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74626 Estimation of Plant Available Silicon Using Different Extraction Procedures for Selected Soils From the Midwest and South USA.

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The method for quantifying plant-available silicon (Si) is not well-developed and standardized. While several extractants are used for determining plant-available Si, most are often restricted to limited groups of soils. This study was conducted to calibrate different soil extraction procedures for Si using selected soils from the Midwest and South USA. Bulk soil samples were collected from Indiana, Mississippi, Ohio, Michigan, and Louisiana. A total of twelve soil types were selected for this study. Pots were filled with approximately 2 kg of air-dried soils and applied with different rates (0, 1, 2, 4, 6, and 8 Mt ha^{-1}) of calcium silicate slag ($CaSiO_3$, 17% Si) before sowing ryegrass seeds (48 g seeds m^{-2}). Biomass was harvested every 30 days of growth for three months; a total of three samplings at 30 days after emergence (30 DAS), and 30 days of growth after the first (60 DAS) and second (90 DAS) samplings. Soil samples were also collected for each sampling period. Biomass, Si content and uptake were determined, as well as soil Si using different extraction procedures (0.5 M acetic acid, 0.01 M $CaCl_2$, distilled water, 0.5 M NH_4CH_3COOH, 0.1 N $NaCH_3COOH$, and 0.1 M citric acid). Distilled water consistently extracted the lowest amount of Si across soil types while on average, both 0.5 M acetic acid and 0.1 N $NaCH_3COOH$ extracted the largest amount of Si. There were corresponding increases in soil extractable Si with increasing $CaSiO_3$ slag rates however, these changes were only reflected (at specific rates) to ryegrass biomass production and Si uptake on selected soils and if 0.5 M acetic acid solution was used as extractant. The initial findings of this study concur with previous studies which documented that among the solutions, soil Si extracted using 0.5 M acetic acid can provide the best estimate of plant-available Si.