



ABSTRACT.--One-third of the eastern hardwood forest area is considered to be central hardwoods. For both growing stock and saw timber, growth continues to exceed removals. However, the quality of our hardwoods is improving much too slowly and there has been little change in the volume of large saw logs since the 1970 resource inventory. Increased utilization of a large volume of lower quality hardwoods and improvement of species composition and tree quality are major challenges to research. The potential for the Central Hardwood Forest is high and it is time to reevaluate our research needs and priorities to maximize the productivity of this emerging resource.

THE RESOURCE

Eastern hardwoods as a forest cover some 248 million acres of land and contain nearly 235 billion cubic feet of growing stock. Looking at the 79 million acre Central Hardwood Forest (Clark 1976), we find 57 billion cubic feet of growing stock, 68 percent of which is contained in oak species. The potential productivity of this forest is high, yet segments of the hardwood industry are concerned with what is viewed as a steady decline in the availability of large trees. This concern is not supported by statistics in the Analysis of the Timber Situation in the United States, 1952-2030 (1982). This Forest Service report shows hardwood saw timber steadily increasing over the last several decades with two-thirds of the inventory in trees 11 to 17 inches in diameter. Although there has been little change in the large saw log class, the potential exists for more large hardwoods in the future.

Current average annual growth of central hardwoods is 2.1 billion cubic feet, more than double removals. The removal of saw timber is 3.6 billion board feet or 68 percent of growth. This growth-removal relationship suggests that our forests can support additional harvests into the

early part of the 21st century. However, our projections of demands and supplies are based on assumptions about trends in economic growth that are subject to social and environmental changes. Of particular importance to future supplies are the management and harvesting decisions made by private landowners who control over 86 percent of the resource and annually provide about 80 percent of the hardwoods cut.

Forest insects or disease outbreaks and possibly atmospheric deposition can also affect future hardwood supplies. The recent gypsy moth infestation in the Northeast demonstrates this potential threat to our hardwood forests.

TO BETTER UTILIZE THE RESOURCE

Increased utilization of large volumes of smaller-sized and lower-quality hardwoods is a continuing challenge to researchers, forest managers, and the forest products industry. We all know that with markets for low-grade trees we could double hardwood timber production with application of available management technology. Currently, we lack adequate markets for low-grade materials and underutilized species, but they are developing. The wooden pallet industry is an example of a developing market; it is growing at about 8 percent annually and uses almost half (4 billion board feet) of the hardwood lumber produced. New technologies developed by Forest Service research to better utilize the hardwood resource and promote good management include the following processes: saw, dry and rip; standard-sized blanks; structural flakeboard; and press-drying paper.

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^{2/}Deputy Chief for Research, U.S. Department of Agriculture, Forest Service, Washington, DC.

^{3/}Principal Research Silviculturist, U.S. Department of Agriculture, Forest Service, Washington, DC.

TO BETTER MANAGE THE RESOURCE

With this brief review of the hardwood resource and the importance of increased utilization, attention is directed to the management side and research to increase the productivity and quality of future hardwood stands. With exception of a few high value species such as black walnut, black cherry, and northern red oak or speciality species such as hybrid poplars, slow growth has discouraged long-term investments for increased volume yield. Our concentration on volume increment has too often distracted us from the research challenge to accelerate growth of preferred trees with the potential for increased quality. The quality of hardwoods is improving much too slowly and there has been no change in the proportions of preferred species in our stands since the 1970 resource inventory.

One key to improving the quality and production of central hardwoods lies in systematic rehabilitation of intermediate age stands, especially on good sites with an adequate component of acceptable growing stock. New and accelerated research should emphasize development of management guidelines to improve growth, quality, and species composition and, at the same time, accommodate the strong demand for other uses. Often a stand is not worthy of rehabilitation and must be regenerated to improve quality and species composition, but the choice between improving an existing stand or starting over is difficult to make with today's technology.

The continuing practice of accepting naturally regenerated stands has contributed to a rather large acreage of mixed hardwoods with a high component of less desirable species. The need for reliable regeneration techniques is particularly critical for oaks which we know are difficult to regenerate in the absence of advanced reproduction. Research suggests that the shelterwood system may provide the best opportunity to increase oak reproduction in central hardwoods but more work is needed to develop specific recommendations. Underplanting is also being tested as an alternative to natural regeneration on good sites. Results to date show good seedling growth after removal of the shelterwood. The control of species composition in hardwood stands following timber harvest should be a high priority for future research.

Once desirable species are established, cultural techniques are needed to ensure survival, favorable growth and quality, and continued stand

development. We should not be satisfied with the gradual improvement that has occurred in stands without management beyond protection. There is an urgent need for innovative research to provide the silvicultural alternatives for both intermediate even-aged and all-aged culture. Computerized systems such as SILVAH (Marquis et al. 1984) for prescribing silvicultural treatments are needed to provide for a systematic evaluation of stand conditions and to formulate management recommendations based on principles established through research.

Growth and yield research is providing information on upland oaks, northern hardwoods, mixed hardwoods, and several bottom-land species. However, effective management in the future will require additional quantitative information on growth response to silvicultural treatments and environmental influences. Models for tree quality, forest economics, and pest management must be developed and linked to growth projection systems such as STEMS (Belcher et al. 1982) and OAKSIM (Hilt 1983) to meet the needs for forest management and resource planning.

Due to past abuse many hardwood stands, including central hardwoods, do not adequately reflect their potential for timber production or wildlife habitat enhancement. Innovative site classification systems such as developed for the Cumberland Plateau (Smalley 1982) are needed by managers to identify investment opportunities as well as limitations.

FUTURE RESEARCH FOR DEVELOPING THE RESOURCE

The potential for the Central Hardwood Forest is high. Analysis of the timber situation by the Forest Service substantiates that there is no physical scarcity of hardwoods, that quality is slowly improving, and that the resource continues to attract attention. In 1980, the Research, Development and Application Plan for the Improved Use and Management of Eastern Hardwoods^{1/} focused attention on the need for a strongly coordinated program to fully develop this resource. The need has not changed, it is still critical. The resource is changing, however, and it is time to take a new look at research needs and our

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priorities. The Hardwood Research Council has recognized this need by initiating a third study of research priorities for eastern hardwoods. The objectives of this study are to define, analyze, and document areas of research opportunity where important advances in hardwood management and utilization could be achieved. The Forest Service is counting on input from this third evaluation to formulate our research and development programs to meet the needs of this emerging resource. We urge researchers, managers and manufacturers concerned with central hardwoods to work closely with the Hardwood Research Council to assure that needs and priorities of this region are included.

In conclusion there are three points to emphasize: (1) with management the Central Hardwood Forest has the capacity to meet projected demands for wood products, fine quality wood, and other products; (2) the prospect for improved management is tied to the use of a large volume of low-valued stems and species; and (3) research should be the primary force to advance technologies needed to increase the levels of utilization and management.

The time is ripe to renew our commitment to research on this extensive and important forest resource. The objectives and program developed by the sponsors of the Fifth Central Hardwood Forest Conference are a step in that direction.

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