Nanobubble Insights Ltd

Nanobubble Insights – Case Study

Nanobubbles increase yield and accelerate growth in Radish microgreens

Organisation: Nanobubble Insights (Microshoots Laboratory)

System: Vertical Farm

Crop: Radish (Sangria) microgreens

Location: Dundee, UK

Summary

Across multiple laboratory trials we have achieved over 30% higher harvest weight in radish microgreens grown with NanobOx nanobubble-treated water. While canopy uniformity varied between trays, nanobubble irrigation consistently improved shoot vigour, root development, and yield efficiency per gram of seed without changes to lighting, nutrients or substrate.

These are **preliminary findings**, and further trials are underway to confirm consistency before publication.

At a Glance:

- **Objective:** Evaluate the impact of nanobubble water on radish microgreens growth rate and harvest yield.
- **Comparison:** Control (standard filtered water) vs. NanobOx nanobubble-treated water.
- **Observation Period**: 5-7 days after sowing.
- **Outcome:** Nanobubble-treated microgreens achieved higher fresh weight and reached control yield approximately one day earlier.

The Challenge

Radish microgreens are grown intensively, and their rapid growth leaves little margin for optimisation. Even small differences in dissolved oxygen, nutrient transport, or moisture dynamics can affect yield and timing.

These trials tested whether NanobOx nanobubble water could improve productivity and shorten the growth cycle without changing existing production inputs.

Our Approach

Trials were conducted in controlled conditions using coco coir substrate:

- **Trial 1 – Yield Comparison:**
  Trays were grown side-by-side for 7 days using identical seed density and nutrients. The only variable was irrigation water type (Control vs. Nanobubbles).
  Objective: Quantify yield gain at standard harvest time.

- **Trial 2 – Harvest Timing Study**
  Trays were harvested sequentially on **Day 5, Day 6, and Day 7** to track yield progression.
  Objective: Determine whether nanobubble water accelerates crop readiness for harvest.

What We Observed

Trial 1 – Increased Yield at Harvest

- Shoots exhibited stronger turgor, thicker stems, and more robust root systems (Figure 1).
- Nanobubble trays produced **over 30 % higher fresh weight** compared with the control (Figure 2).

Control NBs Control NBs

Figure 1. Radish (Sangria) trays before harvest, Control (left, NB, right). Top view and side view.

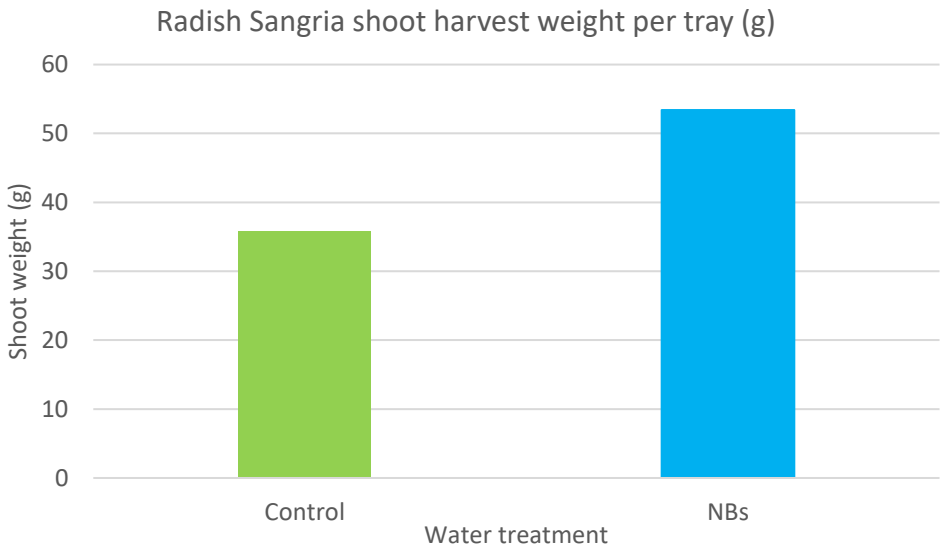

Figure 2. Shoot harvest weight of radish microgreens irrigated with Control vs Nanobubble water.

Trial 2 – Faster Growth Progression (Figure 3)

- Nanobubble trays reached the same harvest weight as the Day 7 control **by Day 6**, indicating accelerated biomass accumulation.
- Yield per gram of seed remained consistently higher throughout the growth window.
- Canopy coverage improved earlier in the cycle, even though final uniformity remained variable.

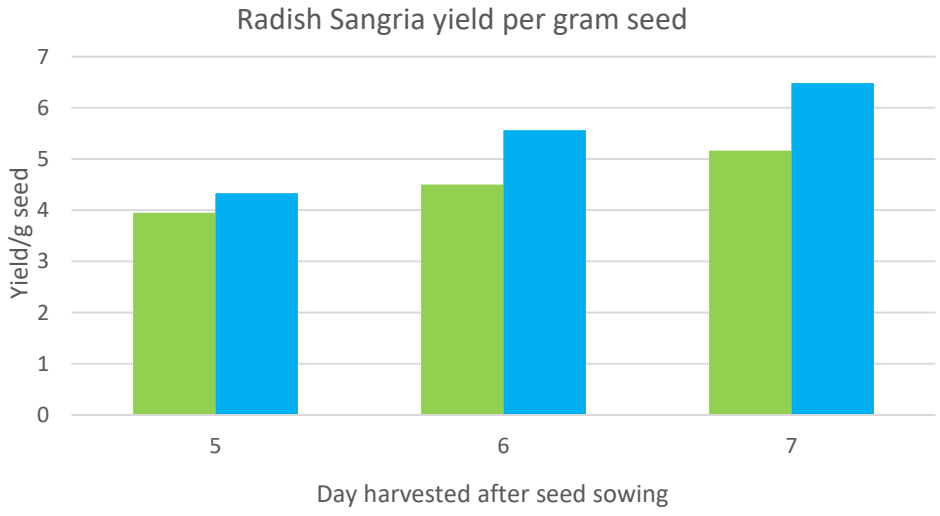

Figure 3. Yield progression over Days 5-7 showing earlier maturity of nanobubble-treated radish.

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Why It Matters

NanobOx nanobubble-enriched water not only boosted yield but also accelerated crop development by approximately one day, a significant gain in high-throughput microgreens systems.

This earlier harvest potential can increase total weekly output without additional energy, nutrient, or labour input.

These results are **early-stage indicators** of the technology's potential and will be extended in larger multi-cycle studies prior to publication.

Commercial Implications

- Over 30% yield increase at standard harvest.
- Earlier market-ready crop by one day.
- Compatible with existing irrigation and fertigation systems.
- No change to nutrient recipe or substrate required.

Current Scope & Next Steps

The next phase will focus on **optimising uniformity of growth** across trays. This includes testing seed density, surface levelling, and irrigation frequency to minimise variability.

Further work will also assess how evenly oxygen and nutrients are distributed within trays to ensure consistent shoot development.

How Partners Can Engage

- **Collaborative trials:** Join upcoming studies on nanobubble applications in controlled environment agriculture.
- **R&D pilots:** Implement small-scale trials in your own systems, or in the Microshoots Laboratory.
- **Consultation:** Learn how nanobubble water can be integrated into your growing process.

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microshoots lab