

Water Treatment & pH Quick Reference

The 5-step Cochise bicarbonate protocol · distilled from Guide 13 §5 + Guide 4 Part 3

The 5-Step Cochise Bicarbonate Protocol

Guide 13 §5

Run every time you fill a hydroponic reservoir, and whenever pre-mixing raw well water for sensitive crops. Chemistry in Guide 13 §6.

#	Action	Detail	What happens
1	Fill	Source water to working volume (≈12 gal in a 15-gal tub). Let stand 15 min if cold from well. Record starting pH, EC, alkalinity.	Starting pH 7.5–8.5; EC 0.3–0.8 mS/cm; alkalinity 150–300+ ppm CaCO ₃ for most Cochise wells.
2	Acid in	Add acid slowly while stirring. Citric stock (1 g/mL), commercial phosphoric pH Down, or distilled vinegar. Dose 0.5–1 mL/gal to start. Target pH 5.0 in this step.	Bicarbonates react with acid — water visibly fizzes as CO ₂ releases. The fizz is the chemistry working.
3	Wait for fizzing to stop	Stir gently every minute. Fizz dies off as bicarbonates run out. Typically 5–15 min. Do not move on until the surface is calm.	All bicarbonates have converted to CO ₂ and left the reservoir. The buffer is now gone.
4	Measure final EC	Read EC after fizzing stops. Should match starting EC + small acid contribution (+0.05–0.15 mS/cm).	If EC dropped meaningfully, alkalinity reading was wrong; if it jumped >0.2 mS/cm, you overshot acid.
5	Adjust to target pH	Small additional doses of pH Down (or pH Up if you overshot). Wait 5 min between checks.	Final water is at target pH, stable, ready for nutrients (hydro) or direct use (irrigation).

WARNING

Never skip Step 3. Adding nutrients while bicarbonates are still active causes Ca/Mg to precipitate as carbonate scale within hours — cloudiness, white film, chalky residue. Nutrients lock up; plants starve. Single most common failure mode in Dragoons hydroponics. Wait for the calm surface. **Always add acid to water, never water to acid** — pouring water onto concentrated acid can cause sudden boiling. Safety glasses + gloves for anything stronger than vinegar.

pH Targets by Use

Guide 13 §5.4

Use	Target pH	Notes
Hydroponic peppers, tomatoes, cucurbits	5.8 – 6.2	Standard fruiting-crop range.
Hydroponic leafy greens (lettuce, herbs)	5.8 – 6.3	Slightly broader tolerance.
Hydroponic brassicas	6.0 – 6.5	Brassicas prefer slightly higher.
Soil-bed drip irrigation, most vegetables	6.5 – 7.0	Headroom for biological drift.
Orchard / mature trees	6.0 – 7.5	Trees are tolerant; minimize acid.
Acid-loving crops (blueberry, azalea)	5.0 – 5.5	Difficult crops in the Dragoons regardless.

Choosing the Acid

Guide 13 §5.3 + Guide 4 Part 3

Acid	Strength	Notes
Citric acid (powder, 1 g/mL stock)	Precise	Best purchased option. Accurate dosing, no surprises. Standard choice for the protocol. ~\$10/lb at any grocery or canning supplier.
Phosphoric acid (commercial pH Down)	Very strong	Most reliable for hard well water. Adds a small amount of phosphorus — a benefit at fruiting, not a problem.
Prickly-pear vinegar (for-aged)	pH 3–4	Best local option once you have a patch. Ferment crushed prickly-pear juice open to air 2–4 weeks. Gentle, easy to dose.
Distilled white vinegar (5% acetic)	Mild	Workable for small batches — but consumes a lot of volume (4–8 oz per 15-gal tub). Household backup, not routine.
Sulfur burn	pH 1–2	Strong; fumes are irritating; outdoors only. Not recommended for routine use.

LOCAL TIP

Source quality ranked (cleaner = less protocol work): monsoon rainwater ●●●●● > RO well ●●●●● > 50:50 RO/rain blend ●●●●○ > treated well ●●●○○ > untreated well ●○○○○ (do not skip protocol). **The Dragoons monsoon collapses the bicarbonate problem mid-July through October** — rainwater catchment reduces Step 2 to a small pH nudge. High-leverage capture window is July.