

ABSTRACT

This research explores the capabilities of fern species as phytoindicators to indicate microclimate changes at different elevations to facilitate productive future growth through the landscape ecology approach. The research collected 103 fern species from four sites, namely; Rimba Ilmu, UM; Taman Pakis, UKM; FRIM botanical Garden, Kepong and Putrajaya Botanical Garden. The sampled sites consisted of three types of habitat, namely; terrestrial (highland, lowland, highland and lowland), epiphyte (highland, lowland, highland and lowland) and aquatic (emerged and floater) as well as different characteristics such as shrubs, trees, climbers, groundcovers, epiphytes, and aquatics. From this sample, the research concluded that different elevation meant different fern species. At higher elevation, there were more diverse fern species. In this research, observation and measurement were made based on two different natural environments, namely; Gunung Jerai, Kedah, and Lata Jarum, Pahang. Interestingly results from the two case studies indicated that the distribution and abundance of fern species was strongly influenced by differences in altitude. Twelve fern species were found at different elevations at Gunung Jerai, Kedah, whereas 20 fern species were found at Lata Jarum, Pahang. Among the species found at Gunung Jerai were *Selaginella willdenowii*, *Arcypteris irregularis*, *Adiantum caudatum*, *Pityrogramma calomelanos*, *Histiopteris stipulacea*, *Athyrium cordifolium*, *Osmund wachellii*, and *Cyathea contaminans*. Whereas the species found at Lata Jarum are *Dicranopteris linearis*, *Phymatodes scolopendria*, *Antrophyum callifolium*, *Arcypteris irregularis*, *Phymatodes crustachea*, *Selaginella willdenowi*, *Angiopteris evecta* and *Aglaomorpha heraclea*. The research also found the urban climate differs complete to natural ecological climate. The urban microclimate is hotter than the natural microclimate ecology. In conclusion, fern species has a close relationship with elevation as well as microclimate changes. In regards to the urban environment, the research studied the coastal urban environment with the $T < 26^{\circ}\text{C}$, $\text{RH} > 60\%$ and $\text{LI} < 800$ lux, namely Gunung Jerai, whereas for the inland urban environment such as Kuala Lumpur with the $T < 27^{\circ}\text{C}$, $\text{RH} > 80\%$ and $\text{LI} < 1500$ lux, sampled environment was Lata Jarum.