Tri-Nuts Australia

Pump-to-emitter: *a 20-minute quick audit*

FACTSHEET

Audits improve uniformity, reduce costs & prevent patchy tree growth

***Checking dripper output** to confirm flow rate and spot blockages or pressure loss (Image: GR)*

1. Introduction

A short pump-to-emitter audit helps nut growers spot the common causes of uneven irrigation. These could include:

- pressure losses
- blocked filtration
- leaks
- worn regulators
- under-performing emitters or sprinklers.

Done a few times each season (and after any repairs), it can improve uniformity, reduce pumping costs, and prevent small faults turning into large yield gaps.

Grab the following

- ☐ A pressure gauge that can connect to your system (or a quick-test gauge kit)
- ☐ A watch/phone timer
- ☐ A bucket (10–20 L) and jug or measuring container
- ☐ A marker/flagging tape and notepad
- ☐ Optional: smartphone photo of your filter gauges and pump panel

Choose a "test run" setting (2 minutes)

- ☐ Do the audit while irrigating one normal zone
- ☐ Pick a representative block and zone (not your easiest one)
- ☐ Run the zone long enough to stabilise pressure and flow (a few minutes is usually enough)
- ☐ If you have multiple system types, do a separate quick audit for each (drip zone, micro zone, mini-sprinkler zone).

STEP 1: Start at the pump (3 minutes)

1. Note pump & power basics

- Pump running smoothly (no surging, rattling, cavitation noise)?
- Any alarms on the controller/drive?
- Unusual pump behaviour that is different from "normal".

2. Record key readings

- Pump outlet pressure
- Total flow for the zone (if there is a flow meter)

Abnormal readings can often point to a filter issue, a major leak, a stuck valve, or pump wear.

STEP 2: Check filtration & pressure (4 mins)

Filtration

- ☐ Read the pressure before and after the filter (if you have gauges).
- ☐ If no gauges, feel the filter body: heavy vibration or rattling can signal issues.

What you're looking for

- A large pressure drop across the filter which suggests it needs cleaning or flushing.
- Frequent filter problems which can indicate source water issues (silt, algae, organics) or undersized filtration for the flow.

Inline filtration unit installed on a drip irrigation mainline to protect emitters and maintain uniform water delivery. (Image: © State of Victoria. Approved use)

Pressure regulation

- ☐ If there is a regulator, confirm it is present, intact, and the downstream pressure matches what you expect for that zone.

What you're looking for

- Downstream pressure that is higher or lower than normal can cause poor distribution and more breakages.

STEP 3: Walk the line – first, middle, last (8 mins)

This is the core of the quick audit.

You are checking whether the system delivers evenly from the start to the end.

A. Pressure check (3 minutes)

Measure pressure at:

- ☐ the start of the submain/lateral
- ☐ roughly mid-run
- ☐ the end of the run (furthest point)

Pressure test on a drip lateral *using a handheld gauge to check for pressure loss and uniform water delivery along the line. (Image: © State of Victoria. Approved use)*

What you're looking for

- Pressure should not fall away sharply from start to end
- A big drop often means undersized pipe, too-long runs, partially closed valves, kinks, root intrusion in SDI, or hidden leaks
- In sprinklers, low pressure at the end often shows as reduced throw and patchy wetting

B. Output check (5 mins)

Pick 3–5 outlets at each position (start/middle/end) and do one simple check:

For drip or drippers

- ☐ Place a container under an emitter or a short section of dripline outlet (where feasible) and time for 30–60 seconds.

Measure dipper discharge rates *and variation by placing containers under drippers and measuring their volumes after 36 seconds. (Image: © State of Victoria. Approved use)*

- ☐ Compare volumes between start/middle/end.

For micro- and mini-sprinklers

- ☐ Observe the pattern: is it a full circle/arc, consistent droplet size, and stable rotation (if applicable)?
- ☐ Do a quick test with sprinkler catch cups.

Sprinkler catch cups can be set out in a grid pattern to measure application rate and uniformity across an irrigated block or sprinkler zone.

What you're looking for

- Outputs should be broadly similar along the run.
- Big differences suggest pressure loss, blockages, worn nozzles, missing components, or non-pressure-compensating emitters in long runs.

Catch cups set out *across a sprinkler zone to measure water distribution and application rate during an irrigation uniformity check. The same approach can be used in nut orchards to identify under - or over-watered areas and fine-tune sprinkler spacing, pressure and run times. (Image: NMSU, Cheryl Kent, 2013. Reproduced for educational purposes)*

Catch-cup spacing

You can base catch-cup spacing on the sprinkler's advertised throw (wetted diameter) as a practical starting point.

The aim is to place enough cups to show how well sprinklers overlap and whether there are dry or over-watered patches, without turning the check into a major job.

A simple rule of thumb is to set cup spacing at around one-quarter to one-third of the advertised wetted diameter (roughly half the advertised radius). For example:

- 4m wetted diameter: 1.0–1.3 m spacing
- 6m wetted diameter: 1.5–2.0 m spacing
- 8m wetted diameter: 2.0–2.7 m spacing
- 10m wetted diameter: 2.5–3.3 m spacing

Use the advertised throw to design the initial grid, then confirm the actual throw under normal operating pressure and typical wind conditions. Adjust as needed.

STEP 4: Spot the top 'fault signatures' (3 mins)

Use these quick clues to narrow the cause:

1. "Good at the start, poor at the end"

Likely causes:

- ☐ Pressure loss from long runs or undersized pipe
- ☐ Partial blockages in lines
- ☐ Valves not fully open
- ☐ Hidden leaks

2) "Random weak spots"

Likely causes:

- ☐ Local blockages (sediment, biofilm, iron)
- ☐ Damaged emitters or kinked microtubes
- ☐ Chewing or mechanical damage

3) "Everything looks weak"

Likely causes:

- ☐ Pump not delivering expected head/flow
- ☐ Filter or intake restriction
- ☐ Incorrect regulator setting
- ☐ A larger-than-normal zone load (too many sub-zones open)

4) "Wet patches, boggy strips, obvious spray"

Likely causes:

- ☐ Leaks, broken risers, split poly, failed joiners
- ☐ Damaged flush valves or end caps
- ☐ Poorly sealed fittings

STEP 5: Fix what you can & record it (2 mins)

1. Some immediate fixes

Clean or flush filters

- ☐ Flush the end of laterals/ submains (especially after repairs or dirty-water events)
- ☐ Replace damaged emitters, microtubes, caps, or sprinkler nozzles
- ☐ Re-seat leaking joiners and clamps
- ☐ Repair visible leaks promptly

Record:

- Zone tested, date, pump pressure, filter drop (if known), end-of-line pressure, and what you fixed.

In a nutshell

1. A 20-minute pump-to-emitter check can show why parts of the block look stronger or weaker
2. Start at the pump and record the key readings
3. Check filtration and pressure regulation
4. Compare pressure at the start, middle and end of the run.
5. Check the output of a few outlets (start/middle/end)
6. Fix leaks and blockages promptly
7. Keep a simple record to track trends and maintain even irrigation across the orchard
8. A simple notebook or phone note builds a baseline so you can spot changes quickly.

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