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Effect of soil additives on the improvement of quality of sandy soil

S. SUGANYA AND R. SIVASAMY

See end of article for authors' affiliations

Correspondence to :
S. Suganya
Department of Soil Science and Agricultural Chemistry,
T.N.A.U., COIMBATORE
(T.N.) INDIA

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ABSTRACT

Soil is one of our most important natural resources. Sandy soils are inherently infertile with their own disadvantage and advantage. Owing to their poor fertility, application of fertilizer nutrients is inevitable for successful crop production. Therefore, an investigation was carried out to improve the nutrient retention characteristics of these sandy soils by amending these soils with locally available soil additives using Finger millet (*Eleusine coracana*) variety Co 13 as the test crop. A pot experiment involving seven treatments *viz.*, control (Sandy soil alone), application of FYM, bentonite, vermiculite, tank silt, termite mound all applied @ 1 % (or) 20 t ha^{-1} and humic acid @ 20 kg ha^{-1} was conducted. Each treatment was replicated six times in a completely randomized design. The results of the pot experiment indicated that the cation exchange capacity of sandy soil was remarkably increased by the application of vermiculite @ 1 % followed by the application of the humic acid @ 20 kg ha^{-1}. The highest improvement in the availability of N, P and K was noticed with the application of vermiculite followed by humic acid. Hence, these results indicated the application of vermiculite @ 1 % (or) 20 t ha^{-1} improved the available nutrient status of the soil.

Key words: Sandy soil, Soil additives, Bentonite, Vermiculite, Humic acid, Cation exchange capacity, Available nutrient status.

Since 'SOIL' is known as the soul of infinite life, continued maintenance of good soil health is vital to agricultural production and nation's economy. Despite the indisputable role of soil for the mankind, animal and plant life, there has been very little concern about soil health care. Soil quality is the capacity of soil to perform a range of productive, environmental and habitat functions. Sandy soils take up a considerable portion of the extent of cultivable land in many countries. A method to improve the nutrient and water retention characteristics of these sandy soils by amending these soils with locally available and long lasting materials like tank silt, bentonite and vermiculite will relieve the burden of poor farmers of investing heavily on fertilizers besides protecting the land and soil from degradation. Different soil additives viz., farm yard manure, bentonite, vermiculite, tank silt, termite mound and humic acid were used to increase the water and nutrient supply capacity of a sandy soil.

Finger millet is one of the major cereal crops of South India and it forms a staple food of the peninsular India next only to rice. In Tamil Nadu, finger millet is grown in about 1,24,958 ha with a production of 2,35,310 tonnes (Anonymous, 2002). Its higher adaptability to moisture stress condition, high protein content of grain is of great value to poor marginal farmers. Hence, in order to get a precise knowledge on the influence of various soil additives on the improvement of quality of sandy soil, an attempt was made using finger millet as the test crop.

MATERIALS AND METHODS

A pot experiment with finger millet was conducted during June-Sep, 2003 at Agricultural College and Research Institute, Coimbatore. The soil used for pot experiment was loamy sand in texture representing Somayanur series with pH 6.46, EC 0.07 d Sm^{-1}, organic carbon 0.34 % and CEC 3 c mol (p^+) kg^{-1}. The amount of $KMnO_4$-N, Olsen-P and NH_4OAc-K were 210, 15.8 and 270 kg ha^{-1}, respectively. The experiment consisted of seven treatments. Each treatment was replicated six times in a completely randomized design. The treatment structure is furnished below.

T_1 : Control (Sandy soil)
T_2 : Sandy soil + FYM @ 1 % level (20 t ha^{-1})
T_3 : Sandy soil + Bentonite @ 1 % level (20 t ha^{-1})
T_4 : Sandy soil + Vermiculite @ 1 % level (20 t ha^{-1})
T_5 : Sandy soil + Tank silt @ 1 % level (20 t ha^{-1})
T_6 : Sandy soil + Termite mound @ 1 % level (20t ha^{-1})
T_7 : Sandy soil + Humic acid @ 20 kg ha^{-1}

A fertilizer dose of 60: 30: 30 kg NPK ha^{-1} was adopted. Fifty per cent of N and full dose of P and K were applied basally. Remaining fifty per cent of N was applied at tillering stage of finger millet crop. The crops were grown to maturity and the yields were recorded at harvest. Soil sample was collected at tillering, flowering