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## Response of Cowpea Genotypes to Low Soil Phosphorus Conditions in Africa

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### Abstract

Soils in tropical regions have inadequate levels of phosphorus and this apparently leads to reduced cowpea yield in Africa. Identifying P-efficient cultivars has the potential to reduce the demand for P fertiliser and increase the productivity of cowpea. Therefore, this study was conducted to identify cowpea genotypes that maintain high yields, high P use-efficiency and uptake under low soil P condition.

A green-house experiment was conducted at the International Institute of Tropical Agriculture (IITA) Ibadan, Nigeria. Fifteen (15) cowpea genotypes were used with two sources of phosphorus fertilisers: rock phosphate (RP) (60, 90 and 120 mg P kg<sup>-1</sup> soil) and mono potassium phosphate (MP) (30, 60 and 90 mg P kg<sup>-1</sup> soil) and compared to the control. The experiment was laid out in a strip plot arrangement, using completely randomised block design with three replications.

The findings suggest that enough variability and genetic heritability exist among the tested cowpea genotypes. Out of the 15 cowpea genotypes, IT90K-59 was identified as best P responder genotype for biomass production and IT90K-76 for grain yield at a rate of 60 mg P kg<sup>-1</sup> soil as MP, whereas Danilla and IT89KD-288 were good performers for grain production under no or minimal external P application. Five genotypes were identified as good responders to rock phosphate based on their grain yield production. The best response by cowpea genotypes was at P-fertiliser treatment level 60mg P kg<sup>-1</sup> soil of MP. A significant correlation was found between grain yield and total P-uptake ( $R^2 = 0.3629^*$ ), but there was a very weak correlation between of grain yield and total N-uptake ( $R^2 = 0.0203$ ) in cowpea genotypes. Fertiliser recovery rate of cowpea genotypes was between 14.03 % - 4.63 % with the cowpea genotype IT90K-59 having the best recovery rate.

The differential response to low P-efficient implies that these traits warrant effective selection for further improvement. Hence, identifying genotypes that can grow well in low phosphorus condition has the potential to reduce the quantity of fertilisers used on agricultural lands. Genotypes with high biomass production are of immense importance in soil fertility management since cowpea has unique potentials to fix atmospheric nitrogen.

**Keywords:** Cowpea genotypes, mono potassium phosphate, nitrogen fixation potentials, nutrient uptake, rock phosphate