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Cassava Root Yield Response to Tillage Intensity, Planting Density and Fertiliser across South Western Nigeria

STEFAN HAUSER¹, REBECCA ENESI¹, FELIX SALAKO², OMOLARA ONASANYA², MUTIU BUSARI²,
FLORENCE OLOWOKERE², THANNI BOLAJI², JOHAN SIX³, PIETER PYPERS⁴, CHRISTINE KREYE¹,
BERNARD VANLAUWE⁴

¹*ETH Zürich, Dept. of Environmental Systems Science, Switzerland*

²*Federal University of Agriculture Abeokuta (FUNAAB), Nigeria*

³*ETH Zurich, Dept. of Environmental System Science, Switzerland*

⁴*International Institute of Tropical Agriculture (IITA), Kenya*

Abstract

Cassava is growing in importance in Nigeria as food security and industrial crop. Current yields are low while production costs are high. Tillage, weed control and fertiliser are the main cost factors. Furthermore, the influence of planting density on yield has not been investigated. To develop decision support tools (DST) targeting a reduction of production costs, effects of tillage intensity, fertiliser application and increased plant density were tested in about 50 farmers' fields in south western Nigeria over two years. Tillage treatments were zero, single and double disc ploughing, followed by ridging versus leaving the soil flat. Fertiliser application was NIL versus 75:20:90 kg ha⁻¹ NPK. Plant density was 10000 versus 12500 ha⁻¹. Cassava was harvested 1 year after planting. Root yields are fresh mass. In the first year, double plough (10.34 Mg ha⁻¹) had no advantage over zero plough (10.32 Mg ha⁻¹), single plough produced 12.61 Mg ha⁻¹ ($p < 0.0047$). Ridging increased yields by 2.29 Mg ha⁻¹ across plough treatments but interacted with ploughing such that in zero plough, ridging added 4.05 Mg ha⁻¹, in single plough 2.84 Mg ha⁻¹, yet no change in double plough. Increasing plant density had a non-significant positive effect (+0.28 Mg ha⁻¹). Fertiliser application increased yields by 4.42 Mg ha⁻¹ across tillage treatments with largest increments in zero (+5.31 Mg ha⁻¹) and single plough (+5.58 Mg ha⁻¹), yet no significant plough or ridge \times fertiliser interaction was found. In the second year, double plough and low plant density were dropped and herbicide based weed control introduced. Ploughing increased yield by 2.26 Mg ha⁻¹, ridging by 3.31 Mg ha⁻¹ and fertiliser application increased root yields by 2.31 Mg ha⁻¹. Using herbicides instead of manual weeding had no effect on cassava yields, yet reduced costs. Root yield had a significant ploughing \times ridging interaction with increases when ridged after ploughing being 0.71 Mg ha⁻¹ (ns), yet adding 5.92 Mg ha⁻¹ when not ploughed and attaining 16.63 versus 16.28 Mg ha⁻¹ when ploughed and ridged. Planting on untilled soil produced 10.71 Mg ha⁻¹. Yield increments of +2 (plough) and +1.5 (ridging) Mg ha⁻¹ were included into the DST.

Keywords: African Cassava Agronomy Initiative, fertiliser application