**Plant Colonization**

**植物殖民化**

Colonization is one way in which plants can change the ecology of a site. Colonization is a process with two components: invasion and survival. The rate at which a site is colonized by plants depends on both the rate at which individual organisms (seeds, spores, immature or mature individuals) arrive at the site and their success at becoming established and surviving. Success in colonization depends to a great extent on there being a site available for colonization – a safe site where disturbance by fire or by cutting down of trees has either removed competing species or reduced levels of competition and other negative interactions to a level at which the invading species can become established. For a given rate of invasion, colonization of a moist, fertile site is likely to be much more rapid than that of a dry, infertile site because of poor survival on the latter. A fertile, **plowed field** is rapidly invaded by a large variety of weeds, whereas a neighboring **construction site** from which the soil has been compacted or removed to expose a coarse, infertile parent material may remain **virtually** free of vegetation for many months or even years **despite** receiving the same input of seeds as the plowed field.

殖民化是植物能够改变一个地方生态的一种方法。这是一个由两部分组成的过程：入侵和生存。一个地方被植物殖民的比率是取决于两个东西的速率：生物体 (种子，孢子，成熟或不成熟的个体) 到达这个区域和它们能成功地立足和生存。成功的殖民化取决于有一个非常适合定居的场所——所谓安全的地方就是，火灾和砍伐的干扰已经赶走了竞争物种或已经减小了竞争力和对入侵物种要立足产生的阻力。对于入侵速率，迁居到一个潮湿肥沃的地方会比到一个干的，不肥沃的地方更快，因为在后者更难存活。一个肥沃，翻耕的领域会迅速地被大量多样的野草侵入，然而一个邻近的建筑区，为了曝光一个粗糙不肥沃的，并且几乎可能是多月或多年都没有植被覆盖的母质层，它的土壤已经是被压实或是移动，尽管是收到了如在翻耕区域相同的种子投入。

Both the rate of invasion and the rate of extinction vary greatly among different plant species. Pioneer species – those that occur only in the earliest stages of colonization – tend to have high rates of invasion because they produce very large numbers of reproductive propagules (seeds, spores, and so on) and because they have an efficient means of dispersal (normally, wind).

在不同的植物种类中，入侵率和灭绝率有很大的差别。先驱物种——只出现在殖民的最初阶段——它们能高效的入侵，因为它们可以产生大量的生殖繁殖体 (像是种子，孢子之类) 并且它们有一种高效的传播方式 (正常情况下，是风) 。

If colonizers produce short-lived reproductive propagules, then they must produce very large numbers unless they have an efficient means of dispersal to suitable new habitats. Many plants depend on wind for dispersal and produce abundant quantities of small, relatively short-lived seeds to compensate for the fact that wind is not always a reliable means of reaching the appropriate type of habitat. Alternative strategies have evolved in some plants, such as those that produce fewer but larger seeds that are dispersed to suitable sites by birds or small mammals or those that produce long-lived seeds. Many forest plants seem to exhibit **the latter adaptation**, and **viable** seeds of pioneer species can be found in large numbers on some forest floors. For example, as many as 1,125 viable seeds per square meter were found in a 100-year-old Douglas fir/western hemlock forest in coastal British Columbia. Nearly all the seeds that had germinated from this seed bank were from pioneer species. The rapid colonization of such sites after disturbance is undoubtedly in part a reflection of the large seed bank on the forest floor.

如果殖民植物产出的是寿命较短的生命繁殖体，之后它们就必须繁殖很大的数量，除非它们有一种高效的传播方式去适应新的栖息地。很多植物依靠风去传播并且产生大量的小且寿命相对较短的种子来抵消这样一种风并不总是能可靠地到达一个适合的栖息地的事实。一些植物已经发展了可供选择的策略，像那些能生产出通过鸟或小型哺乳动物带到合适栖息地的较小却更大的种子的植物，或是能生产出存活得更久的种子的植物。很多的森林植物偏于选择第二种方法，并且大量先驱植物的可存活种子也能在森林地被物上被找到。举个例子，在不列颠哥伦比亚沿海的道格拉斯西部铁杉森林里，每一平方米都能找到1125个可生长的种子。几乎所有在这个种子库里发芽的种子都是属于先驱植物。如这样快速的在这种已被干扰的区域殖民毫无疑问是在部分反映出这个雨林地表的种子库。

An adaptation that is well developed in colonizing species is a high degree of variation in germination (the beginning of a seed’s growth). Seeds of a given species exhibit a wide range of germination dates, increasing the probability that at least some of the seeds will germinate during a period of favorable environmental conditions. This is particularly important for species that colonize an environment where there is no existing vegetation to ameliorate climatic extremes and in which there may be great climatic diversity.

这种在殖民物种里发展的很好的适应方法在萌芽期（种子成长初期）中存在很大程度的变化。一个特定物种的种子表现出一个较宽范围的发芽期，这增加了至少有一部分种子会在有良好的环境条件时期发芽的可能性。这对于要迁居到没有植被去改善极端气候和已具备气候多样性的地方的物种尤其重要。

Species succession in plant communities, i.e. the temporal sequence of appearance and disappearance of species is dependent on events occurring at different stages in the life history of a species. [A]■ Variation in rates of invasion and growth plays an important role in determining patterns of succession, especially secondary succession. [B]■ The species that are first to colonize a site are those that produce **abundant** seed that is distributed successfully to new sites. [C]■ Such species generally grow rapidly and quickly dominate new sites, excluding other species with lower invasion and growth rates. [D]■ The first community that occupies a disturbed area therefore may be composed of species with the highest rate of invasion, whereas the community of the subsequent stage may consist of plants with similar survival rates but lower invasion rates.

植物群落里的物种演替，意思就是说，物种出现和消失的时间顺序是依赖于在一个物种的生存史中发生在不同阶段的事件。入侵和生长比率的变化在决定演替模式中扮演着一个重要角色，尤其是在次级演替中。首先迁居到别处的物种都可以产出大量能够顺利分散到新地点的种子。像这些物种，一般都能迅速的生长和控制新区域，将那些入侵及生长水平更低的其他物种排除在外。因此率先占据受兵家必争之地的群落可能是由有着最高入侵性率的物种组成的，然而再后来阶段的群落可能就由有着相似存活率较低入侵水平的植被组成了。