The Role of EctoMycorrhizae in Drought Tolerance of Douglas-Fir Seedlings

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SUMMARY

Photosynthetic rate of Rhizopogon inoculated seedlings 24 hour following rewatering was 7x that of nonmycorrhizal seedlings. The transpiration rate of Rhizopogon inoculated seedlings was high during periods of soil water availability but declined rapidly during the drought period, and after rewatering quickly resumed a transpiration rate higher than for other treatments.

Since in the Pacific Northwest climate root growth is largely limited to spring and fall when soil moisture is available and temperatures may be cool, seasonal drought avoidance could be achieved by mycorrhizal fungi able to grow and colonize roots at cool soil temperatures. Increased absorptive capacity, more rapid recovery of photosynthetic activity, and increased chances for survival during the drought are other benefits. Rhizopogon colonized seedlings outperformed Laccaria, Pisolistus, an unidentified native mycorrhizal and non mycorrhizal seedlings.

Rhizopogon inoculation increases needle area in both stressed and non-stressed Douglas-fir seedlings.