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## Effect of zinc and boron on maize grain yield in agroforestry parklands of northern Ghana

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### Abstract

Nitrogen (N), phosphorus (P) and potassium (K) fertilisers have been widely used for maize (*Zea mays* L.) production by smallholder farmers in northern Ghana. NPK fertilizer-induced yield increases are on the decline which may be due to micronutrient deficiency in the typical open parkland systems dominated by shea trees (*Vitellaria paradoxa* C.F. Gaertn). Given paucity of information on micronutrient effect on maize agronomic performance in these parklands, this study was conducted to evaluate the effects of NPK and different micronutrients on maize yield. A split plot trial with shea tree area of influence considered as the main plot was delineated into canopy area (Zone A), 3m away from canopy (Zone B), 10m away from canopy (Zone C), and 20m away from canopy (Zone D). Each zone was divided into sub plots where different types of fertiliser treatments were implemented; (i) farmer practice without fertiliser application (FP), (ii) sole NPK fertiliser (national recommended rate (NR): 60 kg N ha<sup>-1</sup>, 13 kg P ha<sup>-1</sup>, 25 kg K ha<sup>-1</sup>), (iii) NR plus 7.5 kg Zn ha<sup>-1</sup> (NRZn), and (iv) NR plus 1.5 kg B ha<sup>-1</sup> (NRB) were applied. Results showed a significant interaction ( $p < 0.05$ ) between zone and fertiliser application whereby grain yields were highest with NRZn in Zone D which was, 2.8-times larger than the FP in Zone A. Fertiliser use efficiency in NR plots was 6 % lower than average fertiliser use efficiency of NRZn and NRB, however this difference was not statistically significant. In the absence of any substantial increase in grain yield and fertiliser use efficiency after application of micronutrients, we conclude that at the current yield levels Zn and B are not limiting farmers' maize yields in the study location.

**Keywords:** Fertiliser use efficiency, NPK fertiliser, shea tree parklands, soil micronutrients, tree crop interaction