

Crop Steering (Irrigation & Substrate) — Combined Quick Reference

Vegetative vs generative goals • P1/P2/P3 phases • Practical tuning levers • Shot-size math

Driver	Vegetative	Generative
EC	↓ lower	↑ higher
WC	↑ higher	↓ lower
VPD	↓	↑
Temp	↑	↓
Irrigation freq.	↑	↓
Feed duration/window	↑	↓

Legend: ↑ increase / ↓ decrease

Daily phases & steering signals

Daily timeline

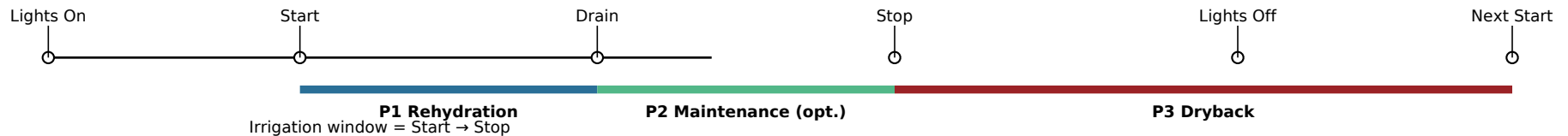
- P1 Rehydration: raise WC from overnight min → max field capacity. Runoff often begins near the end (your “drain” point).
- P2 Maintenance (optional): small shots to hold WC near max field capacity (flatter WC line) and shape P3 dryback.
- P3 Dryback: stop → next start; WC declines and EC often rises (concentration). No irrigation during lights-off.
- Irrigation window: start → stop.

Vegetative signals (push stems/leaves)

- Shot size 2–4% • 15–40 min intervals • Inter-shot dryback 1–4% • VPD 0.9–1.0
- Daily dryback target 10–20% (≈25% of max field capacity).

Generative signals (push flowers/buds)

- Shot size 4–10% • 40 min–2 hr intervals • Inter-shot dryback 4–6% • VPD 1.1–1.3
- Daily dryback target 25–50% (≈50% of max field capacity).



Practical tuning levers (from the pages provided)

- P1 runoff timing: many growers aim to see “drain” (first runoff) within ~the 3rd–4th P1 event so EC can be washed down toward the goal as transpiration ramps.
- P1 spacing controls EC: closer P1 events → runoff sooner → EC drops faster; wider spacing (same shot) → less runoff → EC builds.
- Building EC: 1–2 days with minimal runoff can raise EC; too many days can create nutrient imbalance/deficiencies.
- P2 to hold field capacity: if shot size ≈ inter-shot dryback, WC can stay flat near max field capacity; a slight EC rise in P2 can be normal.
- If EC climbs rapidly in P2: consider increasing P2 shot size (or adding leaching/runoff).
- Last event timing sets P3: to increase overnight dryback, stop earlier (more time to dry); to reduce dryback, stop later. If you already stop ~1 hour before lights-off and dryback is still too large, consider starting P1 earlier the next day.
- Night watering warning sign: needing irrigation during lights-off to stay above minimum WC (avoid wilting) usually means the substrate is too small for plant size/transpiration—consider larger substrate, shorter veg, and/or higher plant density.

Example pattern math shown: Vegetative P1: $6 \times 3\%$ shots – $5 \times 1\%$ inter-shot = ~13% net rehydration. Generative P1: $4 \times 8\%$ – $3 \times 4\%$ = ~20% net rehydration.

Shot Size & Irrigation Duration — Quick Math

Formulas

- 1 gallon = 3789.5 mL
- Emitter output (mL/min) = (GPH × 3789.5) ÷ 60
- Shot size (mL) = substrate volume (mL) × (shot% ÷ 100)
- Event duration (min) = shot mL ÷ total mL/min (all drippers)

Emitter flow quick table (approx.)

GPH	1 dripper (mL/min)	2 drippers (mL/min)
0.3	19	38
0.5	32	64
1.0	63	126

Worked example

1-gal pot, 5% shot, two 0.5 GPH emitters → $3785 \times 0.05 = 189$ mL; 2×0.5 GPH ≈ 64 mL/min; $189 \div 64 \approx 3$ min.

Common substrate volumes (rounded) and example 3/6/9% shots

Substrate	mL	3%	6%	9%
Coco 4×4×4 in	1,000	30	60	90
Coco 1 gal	3,785	114	227	341
Coco 1.5 gal	5,678	170	341	511
Coco 2 gal	7,570	227	454	681
Coco 3 gal	11,355	341	681	1022
Coco 5 gal	18,925	568	1136	1703
Rockwool Delta 6.5	650	20	39	58
Rockwool Delta 8	800	24	48	72
Rockwool Expert Gro-Slab (6×3×36 in)	10,130	304	608	912
Rockwool Slab + 3× Delta 6.5	12,080	362	725	1087

Note: values are rounded for quick use; use the formula for exact numbers.