EFFECT OF PHOSPHATE AND SULFATE APPLICATION ON WHEAT (*TRITICUM AESTIVUM*) GRAIN SELENIUM CONTENT AND YIELD COMPONENTS

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Abstract

The interest in Selenium (Se) has increased due to its potential anti-cancer attributes in human health. Wheat (*Triticum aestivum*) will assimilate Se according to soil availability. There is interest in developing a consistent grain supply of high Se wheat for markets in Europe and Asia since plant-available Se in soils of these continents are very low. Agricultural soils in some regions of central and western South Dakota have high Se content. Yet the common plant available forms of Se, selenate and selenite ions, behave very differently from each other and influence overall Plant Se availability. In addition, literature demonstrated that other ions (orthophosphate and sulfate) can affect soil sorption or plant availability of these ionic forms differently. It would be important to document how nutrient management factors influences grain assimilation as it pertains to total Se content. The objectives of this study were to investigate the optimum management of phosphate (P) and sulfate (S) fertilizer on grain Se concentration, protein, and yield. Field studies were conducted at two locations (Lyman and Tripp County) in central South Dakota. Phosphorus fertilizer was applied with three different methods (band with seed, broadcast after planting, and broadcast in Spring) and six different P rates (0, 1, 1.5, 2.0, 2.5, and 3.0 times the P fertilizer recommendation rates as determined by soil testing methods). Sulfate was applied at four different rates (0, 100, 200, 400 kg ha^{-1}) as broadcast topdressing of gypsum ($CaSO_4.2HO$) at planting. Grain yield was significantly affected by interactions of location-method and method-rate of P fertilizer. However, grain yield and protein content were not affected by S fertilization. The Se concentration in wheat grain was found to be strongly influenced by parent material. Phosphorus fertilization did not affect Se concentration in the wheat grain. However, the sulfate application significantly decreased Se concentration in grain.

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