The Effects of Glomus intraradices on Root Growth and Nitrogen Consumption of Italian Genovese Basil in the Kratky System

Davies, Summer (School: Strawberry Crest High School)

Arbuscular mycorrhizal fungi (AMF) is a biological process enhancing soil stability and nutrient cycling. With a surging global population, increased crop yields exploit nutrient and water application. Nitrogen (N) losses occur from nutrient deficient soils, which require increased fertilizer application. Previous experimentation has concluded AMF extends root systems while nitrogen increases plant biomass; however, AMF's effects on nitrogen absorption for overall plant health remains to be determined. Meanwhile, there lacks considerable research on AMF's effects in water-conserving hydroponic systems. One crop utilized worldwide for traditional food dishes is Italian Genovese basil (Ocimum basilicum). It excels hydroponically and when forming hyphae connections with AMF, like Glomus intraradices. During this experiment, 40 O. basilicum were grown from seed; 20 in 50 ppm N and 20 in 350 ppm N. Ten 50 ppm plants and ten 350 ppm plants were AMF inoculated. All plants grew in Kratky hydroponics for three months to obtain accurate root and shoot growth. Dried roots and shoots were massed separately. Root/shoot ratios were calculated to determine if G. intraradices disproportionately grew root networks compared to the entire plant. Pearson statistical testing confirmed root and shoot mass correlation. Mycorrhizal inoculation by G. intraradices significantly increased O. basilicum’s root growth. Higher nitrogen concentrations generated larger root/shoot ratios. Results largely apply to sustainable agriculture, where G. intraradices increases basil root networks for nutrient absorption. Moreover, optimum nitrogen maximizes root/shoot ratios for healthy plants. By achieving results with an efficient Kratky system, methods apply to areas with water shortages.

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