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## Description of the Spatial Arrangement of the Physic Nut (*Jatropha curcas* L.) Root System - A Case Study from Madagascar

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### Abstract

*Jatropha curcas* L. (physic nut) is a drought resistant shrub or tree belonging to the family *Euphorbiaceae*. It is increasingly cultivated in Central and South America, Southeast Asia, India and Africa for biofuel production and claimed to grow profitably on marginal or degraded land in arid to sub-humid zones with annual rainfall of 300–1000 mm. Whereas yield and physical properties of the oil have been assessed in several studies, nutrient and water demand of *Jatropha* is not well characterised. Due to the fact that *Jatropha curcas* is often cultivated on marginal land, the efficient acquisition of limited resources may be related to root features, including depth of rooting and spatial distribution around the stele. To be able to evaluate the importance of such features, a study on *Jatropha* root systems was performed on a plantation in Fenoarivo, South-West Madagascar.

The spatial arrangement of roots was investigated in established *Jatropha* stands with a planting density of 1250 plants ha<sup>-1</sup> grown on yellow/red to reddish lateritic soil. The effect of soil tillage was investigated by comparing stands established on ploughed and non-tillage sites. Vertical root distribution down to a depth of 120 cm was analysed with the trench wall method, counting the number of root tips visible on grids. In order to assess the root distribution as a function of distance from the stele, samplings were performed at 20, 40, and 60 cm distance from the trunc on both sides. The data presented allow assessment of the spatial arrangement of the root system of *Jatropha* plants raised from seed as affected by land preparation and plant age. Additional data on root length density and root dry mass in specific soil layers will be used to relate information on spatial distribution to functional root parameters required for the analysis of above/belowground biomass allocation and acquisition of resources such as water and nutrients.

**Keywords:** *Jatropha curcas*, root mapping, water relation