Kannika Phetmak 2009: Root Zone Moisture Characteristic of Limestone Derived Soils under Different Grape Varieties. Master of Science (Soil Science), Major Field: Soil Science, Department of Soil Science. Thesis Advisor: Mr. Somchai Anusorntpornperm, Ph.D. 104 pages.

A study on root zone moisture characteristic of limestone derived soils under different grape varieties was conducted in the area of Kanchanaburi station, Wandong subdistrict, Muang district, Kanchanaburi province during June 2008-March 2009. The objectives were to compare soil moisture changes within root zone of different grape varieties using TDR (Time Domain Reflectrometry) to measure volumatic moisture content at various depths and to investigate soil properties relating to soil moisture charcateristic. The instrument was installed in six plots of grape plantation and in a bareland nearby. Result showed that soil in the area was classified as Typic Haplustalf, having loam to clay loam texture. The soil had slightly low to slightly high bulk density and moderate to very slow saturated hydraulic conductivity. Moisture content by volume at field capacity and permanent wilting point ranged between 23.4-25.6% and 14.2-18.9% respectively. The available moisture content (AWC) in this soil varied between 6.6-9.2%. A surface layer (Ap1) contained the greatest total moisture content whereas Ap2 layer had the lowest amount but with quite similar AWC to all subsoil horizons.

Moisture characteristic of seven locations revealed that moisture contents at 10 cm depth were mostly below critical level for normal growth of grape (21.7% by volume) due to a loss by evaporation while the amount at 20-40 cm dpeths mostly being greater than the critical level (24.5-24.9% by volume) only during raining period. However, the moisture became insufficient because of higher rate of evaporation during drought period, roughly starting from November- December. For depths 60 and 100 cm, the moisture contents were above critical value of 25.3% by volume and it was found that the moisture was stored in pores to the maximum capacity of these two layers of the soil acconting from nearly the end of rainy season period to mid summer season. It was called capillary fringe of which all or almost all of micropores were saturated with water but there was a problem of deficient moisture in some areas where marl was present in a particular depth. Comparing moisture contents in the soil as affected by vineyard and table grapes, moisture under vineyard varieties was tentatively higher than that under table varieties at depths between 10 and 30 cm probably because the former area was quite densely covered by killed weeds which might help preserve the moisture at these depths. On the contrary, the latter area was bare thus moisture would evaporate from the soil more than the former with mulched surface. There was no difference in moisture contents at the greater depth in the areas under both varities. Moisture contents of topsoils in the vineyard without plastic roof were rather constant and higher than that with plastic cover. It was possibly due to the amount of rain falling through soil surface being equal to the loss by evapotranspiration. Irrigation at a rate of 20 litres every three days in both no plastic roof and with plastic roof plots had no effect on increasing moisture above critical content for normal growth of grape at depths of 10 and 30 cm, nevertheless the moisture was sufficient at greater depths.

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