Graham, JH, LW Duncan and DM Eissenstat. 1997. Carbohydrate allocation patterns in citrus genotypes as affected by phosphorus nutrition, mycorrhizal colonization and mycorrhizal dependency. *New Phytologist* 135: 335-343.

Abstract

Among closely related citrus genotypes growing in high phosphorus (P) orchard soils, there is a tendency for less mycorrhizal-dependent (M-dependent) species to have lower rates of root colonization than more M-dependent species. We hypothesized that the less M-dependent the citrus species the more limited is their carbohydrate (CHO) allocation to the M fungus. In a glasshouse study, at low and high P supply, lower total incidence of *Glomus intraradices* FL 208, intensity of vesicle formation, and accumulation of 16:1W5cis fungal fatty acid as measures of root colonization were related to lower mycorrhizal dependency (MD; M plant d. wt/non-mycorrhizal (NM) plant d. wt expressed at low P supply) in five citrus genotypes. At high P supply, when host carbon (C) production was not affected by P nutrition, less M-dependent genotypes had consistently lower starch concentrations in their root and shoot tissue than did more M-dependent genotypes, irrespective of M inoculation. At low P supply, M plants were more heavily colonized by *G. intraradices* and had lower starch levels than the M plants supplied with additional P. At high P, M plants of the more dependent genotypes allocated more C to starch pools relative to the NM plant than the least dependent genotype. Concentration of sucrose in tissues did not vary consistently with the dependency of the citrus genotypes or with M inoculation except in high P NM plants, when less M-dependent genotypes had lower levels of sucrose in their roots than the more dependent species. At high P supply, sucrose concentrations were lower in colonized roots than in NM roots. Across citrus genotypes, sucrose in M fibrous roots decreased relative to that in NM roots with increased root colonization suggesting that more sucrose was allocated for growth and maintenance of *G. intraradices* in roots of M-dependent species. The concentration of reducing sugars in root tissues varied in relation to MD of citrus genotypes in the same way as that of starch and sucrose, but was less responsive to M colonization. Responses of total non-structural CHO in tissues indicated that more heavily colonized plants at low P expended more C to acquire P than did M plants of similar biomass and P status grown at high P supply. Total CHO pools increased with MD of citrus genotypes, providing evidence that C allocation patterns in the host affect M colonization.