The usability of Isparta-Keçiborlu sulphur mine flotation wastes in the reclamation of highly calcareous sodic soils

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Abstract

This study was carried out on the usability of sulphur mine flotation wastes (SMFW) in the reclamation of calcareous sodic soils. SMFW are formed during the mineral ore beneficiation process and are stored in ponds built around the plant. However, from time to time, there are complaints that SMFW overflows from ponds and damages the environment. SMFW is very acidic (pH =1.0) and, according to chemical tests, it contains free sulphur, iron, and calcium sulphate. Due to these features of SMFW, it is thought that it can be used in calcareous sodic soil rehabilitation and also contribute to the solution of the waste management problem. For this purpose, the field trial was carried out for three years. The soil improvement tests were carried out in random blocks with 3 replicates, and 0, 30, 60, 90, and 120 tons of SMFW per hectare have been used. SMFW raised the infiltration rate of soil by nearly double. At the same time, the effect of SMFW on sodium leaching was very rapid, and exchangeable sodium was removed from the upper layer with 30 cm of leaching water. In conclusion, SMFW improved the physical properties of sodic soils and established low-cost soil reclamation. SMFW doses of 30, 60, 90, and 120 tons per hectare provided exchangeable sodium leach equivalent to 32, 58, 59, and 86 tons of pure gypsum, respectively, and exchangeable sodium percentage (ESP) decreased significantly, particularly in the topsoil layer. These results showed that SMFW can be used in the reclamation of calcareous sodic soils.

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