

Enhancing Coriander Growth in Hydroponics Using Oxygen Nanobubble Technology

Case Study: Water Technology Lab, Department Of Chemical Engineering, IIT Ropar.

Location	Unit Type	Results
Water Technology Lab, Department Of Chemical Engineering, IIT Ropar	NanoAqua N-5 Nanobubble generator	• Enhance Growth • Shoot length increased • Root Length Enhancement • Higher Biomass Accumulation • Improved Leaf Count
Application	Trial Dates:	
Hydroponic Growth of Coriander	March to April 2024	

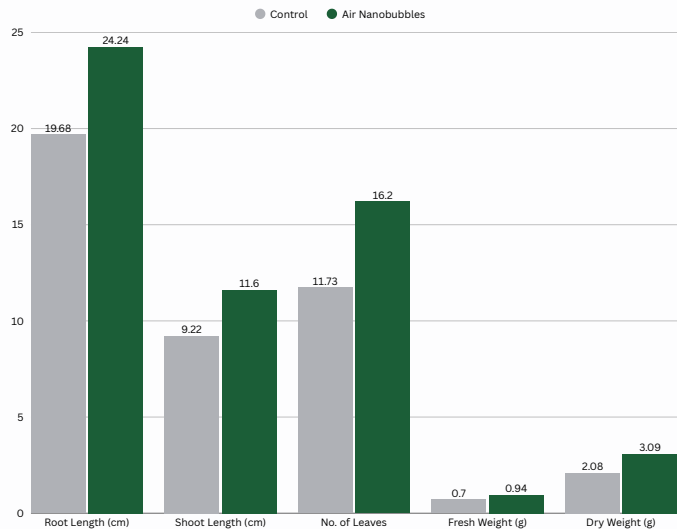
Nanobubbles enhance plant growth by improving oxygen availability and nutrient uptake in water. Their ultra-fine size and stability allow better penetration into the root zone. Hydroponic systems depend on dissolved oxygen and nutrient availability for optimal plant development. Efficient oxygen delivery plays a critical role in root health and overall growth. This study evaluates the impact of oxygen nanobubble-enriched water on coriander growth compared to standard hydroponic conditions, using the NanoAqua N-5 system.

Objective

The primary objective of this study was to assess the influence of oxygen nanobubbles on key Coriander growth parameters, including leaf count, shoot length, root length, fresh weight, and dry weight.

Experimental Setup

The study was conducted in a hydroponic system using nutrient-rich water reservoirs for lettuce cultivation. The NanoAqua N-5 nanobubble generator was integrated to oxygenate the water continuously. Treated water was circulated to ensure uniform distribution across the roots. Environmental conditions, including temperature, humidity, and light, were maintained consistently.



Key Observations:

Enhanced Growth

Coriander plants treated with nanobubble-enriched water showed a clear improvement across all measured growth parameters compared to the control.

Shoot Length Increase

An increase of approximately 26% in shoot length was observed, indicating stronger above-ground growth.

Root Length Enhancement

Root length improved by around 23%, reflecting better oxygen availability and nutrient uptake.

Higher Biomass Accumulation

Fresh weight increased by approximately 35%, showing significant improvement in overall biomass production.

Improved Leaf Count

An increase in the number of leaves was observed, contributing to higher photosynthetic activity and improved plant vigour.

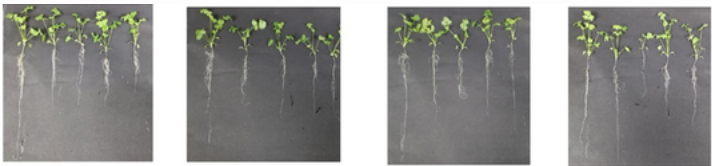


Figure: Control plant grown without Treatment

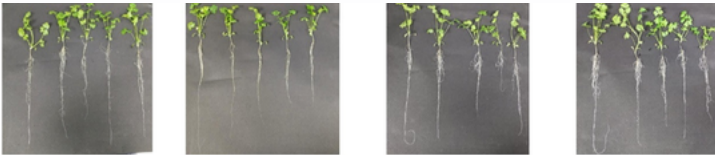


Figure: Plant grown with Oxygen Nanobubbles

Conclusion

This study demonstrates that oxygen nanobubble technology significantly enhances coriander growth in hydroponic systems. Improved oxygenation leads to better nutrient absorption, resulting in increased biomass, stronger root and shoot development, and enhanced leaf growth. The results indicate that nanobubbles can support more consistent and productive cultivation.



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