

Testing & Monitoring Protocols for Agriwater Installation Sites

Recommended testing and monitoring

- Water analysis
 - Standard irrigation water mineral analysis.
 - Only required for pre-installation to determine typical mineral loads in water to be treated.
 - Biological analysis only if known problems with biological contamination exist.
- Soil analysis
 - Mineral soil analysis – include all major cations, N, P, essential trace minerals (S, Mn, Zn, Fe, B, Cu), soil carbon/organic matter, chloride, aluminium, pH, EC.
 - Soil life/soil health – soil respiration (solvita), general microbial population activity
 - 🕒 Done before installation, and once per growing season thereafter.
 - 🕒 **In the first year, control and treated samples should be considered. Control samples can be taken from a comparable, adjacent, same crop field or, if there is a section of the subject field that can have the Agriwater turned off and not receive treated water, control samples can be taken from that section.**
 - Keep an eye on soil sulfur content to ensure sufficient availability. Increased sulfur usage is often seen in soils under Agriwater treatment due to increased aerobic soil life activity.
 - Ensure enough organic matter is available to support increased aerobic soil life activity.
 - On soil that have magnesium base saturations above 18 (especially those with levels of 20% and higher), soils will have a high tendency to exhibit hydrophobic characteristic and have very sticky textures. Under Agriwater treatment you can expect big improvements on both these issues. Verify this by monitoring water penetration, water pooling and run-off during irrigation cycles.
 - If soil amendments are to be done, it is expected that improved efficiencies of cation balancing will be seen under Agriwater treatment.
- Leaf sap analysis
 - Recommended laboratory: NovaCropControl
 - 🕒 Approximately 3 analysis sets per growing season (more can be done to monitor and manage crop nutrition, depending on crop type). Refer to sampling guideline document for crop specific instructions.
 - 🕒 **In the first year, control and treated samples should be considered. Control samples can be taken from an adjacent same crop field or if there is a section of the subject field that can have the Agriwater turned off.**
 - 🕒 Initial spikes in salt minerals like chloride and sodium can be expected as these salts are loosed from their tied-up state in the soil. This will be accompanied by increases in uptake of other tied-up minerals as well. As soil movement is improved with treatment progresses, uptake will normalise throughout the season. Keep an eye out for excessive uptake of essential macro- and micronutrients as root growth and functioning responds to

Agriwater treatment. Cutting back on certain nutrient applications could be required.

- Soil penetrometer testing
 - ⌚ Initial penetrometer readings before/at installation, every 4-6 weeks thereafter.
 - ⌚ Do not measure within 48 hours after an irrigation cycle.
 - ⌚ **Take a minimum of 3 test replications spread in the same vicinity (for averaging). Repeat at least 3 times at different locations on a single field. Thus, total of minimum 9 reps per fields.**
 - ⌚ **If using a Falker digital penetrometer, ensure the data recorded includes a full soil column and that the co-ordinates are registered in the file. Keep files for each field in a single folder. If possible, use a separate folder for each penetrometer series.**
 - ⌚ **The Falker software (cloud version) can create averages for use in presentation and analysis.**
 - ⌚ **The penetrometer readings are an indicator of compaction. Readings under 1,500 kPa indicate an absence of compaction, 1,500 to 2,500 kPa indicates some root growth inhibition and above 2,500 kPa no root growth is possible for MOST crops.**
 - ⌚ **Continuing use of Agriwater treated water is expected to relieve the compaction on a cumulative basis, with the relief moving further down the soil column as treatment progresses.**
- Soil moisture testing
 - ⌚ If probes are available, continuously log soil moisture at varying depth.
 - ⌚ Measure water infiltration rates with infiltration rings – at/before installation, and every 3-6 weeks thereafter.
- Fruit/tuber mineral analysis
 - Mineral analysis of whole fruit/tuber (all edible parts) – include N, P, K, Ca, Mg, Na, S, Zn, Cu, Mn, Fe, B, Mo, Cl, moisture and specific gravity (optional: protein content).
 - Brix measurements of juice pressed from fruit.
 - ⌚ Done at harvest.
 - ⌚ **When comparing results to control samples you would like to see higher mineral values in the treated samples. Nutrition applications through the season will have a big influence on the minerals stored in the fruit/tuber, but under good management and Agriwater treatment higher nutritional values can be achieved.**
- Visual inspections
 - Crop uniformity (size and colour)
 - Can improved overall uniformity, greener leaf colour, thicker stems, longer internode and other signs of healthy and happy crops be seen under Agriwater treatment compared to control.
 - Profile holes – record and describe general soil structure throughout profile, and root growth (depth, abundance and health).
 - Soil will likely be more friable and less “sticky” under Agriwater treatment, depending on soil type.
 - Expect to dig profile holes easier on Agriwater treated fields were treatment has progressed to relief
 - Note changes in any soil horizons throughout the soil profile.

- Root growth will likely be deeper and more widespread through the soil, with more abundant fine root hairs and new root growth under Agriwater treatment.
- Note changes in water pooling and any surface salt precipitates.
 - Expect to see reductions in surface salt precipitates, and eventual elimination thereof under Agriwater treatment.
 - Expect to find less pooling of water and occurrence of run-off water under Agriwater treatment because of better soil penetration of the water.
- Note and record changes in filter cleaning cycles & note removal of build-up or clogging in lines or emitters.
 - Growth of slimy biological growth should be greatly reduced under Agriwater treatment.
 - Sections of drip tape can also be checked for this.
 - Expect more uniform water delivery from drip and micro emitters as blockages and precipitate formations are limited with Agriwater treatment.
- NDVI imaging of fields, where possible
 - Plant stress and water status can be improved under Agriwater treatment.
 - Watch out for any signs of non-ideal water management that can still lead to crop stresses even under Agriwater treatment.

Other optional testing and monitoring

- Soil fertility monitoring via probes
 - 🕒 Continuous, daily or weekly logging of N, P, K, pH and EC of the soil at varying depths.
- Leaf sap brix and pH monitoring
 - 🕒 Weekly refractometer measurements of leaf sap brix and pH level.
- Irrigation uniformity
 - 🕒 Monthly evaluation of uniformity of dripper or sprayer deliveries.
- Drone footage of the fields
 - 🕒 Every 3 – 6 weeks.

For further assistance or enquiries, please contact your nearest Agriwater representative.