

CURRENT STATUS OF BEECH BARK DISEASE

IN NEW ENGLAND AND NEW YORK¹

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Abstract.-- The advancing front of beech bark disease in the northeast is now located in western New York and Pennsylvania. The disease is killing trees as far west as central New York. Cryptococcus fagisuga scale was found on nearly every tree examined during a northern New England disease survey. From that survey and Resource Evaluation plot data, beech mortality is estimated as high as 50 percent in Maine and about 30 percent in New Hampshire and Vermont.

INTRODUCTION

Beech bark disease has been spreading westward throughout New England into New York and Pennsylvania since the early 1930's when the disease was first discovered in Maine (Houston et al. 1979). Its spread throughout the northeastern states follows three stages: the advancing front, the killing front, and the aftermath zone (Shigo 1972). The advancing front, characterized by scattered Cryptococcus fagisuga Lind. scale populations, is presently located in western New York and north-central Pennsylvania. The killing front is found in central New York and northeastern Pennsylvania. Here heavy Nectria infection is causing mortality at a high rate. The aftermath zone is in Maine and New Hampshire, where the disease has been present the longest. In these areas scale and Nectria populations are endemic, beech sprout thickets are abundant, and many trees are defective (Houston 1975).

MATERIALS AND METHODS

From 1975 to 1977, the Forest Pest Management group of the USDA Forest Service, Northeastern Area, State & Private Forestry, conducted a survey to determine the relative

prevalence of the causal organisms of beech bark disease, including C. fagisuga, Nectria coccinea var. faginata Lohman, Watson, and Ayers, and Xylococcus betulae (Perg.) Morrison. Northeastern Forest Experiment Station Resource Evaluation permanent survey plots in Maine, New Hampshire, Vermont, and New York were used to obtain a well-distributed sample. Few Resource Evaluation plots in southern New England contained beech, therefore Massachusetts, Connecticut, and Rhode Island were not included in the survey. Recently, Resource Evaluation crews were asked to continue the surveys in Maine and New York. Since these surveys have only just concluded, few data are available from those states. However, Forest Pest Management has compiled preliminary results for New Hampshire, Vermont, and several counties in Maine.

RESULTS AND DISCUSSION

Overall, populations of C. fagisuga scale were low throughout the three states surveyed. However, scale was present on every plot examined. Of the nearly 1000 trees examined, only 12 trees less than 8 inches in diameter and 2 trees greater than 8 inches in diameter were found uninfested. Various amounts of Nectria fruiting and X. betulae were noted throughout the survey area. Figure 1 illustrates the advancing front in western New York, where only scale is present on the majority of the plots, and the killing front throughout the central portions of the state where Nectria is abundant.

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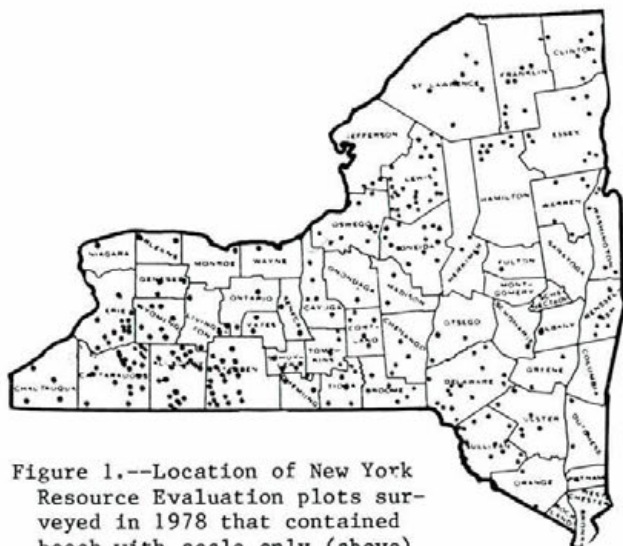
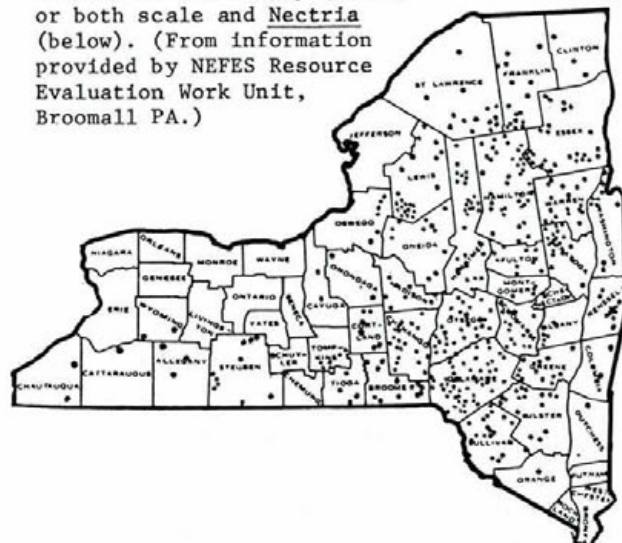


Figure 1.--Location of New York Resource Evaluation plots surveyed in 1978 that contained beech with scale only (above) or both scale and *Nectria* (below). (From information provided by NEFES Resource Evaluation Work Unit, Broomall PA.)



Mortality differed from plot to plot, but was found on about half of the plots examined. (The number of beech trees per plot ranged from 1 to 20, the smallest average number being in New Hampshire.) Overall, a higher percentage of the larger diameter trees have died from the disease (Fig. 2).

Table 1 shows the beech mortality on the Forest Survey plots from the early 1940's to 1970 and from 1970 to 1977. For trees greater than 8 inches in diameter at breast height, losses range from 24 percent in New Hampshire to 50 percent in Maine.

Comparing percent mortality in the aftermath zone in Maine with the killing front in Vermont suggests that a higher percentage of smaller trees are now being killed by the disease in the aftermath zone (Table 2). In Hancock County, Maine, where the disease

has been active for more than 40 years, more than 50 percent of the trees in the 5- to 11-inch diameter classes are now dead; less than 20 percent of these smaller trees are dead in Vermont.

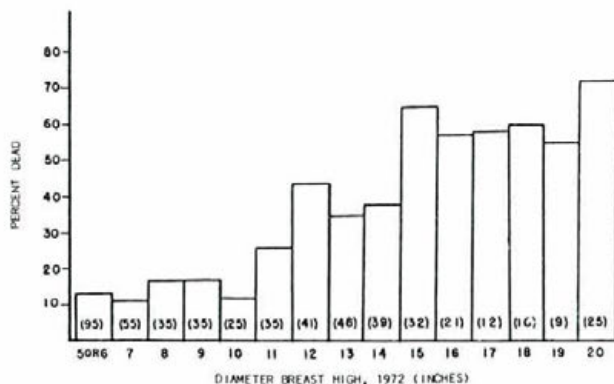


Figure 2.--Distribution of beech mortality in northern New England by diameter class. (Number of trees in each class in parentheses.)

From mortality, damage, and tree volume estimates, the merchantable timber volume loss to beech bark disease in Vermont was estimated at nearly 300 million board feet. This includes the volume of trees killed (135 million bd. ft.), the volume of dying trees (62 million bd. ft.), and the volume of live trees rendered cull by the disease (95 million bd. ft.). Merchantable timber losses have not yet been calculated for the other states in the survey.

Table 1.--Cumulative beech mortality on forest survey plots in New Hampshire, Vermont and Maine up to 1970 and 1970 to 1977.^a

State	Percent mortality			
	>8" DBH ^b		<8" DBH	
	1970	1977	1970	1977
New Hampshire				
State & private lands	20	24	8	12
National forest land	19	30	7	19
Vermont				
State & private lands	29	37	18	18
National forest land	29	32	35	35
Maine				
Hancock County	29	50	23	54
Franklin and Oxford Counties	23	29	44	44

^a Based on USDA Forest Service Resource Evaluation plot data and Pest Management disease survey data.

^b Tree diameter at breast height in 1971 for New Hampshire, 1972 for Vermont, and 1968 for Maine.

Table 2.--Cumulative beech mortality (in percent) by diameter class on forest survey plots in Vermont and Hancock County, Maine from the time of initial infection until 1977. (Number of trees examined in parentheses)

State	Diameter class (inches)				
	5-7	8-11	12-15	16-19	20-22
Hancock County, Maine ^a	58(24)	50(16)	40(10)	100(1)	100(1)
Vermont ^b	12(150)	18(130)	44(158)	58(52)	72(25)

^aInfection present 40+ years.

^bInfection present 20+ years.

RÉSUMÉ

La maladie de l'écorce du hêtre s'est étendue vers l'ouest depuis sa découverte dans le Maine au début des années trente. Des populations de la cochenille *Cryptococcus fagisuga* se retrouvent maintenant dans l'ouest de l'état de New-York et le centre de la Pennsylvanie. L'avance meurtrière, caractérisée par un taux élevé de mortalité des arbres causée par des infections graves de *Nectria* se situe dans le centre de New-York et le nord-est de la Pennsylvanie. La zone ravagée inclut le Maine et le New-Hampshire.

De 1975 à 1977, des équipes du groupe Forest Pest Management ont visité les parcelles de l'Unité Forest Resource Evaluation situées dans le New-Hampshire, le Vermont et plusieurs comtés du Maine, pour déterminer la présence du *C. fagisuga*, du *Nectria coccinea* var. *faginata*, et du *Xylococcus betulae*. La cochenille *C. fagisuga* fut retrouvée sur presque chaque arbre examiné. On estime que jusqu'à 50% des hêtres dans le Maine et environ 30% dans le New-Hampshire et le Vermont sont morts à cause de la maladie. En général, une plus grande proportion d'arbres à fort diamètre sont morts. Dans la forêt ravagée du Maine, plus de 50% des arbres de petit diamètre (5-11 pouces au d.h.p.) sont morts, comparativement à moins de 20% au Vermont. Dans cet état, près de 300 millions de pieds mesure de bois furent perdus à cause de la maladie.

ZUSAMMENFASSUNG

Seit die Buchen-Rindennekrose um 1930 in Maine entdeckt wurde, hat sich die Krankheit stetig nach Westen ausgebreitet. Die Buchenwollschilde (Cryptococcus fagisuga) ist derzeit im westlichen New York und im mittleren Pennsylvanien anzutreffen. Die "killing front", die als Folge starken Nectria-Befalls durch hohe Sterberaten der Buchen gekennzeichnet ist, verläuft im mittleren New York und dem nordöstlichen Pennsylvanien. Die "aftermath zone", also das Gebiet, über das die Krankheit bereits hinweggegangen ist, umfaßt Maine und New Hampshire.

Von 1975 bis 1977 wurden auf Beobachtungspartzen in New Hampshire, Vermont und Maine Bestandsaufnahmen durchgeführt und das Auftreten von *C. fagisuga*, *Nectria coccinea* var. *faginata* und *Xylococcus betulae* registriert. *C. fagisuga* wurde dabei an fast jeder untersuchten Buche (*Fagus grandifolia*) festgestellt. Nach Schätzungen sind in Maine fast 50% und in New Hampshire rund 30% der Buchen als Folge der Krankheit abgestorben. Dabei ist der Anteil der Bäume mit größerem Stammdurchmesser noch höher. Im "aftermath forest" in Maine sind über 50% der dünneren Buchen (12,5 - 27,5 cm BHD) abgestorben, im Vergleich dazu in Vermont weniger als 20%. In Vermont gingen durch die Krankheit fast 8 Mio. fm Buchenholz verloren.

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