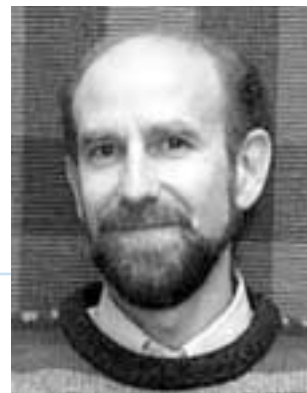


GE trees: The buzz is not from chain saws

By Steve Strauss, Professor of Forest Science and Genetics, OSU



Although all of our crops and most of the trees grown in plantations have been bred to improve their yields and value virtually without controversy, the use of biotechnology has raised concerns from many around the globe. In Europe and Japan, a majority of consumers have been convinced that, despite intensive scientific study, biotechnology is producing crops dangerous for people and the environment. Though not in the majority, there are also many Americans who share these concerns.

Biotechnology has been defined in a lot of ways, and its meaning keeps changing as science and technology grow to encompass new uses. Today, it largely refers to intensive breeding that is normally carried out in conjunction with tissue culture (plants grown in test tubes), which aids in the cloning of trees and genes. When we clone trees we make lots of copies of the fastest growing ones for planting. For this, tissue culture can help but is not a requirement. In Brazil today, which has some of the most productive tree plantations in the world, the large majority of trees planted are cloned eucalyptus produced without the aid of tissue culture. All of them are also exotics (originating from Australia), and many of them are interspecies hybrids. Chile is not far behind in the use of clones, both for pine and eucalyptus. The use of clones in both places is leading to dramatic — and I mean dramatic — improvements in wood quality and yield.

When we clone genes we make lots of copies so we can study, modify, and insert them into other clones or even other species via non-sexual processes. This involves the use of a natural genetic engineer, a microbe called *Agrobacterium*, or “shooting” the DNA into cells using a “gene gun” (no I am not kidding). The movement of genes between species like this strikes some as wrong, although the vast majority of genes carry out the same general functions in all organisms, and gene transfer between even bacteria and trees (as well as humans) has occurred during evolutionary history. Even when we isolate, modify, and reinsert genes into the same species, this has not made opponents any happier.

In Europe, they call all organisms with one or more genes resulting from direct gene transfer GMOs (genetically modified organisms). People have pressured their governments to erect regulations so stiff that their use is extremely restricted compared to that in the USA, where nearly all of our soybeans and cotton, and a great deal of our corn, has one or a few genes inserted via GE methods. Europeans are concerned about GE crops for a host of reasons including: worry over serious mad cow and foot and mouth scares, distrust of their regulatory agencies or scientists, and a dislike of the big companies and patents in control of most GE crops, among others.

The anti-GMO attitude that has radiated from Europe has created a hostile environment for GE trees. One certification system, that of the Forest Stewardship Council, originated with strong input from the extremist environmental groups Greenpeace and Friends of the Earth. It treats the use of any GE trees, even in a completely confined research plot, as a major viola-

tion for which certification would be precluded for that company. It does not matter what genes are under study, whether the goal is to find a solution to a major exotic pest problem (such research is indeed underway), or just to learn about how genes in trees work. The answer is simply no.

This kind of “don’t confuse me with the details” policy shows clearly that the FSC rule is motivated by marketing and politics, not science. Though companies have requested that this rule be rescinded, at least for research, FSC has refused to budge.

As far as anyone can tell, there are no GE forest trees in commercial production anywhere in the west, nor anywhere else in the Americas. The only tree in commercial use is GE papaya, which literally saved the Hawaiian industry from destruction due to a major outbreak of the devastating ringspot virus. The other case in the world is in China, where insect resistant trees are in limited commercial production. Insect resistant trees are helping China to afforest difficult sites, green up a barren countryside, and produce wood to meet its rapidly growing demand.

We have done much research on GE poplars in the U.S., but there have as yet been no commercial plantations. One reason is that scientists, companies, and government regulators wish to wait until we have learned how to engineer trees to be effectively infertile so that new genes won’t spread into wild populations to any significant degree. This is a precautionary and stewardship measure that they have effectively agreed to as a community far before the GMO controversy got going.

Forestry and environmental issues are inevitably complex. The more we know, the more difficult it often is to balance our often conflicting desires for wildness, economic productivity, simplicity, and technological efficiency. Simple answers like “stop GE” are usually motivated by “green fundamentalism” rather than thoughtful analysis, especially given how young gene science really is.

More GE trees are coming, and will be used only after careful government review as required by law, and where there is a clear benefit. Such places are likely to include intensively farmed plantations and orchards (e.g., hybrid poplars), highly stressed street trees, species threatened by exotic pests (e.g., American chestnut), and for specialty needs (e.g., bioremediation of polluted soils). Promising research is underway for all of these goals. GE trees are not “the answer” nor are they a blight to be avoided at all costs. They will be an important tool that will help to satisfy the rapidly growing demand for wood products with minimal impact on wild forests, and to help maintain the tree-filled, healthy landscape that humans love.

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