

Factors affecting the development of blue-green and algal blooms:

Algal blooms means increasing in the biomass of Planktonic algae in their aquatic environments to even millions of cells per liter, therefore this increase toxicity formed in water sources. Some factors could be affecting the algal blooms which secrete toxins. Such factors as those are the general factors that affect the blooms of any other species of blue-green algae and are summarized as following:

I-Chemical Factors:

1 - Nitrogen:

Different requirement for this element in different species. The nitrogen-fixing blue green algae, particularly those containing Heterocysts, they require less inorganic nitrogen, and the limited importance of nitrogen are required to build up the biomass and protein contents of the cells.

2 - Phosphorus:

- Phosphorus is considered as an important element in the formation of a series of phosphorus oxidation (Oxidation Phosphorelation).
- It is also considered as important element in the formation of nucleic acids.
- Blue-green algae need high amounts of phosphorus, and the cyanobacterial blooms usually appear when the phosphorus concentration is high. It may be because these algae show great profusion in the absorption of this element.

3 - Micronutrients:

- The requirements of blue greens for microelements similar to that needed by higher plant,
- In addition to that they need to a **sodium** in relatively high concentration to maintenance of osmotic pressure, and there is an assumption that the sodium required in the reduction of nitrogen to ammonium (NH₄).
- Also, blue-green algae which fix the atmospheric nitrogen need to **iron** (Fe) and **molybdenum** (Mo) in higher concentration than those that do not fix atmospheric nitrogen.
- It has been reported also blue-green algae that live in symbiosis with plant or fungi need to **cobalt** (Co). It does not know until now the role played by this element in particular.

4 - pH:

- The pH of the most influential factor to algal growth when water and light are not limiting factors for algal growth.
- The studies have shown that blue-green algae accounted for 90% of the total algae present in the occupied alkaline soil (pH 7.5-10) and perhaps this explain why blue-green algae inhabits the dry land (the dry land being alkaline).
- On the other hand, the blue-green algae doesn't exist, in the acidic soil.

II-Physical Factors:

1 - Temperature:

- The growth, activity, proliferation and distribution of blue-greens are affected by the differentiation in temperature.
- Many of the blue-green algae are resistant to low temperature below zero, and have found some types of blue-green algae in South Antarctica.
- On the contrary, other species can live in the stages of drought elevated temperatures up to approximately 85°C, and also it was found some species withstanding temperatures (40-60°C) for long periods of time.
- In general we can say that the optimum temperature for many algal species is 35°C.

2 - Humidity (Wetness):

When the water is the limiting factor for growth, blue-green algae adapt greatly to this community, where their growth become active with the increase in available water.

The water shortages or droughts result in the negative impact on the metabolism (photosynthesis) of these organisms. It is shown clearly when studied the seasonal changes in the quantity and abundance of water on the growth of blue-green algae. It was found that:

- The population of blue-greens increased with the increasing of the water availability,
- The numbers of blue-greens were increased in misted soils.
- Some species survival to live in the agricultural land at the time of drought such as the *Formidium flaccidum*, which continue until the rainy seasons.