



# Lessons from the Field

## Chemical free sanitation: Schreurs & Sons



National Vegetable  
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VICTORIA - NORTHERN,  
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Schreurs & Sons are a family horticultural business based in Clyde, Victoria. What started off as a small family business three generations ago, is today a business spanning seven properties and multiple product lines, including fresh and pre-pack celery and leek; and baby leaf (including spinach, rocket and snow pea tendrils). Throughout this growth across the business, Schreurs have remained focused on their values of producing high quality, safe products for their customers, with a strong focus on innovation and technology.

### Produce sanitisation

To ensure safety and quality of their produce, Schreurs have a comprehensive Quality Assurance (QA) program to ensure that all produce meets the required customer and legal requirements. As Schreurs grow their vegetables in soil and have a range of pre-pack lines, part of their QA program is to wash and sanitise their produce. This ensures that the ready-to-wash produce is safe and that the risk of a disease outbreak is minimised. Unsatisfied with their previous method of sanitisation, Schreurs looked for a new and improved method of sanitation.

Initially, Schreurs trialed chlorine dioxide ( $\text{ClO}_2$ ) as a preformed gas that was dispersed into the wash bath solution. However, the agitation in the wash bath caused the gas to come out of solution, which posed significant risk to the safety of staff. With staff safety being equally important to food safety, Schreurs were in the market for an alternative sanitisation method.

Through a Horticulture Innovation Australia research project (VG09086), Dr Robert Premier undertook an evaluation of sanitisation chemicals available in Australia to reduce both spoilage and the presence of microorganisms on leafy vegetables. Through this study, Robert systematically tested a range of available chemicals in a realistic on-farm setting, including the use of existing equipment. A number of sanitisation options were considered including Peroxyacetic Acid (PAA) containing sanitisers, Stabilised Chlorine Dioxide ( $\text{ClO}_2$ ), Electrolysed Oxidised Water (EOW), Citrox, Aussan, CitroFresh, Acetic acid, Nylate and ozone gas.

### What is Electrolysed Oxidised Water (EOW)?

- Normally water isn't pure, it contains small amounts of natural salts that are dissolved in the water (e.g.  $\text{H}_2\text{O} + \text{Na}^+ + \text{Cl}^-$ )
- When this water is electrolysed (running a DC current through it), the make-up is altered generating chemicals such as  $\text{HClO}$  (Hypochlorous acid),  $\text{Cl}_2$  (Chlorine),  $\text{H}_2\text{O}_2$  (Hydrogen peroxide)
- These new molecules are sanitiser molecules, that can kill viruses and bacteria
- Water that has been through this process is called Electrolysed Oxidised Water (EOW)



Dr Marie-Astrid Ottenhof, Technical Director Schreurs & Sons with Production Manager Mark Bell, inspecting the Electrolysed Oxidised Water (EOW) sanitation system installed at their packing facility in Clyde, Vic.

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The study concluded that washing vegetables in water containing 100 ppm of chlorine remains the most suitable system available to growers that wash on-farm. This conclusion is based on the sanitisation outcomes achieved, cost effectiveness and ease of handling. The study did note, however a new emerging technology, Electrolysed Oxidised Water (EOW), produced excellent results as a sanitizing treatment, as well as increasing the shelf life of baby spinach. Furthermore, EOW can be claimed as chemical free sanitisation.

## Electrolysed Oxidised Water (EOW)

The findings around EOW caught the attention of Schreurs & Sons. Interested in the benefits of using EOW as a sanitiser, Schreurs began to work with Unipolar Water Technologies, to design the configuration of the unit that best suited the Schreurs process.

The 12-cell unit, now installed at Schreurs, is used to generate EOW to sanitise the pre-cut celery. Start-up of the sanitation tank takes around 35 minutes each day, and is as simple as adding a cup of everyday table salt to a bath of potable water and pushing a button. As the system is constantly keeping the EOW at the required chlorine concentration (15ppm), staff don't have to manually add any other inputs to the system.

The concentration levels can be read from a screen in the packing shed, and a warning light is triggered if the system varies out of specification. Whilst the system is running, the QC team conduct three chlorine test strip checks across the day, and the chlorine probes are calibrated every 4 months. The unit also self-cleans the electrodes using reverse electrolysis, meaning that no manual cleaning is needed. Despite initial concerns raised by some in relation to the energy demand, the unit is relatively energy efficient, having a power consumption of 1.0 – 1.5kWh/kL.



The Unipolar Water Technologies EOW system at Schreurs & Sons

Schreurs concede they have encountered a few challenges with the EOW system, including the initial capital cost of the system, time delays of approximately 30-45 minutes if the water needs to be changed for a different product line and the shed floor space required by the unit (1m x 3m for 12 cells).

Despite these challenges, the benefits of the EOW system have exceeded expectations for Schreurs, including:

- No chemicals needed (other than table salt)
- EOW reverts back to water and salt over time
- Can be used for direct food applications without rinsing
- Provides more effective clean than conventional sanitisers
- Cost efficient to run and operate
- Is automated and continuously produces desired concentrations of sanitisers
- The system automatically records chlorine levels
- Safer for staff than other sanitisers from a workplace health and safety perspective

## How is Electrolysed Oxidised Water produced at Schreurs & Sons?

- Water is pumped into one of the cells of the unit
- A cup of cooking salt (NaCl) is added to increase the ion concentration
- The electrode within the cell turns on, and begins to run a DC current through the water
- Initially, the ions provided by the salt helps to conduct the current, and then dissociate (Na+ and Cl-)
- Other natural salts dissociate/split up
- These products then form into new combinations with the hydrogen and oxygen already present in the water (H<sub>2</sub>O) (HCl, HClO, H<sub>2</sub>O<sub>2</sub>)
- The probes detect the Chlorine concentrations have reached a certain level (15 ppm at Schreurs)
- The EOW is then recirculated through the holding tank or wash bath