

BIOTIC-ABIOTIC INFLUENCES ON TREES

Living organisms and non-living components

By way of background, here is a short overview of the biotic (living) organisms and abiotic (non-living) components that influence tree growth. It's important to appreciate that trees do not exist in isolation. They are continuously and intimately affected by and, in turn, influencing the living and non-living environment around them. Trees are both ecological providers and participants within an intricate web of life. Briefly:

- *Biotic* factors are *living organisms* – such as bacteria, fungi, viruses, insects, animals, birds and plants, often occurring consecutively and/or in tandem. Some are harmless and beneficial, others harmful and debilitating or fatal – all impacting within a local, regional, national or global ecosystem. Living organisms must contend with others around them. Many detrimental harmful biotic organisms are ubiquitous and occur worldwide, causing plant deformity, morbidity and death wherever they exist. Conversely, plants cannot survive without a host of beneficial organisms that support their development and function throughout all life stages.
- *Abiotic* factors are *non-living components* – such as air, minerals, light, temperature, wind and water, often occurring collectively and/or in combination. They influence the composition, growth, survival and diversity of living organisms, thereby affecting the ecosystem (positively or negatively) through their presence or absence. Abiotic components, though inert, always affect plant growth, since jointly they represent the environment the plant lives within – and, together with biotic factors, promote or restrain growth. Abiotic factors present the greatest challenge to plant growth when they are extreme – as in, for instance, the availability and/or unavailability of essential raw nutrients – where abundance results in toxicity and scarcity causes deficiency.

Trees subsist best where conditions are conducive. They tolerate variations in the quality and volume of the inputs they require, across a spectrum that enables them to basically survive or flourish and thrive. They adapt their physical and physiological processes and responses. They exist in collaboration with a myriad of co-hosts and competitors. They gradually decline with the onset of old age and/or due to damage, decay and deformation, which invariably enables harmful pathogens to influence the rate of death and/or gain succession. They ultimately die when respiration ceases (due to photosynthesis declining to an unsustainable level).

At a simplistic level, all terrestrial trees (and plants) require light, air, water and nutrients. Trees derive these essential inputs from the immediate world around them – absorbing, extracting, cycling and recycling elements in a series of continuous interactive and interdependent processes. Be aware that raw inputs are similarly matched by refined outputs – where trees give away a proportion of organic liquid, solid or gaseous by-products, as compensation and reward to associated beneficial organisms and also (and, in particular, for our greatest benefit) to maintain the aerobic life that surrounds and supports them. Trees liberate oxygen – and in doing so (together with photosynthesising aquatic organisms in the oceans) provide us (and all living things) with the aerobic respiring world in which we exist.