Journal of Chinese Soil and Water Conservation, 34 (2): 113-127 (2003)

## 天然香楠林之熱環境特性

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摘 要 本研究由 1998 年 7 月至 1999 年 7 月止,選定國立屏東科技大學之試驗集水區東側天然香楠林為試驗地點,設置微氣候觀測塔進行:淨輻射量、地中傳導熱量、葉溫、氣溫、地溫、濕度、及風速等七項微氣象觀測,藉以探討天然香楠林之熱環境特性,進而提供森林氣象、水文及其集水區經營等相關研究之基本資料與參考。

香楠樹冠表層葉溫( $T_L$ )多低於其上方氣層之氣溫,表香楠樹冠仍能吸收太陽輻射。在冬季低溫狀態下之林內地面之最低日平均地溫仍在 18 以上,且香楠林內之地表至其下深度 40cm 範圍內,地溫自 9 時開始遞增,且持續至午夜才又遞降,地表下深度 40 至 100cm 範圍內,地溫幾已形成一上下溫差僅 0.5 之等值分布。在林內之相對濕度均大於 80%,且愈近地表其值甚或可達 95%以上。而當  $T_L$ 小於林內氣溫( $T_i$ )時,則林內相對濕度將隨高度遞降,又當  $T_L < T_i$ 時,林內相對濕度將隨高度略增。香楠林熱收支解析得知,地中傳導熱量、顯熱、潛熱及植被儲存熱量分佔淨輻射量之平均比例為:5.2、27.1、42.6 及 25.1%。而潛熱隨淨輻射量增加趨勢並非線性,且由 $\lambda E$  估算香楠林蒸發散量,結果為 0.53~3.3mm,平均為  $1.4\pm0.46mm$ 。又香楠林熱容量經估算為 0.2~0.41 cal  $1m^3$ 。

關鍵詞:香楠、微氣候、熱收支。

## Characteristics of the Thermal Environment of a Natural Machilus zihoensis Woods

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ABSTRACT This study aimed at observation of the microclimate in a natural Machilus forest. A series of observations for the net radiation, soil heat flux, temperature of leaf, air and earth, relative humidity and wind speed were performed from July 1998 to July 1999. An observation tower collected all the data, which was located to the east of an experimental watershed of National Pingtung University of Science and Technology, Taiwan (elevation=90m; latitude=22°39'N; longitude=12°036'E). The results showed that leaf temperature (  $T_L$  ) was less than air temperature above the canopy, and that solar radiation was still absorbed by the canopy. The mean temperature under the ground surface was higher than 18 in winter. Consequently, the behavior of the earth temperature was documented at 0 to 40cm depth increasing at

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9 a.m. and decreasing at midnight. However, there was an isothermal layer existing at 40 to 100cm, and the layer surrounding temperature difference was less than 0.5 . The relative humidity (R.H.) under the canopy was more than 80% but at nearby ground surface it was up to 95%. The correlation between R.H. and height were shown as T<sub>L</sub><T<sub>i</sub> (air temperature under canopy) if positive and T<sub>L</sub>>T<sub>i</sub> if negative. The analytical heat budget in Machilus woods to find the average proportion of soil heat flux, sensible heat, latent heat and canopy heat storage to net radiation were 5.2, 27.1, 42.6 and 25.1%. A regressive relationship between latent heat and net radiation showed a non-linear curve. Estimating evapotranspiration by the latent heat indicated a mean value of 1.4±0.6mm. Then, the estimated canopy heat capacity would be between 0.2 and 0.41 cal <sup>-1</sup> m<sup>-3</sup>. Key Words: Machilus zihoensis woods, microclimate, heat budget.