Title: Phosphatic nutrition affects biomass production, photosynthetic pigment concentration and artemisinin biosynthesis in *A. annua* plants grown in presence or not of *F. mosseae*

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*Abstract: (175 to 275 words)

Artemisia annua L. belongs to the family Asteraceae, and it is appreciated for the production of various secondary metabolites, among which the artemisinin, a sesquiterpene lactone used for malaria treatment. It is well known from the literature that phosphatic (P) nutrition and arbuscular mycorrhizal (AM) fungi can affect plant growth and physiology, also in term of secondary metabolite production. In this work, plants of *A. annua*, inoculated or not with the AM fungus *Funneliformis mosseae* were cultivated for 2 months in controlled conditions and irrigated with Long Ashton nutrient solution at three different P concentrations (32, 96, and 288 µM). At harvest, the fungal colonization in the roots, and the fresh and dry weight of different plant organs were evaluated. Chlorophyll and carotenoid concentration were determined spectrophotometrically using the following wavelengths: 663.8 nm, 646.8 nm, and 480 nm. The leaf artemisinin content was detected by HPLC and MS analyses. Moreover, the shoot and root mineral uptake was assessed by ICP-OES analysis, after samples digestion in nitric acid. Results showed that different P levels significantly affected plant biomass production, AM colonization, and mineral acquisition. The establishmet of the symbiosis was negatively influenced by the high P levels. The artemisinin concentration was inversely correlated to the P level in the substrate. In general, the fungus mainly affected root growth and nutrient uptake and significantly lowered leaf artemisinin concentration. In conclusion, P nutrition can influence plant biomass production and the lowest phosphate level led to the highest artemisinin concentration, irrespective of the plant mineral uptake. The plant-fungus interaction can be modulated by cost–benefit ratios of the mutualistic exchange between the partners and nutrient availability in the substrate.

Keywords: mugwort, P supply, AM fungi, secondary metabolites