Hydrosmart in Agriculture

Hydrosmart provides a wide range of benefits in agricultural situations especially where the water is highly mineralised, a common problem with bore water.

The problems Hydrosmart treatment solves include scale build up in irrigation systems that causes drippers to block up, algae growth in dams, iron and iron bacteria, chemical soil compaction, salinity in bore water and the build up in the soil of these salts to levels that are detrimental to plant growth and health.

All of these issues have been successfully and naturally resolved in hundreds of vineyards and in other branches of agriculture including, hydroponics (lettuce and tomato), stone fruit, strawberries, almonds, olives, orchids and flowers. The breakdown of minerals and nutrients into much smaller bio-available particles improves plant growth with healthier, more disease resistant plants and excellent yields of higher quality, increased tonnage, great tasting fruit and vegetables.

Irrigation Systems

Hydrosmart's computer generated resonance frequencies produce a chemical free scale prevention and de-scaling system that is effective on all the minerals present in our water supplies (including soluble iron and sodium chloride).

It does this by changing large, reactive mineral crystals into tiny non-reactive particles, effectively preventing scale from forming. The resonance frequencies remain active in water for several days and progressively break down any already existing scale or bio-films.

The first bonds to be broken are those between the pipe work and the scale, which can sometimes break off in lumps and flow towards the end of the irrigation system, making it important to flush out the broken down scale during the first few weeks of the de-scaling process.

Once de-scaling is completed no more scale will be formed and the minerals remain in the flow in a non bonding particle size that will pass through any dripper, filter or spray nozzle bigger than 4 microns and more freely travel up into and through the plant as nutrition.

The irrigation system no longer requires maintenance, eliminating the cost of replacing calcium blocked drippers and there is no need for any acid de-scaling which improves soil health as acid kills soil bacteria. The frequencies are transferred via wires wrapped around the outside of the pipe so there are no flow restrictions.

Before

After

One vineyard saved the cost of replacing 70,000 calcium blocked drippers by installing Hydrosmart technology to their bores. Calcium and sodium chloride issues were swiftly turned around within their first season's application.

Chemical soil compaction

Soil compaction is caused by large crystalline mineral structures accumulating in the surface layers of the soil. These crystals block root capillaries, bond nutrients before they reach the plant and prevent nutrients from entering the soil, effectively starving the plant.

The Hydrosmart resonance frequencies break down the minerals in the water to sub 4 micron particles making them small enough to penetrate even the most heavily compacted soil. Because they remain active in the water for several days or until it evaporates, they are able to progressively break down the existing mineral crystals in the soil.

The soil becomes progressively de-compacted, the capillaries unblocked, the nutrients freed up and new nutrients are made available from the break down of the large crystals.

The soil structure improves with each irrigation culminating in uniform soil absorption and a reduction in both the amount of water and fertiliser needed (one turf irrigator states using up to 30 % less fertiliser and 20 % less water to get a 50 % greater annual yield).

Enhanced plant growth & reduced growing problems

Whenever plants are irrigated with mineralised water treated by Hydrosmart there is a significant improvement in plant growth and a reduction in growing problems.

This results from the breakdown of large complex crystals in the water and soil which are too large to freely enter the roots and can block the root capillaries and bind up nutrients in the soil, effectively starving the plant. These crystals which have been broken down into sub 4 micron, bite sized particles, many of them being changed into bio-available simplex elements such as calcium, potassium and manganese, are easily transported throughout the plant.

The tiny calcium elements (being the basic building blocks of plant health) are easily transported throughout the plant, eliminating growing problems such as Tip Burn and Blossom End Rot. Not only are the plants healthier but the overall harvest is improved both in terms of fruit quality and tonnage with significant improvements in fresh weight, taste, colour and shelf life.

The efficient transpiration within the plants causes the sugars to be mobilized at optimum levels and there is an increase in the plant's resistance to disease and insect damage.
The soil will progressively improve with a significant reduction in chemical usage (less fertilizer and wetting agents).

Healthy plants in high salinity water

Hydrosmart technology is resolving salinity issues for commercial growers in a variety of soil types and salinity levels in a totally sustainable way with salinity levels in the soil decreasing.

Salts collect in the soil through successive irrigations and their large molecular structures block root capillaries and grab passing nutrients in a process that starves the plant.

The resonance frequencies break down the salts and other minerals into sub 4 micron, bite sized nutrients and change many of them into bio-available simplex elements such as the calcium, potassium and manganese that the plant has been starved of. Efficient photosynthesis resumes and sugars are mobilized at optimum levels allowing the plants to resume healthy new growth.

The result is no salt toxicity problems and a progressive improvement in soil structures.

Algae and fungus removal

The majority of algae and fungal formations need a substrate like scale or bio-film to form on or anchor to, or mineral deposits suspended in the water that are large enough to form on. Hydrosmart removes the bio-films along with the scale deposits and changes the minerals in the flow into tiny sub 4 micron particles. Consequently the algae and fungal formations **lose their growing base** and cease to feed or breed.

Dams are particularly prone to algae blooms which can clog up irrigation filters and drip lines.
The following photographs show the successful treatment of algae in the Burra Creek in the township of Burra South Australia, following the installation of 2 Hydrosmart systems.

Before

After

Bacterial control

Bacteria are reduced by removing Algae, Moulds, Fungi, Bio-films and Scale that are the breeding grounds for the bacteria. As these are progressively removed by the resonance frequencies a myriad of bacteriological problems are reduced or disappear. Food production facilities are recording exceptionally low bacterial counts accompanied by a significant increase in product shelf life (from 10 to 17days).

A dairy in Western Australia which put a Hydrosmart unit on the water supply has reduced the bacterial count in the milk from 49 to below 17. This result should improve as the remaining bio-films and scale inside the pipes and all of the milk shed apparatus is progressively removed, a process which may take weeks or up 3 months.

In a Fijian fish factory treated with Hydrosmart they had the lowest swab count of any factory that a team of German food inspectors visited. When the fish product got back to Germany the shelf life went from a maximum of 10 to a maximum of 17 days before any bacterial spotting occurred again.

In general, the removal of substrates and bio-films on which bacteria breed will result in a much healthier working environment.

Iron issues

Iron in irrigation water could be an essential nutrient to plants but instead it oxidises on contact with the air and blocks drippers, filters and spray nozzles and contributes to scale build up in the pipes. These result in decreased efficiency of equipment, increased maintenance and in many cases, expensive replacement of drippers.

The Hydrosmart treatment renders the iron non-reactive preventing it from oxidising so it remains in solution. In the process it also gets broken down into smaller particles making the iron much more available to plants as an essential nutrient in the manufacture of chlorophyll

Before

After

Above is a vineyard dam with equally high levels of iron and salinity. Here the unit has been switched off and on purely for demonstration purposes. The effect is in fact instantaneous when the unit is switched on. The pictures clearly show the high-level watermark of the dam and show how the treated water has removed the staining from the concrete below the water line.

Corrosion Prevention

Highly mineralised water accelerates the corrosive process attacking pipes, pumps, valves and any other equipment.

Corrosion is due to chemical reactivity between metals and aggressive chemical compounds in the water supply. Once the water is treated the Hydrosmart resonance frequencies inhibit chemical interactions (e.g. the oxidization of iron), and corrosion ceases.

Background – Plant growth research

One of the first commercial applications for Hydrosmart in agriculture was on a hydroponics lettuce farm which was mainly concerned with the removal of algae from his growing channels. The algae was successfully removed. There was also a distinct absence of tip burn (a problem caused by lack of calcium transpiration throughout the plant).

Hydroponic lettuce

Extensive scientific testing was carried out by Dr. Lynnette Morgan and Simon Lenard PhD of Suntec to establish the mechanisms involved. The results of this research were published in Practical Hydroponics and Greenhouses magazine Jan/Feb 1999.

The lettuce trials were set up under conditions that were known to induce tip burn. They were carried out in winter and summer on two lettuce varieties using rain and bore water. Both of the untreated crops developed a high level of tip burn making them unmarketable. Both of the treated crops made it to market with less than 5% showing any signs of tip burn.

Untreated **Treated**

The picture above was taken from the trials and shows clearly the difference in plant growth between the untreated and treated crops. It is interesting to note that the treated bore water produced bigger plants than the treated rainwater.

The trials concluded that the treatment had made the calcium in the nutrient solution into a bio-available form that the lettuce could easily take up which acted to “enhance xylem conductance thus allowing the plants to transpire more effectively and therefore moving more calcium into the leaf tips”. The treated lettuce had significantly higher ‘head-weight and ‘fresh-weight’ and they concluded that the Hydrosmart treatment “had the effect of producing a higher quality fruit with a greater percentage of dry matter and less water content.” This increase in dry matter gave the fruits “significantly higher shelf lives than untreated samples”.

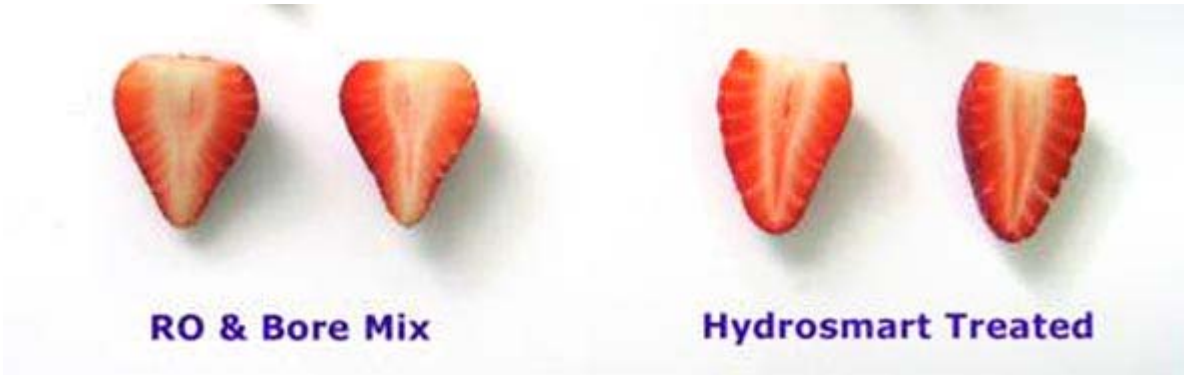
The treated plants had higher leaf calcium levels which accounted for the lack of tip burn problems with the plants not appearing to be under stress. In view of the conditions in which the plants were grown this was considered remarkable. Other conclusions showed a much deeper colour in the ‘Red Coral’ varieties and a taste test showed a big reduction in the bitter taste components (i.e. the lettuce tasted better). Tissue analysis showed a significant increase in the Brix levels (sugar levels) from 5.5 to 7.0; which is unprecedented.

Hydroponic tomatoes

The success of the lettuce trials led to trials being carried out on Hydroponic tomatoes, which suffer from a condition called Blossom end rot. The mechanisms for this problem were thought to be similar to tip burn in lettuce, (i.e. the inability of the plant to absorb and transport sufficient quantities of calcium to the new growth). These trials were also conducted under stressful conditions that were designed to induce the problem. The salinity levels fed to the treated crop were able to be increased by a factor of 7 before any signs of Blossom end rot occurred, whereas the control crop had succumbed to the problem early on in the trial. In the taste test the treated crop had an even bigger contrast than had been observed in the lettuce trials with the panel describing the flavour of the Hydrosmart treated tomatoes as “almost too strong”.

Strawberries

This mirrors the findings from a separate trial with strawberries grown in the Dubai desert Nov '06 to test the use of Hydrosmart treatment on a bore water supply with high levels of salinity (1795 ppm NaCl) against a control crop fed on 793 NaCl and RO water. The treated fruits were noticed to be sweet and very strawberry in flavour and more uniform in size, while the untreated fruits were noticeably sour and a little bitter. They also reported the treated fruits as having a much stronger and sweet strawberry aroma, being more uniform in their shape and colour, and having less insect damage.



Growing Turf

West Coast Turf, a 30 hectare turf farm north of Perth, Western Australia, which is irrigated by two bores, installed Hydrosmart to solve their problem with iron build up in their pipes causing iron sclerosis. The system completely cleaned out the pipes that had been functioning at 70mm diameter, returning them to their normal 100mm and there were no longer any blocked sprinkler heads. But as the season progressed, more striking results appeared. The turf rolls became noticeably stronger and of better quality, he was using much less fertiliser (down approximately 30%), there was no need to apply any wetting agents as there were no dry patches (normally he would have to apply up to 600 litres), and instead of the usual $12,000 per annum on insect control, this season he spent nil. But most of all his overall production was up 50%.

Improved Brix and Baume Levels

The availability of essential minerals in the plant significantly increases the Brix levels, (from 5.5 to 7.0 in trials). Many vineyards using Hydrosmart treatment to de-scale irrigation equipment, are reporting significant increases in Baume levels that are arriving earlier, with bigger tonnages and low juice chloride levels.

Wine – juice Chloride levels

Scientific trials have shown a significant drop in juice chloride levels in Hydrosmart treated vines. This fact was not lost on one highly respected wine maker, who informed his grower that their Hydrosmart treated grapes were the first ever in which the pH balance was perfect and had not required any balancing chemicals. A Shiraz red wine from this vineyard took the gold medal in an Australian small winemakers show beating 697 other wines in the same category.