

Plants with a plan

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MOST people view rain-forests as helpless and static areas of vegetation helpless to its demise by humans for the purpose of progress. But these forests have stood for hundreds of years, so they must have some means of protecting themselves.

There are three main strategies that they have used to stay on the scene as long as they have the first being secondary succession, which occurs in areas where the dominant species has been removed. Since this stage succeeds the primary or pioneer stage the microclimate as well as organic matter of the area has already been established.

Also the disturbances, which led to this stage of succession, are not as severe as that leading to primary succession, hence the soil is not usually disturbed. An example of secondary succession is tree fall gaps. This natural phenomenon is very common in tropical forests and approximately 50% of the canopy is in some stage of tree fall.

The term tree fall can be a bit misleading in that you many think that the entire tree has toppled over, so that tree fall can include fallen branches as well.

When tree falls occur, the canopy collapses to almost close to the ground. Although the conditions are more stressful, there are more opportunities for plant growth such as, a higher source of sunlight and nutrients however, these sources are temporary as tree and animals colony the area, the nutrients are used up and become incorporated into the biomass of the trees which get taller and join the canopy.

Plants are adapted to conditions in a certain niche (which is the particular area within a habitat occupied by an organism), for example, primary and secondary species. This for example, primary stage species

in areas where primary succession has occurred there is a narrower range of abiotic conditions present and hence a narrower niche. Since they have to compete for resources such as light, therefore species have to be physiologically better competitors. At the secondary stage plants must be able to physiologically and morphologically cope with a range of micro-environments. Therefore the niche is classified as broader and the niche styles are ore toward the generator and of the spectrum. This can be better explained if we look at the abiotic conditions faced by tree fall gap species, which includes low humidity during the day accompanied by high temperatures so that they have to deal with moisture. Also large trees can soak up lots of water, so when they are absent as in tree fall gaps, there is a lot of water present so the plants present have to deal with both very moist and dry conditions.

The size, morphology and growth rate of the gap species are also important. Take for instance small gaps where there is a higher level of humidity therefore it is advantageous for the plants that grow there to have large leaves which means that there is a large surface area to gather sunlight for photosynthesis. Also it is quite cheap energy-wise for the plant to produce these large thin leaves. Also besides controlling the opening and closing of the stomatal openings of the leaves to reduce the moisture lost through them and into the atmosphere.

This job is done by the surrounding environment as in a tree gap the amount of light and heat is regulated by how much area is exposed to the elements. However, in large gaps the opposite is true and plants found there have smaller, thicker leaves with fewer stomatal openings.

If you were to separate the rain-forest into different layers you would end up with three main layers; understory, mid level canopy and canopy. At each layer the leaves of the plants have a different shape or morphology. Those at the understory



level or those closest to the forest floor are large while those higher up are slightly smaller with those at the canopy being the smallest.

There is also the trend of fast growth in the stems and leaves of these gap species because of the limited resources available. Therefore the plants there will utilise the resources there to maximise reproduction before competition sets in.

When it comes to reproduction, gap species employ two strategies, one of which include producing many small seeds with the chance that some may find a gap with suitable habitat and resources to thrive. Another advantage of this strategy is that there is a bank of dormant seeds in the soil that are ready to germinate when a gap opens up.

The second strategy involves

using animals as a means to transport the seeds to suitable areas.

Plants and forests may be stationary but they are not defenseless and have many complex strategies that have allowed them to exist for millions of years.

But time will only tell if they are capable of surviving their relatively new challenge - humans.