XP® Extra Protection

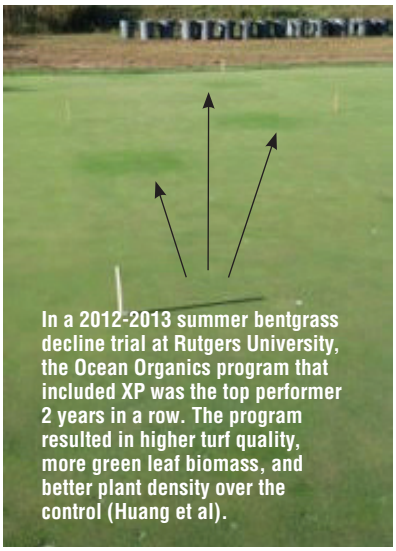
An Innovative Foliar Nutritional Solution To Help You Manage Summer Stress

Superior Summer Stress Protection

Maintaining a golf course for people with high standards and great expectations is never easy… but it's even more difficult in the summer. That's why superintendents spend most of the year conditioning their courses to withstand the stresses that come from more sources more often when the sun shines longer and the temperatures get hotter.

XP Extra Protection Delivers a Powerful "1-2 Punch" of Protective Plant Ingredients and Micronutrients

- XP fights stress starting with unique plant-protective compounds in ascophyllum nodosum, boosted with high levels of other botanical extracts that protect plants under heat and UV stress.
- XP provides the most effective micronutrients (2% Fe, 2% Mn, 1% Mg) to boost color under summer stress. It's formulated with amino acid-chelated micronutrients which are ideal for foliar uptake. Soil-directed iron is also provided for longer-term release and extended color.



In a 2012-2013 summer bentgrass decline trial at Rutgers University, the Ocean Organics program that included XP was the top performer 2 years in a row. The program resulted in higher turf quality, more green leaf biomass, and better plant density over the control (Huang et al).

XP was part of eight years of research at Rutgers, Virginia Tech and UCR showing consistent significant improvement in drought and salinity tolerance in both cool and warm season turfgrasses.

XP Extra Protection — Exceptional:
Turf Quality
Color
Root Health
Stress Tolerance
Recovery

Backed By Research

Independent research over five years at four universities, and with several private researchers, has confirmed XP improved turf quality and recovery under heat stress, salinity, deficit irrigation, and prolonged UV radiation. XP also improved chlorophyll content and protective carotenoid pigment levels.

X Stands for Xanthophyll…the primary pigment in the seaplants from which we make all of our high-performance seaweed extracts. Xanthophyll has a unique capacity to protect and repair photosynthetic membranes from the destructive effects of photoinhibition – excessive sunlight exposure. We also enhance the pigment content of XP using other natural compounds.

P Stands for **Pro-Amino® Technology**: Amino acids are the building blocks of proteins and play a critical role in plant health. Amino acids and similar compounds from plant and ocean sources help chelate micronutrients and provide osomoprotectants during drought and recovery.

Extra Protection

In addition to our proprietary seaweed extract–nature's most diverse and complete source of mineral nutrients and trace elements–XP contains essential micronutrients and beneficial trace elements that become even more critical during summer stress.

XP was part of Ocean Organics top winning program for three years at UC Riverside on bermuda grass greens under heat and salinity stress (Baird et al).

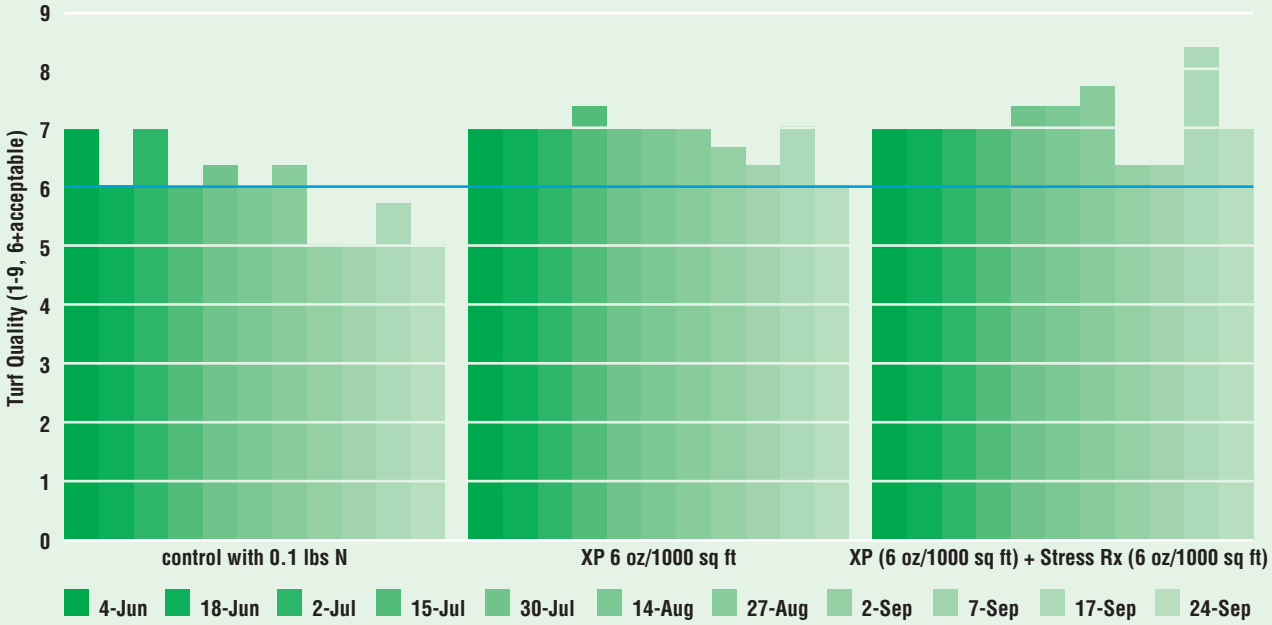
© 2016 Ocean Organics®

XP Extra Protection Statistically Improved Turf Quality and Enhanced Recovery Under Heat, Drought and Salinity Stress.

Field Evaluation: Stress Rx® and XP® Extra Protection on Greens under Heat, Drought and Salinity Stress

Adam Van Dyke, M.S., Professional Turfgrass Solutions, LLC

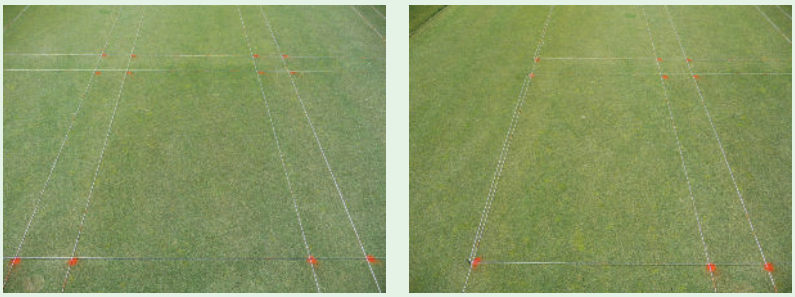
- XP statistically improved turf quality and enhanced recovery on creeping bentgrass putting greens under heat, salinity and drought stress on a course in Salt Lake City, UT.



Adam Van Dyke, Professional Turfgrass Solutions LLC (2015)

Additional Notable Results

- Turf quality was numerically better for all Ocean Organics-treated plots through August, and the 6 oz Stress Rx plus 6 oz XP with UMAXX nitrogen-treated plots had significantly better quality compared to just UMAXX nitrogen-treated plots by the end of summer.



During a period in early July where irrigation did not happen because of a clock malfunction and the rootzone dried down below 10% water content, 6 oz Stress Rx plus 6 oz XP with UMAXX nitrogen-treated plots (left) maintained greater turf quality than just UMAXX nitrogen-treated plots (right). Photo taken July 15, 2015.

- **XP was also part of Ocean Organics' top winning program for three years on *bermudagrass* greens under heat and salinity stress.**
- **In another study, our program statistically improved recovery from cold temperatures and also reduced Dollar Spot incidence.**

XP Extra Protection Statistically Improved Turf Quality, Chlorophyll, and Protective Carotenoid Pigment on Bentgrass Greens Under Heat Stress and Deficit Irrigation.

Evaluating Effects of XP® Extra Protection and Stress Rx® on Heat and Drought Tolerance in Creeping Bentgrass.

X. Zhang and E.H. Ervin, Virginia Tech, July 2015

Table 1. Turf Quality response to seaweed extract products in creeping bentgrass under deficit irrigation.

Tret#	Treatment	Rate (oz/1000 ft²)	Turf Quality (1-9, 9 = the best) 24-Apr	1-May	8-May	15-May	22-May
3	XP	6	7.5a	7.5a	7.5a	7.3a	7.5a
4	StressRx + XP	6+6	7.5a	7.5a	7.3ab	7.3a	7.2b
5	StressRx + XP	3+6	7.3a	7.3a	7.3ab	7.2a	7.2b
6	Control	0	7.3a	7.3a	7.0c	7.0a	6.8c
			29-May	**5-Jun**	**12-Jun**	**18-Jun**	**25-Jun**
3	XP	6	7.0a	6.2a	5.3ab	5.2ab	5.0b
4	StressRx + XP	6+6	6.7ab	6.2a	6.0a	6.0a	6.3a
5	StressRx + XP	3+6	6.3bc	5.5ab	5.3ab	6.0a	6.7a
6	Control	0	5.8c	5.0b	4.5bc	4.3bc	3.7c

Means followed by same letters within same column are not significantly different at P = 0.05.

Table 3. Chlorophyll Content response to seaweed extract products in creeping bentgrass under deficit irrigation.

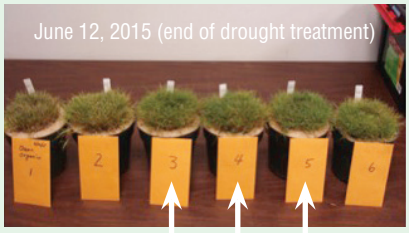
Tret#	Treatment	Rate (oz/1000 ft²)	Chlorophyll Content (mg/g FW) 1-May	15-May	29-May	12-Jun	25-Jun
3	XP	6	2.41ab	2.30a	1.87a	1.15ab	1.58a
4	StressRx + XP	6+6	2.08b	2.03a	1.86a	1.46a	1.50a
5	StressRx + XP	3+6	2.51a	2.40a	2.02a	1.54a	1.83a
6	Control	0	2.15ab	2.08a	1.80a	0.86b	1.00b

Means followed by same letters within same column are not significantly different at P = 0.05.

Table 4. Carotenoids Content responses to seaweed extract products in creeping bentgrass under deficit irrigation.

Tret#	Treatment	Rate (oz/1000 ft²)	Carotenoids Content (mg/g FW) 1-May	15-May	29-May	12-Jun	25-Jun
3	XP	6	0.542ab	0.530ab	0.485a	0.318ab	0.331b
4	StressRx + XP	6+6	0.486ab	0.487ab	0.492a	0.381a	0.331b
5	StressRx + XP	3+6	0.563a	0.547a	0.483a	0.392a	0.413a
6	Control	0	0.481b	0.479b	0.471a	0.246b	0.251c

Means followed by same letters within same column are not significantly different at P = 0.05.



Treatment 3 (XP alone) **Treatment 4 & 5 (XP + Stress Rx)**

X. Zhang and E.H. Ervin, Virginia Tech, 2015

- Field bentgrass putting green turf transplanted into pots
- Immediately after 2nd application (May 8, 14 days after initial application), the grass was subjected to mild drought stress (40% ET) and heat stress (95/77 °F) in growth chambers. The Ocean Organics treatments were applied four times (-14, 0, 14, 28).
- Deficit irrigation and heat stress ended on 6/12.
- XP, alone and in combination with Stress Rx, improved turf quality, chlorophyll, and carotenoids content when compared to non-treated control (Table 1, 3, and 4).
- The addition of Stress Rx to the program especially helped overall performance during deficit irrigation and recovery.

From Ervin and Zhang:
"A partial explanation for better quality (shoot health) of [treatments] may have been related to more energy being allocated from the roots to the shoots during stress."

Ocean Organics Has Researched the Most Potent Botanical Pigments and Amino Acid Sources for XP Extra Protection at a Variety of Universities.

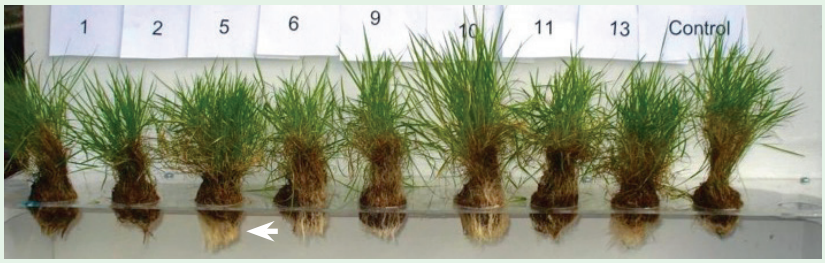
The Science Behind Botanical Pigments

Light is vital for plants to make energy. Yet, light also continuously damages the plant's photosynthetic machinery. This damage is called photoinhibition. Blue light and ultraviolet light (UV) cause the most damage, triggering production of reactive oxygen species (ROS) and damaging the photosystems that are embedded in thylakoid membranes within the chloroplasts. Protecting thylakoid membranes and the plant's photosystems is of utmost importance to keep plants healthy.

Because plants cannot control how much light hits them, their solution is to continuously repair the damage. Plants have several mechanisms that protect against harmful effects of strong light. These mechanisms help protect the photosynthetic machinery when light energy absorption exceeds the amount of light that the plant can actually use.

Normally, the plant's repair process is fairly efficient. However, heat, salinity, drought, and other stresses hinder the plant's repair process. Under these stressful circumstances, turf managers do well to boost the plant's ability to fight stress.

One class of compounds, carotenoid pigments, play a critical role in plants' protection mechanisms. One type of carotenoid pigment is xanthophyll. Xanthophyll forms a key protective mechanism ("xanthophyll cycle") that makes photosynthetic membranes less susceptible to attack from ROS. For years, Ocean Organics has been researching the role of pigments in seaweed's ability to improve stress tolerance. In addition to the xanthophyll in our seaweed extract, we formulated XP with additional botanical pigment sources. Researchers at Virginia Tech showed that XP, alone and in combination with Stress Rx, triggered a statistical increase in carotenoid pigments compared to a control (see previous page).



We screened numerous sources of botanical pigments to evaluate improvements in stress tolerance and recovery. Even on day 36 of this heat and UV-B stress screening (28 days after the end of the stress period), turf treated with this botanical pigment in XP still showed roots that were statistically 60% longer and healthier than controls (3.2b vs 2.0c inches).

The Science Behind Amino Acids

Amino acids are the building blocks of proteins. Life cannot exist without proteins. They are one of the most critical classes of biological compounds. Ocean Organics Pro Amino® is a proprietary technology that delivers 18 of 20 amino acids necessary for protein synthesis. It augments the Ocean Organics product lines — industry-leading performers in promoting plant growth, stress management and recovery. Pro-Amino is based on several innovative sources of amino acids. Our foundational products (Guarantee® Seaweed Extracts) naturally contain amino acids. We bolster these with a variety of botanical and other distinct extracts to enhance the diversity of our amino acid profile and expand its functionality.

We also screened multiple sources of amino acids in order to arrive at Ocean Organics proprietary Pro-Amino® Technology. Above shows the results of one of our key amino acid sources blended with seaweed. On day 8 of this heat and UV-B stress screening at Virginia Tech, turf treated with this amino acid source had roots that were longer than the controls.

Ocean Organics has been processing seaweed and formulating fertilizers for 40 years. Our innovative processing technology yields products richer than others yet with fewer solids and lower viscosity. This means our extracts can be used with a broader range of materials with better blending, mixing and stability characteristics. Our seaweed-based fertilizers, plant health materials and soil conditioners lead the industry in quality, effectiveness, cost efficiency and environmental sustainability.

Ocean Organics®

Manufacturing
Waldoboro, Maine • 888-312-0106
Administration
Ann Arbor, Michigan • 800-628-GROW (4769)
oceanorganics.com

© 2016 Ocean Organics® 12/2021