

## **ECTOL - Heat Shock and Drought Protection**

ECTOL Protect and Grow is an organic based plant stress protectant, containing extracts from marine algae, amino acids, specific carbohydrates, Potassium and trace elements, which collectively builds up the plants own stress protection and response mechanisms.

Plant vines and agricultural crops generally suffer constant seasonal stress due to frost, cold, heat, drought, soil salinity and even pests and disease. While the healthy plant will response and resist such stresses, the response time may not be sufficient to save the plant and the “energy” cost to the plant is so high that seasonal production and quality is often compromised.

Ectol will “top up” these specific plant protectant materials and may be used strategically when the grower forecast a stress event such as a heat wave, or water restrictions. A user friendly and environmentally positive product, a few litres of Ectol can simply be added to the spray tank and is readily taken up in the leaves where it is most needed.

With summer heated stressing grape vines, growers know that proteins are being compromised as the cells dehydrate, and consequently photosynthesis and total grape sugar production will decline, which is not to be confused with the concentration of sugars in dehydrated berries. Ectol will assist the maintenance of cell hydration and metabolism.

The potassium in Ectol is important as Potassium is required as a cofactor for more than 40 enzymes. It is the principal cation in establishing cell turgor and maintaining cell electroneutrality.

The plants response to water loss from the cell is to produce abscisic acid and to accumulate solutes and reverse the concentration gradient in favour of the cell. Potassium being the most mobile of the solutes is rapidly utilised by the cell so as to increase the turgor pressure and concentration gradient and thereby reverse the flow of water back into the cell.

### **3.2 Drought Deficit and Drought Resistance**

Water deficit rapidly impacts leaf expansion and photosynthesis in the chloroplasts. Translocation of solutes is not affected during the early stages of water stress, enabling the plant to translocate these solutes to where they are most needed. As the soil dries plants can only absorb water if its “water potential” is more negative than that of the soil. Osmotic adjustment by the translocation and accumulation of solutes in cells is the process by which water potential is maintained. Most of the adjustment is accounted for by the increase in concentration of a variety of solutes, including sugars, organic acids amino acids, and inorganic ions especially potassium (K). all of which are contained in Ectol and are rapidly taken up and accumulated in the plant cells.

### **3.3 Heat Stress and Heat Shock**

Most tissues of most plants are unable to survive extended exposure to temperatures above 45°C/120°F and both respiration and photosynthesis are inhibited as temperatures reach these higher levels.

In response to a sudden change in temperature of just a few degrees, plants produce heat shock proteins (HSPs), many of which are specific to particular organelles. HSP work by protecting proteins and are also referred to as molecular chaperones.

As with drought stress the osmotic conditions activate the genes that encode the production of these heat shock proteins, but the process uses a lot of energy, at the cost of crop production and quality.

