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Response of Common Bean Genotypes Grown in Soil with Normal or Limited Moisture, with Special Reference to the Nutrient Phosphorus

by Margaret Namugwanya^{1,2,*}, John Stephen Tenywa² and Erasmus Otabbong³¹ Department of Agriculture, Kyambogo University, P. O. Box 1 Kyambogo, Uganda² Department of Agricultural Production, Makerere University, P. O. Box 7062 Kampala, Uganda³ Department of Soil and Environment, Swedish University of Agricultural Sciences, Nytorgetsgatan 3A, Apt. 1201, SE-981 34 Ornskoldvik, Sweden

* Author to whom correspondence should be addressed.

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Abstract

Drought and phosphorus deficiency in the soil are the major production limitations of common beans (*Phaseolus vulgaris* L.) in Sub-Saharan Africa. This study measured the yield responses of low phosphorus-tolerant common beans to drought stress. A field experiment was conducted under two drought conditions codenamed, non-drought-stress (NDS) and drought-stress (DS). The former was located at Mukono Zonal Agricultural Research and Development Institute (MUZARDI) in Mukono District, characterised by rainfall of more than 400 mm season⁻¹. The latter was situated at Wabinyonyi in Nakasongola District, characterised by less than 300 mm season⁻¹; both in central Uganda. Treatments included the two study conditions (NDS and DS); and four test bean genotypes, AFR703-1, AFR 708, JESCA, and MCM 2001, against a local check, K131. A water deficit of 156 mm season⁻¹ was observed in the DS site causing a drought intensity index (DII) of 40%. That pattern contrasted considerably in the NDS site where the actual rainfall did not significantly ($p > 0.05$) vary from the required water by the bean plant. Whereas genotypes AFR703-1 and AFR708 out-yielded the local check in NDS by 213 and 681 kg ha⁻¹, respectively; their grain yield harvested was comparable to the control yield in DS. When grown under DS, low P-tolerant beans, especially the AFR703-1 and AFR708, survived drought stress through faster development by reducing the number of days to flower, reach physiological maturity and develop seeds. AFR703-1 and AFR708 sufficiently withstand drought stress, and are therefore recommended for inclusion in cropping systems that are characteristically constrained by the combined soils' P deficiency and/or drought. View Full-Text

Keywords: drought stress; *Phaseolus vulgaris*; Uganda

