

Article title	Sulfur availability minimizes nitrate leaching losses in vulnerable agricultural soils
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Abstract	<p>Despite the critical need for nitrogen (N) in cropping systems, excessive N fertilizer application has severe environmental consequences. The synergistic interaction between sulfur (S) and N in plant nutrition could be exploited to increase N utilization, thereby maximizing N recovery and reducing losses. In a three-year study at six locations across three countries (USA, Ghana, and Mali), we evaluated the effect of S availability on N leaching losses from N fertilizer application using corn as the study crop. The study consisted of three S sources (micronized elemental sulfur [MES], untreated elemental sulfur [ES], and ammonium sulfate [AS]); five S application rates [(i) site-specific recommended S rate (SR), (ii) ¼ of the recommended S rate (25%_SR) (iii) ½ of the recommended S rate (50%_SR), (iv) ¾ of the recommended S rate (75%_SR); and (v) 1¼ of the recommended S rate (125%_SR)]; and a single N application rate (site-specific recommended N rate). Regardless of the S source, N recovery progressively increased with increasing S application rate. For the AS and MES sources, leachate nitrate concentration from the treatments with S application ≥ SR was statistically similar to that of the background concentrations, and the highest concentrations occurred with the treatment with no S application. Thus, for environmental stewardship, a critical look into S application in cropping systems is a necessity due to its synergistic interaction with N. In addition to improving productivity and enhancing efficient recovery of applied N fertilizers, S availability will minimize nitrate leaching commonly associated with application of N fertilizers.</p>
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