


# 生物策略表

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|---|---|
| 類別  | 生物策略 (Strategy)   |
| 生物策略<br>STRATEGY  | 葉片疏導水分<br>(Leaves channel water)  |
| 生物系統<br>LIVING SYSTEM   | 菩提樹 <i>Ficus religiosa</i> 、胡椒科 Piperaceae、紅樹科植物<br><i>Cassipourea elliptica</i> 、軍刀豆屬植物 <i>Machaerium arboreum</i><br>(Peepul tree, pepper family, <i>Cassipourea elliptica</i> , <i>Machaerium<br/>arboreum</i> ) |
| 功能類別<br>FUNCTIONS   | #分配液體<br>#Distribute liquids  |
| 作用機制標題  | 某些熱帶植物的葉片透過獨特形狀的滴水尖端，輸導水分離開葉片表面<br>(The leaves of some tropical plants channel water off their surface via unique shape, called drip tips.)   |
| 生物系統/作用機制<br>示意圖  |    |
| 作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)  |   |
| <p>菩提樹是一種可以生長成非常巨大、高達 30 公尺 (98 英尺) 的榕屬植物 (<i>Ficus</i>)，原生於印度。心形的葉片有延長的尖端，能幫助輸導水分沿著葉片表面流走，並從尖端離開葉片。這種「滴水尖端」(drip tips) 的作用使菩提樹比起葉片不具有滴水尖端的植物能有效率地運送表面的水分，並更快地變得乾燥。去除葉片表面過多的水分能幫助防處潛在有害的黴菌或微生物生長，它們能夠在菩提樹生長的炎熱潮濕環境中旺盛繁殖。</p> <p>此篇摘要是由 EcoRise Youth Innovations 共同提供。</p> <p>The sacred fig tree is a type of ficus that grows very large, up to 30 m (98 ft.) tall, in humid areas in its native India. The heart-shaped leaves have extended tips that help channel water down the leaf surface and off the bottom of the tip. The action of these “drip tips” enables the plant to move surface water efficiently and dry off more quickly than plants that do not have drip tips on their leaves. Removing excess water from the leaf surface helps to prevent the growth of potentially harmful mildew or microorganisms, which can thrive in the hot and humid conditions that sacred figs live in.</p> <p>This summary was co-contributed by EcoRise Youth Innovations.</p> |   |

## 文獻引用 (REFERENCES)

「滴水尖端被切除的葉片比起另外兩個處理（表 1）在表面多殘留了大約兩到三倍的水分。植物個體之間的差異並不能解釋水分殘留的變化 (F6, 12 5 1.37, P 5 0.3)。這些結果支持了一個假說，即是滴水尖端有助於在林下樹種葉片上減少真菌滋生，以及有效促進水分從葉片表面上流走。」 (Ivey and DeSilva 2001: 189)

「我們以往的研究發現滴水尖端增加了排水及葉片乾燥的效率 (Stahl 1893, Dean & Smith 1978, Lightbody 1985)。這些發現表明滴水尖端可能是一個減少真菌生長或形成群落的機制。然而其他人提出排水及葉片乾燥效率的增加，可能會增加蒸散效率 (Stahl 1893, Leigh 1975)、減少養分從葉片中淋溶 (leaching) 出來 (Edmisten 1970)，以及減少陽光的反射率 (Stahl 1893, Leigh 1975)。滴水尖端亦減少了從葉片上滴落的水滴大小，這可能幫助將對植物底下的土壤擾動 (soil disturbance) 減至最小 (Williamson 1981, Williamson et al. 1983, Rebelo & Williamson 1996)，或是減少植株葉片之間的真菌性病原菌擴散 (J. O'Brien, pers. comm.)。」 (Ivey and DeSilva 2001: 190)

“Leaves with cutoff drip tips retained ca 2.3 times more water on their surface than those in the other two treatments (Table 1). Differences among individual plants did not explain variation in water retention (F6, 12 5 1.37, P 5 0.3). These results support the hypothesis that drip tips play a role in reducing fungi on leaves of understory trees and in facilitating efficient drainage of water from leaf surfaces.” (Ivey and DeSilva 2001: 189)

“Past studies have found, as we did, that drip tips increase the rate of water shedding or leaf drying (Stahl 1893, Dean & Smith 1978, Lightbody 1985). These findings suggest that this may be a mechanism by which drip tips reduce fungal growth or colonization. Others, however, have suggested that increased rates of water shedding and leaf drying may increase transpiration rates (Stahl 1893, Leigh 1975), reduce nutrient leaching from the leaf (Edmisten 1970), and decrease reflectance of sunlight (Lightbody 1985). Drip tips also reduce the size of droplets falling from leaves, which may help minimize soil disturbance beneath a plant (Williamson 1981, Williamson et al. 1983, Rebelo & Williamson 1996) or reduce the spread of fungal pathogens among leaves within plants (J. O'Brien, pers. comm.).” (Ivey and DeSilva 2001: 190)

## 參考文獻清單與連結 (REFERENCE LIST)

Ivey, C. T., N. DeSilva. (2001). A test of the function of drip tips. *Biotropica* 33: 188-191. ([https://doi.org/10.1646/0006-3606\(2001\)033%5B0188:ATOTFO%5D2.0.CO;2](https://doi.org/10.1646/0006-3606(2001)033%5B0188:ATOTFO%5D2.0.CO;2))

Dean, J. M., A. P. Smith. (1978). Behavioral and morphological adaptations of a tropical plant to high rainfall. *Biotropica* 10: 152-154. (<https://www.jstor.org/stable/2388018>)

Lightbody, J. P. (1985). Distribution of leaf shapes of *Piper* sp. in a tropical cloud forest:

evidence for the role of drip-tips. *Biotropica* 17: 339-342.

(<https://www.jstor.org/stable/2388599>)

#### 延伸閱讀

#### 生物系統延伸資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)

[https://en.wikipedia.org/wiki/ficus\\_religiosa](https://en.wikipedia.org/wiki/ficus_religiosa)

<https://en.wikipedia.org/wiki/piperaceae>

[https://en.wikipedia.org/wiki/cassipourea\\_elliptica](https://en.wikipedia.org/wiki/cassipourea_elliptica)

[https://en.wikipedia.org/wiki/machaerium\\_arboreum](https://en.wikipedia.org/wiki/machaerium_arboreum)

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<https://asknature.org/strategy/leaves-channel-water/>