

生物策略格式

KJC, 2019/10/21

類別	生物策略 (Strategy)
生物策略 STRATEGY	生物多樣性交互作用 (Multiple organisms interact)
生物系統 LIVING SYSTEM	生物 (Organisms)
功能類別 FUNCTIONS	#分解活體物質 #化學性分解有機化合物 #循環養分 #Breaking down living materials #Chemically break down organic compounds #Cycle nutrients
作用機制標題	通過粉碎、消耗、消化和排泄有機碎片來加速分解工作，使土壤中的化學物質裂解和使土壤通氣 (Speed the work of decomposition by shredding, consuming, digesting, and excreting organic debris to break down chemicals and aerate the soil)
生物系統/作用機制示意圖	

作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)

透過百萬個生物的交互作用之共同合作，土壤生態系統支持植物生長，使土壤中的化學物質裂解，讓空氣進入以增加通氣性。

The soil ecosystem supports plant growth through interactions of millions of organisms that work together to break down chemicals and aerate the soil.

文獻引用 (REFERENCES)

「跨越整個生物群系，從苔原 (tundra) 到疏林 (savanna)，複雜的群落繁盛生活於距表土層 5-10 公分的土壤，這是大部分碳與營養源發生年度性流動與交換的所在位置。這個喧嚷的活動 (habbus) 不是均勻地散布在整個土壤中，而是集中在植物根周圍的微小活動熱點，在那裡微生物會利用從根排出的糖和有機酸來供給他們自己...微生物群落 (microflora) 可以說是最重要，且當然也是土壤調查中至少會被調查的土壤生物，它們是一大群 (the hordes) 的細菌和真菌，為土壤中、事實上是地球上最豐富及最有多樣代謝能力的生物...每一個微生物群中的官能基專門進行大量化學反應，使蛋白質、碳氫化合物、和其他複雜有機分子分解成簡單有機酸，接著再礦化成無機物型式，像是植物可使用的

氮。有些生物擅於處理在較大任務的微小層面，例如對木質素，纖維素和果膠 (pectin) 等緩慢腐爛的天然聚合物進行多階段處理。在任何給定的土壤中，可能有數百種真菌和細菌按順序工作，就像工廠裝配線上的團隊一樣...如果所有的微生物群落都消失了，地球上的生命很快就會停止、枯萎，並且在整個土地上凋謝成永不腐爛的堆肥堆。然而，這些重要的生物也不能孤立地運作。土壤群落包括無脊椎動物 (invertebrate animal) 的等級，其中一些包含於細菌和真菌，即使是最小的生命形式，都能確保能量和物質的釋放和再循環。許多土壤動物也通過粉碎、消耗、消化和排泄有機碎片，將其轉化為更易接近的碎屑來加速分解工作。最微小的土壤動物是微型動物，例如線蟲 (蛔蟲) 和原生動物 (nematodes (roundworms) and protozoa)，它們主要生活在土壤毛孔周圍的水膜中。雖然有些植物寄生蟲會造成嚴重的作物損害，但其他寄生蟲卻會對細菌或真菌產生影響。微型動物加入了中型土壤動物，即中型動物 (mesofauna)，這包括高度特化的無脊椎動物，如蟎蟲和彈尾魚，它們佔據了充滿空氣的土壤孔洞，並主要捕食真菌...最大和最引人注目的土壤無脊椎動物是大型動物：蚯蚓、螞蟻、白蟻、千足蟲 (millipedes)、蝨子 (woodlice)、甲蟲、昆蟲幼蟲和其他等。這些都足夠大到可以改變土壤的物理結構和凋落物的碎片，在它們鑽挖隧道和取食時，給土壤通氣並形成滲透水的通道。」 (Baskin 1997: 108-110)

“Across all biomes, from the tundra to the savanna, complex communities thrive in the top five to ten centimeters of the soil, where much of the annual flow and exchange of carbon and nutrients takes place. This hubbub is not scattered uniformly throughout the soil but is concentrated in tiny hot spots of activity around the roots of plants, where microbes fuel themselves on sugars and organic acids exuded from the growing root tips...Arguably most important, and certainly least censused of the soil organisms, are the microflora, the hordes of bacteria and fungi that are the most abundant and metabolically versatile organisms in the soil—indeed, on the earth...Each functional group among the microflora specializes in one of the multitude of chemical reactions needed to break down proteins, carbohydrates, and other complex organic molecules into simpler organic acids, then mineralize these into inorganic forms, such as the nitrate that plants can use. Some organisms excel at minute aspects of a larger task, such as the multi-stage processing of slow-rotting natural polymers like lignin, cellulose, and pectins. In any given patch of soil, there may be hundreds of species of fungi and bacteria working at a task in sequence like teams on a factory assembly line...If all the microflora were to disappear, life on earth would quickly come to a halt, wilting and perishing into a never-to-rot compost pile across the land. Yet even these vital creatures do not work in isolation. The soil community includes ranks of invertebrate animals, some of which graze on bacteria and fungi, assuring the release and recycling of energy and materials tied up in even the smallest life forms. Many of these soil animals also speed the work of decomposition by shredding, consuming, digesting, and excreting organic debris, turning it into more accessible crumbs. The tiniest of the soil animals are the microfauna, such as nematodes (roundworms) and protozoa that live mostly in water films around soil pores. Although some are plant parasites that cause serious crop damage, others graze on bacteria or fungi. They are joined by intermediate-sized soil animals, the mesofauna, which include highly specialized invertebrates, such as mites and springtails, that

occupy air-filled soil pores and prey mostly on fungi...Largest and most noticeable of the soil invertebrates are the macrofauna: earthworms, ants, termites, millipedes, woodlice, beetles, insect larvae, and others. All are large enough to alter the physical structure of the soil and fragment the litter as they tunnel and feed, aerating the soil and forming channels for infiltration of water.”
(Baskin 1997: 108-110)

參考文獻清單與連結 (REFERENCE LIST)

Baskin, Y. (1997). *Work of nature: how the diversity of life sustains us*. Diane Pub Co.

延伸閱讀:

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

文章貢獻/編修者與日期:

陳怡安翻譯 (2019/05/11)；朱天愛編修 (2019/12/19)；吳皓編修 (2020/01/04)；許秋容編修 (2020/11/26)；紀凱容編修 (2020/11/26)

AskNature 原文連結

<https://asknature.org/strategy/multiple-organisms-interact/>