Innoculation of Almond Rootstock with Symbiotic Arbuscular Mycorrhizal Fungi

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Objectives:

1. Determine if there is value in adding AM fungi inoculum, particularly at planting of bare root (field grown) and the potted-plant nursery stock.
2. Determine if pre-plant fumigation impacts the extent and nature of mycorrhizal populations in the soil and is this of consequence?
3. Characterize the mycorrhizal fungi populations present on field grown nursery stock vs. potted plants at the time of planting and the resulting tree performance.

Interpretive Summary:

Soil borne arbuscular mycorrhizal (AM) fungus forms a symbiotic (mutualistic) relationship with most plants. The fungus colonizes the root and grows out into the soil. Hyphae net work, the part of the fungus that's in the soil acts as an extension of the root system. The AM symbiosis improves plant phosphorus, nitrogen and mineral nutrition resulting in a 5 to 20% increase in photosynthesis in normal soils. Evidence also suggests the symbiosis provides protection of the plant against pathogens and improves plant water relations**.** In addition to facilitating nutrient uptake, some mycorrhizae secrete a gluey substance, called glomalin, which helps develop soil structure and soil aggregation favorable for plant growth. Field trials on many horticultural, vegetable, grain and tree crops have shown yield gains of as much as 50% in the presence of healthy mycorrhizae populations.

Molecular technologies are powerful tools to reveal exciting and unforeseen details of AM fungi and the symbiosis. The genome project of *Glomus intraradices* should provide valuable insights on the enhancement this beneficial symbiosis. However there is very limited research being conducted on using AM mycorrhizal fungi to improve almond root system. Numerous research publications have documented the AM symbiotic association with roots can increase mineral nutrition uptake, disease resistance and water stress tolerance to plants while optimizing the conservation of soil and water resources. Utilization of these AM fungi by almond growers may generate multiple benefits resulting in economic gains and environmental sustainment.

The purpose of this study is to determine if specific practices associated with planting almonds (e.g., pre-plant fumigation, inoculation with AM, or other factors like choice of field grown vs. potted nursery stock) have an impact on AM fungal populations to the extent subsequent tree performance is affected.