

All living organisms ultimately depend on the ability of green plants to manufacture their own food

– a paper written by Paul Bartlett as part of his studies for the Certificate of Arboriculture (theory)

Green plants may not seem that important to us in our everyday lives. We take so much for granted in our complex lifestyles and certainly we as 'first world' nations are far removed from the sources of our consumables.

But the combination of algae, phytoplankton, herbaceous annuals and perennials, shrubs and trees found throughout our world are responsible for the majority of the oxygen in the air we breathe. Put simply, without them we would die of hypoxia. If plants had a union, they would be the highest paid inhabitants of our planet.

As if that wasn't enough, they also provide us with our food – all of it!

Oh, and I almost forgot to mention our Oil. Without the ancestors of our phytoplankton and algae, there wouldn't be any petroleum oil. And the industrial revolution would never have happened without all the ancient plants that became crushed and metamorphosed into coal. But we don't need oil or coal to survive, and neither do all the other insects, birds, mammals, reptiles, invertebrates, bacteria and fungi. We do, however, need oxygen and food.

The atmosphere of our planet would be very different if there were no plants. CO₂ is a harmful gas. It will kill most living organisms if it is present in too high a percentage. During the process of photosynthesis, plants take in CO₂ gas and use it to help create sugars. As a by-product of this process, oxygen gas is created, which most organisms need to survive. So plants massively reduce the levels of harmful CO₂ and increase the levels of beneficial oxygen.

All the living organisms mentioned need plants in order to survive. The world is a massive interdependent food and resources chain – and green plants are at the bottom: although bottom seems an odd choice of word, as it implies less importance, and plants cannot possibly be described as anything other than essential. So maybe we should say that plants are at the 'start' of the chain. And maybe we should be stressing another word – dependency. As mentioned in the title, we (the living organisms) all totally depend on the plants.

The fundamental issue here is about energy. Energy creates and sustains life. Plants have the unique ability to turn solar energy into chemical energy, using a process we term 'photosynthesis'. No other organisms can, so we all depend on the plants to start the process. We can use the chemical energy they manufacture. We can power our bodies with it. But we cannot create it. *(At this point let us discount the notion that in fact we do have the science to achieve artificial photosynthesis, as at present we cannot achieve it on the scale we would need to survive – and anyway, we cannot replicate it in the wild).*

Plants then use this chemical energy to fuel their growth. They turn solar energy, carbon dioxide and water into glucose and oxygen. Plants only use a tiny amount of oxygen, so the majority of the oxygen is just a waste product. But a very convenient one for us. The plants want the glucose, which can be stored, broken down and forms the basis of all the materials they need to grow and reproduce.

All the other living organisms either digest plants to tap into that chemical energy or digest the organisms that digest the plants. Think about the food we eat. Obviously vegetables, pulses and fruit are of plant origin. But what about meat and its associated dairy products? Livestock need to be fed, and they eat plant material. Big fish feed on smaller fish, which feed on zooplankton, which feed on phytoplankton – a green plant. Bread comes from pulverised seed of various grass-like mono-cotyledons. Rice is one of those plants.

The crucial difference between plants and the rest is that plants are the 'givers' of energy and all the other living organisms are 'takers'. Yes, there are some interdependencies; such as insects used as pollinators and animals used as distributors of seeds. But these are adaptations, not essential to the survival of plants as a whole. Plants could do without living organisms and still adapt and survive. The organisms cannot do without plants. So we are totally dependant on plants; whereas plants are not entirely dependant on us. There is no balance in this relationship; it is heavily weighted in favour of the plants.

Of course, there are also other ways in which plants help to ensure the survival of the other life forms, and this is an area where interdependencies are more noticeable. Larger plants can create habitats for shelter and raising of young organisms. In these relationships, it is not in the interest of the organisms to destroy the plants entirely, so a balance is maintained. Plants want insects or birds to pollinate them, so they lure them to the flower with nectar, a food for the organism. The organisms unwittingly help to spread the plants pollen. Another balance.

Plants also provide stability for the ground, and this is very important. The roots anchor the precious soil in place, minimising harmful erosion. Those same roots, particularly of trees, help to hold and gradually release water and stop a sudden downpour becoming a life-threatening flood. Forests can handle water in this way on a truly massive scale. Even if we didn't need plants for oxygen, CO₂ disposal and food; a world without plants would become a ravaged desert, hardly capable of sustaining life. All the soil would end up in, or at the edge of oceans. Massive floods would be commonplace. The land would just be bedrock and sand.

But the latter interdependencies are really just the 'icing on the cake'. The two big facts that need to be learnt and adhered to are:-

1. All organisms need green plants for control of CO₂ and manufacture of OXYGEN GAS.
2. All organisms need green plants for FOOD.

It is not a balanced relationship. We need plants more than they need us. And when we are busy cutting down forests and concreting over countryside, we should be bearing this in mind.

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28th March 2011