

Bam 1-001 Productivity and nitrogen fixation of Bambara groundnut (*Vigna subterranea* (L.) Verdc.) landraces as influenced by phosphorus levels and liming treatments on tropical acidic soils (Code: Bam1-001)

Mukhtar Musa

Bambara groundnut (*Vigna subterranea* (L.) Verdc.), an underutilised legume possesses a great potential for increased food production on tropical marginal soils, Africa in particular. However, studies on the abiotic stress (such as pH) and N₂ fixation are very limited in this legume. Increased exploitation of biological N₂ fixation and productivity of the crop is constrained by various environmental factors such as soil acidity and low soil P status. Malaysian soil is predominantly acidic and highly leached, thus deficient in range of nutrients such as phosphorus (P). Nutrient deficiency is common in acid soils as these nutrients exist in bound forms which are not available for uptake. Furthermore, unfavorable soil pH can prevent nodulation by legumes. One of the strategies that could be adopted to increase the performance of the crop on tropical acidic soils is to exploit the variation that exists within the Bambara groundnut landraces. In acid soils where aluminium toxicity is a problem, addition of small amount of lime to reduce the aluminium saturation of the soil and to correct calcium deficiency is often sufficient to improve the growth and nodulation of the plants. Inorganic fertilizers are often expensive, hence locally available rock phosphate for use as p source is a potential alternative that could enhance production of Bambara groundnut in Malaysia and other production areas facing similar constraints. Likewise, identification of genotypes for various stress conditions (such as low pH) will lead to efforts being undertaken for increased Bambara groundnut production and incorporation in to various cereal-based cropping systems in Malaysia and elsewhere.

In view of the above, series of field trials will be carried out at the CFFRC Field Research Centre (FRC) near The University of Nottingham Malaysia Campus (UNMC) and the existing screen house located at UNMC to study the productivity and nitrogen fixation of Bambara groundnut genotypes as influenced by liming treatments and phosphorus application using locally and easily available rock phosphate on tropical acidic soils. Treatments will consist of four (4) liming treatments (0, 1, 2 and 3 t/ha), four (4) phosphorus levels (0, 20, 40 and 60 kg P₂O₅ ha⁻¹) and two (2) Bambara groundnut landraces. The treatments will be laid out in a split-plot design with liming as main plot and landrace X rock phosphate levels as sub-plot treatments. All treatments will be replicated three times. Data will be collected on nitrogen fixation using ¹⁵N isotope

technique, growth, yield, soil nutrients availability and plant uptake. The data to be collected will be subjected to analysis of variance (ANOVA) procedure in Genstat and treatments showing significant differences will be separated using series of contrasts statements and Tukey's test. Prior to analysis, assumptions of normality of residuals and homogeneity of variance will be assessed using Shapiro-Wilk and Bartlett's test and plot facility in Genstat