Highest bean grain yield (3338 kgha-1) was on Phaeosem treated with 7.5kg (N+P)ha-1+2.5t manureha-1. However, this was not significantly different from the yield on Cambisol treated with 15kg (N+P) ha-1+2.5 t manure ha-1and Umbrisol treated with and 7.5 kg (N+P) ha-1+2.5 t manure ha-1. Farmers can therefore apply 7.5 kg (N+P) ha-1combined with 2.5or 5 t manureha-1to improve nutrient utilization which suggests for increasing crop-livestock integration.

Key words: common bean, limiting soil nutrients, smallholder farmers, soil types.

Paper Number: 1032

Response of Common Bean (Phaseolus vulgaris L.) to Nitrogen and Phosphorus and Rhizobia Inoculation Across Variable Soils in Zimbabwe.

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Soil fertility depletion ranks as the most important drawback to crop productivity in Sub-Saharan Africa. Three on-farm experiments were conducted to explore the effect of nitrogen (N), phosphorus (P) and rhizobia inoculation on common bean productivity in Eastern Zimbabwe. Two common bean cultivars were tested in a split-plot arranged in randomized complete block design. The main plot was the combination of N (0 and 60 kg ha-1) and P (0 and 20 kg ha-1) and the sub-plot were cultivar (Gloria and NUA 45) and inoculation (+/- inoculum). Both N and P were applied at 20 kg ha-1 at planting and an extra 40 kg ha-1N top dressing.

Number of nodules, active nodules and pods were significantly increased by N and P application. On a degraded site with 0.32% SOC, none of the factors significantly increased grain yields (P > 0.05). Yields for control were a paltry 0.21 t ha-1 compared to 0.45 t ha-1 with N, P and rhizobia. Analysis of variance of grain yield for the two sites that had SOC > 0.6% resulted in significant simple effects of N and P, and NP interaction (P = 0.03). Grain yields significantly increased from 0.49 t ha-1 (control) to 1.56 t ha-1 at 60 kg ha-1N and 20 kg ha-1P. These results suggest that farmers can invest in both N and P for common bean production, but not in acutely degraded soils. Improved common bean cultivars currently on the market barely respond to the local rhizobia inoculum.
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Dynamics of Biologically Fixed Soil N Levels and Its Enhancement in Maize-Legume Cropping Systems in the Northern Guinea Savannah Ecology.

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Dynamics of Biologically Fixed Soil N levels and its Enhancement in Maize-legume Cropping Systems in the Northern Guinea Savannah Ecology

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Abstract
Maize and grain legumes are food security and poverty reduction tools in Sub-Saharan Africa. Traditional farming systems in the savannah ecologies dominated by cereals have occasioned progressive depletion of soil nutrients and low yield of cereals while cost considerations had constrained widespread application of exogenous soil fertility amendments. Effort to raise the productivity of primed cereals such as maize in the region is increasingly drawing on low cost agronomic inputs adoptable by smallholder famers and communities where malnutrition remained a challenge. Intercropping cereals with legumes which hitherto increased the productivity of component cereals is proving inadequate in the short runs under the prevailing savannah agro-systems necessitating sustained quest for improvement options. The treatments in the study included a range of maize-legume cropping systems to investigate the stability of biologically fixed N in-between seasons and options (inoculant) for boosting legume induced N enhancement in the alfisols of Northern Guinea Savannah (NGS) ecology. The result showed decreasing trend in the level of soil nitrogen recorded at harvest compared with that recorded seven months later at the start of the following season. As much as 76% reduction in soil N-level was observed in Soybean plots in the first year and 69 % in the second year. In cowpea plots, the reduction in N-level was 84% and 82% in the first and second years respectively. Though diversity in varietal responses was significant, maize grain yield was 13% higher when intercropped with soybean than with cowpea in the first two years. In the third year when long season variety of cowpea was used in the maize-cowpea intercrop, maize grain yield of the system was comparable with that of soybean.