

Article title	Can Optimal Fertilizer Application Rate Differ from Economically Optimal Fertilizer Rate? a Case Study with Zinc Application for Maize Production in Northern Ghana
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Abstract	<p>Although fertilizer recommendations are based on optimal yields, the minimal fertilizer application rate that ensures both high productivity and profitability will be attractive to most farmers. In a three-year study at six locations across the savanna agroecological zones (AEZs) of northern Ghana, we quantified maize yield responses to seven Zn application rates (0 to 15 kg Zn ha⁻¹), and determined the economically optimal Zn rate for maize production. Across all experimental sites and for the three growing seasons, maize grain yield followed the order: 15 kg Zn ha⁻¹ = 12.5 kg Zn ha⁻¹ = 10 kg Zn ha⁻¹ = 7.5 kg Zn ha⁻¹ > 5 kg Zn ha⁻¹ > 2.5 kg Zn ha⁻¹ > control, suggesting that 7.5 kg Zn ha⁻¹ was the optimal Zn application rate. However, based on agro-input prices at local level and farmgate prices of maize, the potential gross profits resulting from Zn application was maximized at 5 kg Zn ha⁻¹ instead. At Zn application rates of 12.5 and 15 kg ha⁻¹, there was a significant increase in grain Zn concentration. From the combined results, we conclude that for increased profitability from the maize production system, Zn application rate of 5 kg ha⁻¹ is economically justified, but for increasing the Zn content of the grains, Zn application rate should not be lower than 12.5 kg ha⁻¹. Nonetheless, unless premium prices are paid for Zn-enriched maize grains, for sustainable and profitable maize production in these Zn-deficient soils of the savanna AEZs of northern Ghana, ideal Zn applications rate should be 5 kg Zn ha⁻¹, although the optimum Zn application rate was observed to be 7.5 kg ha⁻¹.</p>
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