ABSTRACT

ABD. HARI S BAHRUN. An Eco-Physiological Study of Seasonal Crops that Form Agroforestry in Some Agroclimate Zones on the Upstream Watershed of Ciliwung. Under Supervisor of M.A. CHOZIN as a chairman, HADI SUSILO ARIFIN and DUDUNG DARUSMAN as members of the advisory committee.

The study consists of three major experiments, namely: the identification and analysis of planting patterns; eco-physiological assessment of seasonal crops; and analysis of land productivity and financial analysis of the agroforestry system in some agro-climate zones. The research objectives were to analyze planting patterns and vegetations that create agroforestry as well as the characteristics of microclimate in some agro-climate zones; examine the eco-physiological characteristics of seasonal crops under different levels of shading; determine the productivity of land and make a financial analysis of agroforestry farming patterns based on the composition and constituent species of agroforestry.

The study results of the first stage showed that the land cultivation of the agroforestry system in the climate zone A was quite intensive. The annual crops were cultivated 3-4 times during the planting period one year in the agroforestry system, but 2-3 times in the agro-climate zone C. The combination of agroforestry system with monoculture was more dominant in zone A (60.58%) and B (7.75%) with a simple agroforestry pattern, whereas in zone C (41%) it was with complex agroforestry pattern. There were seven stands of perennial crops suitable for the agroforestry pattern. The resulted analysis of micro-climate and production found that four types of crops can be planted in the agroforestry system: Lycopersicon esculentum Mill, Capsicum frustescens L, Colocasia esculenta L and Zea mays L. saccharata. In the second experiment, the annual crops from the selection in the first experiment were analyzed for eco-physiological characteristics. It was found that the most suitable plants grown with the agroforestry pattern were Lycopersicon esculentum Mill in zone A; Colocasia esculenta L. in zone A and B; Capsicum frustescens L. in zone B and C; and Zea mays L. saccharata. in zone C. The characteristics that mostly determined the tolerance of the annual crops to the shade were the high interception of solar radiation, the coefficient of light and darkness as well as increased levels of chlorophyll a and b, the reduced ratio of chlorophyll a/b. Some physiological characteristics of plants were found to be related to the efficiency in the capture and use of solar radiation intensity, which include: photosynthesis rate, Photosynthetic Active Radiation (PAR), stomata conductance and CO₂ internal.

The results of the third-stage experiment showed that the agroforestry systems in three agro-climate zones were technically and economically feasible based on the land productivity and financial analyses. In the agro-climate zone A, that is, the agroforestry system with cinnamon stands the composition and the best annual crops were carrot and tomato. In zone B with albazia stands, the best crops were taro and chili pepper. Zone C consisted of mindi timber stands and sweet corn.

Key words: agroforestry, agroclimate zones, micro-climate, physiological characteristics, watershed.