MANGO TREE WATER REQUIREMENT IN MAKUENI COUNTY IN KENYA

ROTICH HILLARY
I56/21422/2010

Signature..... **Date**.7/10/2013.....

A research proposal submitted in partial fulfillment for the award of a degree of master of science (plant physiology and biochemistry) in the School of Pure and Applied Sciences, Kenyatta University

SUPERVISORS

Dr. Francis Kariuki

Signature..... **Date**.22/10/2013.....

School of Pure and Applied Science,
Department of plant and microbial science,
Kenyatta University.

Dr. Hungu Gathaara

Signature..... **Date** .9/10/13...

School of Pure and Applied Science,
Department of plant and microbial science,
Kenyatta University.

ABSTRACT

Mango production in Kenya has expanded considerably over recent years, not only in size but also in the geographical location of commercial and homestead plantings. Virtually every smallholding in Makueni County is dedicated to the production of mangoes under rainfall or irrigation. The main problems are that the fruit quality and quantity being produced is low. This is partly attributed to the fact that rainfall pattern of Makueni does not coincide with major water requirement during phenological stages of mango such as flowering and fruit set; fruit growth and development; flower initiation; and paride swelling, in order to realize the full potential yield of mangoes. This study, therefore, aims at looking at mango eco-physiology and water relations in Makueni County, Kenya. In particular, the study will aim at achieving the following objectives: to determine infiltration rates and levels of moisture retention of soil types present in Makueni County; to determine optimum crop water requirement of mango varieties at various phenological stages with respect to frequency and quantity; and to determine the impact of water use efficiency of mangoes on production. Four groups of Apple variety mango farmers in Makueni County will be selected for the study, in which only one farmer's orchard will be selected. All the treatments in this study will be laid out in Randomized Block Design (RBD) comprising nine irrigation treatments rates categorise into two, partial and full irrigation; W_1 (partial 100% irrigation (F1) as calculated based on the climatic water balance according to altitude, place and dates of planting, W_2 (partial deficit irrigation with 75% of F1 [pDI75]), W_3 (partial deficit irrigation (pD1) with 50% of F1 [pD150]), W_4 (partial deficit irrigation with 25% of F1 [pD125]), W_5 (no irrigation), W_6 (full irrigation with 100% [fFI]), W_7 (full deficit irrigation with 75% [fDI75]), W_8 (full deficit irrigation with 50% [fDI50]) and W_9 (full deficit irrigation with 25% [fDI25]). Also growth stage irrigation timing; P_1 (before flowering), P_2 (onset flowering), P_3 (fruiting). Flower induction treatment as well; I_1 (using KNO_3), I_2 (control), I_3 (using ethylene). The estimation of the mango water requirement will be derived from crop potential evapotranspiration based on altitude, place and dates of planting. The data for this study will be analyzed with analysis of variance (ANOVA) to detect differences between trees in the four selected farm groups and LSD test for determining significance of differences, using SPSS for Windows 11.5 software (SPSS Inc.). Also, the data for this study will be subjected to SPSS T-test procedures and Tukey's test ($p < 0.05$) will be employed to separate and determine means whose values will be got from individual fruits.