

Exploitation of Biochar type and ratio as a peat additive/ partial peat replacement in growing media

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Abstract

Biochar has potential as an additive for partial peat replacement and affecting positive plant growth/yield. In the present study, four commercial grade biochars were selected, three from Europe and one from China. They were all wood based materials of the following feedstocks: Forest wood (Biochar A), Husks and paper fiber (Biochar B), Bamboo (Biochar C), and Wood screenings (Biochar D). Biochar mixed in four ratios (0-5-10-15-20%) with peat (P) examined for the cabbage seedling production. Biochar material had high K content and pH ≥ 8.64 . Therefore, the increased rates of biochars increased the pH and very importantly decreased the EC of the growing media. Biochar A and C at 20% reduced cabbage seed emergence. Biochar C (at 10% and 20%) and Biochar D (>10%) delayed the seed emergence as they had higher mean emergence time (MET) comparing to control treatment (P). Biochar A and B at 5% increased but Biochar B at 20% decreased plant height. Biochar A (at 10%), Biochar B (at 5-10%), Biochar D (at 5-10%) increased seedling fresh weight, while 20% of Biochars B & D and 10% of Biochar C decreased seedling fresh weight. Increasing Biochar ratio resulted in decreased plant dry weight. Leaf fluorescence and SPAD units were differently affected by the Biochar type and ratio. The number of leaves did not differ among types and ratio of Biochar. The addition of Biochars increased N and P content in cabbage leaves. Increasing Biochar ratio into the substrate resulted in increased K content in leaves. Biochars C and D at high levels affected negatively the cabbage root length. An increased stress is occurred when high ratio of Biochar is used (i.e. 20%), while lower ratio (5-10%) can benefit plant growth related parameters and can be used as peat additive in the growing media. Biochars A, B and D are quite promising materials.

Keywords: Biochar; peat; growth; cabbage; *Brassica*; vegetables; germination

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