



HARDWOOD TREE
Improvement & Regeneration
CENTER

HTIRC

**Strategic Plan
2006-2010**

***A collaborative national research, development and
technology transfer center for hardwood stewardship.***

Vision Statement: *We are the internationally recognized leader in sustainable production, protection and utilization of hardwoods.*

Mission

The mission of the HTIRC is to advance the science of hardwood tree improvement, genomics, physiology, protection, and utilization in the hardwood region of the United States by:

- Developing and disseminating knowledge on improving the genetic quality of hardwood tree species and conserving fine hardwood germ plasm;
- Developing elite hardwood trees for restoration and regeneration of sustainable hardwood forests and riparian zones for production of forest products and maintenance of genetically diverse ecosystems;
- Increasing knowledge and developing systems for nursery production and plantation establishment;
- Increasing knowledge and developing strategies for protection, utilization and marketing of the hardwood resource;
- Developing recognized and respected science leaders in forest genetics, physiology, regeneration, protection and utilization.

Organization Description and Characterization

The Hardwood Tree Improvement and Regeneration Center (hereafter called “HTIRC”) is a regional collaborative research, development and technology transfer effort. The partnership includes the USDA Forest Service Northern Research Station, National Seed Laboratory, and Northeastern Area State and Private Forestry, Purdue University Department of Forestry and Natural Resources, Indiana Department of Natural Resources Division of Forestry, Indiana Hardwood Lumbermen’s Association, National Hardwood Lumber Association, American Forestry Technologies, Indiana Forestry and Woodland Owners Association, Walnut Council and the Fred M. van Eck Forest Foundation. In addition, it is the lead center in the National Science Foundation Industry/University Cooperative Research Center (NSF I/UCRC) program called Center for Tree Genetics, a cooperative program with Oregon State University. It is unique in several aspects: 1) the HTIRC has a national focus on hardwoods; 2) it is a true partnership of federal, state, university, industry and landowner groups who contribute financial support and advice and; 3) it generating basic knowledge and technologies in hardwood tree genomics, improvement, regeneration, protection, and utilization for tree nurseries, industry, public agencies, and landowners.

HTIRC is located at Purdue University because of its role in the Midwest as a recognized center for biological genomics research. HTIRC is housed in Pfendler Hall with the Department of Forestry and Natural Resources. The molecular genetics laboratory is co-located with fisheries and wildlife genetics faculty in order to stimulate cross-fertilization of research ideas and multidisciplinary research. Research within HTIRC will benefit from Purdue University's development of hardwood scanning technologies and will aid in the development of nanotechnology applications for cellulose.

Operating Environment

The idea for HTIRC was conceived in 1998 because of a perceived void in hardwood tree improvement research in the central hardwood region of the Midwest and Northeast. The birth of HTIRC occurred at the same time that the region was experiencing a severe production shortage of hardwood seedlings estimated anywhere from 25 to 50 million trees annually. In addition, the majority of seedlings being produced in state nurseries were of unknown genetic origin because nurseries relied upon seed collectors to collect and transport seed to the point of purchase at the nursery. Thus, the majority of seedlings being produced are unimproved, of unknown fitness for sustainable forestry, and of unknown genetic diversity.

The hardwood industry was also concerned about the future quantity and quality of the resource for its lumber and manufacturing sectors. Due to political and social pressures, federal forests have significantly reduced the volume of hardwood timber that is being harvested annually. Small private woodlots that supply a significant amount of hardwood timber and veneer are not being managed in a sustainable manner, ownership is not continuous over numerous rotations to insure sound forest management, parcel size is decreasing and fragmentation is increasing, and many woodlots are being converted to residential and recreational uses. In addition, the diameter of timber harvested today continues to be smaller than what it has been due to shorter rotations. Last, the hardwood industry was concerned that it was not taking advantage of new biotechnologies that could increase wood production through tree improvement activities that improve wood quality, growth, and pest resistance.

The professional forester community was also concerned about loss of genetic quality in remaining hardwood woodlots and natural forests. They felt that trees that are currently being managed for future timber harvest do not have the same desirable traits for straightness and vigor and that past forest harvest practices of continually taking the “best” trees may have resulted in loss of genetic quality of the remaining germ plasm.

Over the past decade, the state of Indiana has lost jobs in many sectors including manufacturing. After thorough analysis, the state produced the BioCrossroads report in 2005, which described the forest products sector as the 6th largest in the state and 1st in the agricultural manufacturing sector for number of jobs and average salary. As one of the strategic objectives from that report, the state focused its attention on production of genetically improved hardwoods from HTIRC and associated spinoff technologies as one key for future economic development in the state.

International Economic, Social and Political Environment

Human population growth continues to expand rapidly, and consumer demand for quality hardwood, at some point, will outstrip the region’s ability to produce it unless consumers are willing to accept substitute materials. Much of the US and European demand for hardwood lumber is currently met within the United State’s northern and central hardwood zones, and hardwood production has not shifted to developing countries in any significant manner. The time may come when this pattern of production for world

markets can no longer be maintained because of decreased supply and the environmental consequences of heavy timber extraction on natural environments.

In the central hardwood region, water quality has been degraded by agricultural intrusion along waterways and flooding has further degraded these riparian zones that include major rivers and their tributaries. A significant effort is being made to restore hardwood trees and other native vegetation in these riparian zones. For the most part, unimproved trees are being used, and knowledge of how to restore these degraded areas is lacking, which has resulted in failure of many plantings. The opportunity exists for this significant portion of the land base to be a future site for quality hardwood regeneration although political forces will influence that reality.

Funding for many conservation plantings comes from the Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), and Wetland Reserve Program (WRP). These programs, when funded by federal appropriations, account for the majority of hardwood tree planting and they are increasingly focused on improvement of water quality and wildlife habitat. The genetic characteristics of the trees being planted are unknown and the potential exists for genetic failures as these plantings reach maturity.

Many consumers do not differentiate between the role of plantation forests and natural forests. However, they readily accept that agronomic crops are grown for the purpose of food production and consumption rather than for regeneration of annual vegetation. But, consumers have similar aesthetic and spiritual values that they hold for trees whether they are in an urban, plantation or natural forest setting. If this does not change, plantations may not be accepted as the alternative method for growing highly productive crop trees that would allow the country to maintain natural forests as preserves for biodiversity and recreation. These attitudes exist despite the fact that it would take only a marginal set aside of land currently in forestland cover to produce all of the wood necessary to meet human demands for wood consumption.

Few cities have been able to resolve the conflict that occurs when urban sprawl imposes upon the rural and forest environments. As community planners continue to struggle with these issues, more forest and farmland continues to be converted into residential use. The increase in economic affluence of American households will continue to put pressure on the urbanization of these environments because the desirable qualities of forest environments for residential communing.

Relationship with Other Organizations

Central and northern hardwoods are more desirable than southern hardwoods because of slow, more even growth and the supply of European hardwoods is limited. Because of this, the HTIRC will hold unique importance in the United States to develop superior hardwood trees for markets that supply developed and developing nations. There are no other hardwood tree improvement research centers in the world and few individual

hardwood research programs that have a mandate to satisfy a regional clientele and are financially supported to undertake a long-term program in tree improvement.

HTIRC is vertically integrated with molecular and classical geneticists, tree physiologists, silviculturists, entomologists, and nursery and regeneration specialists. Its strength is its ability to perform basic, applied and developmental research so the basic genetic knowledge that is created will be delivered to industry and private landowners in value-added products rather than knowledge that only benefits the scientific community.

HTIRC will not be the sole institution performing hardwood research desired by the hardwood industry, nursery operators, government agencies, forest landowners, and general public. The region has many outstanding scientists who perform valuable basic and applied research on various species, and it will be essential that the whole hardwood scientific community remains viable to meet these research needs. In addition, HTIRC will not employ biochemists, enzymologists, economists, and all of the other scientific disciplines that will be necessary for research collaborations to provide scientific data for evaluation of the ecological and environmental fitness of HTIRC products. Productive working relationships with scientists from Purdue and other institutions are necessary for the success of the Center.

Strategic Directions

HTIRC has seven strategic directions:

1. Improve the genetic quality and regeneration of fine hardwoods, including black walnut, black cherry, butternut, northern red oak, white oak, and American chestnut through application of classical breeding, genomics, molecular markers, genetic modification, advanced propagation and seed production technologies, and silviculture.
2. Continue to develop a highly credible hardwood research center that will be recognized as a leader and thereby become a leading graduate education and training facility for future scientific leaders in hardwood research.
3. Hire and nurture pre-eminent scientists who will build the credibility of the research program and be highly competitive for federal research grants.
4. Establish the Martell Experimental Forest and John S. Wright Research, Education and Conference Center as a significant site for education and training of consulting and industrial foresters, nursery practitioners, and landowners in nursery management and hardwood culture.
5. Investigate the establishment on HTIRC as a national laboratory for hardwood research.
6. Investigate the permanent relocation of the National Seed Laboratory to HTIRC.

7. Communicate, convey, and market the work of HTIRC in order to be perceived as the pre-eminent international center for hardwood research and development.