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liquid logics
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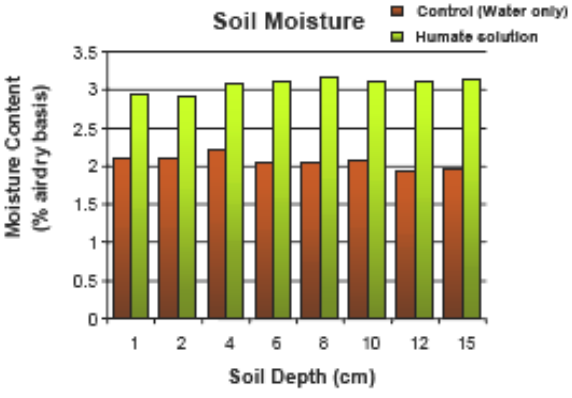
Water Use Efficient Crops – make every drop count!

In light of the current water allocations and the limited amount of water in the soil profile growers are having to ensure that every drop of water applied to crops counts.

Water use efficiency (WUE) is a concept that relies on two simple aspects:

WUE (kg/ha/mm) = Crop yield (kg/ha) / Water supply (mm)

To be able to maintain a profitable yield, crops need to use water at the most efficient rate possible. This can be achieved by managing the soils water holding capacity, increasing the amount of water uptake through the root system and reducing water loss through transpiration. Products that will assist these needs are **Supa Humus** (12% humic acid), **Kelpak** (*11 mg/L auxins, 0.031 mg/L cytokinins*), **Stand SKH** (*NPK 0-0-15 + 20% silica + 1% humic acid*) and **Supa K 30** (*NPK 0-0-30+ trace elements*).



Trial results show that soils treated with humic acid held 44% more water than untreated soils. Besides increasing water retention, humic acid also improves the wet ability of treated soils and makes existing nutrients more available to plants.

Increasing the Soils Water Holding Capacity

A soils water holding capacity is governed by its physical characteristics and its organic matter content. This depends on the equilibrium between the incorporation of new material and the rate of oxidation. Supa Humus is a blend of liquid humic acid and organic catalyst, which contains many functional chemical groups that are highly active in the complexing and mobilisation of plant nutrients. Humic acids hold onto nutrients, attract moisture, provide carbon for microorganisms and help in the development of soil structure.

As seen in the vineyard trial opposite the addition of Supa Humus, even to sandy soils, can improve water retention by up to 44%. This is due to humic acids ability to penetrate the pores and cracks in sand particles and help agglomerate the particles which improves their ability to hold water and also to retain nutrients in the soil.

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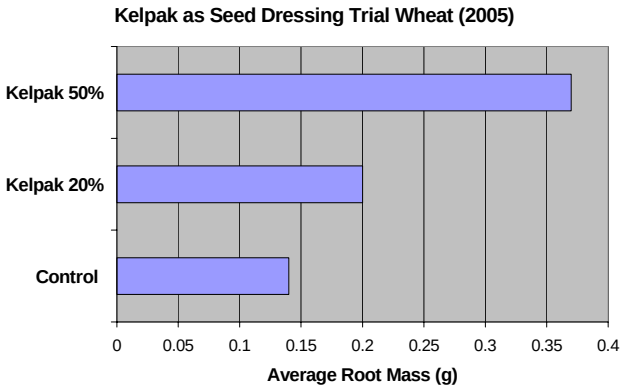
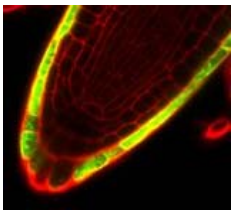
Increasing the Root Density and Water Uptake Potential

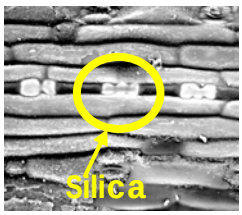
In heat and drought situations it is vital to support and increase the root area so that there is a greater chance of roots intercepting moisture. Application of auxins through Kelpak is the best way to trigger root development in plants. As seen in the opposite graph, Kelpak can increase wheat root mass by up to 38%.



Silica and Reduction of Evapo-Transpiration



Silica accumulation in root tips (yellow)



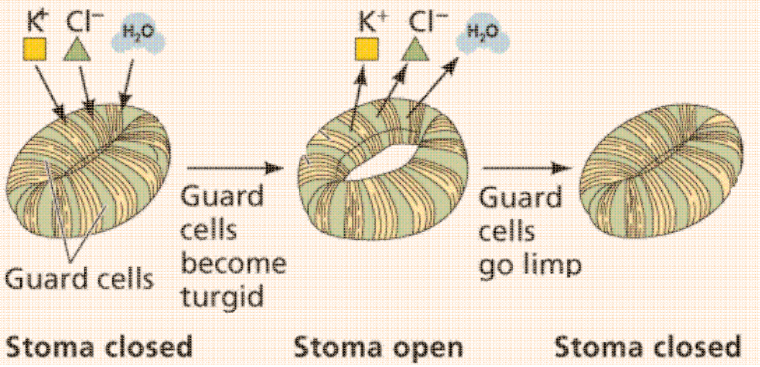
Silica phytoliths deposited in between cells forming a cuticle-silicon double layer

Silica acts physiologically within the plant to decrease evapo-transpiration through the cuticle by re-enforcing the cell wall(cuticle-silicon double layer). Silica will also increase root oxygen supply by strengthening the air-canal walls. In addition to reducing evapotranspiration, Silica also maximises the efficiency of use of the existing water and nutrients in the plant. Silica is carried in the transpiration stream and is laid down at the sink i.e. where-ever the stream is going to. It is laid down as phytoliths and is immobile once deposited. Regular supply is therefore necessary.

Potassium and Water Regulation in the Leaf

Potassium is a highly mobile element and is present in a salt form in the liquid within the cell. The concentration of potassium as a salt controls the movement of water within the plant and the plants respiration rate (stomatal opening and closing) through osmosis. However Potassium is not only vital in the regulation of water transpiration, but it can also improve the plants response to stress conditions(drought). Because, Potassium promotes growth of large xylem vessels giving better ability to translocate sugars and reserve carbohydrates. It also builds cellulose that can counteract the effects of excessive nitrogen by promoting thicker and stronger stalks.

When a guard cell takes up potassium ions, water moves into the cell, causing the cell to become turgid and swell, opening the stoma. When the potassium leaves the guard cell, the water also leaves, closing the stoma. Stomata occupy 1% of the leaf surface, but account for 90% of the water lost in transpiration.



In summary, appliction of **Supa Humus** will improve the soils water holding capacity. **Kelpak** applications will increase the root density and improve the plants ability to scavenge for moisture. Application of **Stand SKH** (20% Silica) will help reduce the plants evapo-transpiration rate under dry conditions. And application of **Supa K 30** (30% Potassium) will ensure regulation of water transpiration and an improved stress(drought) response. The utilisation of one or all of these measures will dramatically improve the water use efficiency of your crop.

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