ACADIAN™ PLANT HEALTH

Battle abiotic stress with Acadian Plant Health biostimulants.

Environmental stress such as drought, heat, cold, and salinity cause plants to initiate survival mode. They reduce transpiration as well as photosynthesis and store water and nutrients in crucial parts, slowing down productivity and growth. Applying Acadian Plant Health™ (APH) *Ascophyllum nodosum* biostimulants throughout the season can help plants cope with abiotic stress, boosting their tolerance and productivity in tough conditions.

Environmental stress impacts crop growth

7–10 X more

than diseases or pests

During stress, plants overproduce reactive oxygen species (ROS), also known as free radicals. ROS can break down plant cells and their protective membrane layers.

The relationship between reactive oxygen species (ROS) and plants.

- ROS act as signals in many plant functions. Even though plants have developed ways to control ROS levels and manage their impact, too much can cause stress and damage.
- ROS are a key player in plant growth and development. They help with seed germination, root elongation, stomatal closure, and senescence. These processes involve ROS working together with other molecules to keep everything synced.
- ROS work like messengers in cells, helping them communicate during different activities. When ROS levels are right, they can prompt plants to respond to stress in ways that help them cope with their environment.
- When plants experience stress like extreme weather or lack of nutrients, their ROS levels increase. This can cause harm to important components of plant cells like lipids, proteins, and DNA, which can lead to the plant's death.
- Excessive ROS can cause cell death, damaging tissues and lowering crop productivity and yield.

Abiotic stress management.

Drought Stress Solutions

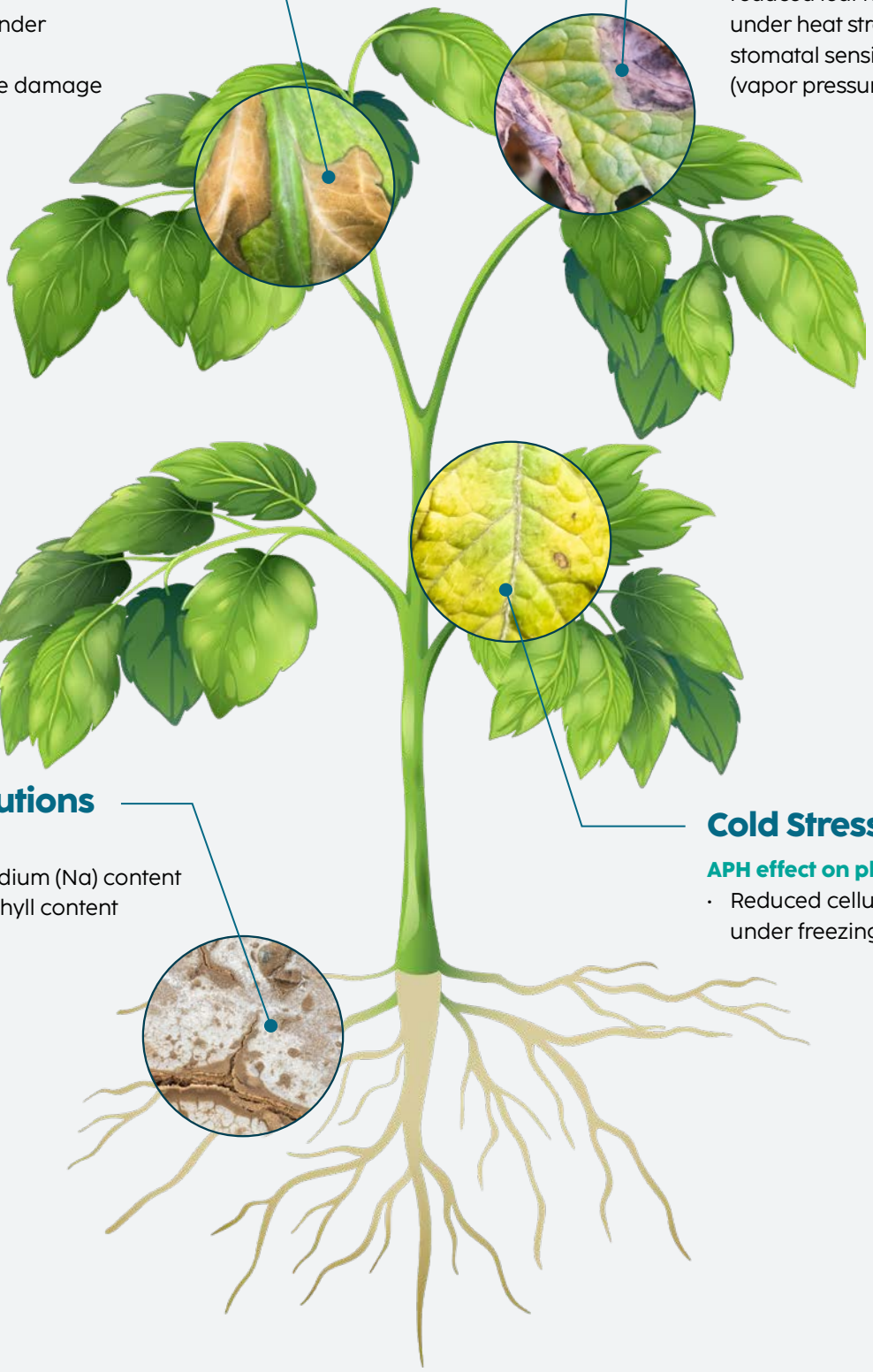
APH effect on plant

- Increased water use efficiency
- Enhanced stress recovery
- Faster acclimation, leading to recovery of higher stomatal conductance and greater photosynthetic activity during recovery
- Reduced wilting
- Increased growth under water stress
- Reduced membrane damage

Heat Stress Solutions

APH effect on plant

- Enhanced plant hydraulic conductivity (internal water movement)—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)



Salt Stress Solutions

APH effect on plant

- Decreased plant sodium (Na) content
- Maintained chlorophyll content

Cold Stress Solutions

APH effect on plant

- Reduced cellular damage under freezing temperatures

Bioactive compounds within APH biostimulants.

Betaines prevent cell water loss due to dry or salty environments and balance cell water content for greater photosynthesis.

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

Proline strengthens cell wall membranes, protects key metabolic enzymes, and mediates water balance in stress situations to prevent cell water loss.

Fucose-containing polysaccharides increase antioxidant levels and help protect plants from stress.

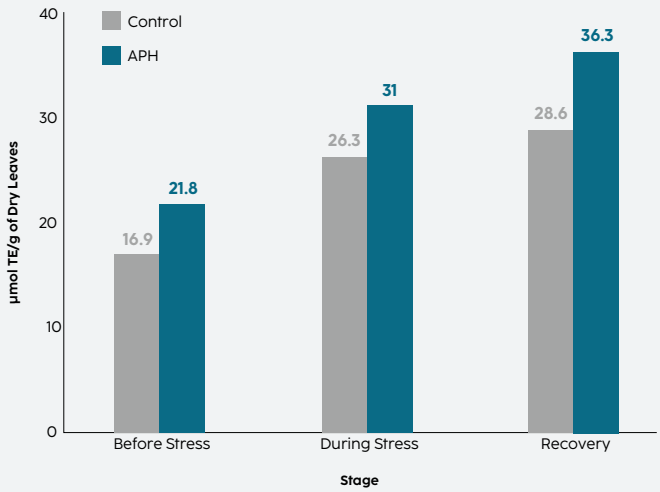
How APH technology comes to the defense.

Ascophyllum nodosum technology can modulate how plant hormone signalling works, especially those related to stress such as abscisic acid (ABA) and salinity. By controlling these pathways, Acadian Plant Health's *Ascophyllum nodosum*-based biostimulants can activate plants' natural defense mechanisms, helping stimulate growth, increase nutrient uptake, and improve stress tolerance.

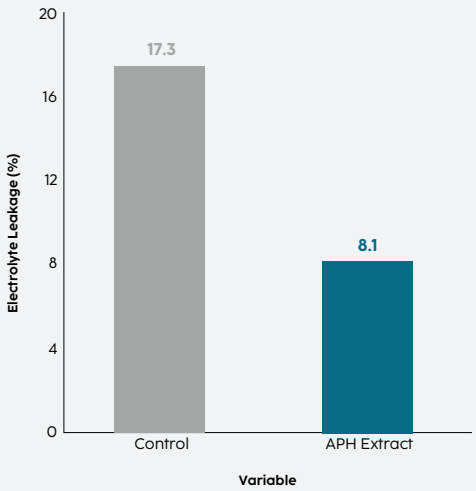
APH biostimulants help plants produce antioxidants like polyphenols and flavonoids, and vitamins like ascorbic acid (vitamin C). The antioxidants aid plants under stress by neutralizing harmful ROS and blocking cells from oxidative damage.

APH biostimulants also encourage proline production, an amino acid and primary protein building block that can have beneficial effects during water shortages. By producing proline during abiotic stress, plants can maintain normal growth by protecting their proteins and cell membrane integrity.

Antioxidant Activity Assay



Cell Membrane Stability

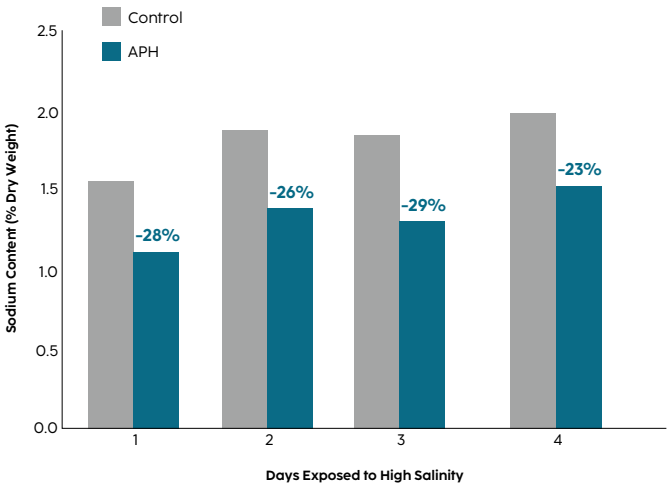


Compared to control, the increased expression of antioxidant genes in APH-treated plants resulted in increased antioxidant activity. There was also less damage to cell membranes (as shown by reduced electrolyte leakage).

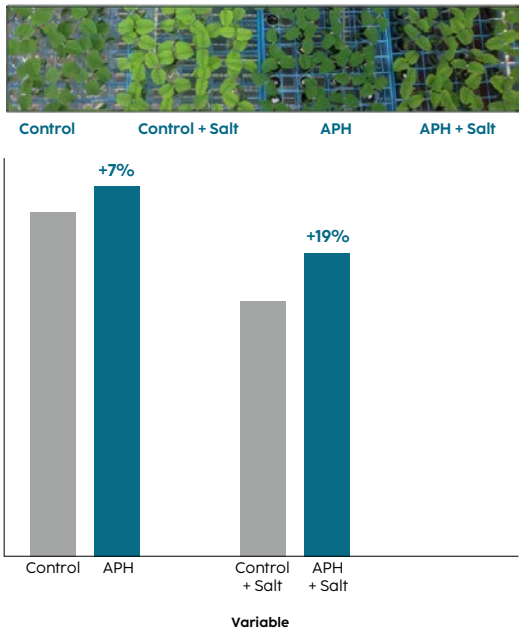
Cover your bases with Acadian Plant Health.

Abiotic stress can be an energy-reducing process for plants, affecting yield quality and growers' profits. Using Acadian Plant Health's *Ascophyllum nodosum* biostimulants can help enhance crop stress tolerance, boost quality, improve yield potential, and sustain profitability in the face of challenging growing conditions.

Plant Sodium Content



Leaf Chlorophyll Content



Acadian Plant Health biostimulants reduce the plant's salt uptake by producing osmolytes, allowing the plant to continue photosynthesis. The image displays control and APH-treated soybean plants under normal and saline conditions. Visual evidence shows a higher level of chlorosis present in the control group with salt added.

ACADIAN™
PLANT HEALTH
SEA BEYOND

Toll Free: 1 800 575 9100 · Tel: +1 902 468 2840 · AskUs@acadian.ca
30 Brown Avenue, Dartmouth, Nova Scotia, Canada, B3B 1X8

acadianplanthealth-na.com