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Technical White Paper #1

Enhanced Root Growth with *Sea to Sprout*; Adventitious Root Growth Assay Using Fermented *Saccharina latissima* (Sugar Kelp) Extract

Executive Summary

This white paper summarizes a controlled bioassay evaluating the dose–response effects of a fermented seaweed extract derived from *Saccharina latissima* on adventitious root formation in Mung bean (*Vigna radiata*). The study demonstrates a concentration-dependent stimulation of root initiation and elongation. Results support the potential of fermented *S. latissima* extracts as plant biostimulants targeting early root development.

Background and Rationale

Adventitious root development is a critical determinant of early plant vigor, nutrient uptake, and stress resilience. Seaweed-derived biostimulants are known to contain phytoactive compounds (e.g., auxin-like substances, polysaccharides, and phenolics) that can enhance root growth. Fermentation may further increase bioavailability of these compounds.

This study was conducted by the Institute for Sustainable Horticulture, Kwantlen Polytechnic University in Surrey, British Columbia, Canada. It employed the Mung bean adventitious root assay, a sensitive and widely used model for screening root-promoting activity, to characterize the dose–response behavior of a fermented *S. latissima* extract. The key objectives of this study were:

- Quantify the effects of fermented *S. latissima* on adventitious root initiation and growth.
- Determine the dose–response relationship and identify an optimal concentration range.
- Assess potential inhibitory effects at high doses.

Seaweed Extract

- Source organism: *Saccharina latissima* (Sugar Kelp)
- Processing: Naturally fermented using pure water and beneficial *Lactobacillus* microbes
- Product dilution range (product to water, v:v) - 1:10 - 1:100

Experimental Design

- Assay type: Adventitious root growth assay in Mung bean (*Vigna radiata*)
- Treatments: Serial dilutions of fermented extract
- Control: Water and commercial kelp extract controls
- Replicates 10
- Exposure duration: 7 days
- Environmental conditions: 27 °C, 16-hour light / 8-hour dark, 80% relative humidity
- Datapoints: Number of roots, root dry-weight

Results and Discussion

Four experiments were performed to evaluate different product doses, batches, and compare *Sea to Sprout* with known commercial products. Kelp extract produced in 2024 and 2025 was tested and both were shown to increase root growth in the assay. Product dosage at 1:100 was consistently found to improve both number and mass of roots. More concentrated applications (1:40, 1:10) were not effective.

Experiment	Sample	Dose	No. of Roots	Mass Roots (mg)
1	2024 Product	1:100	103	13
	Commercial 1	1:75	98	11.4
	Control	1	7	0
2	2025 Product	1:100	95	11.8
	Control	1	13.4	2.1
3	2025 Product	1:100	87	9.4
	Control	1	1	0
4	2025 Product	1:100	67	7.9
	Commercial 2	1:100	56	8.9
	Control	1	15.3	3.3

Key Findings

- *Sea to Sprout* improves adventitious root initiation and growth.
- Optimal dilution: 1 part product to 100 parts water
- High doses inhibit root growth - a little goes a long way!