



## ***Sierra Club's position on Genetically Engineered Trees***

While we think of cities as the way the human signature is most clearly written on the earth, it's agriculture which takes up the most space. Agriculture is the technology which first allowed modern humans to thrive, launching the population and cultural explosions which have characterized the last ten thousand years of human history, and no changes we've made on this planet are greater than our appropriation of the majority of arable land to cultivate our food and fiber crops. A surviving beauty of great meaning to most of us has been the forests which have survived, often on steeper slopes or in more remote areas, less changed by humankind and symbolizing our aspirations to retain some wild places, remnants of a recent but largely dismantled past, to hand down to future generations.

Forests can be characterized in terms of ecosystems, habitats, biodiversity and so forth. Or we may say that they contain beauty and scents and a sacred shade which must not be lost. Sierra Club has devoted itself to maintaining the beauty and honoring a commitment to allow future generations to be nurtured and inspired by it. Once, it seemed that could be done by drawing lines on a map and holding unspoiled lands in a perpetual trust. Today, we realize that human activities have remote consequences and that acid rain or global warming don't respect park boundaries. Another technology which threatens to despoil wilderness despite all boundary lines is genetic engineering.

Sierra Club doesn't think of genetic engineering (GE) like a genie which has escaped from its bottle; there are many genies, many bottles, and we think caution should be the rule. The risk that genes taken from their native genomes and spliced into GE trees will interfere with natural forests isn't a hypothetical possibility but a certainty. Given a lack of caution, genetic engineering may do as much damage to forests as chain saws and sprawl.

### ***Looking at the world inside out***

Looking at the world inside out, genes represent the beauty of life just as much as a forest does. The grandeur of nature is the deployment of the existing genetic diversity of our planet. The genome of a single species contains a rich diversity.

Transgenic technology – taking genes out of the genomes in which they have evolved over millions of years and inserting them into unrelated species – isn't needed. If genetic technologies are applied to silviculture, it should be to study and identify existing diversity. If trees are to be bred like agricultural crops, then genetic sequence data and polymorphisms should be used to steer selective breeding and accelerate identification of the desired combinations. It isn't prudent either, because the tiniest errors in splicing might produce planetary effects. And above all it isn't moral because those who are rolling the dice are not those who will pay the consequences.

### ***The threat is now***

We are often told that commercialization of genetically engineered (GE'd) trees is at least several years away. However, GE'd stands of papaya trees are yielding commercial crops in Hawaii. The tip of the iceberg is already under our prow, not on the distant horizon. But it is for the traditional forestry industries of paper and lumber that most research is presently being done. This is also an area which poses the greatest risk to nature. Engineering trees to grow more quickly into lumber or to have less lignin in order to more easily be turned into paper are

examples of possible changes. Herbicide tolerance and pesticide production, similar to many present GE'd food crops, are being actively pursued.

The threat of GE'd trees interbreeding with wild trees is extreme. While many agricultural varieties are already quite different from their ancestors of thousands of years ago, this is not the case with trees. And genetically engineered trees could easily become invasive. Faster growing trees could crowd out others. Limp, low-lignin trees resistant to common pests could easily become a kudzu-like invasive threat, moving into our national parks and forests and changing their character forever.

We do not say that every application of GE will necessarily be bad. There may be good uses for this technology; it may be possible to use it responsibly. But common sense should warn us that its commercial development in the absence of strict environmental safeguards is a prescription for disaster.

Genetically engineered trees are being designed for plantation growth, and plantations are not forests. The difference between a plantation and a forest will be compounded by genetic engineering. For instance, GE'd pines might be grown without all those "useless" pine cones. Eliminating these would allow the tree to put more of its energy into growing rapidly. Or they may be herbicide resistant so that competing undergrowth could be chemically eliminated. They may produce their own pesticides so that many of the insects which live in association with trees are poisoned.

The result, then, may be a silent forest, one which doesn't support chipmunks or snakes at ground level, holds no birdsong in its branches, supports no raptors soaring above. Clearly, such a stand of trees would hold less beauty and poetry too.

Should we oppose genetic "improvements" to trees? Sierra Club believes that we can't allow the industry to be judged by its hype and that patented genes are not an improvement over nature. We also must avoid only judging what one gene may do, because once hundreds of different genes -- most of them patented by industry and enjoying protection as "intellectual property" -- are allowed access to public lands, the consequences of unintended combinations will be unpredictable. GE trees will also be a danger in other nations, particularly in the underdeveloped world where conditions for effective regulation often don't exist.

Sierra Club calls for action both at home and internationally to create a worldwide moratorium on the further development and planting of GE trees at least until an effective framework for public debate, unbiased scientific evaluation, and regulation in the public interest -- with the goal of preserving biodiversity -- can be brought into being.

We would also point out that decreased utilization of forest resources rather than increased production is a preferred and very practical strategy. The U.S. uses twice as much paper per capita as other highly civilized nations (Europe, Japan). We shouldn't be asking genetic engineering to do what could be accomplished by lower tech means like putting a surcharge on junk mail.

Just as there are powerful economic incentives behind logging on public lands, sprawl, and other activities which Sierra Club opposes, there are similar incentives behind genetically engineered silviculture. Not only are landed property rights and business rights involved, but also the patent rights to genetic code which are now privatizing the genetic heritage of our planet. It is Sierra Club's task, as always, to oppose such interests in order to fight for the right of nature to exist for itself, and of future generations to enjoy and be inspired by it.

Sierra Club Genetic Engineering Committee, 7/8/03

Jim Diamond, M.D., (Chair)

[jim.diamond@sierraclub.org](mailto:jim.diamond@sierraclub.org)

Neil Carman, Ph. D. (Vice Chair)

[Neil\\_Carman@greenbuilder.com](mailto:Neil_Carman@greenbuilder.com)

Sierra Club, the nation's largest grassroots environmental group with over 750,000 members, was pleased to participate in the USDA/APHIS Forest and Fruit Tree Biotechnology Meeting/workshop, July 8-9, 2003 together with other experts and concerned citizens and is pleased to submit the following additional comments for the record. In the interest of brevity, we are here stating our major concern with the process by which it is proposed to consider transgenic trees for non-regulated status.

APHIS has proposed 18 categories dealing with a broad array of issues which must be considered prior to commercialization of transgenic trees. They all deal with characteristics of a transgenic tree and its interactions with the environment. We think all of these categories are appropriate for consideration and important, but that another category of risk has at the same time been omitted from active consideration.

Transgenic technology introduces the possibility of a new sort of risk which APHIS must address. This is the risk that material spliced from one genome into another quite unrelated genome may cause damage at the genomic level due to insertional instability or dysregulation of downstream genes, either within the original organism or in subsequent generations of the new variant or its hybrids. We believe that APHIS clearly has a responsibility to evaluate this risk. Its Congressional mandate in terms of invasive and weedy species demands it, yet the categories "Vegetative vigor -- weediness" or "Number of years to maturity (flowering) -- invasiveness" or "Seed dispersal factors -- weediness potential" or "Outcrossing -- gene flow through hybridization" and "Self compatibility -- measure of potential for invasiveness," while recognizing this issue tangentially, aren't sufficiently broad to completely deal with the risks that genes removed from the species in which they evolved and combined with novel promoters might well present risks of a new character.

We assert that a failure to state this problem as one of the categories for mandatory consideration when evaluating transgenic trees for nonregulated status would amount to a dereliction of duty by APHIS.

Please, therefore, add this as a category or several categories: risks that novel transgenic constructs may not be stable over time and over multiple generations of a tree and its possible progeny including hybrids. Risks that unanticipated changes in the regulation of gene expression may affect genes not contiguous with the insertion site. Risks that when two or multiple transgenic alterations to a species are approved that the novel genetic material may subsequently interact to produce unanticipated results.

Sierra Club asserts that no transgenic trees should be commercialized without explicitly taking the above risks into account and carefully evaluating them at the molecular/genetic level of detail.

We also hold that the genetic data including the full sequence of the novel insertion, its location within the genome, all changes to DNA bases, and all other genetic data should be part of the public record and should not be shielded as confidential business information (CBI). Sierra Club's position is that when self-replicating genetic code is deployed outdoors where it may spread via seed or pollen over great distances with impact to the public, that the public's right to know of its risk exposure outweighs the rights of business to keep the information secret. The public takes a greater risk than do the corporate entities which may commercialize transgenic trees and so deserves an open, transparent process in any deliberations which may lead to non-regulated status. We assert that transparency demands that genetic information be examined and studied. Just as APHIS must look at the genetic level of detail, the public must not be denied access to such information.

For Sierra Club,

Jim Diamond, M.D.  
Chair, Sierra Club national Genetic Engineering Committee

Neil Carman, Ph.D. (botany)  
member, Genetic Engineering Committee