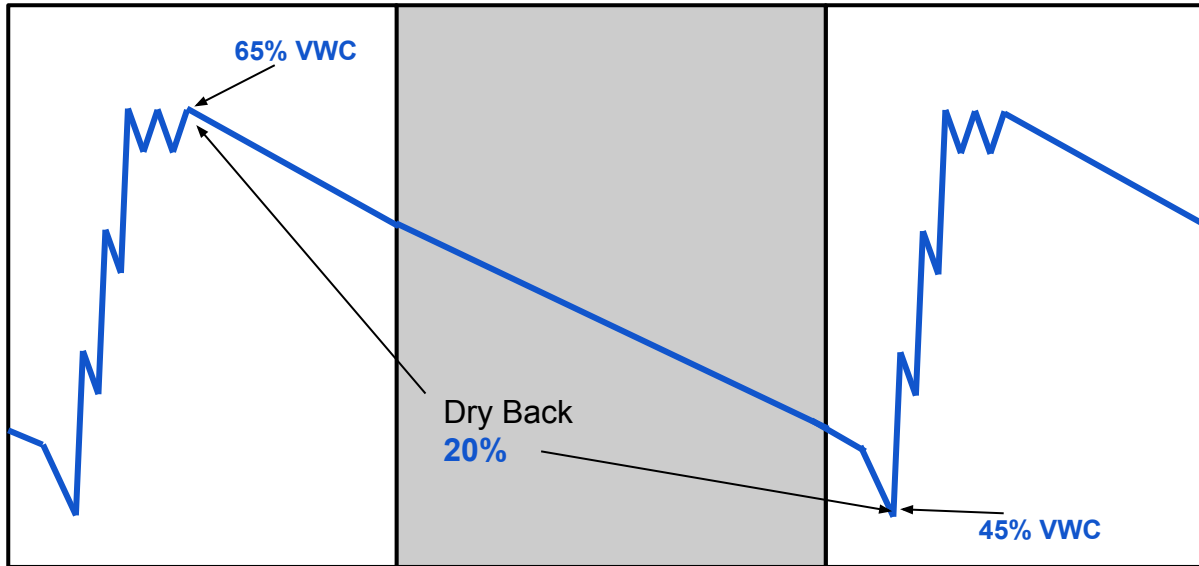


Guide to Substrate Management

By:



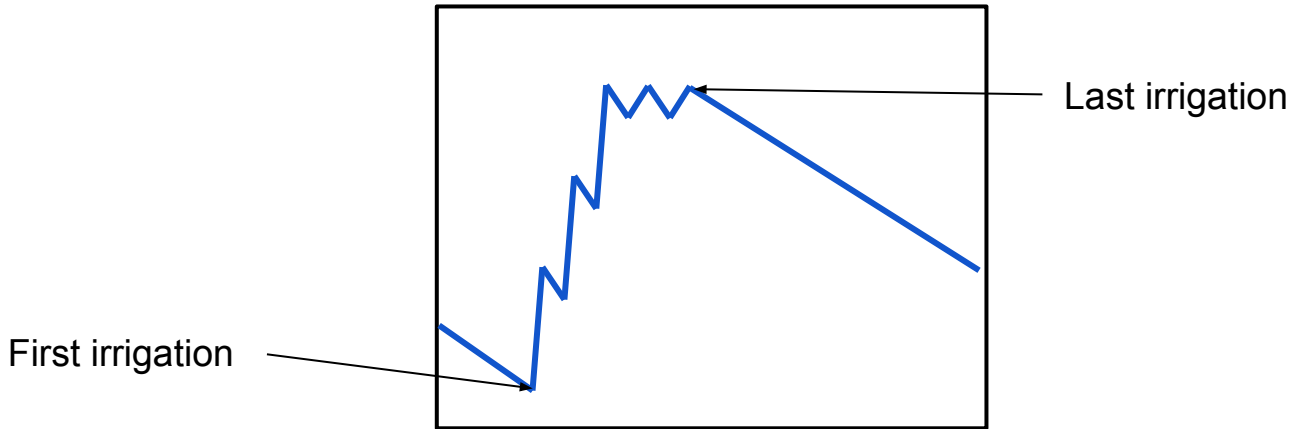
Dryback



Definition - Dryback is the difference in substrate water content from the last irrigation event of the day to the first irrigation event the following day. It is measured in % VWC (and in many cases time).

Irrigation Window

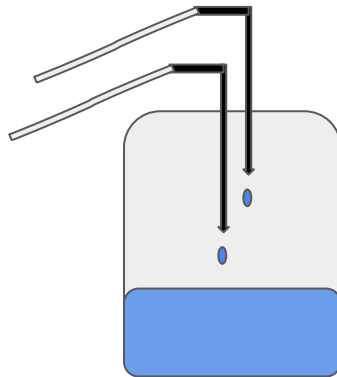
Definition - The amount of time from the first watering event of the day to the last watering event of the day



Example: First irrigation starts at 3:00 am, last irrigation is at 6:00 am. The irrigation window is 3 hours in duration

Shot Size

1. A “shot” is an irrigation event, and “shot size” is simply referring to the volume applied during that irrigation event.
 - a. Example: 3 minute shot with two 1.2 L/H (0.32 GPH) drippers = 120 mL applied during the irrigation event
 - b. The volume of a shot is usually measured in mL and expressed as a percentage of the total substrate volume.
 - i. A “3% shot” simply means the volume of water applied during that shot is equal to 3% of the total substrate volume.
2. Shots should not be more frequent than every 15 minutes, and that 15 minute break is usually termed the “rest period.”
3. In typical indoor cultivation environments, shots should not be larger than 10%. In certain specific scenarios with large plants growing in small containers outdoors, that maximum is less able to be adhered to, especially during use of generative steering tactics.



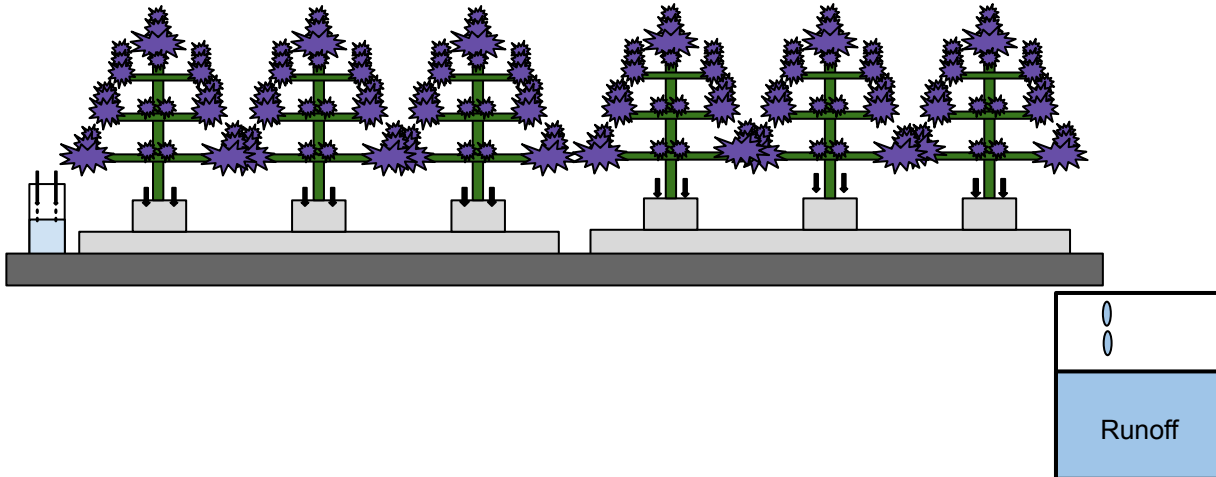
How to measure Shot Size

1. Method 1: Set up a catch cup and capture the volume of solution applied during an event
2. Method 2: Shot Volume = $((N \times Q) / 60) \times T$
 - a. N = number of drippers per plant
 - b. Q = Flow rate per dripper (in either liters or gallons per hour)
 - c. T = Time in minutes that the drippers are running during a shot

Leachate

Leachate (aka “Runoff”)

1. Definition - The solution that has not been absorbed by the medium and is released as drainage during and/or after an irrigation event. This is typically achieved after your substrate has reached Field Capacity (FC, the maximum amount of water the substrate can hold against gravity).
 - a. It is good practice to check and record the Volume, PH and EC of the leachate
 - b. Rockwool Leachate target - 0-20%
 - c. Coco Leachate target- 0-40%
 - i. Example: runoff volume 200 ml / feed volume 1,000 ml = 20% runoff



What is Generative Growth

1. In the literal sense, generative basically means reproductive. The Generative phase of growth is another word for the Flowering phase. However the word Generative is also used to describe a steering tactic that promotes focus on reproductive plant parts by the plant.

What is Generative Steering

2. The use of intentional, targeted stressors to promote more compact growth with a greater plant focus on reproduction and the plant parts necessary to do so.
3. This steering technique can be used to;
 - a. Tighten your node spacing in veg and early flower (weeks 1-3 or 1-4)
 - b. Initiate early flower onset in outdoor environments without exact photoperiod control capabilities
 - c. Create more bud sites per length of stem than would occur if plants were steered vegetatively during weeks 1-3
 - d. Ripen your plants at the end of flower

What is Vegetative Growth?

1. When plants are vigorously producing leaves, stalks, and shoots.
 - a. During this phase plants are building new shoots/branches, large leaves, and strong stalks for optimum photosynthate/assimilate production and to set up a strong supporting stem to hold the weight of the flowers to be created in the next phase of growth.
 - b. These assimilates are the sugars/carbohydrates that are produced by the leaves through photosynthesis, and are used to fuel growth.

What is Vegetative Steering?

1. Vegetative steering is when you promote rapid growth by removing any and all plant stressors. This is done by making water as easily absorbable as possible (lowering ECpw and not allowing for as large of a dryback to occur), while still providing adequate nutrition in the nutrient solution.
2. Every Irrigation event/shot is a vegetative signal, it communicates to the plant that it is time to take advantage of currently available and plentiful resources and grow as much as possible during that time.
3. This steering technique can be used to;
 - a. Promote upward growth of leaf and stalk during veg and, with certain short/bushy cultivars only, during the first week to 10 days of flower
 - b. Bulk flower during peak production of flower mass
 - c. These tactics should be carefully used in weeks 1-3 of flower only under very specific circumstances and for very specific cultivars, otherwise vegetative techniques are reserved for the Veg room and later flower, roughly weeks 4-7.

How substrate volume and type affects a plant's vegetative or generative response

1. Substrate Volume

- a. Larger = Generative
 - i. Slower drybacks, less frequent irrigations, and a shorter irrigation window
- b. Smaller = Vegetative
 - i. Faster drybacks, more frequent irrigations, and a larger irrigation window

2. Substrate Type

- a. High chip ratio vs pure pith coco
 - i. High chip to pith ratio in coco has a lower Field Capacity than pure pith will. With a lower maximum VWC%, a farmer will irrigate more frequently, creating a more vegetative crop
 - ii. Pure pith coco has a higher field capacity than one with chip in it. With a higher maximum VWC% a farmer will need to irrigate less frequently, creating a more generative crop.
- b. Rockwool blocks vs slabs;
 - i. Rockwool blocks cannot hold enough water for most flowering crops and dry back very quickly. With a lower water-holding capacity, a farmer will need to irrigate more frequently, creating a more vegetative crop
 - ii. Slabs have a much higher capacity than blocks, due to the shape and the bottom being fully wrapped in plastic. With a higher water-holding capacity, a farmer will need to irrigate less frequently creating a more generative crop.

To **maintain** a dryback and **decrease** substrate EC

Generative

Start Time	Same
# of Shots	Same
Shot Size	Increase
Irrigation window	Same
Runoff	Increase

Vegetative

Start Time	Same
# of Shots	Increase
Shot Size	Same
Irrigation window	Same
Runoff	Increase

To **maintain** a dryback and **increase** substrate EC

Generative

Start Time	Same
# of Shots	Same
Shot Size	Decrease
Irrigation window	Same
Runoff	Decrease/None

Vegetative

Start Time	Same
# of Shots	Increase
Shot Size	Decrease
Irrigation window	Same
Runoff	Decrease/None

To decrease a dryback and decrease substrate EC

Generative

Start Time	Same
# of Shots	Same
Shot Size	Increase
Irrigation window	Increase
Runoff	Increase

Vegetative

Start Time	Same
# of Shots	Increase
Shot Size	Same
Irrigation window	Increase
Runoff	Increase

To decrease a dryback and increase substrate EC

Generative

Start Time	Same
# of Shots	Decrease
Shot Size	Same
Irrigation window	Increase
Runoff	Decrease/None

Start Time	Same
# of Shots	Same
Shot Size	Decrease
Irrigation window	Increase
Runoff	Decrease/None

Vegetative

Start Time	Same
# of Shots	Increase
Shot Size	Decrease
Irrigation window	Increase
Runoff	Decrease/None

To **increase** a dryback and **decrease** substrate EC

Generative

Start Time	Same
# of Shots	Decrease
Shot Size	Increase
Irrigation window	Decrease
Runoff	Increase

Vegetative

Start Time	Same
# of Shots	Increase
Shot Size	Same
Irrigation window	Decrease
Runoff	Increase

To **increase** a dryback and **increase** substrate EC

Generative

Start Time	Same
# of Shots	Decrease
Shot Size	Same
Irrigation window	Decrease
Runoff	Decrease/None

Vegetative

Start Time	Same
# of Shots	Same
Shot Size	Decrease
Irrigation window	Decrease
Runoff	Decrease/None