Vertical Farming in the Urban Environment

Oscar Davidson
Business Development Specialist

Mission statement

> Our mission is to reduce the waste and carbon footprint of fresh produce by empowering anyone, anywhere, to grow delicious food near its point of consumption.

LettUs GROW

The **industrial food system** is **outdated**, **inefficient,** and is failing **people** and the **environment**...

Globalised urban populations are **distanced** from where their food comes from, with a lack of **transparency** and **traceability…'extinction of experience'**

LettUs GROW

30%

of all food purchased **goes to waste**

We import

60%

of the vegetables of the we eat

Growing, producing & importing food accounts for

30%

UK carbon footprint

Climate change & **Brexit** is threatening our food security

10%

11-14 year olds don't know carrots grow underground

25%

of the population **is obese**

By 2050

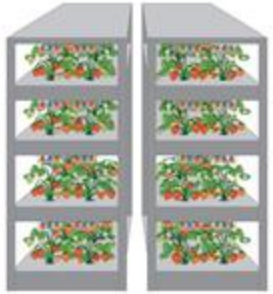
80%

of **food** will be consumed **in cities**

Source: BNF, NHS, Defra, Wrap, Ellen MacArthur Foundation

What is vertical farming?

- Growing inside a controlled environment
- Using vertical stacks to maximise productivity per m²
- Typically using a soil-less system & automated irrigation systems
- Typically using artificial LED lighting
- LettUs Grow use aeroponics, suspending roots in air & irrigating with a nutrient-dense mist
- Other irrigation options include: hydroponics and aquaponics

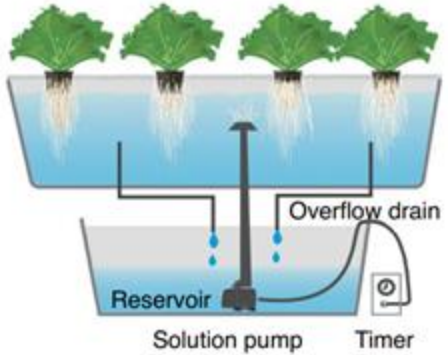


Conventional Open-field farming		Vertical farming
Uncontrolled sunlight (day length, spectrum and intensity), temperature, [CO2], water and relative humidity		Controlled light (day length, spectrum and intensity), temperature, [CO2], water and relative humidity
Unguaranteed and non-uniform quality of produce		Guaranteed and uniform quality of produce
High water use		Low water use
High pesticide use		No or low pesticide use
Low energy use		High energy use
Substantial food miles		Potential for minimal food miles

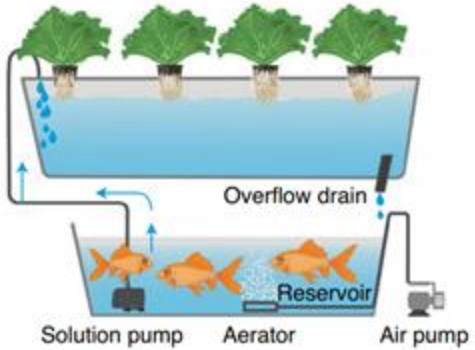
Source: S.H van Delden et al. Current status and future challenges in implementing and upscaling vertical farming systems, Nature Food (2021)

Hydro vs Aero...

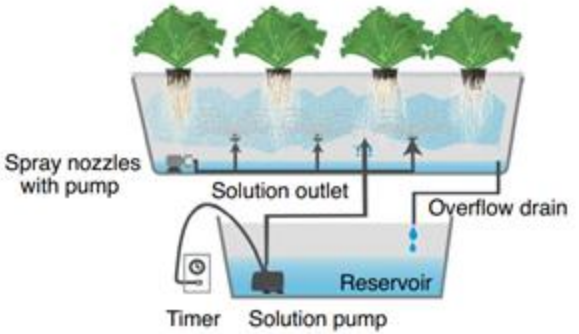
what's the difference?



Hydroponics



Aquaponics

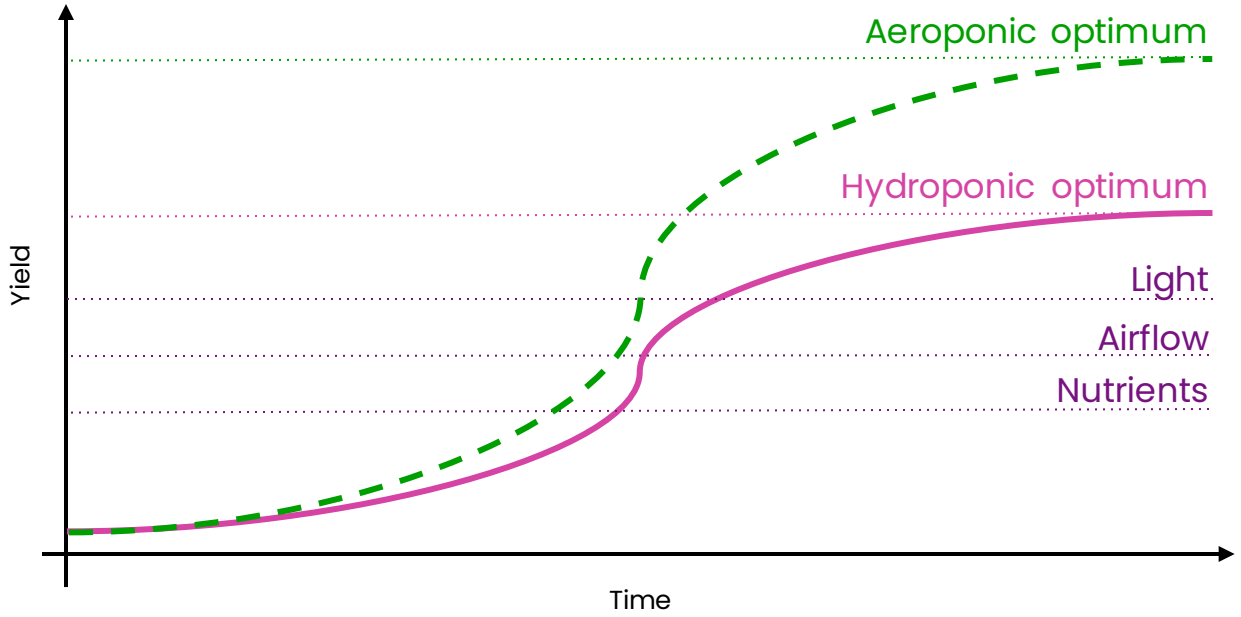


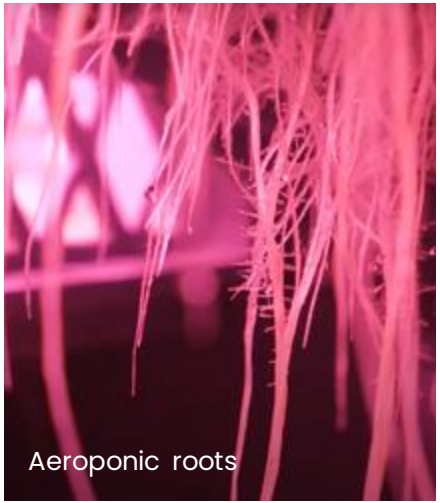
Aeroponics

Source: S.H van Delden et al. Current status and future challenges in implementing and upscaling vertical farming systems, Nature Food (2021)

Aeroponics in action...

Aeroponics: the science





Aeroponics increases the optimal growth rate **beyond the capability** of hydroponic systems, by removing the fundamental limiting factor of root zone oxygenation.


Hydroponics
Aeroponics

Benefits of indoor farming

Up to 95% less water than field farming

No pesticides, herbicides or harmful chemicals

No fertiliser runoff into waterways

Growing closer to the consumer results in less food waste

Takes pressure off depleted soils and farmlands

Growing local can reduce the carbon footprint of produce

The benefits of indoor farming can help protect our shared planet.

Vertical farming at all scales

Automated VF

DROP & GROW

Tower Farms

Automated Aeroponic Greenhouse

Growing area

0 m²

250 m²

1,000 m²

5,000 m²

20,000+ m²

Design & Build

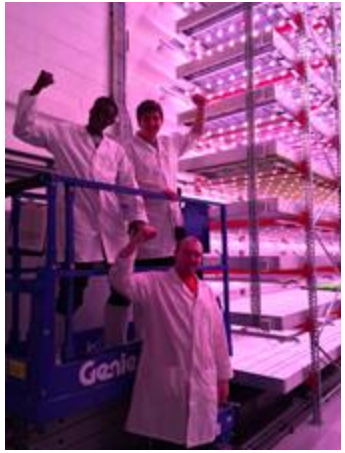
Automated Aeroponic Vertical Farm

GrowUp
URBAN FARMS

GrowUp Box

- Container based aquaponics demo system, 1500l tank w. 150 fish & 40m2 ga.
- Customer engagement - produce sales salads and herbs
- Community engagement - open days and workshops

Aquaponics

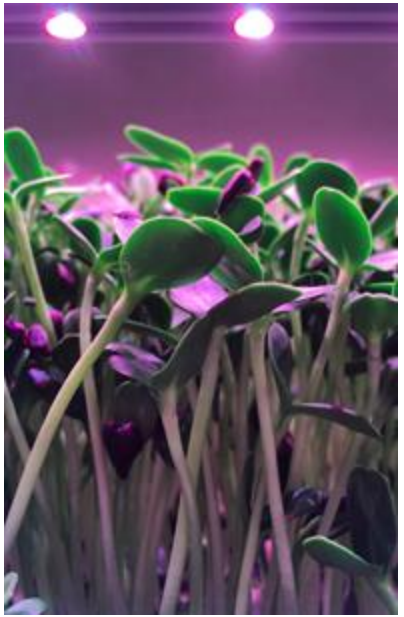





Unit 84

- UK's 1st commercial scale urban aquaponic vertical farm. 36000l / 800m2 ga.
- 20 tonnes of salad and 4 tonnes of fish a year
- All produce harvested and delivered on the same day via electric delivery vehicle.

Aquaponics



Container Farm

- Pioneering container based hydroponic system w. 40m2 growing area.
- Disused industrial space
- Set up in 2015, Bristol Green Capital year.
- 100kg produce / month
- Ultra local food production, training & engagement, research & development

GROW BRISTOL

Hydroponics





Aims:
Create **Opportunity.**
Re-connect people with food.
Transparent food production.

Training & Opportunity:
50 + volunteers, interns, work experience and researchers.
Creating **future farmers.**
Green collar jobs.

Engagement:
School visits
Public tours
Corporate tours
International groups

GROW BRISTOL

Hydroponics

SPARK* YORK

Grow It YORK

Spark York 2019

- Centre of York
- Action Research, micro incubator, local food production
- Training and engagement

Aeroponics

Thank You!

Thyme for Questions

oscar.davidson@lettusgrow.org