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Genetic Evaluation of Four Solanum Species Treated with Npk and Bioinoculants Using Rapd Primers

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Abstract

Solanum is one of the widely grown vegetable crops of high nutritional and medicinal values. Therefore, the variability of morpho-genetic traits were investigated on four solanum species ; Solanum nigrum (NHGB/09/930), *S. macrocarpon* (NG/01/268), *S. scabrum* (Ile-Ife) and S. aethiopicum (NGB/01/736) in eight treatment combinations of NPK (15–15-15), Arbuscular mycorrhiza fungus; AMF (Gigantea gigaspora) and Green manure; GM (*Leucaena leucocephala*) using RAPD primers; OPT- 01, OPT- 06 and OPH- 05. Screen house and molecular experiments were conducted in the nursery farm of the Department of Botany, University of Ibadan and Bioscience Laboratory of the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria respectively. Screen house experiment was laid out in complete randomised design with three replicates. The treatment combinations of AMF-NPK-GM significantly ($p < 0.05$) enhanced plant height; PH (36.69 cm), number of leaves; NL (16.32), leaf length; LL (11.60 cm), leaf width; LW (8.97 cm) and stem girth; SG (6.30), but yielded number of flowers; NF (6.53) and number of seeds; NOS (2.45). The combination of AMF-GM was higher for fresh biomass; BMF (2.44) and dry biomass; BMD (0.26), while GM only produced higher inflorescence; INF (1.40) and NF (2.40). The PH (41.63 cm), SL (25.09 cm), NL (16.96) and NB (1.99) are significantly higher in S. nigrum, while *S. scabrum* yielded higher for INF (1.58), NF (8.43), NOS (2.52) and seed weight; WT (1.13). The PH is positively correlated with SL (r=0.88), NL (r=0.82), and SG (r=0.81), while BMD is strongly associated with BMF at r= 0.98; $p < 0.05$. High heritability ranged from 52–95 % for growth and yield characters.

The RAPD primer OPT-06 had the highest polymorphic information content (PIC) and gene diversity of 0.8736 and 0.8845 respectively. GM+NPK for *S. scabrum* had the highest DNA volume of 2.30 u/l, while GM+NPK for *S. scabrum*, GM only and control for S. nigrum gave the highest DNA concentration of 2.09 ug. Therefore, S. nigrum and *S. scabrum* could be recommended for further breeding, and the adoption of biofertiliser could reduce the adverse effect of chemical fertiliser causing soil pollution. This will secure global food production and safety of the environment in Nigeria.

Keywords: : Solanum, fertiliser, phenotypic, RAPD

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