From Forest Nursery Notes, Winter 2011

86. © How mycorrhizae can improve plant quality. Amaranthus, M. P., Simpson, L., and Landis, T. D. International Plant Propagators' Society, combined proceedings, 2009, 59:296-301. 2010.

How Mycorrhizae Can Improve Plant Quality©

Michael P. Amaranthus, Larry Simpson, and Thomas D. Landis
Mycorrhizal Applications Inc., 810 NW E Street, Grants Pass, Oregon 97526
Email: info@mycorrhizae.com

WHAT ARE MYCORRHIZAE?

A mycorrhiza (plural mycorrhizae) is an anatomical structure that results from a symbiotic association between a soil fungus and plant roots. In exchange for a "home," the fungus provides numerous benefits to the host plant which we'll discuss in the next section. Mycorrhizal fungi produce an extensive network of microscopic hyphal threads that extend into the surrounding soil or growing medium (Fig. 1).

Literally thousands of research papers have been written on mycorrhizal fungi, but many growers are unsure whether their plants have mycorrhizae or how to identify them. Numerous brands of commerical mycorrhizal inoculums are available but, unfortunately, some have been marketed as a "silver bullet" that will cure all your propagation problems. Since you are all experienced propagators who already know how to grow plants, we'd like to share with you how to make them even better.

BENEFITS OF MYCORRHIZAE

The numerous benefits of mycorrhizae can be divided into those that help to grow plants in the nursery and those that improve sales or outplanting performance.

Nursery Benefits. The hyphal network of mycorrhizal roots (Fig. 1) greatly increases the access and uptake of water and mineral nutrients. However, because growers supply these normally limiting factors, the benefits of mycorrhizae are often much harder to see in nurseries. Progressive propagators are looking for ways to minimize potentially polluting nutrients such as nitrogen and phosphorus in runoff water and inoculating your plants with mycorrhizae can do just that (Sharma and Adholeya, 2004). Mycorrhizae greatly increase rooting volume physiology which translates to faster growth and a shorter production cycle (Gianinazzi et al., 1990). A dramatic example demonstrating the benefits of mycorrhizae can be seen in bareroot nurseries following soil sterilization by fumigation. Fungal re-colonization can be very slow and irregular producing a mosaic pattern of normal and stunted plants (Fig. 2). Mycorrhizae also protect roots against pathogenic root fungi due to both the physical effects of a mycorrhizal-produced chitin cell wall covering and certain chemical effects such as antibiotic exudates (Linderman, 1994).

After-the-Sale and Marketing Benefits. The mycorrhizal benefits of increased access to water and mineral nutrients and protection from root pathogens continue after the plants leave the nursery. This is especially valuable when plants encounter stressful transplant or outplanting situations as has been repeatedly demonstrated in horticultural research and ecological restoration projects where mycorrhizal plants greatly outperform non-inoculated controls (Klironomos et al., 2008; Meikle and Amaranthus, 2008; Steinfeld et al., 2003).

Marketing mycorrhizal-inoculated plants also increases their value and "green appeal." Knowledgeable customers and consumers recognize the noticeably larger root plugs and root systems typical of mycorrhizal plants. They know that more