

Seasonal variation of water inputs for epiphytic plants at a subtropical rainforest, Fu-Shan in northern Taiwan

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Fog water is an important input for arid and semi-arid montane area. Fog is also recognized as the main water source for many forest ecosystems, especially in the dry season. However, the fog water used by epiphytic plants at subtropical rainforest in Taiwan is rarely investigated. This study measured water isotopic compositions of rain and fog in Fu-Shan, northern Taiwan, where the annual precipitation is abundant, 5000 mm/yr. We also measured the water isotopic compositions from leaves epiphytic *Hoya carnosa*, *Pyrrhosia lingus* and *Nephrolepis cordifolia* and terrestrial *Nephrolepis cordifolia* between 2016/10-2017/10. The results showed that the average $\delta^{18}\text{O}$ and δD of rain water were -6.2‰ and -30.8‰ with a significant seasonal variation. $\delta^{18}\text{O}$ approximated 0.0‰ and -80.0‰ for summer and winter, respectively. The water isotopic signature of fog water echoed with rain water variation and only enriched by 1.0‰ and 12‰ for $\delta^{18}\text{O}$ of δD , which likely indicated that the fog is mainly from the local or internal circulation. The water isotopic compositions of soil water were comparable with rain water in summer, but were significantly depleted in winter. Moreover, the water isotopic compositions in terrestrial individuals *Nephrolepis cordifolia* followed the variation of soil water, which suggest that soil water was a main source for that species in winter, whereas epiphytic individuals *Nephrolepis cordifolia* showed a more complicated water use. Besides, the isotopic signatures of *Hoya carnosa*, *Pyrrhosia lingus* showed a mixture of rain water, fog water and soil water. Despite the abundant precipitation and the complication of cross-species variation, fog water as well as soil water were both important water sources in the dry winter, implying the importance of the two sources during drought events.

Keywords: water isotope, fog water, species selection, and fog forest