

Title Influence of Water Deficit on the Physiology and Physico-chemical Characteristics of Mango (*Mangifera indica* L. cv. Tommy Atkins) Fruit Part I – Fruit Growth and Development

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Abstract

In Kenya the area under mango cultivation rose from 500 ha in 1970 to approximately 15,000 ha in 2005. The production of mango fruit has increased partly due to increased land under cultivation and improved varieties. Unfortunately, 40-60% of mango fruit is lost through poor postharvest handling and lack of reliable harvestable maturity indices. The study aims to establish the correct harvestable maturity indices of mango (*Mangifera indica* L. cv. Tommy Atkins) Fruits grown with or without irrigation during growth and development. Tommy Atkins' variety of mango was sampled from a farm in Yatta Division, a semi arid area in Machakos District, Kenya for a period of 168 days after bloom. Changes in various physical, physiological and biochemical were monitored during fruit development from fruit set to maturity. Among the measured parameters include changes in size and weight, starch, titratable acidity, total soluble solids, β -carotene pulp content, anthocyanin peel content, firmness, vitamin C, respiration and ethylene production rate. Fruit weight, diameter, length, and starch showed a steady increase with time declining towards fruit maturity. Total titratable acidity increased just before maturity and decreased at maturity. There was no significant difference ($p < 0.05$) in the contents of sucrose, fructose and glucose between the two treatments. Total soluble solids increased as the fruit approached maturity irrespective of the treatment. β -carotene content increased with growth of the mango fruit. Anthocyanins content showed a variance but later decreased toward fruit maturity, no ethylene was detected although respiration rates showed a true climacteric curve. There was a high correlation observed between the increase in firmness and starch $r^2 = 0.86$ and 0.96 for fruits from irrigated and non-irrigated, respectively. Vitamin C content varied at different stages of growth and development. A high correlation was observed between the increase in length and diameter $r^2 = 0.992$ and 0.996 in the fruits from irrigated and non-irrigated trees, respectively. The formula of the equation can be calculated and, therefore, used by farmers to establish harvestable maturity of mango fruits. This is accompanied by an increase in total soluble solids and a decrease in starch content and firmness. Fruits from irrigated trees matured earlier than those from non-irrigated trees.