

Chatchai Worrawetmongkol 2011: Soil Moisture Conservation Affecting Yield of Jatropha.
Master of Science (Soil Science), Major Field: Soil Science, Department of Soil Science. Thesis
Advisor: Assistant Professor Somchai Anusornpornperm, Ph.D. 91 pages.

A study on soil moisture conservation affecting yield of Jatropha was conducted at Kanchanaburi Research Station, Kasetsart University in order to compare the effect of no soil moisture conservation scheme (W1), plant residue mulch (W2), vetiver grass grown between Jatropha rows, slash and mulch (W3), and jack bean as plant cover (W4) on moisture changes within soil profile and yield of Jatropha. Randomized Complete Block design with four replications was employed. Jatropha, KUBP 78-9 variety, was planted on a Ultic Paleustalf soil using direct seed and drip irrigation at a rate of two litres per plant was operated every two days during drought season (Dec 09-May 10). Soil moisture contents at various depths (10, 20, 30, 40, 60 and 100 cm) were monitored weekly using Time Domain Reflectometry (TDR) starting from May 25th till June 27th, 2010. Plant growth parameters such as number of inflorescence, number of capsule cluster and plant yield were recorded monthly. Analyses of plant nutrients concentration in leaf and seed of Jatropha were also included.

Plant residue mulch tended to give the highest Jatropha seed yield at 15% moisture content ($200.0 \text{ kg rai}^{-1}$) compared to the range of $130.9\text{-}145.3 \text{ kg rai}^{-1}$ obtained from other treatments. Growing vetiver grass between rows of Jatropha then slash and mulch tended to give the greatest oil content in Jatropha seed of 37.3%. The highest total oil yield (54.5 kg rai^{-1}) was gained from the scheme using plant residue mulch, which was significantly higher than the ones without soil moisture conservation measure and jack bean plant cover (37.6 and 29.9 kg rai^{-1} , respectively). Average volumetric soil moisture contents at depths of 10, 20 and 30 cm in all treatments ranged between 3.9-14.3 %. These value were below the content measured at permanent wilting point (18.6, 18.1 and 21.8% by volume, respectively). Under plant residue mulch, soil moisture contents were the highest at all depths with the exception at the depth of 30 cm. There was indifferent concentration of plant nutrients in Jatropha leaf at two months of age but the concentrations of major nutrients in treatments with vetiver grass and jack bean seemed to be lower than those with Jatropha grown solely. At fruiting stage (6-month old), plant residue mulch and vetiver grass intercropped equally brought on S contents of 0.50 g kg^{-1} , which were significantly higher than did the other two treatments. Sulfur concentration in seed (0.42 g kg^{-1}) obtained from the control, no soil moisture conservation scheme, was significantly higher than those gained from the others.

Student's signature

Thesis Advisor's signature