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Enhancing Legume Productivity for Sustainable Intensification of Maize-Legume Farming Systems in Sub-Saharan Africa

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Abstract

Increasing food production in the sub-Saharan Africa countries requires sustainable intensification in order to address the chronic problems of food insecurity, under- and malnutrition and to increase the incomes of rural households. The International Institute of Tropical Agriculture (IITA) and Wageningen University, through the N₂Africa and COMPRO projects, are advancing grain legume technologies using the Integrated Soil Fertility Management framework to achieve sustainable intensification of maize-legume farming systems in sub-Saharan Africa. Field activities focus on enhancing biological nitrogen fixation and yields of grain legumes through identification and promotion of effective agricultural commercial products such as inoculants (I) and phosphorus (P) fertilisers, seeds of improved varieties and good agricultural practices appropriate to various agro-ecologies and cultural contexts. Other activities include institutionalisation of regulatory procedures to guarantee quality of inputs and to create sustainable supply chains of these inputs. Field evidence shows that rhizobia inoculation can yield benefits worth US\$50–75 for an investment of only US\$3–5 but with small amounts of P fertiliser to ensure acceptable soybean yields. Yields of groundnut, cowpea and common bean are often doubled with small amounts of P. However, making the most of the benefits offered by 'improved' grain legume varieties requires careful attention to crop management including rhizobial inoculant, balanced fertilisation, timely planting weeding and pest management. Also results indicated that, besides N, P and K, other nutrients e.g. Mg, S and micronutrient limit legume yields in most African soils warranting formulation of area specific legume fertiliser blends. In terms of benefits, farming households with sufficient land and labour benefit most from value chain, market led approaches. Poorer, often female-headed households benefit from the opportunities that grain legumes offer to intensify production and process nutritious food on small farms. A direct and causal developmental impact is clearly demonstrated between the increases in production and N₂-fixation of grain legumes and food and nutritional security and participation in markets. However, agriculture in sub-Saharan Africa faces several challenges sustainable intensification requires coordination of different research products and investments among different stakeholders along a product value chain.

Keywords: Intensification, legumes, n-fixation