

The use of coffee waste in growing media having biostimulants effects on the production of *Brassica* seedlings in nurseries

Antonios Chrysargyris¹, Omiros Antoniou¹, Panayiota Xylia¹, Spyridon Petropoulos², Nikos Tzortzakis^{1,*}

¹Department of Agricultural Sciences, Biotechnology and Food Science, Cyprus University of Technology, Lemesos, 3603, Cyprus.

²Department of Agriculture, Crop Production and Rural Environment, University of Thessaly, N. Ionia, 38446 Magnissia, Greece.

Abstract

Large quantities of coffee waste (CW) are generated the last decades and their recycling is of research interest challenge. In the present study, CW was used for peat (P) replacement in growing media for *Brassica* seedling production. Cauliflower, broccoli and cabbage were seeded in growing media consisted of 0-2.5-5-10% CW. The mixture of CW with peat affected physicochemical properties of the growing media, providing also considerable amount of minerals for the seedling growth needs. Seed emergence was stimulated in 2.5-5% of CW for cauliflower and at 2.5% of CW for cabbage, while 10% of CW decreased the percentage and increased the mean emergence time of the examined species. Plant biomass and leaf number were increased at 2.5% CW for broccoli and cabbage but maintained at cauliflower when compared to control. The CW at 10% decreased stomatal conductance of broccoli and cabbage (including 2.5-5% CW in cauliflower) while chlorophyll content was increased at 10% of CW media. The insertion of CW affected the mineral accumulation in plants with increases in potassium and decreases in magnesium and iron content. Total phenolics and antioxidant activity (DPPH, FRAP) decreased in $\geq 5\%$ CW at cauliflower and cabbage or unchanged for broccoli when compared to the control. Cellular damage was caused by the addition of CW by increasing the hydrogen peroxides and lipid peroxidation, resulting the plants antioxidative (catalase, superoxide dismutase) enzyme metabolism changes. The current study demonstrates that CW can be used for seed germination biostimulants and/or partially substitute the peat for *Brassica* seedling production.

Keywords: coffee waste; peat; growth; *Brassica oleracea*; vegetables; germination; antioxidants

***Author of correspondence: Dr Nikolaos Tzortzakis**

Mailing address: Department of Agricultural Sciences, Biotechnology and Food Science, Cyprus University of Technology, 3603, Lemesos, Cyprus. E-mail: nikolaos.tzortzakis@cut.ac.cy