

Comparison of nutrient film and deep water production systems for hydroponic lettuce

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Hydroponics is the art of growing plants without soil, but in water enriched with nutrients and oxygen



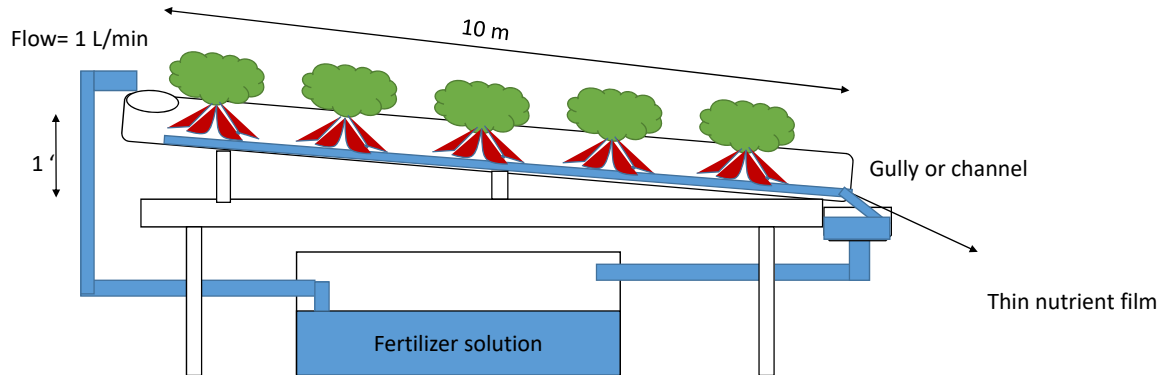
Many hydroponic techniques exist

1. **Nutrient Film Technique**
2. **Deep water hydroponics**
3. Flood & Drain/Floating system sub-irrigation
4. Aeroponics
5. Aquaponics

Nutrient film technique (NFT) is a hydroponic **technique** wherein a very shallow stream of water containing all the dissolved **nutrients** required for plant growth is re-circulated past the roots of plants in a watertight gully, also known as channels.



Nutrient Film Technique Explained



Fertilizer solution is recycled during production

Channels: 6 to 12 inches apart, plants: 6 to 8 inches apart within a channel



Nutrients are recycled in hydroponic lettuce production. Target is to maintain EC but not fertilizer composition in the solution



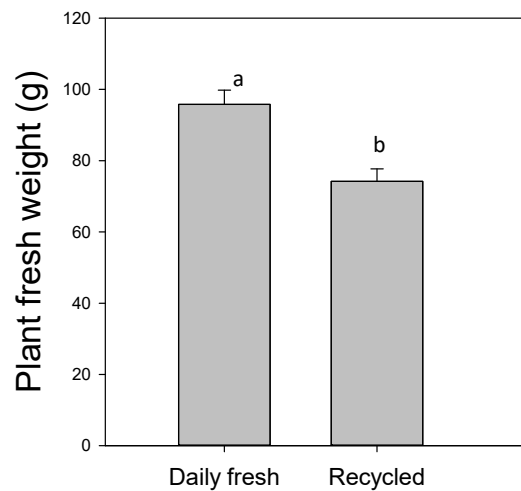
Maintaining target EC may not provide optimal nutrition

- N, P, K and Mn are rapidly taken from the solution while Ca and B are taken very slowly. Other elements have intermediate uptake rates (Bugbee, 2004)
- Elements like Ca, Mg, S and Na can accumulate in the recycled solution. These have high ionic conductivities and can significantly affect EC values

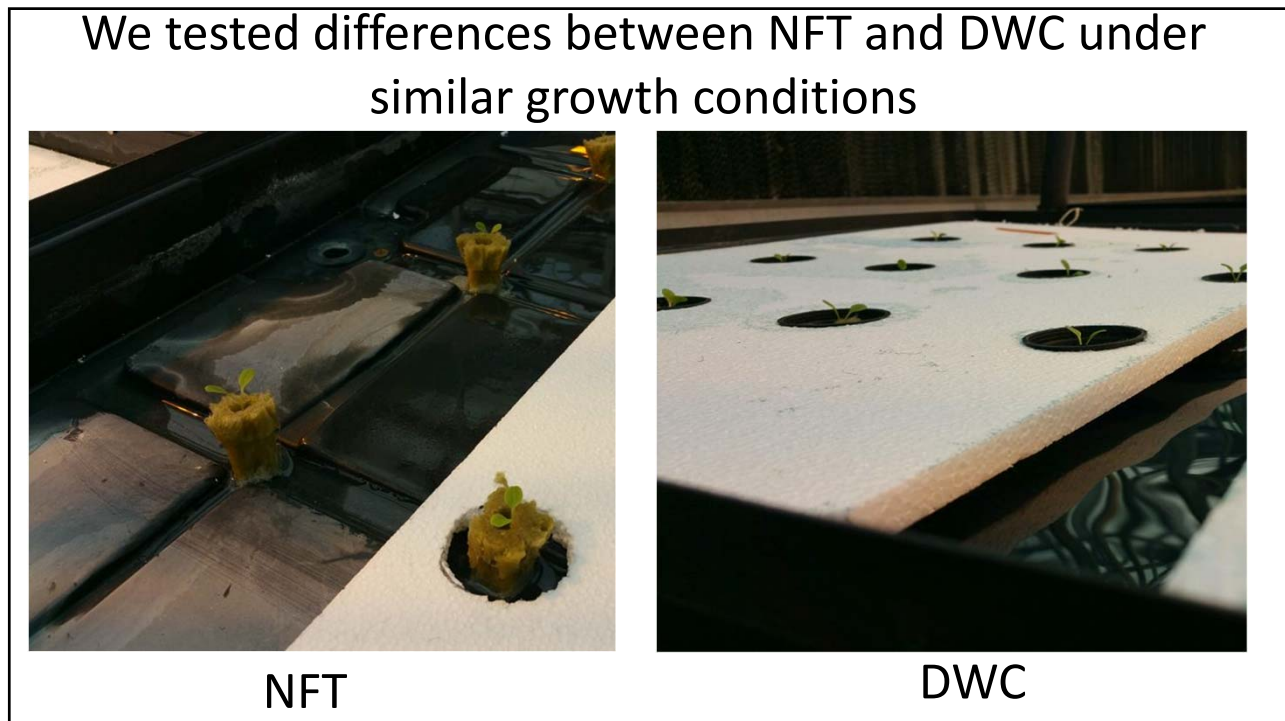
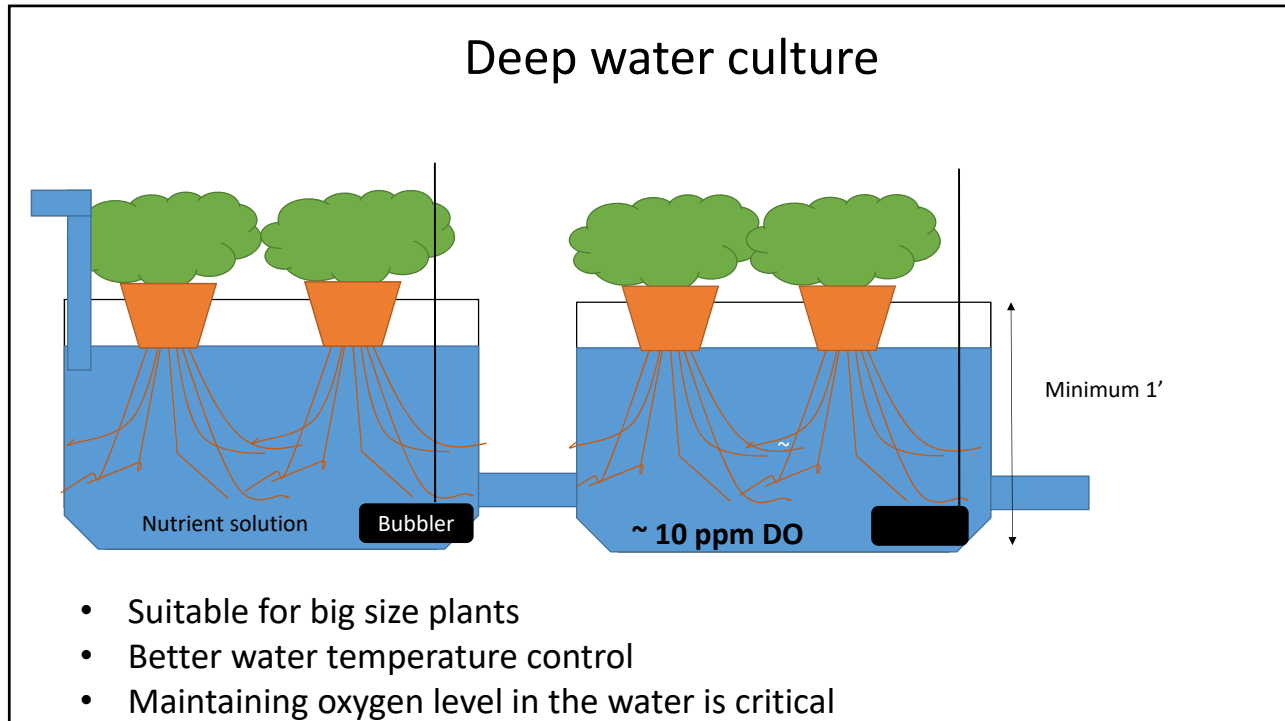
Maintaining target EC may not provide optimal nutrition

Treatment	N	P	K	Mg	Ca	S	Na
	(%)						
Daily fresh	3.76 a	0.53 a	4.19 a	0.51 a	1.06 b	0.31 a	0.19 b
Recycled	2.43 b	0.26 b	2.53 b	0.52 a	1.10 b	0.30 a	0.32 a

Fresh weight under NFT was smaller under recycling conditions





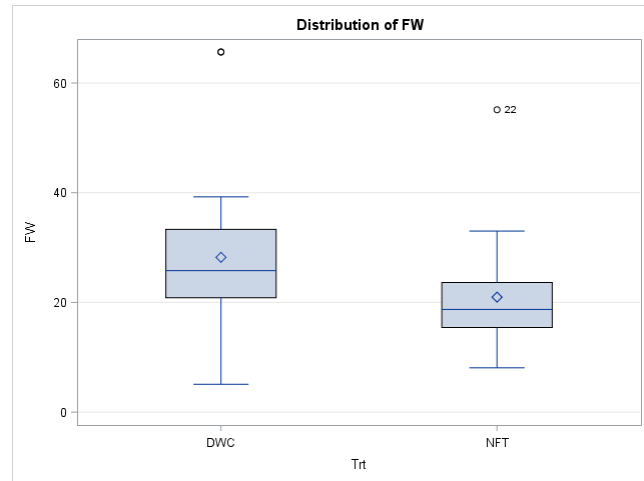


Plants grown under NFT produced lower fresh weight than DWC

Shoot fresh weight:

NFT : 28 g/plant

DWC: 21 g/plant

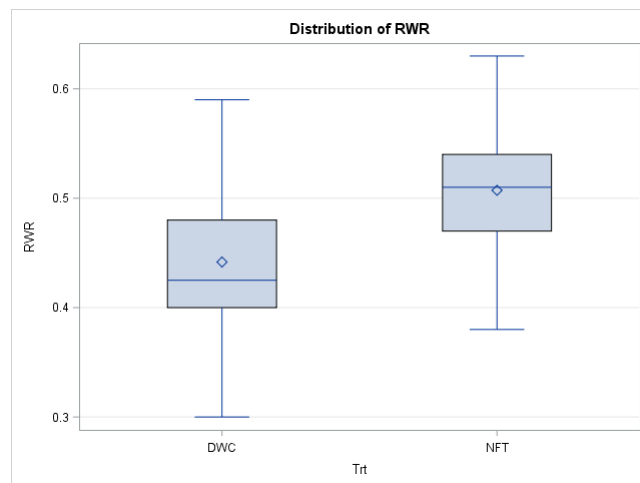


Plants grown under NFT showed more proportion of roots than DWC

Proportion of root weight to total weight:

NFT : 51%

DWC: 44%



Modified NFT?

Replacing recycled nutrient solution frequently and increasing the volume of nutrient solution supplied to roots can increase lettuce yields under NFT