

IngenuityWorx uses microBIOMETER analysis to prove the benefit of nanobubble oxygen to plant growth


IngenuityWorx has been working to prove that the application of nanobubble oxygen as an irrigation/fertigation tool can provide low cost easily applied plant benefits both indoors and outdoors.

It has been known for over 40 years that increased oxygen to plant roots in soil improves nutrient absorption, reduces effects of saline water or sodic soils, increases plant growth and yields but traditional aeration technology prevented its use. Aerated water was limited to very short application duration and limited travel time in an irrigation line with low oxygen transfer efficiency.

The new science of nanobubbles allows us to add high dissolved oxygen concentrations, reaching 30-50 ppm, and the oxygen transfer will continue to take place for weeks. The nanobubbles don't coalesce and break like macro bubbles, they move within the water using Brownian motion, and upon giving up all their oxygen produce small amounts of reactive oxygen species including hydrogen peroxide. This feature provides a built-in cleaning process that removes biofilm.

The analysis process shown below that microBIOMETER analysis provided the data indicating that high DO in the irrigation water stimulated the microbial biomass to increase in number as well as the fungi indicating a healthy microbiome in the soil for plant growth.

Additional work is ongoing to measure and understand the affects of the oxygenated water and microbial increases as it relates to soil carbon utilization and impacts on carbon reserves and available nutrients. For more information contact bob@ingenuityworx.com.




Soil irrigated with nanobubble oxygen germinated wheatgrass seeds and increased plant growth from a microbial biomass background of 50 ugC/g with fungi at 4%. The control used the same soil, wheatgrass, and distilled water.

After 6 days of irrigation using only the respective water, the nanobubble oxygenated soils increased microbial biomass to 205 ugC/g and the fungi content increased to 28% vs the non-nanobubble water increased to 59 ugC/g, and fungi remained at 4%.

The significant increase in microbial biomass and fungi are related directly to the additional oxygen from the nanobubbles and provides improved soil health without any additional fertilization or amendments.

Nanobubble oxygenated water provided by a Chucaotec Quetrox 10 system.



Parameter	soil + NB O2 water	soil + DI Water
Soil microbes	205 ug C / g	59 ug C / g
F:B ratio	F:B = 0.4 : 1	F:B = 0.0 : 1
Fungi (%)	F 28 %	F 4 %
Bacteria (%)	B 72 %	B 96 %
MBC	Low	Low
F:B	Mid	Mid

Contact us for more information:

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