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Developing reservoir sediment ceramsite as a novel growing medium: II pot experiments

Yi-Hao Chu, Yu-Hsiang Liu, and Chih-Hsin Cheng

School of Forestry and Resource Conservation, National Taiwan University, Taipei 106, Taiwan

Reservoir sedimentation is an environmental issue that can be substantially detrimental to the lifetime of reservoirs. In this study, we tried to develop the ceramsite made from reservoir sediment and used it as a growing medium. Different from the traditional method, we sintered the material at a lower temperature (800°C) under an anaerobic atmosphere. The low-temperature ceramsite might provide higher water and nutrient retention capacity compared to the high-temperature ceramsite. The anaerobic atmosphere could preserve organic matter as biochar, which may offer better water and nutrient retention capacity as well. Pot experiments using the low-temperature ceramsite along with commercial high-temperature ceramsite (1200°C) and lava rock as the growing media were conducted. Two species *Tagetes erecta* and *Melissa officinalis* under the full water supply and limited water supply (100 ml per pot per week) conditions were planted. The results showed that the plants grown in low-temperature/anaerobic ceramsite had the best agronomic performance. Under the full water supply, the shoot height was higher in the low-temperature ceramsite than other treatments. The height was 45.8 - 48.2 vs. 16.28 - 18.73 cm in *Tagetes erecta* and 15.1 - 18 vs. 7.65 - 9.4 cm in *Melissa officinalis*. The dry weight in the low-temperature ceramsite was 5-10 times higher than those in other treatments after four months of growth. Under the water-limited condition, the plants are grown in the low-temperature ceramsite still performed better on shoot height (*Tagetes erecta*: 25.05 - 30.88 cm and *Melissa officinalis*: 14.08 - 14.75 cm) and dry weight (*Tagetes erecta*: 1.03 - 1.5 g and *Melissa officinalis*: 0.67 - 0.89 g). The results suggest that the low-temperature/anaerobic ceramsite has the potential using as a novel growing medium and a new option for treating reservoir sediment.