

Substrate growing: Drain Percentage

Jordan Hydroponic Agriculture and Employment Development Project:

Experiences 2018 - 2019

no. 5

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Introduction

Drain percentage is measured to ensure adequate control of substrate salinity. Without drain, harmful salts will accumulate in your slabs. Drain measurements should be performed daily. Drain should be around 25%, somewhat lower on cloudy days and somewhat higher on sunny days but never exceeding 20-30%. Use a registration form as it will help you collect and register data in a structured way. Note values are always reported per m². The reason is that light, the most important factor for growth and for transpiration, arrives per m² rather than per plant.

Supply volume

You can measure the supply by putting a large bucket or bottle under a spare dripper. Every morning before irrigation starts, measure the volume to know what was the supplied amount from the previous day. Empty the bucket. The formula, measured volume * plant density/m² will give you the supply volume/m².

Drain volume

Preferably use a specially designed support (as in Fig 1) to elevate one slab and collect its drain. If not available, you can make it yourself by cutting a piece of gutter the size of one slab, closing the two ends and making a hole at the lower slope side that you connect with a pipe. Place a large bucket under the pipe. Measure the drain volume at the same moment as the supply volume. Empty the bucket. The formula, measured drain volume * slab density/m² will give you the drain volume/m². Even if your climate computer has a drain counter, manual checks are necessary.



Figure 1: Left: Supply volume is measured from 1 dripper. Right: Drain volume is measured from a whole slab.

Drain percentage

From the supply & drain volume you can calculate the drain percentage using the formula: drain/supply*100. The drain percentage is an important parameter which you can influence by changing the irrigation. You don't want the drain percentage to be too high because it means you are flushing the slabs. Secondly, it is a waste of water. You don't want your drain percentage to be too low because it means your plants are not getting enough water and in the long term, your slabs might dry up decreasing their quality and resulting in inhomogeneity between the slabs. Furthermore, the EC might become too high which will cause damage to your plants. Some nutrients can become depleted even at high EC.

Example

Table 1: How to calculate drain percentage?

Parameter	Unit	Value	Calculation
Measured supply	L/dripper	1.8	A
Measured drain	L/slab	1.4	B
Dripper density	Drippers/m ²	2.5	C
Slab density	Slabs/m ²	0.9	D
Drain percentage	%	28%	(B*D)/(A*C)*100

Slab management

You want your slab moisture content to be about 70% and this should be uniformly around the greenhouse. To check this you can weigh the slabs but also feeling the weight with your hands will give you a rough idea about the moisture content. For rockwool substrates, there are also special moisture content sensors available. Keep track of this through all of the greenhouse and if you observe some slabs are too wet/dry, find out the cause and adjust. For example, at the sunny side slabs might need an extra dripper.

Cross checking

Measuring drain and supply allows you to check whether your system is working correctly. Write down weekly your measured values and the values measured by the computer to cross check whether what the computer measures is really happening. Convert all results to L/m² so that you can compare them with each other. Most climate computers register nr of cycles/day, dripper volume and amount of flow to all valves.