

## Seaweed Fertilizers As Soil Conditioners In Agriculture

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**ARTICLE ID: 005**

### **Introduction:**

Usage of chemical fertilizers in agricultural fields for increasing productivity leads to a decrease in the richness of the soil. These chemicals which are not taken up by the plants will accumulate in the soil like salts, other elements, therefore, cause poisoning of the soil, or leach into nearby lakes, rivers, etc which may pollute the entire water bodies. They may also lead to plant damage when they come in contact with the leaves of the plant which causes leaf scorching. As the disadvantages of the chemical fertilizers are more apparent now farmers are looking at organic fertilizer. Generally, seaweeds are also known as microalgae which includes some types of Rhodophyta (red), Phaeophyta (brown) and Chlorophyta (green) macroalgae. These occupy various ecological niches, they are attached to rocks, seafloor, and some are attached to substrate several meters deep but still float freely. These seaweeds are light sufficient to support photosynthesis. These seaweeds composed of 80-90% of water and their dry weight basis contain 50% carbohydrates, 1-3% lipids and 7-38% minerals. The protein content is highly variable 10-47% with high proportions of essential amino acids. Some seaweeds are particularly rich in some elements like sulphur, phosphorus, zinc, calcium, etc.



In traditional practices of farming, algae are mostly used in cultivating crops like rice, pulses, etc. There are many beneficial reports on seaweed fertilizers, which showed that they have better seed germination, deeper root development, increased resistance to diseased plants, high yield increased nutrient uptake, and changes in plant tissue composition and reduced incidence of insect attack. Some seaweed species like *Sargassum wightii*, *Sargassum johnstonii*, *Sargassum polycystum*, *Caulerpa racemosa*, *Cladophora rupestris*, *Ulva lactuca*, *Ulva facicata*, *Grateloupia lithophila*, *Gelidiella acerosa*, *Pandina boergesenii*, *Turbinaria conoides*, etc showing the high quality of extraction which can be used for seed treatment, for spraying, and also as a soil drench in agriculture to increase productivity.



### **Chemical Constituents Of Seaweed Extracts:**

These seaweed extracts act as an organic fertilizer with high nutrient value, they contain some trace elements, plant growth hormones (auxins, cytokinins, gibberellins), micronutrients i.e vitamins (A,C,E,K), minerals (sodium, zinc, magnesium, calcium etc) and macronutrients i.e carbohydrates, protein, lipids, etc which enables proper intake of nutrients by plants, subsequently which leads to harvesting higher yields.

### **Materials Required**

1. Seaweeds (*Cladophora rupestris*, and *Ulva lactuca*) which are collected on the surface of submerged rocks.
2. Distilled water
3. Cheese cloth /filter paper for collecting the filtrate.

### **Preparation Of Seaweed Extracts:**

- The collected seaweeds are properly washed to remove impurities viz., epiphytes, and adhering sand, and dust particles. Wash them thoroughly 3-4 times.
- Dry the seaweeds in a shady area for 3-4 days to remove the water content from it.
- The dried seaweeds are soaked in distilled water and boil them for 30 mins.
- Dried seaweeds can also be stored in powdered form and preserved at dry places for future use.
- This boiled content is filtered using a fresh cheesecloth.
- The filtrate which is collected is stored in airtight containers to prevent spoilage.
- The filtrate was taken as 100 percent concentration of seaweed extract and from this different concentration can be diluted based on the usage.

### **Effect of Seaweed Extracts on Seed Germination:**

Seaweed extracts increase the seed germination when the moderate concentration of seaweed extract of *Cladophora rupestris* and *Ulva lactuca* is given to black gram (*Vigna mungo*), green gram (*Vigna radiata*), wheat (*Triticum aestivum*), Rice (*Oryza sativa*), high rapid germination is observed when compared with seed which germinated in water. In high concentrations of seaweed, the extract is given to Bengal gram (*cicer arietinum*) which showed a low percentage of germination due to high respiratory activity of seeds. Thus, the moderate the concentration of the seaweed extracts are used to increase the rate of germination.

### **Seaweed Extracts As Soil Quality Enhancers:**

Macro algae are generally used in agriculture as manure to improve the soil properties before cultivation or even during cultivating crops. These seaweed fertilizers also provide good essential elements to the soil to enhance its ability to bear a crop. These are particularly useful for alkaline soils, mineral deficient lands, which may help to improve the soil fertility. Seaweed fertilizers are in two forms i.e powdered/dust forms or liquid forms i.e extracts. These liquid extracts shows good improvement in plant growth and soil texture, improved soil texture leads to proper aeration, nitrogen fixation, and capillary action in the soil.

### **Applications:**

[www.justagriculture.in](http://www.justagriculture.in)

- Seaweed fertilizers are used in agriculture which helps in enhancing the soil fertility.
- They act as natural plant growth stimulators and enable the plants to withstand drought, disease or frost conditions.
- Seaweed fertilizers and pesticides showed more or similar suppressive effect on root pathogens of tomato and sunflower by reducing fungal root infection and nematode's galls on roots and nematode's penetration in roots.
- They are also used as insecticides in agriculture.
- Apart from the above applications, these seaweed extracts have good medicinal properties for curing arthritis, cold, influenza and worm infections and some fungal infections.

### Summary

Seaweeds are a potential source of green fertilizers, which leads to better seed germination, deeper root development, increased resistance to diseased plants, high yield increased nutrient uptake, and changes in plant tissue composition and reduced incidence of insect attack. Thus seaweed culturing and growth can be one of the most emerging areas of green and sustainable agriculture and a great venturing opportunity in the near future.

