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Options for Sustainable Intensification of Maize Production in Nigeria

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Abstract

Sub-Saharan Africa (SSA) is the region at greatest food security risk because by 2050 its population would increase 2.5-fold and demand for cereals approximately tripled. SSA's self-sufficiency (a ratio between domestic production and total consumption or demand) in staple cereals is among the lowest compared to other sub-continents, indicating current levels of cereal consumption already depend on substantial imports. To meet the increasing food demands and protecting environmental quality simultaneously, in a sustainable manner, it is necessary to optimise agronomic management practices to enhance the nitrogen and water use efficiency. Various approaches have been proposed to overcome soil nutrient limitations such as i) conventional intensification mainly based on increased use of mineral fertiliser, ii) using legumes in rotation with main the crop or intercropping systems, or iii) a mix of both by rotation with legumes and supplementary mineral N supply. The mixed approach is widely being promoted in agricultural development programs for small-scale farming in SSA, Estimation of resource use efficiency of double-cropping and crop rotation system is scarce, especially in SSA. Therefore, here we use SIMPLACE modelling framework to identify suitable intensification options for maize-based cropping system in three districts of Nigeria, namely Kwara, Edo and Ogun through investigating (i) long-term crop yield response and (ii) change in crop available N over time. The simulations were run at 10×10 km grid cells for 29 years (1982–2010) and aggregated to the district level for comparing the effects of intensification options. Results indicate that an increase of 276 %, 199 % and 186 % in maize yield could be achieved in Kwara, Edo and Ogun respectively under the intensification option where maize was grown in rotation with groundnut and 60 kg N ha^{-1} was also applied when compared to the yield levels achieved under conventional farming practices (i.e., under current mineral fertiliser application rate).

Keywords: Food security, intensification, maize, Nigeria

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