

Viwat Sangphet, Acting Second Lieutenant 2009: Fertilizer Management for Chinese Tea Grown on Highland Soils, Mon Ngo Area, Chiang Mai Province. Master of Science (Soil Science), Major Field: Soil Science, Department of Soil Science. Thesis Advisor: Miss Suphicha Thanachit, Ph.D. 84 pages.

Influence of fertilizer management pattern on yields of Chinese tea (#12 and Oolong varieties) and residual effect on soil properties were studied. Field experiments were carried out in highland soil with level terrace installed. The site was situated between 980-990 m above MSL in the area of Mon Ngo Royal Project Development Centre, Chiang Mai Province. Randomized complete block design with five fertilizer management methods and four replications was employed. Fertilizer management methods consisted of T1: no fertilizer (control), T2: 2,000 kg cattle manure per rai (equal to 21.6-5.6-25.0 kg N-P₂O₅-K₂O rai⁻¹), T3 to T5: mixed chemical fertilizers between urea and 25-7-7 with the rates of 75.2-5.6-5.6, 75.2-5.6-5.6, 37.6-2.8-2.8 kg N-P₂O₅-K₂O rai⁻¹, respectively. For T4 and T5, nitrogen application was split equally with application interval being at 15 days after the first one. Yield was harvested at three following times, in September and November 2008, and in February 2009. Fertilizer in each treatment was applied 45-50 days before harvesting time for the first and second harvests and there was no fertilizer application before the last harvest.

Results revealed that the residual effect of fertilizers induced significant differences in the soil pH, available K and exchangeable Al of which topsoil was more affected than that of subsoils. Application of cattle manure at the rate of 2000 kg rai⁻¹ clearly increased soil pH and available K, whereas exchangeable Al was decreased. Nevertheless, all chemical fertilizers (T3-T5) showed no impact on lowering soil pH and on increasing exchangeable Al.

Yields, concentration of macronutrients in tip and the first three leaves from the tip, and macronutrients loss by crop removal of both varieties showed no statistical difference among treatments. The split application of fertilizer in T4 (75.2-5.6-5.6 kg N-P₂O₅-K₂O rai⁻¹) tended to give maximum yield of 453 kg rai⁻¹ for No. 12 variety and 298 kg rai⁻¹ in T5 (37.6-2.8-2.8 kg N-P₂O₅-K₂O rai⁻¹) for Oolong variety. There was a wide range of nitrogen concentration in harvested leaves for both varieties (3.16-5.0%) indicating low to sufficient level for normal growth of these Chinese teas, while phosphorus and potassium concentrations were higher than that of critical level for normal growth with the amounts of 0.3-0.5 and 1.91-2.69%, respectively. Macronutrient concentrations in leaves of Oolong variety were lower than those of No. 12 variety. No. 12 variety had higher loss of macronutrients by crop removal than did Oolong variety. The high rate of fertilizer (75.2-5.6-5.6 kg N-P₂O₅-K₂O rai⁻¹) using split application gave the highest loss of nitrogen, phosphorus and potassium with the amounts of 6.05, 0.57 and 3.55 kg rai⁻¹, and 4.09, 0.41 and 2.46 kg rai⁻¹ for No. 12 and Oolong varieties, respectively. However, the total loss of these nutrients by crop removal was lower than those applied in in the form of fertilizers in all treatments.

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