# XStress

## REDUCING STRESS VIA ENHANCED PLANT HEALTH

Under stressful growing conditions a plant's uptake of micro-elements is drastically reduced because of stomatal closure and limited root functionality.
Some of these micro-elements are essential for the production of enzymes that are utilised by the plant's own self defence mechanisms preventing irreversible cellular damage.

**XStress** is a fully optimised plant nutrient formula designed for the absorption, uptake and transport of micro-elements via the leaf and root vascular systems.
XStress is a new technology designed in house and exceeds all other products in the speed and safety of uptake, without causing any additional stress to the plant that can occur with other formulations.

**XStress** is based on the essential micro-elements required for enhanced plant health, including the correct proportions of iron, zinc, manganese and copper, combined with additional magnesium and glycine to enhance photosynthesis and growth.

Plant stress can be caused by poor weather conditions, lack of water, light levels, soil salinity (abiotic stress) and the negative impact of pests and diseases (biotic stress). A plant can not differentiate the source of the stress that it is under, so the plant's self defence mechanism follows the same pathways irrespective of cause avoiding undesirable effects like flower and fruit fall, etc. **XStress** positively impacts all types of stress wether caused by biotic or abiotic agents.

The initial effect of **XStress** is to enhance plant health by removing any micro-element deficiencies that occur during stressful conditions allowing the plant to grow and continue production of beneficial anti-stress enzymes and hormones.
Further regular applications of **XStress** allow the plant to increase (upregulate) the level of the beneficial anti-stress chemicals catalases, peroxidases, 1,3 beta glucanases, jasmonates, phytoalexins, poliamines and other proteins with antioxidant capacity that combat the key negative stress compounds - reactive oxidative substances (ROS), hydroxides and ammonia.

A further benefit of using **XStress** is that the amount of ethylene produced by a plant under stress decreases dramatically, leading to visibly better fruit quality, yield and shelf life.

In conclusion, a plant's natural response to the presence of stress is to produce natural defence enzymes and hormones. **XStress** through the action of improved plant health upregulates the ratio of positive defence chemicals versus negative destructive stress compounds and consequently has a major impact on preventing both plant damage and yield loss.


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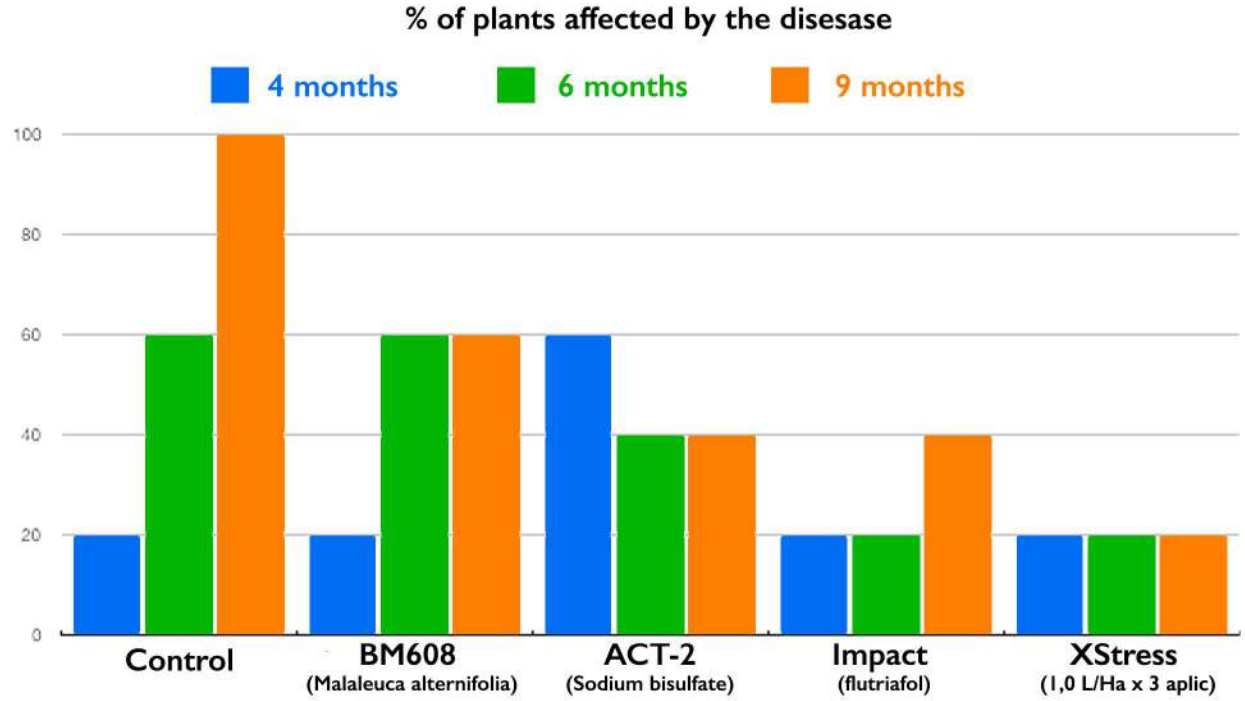
# XSTRESS IN BANANAS

Petrolina, Brasil

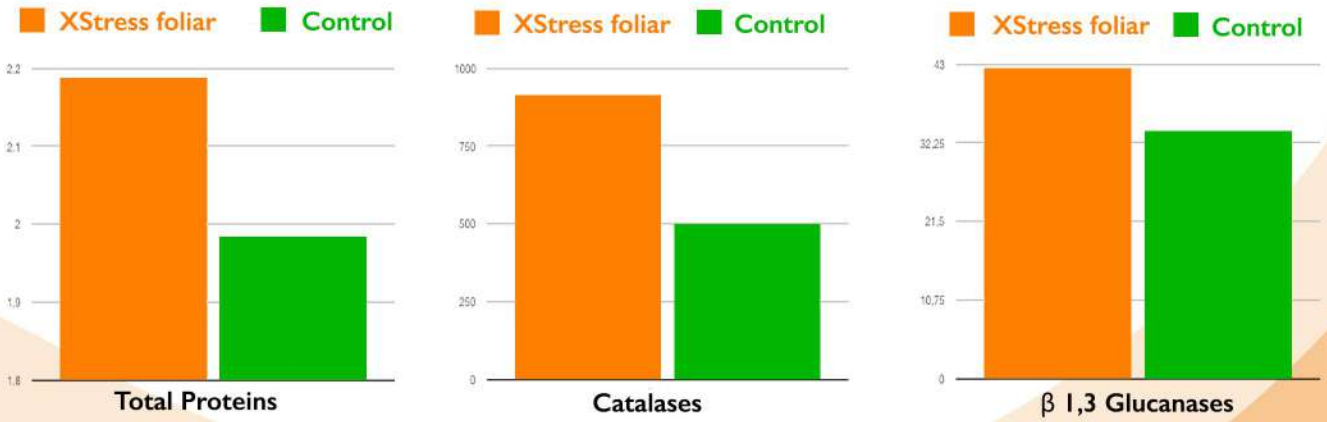
## PANAMA DISEASE - BRASIL 2016




Where XStress was used as an anti-stress product, it prevented Panama disease from establishing in the crop. By maintaining cell integrity and plant health, the fungi was prevented from growing and spreading in plants and between plants.

## BRASIL 2019

Plant response to severe stress measured at 80% superoxide radical (ROS) level.




XStress raised the levels of all the protectant anti-stress compounds, protecting the crop from stress, therefore allowing healthy plant growth.

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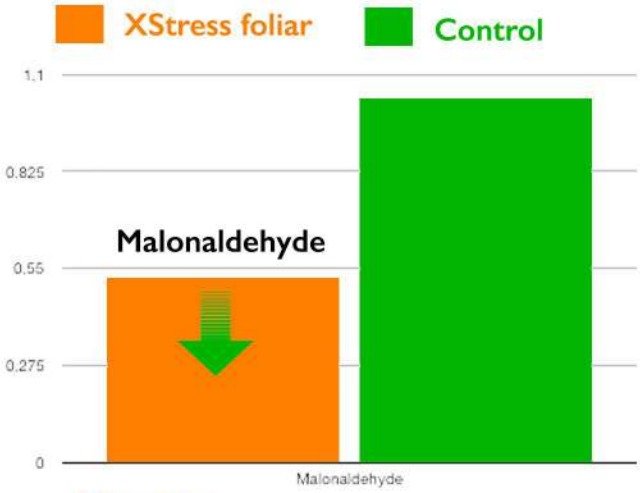
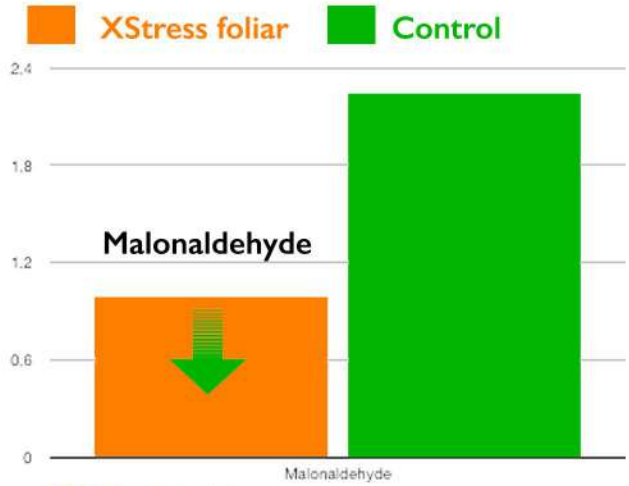
# XSTRESS IN TOMATO
# WATER STRESS - SPAIN 2019

Almeria, Spain

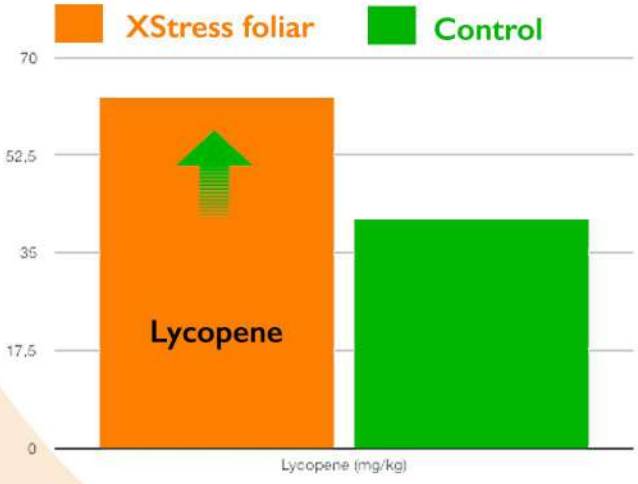



**XStress** in Tomato in severe water stress conditions (50% irrigation reduction)

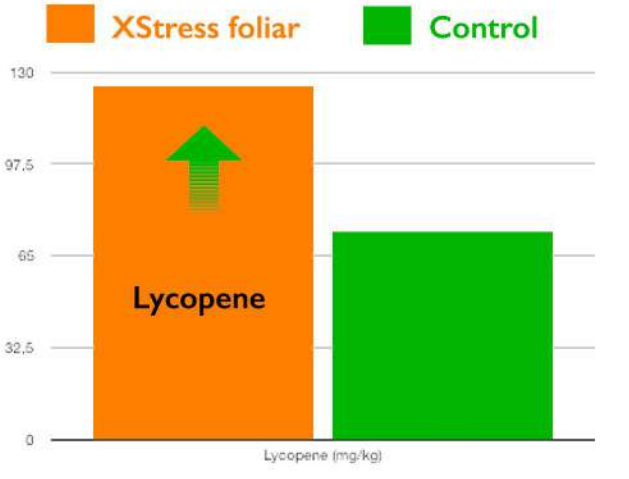



**XStress** in Tomato in severe water stress conditions (25% irrigation reduction)

**Malonaldehyde is the main breakdown product of linoleic acid. The level of malonaldehyde as the final product of oxidation is a marker of the level of oxidative stress. The lower levels of malonaldehyde in XStress treated plants indicates lower levels of plant stress under drought conditions, allowing continued growth.**




**XStress** in tomato in severe water stress conditions (50% irrigation reduction) after 21 days cold store (post-harvest)




**XStress** in tomato under conditions of salt stress (6.0 dS in irrigation water) after 21 days cold store (post-harvest)

**Lycopene is a carotenoid compound that gives the red colour to tomatoes; the level increases in plants that have experienced reduced stress. The results show that XStress treated plants produce more lycopene, have less stress, leading to better quality fruit and improved cardiovascular health benefits to consumers of the fruit.**

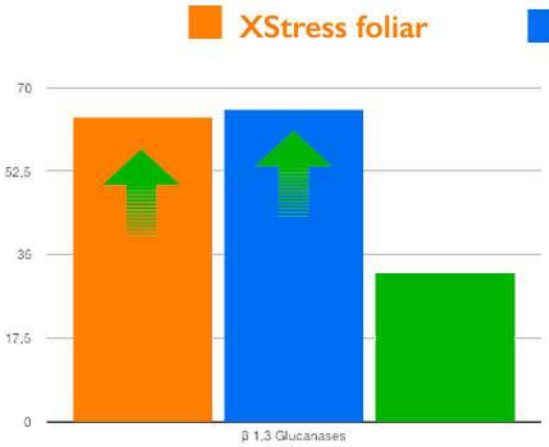
# XSTRESS IN GRAPES

## OSMOTIC STRESS - BRASIL 2019

Petrolina, Brasil

Severe stress caused by high temperatures and reduced water.

Rate of application: Foliar: 4 applications @ 1.0 l/ha - Irrigation: 4 applications @ 1.5 l/ha




β 1,3 Glucanase (µmol AR min-1 mL-1 extract)


Peroxidases (mg g-1 of proteins)

The up-regulation of glucanase and peroxidase levels is positive for the plant (reduces negative effects of stress) and reduction of negative radical superoxides is the beneficial outcome, leading to better growth and yield in crops growing in poor conditions.