tpo_32_passage_3

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. 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). 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. 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. 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. Variation in rates of invasion and growth plays an important role in determining patterns of succession, especially secondary succession. The species that are first to colonize a site are those that produce abundant seed that is distributed successfully to new sites. Such species generally grow rapidly and quickly dominate new sites, excluding other species with lower invasion and growth rates 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.

question 1

According to paragraph 1, how does disturbance of a site influence its colonization by a plant species?

A Disturbance reduces or eliminates competition by other species.

B Disturbance increases negative interactions with other organisms on the site.

C Disturbance prevents a plant species from colonizing a new site.

D Disturbance reduces the fertility of a site.

question 2

Why does the author mention a plowed field and a construction site in the passage?

A To argue that sites that have been affected by human activity tend to be colonized slowly

B To illustrate the kind of sites that may be invaded by weeds

C To contrast sites in terms of their suitability for colonization

D To explain that exposing or compacting the soil results in successful colonization

question 3

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

A The seeds of pioneer species are usually carried by the wind to fertile sites, where they reproduce very efficiently.

B Pioneer species are successful invaders because they produce lots of seeds that are dispersed effectively.

C Pioneer species produce their largest numbers of propagules during the earliest stages of their colonization.

D Pioneer species reproduce very quickly and efficiently because they produce very large numbers of seeds.

question 4

What can be inferred from paragraph 3 about the reason that large seeds are dispersed by birds or small animals rather than by the wind?

A Large seeds are easier for birds and animals to see than are the small seeds dispersed by the wind.

B Large seeds are too heavy for the wind to disperse.

C Large seeds cannot be eaten by birds and animals.

D Large seeds are short-lived and thus require a more efficient means of dispersal than small seeds do.

question 5

The phrase "the latter adaptation" in the passage refers to

A producing fewer seeds

B producing larger seeds

C dispersal by birds or small mammals

D producing long-lived seeds

question 6

The example of the 100-year-old Douglas fir/western hemlock forest in paragraph 3 illustrates which of the following ideas?

A It is uncommon for older seed to germinate.

B Pioneer species tend to prefer forest floors for colonization purposes.

C Long-lived seeds of pioneer species can successfully germinate over long periods of time.

D Coastal British Columbia is particularly suited for pioneer species to develop.

question 7

According to paragraph 4, how do plants manage to germinate in areas with great climatic diversity and climatic extremes?

A By producing seeds only during favorable climatic conditions

B By generating large numbers of seeds

C By colonizing only those areas where other plants have survived

D By producing seeds that have a wide range of germination dates

question 8

According to paragraph 5, which of the following determines the sequence in which plant species will colonize a site?

A The extent of growth of a species on a prior site before it begins to colonize a secondary site

B The differences in invasion and growth rates across species

C The degree of fertility of a site

D The kind of disturbance that the site has undergone

question 9

Look at the four squares [ ] that indicate where the following sentence could be added to the passage.

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. 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). 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. 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. 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. [] Variation in rates of invasion and growth plays an important role in determining patterns of succession, especially secondary succession. [] The species that are first to colonize a site are those that produce abundant seed that is distributed successfully to new sites. [] Such species generally grow rapidly and quickly dominate new sites, excluding other species with lower invasion and growth rates 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. []

question 10

Directions: An introductory sentence for a brief summary of the passage is

provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

A. The species that first colonize a disturbed site are typically ones that produce a large number of efficiently dispersed seeds.

B. Plants that cannot successfully compete with other species can invade and colonize a site only if it is fertile and moist, such as a plowed field.

C. Pioneer species arrive at a site first but have lower survival rates than do species that arrive later.

D. Producing seeds that geminate at various times over long periods allows some plants to colonize sites that only occasionally present the right conditions for growth.

E. Large, long-lived seeds tend to result in large seed banks with short germination periods requiring favorable environmental conditions for development.

G. The successive appearance and disappearance of species on a site is a result of variation in species' rates of invasion, growth, and survival.