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Determining the proportion of basal to topdress nitrogen that optimises maize yield in northern Ghana

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Abstract

In northern Ghana, the average grain yield of maize is constantly lower than the potential yield. Poor N use efficiency has been reported as a key factor. Most farmers have therefore adopted the split method of N application. They use compound fertiliser (NPK) as the basal application and urea or sulphate of ammonium as the topdress, to make up for the crop's N supply. With this, the proportion of basal to topdress N amounts applied is basically determined by the grade of the compound fertiliser. It is against this background that this investigation was carried out to determine the proportion of basal to topdress N amounts that would produce optimum maize growth and yield in northern Ghana and subsequently, recommend an appropriate NPK grade. The investigation was carried out at the CSIR-SARI experimental field at Nyankpala in 2024 and 2025 growing seasons. The recommended rate of NPK fertiliser in the Guinea savannah (90–60-60) was used. All P and K were applied during the basal application in the form of TSP and MOP respectively. The N rate (90 kg) however, was splitted into two according to different ratios for basal and topdress applications. Urea was used as the source of the N. Eight treatments; (1) No fertiliser (control) (2) 20%-80 % (3) 30%-70 % (4) 40%-60 % (5) 50%-50 % (6) 60%-40 % (7) 70%-30 % (8) 80%-20 % were arranged in RCBD with three replications. SPAD and other growth parameters were taken at various growth stages and grain yield at harvest. Results for SPAD and other growth parameters revealed the optimum amount of basal N to be 45 $^{kg}/_{ha}$ (50 % of the 90 kg required). Grain yield results further corroborated this finding, where the highest maize grain yields for both years (3.6 and 4.7 $^{ton}/_{ha}$) were recorded in the 50%-50 % treatment. These were 0.7 and 1.0 $^{ton}/_{ha}$ higher than those of 70%-30 % treatment, which represents the most popular NPK grade on the Ghanaian market (15–15-15). The NPK fertiliser grade that would result in 50%-50 % basal-topdress applications is 15–20-20. It is therefore recommended that, fertiliser producing companies should consider the production of this grade of NPK fertiliser.

Keywords: Basal, fertiliser, grade, maize, nitrogen, rate, topdress, urea

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