



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

Arisoa Rajaona¹, Holger Brueck¹, Folkard Asch¹

¹Garbenstrasse 13, 70599 Stuttgart, Germany (arajaona@uni-hohenheim.de)



Introduction

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 been thoroughly investigated.

The aim of this study was to characterize seasonal leaf area dynamics, partitioning of biomass between structural components (branches) and leaf area 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 1.250 *Jatropha* plants per ha in a randomized design from December 2009 till May 2010.



Conclusions and Outlook

- Dry mass of newly formed twigs and leaves were correlated with pre-existing branch dry matter indicating the significance of reserves from pre-season growth phases for actual growth potential.
- Hemiview can be a reliable tool to estimate LAI of bushes
- Irrigation effect depends on the soil type.
- Based on additional information from nutrient concentration it can be concluded that *Jatropha* must be considered as a high-input crop if profitable oil production is the target.

Results

Partitioning (%) of shoot DRM between assimilating surface (Leaf), newly formed (twigs) and supporting structure (branches) over time.

	Jan	Feb	Mar	Apr	May
Leaf	20.8	3.8	10.3	12.4	14.1
+ w Twig	39.4	40.2	39.7	32.6	33.1
Branches	39.8	56.0	50.0	55.1	52.7
Leaf	21.3	3.6	11.4	13.3	12.9
- w Twig	43.6	39.4	38.5	36.5	28.8
Branches	35.1	57.1	50.0	50.1	58.1

Fig 1. LAI dynamics over time at two sites

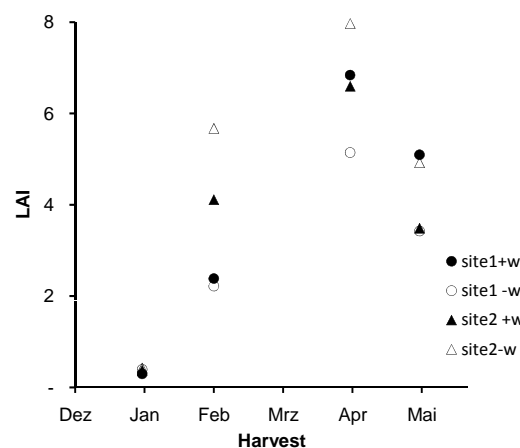
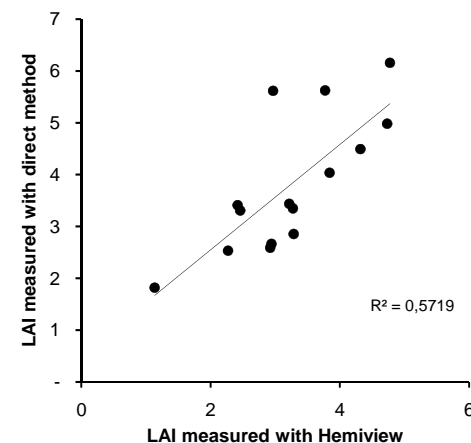


Fig 2. Comparison of LAI from destructive and non destructive method



- Branches as the structural component increase during early season and remain constant later on.
- No irrigation effect on dry mass partitioning.
- Leaf DRM% is low throughout the season compared to twigs and branches.

- Specific leaf area (SLA, m²/kg) was 15,24 ± 1,10 (n=250) and remained constant over the season.
- LAI dynamics exhibited a typical response over time (sigmoidal growth rate with senescence towards end of the season).
- LAI did increase by irrigation on site 1 but not on site 2.

- Non-destructive measurements of LAI with Hemiview images are correlated with LAI data from destructive sampling. Further refinement of image analysis is required.

Materials and Methods

- Plant materials: 3 years old *Jatropha* plants pruned at the beginning of the winter season.
- Sites: 2 sites with different soil types.
- Treatment: Plants were on rainfed condition or daily supplied with 10 mm of water.
- Measurement:
 - Specific leaf area (SLA) was calculated from single-leaf DrM and leaf area.
 - Destructive: biomass at 5 harvest dates. Leaf area index was calculated from leaf DrM and SLA.
 - Non-destructive: leaf area index (LAI) at four positions around the bush at two lateral distances with the Hemiview system.

