NURSERY DISEASE WORKSHOP

EASTERN SESSION - CHARLESTON, S.C.

C. E. Cordell, 1/ T. H. Filer, Jr., 2/ S. J. Rowan 3/

INTRODUCTION

The South presently leads the Nation in nursery seedling production and reforestation. Throughout the South there have been over 15.3 million acres of plantations established during the past 40 years. In the next 14 years, it is estimated that another 34 million acres of pine and hardwoods will be planted or converted to produce the necessary wood fiber for use by the year 2000. Seedling capacity in our southern nurseries is 1.2 billion, with an annual production of 750 million seedlings being produced in 57 state, industry, and federal nurseries.

As might be expected, the greatest variety of nursery seedling species are also produced in the South on the widest variety of soil sites and environmental exposures. Annual seedling production includes over six species of pines, five to six related conifers, and over a dozen species of

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hardwoods. For example, one state nursery in Virginia produces some 30 species of conifers and hardwoods annually. Nursery sites and environmental exposures range from the mountains of western North Carolina, western Virginia, and eastern Kentucky to the subtropics of southern Florida and Puerto Rico.

Accelerating operational costs and corresponding high-value products presently realized in our southern nurseries have significantly increased the impact of a variety of disease problems on both conifers and hardwoods. For example, seedling costs presently range from $8.00 to over $200/M seedlings. Nursery pest control costs such as soil fumigation have nearly doubled during the past 5 years.

Consequently, some of our highest forest resource values are at stake, demanding the utmost in disease protection and affording control action that is uneconomical and/or impractical on other forest resources.

OBJECTIVES

The objectives of our workshop today are to review and discuss the major disease problems presently occurring in our southern forest tree nurseries along with the recommended and registered control procedures to reduce their impact. Full participation from all workshop attendees is encouraged throughout our informal discussions.

Larry Barber, Entomologist, FI&DM, SA-S&PF, Asheville, N.C. is also available for any particular questions and comments concerning nursery insect problems.

NURSERY DISEASE STATUS AND CONTROL

Fusiform rust and soil-borne diseases continue to be the most serious and economically important problems in southern forest tree nurseries. Root rot and damping-off diseases, caused by a variety of soil-borne pathogenic fungi, have caused significant losses to both conifer and hardwood seedlings in widespread nursery locations.

HARDWOOD SEEDLING DISEASE PROBLEMS - T. H. Filer, Jr.

Sweetgum, green ash, yellow-poplar, sycamore, black locust, black walnut, cherrybark oak, and sawtoothed oak are the primary hardwood seedling species being grown in large numbers in nurseries. The most important disease is pre-emergence and post-emergence damping-off. This results in low and unequal seedling density, non-uniform size of existing seedlings, and high production cost. Soil fumigation reduces losses from damping-off but does not give complete control. Results of previous studies show that several systemic and non-systemic chemical seed treatments appear promising for damping-off control.

Cylindrocladium root rot is a major problem in some nurseries. Yellow-poplar, black walnut, and sweetgum are the most susceptible. Nursery beds must be fumigated to prevent losses.

Leaf blotch caused by Gloeosporium is a serious problem of yellow-poplar. The fungus causes leaf loss and mortality of seedlings throughout the growing season, but most mortality occurs during May, June and July. Defoliation results in death because the seedlings probably do not have enough root reserves to produce new leaves.

Septoria leaf spot and Melampsora rust cause economic losses in cottonwood nurseries by reduction in number and size of plantable cuttings. Rust can be controlled with Benlate®, Kocide and Plantvax at 10- to 14-day intervals. Disease resistant planting stock is being developed at Stoneville but will be several years before clones will be released for commercial use.

IMPORTANT NURSERY DISEASES OF SOUTHERN PINES - S. J. Rowan

The importance of nursery diseases are measured simply, by their impact on seedling production. Inflation is rapidly changing the economics of producing seedling crops and causing more importance to be placed on seed, seedlings, and, consequently, disease losses. Observations in Georgia and Florida nurseries during the 17-year period, 1959 to 1975, recorded an average annual loss to fusiform rust of 2.5% in slash and loblolly seedlings sprayed with ferbam. This disease appears to be the most important disease of conifer seedlings in southern nurseries. Incidence of fusiform rust is correlated with the abundance of susceptible oaks near a site and oak eradication should help reduce the rust hazard in nurseries. Ferbam is being reviewed for it's usefulness and environmental pollution potential and, consequently, could be removed from the market (Stevenson discovered this to be a true statement after the meetings by reading "Pesticide Chemical News"). Work is underway to determine the effectiveness of several systemic fungicides for rust control and preliminary results are encouraging.

CYLINDROCLADIUM ROOT ROT — C. E. Cordell

Cylindrocladium root rot, caused by the soil pathogenic fungi *Cylindrocladium scoparium* and C. *floridanum,* has been associated with widespread severe damage to several species of southern hardwood seedlings during recent years. Seedling species damaged most severely and consistently have been black walnut *(Juglans nigra)* and yellow-poplar *(Liriodendron tulipifera)* where 50% or more losses have been realized in at least six southern nurseries during the past five years. Artificial greenhouse root rot and damping-off fungus inoculations have demonstrated variable disease susceptibility on several commercially - grown species of both hardwood and conifer seedlings.

Root rot symptoms on hardwood seedlings such as black walnut and yellow-poplar involve a highly conspicuous blackening cf the tap and lateral roots (particularly on yellow-poplar) frequently associated with a longitudinal cracking of the root cortex. Foliage symptoms and mortality usually occur earlier and are much more severe on black walnut than on yellow-poplar.

Cylindrocladium root rot continues to cause localized severe recurrent damage to black walnut and yellow-poplar seedlings in southern nurseries where the disease presence is now known in 15 nurseries in 9 states. In addition, the disease has been found in one yellow-poplar plantation and one sweetgum *(Liquidambar styraciflua)* natural stand near Athens, GA. More recently, the disease has been found on Caribbean pine *(Pinus caribea)* potted seedlings in a Puerto Rico Nursery and in nurseries and field plantings of several species of both pines and hardwoods *(Eucalyptus sp.)* in Brazil.

Field plantings of black walnut and yellow-poplar in North Carolina and Tennessee, respectively, showed variable cylindrocladium root rot mortality over a five-year period. Black walnut mortality in an eastern North Carolina field planting was approximately 75%. Mortality in a yellow-poplar planting in western Tennessee, however, was approximately 25%.

Results obtained from cylindrocladium root rot control studies in two North Carolina nurseries showed that the preplant soil fumigant MC-33® (methyl bromide - 67%; chloropicrin - 33%) was most effective in controlling the disease in nursery seed beds. MC-3f is currently registered for use as a preplant soil fumigant in southern forest tree nurseries. In addition, for the deeper-rooted hardwood seedling species such as black walnut, yellow-poplar, and sweetgum, disease control effectiveness was increased by applying the fumigant at deeper soil depths (12+ in.) and at higher dosage rates (600-700 lb./ac.).

Consequently, cylindrocladium root rot is presently considered as a very serious disease problem and potential threat in both hardwood tree nurseries and field plantings. Therefore, nurserymen and field foresters should be alerted to the disease and become familiar with its field diagnosis characteristics, host species involved, and practical control remedies.