

Mycorrhizae and Phosphorus Nutrition of Pine Seedlings in a Prairie Soil Nursery

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CONTENTS

	Page
Introduction	583
Experimental	585
Inoculation of nursery seedbeds	588
Nutrient absorption by inoculated and uninoculated pine	588
Responses of jack pine to nitrogen and phosphorus	594
Growth of jack pine on several surface soils..	598
Effect of soil inoculation and fertilization on the root systems of pine	598
Discussion	602
Summary	609
Literature cited	610

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The relation of the mycorrhizal soil fungi to the growth of conifers has long been a controversial subject.³ Recent experiments in nursery production, in afforestation and in extending the range of certain species of conifers (11, 14, 21, 32, 36, 37, 38) have reemphasized the importance of these fungi in promoting tree growth and aiding nutrition. Nonetheless, the manner in which these organisms work is still obscure, and growth stimulation of seedlings has been attributed both to effects resulting from the invasion of short roots by fungi and to the activity of the fungus in the soil adjacent to the roots.

The invasion of the short roots by the fungus commonly results in the formation of ectotrophic mycorrhizae which are characterized by an external fungal mantle and an internal Hartig net (16). When the fungus is more active, intracellular haustoria (48) are formed in addition to the intercellular net, and these types of mycorrhizae have been called ectendotrophic. The nature of the fungal infection is apparently dependent to a considerable degree upon the species of fungus and the relative vigor of both the host plant and the fungus. Endotrophic mycorrhizae, which are characterized by intracellular infection, but which lack the fungal mantle and Hartig net, are apparently not common among the pines.

When mycorrhizae are formed, the root system of the plant is often enlarged. According to Hatch (15) this enlargement results in better mineral nutrition. Better nutrition is derived directly from the greater number of absorbing short roots, the greater surface area of individual mycorrhizal roots, the delay in suberization of the cortex and endodermis, and the great extension of the fungal mycelium through the soil. Mycorrhizae are also claimed to enable trees to acquire an increased supply of any limiting

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³ The literature on this subject has been extensively reviewed by Kelley (20), Hatch (15) and Rayner (35).

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