

SEA BEYOND



ACADIAN™
PLANT HEALTH

We're Acadian Plant Health™

And we're changing the biostimulant game.

For over 40 industry-leading years, our goal has gone unchanged: provide the best seaweed extract products to our partners by bringing performance and sustainability together like never before. Acadian Plant Health is the largest independent marine plant harvesting, cultivation, and extraction company in the world. Acadian is an international leader in sustainable, science-based biological solutions for high-value specialty crops as well as broad-acre crops. We are committed to launching patented innovative products, with a focus on sustainability and regenerative agriculture. Acadian Plant Health products are used in over 100 crops in more than 80 countries worldwide.



40+
years of experience
founded in 1981



400+
employees
worldwide



5

manufacturing and production facilities focused around key harvesting areas, including Canada, Scotland, and Ireland



sustainable processing harvesting and extracting

Acadian products are used in soil & foliar inputs on:



100+
crops



80
countries
worldwide

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Seaweed makes stronger plants.

Not all seaweeds are the same.

We use *Ascophyllum nodosum* to manufacture novel, proprietary products.

Ascophyllum nodosum, the most highly researched marine plant, grows exclusively in the inter-tidal zone of the North Atlantic Ocean. This species of marine plant was specifically selected, as it is comprised of a complex array of bioactive compounds with stress-mitigating properties.

Ascophyllum nodosum thrives in some of the most difficult growing conditions on the planet. Such as low tide when the temperature reaches -25°C/-13°F in winter and +40°C/+104°F in summer, and desiccation and submersion periods in salt water as the tides change.

Our *Ascophyllum nodosum* extracts modify the physiological processes in plants that enable them to effectively mitigate abiotic stress. Results include improved root growth and plant establishment, increased nutrient uptake, environmental stress tolerance, and enhanced quality and yield.

Our customized extraction process makes a big difference:

- It helps maintain the correct ratio of each ingredient in complex natural mixtures.
- It gives our extracts a unique and consistent biochemical composition, with a high concentration of stress-mitigating biomarkers.
- It allows us to liberate more pure and bioactive compounds, so more of their natural strength is maintained, improving the strength of the plant.

We've got the richest concentration of bioactive compounds.



Betaines

help plants adjust water levels, salt, and other substances within cells and better manage abiotic stress and protect chlorophyll.



Mannitol

protects and adjusts the amount of water in plant cells in times of water-related stresses.



Organic acids

help produce energy for plants and encourage production of new compounds boosting plant production.



Oligosaccharides

elicit plant abiotic defense mechanisms to help keep plants healthy.



Alginic acid

helps chelate nutrients, making them more available to plants, and serves as a food source for beneficial soil microbes.

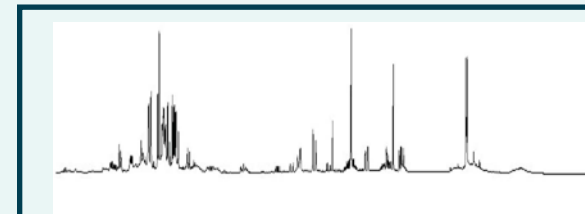


Fucose containing polysaccharides

increase antioxidant levels and help protect plants from stress in general.

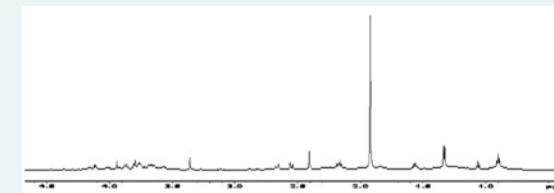
Comparing Efficacy of Different Biostimulants

Seaweed extracts' biochemical composition is complex, so understanding the mechanism of action is intricate. Partnering with the National Research Council of Canada, we have identified a 'biochemical fingerprint' for our products using nuclear magnetic resonance (NMR) technology. This fingerprint shows that our products are biochemically unique and consistent in quality.



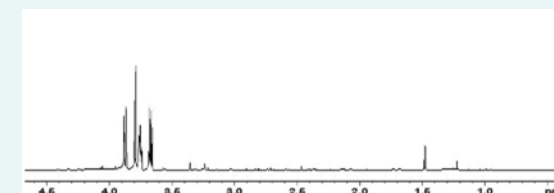
APH *Ascophyllum* Extract

Produces a distinct NMR signature. The NMR peaks relate to organic compounds that can provide support to the plant that it is applied to.



Sargassum sp. Extract

Fewer NMR peaks are observed in extracts of this species.



Ecklonia sp. Extract

Fewer NMR peaks are observed in extracts of this species.

Enhancing your crop's potential.

A biostimulant is a substance or microorganism that, when applied to seeds, plants, or on the rhizosphere, stimulates natural processes to enhance or benefit nutrient uptake, nutrient use efficiency, tolerance to abiotic stress, crop quality, and yield. Biostimulants are not traditional fertilizers, nor do they have direct effects on pests. Instead, biostimulants are a category of plant nutrition and soil fertility products that, independent of their nutrient content, affect numerous natural pathways, thus increasing the availability or utilization of plant nutrients.

Our products are part of an integrated crop management approach that complements fertilizer, plant genetics, and crop protection products. APH extracts are scientifically proven to enhance both plants' tolerance to environmental stressors and overall health. Both of which are essential to protecting and improving yield.



Improved Abiotic Stress Management

APH seaweed extracts help plants to perform to their potential even under stressful conditions. Our research results show improved crop tolerance in the face of stressors like drought, heat, chill, salinity, and nutrient deficiencies.



Improved Water Use Efficiency

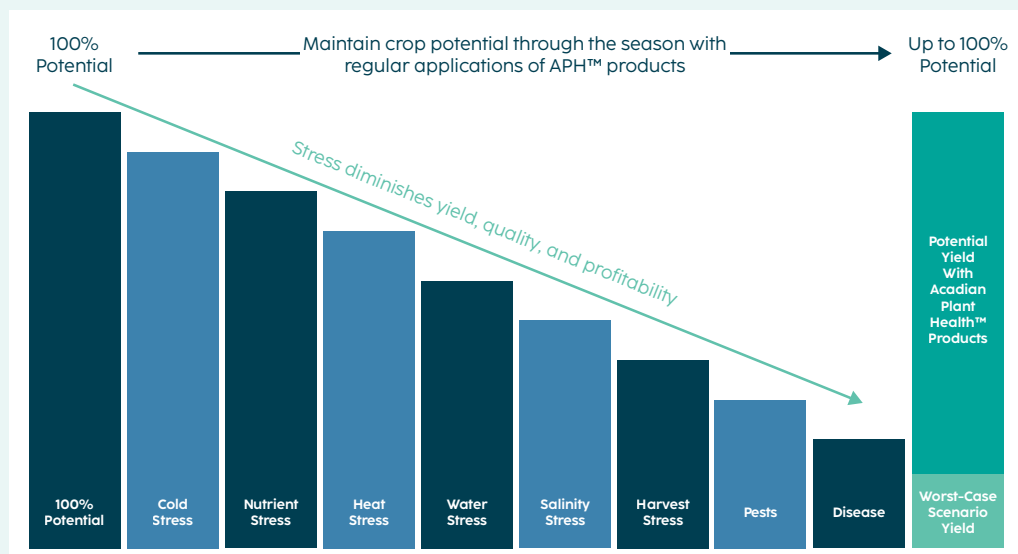
The unique compounds found in our extracts are scientifically proven to help plants in water-stress situations. They help to "prime" plants to utilize their natural defense systems faster and more effectively, so they can maintain productivity and water balance in tough growing conditions like extreme heat and drought.



Improved Nutrient Uptake and Use

Our extracts' bioactive compounds help the plant to attract and absorb nutrients in the soil through chelation, and help plants with nutrient assimilation, translocation, and use. This all results in enhanced growth, fuelled by a suite of genes that are responsible for growth, metabolism, and stress response under limited nutrient conditions. Optimal nutrient availability provides plants with the nutrients they need for growth and minimizes yield reductions correlated to deficiencies.

When used throughout the season, biostimulants can influence crop stress resistance throughout the crop life cycle, supporting various physiological benefits at all stages of growth that collectively, lead to significant potential for increased yield, quality, and return on investment (ROI).



Rooted in research.

How APH extracts work.

Abiotic Stress Management

You can't control the weather, but you can control how plants defend themselves. Biostimulants allow plants to achieve a higher yield in situations where environmental conditions are not optimal.

APH biostimulants are a great agronomic tool, as they work with your plants' internal defense systems to deliver the following modes of action:

- Reduced damage to plant cells
- Protected growth during stress
- Ability to maintain water status during osmotic stress (which helps with cooling and transport of nutrients)
- Increased cell membrane stability, phenolic, and flavonoid compounds
- Increase in levels of compatible osmolytes
- Increased antioxidant levels under stress
- Increased expression of stress response genes

Drought Stress

Solutions

APH effect on plant

- Increased water use efficiency
- Better stress recovery
- Faster acclimation leads to recovery of higher stomatal conductance & greater photosynthetic activity during recovery
- Less wilting
- Increased growth under water stress
- Reduced lipid peroxidation

Metabolites

- Reduced MDA (a marker for cell membrane damage)
- Increased antioxidants (alpha tocopherol, ascorbic acid, superoxide dismutase, & total antioxidant capacity)
- Increased betaines, plant growth regulators, chlorophyll, carotenoids, proline, & phenolic compounds

Gene expression

- Gene expression for stomatal control
- Increased expression of aquaporin genes

Salt Stress

Solutions

APH effect on plant

- Decreased plant Na content
- Maintains chlorophyll content

Metabolites

- Increased antioxidants (alpha tocopherol, ascorbic acid, superoxide dismutase, & total antioxidant capacity)
- Increased betaines, plant growth regulators, chlorophyll, carotenoids, proline, & phenolic compounds

Gene expression

- Increased expression of: SOS1 gene (Na/H antiporter – removes Na from cells), NHX1 gene (moves Na into vacuole), HAK5 (takes up K instead of Na)
- Differential micro RNA expression, leading to changes in gene expression

Heat Stress

Solutions

APH effect on plant

- Greater plant hydraulic conductivity – allows for more cooling and altered regulation of stomata, which causes reduced leaf temperature under heat stress, and less stomatal sensitivity to VPD (vapor pressure deficit)

Metabolites

- Increased cytokinins
- Increased SOD (superoxide dismutase, antioxidant) activity
- Reduced MDA (a marker for cell membrane damage)

Cold Stress

Solutions

APH effect on plant

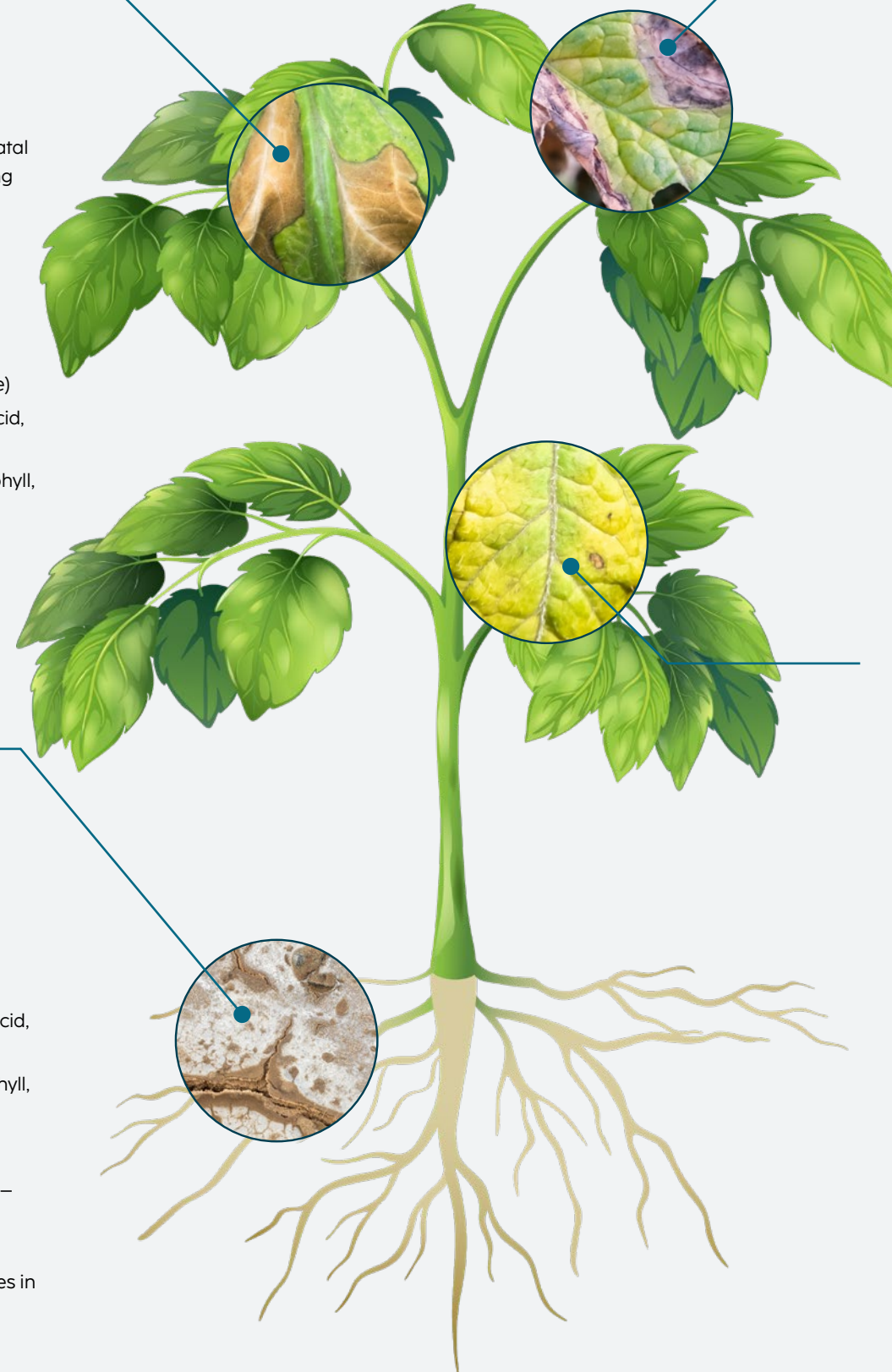
- Reduced cellular damage under freezing temperatures – less electrolyte leakage

Metabolites

- Increased proline sugars, unsaturated fatty acids, & phenolic compounds
- Increased antioxidants (alpha tocopherol, ascorbic acid, superoxide dismutase, & total antioxidant capacity)

Gene expression

- Decreased expression of sucrose & proline degradation genes
- Increased expression of proline biosynthesis genes



How APH extracts work

Plant & soil health benefits.

How do you know that APH extracts are a wise investment? Even in the unlikely event that your crops have no abiotic stress at all, the active ingredients in our extracts enable plants (and the soil they grow in) to reach their potential by helping with:

- Seed emergence & early growth
- Root growth
- Nutrient uptake and use
- Soil microbial activity
- Plant growth
- Photosynthesis
- Fruit set & size
- Post-harvest shelf life

Photosynthesis

APH effect on plant

- Increased chlorophyll content
- Increase in stomatal conductance that allows for greater photosynthesis

Metabolites

- Increased betaine production
- Increases photosynthetic pigments

Gene expression

- Enriched pathways for carbon metabolism & metabolic pathways
- Increased transcription of BDH & CMO

Nutrient Uptake

APH effect on plant

- Increased nutrient levels (N, P, Ca, K, and others) through improved rooting
- Improved growth (root and shoot) and yield under nutrient-limited conditions

Gene expression

- Increased expression of genes for productivity in limited phosphorous conditions
- Increased expression of metal & cation binding genes
- Increased expression of genes for nutrient uptake & transport

General Microbial Activity

APH effect on plant

- Increased colony counts, soil respiration, & soil ATP (indicator of soil microbial biomass)
- More diverse microbiome

Gene expression

- Increased expression of genes for AMF, nodulation, & seed germination

Mycorrhizal Fungi Activity

APH effect on plant

- Stimulates AMF colonization of plant roots
- Increases spore germination, germ tube length, & branching

Gene expression

- Increased expression of genes involved in AMF accommodation



Post-Harvest Shelf Life

APH effect on plant

- Increased firmness

Metabolites

- Reduced lipid peroxidation
- Reduced MDA (a marker for cell membrane damage)
- Increased antioxidants

Plant Growth

APH effect on plant

- Increased fruit number and weight

Metabolites

- Increased conversion of ammonium to glutamine
- Increased activity of nitrate reductase, photochemical activity, & SOD (superoxide dismutase, antioxidant)
- Elicitation of endogenous plant growth regulators, total cytokinin metabolites

Gene expression

- Modulated plant growth regulator genes
- Increased expression of flowering genes

Seed Emergence & Early Growth

APH effect on plant

- Increased emergence & early shoot length/weight

Metabolites

- Increased alpha amylase activity

Nodulation Activity

APH effect on plant

- Increased functional nodules on the plant

Metabolites

- Flavonoids in root exudates
- Increase NOD factor production in rhizobium

Root Growth

APH effect on plant

- Greater root growth – fresh & dry weight

The performance you want.

Our industry-leading biostimulant research and development offers a rich pipeline of sustainable products.

- World-class technology excellence centres: the Craigie R&D Centre for Innovation in Canada and the Formulation Centre of Excellence in the UK
- Tailored solutions to help improve crop productivity, since every grower faces different challenges
- We partner with the world's best private, university, and government scientists to provide credible research and support through our Acadian Open Academy™
- Our research is published in leading peer-reviewed scientific journals

“Everything we do is focused on delivering solutions that perform where it matters most – in the field.”

Dr. Sarah Maude, Vice President, Technology at Acadian Plant Health



Efficacy proven in the field

We conduct extensive field, greenhouse, and laboratory trials on a wide variety of crops, growing conditions, and environmental challenges. We've proven our products' efficacy in thousands of company and cooperative field trials around the world. Our team of specialists enables us to design best-use, targeted recommendations.



Quality control at every stage

Our comprehensive, frequently audited Quality Assurance (QA) program ensures our products consistently meet and exceed customer expectations. Our QA team enforces strict standards of excellence at every step of the operation. From harvesting to final delivery, this commitment ensures our customers receive top-quality products.

The sustainability you need.

We're moving in the right direction through regenerative agriculture.

Regenerative agriculture's highest priority is to protect the soil as a habitat for a rich ecosystem of microorganisms and a storage sink for carbon. Implementing regenerative agriculture methods yields benefits for growers, consumers, the environment, and the world.

Adding our biostimulant solutions to your crop care inputs can help you to move to regenerative agriculture methods without sacrificing productivity or yield in a cost-effective way. Improving plant nutrition and soil health – both of which are foundational to any regenerative and sustainable agri-food system – is how to get there.

Why we need healthy soil.

Soil health is the capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Although soil health is dependent on a delicate balance of physical, chemical, and biological elements, the microbiome is perhaps the most important building block, as it has immense potential to sustainably improve plant productivity.

Extensive research has shown that soil health is nurtured by encouraging soil's complex web of microbial life. Due to their proximity to plant roots, soil microbes directly influence plant growth, health, and productivity. Plants also actively influence their rhizosphere microbiome by releasing molecules to stimulate beneficial microbial activity.

How APH extracts improve soil micro-biodiversity:

- **Increased growth of arbuscular mycorrhizal fungi**
- **Enhanced plant-microbe symbiosis**
- **Optimized nutrient availability**
- **Promotes carbon content in soil** through the development of healthier soil and increased root biomass
- **Increased root nodulation** helps the plant to absorb nitrogen and use fertilizer more efficiently
- **CO₂ “storage sink”** Plants absorb carbon dioxide during photosynthesis and convert it into carbohydrates, which they use to grow leaves, stems and roots
- **Increased soil aggregation and improved soil structure**
- **A well-developed microbiome** out-competes pathogens, allowing for better crop establishment, which can lead to improved yields

43%*

increase in functional nodules

Research found a

52%*

increase in microbial activity during drought stress



Seaweed is a regenerative resource, and we work hard to keep it that way.

At Acadian Plant Health, longevity of our raw materials supply is important to us, because it ensures we can supply the agricultural industry in a sustainable way. We carefully oversee every step of our raw material harvest to ensure a healthy habitat for the animals and other marine plants. In fact, we can guarantee a supply of high-quality products while doing so sustainably.

Our harvesting allows for faster regrowth

We responsibly harvest less than 25% of the allowed quota of our raw material, using tools that are gentle on the ecosystem and allow for quick regrowth of the resource. After decades of harvesting, we're able to determine the impact on the biomass and height of the seaweed. Our research shows no significant decrease in the biomass and in some cases, the biomass even increased! We're proud to say that our world-leading resource management system has led to a seaweed stock that is both plentiful and healthy.

We monitor all stages of harvesting to guarantee a long-term supply

We have a dedicated research and regulatory team to ensure we're operating in an environmentally sound business model. This includes our tools and techniques, as well as where and how often we harvest *Ascophyllum nodosum*. Our team includes specialists with PhDs, and their job is to monitor the growth and ecology of the *Ascophyllum nodosum* seaweed beds, with a focus on ensuring we keep this valuable resource. Because of this, we are granted long-term governmental licenses, which allows us to ensure security of supply globally.

Our products. United States

- 18 Acadian®
- 20 AscoStar™
- 22 Stimplex®
- 25 Toggle®



ACTIVE INGREDIENT	<i>Ascophyllum nodosum</i>
FORMULATION	Acadian LSC: Liquid Acadian Organic: Liquid
MODE OF ACTION	Biostimulant
PACKAGING	Acadian Organic LSC Case: 2.5 gal x 2 Tote: 264 gal Acadian LSC Conventional Case: 2.5 gal x 2 Tote: 264 gal

Add Acadian® to your crop program to keep plants in peak condition and ready to fend off what the season has in store. Acadian can be applied on a variety of specialty crops throughout the season to help with production including improving early season growth, enhancing nutrient uptake, flowering, and fruit development. Acadian helps plants manage environmental stresses and helps to release soil nutrients for plant uptake during critical growth and development.

PRODUCT BENEFITS

- Acadian improves plant establishment, root structure, and mass, which leads to improved plant establishment and facilitates greater uptake of water and nutrients
- Containing natural chelators (which bind to micronutrients), Acadian improves the bioavailability and transport of nutrients within the plant
- By increasing chlorophyll production within the plant, Acadian improves photosynthesis for greater plant productivity
- Acadian activates antioxidant production and increases water retention, which reduces the impact of environmental stresses including drought, salinity, heat, and chill
- Increases fruit and vegetable quality and uniformity, with better sizing, reduced culls, delayed senescence, higher brix, and increased post-harvest shelf life



APPLICATION METHODS AND RATES

For information on optimal application rates and timings for your crop, and for crop-specific usage rates and timings, please refer to the label.



CROP	RATE PER ACRE	RECOMMENDATIONS & TIMING
Fruit Crops		
Stone Fruit, Pome Fruit, Cherries, Citrus, Wine Grapes, Table Grapes	64 to 128 ounces per acre	Starting at regrowth in the spring, repeat treatments every 7-30 days. At transplanting, a root treatment can be used. Post-harvest applications can be made every 1-4 weeks from harvest to dormancy. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated plant stress.
Caneberries, Bushberries, Strawberries	64 ounces per acre	
Vegetable Crops		
Root and Tuber Vegetables, Legumes, Potatoes, Peanuts	48 to 64 ounces per acre	Start applications at planting with repeat treatments every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to anticipated plant stress.
Leafy Vegetables	32 to 64 ounces per acre	
Nuts		
Almonds, Hazelnuts, Pistachios, Tree Nuts	64 to 128 ounces per acre	Starting at regrowth in the spring, repeat treatments every 7-30 days. At transplanting, a root treatment can be used. Post-harvest applications can be made every 1-4 weeks from harvest to dormancy. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated plant stress.
Field Crops		
Alfalfa, Corn, Cotton, Hops, Rice	32 to 64 ounces per acre	Start applications at planting with repeat treatments every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to anticipated plant stress.
METHOD		
Rooting	Prior to or at transplanting, treat roots with a solution of Acadian at the rate of 0.1-0.7% solution.	After transplant application, switch to a soil or drench program.
Drench	Apply soil drench using dilution of 0.45 ounces per gallon.	Applications can be made at 1- to 3-week intervals throughout the growing season.
Soil	Soil-applied treatments can be made by mixing with soil-applied fertility, directed sprays to the soil, side-dress treatments, and applications through irrigation systems.	Applications can be made at 2- to 4-week intervals throughout the growing season. Avoid heavy irrigations following application.
Foliar	Foliar spray should be applied as a fine mist, with low fluid velocity until the foliage is wet. See label for crop specific application timings.	Do not apply in rain, high winds, or extreme temperature conditions; Apply during the cool part of the day or when temperatures are <85 degrees Fahrenheit; Do not spray just before or after rainfall or sprinkler irrigation; Use a surfactant for maximum dispersal and leaf adherence.
Late Season & Post Harvest	7.5 to 11 ounces	An excellent way to encourage root growth and prepare perennial crops for next season's early growth.

Compatibility: Acadian is compatible with most insecticides, fungicides, and fertilizers. Some pH adjustments may be required with acidic mixtures. Add surfactants after the product has completely dissolved in the tank solution. When mixing with calcium products, thoroughly mix Acadian with the water in the tank prior to adding the calcium product. If interaction of chemicals is unknown, a "jar" compatibility test is recommended.



ACTIVE INGREDIENT	<i>Ascophyllum nodosum</i>
FORMULATION	Powder
MODE OF ACTION	Bio stimulant
PACKAGING	USA Case: 44 lb

AscoStar™ is an organic concentrated dry powder derived from *Ascophyllum nodosum*, which is specially formulated to support early growth phases of plants.

Ideal for use at seeding and transplant to support nutrient uptake through the natural chelators, improving bioavailability and transport of nutrients to the plant. AscoStar boosts root and stem growth, getting plants off to a good start.

The powder formulation is easily absorbed during this critical period, stimulating rooting and the rhizosphere microbial community, leading to improved plant establishment. AscoStar helps reduce stress at the time of transplanting and promotes vegetative growth. AscoStar can be applied to the soil, foliar and through irrigation systems (drip, sprinkler) and is compatible with most fertilizers, herbicides, insecticides, and fungicides.

PRODUCT BENEFITS

- Developed for applications to support early growth phases via soil and foliar applications
- Promotes strong root initiation, vigorous vegetative growth and development, plants benefit from faster establishment
- Actively promotes uptake and transport of nutrients
- Reduces the time to overcome stress from transplanting
- Increases plant resilience to abiotic stress, supports plants with vegetative growth in normal growing conditions and during environmental stress
- AscoStar is water soluble and suitable for use in liquid, foliar, soil applied and fertigation applications



APPLICATION METHODS AND RATES

For information on optimal application rates and timings for your crop, and for crop-specific usage rates and timings, please refer to the label.



CROP	RATE PER ACRE	RECOMMENDATIONS & TIMING
Fruit & Nut Crops		
Strawberry	1 to 2 lbs per acre	Apply at planting with repeat treatments every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to anticipated stress event.
Woody Perennials (Trees, Vines, Bushes)	1 to 4 lbs per acre	Apply starting at growth in the spring. Repeat treatments every 7-30 days. At transplanting, a root treatment can be used. Post-harvest applications can be made every 1-4 weeks from harvest to dormancy. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated plant stress.
Vegetable Crops		
Vegetable Crops	1 to 2 lbs per acre	Apply at planting with repeat treatments every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to anticipated stress event.
Field Crops		
Corn, Soybeans, Cotton, Peanuts, Potatoes	1 to 2 lbs per acre	Apply at planting with repeat treatments every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated stress event.
Hydroponics		
Hydroponic Applications	Dilute to ratio of 0.13 to 0.25 dry ounces per 100 gallons of water.	In a recirculation system, replace solution regularly (every 1-2 weeks). In a non-recirculation system, apply solution with every pulse.
METHOD	APPLICATION INFORMATION	NOTES
Rooting/ Transplant	To encourage the establishment of new transplants, treat roots with a solution of AscoStar at the rate of 2.5 to 7.5 dry ounces per 20 gallons of water prior to transplanting.	
Soil	Soil applied treatments can be made by mixing with soil-applied fertility, directed sprays to the soil, side-dress treatments, applications through the irrigation systems or other methods which effectively apply AscoStar to the soil. Refer to label for crop specific rates and application timing.	Avoid heavy irrigation following application as that could leach material beyond the root system of the crop.
Foliar	Foliar spray should be applied as a fine mist, with low fluid velocity until the foliage is wet. See label for crop specific rates and application timings.	For best results apply during the cool part of the day or when temperatures are below 85°F. Do not spray just before or after rainfall or sprinkler irrigation. Use a mild rate of surfactant for maximum dispersal and leaf adherence.
Late Season & Post Harvest	AscoStar is an excellent way to prepare perennial crops for next season's growth. Apply to the soil or foliar using above methods. Refer to label for crop specific rates and application timing.	Post-harvest applications can be made every 1-4 weeks from harvest to dormancy.

Compatibility: AscoStar is compatible with most insecticides, fungicides, and fertilizers. Some pH adjustments may be required with acidic mixtures. If surfactants are used, please add at the end of the tank mixing process. When mixing with calcium products, thoroughly mix AscoStar with the water in the tank prior to adding the calcium product. If interaction of chemicals is unknown, a "jar" compatibility test is recommended.



ACTIVE INGREDIENT	<i>Ascophyllum nodosum</i>
FORMULATION	Liquid
MODE OF ACTION	PGR (EPA Approved)
PACKAGING	Case: 2.5 gal x 2 Tote: 264 gal

Set the stage for stronger growth and higher yields. Add Stimplex® to your crop nutrition program to improve root and shoot growth as well as stress tolerance. Stimplex is an EPA registered plant growth regulator (PGR) derived from *Ascophyllum nodosum* that triggers a biological response equivalent to 100 ppm of cytokinin. It improves growth and development of plants by working at the cellular level to improve the production of naturally occurring plant hormones and activating pathways that increase stress tolerance, stimulate root growth, and improve nutrient uptake. Optimum nutritional uptake and increased tolerance to environmental stress lead to greater yields and better quality crops—results you can measure.

PRODUCT BENEFITS

- Formulated to increase root initiation and growth which helps absorb more water and nutrients from the soil enhancing vegetative growth
- Increases the plant's ability to uptake and utilize nutrients in the soil as well as utilize water more efficiently
- Applied as a foliar treatment, Stimplex ensures crops have access to nutrients and growth promoters during critical flowering and fruit set growth stages
- Improves crop tolerance to stressful growing conditions by promoting stress protective compounds like antioxidants and cytokinins within the plant
- Improves fruit growth, weight, maturation, quality attributes, and yield
- Stimplex improves fruit firmness and post-harvest storage



APPLICATION RATES AND TIMING

For information on optimal application rates and timings for your crop, and for crop-specific usage rates and timings, please refer to the label.



CROP	RATE PER ACRE	RECOMMENDATIONS & TIMING
Fruit Crops		
Bushberries, Caneberries, Cranberry	32 to 96 fluid ounces per acre	1st application: 4 weeks pre-bloom; 2nd application: 2 weeks pre-bloom; Repeat: every 2-4 weeks during summer months; Post-harvest application: 2-4 weeks after harvest.
Strawberry	48 to 96 fluid ounces per acre	Pre-plant: 0.15-1.00% solution; Repeat: soil applications every 2 weeks until harvest is complete.
Citrus	64 to 128 fluid ounces per acre	1st application: pre-bloom; 2nd application: post-bloom; Repeat: every 2-4 weeks; Soil applications during root flush; Apply prior to stress and fruit drop periods.
Grapes (Table, Raisin, Juice)	40 to 128 fluid ounces per acre	1st application: 1-4 inch shoot growth (foliar and soil); 2nd application: 10-12 inch shoot growth (foliar and soil); 3rd application: 5 days pre-bloom (foliar). Avoid foliar pre-bloom application in varieties that are prone to under shatter. Use high rate in pre-bloom sprays on varieties that tend to over shatter. 4th-6th applications: sizing sprays (foliar); 7th application: veraison (foliar and soil); Repeat: every 2-4 weeks during summer months; Post-harvest application: 2-4 weeks after harvest.
Grapes (Wine)	40 to 128 fluid ounces per acre	1st application: 1-4 inch shoot growth (foliar and soil); 2nd application: 10-12 inch shoot growth (foliar and soil); 3rd application: 5 days pre-bloom (foliar). Avoid foliar pre-bloom application in varieties that are prone to under shatter. Use high rate in pre-bloom sprays on varieties that tend to over shatter. 4th application: 'BB' sized berries (2-3mm) (foliar); 5th application: veraison (foliar and soil); Repeat: every 2-4 weeks during summer months; Post-harvest application: 2-4 weeks after harvest.
Pome Fruit	40 to 128 fluid ounces per acre	1st application: pre-pink; 2nd application: pink bud; 3rd application: 7-10 days post-petal fall; 4th application: 1/2-3/4 inch fruit; Repeat: every 2-4 weeks; Post-harvest application: 2-4 weeks after harvest.
Stone Fruit	48 to 128 fluid ounces per acre	1st application: pink or white bud; 2nd application: petal fall; 3rd application: jacket split; Repeat: every 2-4 weeks; Post-harvest application: 2-4 weeks after harvest.
Cherry	48 to 128 fluid ounces per acre	1st application: white bud; 2nd application: petal fall to shuck fall; 3rd application: exposed young fruit; 4th application: straw color. Apply with gibberellin sprays. Avoid sprays after straw-colored fruit on non-gibberellin blocks where early market is desired. Repeat: during times of stress; Post-harvest application: 2-4 weeks after harvest.
Vegetables		
Brassica (Cole) Leafy Vegetables, Cucurbits, Fruiting Vegetables	40 to 96 fluid ounces per acre	1st application: soil or transplant treatment at planting; Repeat: soil or foliar applications every 2-3 weeks until harvest is complete.
Bulb Vegetables	40 to 96 fluid ounces per acre	1st application: soil applied treatment at planting; Repeat: soil or foliar applications every 2-3 weeks until harvest is complete.
Leafy Vegetables	40 to 96 fluid ounces per acre	1st application: foliar application at the 2-4 leaf stage; Repeat: foliar application every 2-3 weeks until harvest is complete.
Legumes, Root & Tuber	32 to 96 fluid ounces per acre	1st application: soil applied treatment at planting; Repeat: soil or foliar applications every 2-3 weeks until harvest.
Fruiting Vegetables	40 to 96 fluid ounces per acre	1st application: soil or transplant treatment at planting; Repeat: soil or foliar applications every 2-3 weeks until harvest is complete

METHOD	APPLICATION INFORMATION	NOTES
Nuts		
Hazelnuts	40 to 128 fluid ounces per acre	1st application: pre-bloom; 2nd application: post-bloom; Repeat: every 2-4 weeks until harvest; Post-harvest application: 2-4 weeks after harvest.
Other Nuts (Beechnut, Brazil Nut, Butternut, Cashew, Chestnut, Chinquapin, Hickory Nut, Macadamia Nut, Pecan, Walnut)	64 to 128 fluid ounces per acre	1st application: pre-bloom; 2nd application: approximately 2 weeks after bloom.
Rooting & Transplant	Treat roots with a solution of Stimplex at the rate of 0.15-1.00% solution (19-128 fluid ounces per 100 gallons of water) prior to transplanting.	After transplant application, growers can transition to a drench treatment or soil application.
Drench	Apply soil drench using dilution of 0.30-0.70% solution (38-90 fluid ounces per 100 gallons of water) ounces per gallon.	Applications can be made at 1- to 3-week intervals throughout the growing season.
Soil	Soil-applied treatments can be made by mixing with soil-applied fertility, directed sprays to the soil, side-dress treatments, and applications through irrigation systems.	Avoid heavy irrigation following application.
Foliar	See label for crop-specific application timings.	Do not apply in rain, high winds, or extreme temperature conditions; Apply during the cool part of the day or when temperatures are <85 degrees Fahrenheit; Use a surfactant for maximum dispersal and leaf adherence.
Late Season & Post Harvest	Apply Stimplex to the soil or foliage using the above methods. Stimplex is not intended to be applied to an edible food commodity after harvest.	Soil or foliar application.

Compatibility: Stimplex is compatible with most insecticides, fungicides, and fertilizers. When mixing with calcium products, thoroughly mix Stimplex with the water in the tank prior to adding the calcium product. If interaction of chemicals is unknown, a "jar" compatibility test is suggested.



ACTIVE INGREDIENT	<i>Ascophyllum nodosum</i>
FORMULATION	Liquid
MODE OF ACTION	Bio stimulant
PACKAGING	Case: 2.5 gal x 2 Tote: 264 gal

Tame a tough season with Toggle®. Toggle is specially formulated for row crops. Growers can use this innovative technology to improve plant growth and development as well as defend against yield-robbing abiotic stress. It also gives plants the natural ability to better utilize nutrients so that your nutrient management program delivers more of a positive impact while encouraging the plant to boost its own defenses against negative environmental impacts such as heat stress and times of reduced moisture.

With the versatility to apply in-furrow or by foliar application, Toggle works synergistically with your existing nutritional program to reduce the impact of stress throughout the growing season.

PRODUCT BENEFITS

- Toggle improves root initiation, elongation, and branching, which leads to improved plant establishment and facilitates greater uptake of water and nutrients
- Containing natural chelators (which bind to micronutrients), Toggle improves the bioavailability and transport of nutrients within the plant
- By increasing chlorophyll production within the plant, Toggle improves photosynthesis for greater plant productivity
- Toggle activates antioxidant production and increases water retention, which reduce the impact of environmental stresses including drought, salinity, heat, and chill
- Toggle helps plants produce energy, and its components act as precursors that encourage plants to produce new active compounds that in turn boost crop quality and yield



* Stimplex is not registered for use in Arizona, California, Hawaii, Nevada, and New Mexico.



APPLICATION METHODS AND RATES

For information on optimal application rates and timings for your crop, and for crop-specific usage rates and timings, please refer to the label.



USA



BROAD ACRE,
ROW CROP

CROP	APPLICATION INFORMATION	RATE PER ACRE	RECOMMENDATION & TIMING
Corn (Field Corn, Silage, Sweet Corn, Popcorn, Seed Corn)		32 to 48 ounces	Foliar broadcast spray at V4-VT. Note: Always follow fungicide labels regarding surfactant use at/near tassel stages.
Soybeans		32 to 48 ounces	Foliar broadcast from V4-R3
Wheat	1st	32 to 48 ounces	At tiller initiation
	2nd	32 to 48 ounces	At early boot to early panicle emergence
Cotton	1st	32 to 48 ounces	Foliar broadcast at pinhead square
	2nd	32 to 48 ounces	Foliar broadcast 2 weeks after pinhead square
Rice	1st	32 to 48 ounces	Foliar broadcast at tiller initiation
	2nd	32 to 48 ounces	Foliar broadcast at early panicle emergence
Alfalfa, mixed hay	1st	32 to 48 ounces	Soon after each cutting
	2nd	32 to 48 ounces	2 weeks after cutting
Potatoes	1st	32 to 48 ounces	At tuber initiation
	2nd	32 to 48 ounces	Through late tuber set (if more potatoes are desired)
Peanuts	1st	8 ounces	In-furrow or banded at planting OR with row starter
	2nd	32 to 48 ounces	After plants are established through to harvest

Compatibility: Toggle is compatible with most insecticides, fungicides and fertilizers. When mixing with calcium products, thoroughly mix Toggle with the water in the tank prior to adding the calcium product. If interaction of chemicals is unknown, a "jar" compatibility test is suggested.

Our products. Canada

- 28 Advassa™
- 30 AscoStar™
- 32 Stella Maris®



Advassa™ is a new highly concentrated biostimulant for broad acre and row crops, that fortifies plants against the numerous stressors that can chip away at yield throughout the growing season. Advassa supports improved yield and defends against yield-robbing impacts by supporting root growth and plant establishment, boosting nutrient use efficiency, and helping plants increase tolerance to environmental stressors like drought, heat, chill, and salinity.

PRODUCT BENEFITS

- Advassa improves plant establishment, root structure, and mass
- Optimizes plant nutrient availability throughout the growth cycle and creates conditions for root growth, plant vigor, and increased yield.
 - Advassa contains natural chelators that bind to micronutrients leading to improved uptake and translocation within the plant
 - Increases AMF (arbuscular mycorrhizal fungi) colonization and nodulation. AMF facilitate the uptake of nutrients by effectively extending the reach and increasing the surface area of a plant's root system
- Promotes antioxidant production which aids in stress tolerance and improves photosynthesis by increasing chlorophyll production for better vegetative growth
- Improves plants' tolerance to abiotic stress conditions such as heat, chill, salinity, and drought:
 - Helps regulate water loss through stomata in times of drought which improves moisture retention and reduces wilt
 - Increases plant salt tolerance in both saline soils and irrigation



ACTIVE INGREDIENT	<i>Ascophyllum nodosum</i>
FORMULATION	Liquid
MODE OF ACTION	Biostimulant
APPLICATION	In-Furrow 55 mL/ac Foliar 235-330 mL/ac Irrigation
PACKAGING	Canada Case: 2 x 10 L

APPLICATION METHODS AND RATES

For information on optimal application rates and timings for your crop, and for crop-specific usage rates and timings, please refer to the label.



CROP	APPLICATION INFORMATION	RATE PER ACRE	RECOMMENDATION & TIMING
Canola	1st	55 mL	In-furrow or banded at planting OR with row starter
	2nd	235-330 mL	At herbicide timing, after cotyledon stage
Cereals	1st	55 mL	In-furrow or banded at planting OR with row starter
	2nd	235-330 mL	At tiller initiation
	3rd	235-330 mL	At early boot to early panicle emergence
Dry Beans & Pulses	1st	55 mL	In-furrow or banded at planting OR with row starter OR inoculant
	2nd	235-330 mL	Applied soil or foliar at the R1-R3 stage
Corn (Field corn, Silage, Sweet Corn, Popcorn, Seed Corn)	1st	55 mL / 2 ounces	In-furrow or banded at planting OR with row starter
	2nd	235-330 mL	Foliar broadcast spray at V4-VT
Soybeans	1st	55 mL	In-furrow or banded at planting OR with row starter OR inoculant
	2nd	235-330 mL	Foliar broadcast spray at V4-R3
Potatoes	1st	55 mL	In-furrow or banded at planting OR with row starter
	2nd	235-330 mL	At tuber initiation
	3rd	235-330 mL	2 weeks after tuber-initiation treatment
	4th	235-330 mL	Through later tuber set
Alfalfa, mixed hay	1st	55 mL	In-furrow or banded at planting OR with row starter
	2nd	235-330 mL	Soon after each cutting
	3rd	235-330 mL	2 weeks after cutting
Root crops (Sugar Beet, Turnips, Swedes)	1st	55 mL	In-furrow or banded at planting OR with row starter
	2nd	235-330 mL	Applied soil or foliar at 80% row closure
	3rd	235-330 mL	Applied soil or foliar at 100% row closure
Onions	1st	55 mL	In-furrow or banded at planting OR with row starter
	2nd to 5th	235-330 mL	Applied soil or foliar every 2 weeks beginnings at early bulbing (3-4 treatments)
Carrots	1st	55 mL	Soil applied at or near planting
	2nd	235-330 mL	Applied soil 3 weeks after the last application
	3rd	235-330 mL	Applied soil 3 weeks after the last application
Sunflowers	1st	55 mL	In-furrow or banded at planting OR with row starter
	2nd	235-330 mL	At fungicide timing, late vegetative/early reproductive stage

Compatibility: Shake well before use. Dilute Advassa in water at a minimum rate of 10 gallons per acre and agitate thoroughly. Advassa can be tank mixed with most commonly used fertilizers, herbicides, fungicides, and insecticides. If interaction with chemicals is unknown, a "jar test" is recommended.



ACTIVE INGREDIENT	<i>Ascophyllum nodosum</i>
FORMULATION	Powder
MODE OF ACTION	Bio stimulant
PACKAGING	Canada Case: 20 kg

AscoStar™ is an organic concentrated dry powder derived from *Ascophyllum nodosum*, which is specially formulated to support early growth phases of plants.

Ideal for use at seeding and transplant to support nutrient uptake through the natural chelators, improving bioavailability and transport of nutrients to the plant. AscoStar boosts root and stem growth, getting plants off to a good start.

The powder formulation is easily absorbed during this critical period, stimulating rooting and the rhizosphere microbial community, leading to improved plant establishment. AscoStar helps reduce stress at the time of transplanting and promotes vegetative growth. AscoStar can be applied to the soil, foliar and through irrigation systems (drip, sprinkler) and is compatible with most fertilizers, herbicides, insecticides, and fungicides.

PRODUCT BENEFITS

- Developed for applications to support early growth phases via soil and foliar applications
- Promotes strong root initiation, vigorous vegetative growth and development, plants benefit from faster establishment
- Actively promotes uptake and transport of nutrients
- Reduces the time to overcome stress from transplanting
- Increases plant resilience to abiotic stress, supports plants with vegetative growth in normal growing conditions and during environmental stress
- AscoStar is water soluble and suitable for use in liquid, foliar, soil applied and fertigation applications



APPLICATION METHODS AND RATES

For information on optimal application rates and timings for your crop, and for crop-specific usage rates and timings, please refer to the label.



CROP	RATE PER ACRE	RECOMMENDATIONS & TIMING
Fruit & Nut Crops		
Strawberry	1.25 – 2.5 kg per hectare (0.5 to 1 kg per acre)	Apply at planting every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated abiotic stress.
Woody Perennials (Trees, Vines, Bushes)	1.25 – 5 kg per hectare (0.5 to 2 kg per acre)	Apply starting at growth in the spring. Repeat treatments every 7-30 days. At transplanting, a root treatment can be used. Post-harvest applications can be made every 1-4 weeks from harvest to dormancy. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated plant stress.
Vegetable Crops		
Vegetable Crops	1.25 – 2.5 kg per hectare (0.5 to 1 kg per acre)	Apply at planting with repeat treatments every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to anticipated stress event.
Field Crops		
Corn, Soybeans, Potatoes	1.25 – 2.5 kg per hectare (0.5 to 1 kg per acre)	Apply at planting with repeat treatments every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated stress event.
Hydroponics		
Hydroponic Applications	Dilute AscoStar to a ratio of 0.015 g/L to 0.025 g/L.	In a recirculation system, replace solution regularly (every 1-2 weeks). In a non-recirculation system, apply solution with every pulse.
METHOD	APPLICATION INFORMATION	NOTES
Rooting/ Transplant	To encourage the establishment of new transplants, treat roots with a solution of AscoStar at the rate of 10 to 30 grams per 10 litres of water (2.5 to 7.5 dry ounces per 20 gallons of water) prior to transplanting.	
Soil	Soil applied treatments can be made by mixing with soil-applied fertility, directed sprays to the soil, sidedress treatments, applications through the irrigation systems or other methods which effectively apply AscoStar to the soil. Refer to label for crop specific rates and application timing.	Avoid heavy irrigation following application as that could leach material beyond the root system of the crop.
Foliar	Foliar spray should be applied as a fine mist, with low fluid velocity until the foliage is wet. See label for crop specific rates and application timings.	For best results apply during the cool part of the day or when temperatures are below 29°C. Do not spray just before or after rainfall or sprinkler irrigation. Use a non-ionic surfactant after the product has completely dissolved in the tank solution. Refer to the surfactant recommended rate based on use pattern.
Late Season & Post Harvest	AscoStar is an excellent way to prepare perennial crops for next season's growth. Apply to the soil or foliar using above methods. Refer to label for crop specific rates and application timing.	Post-harvest applications can be made every 1-4 weeks from harvest to dormancy.

Compatibility: AscoStar is compatible with most herbicides, insecticides, fungicides and fertilizers. Some pH adjustments may be required with acidic mixtures. Use a non-ionic surfactant after the product has completely dissolved in the tank solution. Refer to the surfactant recommended rate based on use pattern. When mixing with foliar fertilizer products, thoroughly mix AscoStar with the water in the tank prior to adding the foliar fertilizer. If interaction of chemicals is unknown, a "jar" compatibility test is recommended.



Stella Maris® is the critical step to condition plants to produce when it matters the most by giving your crop strong early growth, increased nutrient uptake, and the ability to tolerate whatever Mother Nature dishes out for your best season yet. Stella Maris is a high-concentrate liquid *Ascophyllum nodosum* seaweed extract biostimulant designed for soil and foliar use.

Stella Maris enhances crop quality and productivity by supporting root growth and early establishment, boosting nutrient use efficiency, and helping plants increase their tolerance to challenging growing conditions that can rob yield, such as drought, heat, chill, and salinity.

PRODUCT BENEFITS

Stella Maris enhances root initiation, elongation and branching, which leads to improved plant establishment and facilitates greater uptake of water and nutrients.

- Natural chelators (which bind to micronutrients) present in Stella Maris improve the bioavailability and translocation of nutrients within the plant
- By increasing chlorophyll production within the plant, Stella Maris improves photosynthesis for greater plant productivity
- Stella Maris activates antioxidant production and increases water retention, which reduce the impact of environmental stresses including drought, heat, salinity and chill
- Helps plants produce energy, and its components act as precursors that encourage plants to produce new active compounds that in turn boost crop quality and yield
- Increases fruit and vegetable quality and uniformity, with better sizing, reduced culls, better color, delayed senescence, higher brix, and increased shelf life



APPLICATION METHODS AND RATES

For information on optimal application rates and timings for your crop, and for crop-specific usage rates and timings, please refer to the label.



CROP	RATE PER ACRE	RECOMMENDATIONS & TIMING
Fruit Crops		
Fruit Crop	2.5 to 5 litres per hectare (1 to 2 litres per acre)	Starting at planting with repeat treatments every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated plant stress.
Perennial Crops (Trees, vines, Bushes)	2.5 to 10 litres 1 to 4 litres per acre)	Starting at spring growth. Repeat treatments every 7-30 days. At transplanting, a root treatment can be used. Post harvest applications can be made every 1-4 weeks from harvest to dormancy. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated plant stress.
Vegetable Crops		
Vegetable	2.5 to 5 litres per hectare (1 to 2 litres per acre)	Starting at planting with repeat treatments every 7-30 days. Applications can be made either foliar or to the soil. Apply 3-5 days prior to an anticipated plant stress.
Greenhouse & Transplants		
	40 mL in 10 litres of water	Application via the irrigation system on a weekly basis.
Hydroponics		
Hydroponic	0.035 mL/L to 0.070 mL/L	In a recirculation system, replace solution regularly (every 1-2 weeks). In a non-recirculation system, apply solution with every pulse.
METHOD	APPLICATION INFORMATION	NOTES
Greenhouse & Transplants	Apply 40mL in 10L of water via irrigation system on a weekly basis.	Applications can be made on a weekly basis. After transplant application, switch to a soil or drench program.
Soil	Soil-applied treatments can be made by mixing with soil-applied fertility, directed sprays to the soil, side-dress treatments, and applications through irrigation systems. Refer to label for rates.	Applications can be made at 2- to 4-week intervals throughout the growing season. Avoid heavy irrigations following application.
Foliar	Foliar spray should be applied as a fine mist, with low fluid velocity until the foliage is wet. See label for crop-specific application timings.	Do not apply in rain, high winds, or extreme temperature conditions; Apply during the cool part of the day or when temperatures are <85 degrees Fahrenheit (29 degrees Celsius); Do not spray just before or after rainfall or sprinkler irrigation; Use a surfactant for maximum dispersal and leaf adherence.
Late Season & Post Harvest	An excellent way to encourage root growth and prepare perennial crops for next season's early growth. Refer to label for rates.	Soil or foliar application. Post-harvest applications can be made every 1-4 weeks from harvest to dormancy.
Hydroponics	Dilute Stella Maris to a ratio of 0.035mL/L to 0.070mL/L	In a recirculation system, replace solution every 1-2 weeks. In a non-recirculation system, apply solution with every pulse.

Compatibility: Stella Maris is compatible with most insecticides, fungicides, and fertilizers. Some pH adjustments may be required with acidic mixtures. If surfactants are used, please add at the end of the tank mixing process. When mixing with calcium products, thoroughly mix Stella Maris with the water in the tank prior to adding the calcium product. If interaction of chemicals is unknown, a "jar" compatibility test is recommended.

ACTIVE INGREDIENT	<i>Ascophyllum nodosum</i>
FORMULATION	Liquid
MODE OF ACTION	Biostimulant
PACKAGING	Case: 5 L x 4 Case: 9.4 L x 2 Drum: 208 L Tote: 1000 L

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