

### **Abstract**

The growth response of greenhouse cucumbers (*Cucumis sativus*) to infection by vesicular-arbuscular mycorrhizal (VAM) fungi was determined from plant establishment to full maturity, under varying levels of P nutrition. Infection of plants by VAM species (*Glomus mosseae*, *G. dimorphicum* and *G. intraradices*) decreased as the level of P nutrition increased. Other than the stunting of plant growth at low levels of P nutrition, visual symptoms of P deficiency were not apparent during plant establishment. However, leaves of P-deficient mature plants had localized, desiccated areas in the interveinal regions. Leaf area and plant dry weight components were greatly increased by VAM infection and increasing P nutrition during plant establishment. Moreover, from seeding to 38 DAP, VAM stimulated plant growth at all levels of P nutrition. During establishment, plant P concentration increased with P nutrition and decreased with time. VAM-infected plants accumulated more total P in roots, stems and leaves than nonmycorrhizal plants. The concentration of soluble nitrogen in plant tissues decreased with increasing P nutrition and time, and VAM-infection influenced total nitrogen accumulation and the rate of change in soluble nitrogen pools over time. Leaf and root total soluble carbohydrate concentration increased faster during growth of control plants, as compared with VAM plants.

VAM did not enhance total fruit yield per plant at any level of P nutrition. However, VAM-infected plants produced more fruit than nonmycorrhizal plants during the first two weeks of production, resulting in higher early yields from VAM plants. Total yield increased significantly with increasing P nutrition. Phosphorus nutrition affected the postharvest respiration rates of fruit such that low P plants produced fruit with higher respiration rates than those from high P plants. Fruit P concentration was also lower in fruit from low P plants. VAM infection resulted in higher fruit respiration rates.