Tropentag, September 18-21, 2016, Vienna, Austria

"Solidarity in a competing world — fair use of resources"

Growth and Resource Use of Young Rubber (*Hevea brasiliensis*) on Hillsides in Northern Thailand

Nuttapon Khongdee[1], Wanwisa Pansak[1], Thomas Hilger[2]

[1] *Naresuan University, Dept. of Agricultural Science, Thailand*

[2] *University of Hohenheim, Inst. of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute), Germany*

Abstract

In the past decade, rubber production largely expanded into the uplands of northern Thailand, substituting primary forests. Without proper soil conservation, monocropping of rubber generates soil loss in the magnitude of 14 Mg ha^{-1} in upland areas. Growing rubber together with either annual crops and/or cover crops is a way to decrease such environmental impacts. The objective of this study was to evaluate rubber growth, soil and leaf nutrient content of two soil and water conservation systems. The study was conducted during 2013 and 2015 on a rubber plantation established in 2011 at Wang Thong District, Phitsanulok province, Thailand (16° 55'N, 100° 32'E), using clone RRIM 600. The slope gradient ranged from 12 to 30 %. The experiment was set up as a randomized complete block design with three replications. The treatments were: (i) rubber sole cropping, (ii) rubber plus maize, and (iii) rubber plus maize and legume. Results show that the girth expansion used as proxy for growth performance was highest in rubber intercropped with maize. Across all treatments, C, N, C/N ratio, P, K, Ca, Mg, K/Mg, K/Ca, and Mg/Ca ratios of soil were 1.18-1.26 %, 0.13-0.14 %, 8.89-9.17, 2.74-3.16 mg kg^{-1}, 387-466 mg kg^{-1}, 76-93 mg kg^{-1}, 203-245 mg kg^{-1}, 1.67-2.22, 4.47-5.26, 2.44-2.72, respectively. Soil organic carbon and exchangeable potassium concentrations under sole rubber and intercrop treatments were higher than the optimum ranges for premature rubber trees. Leaf C, N, C/N ratio, P, K, Ca, Mg K/Mg, K/Ca, and Mg/Ca ratio of all treatments were in the ranges of 47.7-48.2 %, 2.87-3.11 %, 15.6-16.9, 0.17-0.24 %, 0.21-0.24 %, 0.09 %, 0.35-0.45 %, 0.48-0.87, 2.72-3.65, and 4.95-5.75, respectively. Leaf Mg concentration showed an optimum level as recommended by standard values for rubber, while leaf C, N, C/N ratio, K, Ca, and K/Mg, ratio values represented low levels of rubber requirements. The soil conservation systems tested indicate a fair resource use, improve farmers' economy during juvenile growth of rubber where tapping is not possible, and avoid negative environmental impacts. Rubber intercropping with annual crops is, hence, a viable alternative cropping option for the target region.

Keywords: Growth performance, *Hevea brasiliensis*, premature rubber, soil and leaf nutrients, soil conservation

Contact Address: Wanwisa Pansak, Naresuan University, Dept. of Agricultural Science, 65000 Phitsanulok, Thailand, e-mail: wanwisapa@nu.ac.th