THE POLITICS OF FOREST MANAGEMENT:

IMPLICATIONS FOR GENETICISTS

Stanley L. Krugman[1]
Timber Management Research
USDA Forest Service
Washington, D.C.

Abstract: Politics and forest genetics do not mix. Yet, there are emerging political issues that will influence both research and the application of tree improvement methods. The constant controversy and numerous regulatory requirements associated with the new biotechnology is a recent example that forest science and social actions have merged. Concerns with biological diversity in both natural and man-made systems is a current issue before Congress. There is already a new bill being proposed that would measure and, to a degree, regulate diversity in natural systems; i.e., forests. This may well have a direct impact on the use of genetically improved trees. Closely related to biological diversity are the increasing concerns with clonal forestry and "exotic" germplasm. Although regulatory activities of clonal forestry have not as yet been applied in the U.S., it does exist in Europe, as does the control and use of exotic germplasm. What is important is for forest geneticists to play a technical role in advising Congress or other legal bodies on the scientific concerns involved in these issues. We can no longer afford to just sit on the sidelines but must become active players in shaping policy.

INTRODUCTION

Water and oil do not mix and so it is with forest genetics and politics. Yet in the last 15 years, an array of political issues has emerged that is influencing and will influence the way forest genetics research is done and how this science will be applied in advancing forestry. Just as important, there is a role for forest geneticists in shaping these political/scientific issues. In fact, it is essential that forest geneticists contribute to these debates both at the local as well as the national level. If geneticists do not take part, one can expect that decisions will be made by our various representatives more on emotions rather than science. This is the price one pays when you do not get involved.

I would like to explore briefly three major issues which can be described as: (1) the new biotechnology, (2) biological diversity, and (3) germplasm management, including clonal forestry, use of exotic germplasm, and the influence of silvicultural practices on genetic structure.

[1] Director, Timber Management Research, USDA Forest Service, Washington, DC.

THE NEW BIOTECHNOLOGY

About 1970, plant physiology, biochemistry, plant genetics, and molecular genetics merged into a new field now commonly called genetic engineering, or the new biotechnology. It was now possible to move genetic information rapidly within or between species. In fact, the basic genetic information--i.e., the gene--could now be moved between any living systems. The possibilities for genetic improvement appear to be unlimited. However, to some scientists and a concerned public, the new science was and is a serious threat. Unfortunately, the new biotechnology appeared when there was a strong and vocal outcry that science must be controlled. Part of this concern had to do with the war in Asia where some felt that science had played a major role.

Whatever the reasons, governing bodies at all levels had proposed laws and regulations from banning the new biotechnology to controlling its use and testing. The events with the new biotechnology strongly suggest that society at large wants a say in the science of the present and the future. Although current regulations are not unreasonable and are less restrictive as society begins to learn more about what biotechnology is and is not, there are still some scientists fighting society's role in managing science. What has this to do with forest genetics? Since the 1970s, an array of forest scientists have demonstrated that woody plants can be manipulated by the new biotechnology. The first tree has already been transformed--i.e., a gene from a bacterium--and gene mapping is now well underway at several laboratories. Within the next several years, we can expect the first genetically engineered tree to be field tested. Others may soon follow. It may be possible to bypass the constraints of sexual reproduction in breeding of trees. In fact, it may soon be possible to quickly improve disease resistance, cold hardiness, and drought tolerance in trees by selecting useful genes from simple organisms. Still, these transgenetic trees must be field tested.

It should be noted that these regulations apply to all biotechnical research and application laboratories. There are no Federal laws but courts have essentially supported Federal regulation of biotechnology. Currently, U.S. Environmental Protection Agency (EPA) rules cover microorganisms while the U.S. Department of Agriculture will cover higher plants and animals as related to field testing. During 1988, new guidelines for field testing higher plants will be available. The courts have already accepted these guidelines. Today, in mid-1988, at least six genetically engineered higher plants are being field tested without problems from the courts. The key is to be sensitive to the concerns of society and to be professional in responding to those concerns. Science must be explained to the public and scientists have an important role in informing others as to what they are doing.

BIOLOGICAL DIVERSITY

During the 1987-1988 Congressional session, several bills appeared dealing with biological diversity. A few years earlier, Congress had added to the State Department appropriations funding bill a section requiring the U.S. Agency for International Development (USAID) to consider biological diversity issues when developing international projects. Interestingly, Congress required the State Department to consider biological diversity in the international area while

there is no such requirement in domestic programs. That is not entirely true, since the National Forest Management Act (NFMA) of 1976 required the USDA Forest Service "to provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, and within the multiple-use objectives of a land management plan adopted pursuant to the section, provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan."

Biological diversity has been further defined in the regulations published in the Federal Register (USDA, 1982) as "the distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan."

For some, biological diversity is more of a philosophical concept rather than a precise management strategy. Here is where forest geneticists can or should play a role. For many, biological diversity can only be maintained by preservation methods, such as in National Parks or other protected areas. There is little understanding of the numerous concerns associated with this issue. There is little understanding that biological diversity must be considered at three levels: ecosystem, species, and the gene. There is little understanding that nature is not static but dynamic and everchanging. There is little understanding that forest management can and should be a tool for ensuring diversity. Genetic diversity is the very foundation of modern forest genetics and forest geneticists should be playing a leading role in formulating plans for genetic resource protection and management. Yet the driving force is the preservation groups, especially those associated with wildlife protection.

Because genetically improved trees are "man-" made, there are those who seriously oppose their use in "natural" forests, including man-made plantations. Although most of these concerns are commonly addressed to Federal lands, in time, one can expect through State forest practices acts to see similar regulatory guidelines on State managed lands and, to a limited extent, on private lands. Forest geneticists can and should contribute to this debate on how to maintain broad genetic diversity, and on how to manage for ecosystem stability, while at the same time producing an array of goods and services.

GERMPLASM MANAGEMENT

There are several issues which have not as yet reached the regulatory state. Among these are those dealing with clonal forestry, exotic germplasm, and, finally, the impact of harvesting on genetic structure.

Slowly but surely, clonal forestry will be more widely practiced in the United States. In West Germany, some States are already proposing limiting the use of clones. We need to define the number and the proper mix of clones to be safely employed in the U.S. Obviously, this may vary with species and growing conditions. Still, there will be a segment of the concerned public that will challenge the wide use of clones unless we have the information that demonstrates that clonal forestry is environmentally safe and a valid approach to increasing productivity. There is still time for us to gather this information and be prepared to debate the value of clonal forestry.

Exotic woody germplasm makes up a rather small segment of U.S. forest germplasm. To be sure, Christmas trees from Soots pines are common in the East, and there are some plantations of Eucalyptus in California and southern Florida. But with our richness of native woody plants, exotics will not be a major issue. In Sweden, for instance, planting exotics such as lodgepole pine is not permitted in some areas since they are replacing the native Scots pine. But we can expect a closer watch on the movement of native woody plants. Unless forest geneticists can demonstrate otherwise, I suspect there will be added constraints on the random plants of native species. On USDA Forest Service managed areas, there are already restrictive rules for controlling germplasm planting. This is justified because the older practices of uncontrolled seed source movement, which has often led to poor growth and failures. In the future, State lands will be under more germplasm control. Genetics research over the last 80 years has clearly demonstrated the importance of controlling the origin of the seed source. As forest geneticists, we will need to better define various species planting zones, and refine the limits of seed movement.

Finally, we need to discuss an emerging issue, one I feel we have neglected for a number of reasons. We are beginning to be asked about the impacts of our harvesting practices--i.e., silvicultural practices--on the genetic structure of natural forests. Interestingly, I am aware of only a relatively few papers on this subject and some of these are from Europe. I see, as a major challenge to forest practices in the future, the threat to demonstrate that we are not mining the genetic resource. This is certainly an issue on Federal lands. In any event, we need to know what past and current practices are doing to genetic structure. If we are to be responsive to the changing needs and uses of our forests, we need to know more about their future genetic composition. This is a research area that only now is beginning to receive some serious attention.

This has been a very brief discussion on how selected issues are influencing the practices of forest genetics and tree improvement. Virtually everyday, there is an opportunity for responsible scientists to play a role in shaping public policy at some level of government. For too long, we have left to others, less informed, the opportunity to shape the laws that govern our management practices. I firmly feel we need to play a more active role. It is no sin to deal with politicians.