

**USDA FOREST SERVICE COOPERATIVE RESEARCH
CHESTNUT PROGRAM 1978 TO 1982**

H. Clay Smith

USDA Forest Service
Northeastern Forest Experiment Station
Parsons, West Virginia 26287

ABSTRACT.--Cooperators in the USDA Forest Service American chestnut hypovirulent research program are identified. From 1978 to 1982, there have been 8 cooperators involving 15 studies. Approximately \$400,000 have been obligated for this federal cooperative research effort.

The impact of the loss of the American chestnut tree in this country is difficult to evaluate realistically (Figure 1). Of the more than 100 commercial Appalachian species, the American chestnut tree at one time comprised over 25 percent of the eastern hardwood forest. Research efforts to control the chestnut blight or drastically reduce the effect of the blight on American chestnut trees have not been successful. Recent developments in Europe have stimulated research efforts and renewed optimism toward controlling this disease. Certain less pathogenic (hypovirulent) strains of chestnut blight have been reported to inhibit growth of the virulent strains of the blight. Many European chestnut trees infected with the hypovirulent strains have recovered from the blight. Hypovirulence as a biological control has been the major thrust of new research.

In 1978, the USDA Forest Service, through the efforts of Senator Robert C. Byrd and his associates, provided funds for American chestnut research. To date, approximately \$400,000 have been obligated for this research effort. Cooperators were selected to evaluate the hypovirulence phenomenon. The eight cooperators and major researchers are:

West Virginia University - Department of Plant Pathology
William MacDonald, Dale Hindal, and Walt Kaczmarczyk

Duke University - Department of Forest Pathology
William Stambaugh and Bruce Nash

University of Kentucky - Department of Plant Pathology
Louis Shain, Gerald Nordin, and John Russin

Virginia Polytechnic Institute and State University -
Department of Plant Pathology
Gary Griffin, Fred Hebard, and John Weidhaas, Jr.

Utah State University - Department of Biology
Neal Van Alfen, James Bowman, and John Simmons

Concord College - Department of Physical Sciences
John Elkins and Bruce Given (West Virginia Department of Agriculture)

Southeastern Forest Experiment Station
George Kuhlman

Northeastern Forest Experiment Station
Alex Shigo



Figure 1. Spread of the chestnut blight in the eastern United States (Agricultural Research Service 1959). Wide solid line indicates natural range of the American chestnut, while dash lines indicate the periodic movement of the blight.

This cooperative research program involves a variety of research interests as indicated in the forthcoming papers and abstracts on hypovirulent and virulent forms of the chestnut blight. The major short-term objective of the USDA Forest Service cooperative research program is to evaluate the potential usefulness of hypovirulence as a biological control for *Endothia*

parasitica in the forest environment. At Duke University, research is being done on the transmission of hypovirulence in *E. parasitica* to chestnut and oak species in North Carolina. West Virginia University researchers are involved in a number of American chestnut tree field inoculation and blight dissemination studies. Also, vegetative compatibility, physiology, and molecular biology studies relating to *E. parasitica* are being done in the laboratory at West Virginia University. Canker development is being studied by George Kuhlman at the Southeastern Forest Experiment Station. Virulent and hypovirulent isolates are being evaluated as related to survival of American chestnut trees.

Hypovirulent and virulent strains of *E. parasitica* are being evaluated in "blight resistant and blight susceptible" chestnut trees by Virginia Polytechnic Institute and Concord College. Recent research data indicate that there may be some degree of blight resistance present in a large surviving American chestnut tree in Virginia. Also, histopathological studies are being done at Virginia Polytechnic Institute. The University of Kentucky scientists are evaluating the sporulation and dissemination of hypovirulent isolates of the chestnut blight with major emphasis on insects. At the Northeastern Forest Experiment Station, Alex Shigo is doing anatomical studies to evaluate and explain the American chestnut tree's defense system for the chestnut blight. John Elkins at Concord College has been evaluating the influence and utilization of chestnut tannins by *E. parasitica*. At Utah State University, researchers are evaluating how the hypovirulent factor reduces the virulence of the chestnut blight fungus. These researchers are assuming that hypovirulence of the blight is caused by double-stranded RNA that has been found in hypovirulent but not virulent isolates of the blight.

In addition to the above cooperators and their respective staffs, several non-funded cooperators are presently contributing or involved in the cooperative program. Researchers at the Connecticut Agricultural Experiment Station have made major contributions to the chestnut program. Several papers were given by the Connecticut staff in these proceedings. Also, participants from Michigan State University and Western Michigan University presented papers and have been consulted by many of the funded cooperators. The development of American chestnut trees in the Great Lakes Region, especially Michigan, is receiving considerable attention, and presently some chestnut trees in Michigan with superficial callousing cankers are apparently recovering from the blight.

During 1982, several additional studies will be funded. Research is progressing, and we must all keep abreast of the development in the various American chestnut research programs in this country. Eventually, researchers hope to solve the mystery of the chestnut blight and provide a means for the American chestnut to regain some of its usefulness in the eastern hardwood forest.

Literature Cited

Agricultural Research Service. Chestnut blight and resistant chestnuts. USDA; Agric. Res. Serv.; Tree Nut Section, Fruit and Nut Crops Res. Branch; Crops Res. Div.; 1959; Farmers' Bull. No. 2068. 21 p.

Acknowledgment

The author appreciates and thanks James Lockyer, Northeastern Forest Experiment Station, Broomall, Pennsylvania, for completing Figure 1.