

COMPLETION REPORT

Meteorological phenomenon of green land in parks is influenced by trees planting, air temperature, humidity and wind. The mitigation of heat stress and thermal comfort in summer by green land in urban areas has become increasingly significant. The measurement of physiological functions of trees and microclimate has been carried out in parks in Tainan and Tokyo. In Tainan Park, Araucaria heterophylla, the representative of araucaria in tropical coniferous forests, was selected. Three types of allocation were investigated (mass planting, side-row planting, and row planting). The mass planting and side-row planting in sandy ground areas showed greater transpiration than row planting area, which was planted in grassy ground. Five-time difference in the amount of transpiration was found. In Hibiya Park, Prunus × Yedoensis Matsum (Sakura) was chosen. Transpiration measurement was carried out for different time periods (morning, noon and the afternoon) in summer daytime during Aug 7th- 9th, 2012. Moveable measurement was also conducted to collect the microclimate data of air temperature and wind speed inside the park. The average temperature was 28-35°C and the average wind speed was 0.7-1.6m/s. The transpiration characteristics of trees planted on sandy ground, grassy ground, and in shrub area was analyzed. The transpiration rate in afternoon in grass ground and sandy ground was found greater than that in the morning due to the higher wind speed. For trees in shrub area, the transpiration rate was shown less influenced by wind speed. The results clearly demonstrated that the amount of transpiration in sandy ground was greater than the amount in shrub area. Three-time difference of the transpiration amount was found in the afternoon. Trees allocation and cover condition on ground both affected the amount of transpiration. Tree physiology and environmental management are crucial issues for planning the allocation of trees and choosing ground vegetation for planting areas. The methodology of approaches for analyzing thermal environment and human comfort was confirmed in this study. Tainan Park is surrounded by residential buildings and Hibiya Park is in commercial zone. Elderly person take exercise in Tainan Park and people who work nearby have lunch in Hibiya Park during noon time. Thermal comfort index, new standard effective temperature (SET*), was affected by air temperature, wind speed and mean radiant temperature (insolation/shading). More than 40°CSET* was observed for areas without shading by trees and 30-35°C SET* was observed for shading area. From the viewpoint of behavior of users, the ages, clothing, and time schedule of users, etc., the improvement strategies for thermal comfort by planting pruning and allocation based on the consideration of the direction prevailing wind was discussed. Detail further discussions on the meteorological phenomenon of green land from the viewpoints of transpiration, shading and wind speed inside Tainan Park (subtropical climate zone) and Hibiya Park (temperate climate zone) and their surroundings are recommended.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

May 2013, Taipei University (Taiwan), 11th Symposium on Land Use Research, A Simplified Analysis Method for Evaluating Thermal Comfort, Chun-Ming Hsieh and Yin-Hsuan Sun (In Chinese)

Aug 2013, Sendai City (Japan), International Symposium on City Planning 2013, The Influence of Vegetation Allocation in Micro Climate for a Urban Park and its Neighborhood Area, Chun-Ming Hsieh, Yin-Hsuan Sun and Feng-Chun Jan (Abstract accepted)

Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)

Will submit soon

Book (Publisher and Date of the Book, Title and Author of the Book, etc.)