

**INFLUENCE OF FERTILIZER APPLICATION, TIME OF PINCHING AND
HARVESTING METHOD ON GROWTH, YIELD AND NUTRITIONAL QUALITY
OF COWPEA (*Vigna unguilata* L.) AND SPIDER PLANT (*Cleome gynandra* L.)**

BY

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DECLARATION

This thesis is my original work and has not been presented for an award of a degree in any other university

Signature.....

Date.....26.11.2018

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This thesis has been submitted for examination with our approval as university supervisors:

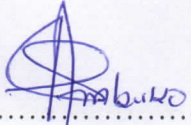
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GENERAL ABSTRACT

Introduction of exotic vegetables in mainstream agriculture has seen a decline in the utilization of African indigenous leafy vegetables (AILVs) such as cowpea and spider plant. This has caused inadequate, imbalanced nutrients in the human diet, contributing to malnutrition especially in the poor, sick, children and elderly people in Sub-Saharan Africa. These groups have high nutrient requirements but they are unable to access adequate amounts from animal sources due to high cost. African indigenous leafy vegetables contain high levels of minerals such as zinc, calcium, iron, vitamin C and β carotene and proteins. Use of fertilizers and appropriate pinching and harvesting practices could lead to increased leaf yield and nutrition quality of cowpea (*Vigna unguiculata* L.) and spider plant (*Cleome gynandra* L.). A study was therefore, conducted at Kabete Field Station, University of Nairobi, during 2014 short rains and 2015 long rains to assess the effect of fertilizers, time of pinching and harvesting method on growth, yield and nutrition quality of cowpea and spider plant. Treatments of each vegetable consisted of four fertilizer levels (no-fertilizer control, 200 kg/ha di-ammonium phosphate, 10 t/ha manure, 100 kg/ha di-ammonium phosphate + 5 t/ha manure), two types of pinching (early pinching and late pinching) and two harvesting methods (piecemeal and wholesome) which were evaluated in a randomized complete block design with a factorial arrangement, replicated three times. Data collected included plant height, number of branches, number of edible leaves, canopy span, fresh and dry leaf yields, days to 50% flowering, number of pods per plant, vitamin C, β carotene and mineral elements (zinc, iron, calcium and magnesium). Collected data were subjected to analysis of variance using Genstat software and means separated using the least significant difference test at $P \leq 0.05$.

The results showed significant increase in plant height, number of branches, number of edible leaves and marketable fresh weight of both vegetables due to fertilizer application.

Applications of 200 kg/ha DAP and 100 kg/ha DAP + 5 t/ha manure were superior to other treatments in cowpea and spider plant, respectively. Incorporation of diammonium phosphate and manure either singly or in combination significantly ($P \leq 0.05$) increased β carotene, vitamin C, zinc, calcium and magnesium levels but significantly ($P \leq 0.05$) reduced iron content in both crops. Late pinched cowpea and spider plants had significantly ($p < 0.05$) higher plant height, number of edible leaves, fresh and dry leaf yields, vitamin C, calcium, magnesium and iron content than early pinched plants. However, early pinching resulted in significantly ($p < 0.05$) higher content of zinc in both crops. Wholesome harvesting led to an increase in number of edible leaves, fresh and dry leaf yields, β carotene, vitamin C, zinc, calcium and magnesium in both crops. Plants subjected to 100 kg/ha DAP + 5 t/ha manure + late pinching + wholesome harvesting recorded the highest leaf yields and accumulation of calcium and magnesium levels. Therefore, to maximize yields and the nutritional composition of cowpea and spider plant, fertilizer application, late pinching and wholesome harvesting should be adopted as a management practice.

Key words: Cowpea, fertilizer, harvesting, nutrition, pinching, spider plant and yield