

生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	降低水分含量使種子釋放 (Lower water content releases seeds)
生物系統 LIVING SYSTEM	翠蘆莉 <i>Ruellia simplex</i> (Mexican petunia)
功能類別 FUNCTIONS	#散佈種子 #分配固體 #Disperse seeds #Distribute solids
作用機制標題	翠蘆莉的蒴果達到特定乾燥程度時會爆炸性彈開 (The seed capsules of some wild petunias spring open explosively when they reach a certain degree of dryness.)
生物系統/作用機制 示意圖	
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
文獻引用 (REFERENCES)	
<p>某些蒴果會巧妙的透過調節水分含量來獲得能動性 (motility)。Witztum and Schulgasser (1995) 顯示了分成蒴果 (capsule) 的兩裂瓣 (如圖 22.1 所示) 能在乾燥時貯存能量；達到一定乾燥度時 (或在部分物種，當蒴果的頂端沾濕時)，從連接兩瓣的接縫 (seams) 處突然裂開。蒴果兩瓣於是往外彈出，不只釋出內含的種子，更將種子以高達 12 m/s (27 mph) 的速度爆炸性噴出；它們可以到達大約 3 公尺遠的地方。這種他們提出的彈出機制，與我們製作溫度計及電鍋內定溫器的雙金屬片一致，由於縱向接合的兩層金屬延展性有差異，產生的壓力以彈射方式釋放。(Vogel 2003: 444)</p> <p>屬於爵床科 (Acanthaceae) 爵床亞科 (Acanthoideae) 物種的蒴果為兩瓣室 (bilocular)，皆為濕裂散開 (hygrochastic) 或乾裂散開 (xerochastic)，但在兩種情況下種子噴出的機制都是類似的；兩種情況中只有「觸發裝置」不一樣。蒴果的乾燥使彈力能貯存在蒴果的兩瓣之中。直到連接兩瓣的接縫處裂開，引發貯存在兩瓣及種子中的彈性能轉變。在濕裂散開情況中，接縫裂開是因蒴果尖端沾濕吸收水分，使果膠質 (pectic) 的「黏膠」變得脆弱；在乾裂散開的情況中，接縫裂開單純是由於在一定脫水程度下，黏合層中的高度壓力釋放所導致。(Witztum and Schulgasser 1995: 531)</p>	

“Some seed capsules have a particularly neat way of achieving motility by varying water content. Witztum and Schulgasser (1995) showed that the two halves of the capsule (as in fig. 22.1) store energy as they dry; at a certain dryness (or, in some, when the top of the capsule is wetted) the seam joining them gives way suddenly. The capsule halves spring outward, which not only releases the seeds within, but expels them explosively at speeds up to 12 meters per second (27 miles per hour); they travel up to about 3 meters. The springing mechanism, as they point out, matches that of the bimetallic strips we use for thermometers and thermostats— differential expansion of longitudinally joined layers produces the stress that springing relieves.” (Vogel 2003: 444)

“The bilocular seed capsules of species on the Acanthaceae subfamily Acanthoideae are either hygrochastic or xerochastic, but in both cases the mechanism for seed expulsion is similar; only the “trigger” differs in the two instances. The drying of the capsule results in the storage of elastic energy in the capsule valves. The failure of the seam joining the two valves precipitates the conversion of the elastic potential energy stored in the valves and seeds. In the hygrochastic case the failure is due to moisture absorption on wetting of the capsule beak which weakens the pectic “glue”; in the xerochastic case the seam failure is due simply to the high stress in the bonding layer at some degree of desiccation.” (Witztum and Schulgasser 1995: 531)

參考文獻清單與連結 (REFERENCE LIST)

Vogel, S. (2013). *Comparative biomechanics: life's physical world - second edition*. Princeton University Press.

Witztum, A. and K. Schulgasser. (1995). The mechanics of seed expulsion in Acanthaceae. *Journal of Theoretical Biology* 176: 531-542. (<https://doi.org/10.1006/jtbi.1995.0219>)

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/ruellia_simplex

https://www.onezoom.org/life/@ruellia_simplex

<https://eol.org/pages/590266>

撰寫/翻譯/編修者與日期

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AskNature 原文連結

<https://asknature.org/strategy/lower-water-content-releases-seeds/>