Sosdia™ Stress

ABIOTIC STRESS MITIGATOR

Helps protect crops in times of stress

Technical Data Sheet

Proline can have beneficial effects on crops during seasonal drought stress when applied in the appropriate amount. Sosdia™ Stress Abiotic Stress Mitigator is expertly formulated to provide sufficient amounts of proline to maintain optimal crop performance during drought stress. Sosdia Stress is a foliar application proven to mitigate crop stress during seasonal water shortage in several row crops. Nearly every growing season includes periods of reduced rainfall that can limit crop growth and productivity. Sosdia Stress is a safe and natural way to prepare crop plants for an unpredictable environment that will help protect crop health and improve yield.

All crops are exposed to some level of environmental stress such as drought, extreme temperatures, salinity, herbicide damage, and UV radiation. The negative effects of environmental stress are almost always mediated by reactive oxygen species, or ROS. ROS are oxygen-containing molecules generated through normal plant metabolism that regulate plant growth and development. They also play a key role in the plant response to stress. Environmental stress can cause sudden increases in ROS production that can trigger stress response genes and lead to abnormal plant growth or even death. Plants balance the production and removal of ROS to maintain healthy growth and development in normal conditions. Therefore, limiting the negative effects of sudden spikes in ROS is critical to maintain crop productivity in stressed environments, such as drought.

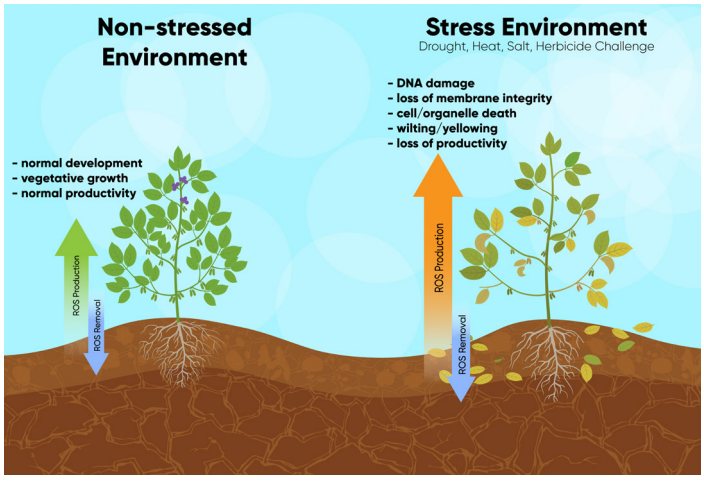

Figure 1. Reactive oxygen species maintain a careful balance during normal growth and development. Environmental stressors, such as drought, can disrupt this natural balance to have toxic effects on plants.

Plants produce osmolytes that help maintain ROS balance. Osmolytes are small natural compounds produced by the plant, which can directly neutralize ROS and induce production of ROS-degrading enzymes. Plants that have adapted for growth in stressful environments have naturally higher levels of osmolytes (Figure 2).

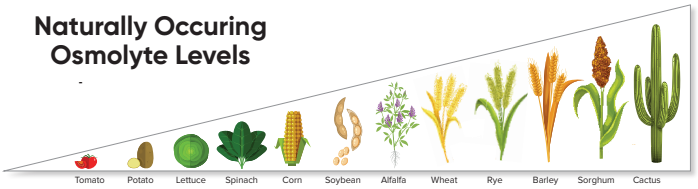

Figure 2. Plants adapted to life in drought environments produce higher levels of osmolytes.

At the cellular level, osmolytes allow plant cells to maintain cell integrity, water balance, and metabolism in unfavorable environments. Therefore, providing an additional supply of osmolyte to crop plants can help protect plant health and productivity in harsh stressful conditions such as drought (Figure 3).

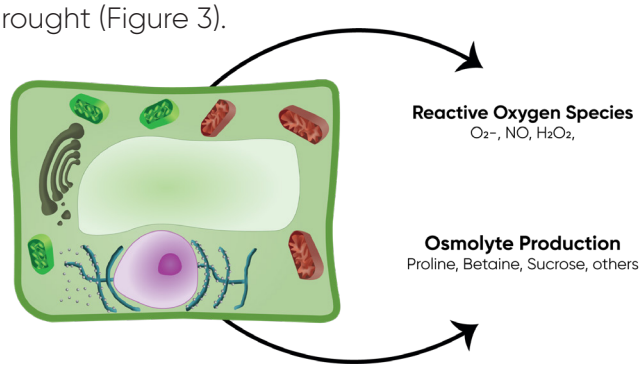

Figure 3. Plant cells produce several different ROS molecules, which are part of natural metabolic processes. Negative effects of ROS are balanced by the production of various osmolytes, including nitrogen-based compounds proline and betaine.

Proline: A natural osmolyte that maintains balance

Proline is an amino acid that is a primary building block for proteins, such as enzymes. Plants produce proline in response to abiotic (drought, heat, salinity, etc.) and biotic (insect and fungal predation) stress.

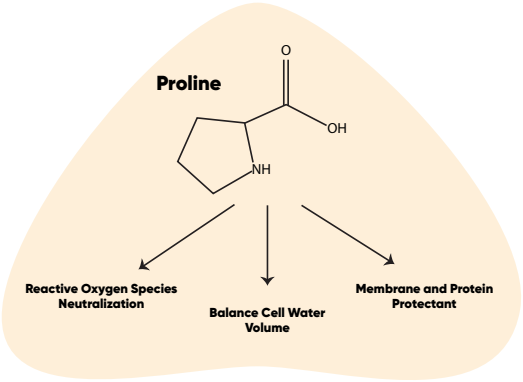

Figure 4. Proline is an amino acid that is utilized by cells to build functional proteins, such as enzymes. However, plants can take advantage of the osmolytic properties of proline in stressful environments.

Proline can directly neutralize reactive oxgen species, protect cell membrane integrity, and balance cell water volume (Figure 4). However, proline produced by plants also requires valuable nitrogen, which is important for optimal crop growth. Therefore, application of exogenous proline is a preferred means to help crops mitigate negative responses to drought by allowing plants to maintain normal productive growth rather than use valuable resources in the stress response.

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Sosdia Stress is a patent-pending formulation of proline as a foliar application for a wide range of crops. It contains the appropriate amount of proline for optimal stress protection and is intended as an addition to common tank mix mixitures of crop treatment products. It is supplied as a concentrated solution containing phosphate and a non-ionic surfactant. Potassium phosphate is utilized to maintain product stability and as an additional, but minor source, of potassium, a key nutrient for optimal plant growth. The non-ionic surfactant is included to assure maximal leaf spread and proline uptake following foliar application. This expert formulation assures Sosdia Stress delivers appropriate amount of plant-protecting osmolyte during times of stress, such as drought.

Figure 5. A controlled environment experiment showing effects of Sosdia Stress on New Guinea Impatiens that were maintained at 38°C (100°F) and not watered for 26 hours.

References

M. Ashraf, M.R. Foolad. Roles of glycine betaine and proline in improving plant abiotic stress resistance,Environmental and Experimental Botany. 2007 Vol 59(2):206-216.

El Moukhtari A, Cabassa-Hourton C, Farissi M, Savouré A. How Does Proline Treatment Promote Salt Stress Tolerance During Crop Plant Development? Front Plant Sci. 2020 Jul 23;11:1127.

Hayat S, Hayat Q, Alyemeni MN, Wani AS, Pichtel J, Ahmad A. Role of proline under changing environments: a review. Plant Signal Behav. 2012 Nov;7(11):1456-66.

Huang H, Ullah F, Zhou DX, Yi M, Zhao Y. Mechanisms of ROS Regulation of Plant Development and Stress Responses. Front Plant Sci. 2019 Jun 25;10:800.

Liang X, Zhang L, Natarajan SK, Becker DF. Proline mechanisms of stress survival. Antioxid Redox Signal. 2013 Sep 20;19(9):998-1011.

Vendruscolo EC, Schuster I, Pileggi M, Scapim CA, Molinari HB, Marur CJ, Vieira LG. Stress-induced synthesis of proline confers tolerance to water deficit in transgenic wheat. J Plant Physiol. 2007 Oct;164(10):1367-76

Wang M, Zheng Q, Shen Q, Guo S. The critical role of potassium in plant stress response. Int J Mol Sci. 2013 Apr 2;14(4):7370-90.

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