

Using of growing medium based on bottom sediment as a source of nutrients and an agent for improving soil properties

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Introduction: Several possibilities for the beneficial use of dredged sediments have been recognized, e.g.: erosion control, aquaculture, forestry, shoreline stabilisation, manufacture aggregates, construction uses, and energy production. Most of the uncontaminated or slightly contaminated sediments can be used in agriculture, horticulture and recultivation. The agricultural utilisation of sediments is of the most promising alternatives due to the beneficial properties of sediments that are rich in clay, silt, organic matter, macro- and micronutrition, and microbial activity [1, 2]. The aim of the study were to investigate the effects of the application of the growing medium prepared based on bottom sediment and coffee hulls (75% bottom sediment and 25% coffee hulls) on 1) the physical and chemical properties of soil, and 2) the yield and chemical composition of courgette biomass.

Methods: The bottom sediment was sourced from the Rożnów reservoir located in southern Poland. The Rożnów reservoir is the fastest silting dam reservoir in Poland, especially its backwater area (inlet zone). Four doses of growing medium based on bottom sediment were assessed as part of a pot experiment conducted inside a temperature and moisture controlled condition, and compared with the control (soil). The growing medium in doses of 25%, 50%, 75%, 100% were added to the light soil. The test plants were harvested after 30 days of vegetation. After harvesting, yield was determined. The soils from each treatments were objected to chemical and ecotoxicological analysis.

Results: The soil caused an increase in the soil pH value ranging from 14% to 15% in compare to the treatment without of sediment. The application of sediments increased the biomass of courgette, and no negative effects caused by salts and pollutants were observed. The highest yield was observed in the treatment with a 75 and 100% addition of the growing medium.

Table 1. Effect of the growing medium application on change of pH and yield of tested plant

Treatment	pH	Yield g/pot
Control (soil 100%)	6.33	27.26
25% growing medium	7.37	29.18
50% growing medium	7.40	28.45
75% growing medium	7.41	34.57
100% growing medium	7.42	34.76

Growing medium based on bottom sediment and coffee hulls had deacidifying properties, significant TOC content, and total quantities of macro- and micronutrients. This growing medium, as a soil amendment, have an economical and environmental value.

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References: [1] Baran et al. (2019) *Environmental Engineering and Management Journal*: 18(8): 1647-1656; [2] Szara et al. (2020) *Journal of Environmental Management*:1(273):111176