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Aboveground biomass of forage sorghum *(Sorghum bicolor (L.))* grown in magnesium-saturated soil treated with soil conditioners

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Currently, 8.7% of the planet's soils are affected by salts, including magnesium. In this regard, soils with significant salt quantities can be a limiting factor for agricultural production. Among soil limitations, soil degradation due to salinization is the main reason for productivity loss and other environmental implications in many arid and semi-arid regions of the world, such as the Brazilian semi-arid region and parts of the Pernambuco Agreste. Thus, the aim of this study was to evaluate the biomass productivity of forage sorghum *(Sorghum bicolor (L.))* grown in magnesium-affected soil in response to the action of soil conditioners, agricultural gypsum, and dairy sludge. The experiment was conducted in the greenhouse of the Federal University of Agreste de Pernambuco, in Garanhuns, Pernambuco, Brazil, using forage sorghum, variety IPA 467-4-2. Eight treatments were evaluated, six of which involved the incorporation of conditioners into the soil ten days before seed planting. These treatments included dairy sludge at 100% of the requirement; agricultural gypsum at 100% of the requirement; dairy sludge at 100% of the requirement combined with 100%, 75%, 50%, and 25% of the gypsum requirement. One treatment involved gypsum incorporated into the soil ten days before planting, with dairy sludge added to the soil surface 20 days after seed sowing, while the control treatment had no conditioner added. Each treatment had three replications, with each replication represented by a 15 L pot containing 12 kg of soil and one forage sorghum plant. After 50 days of germination, the plants were cut, and their botanical structures were separated, weighed, and placed in a forced air circulation oven for 72 hours at 55°C. The analyzed variables were leaf green weight (LGW), leaf dry weight (LDW), stem green weight (SGW), stem dry weight (SDW), sheath green weight (SGW), sheath dry weight (SDW), and whole plant green weight (PGW). Subsequently, the data were evaluated using the Scott-Knott mean comparison test at 5% probability using Sisvar® software version 5.8. The different conditioners were able to assist in mitigating the effects of magnesium saturation, with the treatment of dairy sludge plus 25% gypsum requirement standing out, which not only promoted maximum plant development but also reduced field costs. This treatment, dairy sludge plus 25% gypsum, provided increments of 249.64; 40.97; 145.15; 17.22; and 891.00 g compared to the control treatment for the variables LGW, LDW, SGW, SDW, and PGW, respectively. Thus, it is concluded that dairy sludge associated with a 25% gypsum level promoted satisfactory gains in forage sorghum biomass, demonstrating its relevance for optimizing magnesium-affected soils.

Keywords: industrial residue, productivity, dairy sludge, salinity

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