



LAWS OF LIMITING FACTORS, STUDY OF PHYSICAL FACTORS, THE BIOSPHERE

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WHAT IS A FACTOR IN ECOLOGY?

Any part or condition of the environment that influences the life of one or more organisms can be termed as an ecological factor, environmental factor, eco factor or simply factor.

These can be classified in different ways:

1. Abiotic and biotic factors
2. Density dependent and density independent factors
3. Primary periodic, secondary periodic and aperiodic factors

PHYSICAL ENVIRONMENTAL FACTORS

Classification:

1. Lethal: causing death (e.g. Temperature)
2. Masking: modify effect of other factors (e.g. Humidity)
3. Directive: orienting response (e.g. Migration)
4. Controlling: influences rate of some process (e.g. Temperature and Metabolism)
5. Deficient/ limiting: curtailing activity (e.g. Nutrient)



REVIEW OF PHYSICAL FACTORS

1. TEMPERATURE
2. LIGHT
3. WATER
4. ATMOSPHERIC GASES
5. GASES IN AQUATIC ENVIRONMENT
6. WIND
7. BIOGENIC SALTS
8. FIRE
9. SOIL
10. PRESSURE

LAWS OF LIMITING FACTORS

Regulating factor, also known as a *limiting factor*, is something that keeps a population at equilibrium (neither increasing nor decreasing in size over time). Common limiting factor resources are environmental features that limit the growth, abundance, or distribution of an organism or a population of organisms in an ecosystem.

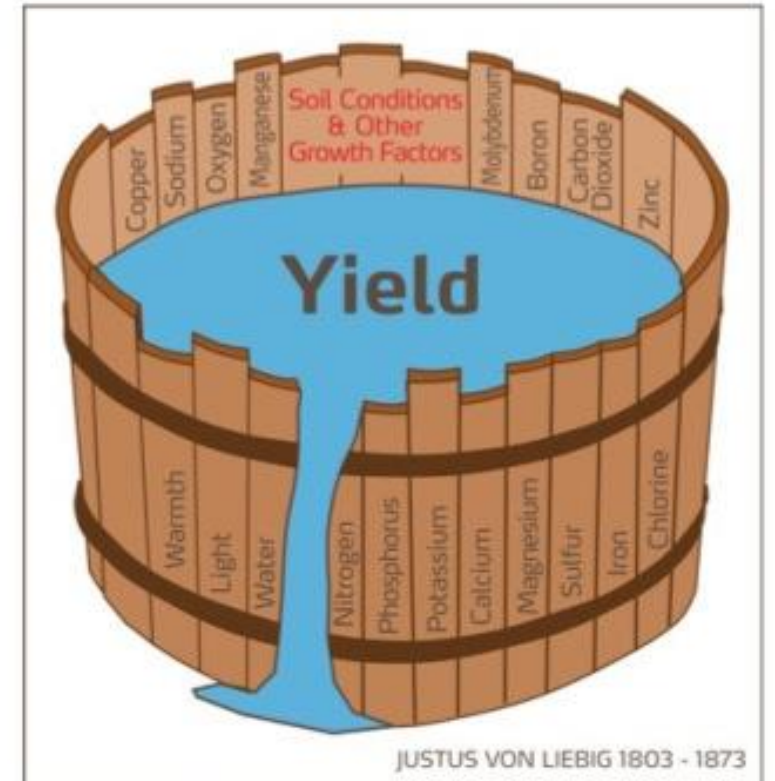
1. Liebig's law of the minimum [Proposed by Justus Liebig (1840)]
2. Shelford's law of tolerance [Proposed by V. E. Shelford (1913)]

LIEBIG'S LAW OF THE MINIMUM

Justus von Liebig's famous "**Law of the Minimum**" **principle** implies that crop yield is proportional to the amount of the most limiting essential nutrient, whichever nutrient that may be. And although each nutrient is needed by the plant in different amounts, it is the relative amount of each nutrient available (usually expressed as a percentage of ideal) that may be limiting.

Justus von Liebig's
"Law of the Minimum"
published in 1873

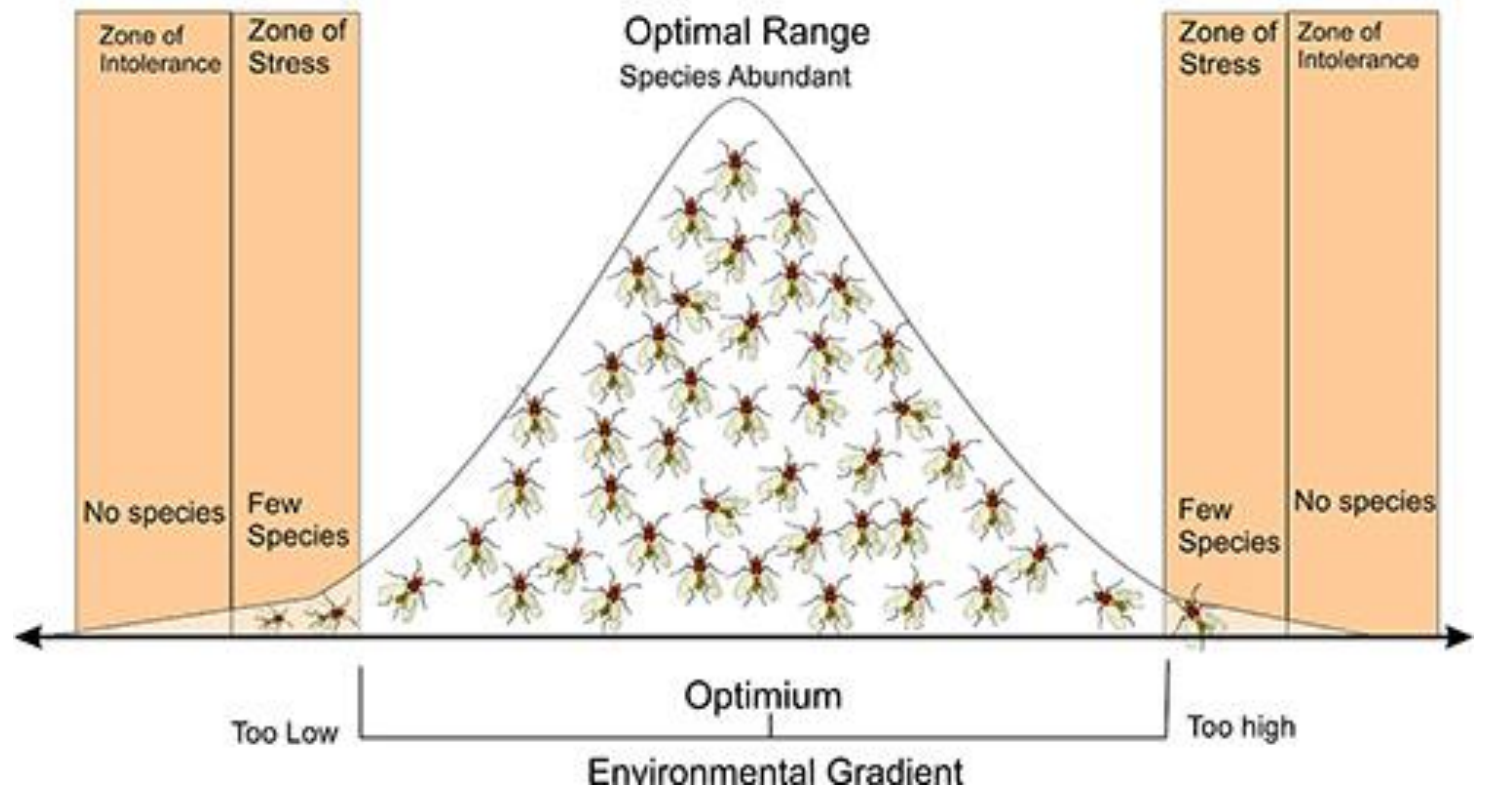
"If one growth factor/nutrient is deficient, plant growth is limited, even if all other vital factors/nutrients are adequate...plant growth is improved by increasing the supply of the deficient factor/nutrient"



SHELFORD'S LAW OF TOLERANCE

A law stating that the abundance or distribution of an organism can be controlled by certain factors (e.g. the climatic, topographic, and biological requirements of plants and animals) where levels of these exceed the maximum or minimum limits of tolerance of that organism.

Principle of Tolerance Limits



THE BIOSPHERE

- The word biosphere was first used by English-Austrian geologist Eduard Suess (1831–1914)
- Suess combined bio, meaning “life,” and sphere, referencing the Earth’s rounded surface
- The biosphere is a global ecosystem composed of living organisms (biota) and the abiotic (nonliving) factors from which they derive energy and nutrients
- Earth's environmental spheres: Earth's environment includes the atmosphere, the hydrosphere, the lithosphere, and the biosphere
- # Ecosphere # Parabiosphere

