

Phosphorus Fertilizer Rating and Rhizobia Inoculation for Improved Productivity of Cowpea in Northern Uganda

S. M. Nyamaizi^{1,2*}, J. B. Tumuhairwe³, R. Amayo⁴, C. L. Tumuhe^{5,6}, E. Tereka³, D. L. Nabirye³, B. B. Obaa³

¹Agassiz Research and Development Centre, Agriculture and Agri-Food, Agassiz, BC, Canada

²Faculty of Land and Food Systems, The University of British Columbia, Vancouver BC, Canada

³Department of Agricultural Production, College of Agricultural and Environmental Sciences, Makerere University, Kampala, Uganda

⁴Department of Crop Production and Management, Faculty of Agriculture and Animal Sciences, Busitema University, Tororo, Uganda

⁵Department of Environmental Management, Makerere University, Kampala, Uganda

⁶African Rural University, Kagadi, Uganda

Email: *sylvia.nyamaizi@canada.ca

How to cite this paper: Nyamaizi, S.M., Tumuhairwe, J.B., Amayo, R., Tumuhe, C.L., Tereka, E., Nabirye, D.L. and Obaa, B.B. (2020) Phosphorus Fertilizer Rating and Rhizobia Inoculation for Improved Productivity of Cowpea in Northern Uganda. *American Journal of Plant Sciences*, 11, 1505-1519.

<https://doi.org/10.4236/ajps.2020.119109>

Received: August 14, 2020

Accepted: September 26, 2020

Published: September 29, 2020

Copyright © 2020 by author(s) and Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Cowpea (*Vigna unguiculata*) is an important legume crop in the tropics and subtropical regions of the world. It is mainly grown for its leaves and grains, and to a lesser extent as a fodder crop. Cowpea is considered as the most important food grain legume in the dry savannas of tropical Africa. This study compared the yield of local (*Agondire*) and improved (SECOW 2W) cowpea varieties grown on an Oxisol. Inorganic P at levels of 0, 10, 20, and 40 kg·ha⁻¹ was tested on each variety with or without rhizobia inoculation. The experiments were set up in a randomized complete block design and replicated thrice during the short and long rains of the 2015/2016 seasons on fifteen fields in Arua district, northern Uganda. *Agondire* responded significantly ($P < 0.05$) better than SECOW 2W when high rates of inorganic phosphorus (40 kg P ha⁻¹) were applied. A significant increase of 26.4% and 28.4% in grain yield of *Agondire* and SECOW 2W, respectively was obtained after inoculation with rhizobia. We concluded that inoculation and P fertilizer application increased the yield of both varieties, but with inoculation, SECOW 2W performs much better at lower P fertilizer rates than *Agondire*. Therefore, we recommend growing of SECOW 2W under inoculation with 20 kg P ha⁻¹ and an application of 40 kg P ha⁻¹ for *Agondire* local cowpea variety in northern Uganda.