

Proactive Plant Nutrition and Strategic Stress Management for Agriculture

Science-Based Products for Forward Looking Growers

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**OCEAN ORGANICS CORPORATION
Manufacturers of High-Performance,
Science-Based Plant Strengthening and
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Ocean Organics Corporation Back Cover

For over four decades, Ocean Organics has developed sustainable, science-based, plant strengthening materials. During that time, we've worked with leading scientists at more than two-dozen public universities and numerous private research organizations. **Ocean Organics has emerged as a leader in science-based strategic stress management products that are university tested, independently proven, and sustainably produced in the USA.**

Ocean Organics harvests *Ascophyllum nodosum* seaweed off the coast of Maine and processes fresh seaweed in our plant in Waldoboro, Maine. We introduced the first seaweed-based product into the golf industry in the late 1970s. Our success was largely based on pioneering research; we had initiated some of the first university turfgrass studies establishing liquid *Ascophyllum nodosum* as an effective tool to increase tolerance to heat, drought, salinity and UV stress.

Research Driven
•
Independently Tested
•
Scientifically Proven

Our products have
been producing results
worldwide for over
40 years.

We continued our science-based approach and developed products for the agriculture and horticulture industries in the late 1990s. Although our initial products were created for reformulators, we soon introduced the Guarantee® line of seaweed extracts. Using innovative, proprietary techniques, Ocean Organics produces both organic and conventional seaweed extracts that are richer than others but with fewer solids and inert ingredients. The result: more beneficial active ingredients that deliver superior stress

tolerance benefits; lower viscosity that allows easy mixing, application and outstanding plant uptake.

Managing stress from multiple sources – often simultaneously – is what makes the job of growers so challenging. **Our mission has been, and continues to be, to innovate science-based plant strengthening materials that help growers develop better strategies in an ever-changing agricultural landscape.**

Ocean Organics... An Industry Leader in Science-Based, High Performance Seaweed Extracts.



Industry-Leading Seaweed Extracts and Stress Management Products

Superior Plant Nutrition and Stress Tolerance Benefits

Seaweed has been used in agriculture for many centuries, especially in coastal communities. Many agricultural and horticultural historians say that seaweed was second only to manures as a natural fertilizer. *Ascophyllum nodosum*, the intertidal seaweed species that Ocean Organics harvests in the Gulf of Maine, is the most well researched of the species used for commercial extracts for agricultural and horticultural applications.

In recent decades, the benefits of *A. nodosum* extracts have been documented in the scientific literature and confirmed by grower experience. Because there are significant differences among species and processing approaches within our industry, Ocean Organics has devoted decades to making the scientific case for our own seaweed extracts. Most notably, there is a growing body of research that makes a clear case that *A. nodosum* extracts do the following:

- Provide stress tolerance to heat, drought, salinity and disease
- Optimize macro and micronutrient uptake to support increased crop yields and quality
- Improve soil and microbial characteristics for better root growth
- Improve plant appearance and color under abiotic stress

Highly Compatible; Excellent For Foliar Use As Well As Drip Irrigation

Our products are highly compatible with most liquid fertilizer components. Our products can be readily incorporated into liquid and foliar fertilizers and delivered easily through irrigation systems

Science-based. Independently Tested and Proven.

The Ocean Organics Difference

Ascophyllum nodosum seaweeds are among the most stress tolerant plants on Earth. Every day they fluctuate between being completely submerged at high tide in water (3% saline) and being completely exposed at low tide to air temperatures well below 0° F in winter to nearly 100° F in summer.

The robust “root-like” organs that anchor *A. Nodosum* (also known as “North Atlantic Kelp” and “Rockweed”) to the rocks are called “holdfasts” and they are aptly named. They tolerate constant wave action and withstand sustained violent storm surges. So it’s not surprising – given that they have evolved and thrived in incredibly harsh environments – that they are prolific producers of naturally occurring stress tolerance and plant strengthening compounds, including:

- Trace minerals and nutrients
- Antioxidants
- Osmoprotectants
- Protective and photosynthetic pigments (not “sunscreens”)
- Amino acids
- Polysaccharides such as alginates

Using innovative and sustainable techniques, Ocean Organics produces seaweed extracts that are richer than others but with fewer solids and inert ingredients. The result: more beneficial active ingredients that deliver superior plant strengthening and stress tolerance benefits; lower viscosity that allows easy mixing, application and plant uptake.





Challenges Facing Growers

In general, North American growers have more tools to manage biotic stresses caused by living organisms like disease pathogens and insect pests than they have for coping with abiotic stresses such as high and low temperature extremes, drought, salinity, sodicity, intensifying U.V. exposure, declining nutrient availability and deteriorating water and soil quality.

For the last 75 years, the majority of the research and development invested in N. American agriculture and horticulture has been focused on developing plant protection products targeted toward biotic sources of stress triggered by living organisms like predatory insects, invasive weeds, disease pathogens. Most growers today have an impressive arsenal of proven insecticides, herbicides, fungicides and other chemical control materials to deal with the vast majority of problems generated by biotic stressors.

In recent years, weather and climate patterns have continued to become more extreme and difficult to predict. Both soil and water quality appear to be declining. Clearly plants growing in compromised conditions can't come close to achieving their genetic potential. There is a clear-cut need for stress tolerance

and plant strengthening materials that enhance plant performance under abiotic stress conditions that will almost certainly multiply and intensify; in other words, product that can improve stress tolerance while maintaining focus on complete, balanced, diverse nutrition.

5 Reasons People Who Grow for a Living Use Ocean Organics

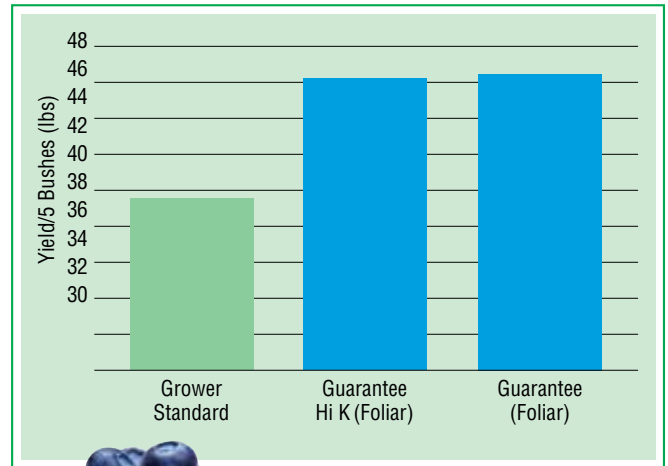
1. **Research**
2. **Product Efficacy** Claims You Can Count On
3. **Superior Product Quality, Ease of Use and Efficiency**
4. **Performance** You Can Predict, **Results** You Can Measure
5. **Value and Cost-Efficiency** that Boost Your Bottom Line

GUARANTEE®

(0-0-1) Our proprietary Seaweed Extract – *Ascophyllum nodosum* – increases stress tolerance, strengthens plants with key trace minerals, improves soil and microbial characteristics in the rhizosphere for better root development. For use in agriculture, greenhouse, hydroponics, landscape, gardens, as well as a wide variety of other growing applications.



Sizes: 2x2.5 gal cases, 15 gal drums, 55 gal drums, 275 gal totes



Cumulative Yield in Blueberries (3 Picks). Guarantee, as well as Guarantee Hi K, **increased yield** by 17% in blueberries grown under summer stress (Mid Michigan Agronomy, 2016).

Better Quality, Better Yield, Better Return on Investment

Calcium + Guarantee on Jonagold Apples



Guarantee® + foliar calcium

Red side of fruit

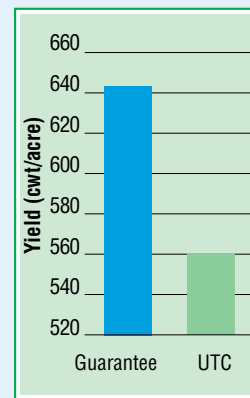


UTC

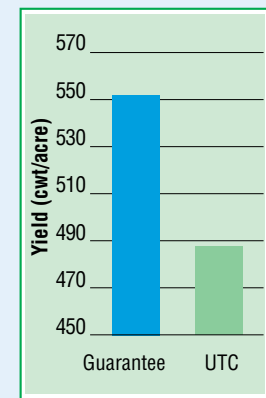
Red side of fruit

Foliar calcium applications are often used to prevent bitterbit incidence. Seaweed is often used with foliar nutrient and micronutrient applications to improve chelation, complexing and uptake. In this trial, pre-harvest applications of Guarantee and foliar calcium **helped improve stress tolerance** in Jonagold apples in a year when bitterpit pressure was high due to record heat and parched conditions (Jeff Alicandro, 2016).

Total Yield Per Acre



Yield of Large (US-1) Potatoes



Total Yield and Yield of Large (US-1) Potatoes Grown Under Summer Stress. Guarantee seaweed extract **increased potatoes yield** (Mid Michigan Agronomy, 2015). Three additional trials also show yield increases with application of Guarantee (data not shown).



Harvest date: 10/12/16	Fruit color evaluation at harvest % of fruit (by fruit number) with:				Fruit soluble solid levels at harvest
	less than 50% red color	between 50-75% red color	greater than 75% red color	total greater than 50% red color	
1 UTC (Untreated Control)	21.25	70.25	8.50	78.75	12.70
2 Guarantee + foliar calcium	15.00	68.50	16.50	85.00	13.15

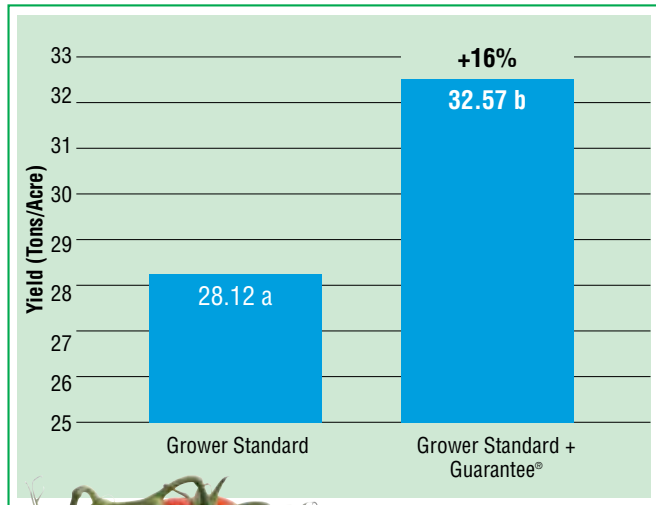


Chardonnay Field Trial at Harvest. This historic Monterey County vineyard was established in rocky and coarse-textured soils with limited nutrient and water holding capacity. A program that included Ocean Organics seaweed, as well as an engineered carbon and a mycorrhizal fungi product, was the top-performing treatment in a three-year field trial with an average **9.8% annual yield increase** when compared to the untreated check. Research and photo by Mark M. Mahady & Associates, Inc., *A Three-Year Evaluation of Products for Enhancement in Plant Health and Yield Production of Chardonnay Wine Grapes.*

Enhanced Stress Tolerance More Rapid Recovery

- Heat
- Drought
- Salinity
- UV over-exposure
- Disease
- Sodicty
- Low Temperatures

Guarantee delivers results under a wide variety of stresses.



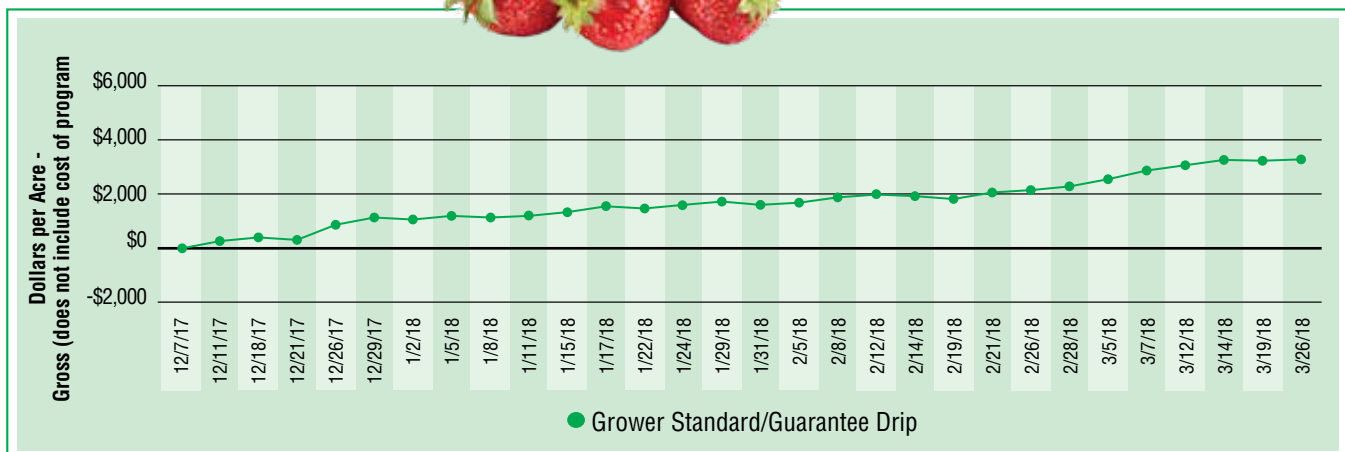
Cumulative Differential from Grower Standard Return – Strawberries in Ventura County - Winter 2018. Strawberry growers in California often face a variety of abiotic stresses, including heat, drought, and salinity. In this field trial, Guarantee **increased net returns for the season** by \$3,252 per acre compared to the Grower Standard. Guarantee **increased yield** over the Grower Standard by 12% (2822 extrapolated flats per acre compared to 2512 flats per acre). Note: Ocean Organics has been involved in seven strawberry trials with Holden Consulting with similar positive results for Guarantee Hi K, Guarantee Complex and Stress Rx Ag.



Yield and Returns in Roma Tomatoes under Heat Stress.

Guarantee increased yield by 16% compared to the grower standard. Based on tomato prices and conservative estimates of grower costs, the applications of Guarantee **increased grower income** by roughly \$890 per acre (Holden Research and Consulting, 2012).

Increased Net Returns



What Is Organic?

Ensuring organic product integrity is critical to building and maintaining the consumer confidence necessary for organic agriculture's continued growth. Organic standards for input materials have been developed and are monitored and sustained by OMRI, the Organic Materials Review Institute. Founded in 1997 by organic certifiers and stakeholders, OMRI provides an independent review of input products to determine which qualify for organic use. OMRI coordinates its standards with the U.S. National Organic Program, the Canada Organic Regime, and the Mexican Organic Products Law.

When companies apply, OMRI reviews their products against the organic standards. Acceptable products are OMRI Listed® and appear on the OMRI Products Lists.

Guarantee Organic and Guarantee Hi K are OMRI listed.

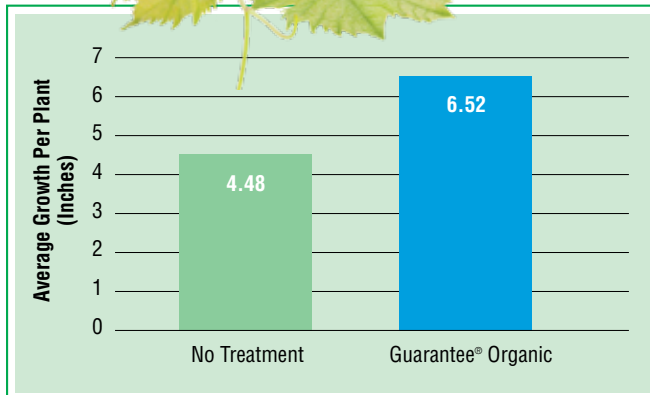
GUARANTEE® ORGANIC

(0-0-1) A versatile liquid seaweed extract – *Ascophyllum nodosum* – OMRI listed for use in organic crop production. It can be used for agriculture, greenhouse, hydroponics, landscape, gardens, as well as a wide variety of other growing applications.

Sizes: 2x2.5 gal cases, 15 gal drums, 55 gal drums, 275 gal totes



Yield in 'Envy' Zucchini. Application of Guarantee Organic increased yield by 10%. The projected per acre weight differences between the treated and untreated was (25,812 – 23,256 = 2,446 lbs). This would equal approximately 127 more boxes per acre (Dr. Kerry Johnson, 2010).



Chardonnay Replants Grown Under Heat Stress. Guarantee Organic applications at 2-week intervals resulted in an **increase in total growth** in the grape vine replants as compared to the Grower Standard.

UNTREATED

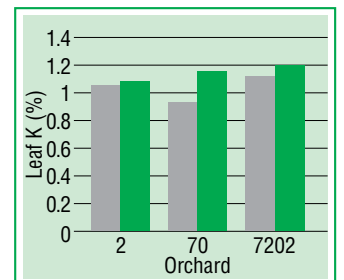


TREATED



Leaf Potassium Concentration in Honeycrisp Apples Grown Under Summer Stress. Guarantee statistically increased leaf potassium concentration (lower right). Treated apples (above right) also had statistically **increased redness, blush, flesh firmness** as compared to untreated (Dr. Renae Moran, University of Maine).

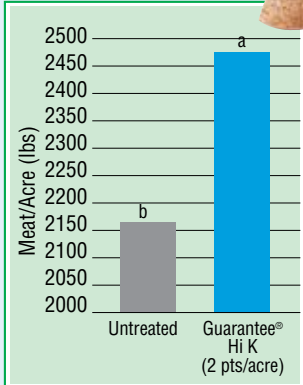
■ Control
■ Guarantee



GUARANTEE® Hi K

(0-0-6) An innovative liquid *Ascophyllum nodosum* extract with a higher potassium level – for use in agriculture, greenhouse, hydroponics, landscape, gardens, as well as a wide variety of other growing applications.

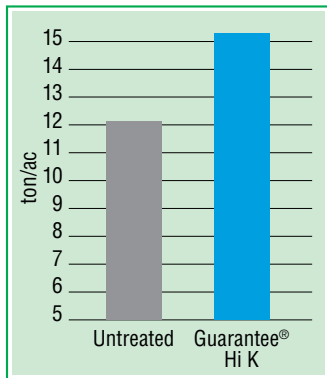
Sizes: 2x2.5 gal cases, 15 gal drums, 55 gal drums, 275 gal totes



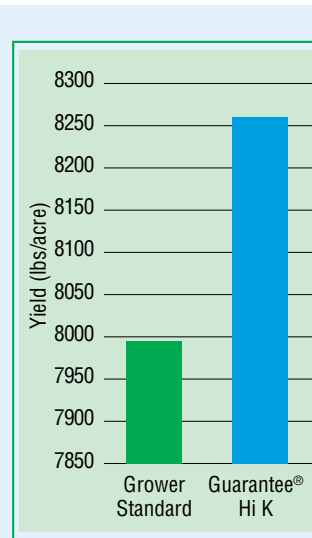
Almond Yield. Guarantee Hi K statistically increased almond meat/acre in 2019. Yield in treated trees increased by 307 lbs (2 pt/ac rate) compared to the untreated control. Yield also increased in 2018 by 260 lbs/acre (Dr. Barat Bisabri, 2018-19). Growers in California's Central Valley face a variety of abiotic stresses; Guarantee Hi K was shown to be an effective tool to increase yields under these conditions.

Treatment(s) rate: GTE Hi K*	Total GTE Hi K used in 3 foliar per acre	Total GTE Hi K used in irrigation per acre	Incremental yield cartons per acre **	Extrapolated incremental value/acre ***
Control protocol: 0	0	0	0	0
Low rate protocol: 1 qt	3 qt	2 qt	71	\$1,420
High rate protocol: 2 qt	6 qt	2 qt	50	\$900

Yield and Returns in Bell Peppers under Heat Stress. Growers in the desert region of Coachella Valley face many challenges posed by heat stress. Both rates of Guarantee Hi K increased yield and value/acre in bell peppers under these difficult growing conditions. (West Coast Research, 2018).



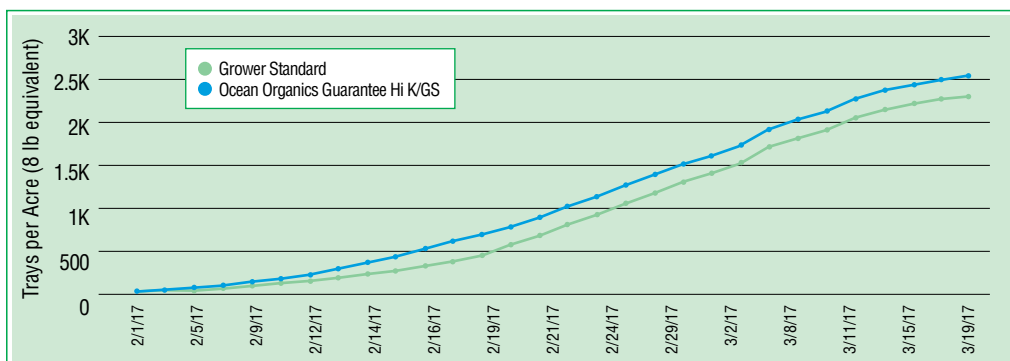
Yield in Red Seedless Grapes (Kriissy) Under Summer Stress. Guarantee Hi K increased yield by 24% and gross return by \$2,875 per acre (Crop Matters, 2019). Bunches treated with Guarantee Hi K led to an 8% increase in rachis length and 47% increase in shoulder length compared to untreated (data not shown). Second year trial data included color evaluations and recorded color improvements in addition to increases in yield and cluster dimension.



“The orchard utilized for this demonstration is very vigorous. To see a nice product response in a healthy orchard was, to say the least, impressive.”

Report from
Holden Research and Consulting

Extrapolated Yield in Hass Avocados. Guarantee Hi K increased yield with data showing a statistical rate response. The incremental increase in extrapolated yield between treated and control trees was 268 lbs/acre (Holden Research and Consulting, 2018).



Cumulative Marketable Production by Pick Day in Raspberries. Guarantee Hi K increased marketable yield by 228 trays per acre, a 10% increase (Holden Research and Consulting, 2017).

GUARANTEE® COMPLEX

(0.2-0-6) A unique liquid *Ascophyllum nodosum* extract with natural complexing agents for use in agriculture, greenhouse, hydroponics, landscape, gardens, as well as a wide variety of other growing applications. Guarantee Complex's superior formulation technology makes every tank mix perform better, allowing the components of your formulation to remain in solution for superior uptake.

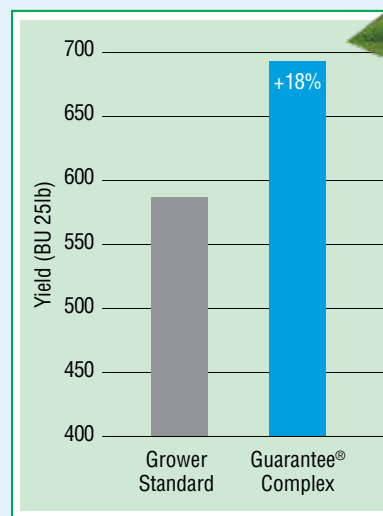


Sizes: 2x2.5 gal cases, 15 gal drums, 55 gal drums, 275 gal totes

What can *Ascophyllum nodosum* extracts do to help you grow?

- Provide stress tolerance to heat, drought, salinity and disease
- Optimize macro and micronutrient uptake to support increased crop yields and quality
- Improve soil and microbial characteristics for better root growth
- Improve plant appearance and color under abiotic stress

A pecan grower got in touch with us recently. Kinley Sorrells of Sorrells Farms in the heart of Texas was excited to share this story. An extension agent recently visited his orchard. He said this agent “does not give out compliments easily.” After driving through several hundred acres, the extension agent asked Kinley, “Okay, what’s the deal with your orchard?” The agent said that in his many years of experience, he had rarely seen such a “green healthy looking” orchard in that part of Texas, known for its sandy farmland. The deal was this: Kinley had recently added Guarantee Complex to his program. His first application was early March, followed by 5 applications throughout the season. We loved hearing Kinley so positive about his experience with Guarantee Complex.



Average Yield Per Acre in Mandarins. Guarantee Complex increased yield by **18%** over the grower standard. *Fruit count and fruit weight also increased* despite significant heat stress events (Holden Research and Consulting, 2020).

Report of Analysis in Percent

Sample ID	N	S	P	K	Mg	Ca	Na
Control	2.64	0.23	0.15	1.14	0.33	3.52	0.04
Hi K	2.72	0.32	0.16	1.21	0.38	4.07	0.04
Complex	2.68	0.35	0.17	1.18	0.38	4.01	0.04

Report of Analysis in Parts Per Million

Sample ID	Fe	Al	Mn	B	Cu	Zn
Control	241	106	88	102	6	70
Hi K	294	126	115	119	8	95
Complex	482	214	175	123	17	166

Mandarin Leaf Analysis. Guarantee Complex and Guarantee Hi K increased leaf nutrient levels, especially calcium, magnesium and all micronutrients measured. The Guarantee Complex treatment showed **almost double the concentration** of Fe, Al, Mn, Cu, and Zn over the grower standard.

“Impressive drop reduction from [mandarin] trees holding more fruit...I thought you might like see the stress reduction influence by the treatments. We had 108-110F in this orchard for 2-4 hours on Sunday, September 5!”

David Holden, Holden Research and Consulting, CA



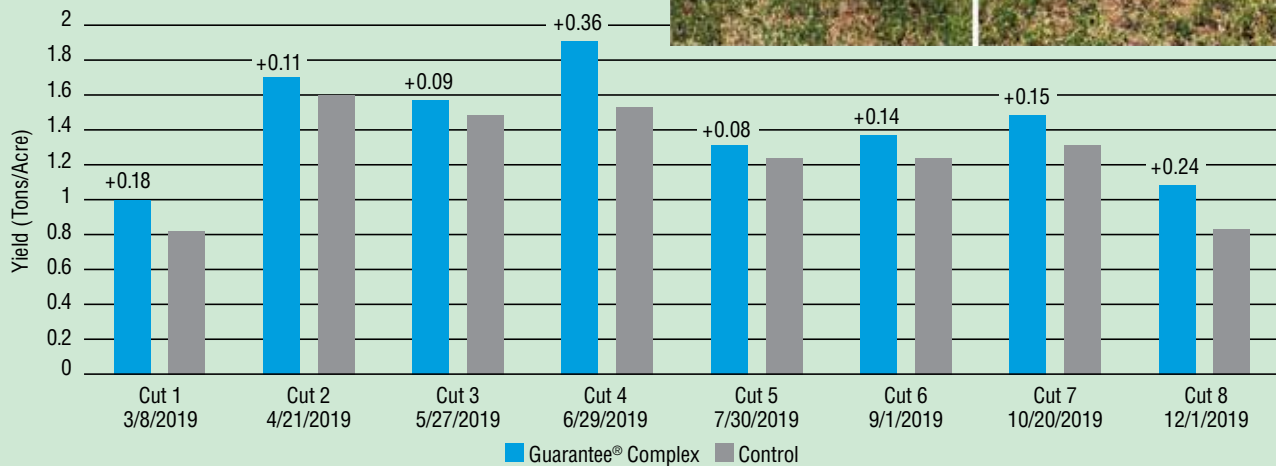
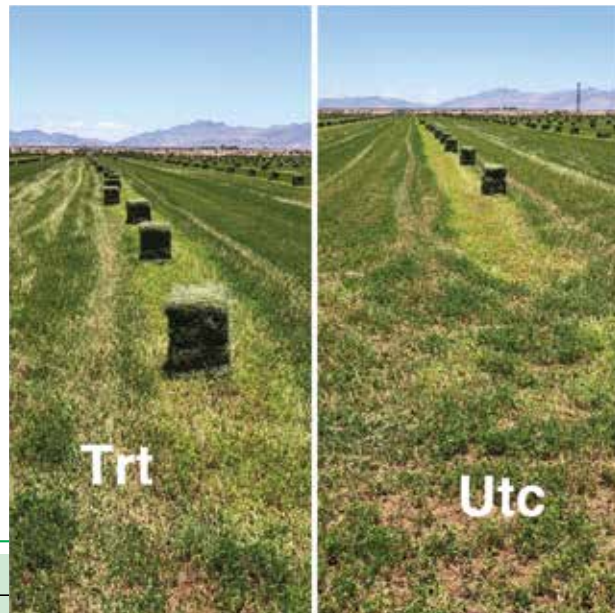
Guarantee Complex Improves Yield and Quality in Lemons Grown Under Summer Stress. Guarantee Complex was applied to a mature block of lemons (cv. Eureka) and in-season yields were collected for three picks during the spring and summer of 2020. Guarantee Complex produced **numerical and statistical yield increases** over the course of the season with an almost 12% improvement over the untreated check. The last pick in August of 2020 resulted in a statistically **significant increase in fruit per tree**; returns to growers increase at this time of year. In addition to summer stress, growers in this area faced abiotic stress in the fall from east winds (Santa Ana's).

“Very positive improvements in general production were seen with [Guarantee Complex] particularly... in the increases in summer fruit harvest (anything picked after May-June). FOB prices and returns to growers increase during this period and a quarter box improvement per tree yield increase can improve a grower’s returns per acre significantly.

David Holden, Holden Research and Consulting, CA



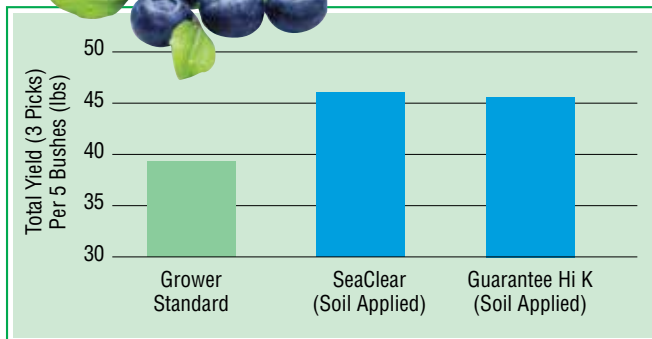
Guarantee Complex increased potato yields, size and uniformity (Northeast Agricultural Sales, 2018).



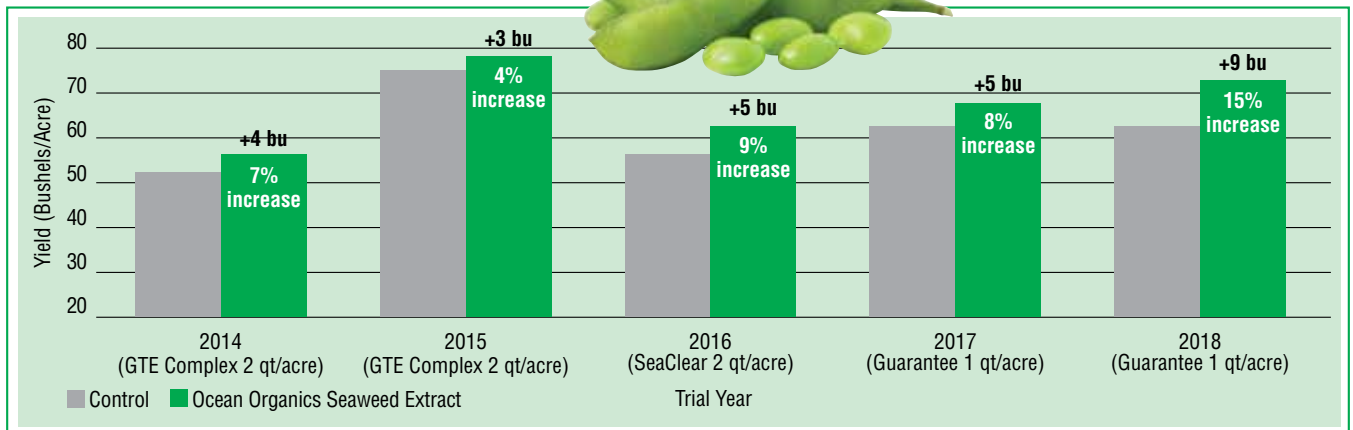
Yield Per Acre in Alfalfa for Eight Cuttings. Guarantee Complex **increased yields in every cutting** in 2019 (shown above), as well as 2018 (data not shown). The total yield increase in 2019 for all eight cuttings combined was 1.35 tons/acre. Crude Protein (CP), Relative Feed Value (RFV), and Total Digestible Nutrients (TDN) also increased in both years of the trial in both years of the trial (Research 2000, 2018-2019).

(0-0-1) SeaClear® is a versatile clarified liquefied *Ascophyllum nodosum*. It can be used for agriculture, hydroponics, landscape, gardens, and other growing applications.

Sizes: 2x2.5 gal cases, 15 gal drums, 55 gal drums, 275 gal totes



Blueberry Yield Under Summer Stress. SeaClear, as well as Guarantee Hi K, improved blueberry yield (Mid Michigan Agronomy, 2016).



Soybean Yield in Iowa Under Summer Stress. SeaClear, as well as other Ocean Organics seaweed extracts, consistently improved soybean yield (Dr. Bert Schou, ACRES, 2014-2018). Later data showed that a 1 qt/acre rate was as effective as 2 qt/acre. Ocean Organics makes it a goal to participate in multi-year trials.

General Application Instructions for Ocean Organics Liquid Agricultural Products

Application Rates

General recommended application rates for Guarantee, Guarantee Organic, Guarantee Hi K, Guarantee Complex, and SeaClear: 2-4 pints/acre (2.5-4.75 liters per hectare). Recommended application rate for Stress Rx: 2-4 quarts/acre. *Please see labels for specific crop applications and timings.*

Application and Mixing Guidelines

Suitable for use in any foliar, soil applied, or irrigation water application. Can be applied to seed, seed pieces, bulbs, tubers and cuttings. Use a minimum of 1 U.S. gal. of water carrier per 1,000 sq. ft. (3.8 L. per 93 m²). Fill mix tank with half of required spray water and turn on agitation. Measure product into tank, add remaining water and other soluble materials.

Compatibility

This product is compatible with most fertilizers and other spray materials. Conduct a jar test as needed.

Impressive Results... Even Under Intense Stress

STRESS RX® AG

(6-0-1) This multi-faceted foliar fertilizer contains seaweed extract along with nutrients, micronutrients, and osmoprotectants that significantly increase stress tolerance, survival potential and recuperative ability from heat, drought and salinity. For use in all growing applications.



Sizes: 2x2.5 gal cases, 15 gal drums



Creeping bentgrass subjected to UV and heat stress and treated with Stress Rx had **longer and more robust roots** than the untreated control (Dr. Xunzhong Zhang).

Severe drought throughout the 2020 growing season had Tom Luhrs, a grain seed grower in SW Nebraska, more than concerned. In late May he told all his dryland wheat was dying; his wheat under pivot was fine.



He had just planted 160 acres of dryland Golden German Foxtail Millet and was concerned it would suffer the same fate as the dryland wheat. German or foxtail millet is an annual warm season grass that matures quickly in the hot summer months. It is one of the oldest cultivated crops. Although German millet has a fairly low water requirement, it doesn't recover easily after drought because of its shallow root system.

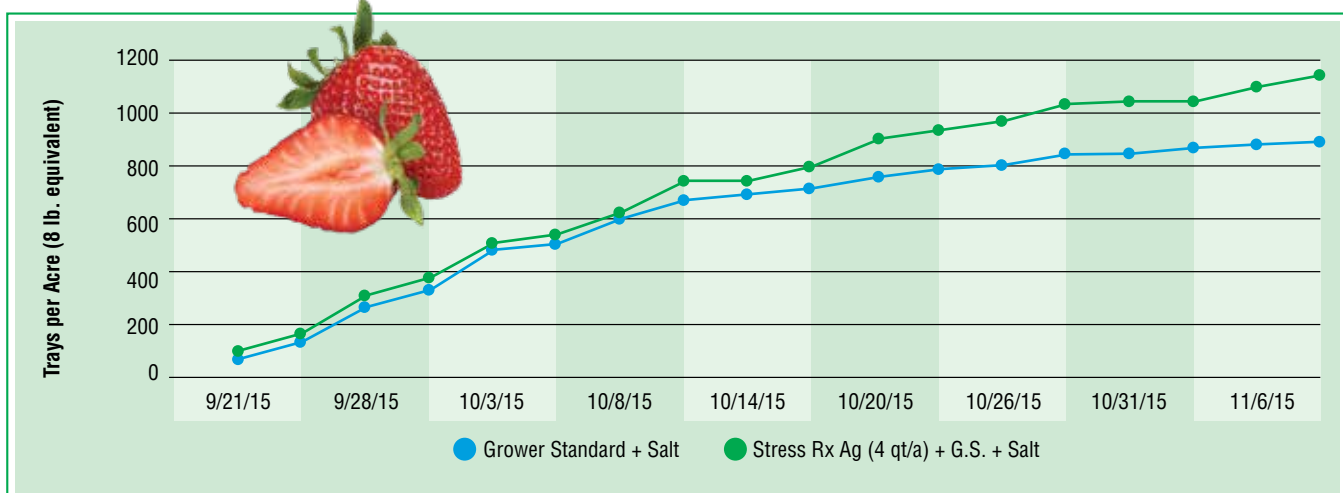
Tom sprayed the entire 160 acre plot with Ocean Organics Guarantee® Organic seaweed extract in early June. **Guarantee has been shown to aid stress recovery along with promoting better growth.** Still, Tom was concerned – it appeared a long season of drought was ahead. Ocean Organics shipped him a 55 gallon drum of Stress Rx® Ag (6-0-1).

Tom applied Stress Rx Ag on 80 of the 160 acres toward the end of June, using just one treatment at the “high” label rate of 1 gallon per acre. Then he went through 8 weeks of drought. Ocean Organics received this text from Tom on Sunday, Sept. 27, 2020:

“What is that drought product called? 28 bu/a untreated side, vs 35 bu/a treated. WOW! Crop is dryland Golden German Foxtail Millet. Will this help in a normal year too?”

The answer is Yes, it will boost yield and quality in a normal year too, but the significance of growing in severe drought cannot be overstated.

Excellent Strawberry Production Despite Salt Stress



Cumulative Marketable Production by Pick Day in Strawberries Under Salt Stress. Stress Rx Ag increased marketable yield by 1123 trays per acre (Holden Research and Consulting, 2017). Irrigation water contained 200 ppm of NaCl. StressRx Ag was applied at 4 qt/acre (applied every 14 days. Start 2 weeks post plant)

Research Conducted at Universities, Laboratories, and Independent Field Research

“Guarantee® Hi K increased cluster shoulder length (statistically) and rachis length (numerically) relative to untreated. Bunches in the Guarantee® Hi K treatment were also numerically heavier, and there were more bunches per vine. Overall, these factors combined to result in [Guarantee Hi K] improving yield over untreated by 24%.”

Megan Townsend, Crop Matters

“Based on the data collected in this trial, the use of the Ocean Organics Guarantee® Hi K had significantly positive effects for the production and financial return for this raspberry crop.”

David Holden, Holden Research and Consulting, CA

“Based on the data collected in this trial, the Ocean Organics program added very nice numerical returns to the pack outs and grower dollar returns per acre based on the sampling data collected during the course of this [strawberry] trial.”

David Holden, Holden Research and Consulting, CA



	University
	Laboratory
	Independent Field Research

*“We tested 30 commercial and experimental products for their ability to alleviate salinity stress on bermuda grass. **The only program that had an effect on turfgrass quality and soil chemistry was DeSal + Stress Rx + XP Extra Protection.**”*

Increased turf quality and Dark Green Color Index (DGCI)

Decreased EC, SAR and Na content in the soil. “The best combination of salinity alleviation and turf quality in both years of the study.”

U.C. Riverside, 2013-2014

How Does Ocean Organics Compare?

Ask for the Research.

What Are the Differences in Liquid Seaweed Products?

Different manufacturers make seaweed products in different ways. They use different seaweeds, include different additives at different pH's, use various extraction agents and evaporate to different concentrations using different temperatures. Some dehydrate their extracts to make soluble powder or provide a reconstituted product. Though dehydration is recognized as damaging to some of the natural compounds, it significantly reduces transportation expenses — it's done for economic, not agronomic reasons.



The Ocean Organics Difference

At Ocean Organics, we use proprietary and superior processing technologies to make high-performance products from fresh *Ascophyllum nodosum*. Using innovative and sustainable techniques, Ocean Organics produces seaweed solutions that are richer than others but with fewer solids and inert ingredients. Lower viscosity allows easy mixing and application.

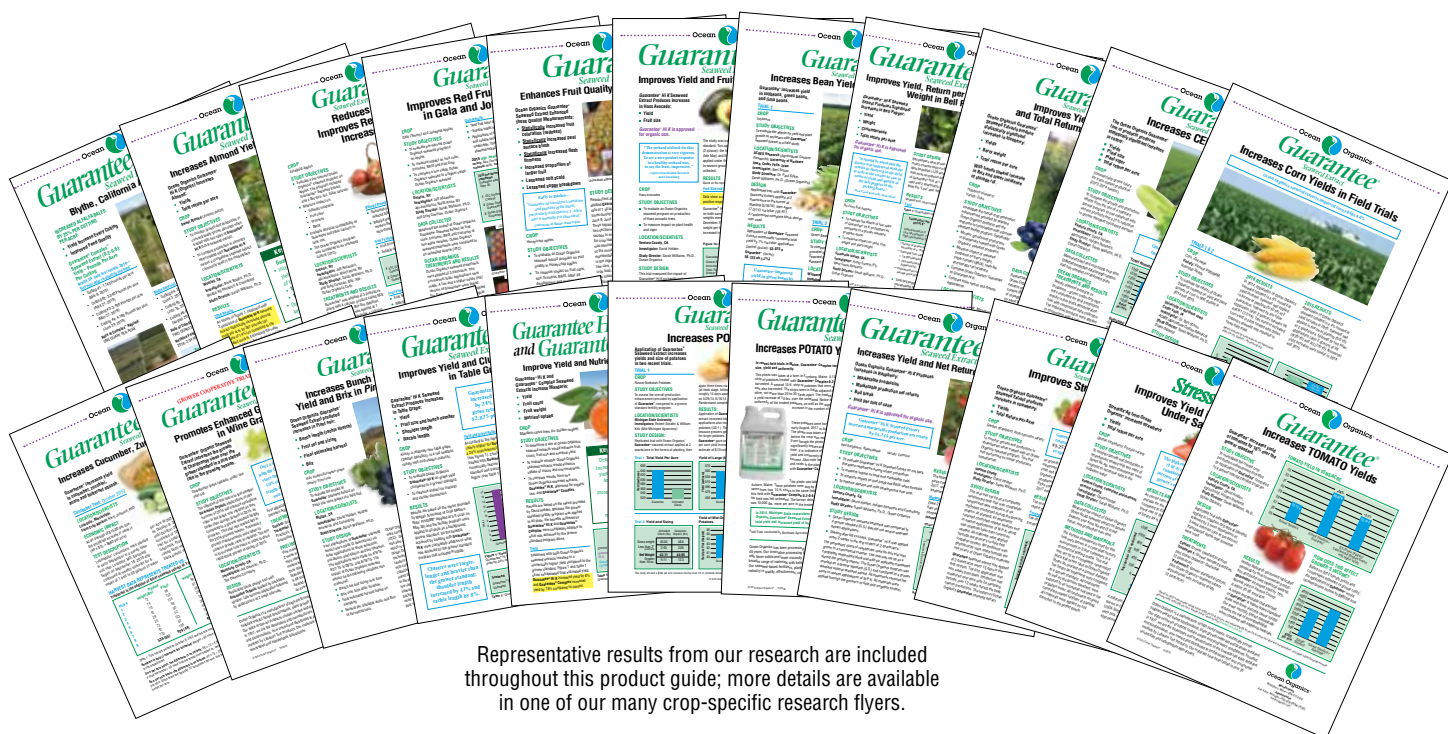
Traditional approaches to evaluate liquid seaweed products include bioassays, measurement of dissolved and suspended solids, field trials, yield comparisons under a variety of stresses, and scientific procedures such as chromatography. No single method or combination of methods has been accepted by the scientific community as the “right” way to evaluate these natural products. In fact, there is no universal definition of “seaweed extract,” no universal explanation of how seaweed products “work” or how to compare their relative potency.

So how do you know which is best?

Count on the company who uses independent research to prove superior performance.

“Plots treated with the [Ocean Organics program] consistently performed best overall throughout the summer stress period.”

Rutgers Report, 2017



Representative results from our research are included throughout this product guide; more details are available in one of our many crop-specific research flyers.

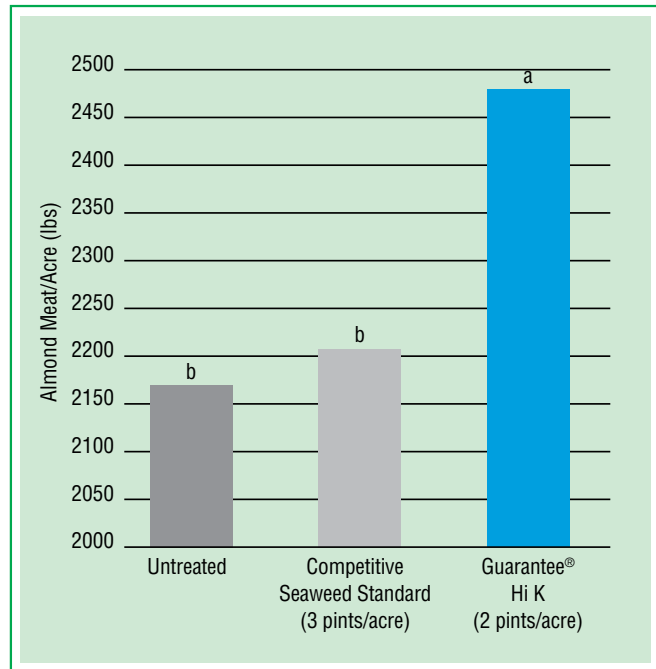
Consistent Quality Control and Industry-Leading Performance

Ocean Organics harvests fresh *Ascophyllum nodosum* seaweed off the coast of Maine. We've continually improved our extraction techniques for many decades, routinely testing our extracts in a variety of laboratories to ensure bioactive levels of key stress protection compounds. Ongoing field research shows not only consistent increases in yield and quality under a variety of stresses (Table 1 and Table 2), but a history of numerous #1 performances in competitive trials. In our laboratory in Maine, we also compare our extracts to other seaweed extracts and biostimulants in the marketplace to ensure the highest quality.

Products Backed by Research

Our products have been tested through more than 30 universities and independent research organizations for more than 40 years. Research flyers that summarize each of our trials are available upon request.

Because there are significant differences among seaweed species and processing approaches within our industry, Ocean Organics has devoted many years to making the scientific case for our own seaweed extracts. We don't just rely on other papers about seaweed, we test our own extracts in the lab and in the field.

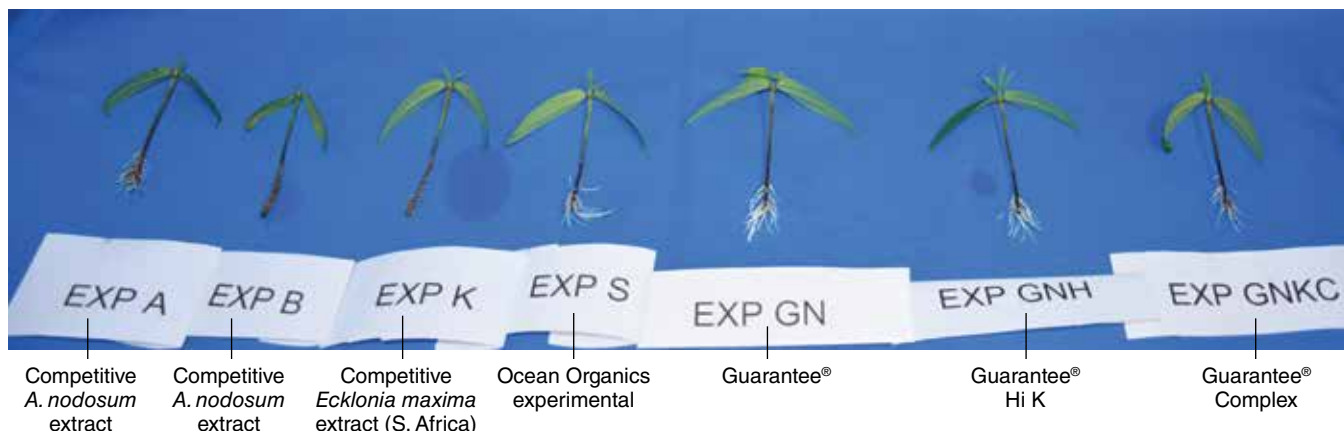


Almond Yield in Competitive Trial. For the second year in a row, Guarantee Hi K outperformed the most widely used *Ascophyllum nodosum* seaweed in a 2019-2020 trial by Dr. Barat Bisabri in Newman, CA.

Table 1. Research trials with Ocean Organics seaweed products show yield increases in many different crops subjected to a variety of abiotic stresses.

Crop	% Yield Increase	Researcher
Alfalfa	20	Research 2000, Blythe, CA
Almonds	12	Dr. Barat Bisabri, Newman, CA
Avocados	3.4	Holden Research, Ventura, CA
Blueberries	17	Robert Schafer, Mid-Michigan Agronomy
Celery yield (reduced N)	12	Holden Research, Ventura, CA
Corn	5	Dr. Bert Schou, ACRES Research, IA
Cucumber	14	Dr. Kerry Johnson, Agra-Hort, Mississippi
Green Beans	22	Grower cooperater trial, OR
Green Bell Peppers	71 cartons/acre	Rusty Sarrett, Western Research Company
Lemons	10	Holden Research, Ventura, CA
Lima Beans	5	Holden Research, Ventura, CA
Mandarins	18	Holden Research, Ventura, CA
Potatoes	14	Robert Schafer, Mid-Michigan Agronomy
Raspberries	10	Holden Research, Ventura, CA
Soybeans	7	Dr. Bert Schou, ACRES Research, IA
Strawberries	15	Holden Research, Ventura, CA
Table Grapes	24	Crop Matters, Pullman, WA
Tomatoes	16	Holden Research, Ventura, CA
Wine grapes	8	Holden Research, Ventura, CA
Zucchini	11	Dr. Kerry Johnson, Agra-Hort, Mississippi

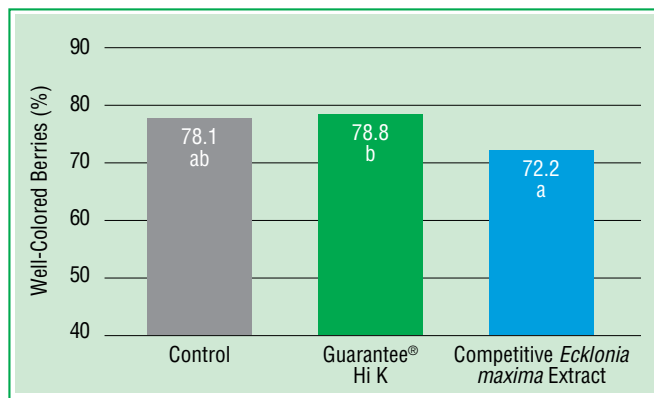
How Does Ocean Organics Compare? *continued*



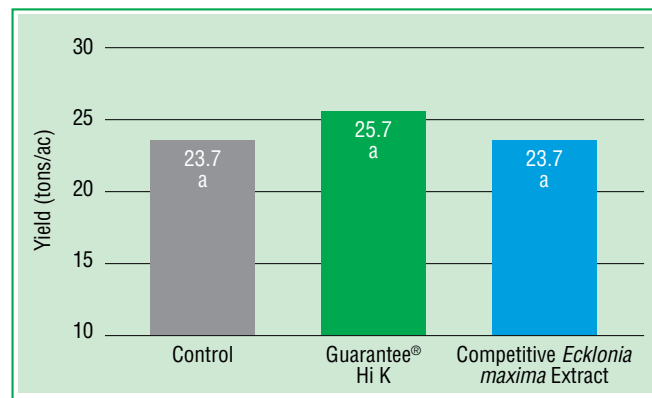
Quality Control Bioassays. Ocean Organics regularly performs quality control bioassays under a variety of abiotic stresses. Four on right: Guarantee, Guarantee Hi K, Guarantee Complex, and an Ocean Organics experimental. Three on left: seaweed extracts from other companies. Bioassays performed by Dr. Xunzhong Zhang of Virginia Tech.

Table 2. Research trials with Ocean Organics seaweed products show diverse benefits in crops grown under a variety of abiotic stresses.

Crop/Plant	Crop Benefit	Researcher
Alfalfa	Improved RFV (relative feed value); TDN (total digestible nutrients); CP (crude protein)	Research 2000, Blythe, CA
Apples	Improved color, brix, reduction in bitterpit	Jeff Alicandro, agr.assistance, North Rose, NY
Avocados	Improved fruit weight/yield	Holden Research, Ventura, CA
Bell Peppers	Increased yield, weight, circumference, total return per acre	West Coast Research, Coachella Valley, CA
Bermuda grass	Improved salinity stress tolerance and quality (#1 program for all 4 yrs)	Dr. James Baird, UC Riverside
Blueberries	Increased berry weight/brix	Robert Schafer, Mid-Michigan Agronomy
Creeping bentgrass	Improved summer stress tolerance and quality (#1 program for both years)	Dr. Bingru Huang, Rutgers University
Creeping bentgrass	Improved drought tolerance	Dr. Bingru Huang, Rutgers University
Mandarins	Improved leaf macro- and micronutrient levels	Holden Research, Ventura, CA
Poa Annua	Improved cold temperature recovery and dollar spot reduction	Dr. Emily Merewitz, Michigan State University
Table grapes	Improved yield, rachis stretch, and shoulder length	Crop Matters, Pullman, WA
Wine grapes	Increased rachis stretch	Holden Research, Ventura, CA
Yellow Onions	Increased quality, size, yield and return	Crop Matters, Pullman, WA



Percentage of Well-Colored Berries at Harvest in Table Grapes Grown Under Heat Stress, Selma, CA. Guarantee Hi K had a statistically higher percentage of well-colored berries than a competitive *Ecklonia maxima* kelp extract in berries grown under heat stress (Crop Matters, 2020).



Average Yield in Table Grapes Grown Under Heat Stress, Selma, CA. Guarantee Hi K had a numerically higher yield than a competitive *Ecklonia maxima* kelp extract by 2 tons/acre (Crop Matters, 2020).

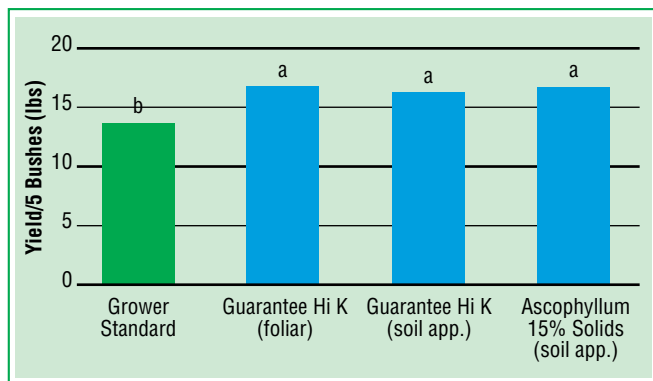
No matter what you grow, optimizing root development matters. A robust root system is every grower's goal and maximizing root system performance under multiple summer stresses is vital.

The Myth of "High Solids"

We innovated a process to preserve the efficacy of seaweed with fewer solids to improve the formulation process. Many companies still falsely promote the idea that seaweed extract strength is proportional to its solids. How do we respond?

Although it may seem counterintuitive, the efficacy of seaweed extracts is not proportional to its "thickness" or solids.

First, the best test of the strength of an extract is how it performs in the field. The figure on page 17 shows that our lower solids Guarantee Hi K had a higher yield improvement in almond field trials under a variety of stresses than a higher solids competitive product. In a trial on blueberries, Guarantee and Guarantee Hi K showed a higher statistical yield increase compared to a higher solids (15% solids) *Ascophyllum nodosum* extract under summer stress (see below). The tables on page 17-18 show results from field trials in many additional crops using Ocean Organics extracts. Our extracts are clearly not "low strength" when it comes to producing actual results in field trials.



Percent Solids Did Not Impact Blueberry Yield. In this field trial, foliar or soil-applied Guarantee Hi K (low solids) statistically increased yield to the same extent as a higher solids (15%) *A. nodosum* extract. There was also no statistical difference between foliar and soil application methods for Guarantee Hi K (Rob Shafer, Mid Michigan Agronomy, 6/30/16).

Field trials have consistently shown that the percent solids of an extract is not the key mode of action for producing results in the crops we've tested. This is not to say that the carbohydrate polymers in solids do not play any role.

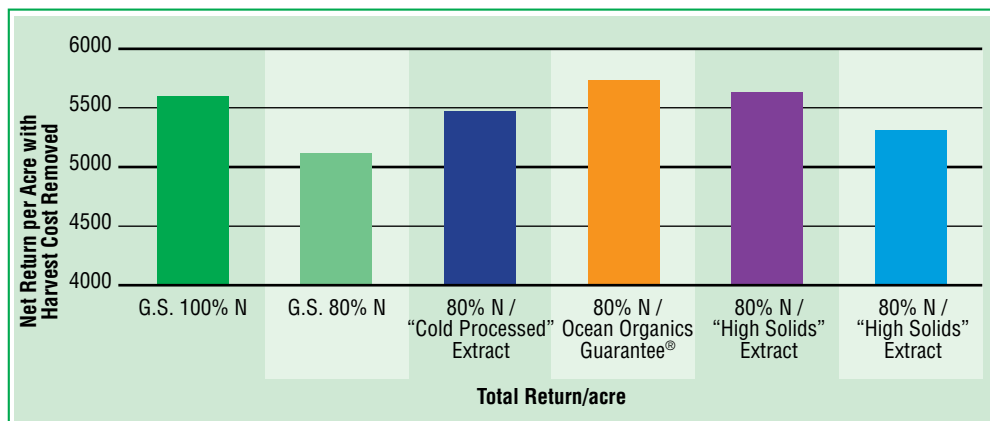
Second, we have researchers quantify various stress protection compounds in our extracts as a tool for quality control. Both the Ocean Organics extracts and high solids competitive extracts consistently produce similar results.

The Myth of "Cold Processed"

Several decades of research show the ideal seaweed extraction is not cold. We keep temperatures low enough to maintain efficacy of key compounds, but high enough to break down long-chain sugars to more bioavailable short-chain sugars. Our quality control work shows that Ocean Organics' lower solids extract contains similar or higher levels of abiotic stress protection compounds relative to higher solids competitors.

"Best Pack Out Ever!"

A well-established table grape grower in the Central Valley of California reported his best grape crop ever after using Guarantee®. He reported very significant improvements in uniformity, rachis stretch, bunch and berry size under stressful growing conditions. That area experiences severe heat stress and the quality of irrigation water often poses challenges. His Thompsons yielded the highest percentage of #1 ever resulting in "his best pack out ever." Treated TomCords showed improvement in color uniformity allowing harvest a week earlier than his competitors – and his raisins rated higher than ever. Use of Guarantee resulted in significant revenue gains for this grower.



Net Return per Acre in a Multi Participant Trial on Celery in Ventura County, CA, 2013-2014. Treatment with the Ocean Organics extract resulted in the highest numerical yield among all the seaweeds, including "high solids" and "cold processed" extracts.

Science of Seaweed

Diverse Natural Compounds – Diverse Benefits

We begin discussions about the science of seaweed with seaweed's agricultural benefits. Evidence in the scientific literature, as well as grower experience, make a clear case that seaweed extracts do the following:

- **Provide stress tolerance to heat, drought, salinity and disease**
- **Optimize macro- and micronutrient uptake to support increased crop yields and quality**
- **Improve soil and microbial characteristics in the rhizosphere for better root growth**
- **Improve plant appearance and color under abiotic stress**

Although the benefits of seaweed may be well documented, many growers can't help but ask the natural question: how does it work? Most scientists agree that seaweed extracts fall in the category of biostimulants and have multiple modes of action. We liken seaweed to a symphony orchestra—there are many different “instruments” that perform together to achieve the desired outcome. The chemistry of seaweed is vastly different than the “solo performance” of a pesticide for example. Researchers are still determining modes of action of various chemical components of seaweed; progress has been made, but there is still a long way to go.

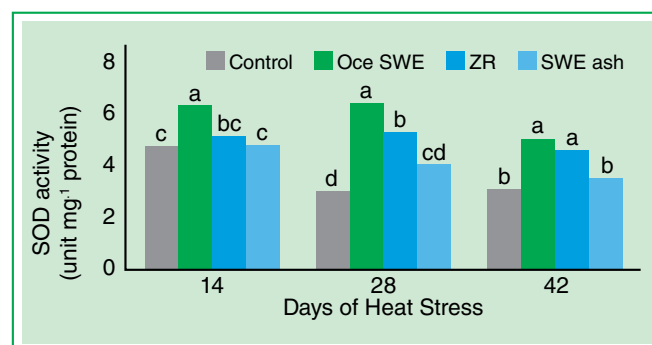
One thing we do understand is that no other biostimulant available has such a diversity of stress-fighting compounds. *Ascophyllum nodosum* is an intertidal species, so it is completely exposed to the elements for part of its life, and completely submerged in salt water at other times, leading to the development of distinct compounds that foster an array of crop benefits in the face of abiotic stress. Unique constituents include:

- **Oligosaccharides – short chain sugars that complex micronutrients**
- **Hormones – active at very low levels to play a variety of roles to aid in abiotic stress protection**
- **Antioxidants – fight free radicals created under stress**
- **Amino Acids – building blocks of proteins, effective at chelating micronutrients (our seaweed extract analysis shows 18 amino acids)**
- **Osmoprotectants (including betaines) – compounds that help plant cells adjust to drought and salt stress**
- **Pigments – compounds that help protect plants from harmful UV rays**
- **Polymers – large sugar polymers (such as alginates) that can help stimulate microbial communities**

The Science of Stress Protectants

One of the best understood benefits of seaweed is in the area of stress protection. Seaweed extracts have been shown in the literature, and in our own studies, to improve stress tolerance to heat, drought, salinity and disease. Much of the pioneering research on using seaweed for stress management has been performed by plant physiologists at Virginia Tech and Rutgers; stress tolerance research is of primary importance to these scientists as intensively-maintained turfgrasses, such as golf course greens, are under constant stress.

Under favorable growing conditions, plants produce their own natural compounds for health and survival. Certain of these naturally occurring compounds are vital for plants under stress, but the ability to produce them decreases as heat, drought, salinity and other stress levels increase. Dr. Erik Ervin's work at Virginia Tech established that our products' natural plant-available compounds can offer significant stress tolerance benefits. The figure below shows that as heat stress progressed, creeping bentgrass that was treated with Ocean Organics seaweed had



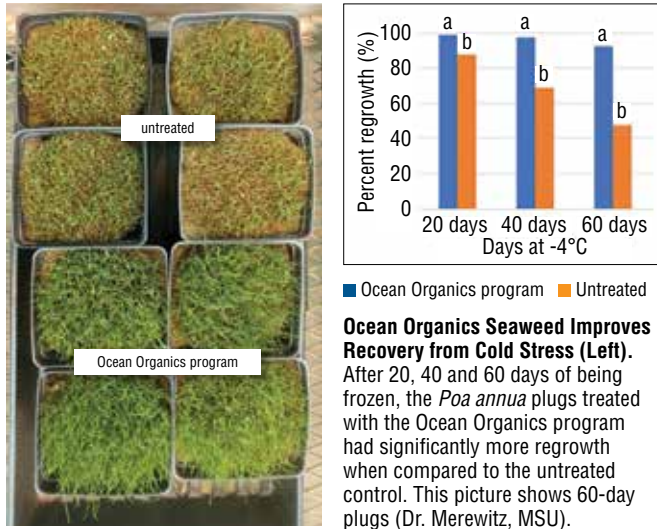
Ocean Organics Seaweed Increases Activity of an Important Antioxidant Enzyme Under Heat Stress. Creeping bentgrass under heat stress and treated with Ocean Organics seaweed extract (Oce SWE) had statistically higher leaf levels of superoxide dismutase (SOD, an antioxidant enzyme) than the control, a synthetic hormone, and seaweed ash (Zhang and Ervin, 2008).

Antioxidants

Plants under stress produce increasing levels of Reactive Oxygen Species (ROS), also known as free radicals. ROS are powerful oxidants that damage critical molecules like DNA, RNA and proteins. If you picture ROS as rebel compounds attacking cells, then antioxidants could be viewed as the cell's armed forces. Antioxidants react with ROS before they have a chance to react with vulnerable molecules in cells. The powerful antioxidant enzyme called super oxide dismutase helps neutralize an ROS called super oxide. Research shows that Ocean Organics seaweed boosted levels of this key antioxidant enzyme in creeping bentgrass grown under heat stress (see above).

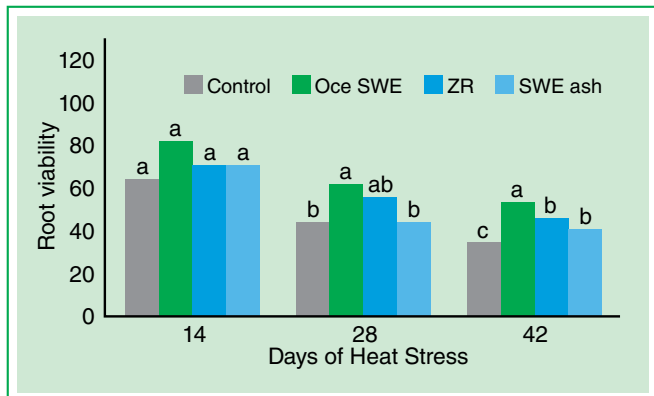
statistically higher leaf levels of the protective antioxidant enzyme called superoxide dismutase (SOD). Antioxidants are critical in fighting free radical damage caused by a variety of stresses.

In addition to increasing heat stress tolerance, **our products also improve recovery from cold stress**, as shown in trials with Dr. Emily Merewitz at Michigan State University. *Poa annua* plugs treated with the Ocean Organics program had statistically better regrowth when compared to the untreated control.



Healthier Roots Under Stress

When plants are under stress, their root systems suffer. Unfortunately, plants are often subjected to at least one and often multiple sources of stress. Many growers view frequent applications of seaweed extract as beneficial for overall stress protection for their crops' root growth. Although exact modes of action are not completely understood, studies show that certain compounds in *A. nodosum* seaweed extract appear to sustain roots under stress. Seaweed appears to improve microbial diversity in the rhizosphere and can help chelate micronutrients for better root uptake. Several studies have shown that soil



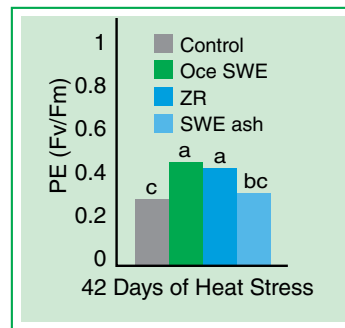
Ocean Organics Seaweed Improves Root Viability Under Heat Stress. Creeping bentgrass under heat stress and treated with Ocean Organics seaweed extract (Oce SWE) had statistically better root viability than the control, a synthetic hormone, and seaweed ash (Zhang and Ervin, 2008).

applications of seaweed have stimulated microbial communities surrounding root systems. Dr. Erik Ervin's work showed that bentgrass root systems survived heat stress more effectively when treated with our seaweed. In laboratory assays performed by Dr. Xunzhong Zhang, plants treated with Ocean Organics seaweed showed more robust root growth than untreated plants.

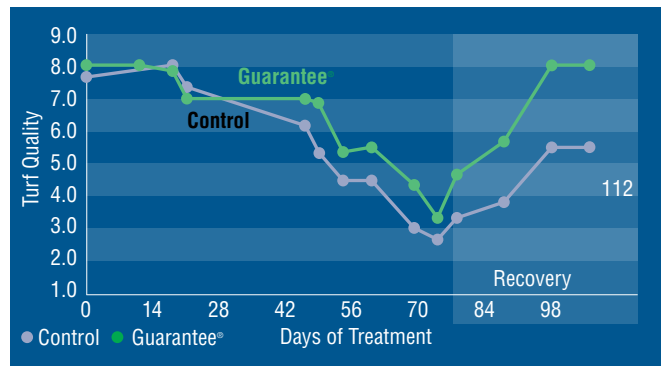
Supporting Photosynthesis Under Stress

Statistically higher photosynthetic efficiency and increased chlorophyll production

Photosynthesis is the conversion of light energy into chemical energy; it occurs in two phases. In the first phase (historically called the "Light Reactions"), photosynthetic reactions capture energy from the light of the sun and use it to create high-energy molecules. The second phase (which involves the Calvin-Benson Cycle) uses the resulting high-energy molecules made during the Light Reactions to capture carbon dioxide (CO₂) and make carbohydrates. Chlorophyll and other pigments are critical to the first phase of photosynthesis, allowing cells to absorb energy from light. Yet research shows that chlorophyll levels often decrease under a variety of abiotic stresses. Research using seaweed from Ocean Organics has shown improved chlorophyll levels under a variety of stresses. Seaweed also contains other protective pigments that are known to support the membranes where the "photosynthetic machinery" is located in cells (such as thylakoid membranes).



Ocean Organics Seaweed Improves Photochemical Efficiency (PE) Under Heat Stress. Creeping bentgrass under heat stress and treated with Ocean Organics seaweed extract (Oce SWE) had statistically higher photochemical efficiency (PE) than the control, a synthetic hormone, and seaweed ash (Zhang and Ervin, 2008).

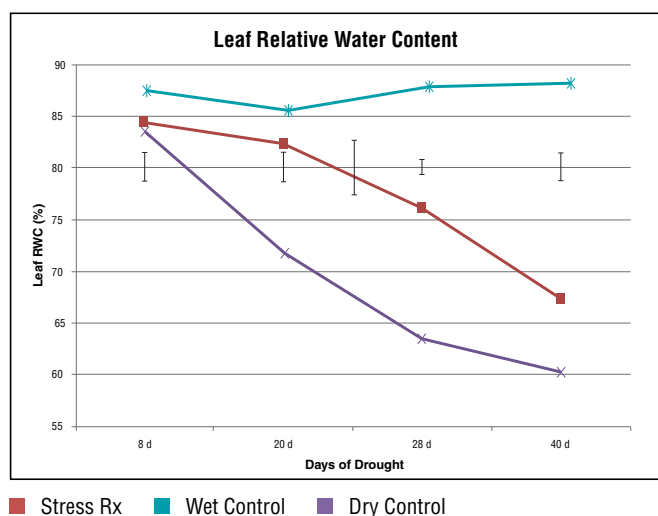


Guarantee Improves Chlorophyll Index and Other Measures of Quality. Under heat stress and reduced irrigation in growth chambers, Creeping Bentgrass treated with Guarantee seaweed extract had higher Turf Quality, Percent Cover, and Chlorophyll Index during stress and recovery periods (Michelle DaCosta et al., U Mass).

Science of Seaweed *continued*

Osmoprotectants: Helping Plants Survive Salinity and Drought Stress

Osmoprotectants, also called compatible solutes, help plants adjust to osmotic stress. This type of stress is most often caused by drought or salinity, but can also occur during temperature fluctuations. Osmotic potential is maintained within cells by the accumulation of these small molecular weight compounds. Relatively few compounds can accumulate in sufficient concentrations without inhibiting enzyme activity. Seaweed contains several kinds of osmoprotectants, including betaines, sugars, and amino acids. These small molecular weight compounds help stabilize proteins and enzymes, as well as maintain membrane integrity under stress.



Plots of creeping bentgrass treated with Stress Rx maintained statistically higher turf quality, NDVI (indicative of higher chlorophyll), Leaf Relative Water Content, and had lower Leaf Electrolyte Leakage (data not shown) than the dry control plots during drought and heat stress and also recovery (Huang and Burgess, Rutgers, 2011).

Seaweed: Natural Trace Minerals and Complexing/Chelating Agents

Seaweeds are one of the most diverse natural sources of minerals known; they contain traces of the majority of primary, secondary and micronutrients needed by plants. There are 18 different elements that are now considered essential for plants to grow and thrive. Nine of them are macronutrients: nitrogen, phosphorus, potassium, calcium, sulfur, magnesium, carbon, oxygen, and hydrogen. The remaining nine are micronutrients (also called trace minerals or trace elements): iron, boron, manganese, zinc, copper, molybdenum, chlorine, cobalt, and nickel (C4 plants also require sodium). Ocean Organics seaweed extracts contain low levels of at least 13 of the essential elements.

Micronutrients are absolutely essential for plant growth because they help enzymes function. Almost all of the life processes in plants are enzymatic to some degree; even low levels of these micronutrients can be significant for plant and microbial enzymes to function properly. Even though essential micronutrients are required in much lesser amounts (they exist in plant tissue at parts per million levels), if one of them is deficient, plants will not reach maximum yield (this is called Law of the Minimum).

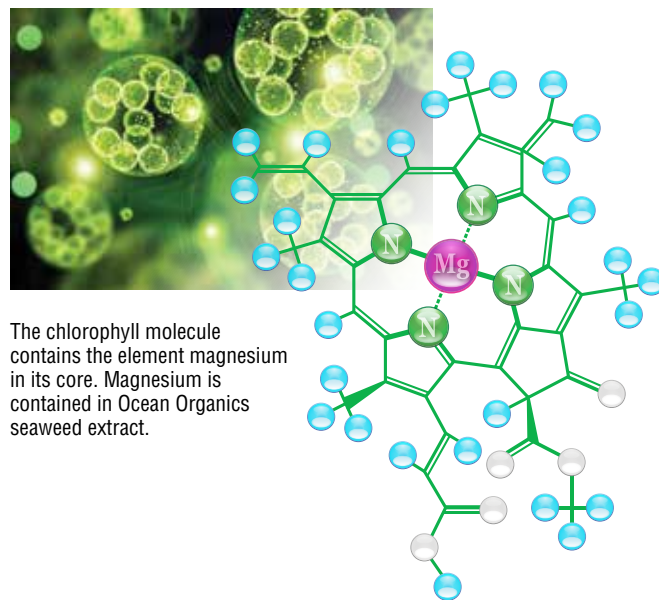
The Law of the Minimum governs maximum potential yields.

In addition to essential micronutrients, there are also those that can have important biological function, such as aluminum, iodine, silicon, vanadium, and selenium. Seaweed contains many of the essential micronutrients, as well as some that are not necessarily essential, but can be beneficial to plants or microbes for various reasons.

Seaweed is also a source of natural chelating and complexing agents. The sugars (polysaccharides and oligosaccharides) and amino acids in seaweeds are known to complex and chelate micronutrients, which are then more bioavailable for root or foliar uptake. Growers apply a variety of macro- and micronutrients and often include seaweed in the tank mix to enhance both foliar and root uptake. Researchers have reported that seaweed application has increased leaf macro- and micronutrient levels, and we have confirmed this in crops such as mandarins.

Seaweed's rich trace elements and complexing/chelating agents also have the potential to increase microbial diversity and beneficial microbial populations within the rhizosphere.

Our team at Ocean Organics looks forward to continuing our partnership with an inspiring group of researchers and industry leaders who delve into the science of seaweed.



Granular Fertilizers

THE RIGHT STUFF®

(4-3-4) A natural, organic-based fertilizer and soil conditioner that increases plant growth, health and vigor.

Size: 50 lb bags



GRAND PRIZE®

(5-7-4) The World's Best Natural-Based Flower Fertilizer. Ingredients include Kelp Meal, Fish Meal, Crab Meal, Alfalfa Meal, Shrimp Meal, Poultry Meal, Seaweed Extract, and Rock Phosphate.

Size: 50 lb bags



NUTRIVEG®

(5-4-4) An all-purpose, high-performance granular fertilizer reviewed and allowed for use in organic growing by MOFGA (Maine Organic Farmers and Gardeners Association).

Size: 50 lb bags



Consider the Source

Renewable resources from the world's oceans — kelp, fish, shrimp, lobster, crab. All are rich and diversified protein sources, delivering unique forms of nitrogen. These marine organic meals and other renewable resources are the core constituents that make up our granular organic base. North Atlantic sea plants are also a rich source of trace elements, micronutrients and a wide variety of other beneficial compounds. Understanding and using these unique constituents to enhance the performance of conventional materials sets Ocean Organics apart from other manufacturers and formulators. Our products perform well beyond the NPK numbers on the label.



Trauma & Rescue

How to Help Save Your Crops

As growers more frequently see conditions of intense stress from multiple sources they need additional responses.

One thing is simple. The top priority is to build the strongest, healthiest plant possible, because stress attacks the weak first. Our Seaweed Solutions™ proactively help crops thrive while protecting them from heat, cold, salt stress and more.

But with periodic, random stress events — such as hail, herbicide damage, winter damage, heat damage — many growers are turning to our Seaweed Solutions™ for recovery.

Our seaweed products' strengths are in their diversity. They have the widest array of beneficial constituents of any agriculture products on the planet—and they are highly safe and cost efficient.

From hail damage to heat damage, our customers have shared stories and observations from the field.

Sometimes you need a “Hail Mary!”

When stressors multiply, stress management only gets more complicated.

LATE FROST RECOVERY 2018

Seedling field corn (Nebraska)—survived and thriving after early morning late frost episode burned back the untreated seedling on neighboring property.



HAIL DAMAGE RECOVERY 2019

Wheat after hailstorm (Chase County, Nebraska). Field on right was treated with Ocean Organics Guarantee® Organic Kelp Extract applied at 1st joint at 1 quart/acre. An additional 1 quart was applied two days after the hailstorm. Field on right withstood the hailstorm significantly better and wheat is coming back, shooting new secondary tillers that are in late boot to early heading stage.

– Grower's Report

Last week I got a phone call from our new distributor in Nebraska. His area had received thunder storms with severe, damaging hail. He asked if applying our Guarantee® Organic would help the spring wheat crop recover. I said I didn't know but told him of other crops that have recovered from hail and some from herbicides. I knew that it couldn't hurt to spray, so he aerial sprayed all the acreage with Guarantee.

This morning he said all the damaged spring wheat has recovered. His neighbor, a conventional grower, had planted winter wheat, which was much farther advanced in growth and had also been damaged. It has yet to recover. I suggested that our customer sell some to the neighbor!”

– Mike R., Ocean Organics



Field on left is neighbor's wheat. Field on right was treated with Ocean Organics Guarantee® Kelp Extract

Call and ask for our more detailed, scientific research.

HIGH HEAT/UV STRESS 2016

Haas Avocados (Kingsburg, California). Three year old planting survived high heat (105° F) in California San Joaquin Valley. Thriving under the high temperature and high insolation (sun exposure) of June 2019!



HERBICIDE DAMAGE RECOVERY • 2016

Justin Choiniere, President of Northeast Agricultural Sales (Detroit, Maine) reported this incident.

"We custom apply pesticides to a variety of different crops all across the state of Maine. In one particular instance, we ran into some herbicide injury on silage corn in Clinton, Maine in June 2016. After applying 3 ounces per acre of a popular herbicide, and 2 quarts per acre of another herbicide and 1/2 ounce of a fungicide, 4 days later, the then 6 inch tall corn exhibited obvious phytotoxicity shown in these pictures.

Based on a suggestion from Ocean Organics Corp, we applied 2 pints of Guarantee® Organic foliar per acre. Within a week a noticeable plant health response was evident. By the end of the growing season, it was hard to tell which hybrids in the plots had been affected by the injury. Growth response was so great, that both Caragh Fitzgerald and Rick Kershbergen (U.Maine extension agents) had to double check their notes as to which hybrids had been damaged."

Desiccated corn plants began responding within a week of Guarantee® application.



July, 2016, one month after Guarantee® application



SALT LEVEL IN SOIL • 2018

Strawberries (California). 2 qts per acre Guarantee® improved plant health. SDI drip irrigation.



SALT LEVEL IN IRRIGATION WATER • 2016, 2017, 2018

Turf (California). Guarantee® improved plant health. Sprinkler irrigation.



WINTER DAMAGE • 2019

A lavender farm in Mid-Coast Maine showed the ravages of a difficult winter. It had suffered multiple sequences of heating and cooling, and even in June the plants showed the signs of deep stress. The owner called Ocean Organics for help. She was given three kelp extract products to sample and chose Guarantee® Organic for her rescue effort. Three weeks after spraying, her farm had recovered and was beginning to bloom.



Faster Recovery from Stress.

Guarantee® Your Crops.

Harvesting *Ascophyllum Nodosum* Sustainably

Ascophyllum nodosum, also called rockweed and knotted wrack in the northeast, is native to the North Atlantic Ocean and the Gulf of Maine. It is a large marine algae (macroalgae) that is an important part of the intertidal habitat along Maine's rocky coastline. Because *A. nodosum* is very effective at accumulating nutrients and minerals from ocean water, it has become a valuable resource; it is harvested for use in food, fertilizer, soil conditioners, animal feed, and other products.

Companies that harvest *A. nodosum* in the Gulf of Maine do so either by hand with knives or rakes, or by using specially-designed mechanical harvesters. Ocean Organics primarily processes *A. nodosum* that has been harvested by hand. Seaweed has an amazing ability to regenerate. Scientists estimate the biomass of unharvested *A. nodosum* beds is replaced with new growth every 3-11 years.¹ Harvesters rotate sites in order to allow beds to recover.

No one cares more about the sustainability of seaweed harvesting than the companies who steward this resource. According to the Maine Sea Grant, as well as the Maine Department of Marine Resources, the Gulf of Maine contains more than one million tons of *A. nodosum*. Their research has shown that 30-40 % of the total *A. nodosum* standing crop could be harvested sustainably on an annual basis, yet the current level of harvest is only less than one percent. When it is cut at least 16 inches above the holdfast and above the lowest lateral branches, it can recover in 2-5 years. Ocean Organics is part of the Maine Seaweed Council and is committed to sustainability within our industry.



Ocean Organics processing plant, Waldoboro, Maine

Statistics in this section taken from:

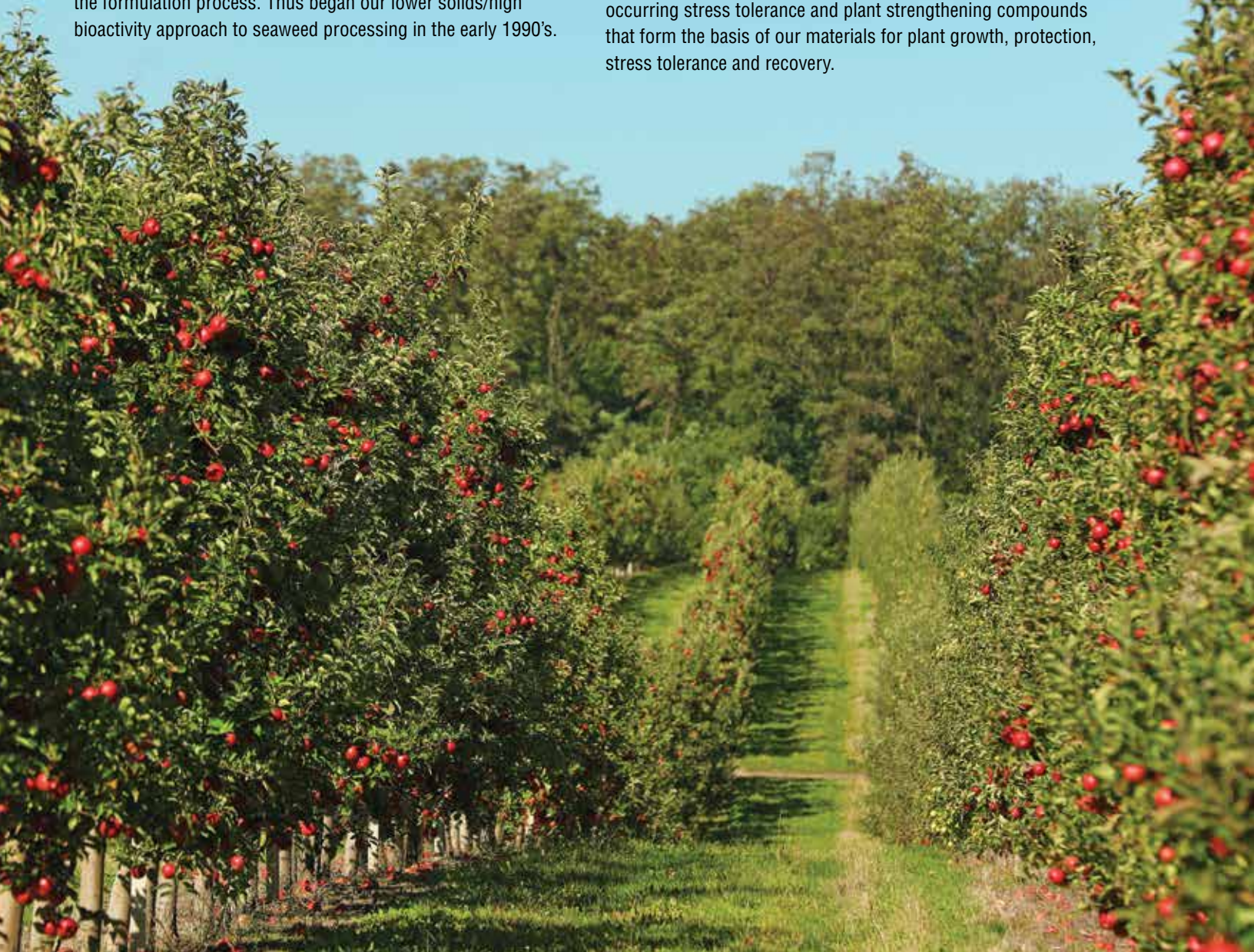
1. "Rockweed, Ecology, Industry & Management. Maine Sea Grant in partnership with Maine Department of Marine Resources, 2011.

Manufacturers of High-Performance, Science-Based Plant Strengthening and Fitness Materials for Stress Tolerance and Recovery

Ocean Organics began as the company called Emerald Isle, Ltd. The original mission of Emerald Isle in the late 1970s was to formulate biostimulants in the golf industry, not to become a seaweed processor. Due to increasing solids and settling issues in the seaweed products we were buying from other suppliers, we began our own extracting process in 1992. Our key motivation to process our own seaweed was the frequent precipitation issues we experienced using high solids seaweed extracts in the market, especially when creating complex micronutrient formulations for the golf industry. Our scientists innovated a process change by which we could preserve the activity of seaweed without as many solids to hinder the formulation process. Thus began our lower solids/high bioactivity approach to seaweed processing in the early 1990's.

The seaweeds we harvest are in the brown family. They are "intertidal" species (predominantly *Ascophyllum nodosum*) that anchor themselves to rocks along craggy coastlines throughout the North Atlantic Ocean from Maine and the Maritime Provinces, through Iceland and down to the Western Coast of Ireland.

If there is a single word that best describes *Ascophyllum nodosum* it's probably "diversity." Sooner or later, almost everything makes its way to the sea. The seaweeds we use to make our plant strengthening materials contain at least trace amounts of every mineral element that exists on earth. In addition, they contain an extraordinary array of diverse and unique constituents. They are prolific producers of the naturally occurring stress tolerance and plant strengthening compounds that form the basis of our materials for plant growth, protection, stress tolerance and recovery.





As the developers and manufacturers of high-performance, industry-leading stress management products and specialty fertilizers, our overarching research and development mission is to help golf course, agricultural and horticultural professionals maximize the performance and genetic potential of the plants and crops they grow, manage and protect... particularly under difficult, often stressful conditions. We prefer to work with renewable natural resources for economic as well as ecological reasons.

For more than 40 years, Ocean Organics products have been independently tested at more than 30 universities and private research labs, and in scores of field trials.

Independent research confirms:

- Better high temperature tolerance
- Better U.V. tolerance
- Better drought, salinity and sodicity tolerance
- Better quality, color, and vigor under summer stress
- Better root development under stress
- Better cold temperature tolerance
- Better stress tolerance to support better yields

Our products lead the industry in quality, effectiveness, and cost efficiency.



Ocean Organics®

Manufacturing

Waldoboro, Maine • 888-312-0106

Administration

Ann Arbor, Michigan • 800-628-GROW (4769)

www.oceanorganics.com

