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Performance of Soybean (*Glycine max* L.) as Influenced by Different Rates and Sources of Phosphorus Fertiliser

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Abstract

Low yields of soybean in Nigeria are attributed to many factors among which are declining soil fertility and use of low yielding soybean varieties. Phosphorus is a soybean plant growth-limiting nutrient; therefore, application of phosphorus fertiliser at optimum level is essential. *Tithonia diversifolia* and poultry manure have been previously identified as good organic fertiliser sources. Two experiments were carried out in the screen house of the Department of Agronomy, University of Ibadan, Nigeria to estimate the optimum P requirement for soybean and to investigate the response of soybean to different sources of P fertiliser applied at the optimum rate. The treatment in the first experiment were two soybean varieties (TGX 1987–10F and TGX 1987–62F) and single superphosphate (SSP) fertiliser applied at five rates: 0 kg P ha⁻¹, 20 kg P ha⁻¹, 40 kg P ha⁻¹, 60 kg P ha⁻¹ and 80 kg P ha⁻¹. The treatments in the second experiment were: SSP, *Tithonia* compost (TC), poultry manure (PM), TC+PM, SSP+TC, SSP+PM applied at optimum P rate obtained from Experiment 1 and control. Data were collected on morphological parameters, grain yield and nutrient uptake. The data were subjected to analysis of variance and the significantly different means were separated using least significant difference at 0.05 level of significance. Results showed that TGX1987–62F (1.96 Mg ha⁻¹) produced significantly higher grain yield than TGX1987–10F (1.26 Mg ha⁻¹). Application of SSP at 40 kg P ha⁻¹ produced tallest plants (104.9 cm), highest number of leaves/plant (19.0), number of pods/plant (19.4), and grain yield (2.28 Mg ha⁻¹) across the two varieties. Highest K-uptake was observed in plants treated with TC+SSP (6.1 mg pot⁻¹) while highest P-uptake was observed with application of SSP (2.6 mg pot⁻¹), significantly higher than the control. The combination of *Tithonia* compost and SSP at 40 kg P ha⁻¹ produced highest number of flowers per plant (35.6), number of pods/plant (38.7) and grain yield (3.9 Mg ha⁻¹). A combination of *Tithonia* compost (an abundant under-utilised weed) and SSP applied at 40 kg P ha⁻¹ will increase seed yield of soybean in southwestern Nigeria.

Keywords: Nigeria, phosphorus fertiliser, soybean varieties, SSP, *Tithonia* compost