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A study on organic amendments effect on sandy soil properties and plant growth

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B.Sc. Agric. (Soil Sci.), Cairo University, 2001

A Thesis

Submitted in Partial Fulfillment of the Requirements for the Degree of Master

in

Agricultural Science

(Soils)

Department of Soils and Water

Faculty of Agriculture

Benha University

2020

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in US dollar (1 US dollar= 17 L.E). (see footnote Table 3). Different letters indicate significant differences between treatments ($P<0.05$).

6- Summery

Poor fertility and low water retention at the different soil moisture constants are both limiting factors of crop productivity in sandy soils. Recycling organic wastes might provide such soils with nutritive elements and, at the same time, improves their chemical and physical characteristics. Thus, two organic amendments (biochar and compost) were selected in the current study to investigate their effectiveness as amendments of a sandy soil while considering the following two assumptions: (H1) efficiency of a half dose of biochar or less is comparable to the effect of the full dose of compost for improving soil physical and chemical characteristics. Furthermore, the residual effects of biochar (vs compost) on soil properties seemed to be more noticeable in the successive growing season. (H2) Biochar can negatively affect the bio-availability and concentrations of P and soil micro-nutrients within the areal parts of plants due to its alkaline nature on one hand, and its relatively high persistence in soil, on the other one. Accordingly, a sandy soil (of low buffering capacity) was amended with either biochar (BS at elevated rates) and/or compost (CT), solely or in combination and then planted with peanut. The residual effect of these amendments was investigated in the successive season on wheat. Results revealed that the effect of applying 12.5 Mg Bs ha^{-1} was almost similar to that of

applying 25 Mg CT ha^{-1} during the two seasons of study. On the other hand, the application of only 5 Mg Bs ha^{-1} could improve slightly; but insignificantly some soil characteristics. The combination between "Bs+CT" recorded further significant improvements in the abovementioned characteristics especially at the higher doses of application. Thus, we partially accept the first assumption. To investigate the second one, the availability of N, P, K, Fe, Zn and Mn nutrients was considered in the investigated soil by the end of each growing season in addition to the concentrations of these nutrients within the areal parts of the grown plants. Results obtained herein indicate that biochar underwent considerable decomposition in sandy soils shifting the pH slightly towards alkalinity. . On the other hand, both the biochar and compost could improve significantly the availability of soil macro-and micro- nutrients and hence increased their uptake by the grown plants. These finding does not, therefore, support the second hypothesis. In conclusion, biochar is recommended as a slow release fertilizer for macro- and micro-nutrients when applied at only a half dose of compost and its effect on soil physical and chemical characteristics may extend for more than one year after application.