Special Technology Development Progam
Progress Report

PROJECT NUMBER (from original application)**:** NA-2000-04

PROJECT TITLE (from original application)**:** Development of guidelines and a model system to facilitate placement of barrier control lines for oak wilt.

PROJECT STATUS (select one by deleting inapplicable options)**:**
Continuing (work continues but no STDP finds are requested for the next fiscal year)

EXPECTED PROJECT DURATION (total years for project): Two years

EXPECTED COMPLETION DATE OF THE PROJECT (fiscal year**): Jan 1, 2002 (FY 2002)**

SUBJECT (from original application form)**:** Forest Disease Management, Disease Modeling, *Ceratocystis fagacearum*

STATUS OF SUBJECT SPECIES (select one by deleting inapplicable option)**:** Unknown, but presumed native

PROJECT OBJECTIVE(S) (from original application)**:** The project objective is to develop an optimal working model (or models) and guidelines for oak wilt barrier placement that will be useful for locations throughout the entire Midwest, regardless of soil type.

BRIEF DESCRIPTION OF PROJECT (from original application form):

Several studies have attempted to model the behavior of the oak wilt pathogen in regard to disease transmission through root grafts, with a resulting variety of equations for predicting the spread of oak wilt on a particular soil type, or within a particular stand (e.g., Appel et al. 1989; Bruhn et al. 1991; Himelick and Fox 1961; Menges and Kuntz 1985). However, none of these studies has examined the operational effectiveness of vibratory plow lines placed by contractors who routinely do this kind of work, and thus fail to address critical questions regarding the practical usefulness of these models.

We propose that examining the effectiveness of such barriers made during the past five years can make significant improvements in the placement of root graft barriers. We further propose the development of a model that would explain the success or failure of these barriers. Expected improvements in barrier placement would save trees that would be needlessly sacrificed under existing models, would minimize “skips” of the disease past the established barriers, and would thus help to ensure that the placement of root graft barriers is optimal.

The questions that will be answered include:

1. What is the theoretical rate of tree-to-tree spread of the oak wilt pathogen in various soil types encountered in the active oak wilt region of the Upper Midwest?

2. How effective are the current methods for establishing root graft barriers (usually simply the vibratory plow operator’s judgment), and what could be gained by using a specific model for establishing these barriers (see question 3, below)? This portion of the study would extend preliminary information developed by the St. Paul Field Office, and provide data for the development of an effective model for the placement of root graft barriers.

3. Using existing or proposed models of oak wilt spread, what is the extent and distribution of tree mortality that can be expected using different guidelines for establishing root graft barriers?

CHANGES TO PROJECT SCOPE OR OBJECTIVES (Changes that need to be made to the original proposal and reasons for the changes.)**:** None

ADDITIONS TO PROJECT SCOPE OR OBJECTIVES (Describe additional accomplishments expected from the project.):

FHP LEAD CONTACT (FHP person submitting proposal)**:**

Name	Affiliation (Office or Dept.)	Phone, E-mail, Fax
Joseph G. O’Brien	NA, SPFO	651-649-5266 (phone)

651-649-5238 (fax)
jobrien@fs.fed.us

FHP LEAD INVOLVEMENT

Role	Time Committment
Assist with data acquisition, analysis	10%

PRINCIPAL INVESTIGATOR(S) (add lines as necessary)**:**

Name	Affiliation (Office or Dept.)	Phone, E-mail, Fax
Gary Johnson	University of Minnesota, Dept. of Forest Resources	612-625-3765 john054@tc.umn.edu

PRINCIPAL INVESTIGATOR INVOLVEMENT

Role	Time Committment
Advise graduate student, provide technical assistance	10%

COOPERATORS (contributing to, but not leading, the project) (add lines as necessary)**:**

Name	Affiliation (Office or Dept.)	Phone, E-mail, Fax

Graham Mahal, graduate student, University of Minnesota
Dr. Jennifer Juzwik, Research Plant Pathologist, North Central Research Station, USDA Forest Service, St. Paul MN
Dr. Tom Skalbeck, Entomologist, USDA Forest Service, North Central Research Station, USDA Forest Service, St. Paul MN
Ron McRoberts, Statistician, USDA Forest Service, North Central Research Station, USDA Forest Service, St. Paul MN
Rose Ingram, Silviculturist, USDA Forest Service, Huron Manistee National Forest
Roger Mech, Entomologist, Michigan DNR
Steve Kunde, Professional Arborist, St. Paul, MN
Steve Cook, Professional Arborist, St. Paul, MN
Minnesota Dept. of Transportation
Hennepin County Parks Commission, Hennepin County, MN

COOPERATOR INVOLVEMENT (add lines as necessary)**:**

Name	Role	Time Commitment
Graham Mahal, graduate student, University of Minnesota	Primary technical responsibility for project completion.	50%

The following people are cooperators on the project, providing *ad hoc* assistance with the project as needed, with a time commitment of **5% or less**.

Dr. Jennifer Juzwik, Research Plant Pathologist, North Central Research Station, USDA Forest Service, St. Paul MN
Dr. Tom Skalbeck, Entomologist, USDA Forest Service, North Central Research Station, USDA Forest Service, St. Paul MN
Ron McRoberts, Statistician, USDA Forest Service, North Central Research Station, USDA Forest Service, St. Paul MN
Rose Ingram, Silviculturist, USDA Forest Service, Huron Manistee National Forest
Roger Mech, Entomologist, Michigan DNR
Steve Kunde, Professional Arborist, St. Paul, MN
Steve Cook, Professional Arborist, St. Paul, MN

PRODUCTS AND DUE DATES (from original application form)**:**

The products of this project will be a Master's thesis (Graham Mahal) that addresses the project goals, and associated publications and on line documents that will provide guidelines and advice for the establishment of root graft disruption lines for controlling oak wilt. Such guidelines are in great demand but, except for those resulting from the model developed by Dr. Johann Bruhn, are lacking. Unfortunately, Dr. Bruhn's guidelines are specific to two soil types found in the upper peninsula of Michigan, and are probably not useful in determining barrier placement in other areas. The publications forthcoming from this project should provide some guidance for placing barrier lines with some confidence that the barrier lines will prevent the spread of oak wilt without sacrificing trees to the disease needlessly.

STATUS OF PRODUCTS/PRESENTATIONS: Products will be forthcoming in FY 2002. Data collection took longer than expected, and no publications were produced in FY 2001. The project is still considered on time, and publications will be prepared in FY 2002.

ACCOMPLISHMENTS TO DATE:

Products: None to date; expected in FY 2002.

Publications: None to date; expected in FY 2002

Technology Transfer: None to date; expected in FY 2002

BRIEF DESCRIPTION OF ACCOMPLISHMENTS AND RESULTS:

> Equipment for precise mapping of trees in oak wilt centers and barrier control lines, and software/hardware for analyzing the maps and data were obtained.

> Several oak wilt infection centers in Michigan and Minnesota were mapped; data was stored for later analysis. Field work, including the mapping of many more infection centers, is continuing throughout the fall. Seventy plots were established in the Minneapolis/St. Paul metropolitan area. Forty plots have been established on sites dominated by coarse sandy soils on the Anoka sand plain in the community of Ham Lake, Minnesota. Ten plots were established for sites treated in each of the years 1996 through 1999. Complete stem maps of all oak trees on the sites were obtained, and data were recorded for each oak tree on the site, including species, diameter, health status and position inside or outside of the oak wilt treatment areas.

> Graham Mahal , a graduate student in Forest Resources at the University of Minnesota is analyzing several different models developed for oak wilt barrier line placement. He will be analyzing data collected during FY 2000 and FY 2002 during the fall of 2001. He is expected to complete his Master's thesis by January, 2002.

DOCUMENTATION: Publications, including Graham Mahal's Master's Thesis, will be developed FY 2002. Information on this project will be presented at the 2002 meeting of the American Phytopathological Society, and at other regional meetings in the Northeastern U.S. When these publications become available, they will be sent along with the final progress report.

FIRST FISCAL YEAR FUNDED: 2000

FUNDS OBLIGATED FROM BEGINNING OF PROJECT THROUGH FINAL FISCAL YEAR (extend table as needed)**:**

Fiscal Year	STDP Funding	Other-Source funding	Source
2000	**$27,000**	**$60,000**	**MN Legislative Committee on Natural Resources (LCMR)**

FUNDS NOT USED FROM PREVIOUS FISCAL YEAR: All funds obtained from STDP have been utilized. No additional funds are requested from STDP.