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Response of Leaf Area and Biomass Partitioning of Physic Nut to Variable Water Supply

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Abstract

Jatropha curcas L. (physic nut), a perennial plant belonging to the *Euphorbiaceae* is considered as an important source of biodiesel production. However, basic agronomic properties of *Jatropha* have not thoroughly investigated. The aim of this study was to characterise crops growth rates, biomass partitioning parameters and leaf area development under rainfed and irrigated conditions.

The study was carried out in Fenoarivo, South-West Madagascar on a site with yellow / red or reddish lateritic soil with a planting density of 1250 plants/ha in a randomised design from December 2009 till May 2010. The experiment was done on 3 years old *Jatropha* plants that were pruned at the beginning of the winter season. Plants were rainfed or daily supplied with 10 mm of irrigation. Crown diameter, plant height and biomass were measured at 5 harvest dates and bushes were separated into trunk, branches, twigs and leaves. Length of branches and leaf dry mass per branch were determined. Non-destructive measurements of leaf area index (LAI) were done at four positions around the tree at two lateral distances (30 and 50 cm) each with a Hemi-View system and compared with destructive samplings of leaf area and dry mass.

First findings indicate that neither crop growth rate nor LAI were increased by irrigation but effects are expected during later sampling dates. Dry mass of newly formed twigs and leaves were correlated with pre-existing branch dry matter and volume indicating the significance of reserves from pre-season growth phases for actual growth potential. Leaf dry mass per branch appears to be a rather stable parameter of biomass allocation illustrating a conservative way of spatial exploitation of light. Non-destructive measurements of LAI with Hemi-View images are correlated with data from destructive sampling. Estimates of LAI from images at 30 cm distance correlated better with total LAI compared to that taken at 50 cm distance. Based on additional information from nutrient concentration it is concluded that *Jatropha* must be considered as a high-input crop if profitable oil production is the target.

Keywords: Biomass, growth , *Jatropha curcas*, leaf area