

Naruenat Chairungsee 2014: Above-and Belowground Biomass and Net Primary Productivity of Rubber Plantation (*Hevea brasiliensis* Muell. Arg.). Doctor of Philosophy (Tropical Agriculture), Major Field: Tropical Agriculture, Faculty of Agriculture. Thesis Advisor: Associate Professor Poonpipope Kasemsap, Ph.D. 112 pages.

The main objectives are to estimate above and belowground biomass increments, to study the effects of environment on fine root growth dynamics, and to assess net primary productivity (NPP) of 14-year-old RRIM 600 rubber plantation at Chachoengsao Rubber Research Center from October 2007 to December 2009. Rainfall and its distribution during the two successive years showed strong differences with 1500 mm in 2008 and 950 mm in 2009. Aboveground and belowground standing biomass were 271.6 t ha⁻¹ in 2008 and 35.9 t ha⁻¹ in 2009. Approximately 95% of aboveground biomass was in trunk and coarse branches while 61% of belowground biomass was in tap roots. Moreover, 64% of fine, medium and coarse root biomass was in the top 30 cm of soil. Fine root production completely stopped during the dry season and resumed quickly after the first rains. During the rainy seasons, fine root production and the daily root elongation rate were highly variable and exhibited strong annual variations with an average root elongation rate of 0.16 cm day⁻¹ in 2008 and 0.12 cm day⁻¹ in 2009. The positive correlations found between fine root production, root elongation rate, the appearance of new roots, and rainfall indicated significant impact of rainfall seasonality on fine root dynamics. However, the rainfall patterns failed to explain the weekly variations of fine root dynamics observed during rainy seasons. Total NPP of rubber plantation were 13.68 t ha⁻¹ y⁻¹ in 2008 and 10.36 t ha⁻¹ y⁻¹ in 2009, respectively. Aboveground litter ranged from 44% to 51%, aboveground biomass increment varied from 35% to 22%, belowground biomass increment were from 3% to 14% and belowground litter were 9% to 12% of NPP in 2008 and 2009, respectively. Latex production was 9% of NPP in 2008 and 13% in 2009.

Student's signature

Thesis Advisor's signature