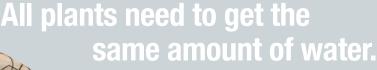# Distribution uniformity of irrigation

Distribution Uniformity (DU%) is a way of measuring whether all plants are getting the same amount of water. It is measured as a percentage (%). The higher the distribution uniformity, the better the irrigation system is working.

The amount of water that comes out of an emitter in your hydroponic system may be different to the amount coming out of another emitter.

To make sure that your crop grows evenly, every plant has to get the right amount of water. If one section of your greenhouse gets more water than another section when you irrigate, some plants will either get too much or not enough water. This will reduce your yield. It can also make pest or disease problems worse.

All plants need to get the same amount of water.

For a hydroponic system, you should aim to have a distribution uniformity (DU%) of 95-100%. You can compare the DU% for your hydroponic systems with the following values:

Excellent	90-100%
Good	80-90%
Okay	70-80%
No Good	< 70%

There are a few things you can do to make the distribution uniformity better.

1 Flush hoses and laterals once a week. Flush sub and main irrigation lines every month.

2 Keep your filters clean. Make sure they are in good condition.

3 Use cleaning agents (such as an acid flush) to remove bacterial and mineral blockages.

4 Avoid high and low areas in the hydroponic system.

5 Control the water pressure between emitters.

6 Make sure the pumping capacity of the pump is correct for the size of the irrigation section.

This **Preventing pests and diseases in the greenhouse** fact sheet is part of a series designed to show basic irrigation practices for substrate hydroponics. Correct irrigation can significantly reduce costs and losses from pests and diseases and improve crop production.

For more information on irrigation in substrate hydroponics contact your local independent advisor.

These materials were developed by NSW Department of Primary Industries with the assistance of Horticulture Australia Ltd, through the national vegetable levy.

For more information: Jeremy Badgery-Parker

Working out DU%

To check if your hydroponic system is working properly you need to:

1 Work out the average water application rate for all the sampled emitters

2 Work out the average water application rate for the lowest quarter of the sampled emitters

3 Calculate the distribution uniformity (DU%)

Each section of your hydroponic system needs to be checked separately. Samples of water are collected from different areas of the hydroponic system. If there are any parts or areas of your hydroponic system where you think there is a problem, take extra samples. Take at least 28 samples from each area tested.

Average water application rate

The application rate is the amount of water (in litres) that each emitter puts out in one hour.

1 Choose the locations where you will take each sample. Four emitters should be selected from each lateral pipe. One sample needs to be taken from an emitter near the beginning of the lateral pipe and one sample from an emitter near the end of the lateral. The other two samples should be from emitters somewhere along the row, for example, one third and two thirds of the distance along the row. If you have seven (7) rows in the greenhouse, you will end up collecting 28 samples.

2 Place a cup or small container under each emitter that you will sample.

3 Turn on the irrigation system for 60 seconds (1 minute) then turn off the water.

4 Collect each sample and use a measuring cylinder to measure the amount of water (in millilitres, ml) in the cup. Record the amount of water for each emitter on a data sheet.

5 Calculate the amount of water that comes out of each emitter in millimetres per hour (L/hr). Record these numbers on a data sheet.

Amount of water per hour (L/hr) = Water collected (ml) x 60

6 Add up the numbers for all the emitters. Divide this total volume by the number of emitters sampled.

7 Record this number on the data sheet.

Average water application rate for the lowest 25% of emitters

1 Rank the emitters in order of how much water they put out.

2 Mark which ones make up the lowest quarter (25%) of emitters.

3 Now, add up the numbers for the lowest 25% of the emitters. Divide this total volume by the number of emitters (lowest 25%).

4 Record this number on the data sheet.

Calculate the distribution uniformity percentage (DU%)

Divide the average application rate of the lowest 25% of the emitters by the average application rate of all the emitters. Multiply this number by 100.

$$DU\ (\%) = \frac{\text{Average application rate of the lowest 25\% of sampled emitters}}{\text{Average application rate of all sampled emitters}} \times 100$$

DU% data sheet

Emitter number	Location	Water collected (ml in 60 seconds)	Application rate (L/hr)	Lowest 25% (28/4 = 7)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
TOTAL	All emitters			
Average	All emitters			
TOTAL	Lowest 25%			
Average	Lowest 25%			

Average application from lowest 25% of emitters

DU (%) = --- x 100

Average application from all emitters

DU (%) = -------------------- x 100

DU (%) = _____%