

**Effects of Phosphate Fertilization on Productivity of Grain Amaranth(*Amaranthus incas*)  
in Murinduko Location of Kirinyaga County.**

by

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## Abstract

This study was carried out between November 2010 and March, 2011 to determine the influence of phosphate fertilization on productivity of *Amaranthus incas* (Grain amaranth). Kenyan farmers in the dry lands suffer perpetual food insecurity and poor livelihoods despite having large hectares of fallow lands. Grain amaranth is a drought resistant crop of high value which has a potential for improving food and nutritional security and income generation for farmers in arid and semi-arid lands. The specific objectives were to evaluate the yields per plant for the different rates of phosphate fertilization and determine grain crude protein content of amaranth using the different phosphate fertilization regimes. The study used a Randomized Complete Block Design (RCBD) with three replications to compare productivity (production of grains per unit area) of grain amaranth using 0, 5, 7 and 10g fertilizer applications per plant from Manure, DAP and Rock Phosphate per hole. The research findings indicated that productivity was improved most by 5g fertilizer application per plant ( $595.05\text{g}/\text{m}^2$ ) for DAP followed by ( $342.6\text{g}/\text{m}^2$ ) Rockphosphate in total yield per plot compared to control ( $237.33\text{g}/\text{m}^2$ ). The total dry grain yield in the 10g of fertilizer per plant (L4) plots were  $293.98\text{g}/\text{m}^2$  for DAP and  $275.55\text{g}/\text{m}^2$  for Rock-phosphate, Manure ( $160.8\text{g}/\text{m}^2$ ) and Control ( $256.93\text{g}/\text{m}^2$ ) respectively. The 7g per plant fertilizer plots were moderate in yields and sometimes gave similar yields as 5g per plant fertilizer (L2) plots. The L3 plots had  $579.33\text{g}/\text{m}^2$  for DAP,  $275.55\text{g}/\text{m}^2$  Rock-phosphate,  $190.59\text{g}/\text{m}^2$  for manure and  $244.41\text{g}/\text{m}^2$  for control. Crude protein value was highest at 5g Rock phosphate application followed by 5g and 7g DAP application per plant and these could be confirmed and used for protein consideration when establishing grain Amaranth crop. The research therefore concluded that there were significant differences between grain yields at 95% confidence interval.

**Key Words:** Amaranth, Phosphorous, Productivity, Kirinyaga County, Rock Phosphate, Manure, Di-Ammonium Phosphate (DAP), Randomized Complete Block Design (RCBD)