



# Let's BEAT the HEAT for increased yields



The promise of summer is fun in the sun, lazy days lounging at the pool with braais and celebrations until the late night, BUT the reality on the farm is the summer sun is scorching hot and the No.1 challenge for our crops every year from November to March, when maximum day temperatures easily reach 36 to 45+ degrees Celsius.

## HOW DOES HEAT STRESS REDUCE YOUR CROP YIELDS

For most crops, the ideal temperatures are between 20 and 30°C. Heat stress affects plants when exposed to extended periods of **sunlight and heat** which can retard their normal growth, and productivity. Temperatures outside this range, whether in the air or soil, during the day or night, can result in stress and therefore losses in yield of every crop from trees, vines, cereals, legumes, pastures, and vegetables.

Heat stress in crops is determined by:

1. Severity of the heat
2. Length of exposure of the crop to heat
3. Rate at which the temperature increases
4. Water availability and qualities
5. Soil carbon, structure, chemistry, and biology
6. Crops suitability to the climatic conditions.
7. Farming practices

With short term or moderate heat stress, plants regulate temperature by controlling their respiration and transpiration rates. But excessive or prolonged heat stress disrupts the plants biochemistry and physiology as follows:

- Closing stomata **prevents plants from taking in enough carbon dioxide (CO<sub>2</sub>) for photosynthesis**, which can stunt their growth and diminish their yield
- **Damage to proteins** at hot temperatures reduces enzyme function, which retard metabolic processes essential to plant productivity.
- Cause **oxidative stress**, which harms plant cells and impairs their growth by releasing reactive oxygen species (ROS), buildup of waste products.
- During the fruit development stage, stress can **reduce sugar and starch content**.
- Increased transpiration rates (water cooling system) can lead to **water stress** if there is not enough water available for crops.

## WHAT ARE THE SIGNS OF HEAT STRESS IN PLANTS?

- **Rolling and cupping of leaves** to regulate their water loss. The leaf's surface area shrinks, and its stomata (tiny pores that enable gas and moisture exchange) close.
- **Wilting** occurs when there is too little water, which lowers water pressure in the plant

## DID YOU KNOW?

**Hottest place:** Letaba in Limpopo is the hottest place in South Africa, with an average annual maximum temperature of 35°C

**Sunshine:** South Africa receives an average of 8.5 hours of sunshine per day

**In Our Lifetime:** As projected in SA a 20-year-old today by 2071, at the age of 67, will be farming with a 5 degrees C rise in the earth's surface temperature.

during peak heat of the day. Increase water supply as needed to prevent damage to plants function.

- **Dried Leaf Margins** crops like pumpkins and squash ensure survival as they have "extra" room in the leaves, so they can still continue to function at reduced capacity.
- **Flower or Fruit Drop** during a heat wave the plant can prioritize its vital organs over other less critical needs under stress, so they may not flower or even abort buds, blossoms, and fruits.
- **Bolting to Seedheads** especially cool-weather crops like lettuce, spinach, cauliflower, and broccoli bolt under heat stress to ensure seeds for future crops.
- **Sunburn on** fruits like tomatoes, peppers, melons, apples, and mango may present as blotches, soft spots, blisters, firm and dry, or



Change in surface temperature from present (°C)

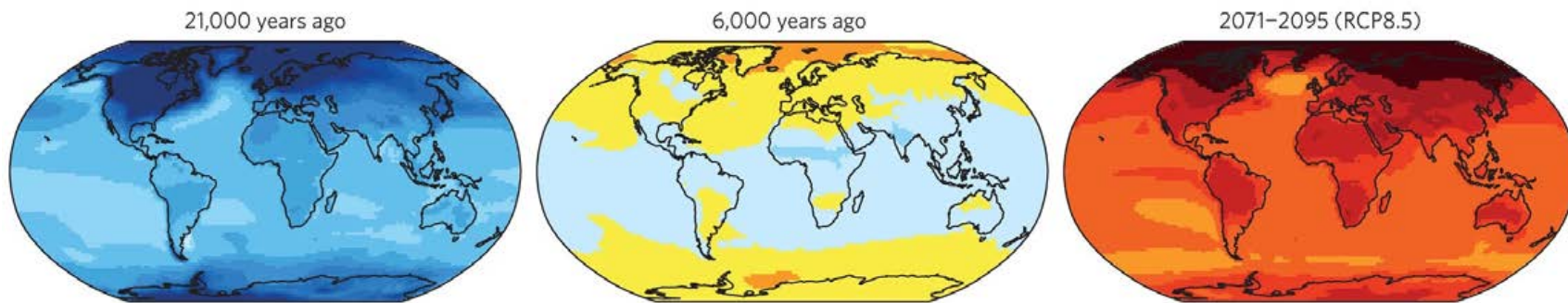
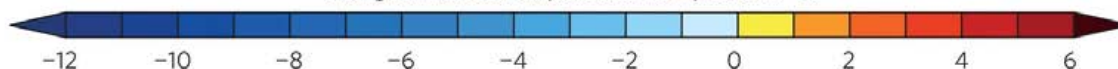


Diagram: <https://climateknowledgeportal.worldbank.org/overview>

sunken patches on fruit skin.

- **Blossom-End Rot (BER) in fruit crops** (e.g., tomato and peppers) results when heat stressed plants divert water and calcium from the fruit to the leaves to increase transpiration and photosynthesis in an attempt to make more proteins and sugars to support plants in their fight to survive.
- **Increased pests and disease** as imbalanced, stressed plants are weak and vulnerable, this is natural genetic selection for survival of the fittest species.

**HOW TO SAVE PLANTS FROM HEAT STRESS**

Protect crops and increase their resilience to save the crop or reduce losses from heat stress. Plants should recover quickly without severe damage from short heat waves, but the following methods could save crops from serious losses.

**Shading**

To shield your crops from excessive heat waves, use temporary seasonal shading structures or permanent shade nets to prevent heat stress.

- Plant appropriate fruit or nut producing trees or shrubs that can moderate air temperatures and function as windbreaks or shade protection in peak heat periods while adding diversification of income to your Farm.
- Intercrop mixed companion crops of varying heights to shade crops.

**Increase Irrigation & Water retention**

- Adjust irrigation to maintain correct soil moisture required to optimise transpiration for plants temperature control.
- Increase Carbon levels in soil by adding compost, leaving crop residues, growing green manure or cover crops.

**Support & Supplement correct Nutrients**

- Avoid salt-based fertilizer where osmotic pressure transfers nutrients into roots. Under heat and drought stressed conditions reverse osmosis can result in water withdrawal from plants into dry salty soil. Rather choose **Talborne Organics VITA** nutrients (see <https://talborne.co.za/solid-fertilizers/>) with low salts, which supply the nutrients released by microbial activity and exudates from soil solutions for uptake by the roots.
- Highly concentrated chemical fertilizers like fast release Nitrogen and Potassium Chloride can disrupt or kill off biological life and deplete soils by stripping carbon and creating global warming gasses in the atmosphere.

**Fertilize correctly for Crop Resilience**

- Grow resilient crops with robust roots and

structure, and strong leaf cells to resist disease. Use **Talborne Organics VITA** quality fertilizers formulated for a rich and sustained buffet of readily available natural nutrients like protein Nitrogen, Phosphate, Potassium, Calcium, and micronutrients, free from toxic residues and heavy metals.

- During heat stress, the concentration of soluble protein (amino acids) and sugars adjust the osmotic pressure inside the plant cell. Supplement these with Talborne Organics NOURISH as a foliar spray or soil drench for crop resilience and energy (see <https://talborne.co.za/liquid-fertilizers/>).
- Potassium is a most valuable anti-stress nutrient which together with Calcium strengthens the plant cells and counters Sodium to maintain the water balance (turgidity) and distribution into crops cells. **Talborne Organics NOURISH 4:1:6(11)** liquid plant food is a quick way to supplement Potassium, sugars and amino acids before or during periods of heat stress (see <https://talborne.co.za/liquid-fertilizers/>).
- Silica strengthens cells of plants leaves and stems so Diatomaceous Earth can be blended into your fertilizer to increase plants' resilience and reduce wilting and lodging in stressed plants.
- All Talborne Organics inputs feed the unseen workforce, with perfect food for the microbial ecosystem like algae, fungi (Trichoderma) and bacteria (bacillus) plus more to regenerate soil fertility.
- Plant legumes and mixed cover crops to build carbon and increase plant sugars and proteins from root exudates.

**Mulch**

Soil temperatures rise with the sun's intensity, reduce this by covering the soil with a mulch - a layer of straw, leaves, crop residues, clippings or plant a cover or companion crop to reduce the temperature and lessen the adverse impacts of heat on the plants.

**Limit Chemical Sprays**

Sprays for crop diseases and pests can be ineffective or even harmful with temperatures over 27°C+. Even mild sprays like soaps and oils can burn leaves or damage cells which will restrict transpiration and cause further harm. If sprays are required to prevent crop damage or loss spray late afternoon or evening when temperatures are cooler.

**Select tolerant Seeds and strong Tree Rootstocks**

The effects of climate change require a focus on planting hardy, proven or breeding new crop varieties with strong roots and plant structure and tolerance to extremes of heat and cold.

**Adapt Farming Methods and Practices**

Protecting crops from extreme temperatures at key growth and production stages, by optimizing planting time, crop spacing, thinning, pruning, irrigation, harvesting and conscientious farming practices.

It's time to change NOW to Nature Friendly Farming.

WATCH THIS BOOK LAUNCH MOVIE:

**60 HARVESTS LEFT**

Click here to WATCH video



'Transformative. We must read, mark and learn, fast' MICHAEL MORPURGO  
'A vitally necessary book' ISABELLA TREE, AUTHOR OF WILDING

PHILIP LYMBERY

**SIXTY**

**HARVESTS**

**LEFT**

HOW TO REACH A  
NATURE-FRIENDLY FUTURE

BLOOMSBURY

**THE HEAT IS ON, LETS BEAT IT!**

Talborne Organics for proven solutions.

**Talborne Organics**  
Growing Health

For more information on soil health and quality, commercial organic plant nutrition, visit [www.talborne.co.za](http://www.talborne.co.za)

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