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Influence of synthetic aggregates as a soil amendment on the grey soils in Okinawa Japan

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The objective of this study was to produce pellet aggregates (PA) from coal fly ash with paper wastes and evaluate their potential utilization as a soil amendment to problematic grey soil in Okinawa, Japan for the production of the leafy vegetable *Brassica campestris*. Furthermore, this can be considered as an effective method of waste management. Two types of pellet aggregates (PA) with 5 mm [small PA (SPA)] and 10 mm [large PA (LPA)] diameters were produced from coal fly ash (CFA) and paper waste (PW). Problematic grey soils in Okinawa Japan were amended with SPA and LPA to improve deprived physic-chemical parameters for the cultivation of *Brassica campestris*. Different treatments of the experiment were grey soil with SPA alone, LPA alone and both SPA and LPA. Soil without any amendment was used as the control. The study was conducted in experimental plots with dimensions of 2.5 m × 0.8 m × 0.6 m. The physicochemical properties of soil-PA amendment mixtures were then analyzed. The growth and yield parameters of *Brassica campestris* were determined. PA addition as a fertilizer and as a soil amendment improved the physical and chemical properties of soil such as bulk density, hydraulic conductivity, water holding capacity, electrical conductivity and the nutrient concentration (K, Mg, Ca, Zn, Cu). The heavy metal concentrations in the PA added media were well below the permissible levels. Moreover PA addition increased the growth and yield parameters of *Brassica campestris* compared to the grey soil control. Plant height, plant fresh weight and plant dry weights of PA amended soil were increased by 15 – 43 %, 44 – 101 % and 44 -73 %, respectively, compared to the control. Moreover, the heavy metal content of the plant tissues were well below the permissible level and no phytotoxic symptoms were observed. It can be concluded that PA can be utilized as a soil amendment to improve crop production in the problematic grey soils in Okinawa, Japan.

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