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### **The Myth of Curative Kelp:**

*"Seaweed extracts reduce disease, improve production, and increase stress resistance in landscape plants"*

#### **The Myth**

Seaweeds are ancient relatives of terrestrial plants and play a similar ecological role in coastal systems. Kelps, the larger seaweeds species, are also of historical dietary and medicinal importance to various human cultures. Their extracts have extensive industrial applications, and more recently their activity as antioxidants and antibiotics has been investigated. It is clear that human consumption of some seaweeds imparts health benefits; can seaweeds also benefit plant health?

Vendors of natural garden products certainly want you to think so. Web sites and sales literature praise the effectiveness of seaweed extracts as soil conditioners, disease suppressants, and stress reducers. Research (rarely verifiable) is presented to support the use of seaweed drenches or sprays on turf, fruits and vegetables, flowers, perennials, shrubs and trees in every possible situation. Are seaweed extracts that elusive magic bullet for creating perfect landscapes?

#### **The Reality**

Seaweed extracts (SE) have been dubbed "biostimulants" or "metabolic enhancers", defined as chemicals with growth-enhancing properties but little nutrient value. Growth enhancement has been attributed to the presence of plant growth regulators (sometimes called plant hormones), and several of these growth regulators have been isolated from seaweed extracts, including cytokinins, auxins, and gibberellins. This is not surprising, as seaweeds are part of the plant kingdom and like other plants manufacture their own growth regulators. More important is the question of whether these substances applied to other plant materials might have similar regulatory effects.

#### ***Scientific literature***

There is a substantial body of scientific literature on the application of seaweed extracts in agriculture, in some cases dating back nearly a century. Much of the earlier research suggested benefits from SE treatment, but more recent results have been cautious in recommending SE use. I've compiled a brief summary of these research findings:

##### ***1) Rooting***

Logic suggests that the growth regulators found in SE, like any other commercially available rooting hormone, can stimulate root development on cuttings and transplants. This suggestion is borne out in research on both potatoes and pines in laboratory and greenhouse applications and could have use as a root dip during transplanting. Success would not be expected (nor has been found) in field applications to existing plants, as these compounds are quickly degraded by microbes and are unlikely to have any regulatory effect on nearby plant tissues.

##### ***2) Turf health***

There has been some success in utilizing seaweed extracts as a turf-enhancing treatment. The predominant research has focused on Kentucky bluegrass, where SE applications have been associated

with improved seedling establishment, rooting, and increased drought and salinity tolerance. However, other research with the same plant material reported “little effect” after SE treatment. Seaweed extracts are also reported to improve root growth of bentgrass and improve the “physical strength” of environmentally stressed turf.

### **3) Foliar growth**

Other than the aforementioned turf benefits, there are few, if any documented advantages of SE application to plant foliage. Treatment of cabbage resulted in no change in either head yield or nutrient content; similarly in apple neither vegetative growth nor leaf mineral content were altered. Likewise, SE did not improve production of peppers or several species of herbaceous perennials.

### **4) Fruit size, yield and/or quality**

Many studies have examined SE efficacy in improving fruit production. The most positive results appear to be in citrus production, where some trials revealed slight increases in fruit yield. Other work on oranges reported no effect on either sprouting or fruit set, however. Peaches gained firmness in response to one SE product, but neither they nor apricots exhibited any response to another SE product. Some apple varieties developed better fruit color after SE treatment, but none of the tested varieties showed improvements in yield, weight, or mineral composition. Likewise, SE treatment had no effect on grain yield in wheat, persimmon production, strawberry or pepper yields, pear fruit set, or tomato yield or quality.

### **5) Disease management**

There are few reports of successful disease management through SE application. One positive result was found in potted cabbage seedlings, where damping-off disease was prevented by treatment with seaweed extract. Other experiments on bacterial and fungal control have had less success. Grain treated with SE was no more resistant to subsequent fungal infection, but germination rates actually decreased as a result. SE treatment of strawberry fungal infection and bacterial leaf spot in tomato had only a 33% success rate, while investigations on *Alternaria* leaf blight and peach leaf curl showed no effect.

### **6) Pest management**

An early report 40 years ago suggested that seaweed extract would decrease red spider mite infestations. Nothing more has developed from that initial hypothesis, but a number of more recent papers have documented the nematicidal activity of some seaweed extracts. Researchers have found reduced egg production and hatching and increased larval mortality in nematodes treated directly with seaweed extract. Applied to greenhouse plants, seaweed extracts reduced nematode infestation of tomato plants and citrus species, but no effect was found on these latter plants in the field. Researchers have suggested that plant maturity could influence effectiveness, with a greater benefit seen in younger plants compared to older, established trees in the field.

### **7) Environmental stress resistance**

Virtually no success has been reported in this area; while the earlier-mentioned turf work suggested SE application improved salinity and drought tolerance, that effect does not carry over to other plant materials. Herbaceous perennials treated with SE did not exhibit improved drought resistance, nor did SE treatment assist in plant growth or transplant survival of four common ornamental shrubs and trees. In fact, untreated plants mulched with pine bark performed better than those that received a commercial product containing “a blend of endo- and ectomycorrhizal fungi, beneficial root/soil bacteria, chelated

m micronutrients and biocatalysts including humic acids, complex carbohydrates, yucca plant extract, sea kelp and organic N and P.” In another study, compost was found to be more effective in drought resistance than biostimulants including seaweed extracts.

### ***Conclusions from researchers***

**1) *Plant selection:*** “...working with resistant varieties seems to be the best solution [to disease resistance].”

**2) *Environmental conditions:*** “...soil fertility and production conditions were more important growth and yield determinants than were foliar sprays.”

**3) *Management techniques:*** “If proper planting techniques are followed, the use of biostimulants is unwarranted.”

**4) *Overall assessment:*** “...treatments are ultimately dependent on multiple plant, soil, and environmental factors, and often have no discernible effects.” “...there appears to be little value in applying these products.”

**5) *Marketing:*** “Manufacturers’ claims for the benefits of these products go beyond what is substantiated by the research.” “The number of products now on the market seems to outnumber the published papers.”

These researchers’ conclusions say it all – seaweed extracts are aggressively marketed with little regard for objective, scientific research. There is a final concern never addressed, which is the justification for large-scale removal of vegetation from one ecosystem (the marine kelp “forests”) for application to another (terrestrial landscapes). The ecological impacts of increased seaweed harvesting are currently under investigation and the possibility of significant ecosystem damage is real. There is no argument that seaweed products are useful and valuable to humans for the reasons discussed earlier. However, given that there are few documented benefits from applying seaweed extracts to plants, this is not a justifiable nor sustainable practice. The marketing of such products as “earth friendly” in this context should be repugnant to environmentally conscious consumers.

### **The Bottom Line**

- Seaweed extracts contain plant growth regulators which, like traditional rooting products, can stimulate root growth in cuttings and transplants
- Seaweed extracts have no reliable effect on plant production or resistance to disease and environmental stress, especially in field conditions
- Variations in plant materials and environmental conditions are greater determinants of plant health than applications of seaweed extract
- Seaweed extracts for landscape use represent a poor use of natural resources, especially those from environmentally sensitive coastal ecosystems

For more information, please visit Dr. Chalker-Scott’s web page at <http://www.theinformedgardener.com>.