



Investigating interactions between atmosphere and vegetation under different patterns of management of tea field.

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Among the perennial small shrubs, tea is an important economic crop in South and Southeast Asia and is expected to have dominant control on regional water and energy budget. Characterizing the key factors influencing energy budget is an important issue to clarify the interactions between vegetation and root layer of soil in microenvironmental scale. Previous studies have documented that the energy patterns under different management strategies for economic crop like maize, soybean, coffee and vineyard could affect the microclimate and the crop yield. However, very few attentions are given to tea field in terms of the dynamics of energy profiles and water budget under different farming and management. In addition, little research has examined which factors affect the microclimate physics in the tea field, nor has a comparison been explored between the differences in farm management and in canopy structure. In this study, a series of measurement is conducted in several tea fields under different farming and management in Pinglin in northern Taiwan to quantify the sensible heat, latent heat, and heat storage term by using eddy covariance technique and energy balance Bowen ratio method. The measurement considers all the components throughout the canopy volume including canopy layer and root layer of soil. The canopy structure is quantified by leaf area index and image analysis. The tea field with higher canopy coverage is expected to reduce the strength of canopy heat storage and the variation of temperature in diurnal cycle. In the seasonal scale, it is expected to observe the similar patterns in soil heat storage and variation of soil temperature for denser tea canopy. Understanding the interactions around this tea tree canopy layer could help farmers to protect their tea field against drought in the future. This result could also fill the deficiency of microclimate physics in the perennial small shrub.

Keywords: Canopy structure; Surface energy budget; Storage; Microclimate physics; Eddy covariance; Bowen ratio