PRINT: ISSN 0976-6898 ONLINE: ISSN 2456-6535
JOURNAL OF
AGRICULTURAL SCIENCES

J Agri Sci, 2(1): 1-8 (2011)
PRINT: ISSN 0976-6898 ONLINE: ISSN 2456-6535
DOI: 10.31901/24566535.2011/02.01.01

Genotypic Responses of Cowpea (*Vigna unguiculata*) to Sub-Optimal Phosphorus Supply in Alfsols of Western Kenya: A Comparative Analysis of Legumes

Joseph P Gweyi-Onyango[1*], Peter Akwee[2], Christine Onyango[2] and Tsehaye Tesfamariam[3]

[1]Kenyatta University, Department of Agricultural Science and Technology, P O Box 43844-00100, Nairobi, Kenya
[2]Masinde Muliro University of Science and Technology, P.O. Box 190-50100, Kakamega, Kenya
[3]Institute of Plant Nutrition, University of Hohenheim, Stuttgart, Germany
[*]E-mail: josephonyango2002@yahoo.co.uk

KEYWORDS Legumes. *Vigna Anguiculata* Genotypes. Nodulation. Phosphorus Efficiency. Aluminium

ABSTRACT Western parts of Kenya are characterized by acid soils with phosphorus [P] deficiency and aluminum [Al] phytotoxicity. Reports indicate a declining trend in yields of legumes such as cowpeas. Though legumes can fix N, starter phosphorus need to be supplied for better yields and more often plants develop adaptive strategies for better P acquisition; probably through increased Al tolerance by carboxylates exudation, improved nodulation as a result of high P and better root development. Present study examined mutual relationship between P and nodulation in explaining yield differences between Cowpea (*Vigna unguiculata*) varieties: Elanda (ELn, high yielding) and Inzeku (INz; moderate yielding), Ground nut (*Arachis hypogea*)-GN and Bambara nuts (*Vigna subterrenea* (Verdc) - BBN with proven P efficiency and Bean (*Phaseolus vulgaris* L) varieties Rosecoco (RCC) and Edwin (ED); low P efficient formed basis for comparison. The experiment was conducted at Masinde Muliro University field station from April 2009 and experimental design was CRBD having split plot with P as main plots (+P; or –P), whereas GN, BBN, ELn, INz, RCC and ED legumes were randomized within the P treatments. Legume genotypes were replicated four times. There were no differences in shoot biomass with +P and –P (INz), but ELn showed higher shoot DM with +P as compared with –P (significant $p<0.05$). Similar trends were replicated with nodulation with P supply. Shoot DM and nodulation were positively correlated for ELn ($r^2=0.99$; +P and $r^2=0.68$; -P) but not INz. Correlations were negative for beans and performance of BBN with +P and –P showed trends similar with Inz genotype. Sub-optimal P supply with concomitant enhancing nodulation in INz could not explain genotypic differences in yields, since high yielding BBN lacked this trait with additional P. Factors like high proton concentration and Al saturation need to be assessed and likely an interaction between P and Al through enhanced exudation of carboxylates may give more insights to cowpea genotypic differences.