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# Modelling Sorghum Yield in Response to Inorganic Fertiliser Application in the Semi-arid Region of Ghana

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**Abstract**

Agriculture in the Guinea-savannah of Ghana is the main basis of livelihood for the people. Agriculture employs about 80 % of the population and is characterised by low external inputs. Soils in this area are light textured and inherently low in organic carbon, cation exchange capacity, nitrogen and phosphorous. Sorghum is one of the important staple crops cultivated in this region. Its successful and viable cultivation is, however, restricted to compound farms where animal manure is applied to increase soil productivity and yields. On the other hand, sorghum yields of the more remote, so called bush farms are notoriously low. Bush farms conventionally relied on long fallows to restore some moderate soil fertility, and are nowadays less productive partly due to the shorter fallows and annual bush burning in the area. This is worsened by the transfer of nutrients through the removal of crop residues from the bush farms to use as feed and beddings for animals around the compound. Under these conditions, the demand for sorghum outweighs the level of production from the compound farms resulting in seasonal famine. Hence, there is the need to explore means of increasing the production of sorghum.

This study seeks to assess and predict the inorganic fertiliser yield response of sorghum on both compound and bush farms. To achieve this, experiments were conducted with three levels of inorganic phosphate and four levels of N fertiliser application. The plots were laid out in a randomised complete block design with four and seven replicates in bush and compound farms, respectively. The DSSAT crop-soil simulation model is used to simulate sorghum crop yields. It uses soil, weather, and crop management data as input parameters. The model is currently being calibrated and will be used to forecast Sorghum yield in this region over the next 10 years using generated weather data and different management and fertilisation scenarios. The model is anticipated to support the identification of the most promising management of inorganic fertiliser application in Sorghum production in both management systems.

**Keywords:** Modelling, Soil productivity, Sorghum yield

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