forest gene pools or biodiversity, or all proposed genetic modifications that have lower potential biological effects should also be unregulated.

The extent of natural variation in forest trees is not adequately considered. One example is lignin composition. A natural variant of loblolly pine has more dramatically modified lignin than any transgenic tree or plant for modification of lignin composition that has been constructed by transgenic technology. It would seem that all such transgenics should be unregulated, or at least have a minimal status for regulation. Lignin content in at least some cases is negatively correlated with growth, and reduction in content may be highly advantageous for yield due to more growth and more efficient processing.

Genetic modification within genomes abounds. Virtually every internal rearrangement that could be made by moving genes within a species has been made within organisms on a cellular level, and within individuals on a population level. All genetic modifications that involve movement or regulation of endogenous genes should be considered low risk as these events occur naturally. Simply increasing or decreasing expression of individual genes or small groups of genes should be low risk too.

Effect on fitness of individuals or populations should be considered if a gene is considered a risk on a long-term basis in a population. Any gene that is at a selective disadvantage would be removed from a population without intervention. Deleterious genes would contribute to genetic load to a modest, and likely negligible extent, considering the high genetic load of forest trees. A neutral gene is subject to drift and would have no genetic load effect on the population. However, many temperate forests are relatively young, having been established after the last glacial episode. Given that trees may have an average generation time of a hundred years, the age of a forest may be only several thousand years. If a gene is unlikely to have any effect in a period of 10,000 years, it should be considered to not have an environmentally harmful effect. Most genes of neutral effect would be in this category.

Genetic modifications are an important step toward domestication of forest trees. Increased specialization of trees for specific products is likely to be the future of our industry. Currently, the US wood, pulp and paper products industry is in decline, and may have new technology as its only hope for a competitive future. Unnecessary restriction of transgenic technology closes a door to economic competitiveness that badly needs to be kept open. Other countries such as China that embrace the technology may come to dominate the industry.

Something needs to be done, bringing ecologists and geneticists together to hammer out what are real or perceived or imaginary risks to forests. Until the scientific community speaks with a more unified voice, there will be difficulty in the establishment of policy. These areas have nonoverlapping expertise and opinions. Some greater interaction of these “cultures” is essential for the proper development of regulation and policy.

Finally, a mechanism for more outside information relative to the formation of regulations is badly needed. I am aware of the difficulty of forming advisory committees, but the current situation places APHIS at risk for criticism regarding adequate information.