JUST AGRICULTURE
multidisciplinary e-Newsletter

Seaweed extract: Nectar for Plant and Soil Improvement

Sayali Biradar
Ph.D. (Scholar), Post Graduate Institute, MPKV, Rahuri- 413722, Maharashtra (India).

ARTICLE ID: 73

Seaweeds are the eukaryotic, macroscopic, marine algae that are also known as kelp. These are simply a type of sea plants anchored to sea bottom or other solid structures with help of holdfasts which act like roots for anchorage. Most of them are red (6000 species), brown (2000 species) or green (1200 species). These are principally present in intertidal zones where adequate light can penetrate the water column for supporting their growth. Seaweed and its derived products are used as nutrient source in coastal areas around the globe. In eastern costs of Tamil Nadu and even in Kerala it is used in coconut plantation. Liquid extracts obtained from seaweeds have recently gained importance to be used for foliar sprays for many crops including various cereals, pulses and different vegetable species. These seaweed extracts are significantly rich in major and minor nutrients, amino acids, vitamins, cytokinin, auxin and ABA like growth promoting substances which stimulate the growth and yield of plants. Due to its higher total potassium content, it develops tolerance in plants against biotic and abiotic stresses.

Seaweeds are found to be superior to chemical fertilizers due to high levels of organic matter, micro and macro elements, vitamins and fatty acids and also rich in growth regulators (Crouch and Van Staden, 1993). Different plant species can have different responses to the application methods and rates of seaweed concentrations (Khan *et al.,*2009). Thivy (1960) studied the application of seaweed as manure on vegetables and field crops and the performance of the seaweed manure was found to be significantly better than that of farmyard manure due to the easy decomposability of its carbonaceous matter and presence of micro-nutrients. The use of seaweed manure in conjunction with inorganic fertilizers has been found to be better than the other organic input for the growth and development of plant (Kalia Perumal, 2000).

Following are some of the major advantages of using liquid seaweed extract:

- Extends shelf life of fruits and vegetables.

JUST AGRICULTURE
multidisciplinary e-Newsletter

- Lengthens life of cut flowers if sprayed a day before cutting.
- Accelerates root growth, root length when used as rooting solution before transplanting.
- Improves stress tolerance of crops and quality of produce due to richness of potassium.
- Rich in multiple micronutrients that are present in chelated form.
- It induces natural sprouting.
- Helps to reduce post-transplant shocks.
- Stimulates and accelerates the germination of seeds.
- It is a great source of phytoalexins (the natural defence secretions of plants).
- Increases microbial activity mediated mineralization process in soils.
- The alginates present in seaweed acts soil conditioners and improves soil aggregation.
- Excellent carbon sequesters.
- Various growth hormones induce faster root and shoot development.
- It improves moisture and nutrient retention capacity of soils.
- Easily decomposes and no harmful residual effects on environment.

The table here indicates general nutrient components of seaweed liquid extract.

Table 1: General nutrient status of seaweed extract

Minerals	Hormones	Nutrients
Nitrogen (2%)	Auxin	Carbohydrate
Phosphorous (0.3%)	Cytokinin	Vitamin A
Potassium (2-3%)	Gibberellin	Vitamin C
Calcium (2%)	Betaine	Vitamin K
Magnesium (1%)	Abscisic acid	Vitamin E
Sulphur (1-8%)		Folic acid
Copper		Protein
Iron		Phenol
Manganese		
Zinc		
Sodium (5%)		

JUST AGRICULTURE
multidisciplinary e-Newsletter

Fig.1 Effect of seaweed extract root dipping on root growth before transplant.

Various methods of seaweed liquid extract utilization in crop production:

1. **Foliar application**
   - ✓ Easier, efficient, effective method for better biomass production and improving fruit and vegetable quality.
   - ✓ Easy uptake of nutrients through stomatal openings when applied in mist form.
   - ✓ Can be applied with 15 days interval after 15 DAS as 20-30 ml per liter dissolution on vegetable shrubs.
2. **Soil application**
   - ✓ Can be used for drenching soil with diluted solution.
   - ✓ More beneficial when applied in seedling stage.
   - ✓ Enhances physico-chemical and biological properties of soils.
   - ✓ Excellent organic input for soil health improvement.
3. **Seed treatment**
   - ✓ Overnight soaking of seeds before sowing.
   - ✓ Increases rapid germination and avoid seed borne diseases.
   - ✓ Higher survival rates of seeds in water stress conditions.
4. **Root feeding**
   - ✓ By dipping seedlings before transplanting to reduce the transplant shock.
   - ✓ Used as rooting solution by placing the cuttings in solution.

JUST AGRICULTURE
multidisciplinary e-Newsletter

- ✓ Excellent nutrient and hormone source for hydroponic or aeroponic practice.

The Government of India is promoting utilization of this natural resource by providing budget to set up a multi-purpose seaweed park in Tamil Nadu which was declared in 2021 Financial Budget of nation. Commercial production of seaweed extracts can also open global market opportunities for marginal agricultural entrepreneurs in coastal areas having low cultivable land areas. The multinational companies such as IFFCO, Organic Bazar, Feromones, Grow more have launched there seaweed-based products in market but its importance and utilization rate has to be promoted.

Conclusion:

Even though there are numerous proven benefits of seaweed extract it is utilized in limited parts of country. In India, seaweeds are extensively used for production of phycocolloids, but its exploitation in agriculture sector is yet underrated. India is well facilitated with a total coastal exposure of 7516.6 km including island and mainland territories which are enormously rich with seaweed diversity in intertidal regions. Improved awareness towards importance of sustainable and organic or naturalcrop production demands for better plant based nutrient resources that can eliminate or at least reduce dependency on synthetic fertilizer products. Seaweed liquid extracts could be a key element in organic crop production if used in integration with organic manures.

References:

Crouch I. J. and Van Staden J. (1993) Evidence for the presence of plant growth regulators in commercial seaweed product. *Plant growth Regulator*. 13: 21-29.

Kaliaperumal N. (2000) Marine plants of Mandapam coast and their uses. Regional Centre of Central Marine Fisheries Research Institute Special issue: 40-43.

Khan W., Rayirath U.P., Subramanian S., Jithesh M.N., Rayorath P., Hodges D. M., Critchley A. T., Craigie J. S., Norrie J., and Prithiviraj B. (2009) Seaweed extracts as biostimulants of plant growth and development. *Journal of Plant Growth Regulator*. 28: 386–399.

Thivy F. (1960) Seaweed utilization in India. Proceedings of Symposium on Algology, ICAR, New Delhi, 345-365.