

Sirikanda Watcharathai 2008: Study on Carbon Balance and Soil Carbon Sequestration in Planted with *Jatropha curcas* L. on Clay and Sandy Loam Soils. Master of Science (Environmental Technology and Management), Major Field: Environmental Technology and Management, Department of Environmental Science. Thesis Advisor: Assistant Professor Patthra Pengthumkeerati, Ph.D. 73 pages.

This study aims to investigate the potential of *Jatropha curcas* L. for soil carbon sequestration and study carbon balance in the planting area. The selected varieties of *Jatropha curcas* L. were Kampangsan (KP) and Rai Suwan no. 80 (SW 80). The studied soils in the Suwanwajokkasikit (SW) and Khoa Hin Sorn (KH) Field Crops Research stations of Kasetsart University were clay and sandy loam, respectively. The design of the experiment was a Randomized Block Design with four replications. CO₂ efflux from soil surface was measured every 2 months. Soil samples were taken at the soil depth of 0-10 and 10-30 cm in February and August / September to analyze for soil organic carbon fraction, including soil organic C (SOC), particulate organic carbon (POM-C) and mineral-associated organic carbon (MaOM-C). Height and diameter of tree were measured to establish allometry equation of above-ground biomass. The above information and plant litter were used to calculate and compare net carbon balance of two varieties of *Jatropha curcas* L. in the studied systems.

This study found that SOC and MaOM-C contents tended to decrease for all the studied depths, but POM-C content tended to increase, especially in the topsoil (0-10 cm). For KH site, the soil planted with the KP variety tended to restore greater C content than that with the SW80 variety, as was observed in the higher SOC and C fractions of the KP variety. However, this observation was not clear for the SW site. Despite great C restore in the soil for KP variety, soil CO₂ efflux from soil surface of this variety was relatively higher than the SW80 variety. The net carbon balance showed that the system planted with the KP variety had a greater potential to restore C than that with the SW 80 variety. In addition, plant biomass and litter of the KP variety were greater than those of the SW80 variety. Net carbon balance in the system planting with *Jatropha curcas* L. in this short-term study showed that the KP variety had a higher net carbon balance than the SW80 variety. Considering change in SOC, we observed that the soil planting with *Jatropha curcas* L. had a decreased soil carbon stock by -11.23 and -2.41 ton C ha⁻¹ yr⁻¹ for the SW and KH sites, respectively. Hence, the finding in this preliminary study suggested that the KP variety showed a greater potential to restore carbon in the system planting with *Jatropha curcas* L. than the SW80 variety, but the study should be conducted in the longer term for better understanding.

Student's signature

Thesis Advisor's signature