

CONFIDENTIAL



Oct 5, 2022

www.Moleaer.com

MOLEAER[®]

ADVANCING NANOBUBBLE TECHNOLOGY

SOIL CULTIVATION



Our Mission:

Unlock the power of water to do more with less

Our patented, chemical-free nanobubble technology improves sustainable food production and processing and improves water utilization across a wide variety of industries.

Moleaer is the global leader in nanobubble technology with over 2000 installations in 42 countries.

Research Validation



2016

Founded in Southern California & patented nanobubble technology



2017

First Commercial Nanobubble Generator Launched



2020

Moleaer is awarded Adapted Irrigation Solution of the Year



2021

Moleaer is awarded Best Crop Enhancement and Yield Improvement



2022

Moleaer receives: Global Cleantech 100 Company, Impact Award and Distinction for Water Project of the Year at Global Water Awards.



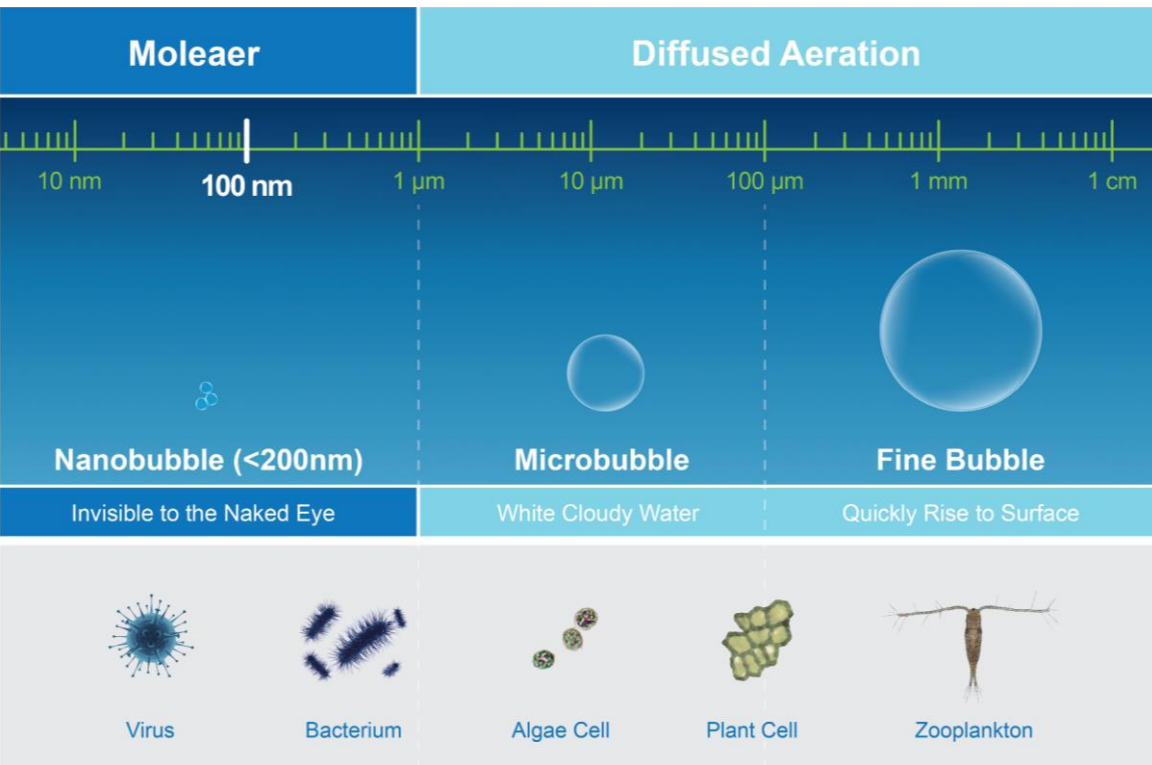
Mission: Unlock the power of water to do more with less

Our patented, chemical-free nanobubble technology improves sustainable food production and processing and improves water utilization across a wide variety of industries. Moleaer is the global leader in nanobubble technology with over 2000 installations in 42 countries.



What are Nanobubbles?

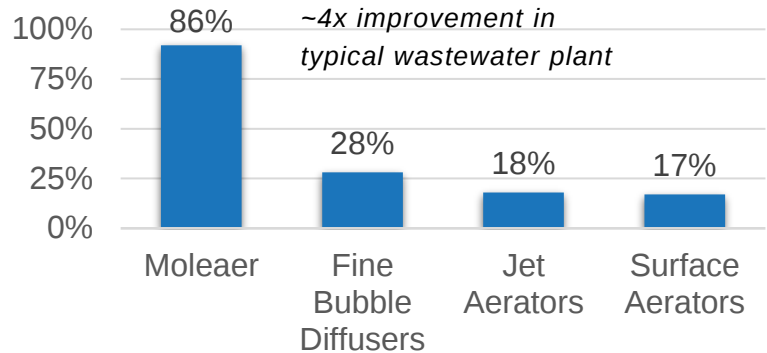
Nanobubbles are tiny bubbles that remain suspended in solution for months



Independent Validation



HIGHER OXYGEN TRANSFER

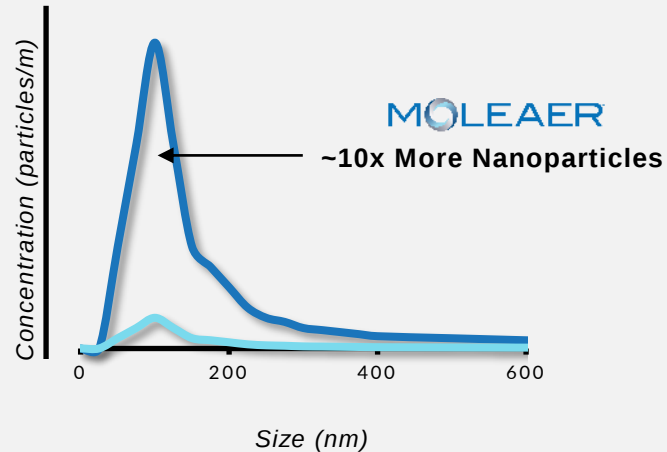


Oxygen Transfer Efficiency

- Achieves over 85% oxygen transfer efficiency in any depth
- Independently tested by Michael Stenstrom at UCLA

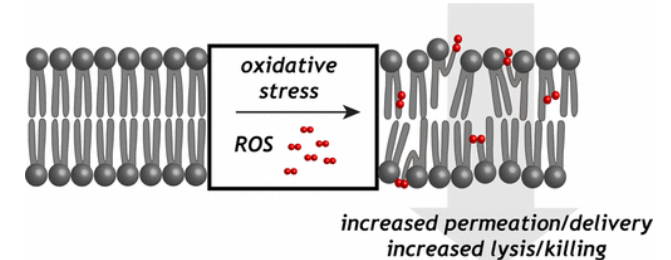
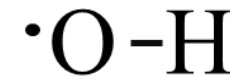


NANOSIGHT



Surface Tension Reduction

- Detected ~1B stable nanobubbles / ml
- Nanobubbles detected weeks after time of injection



Pathogen Control

- Confirmed the generation of hydroxyl radicals, a reactive oxygen species (ROS), with Moleaer air nanobubbles

Fundamentals of Nanobubbles

100 nanometer size bubbles display unique properties and behaviors

Properties

Hydrophobic

Charged Surface

High Internal Pressure

Hard Surface

High Gas Transfer Efficiency

Behaviors

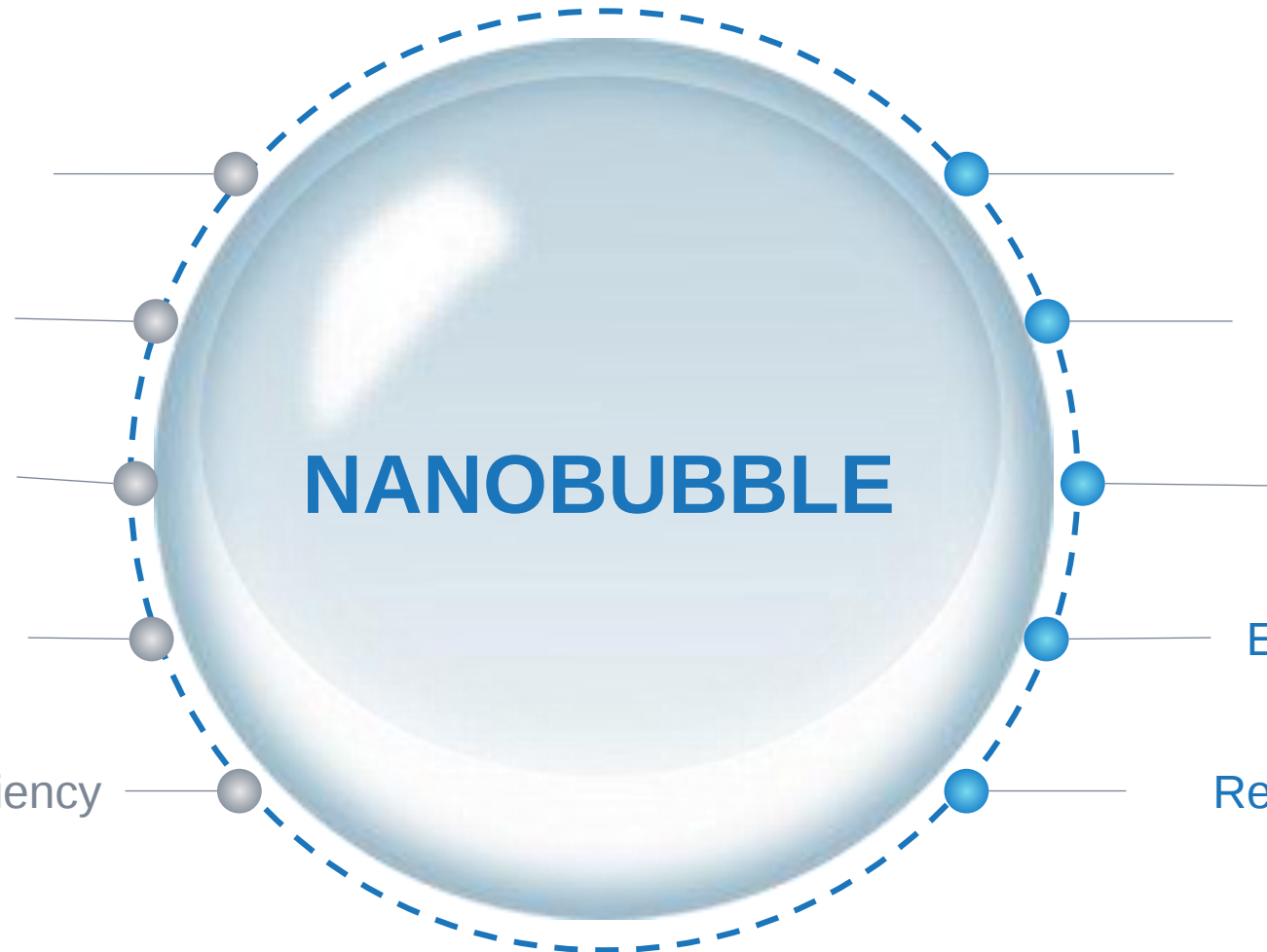
Neutrally Buoyant

Stable & long-lasting

Oxidative

Electrochemically active

Reduces Surface Tension

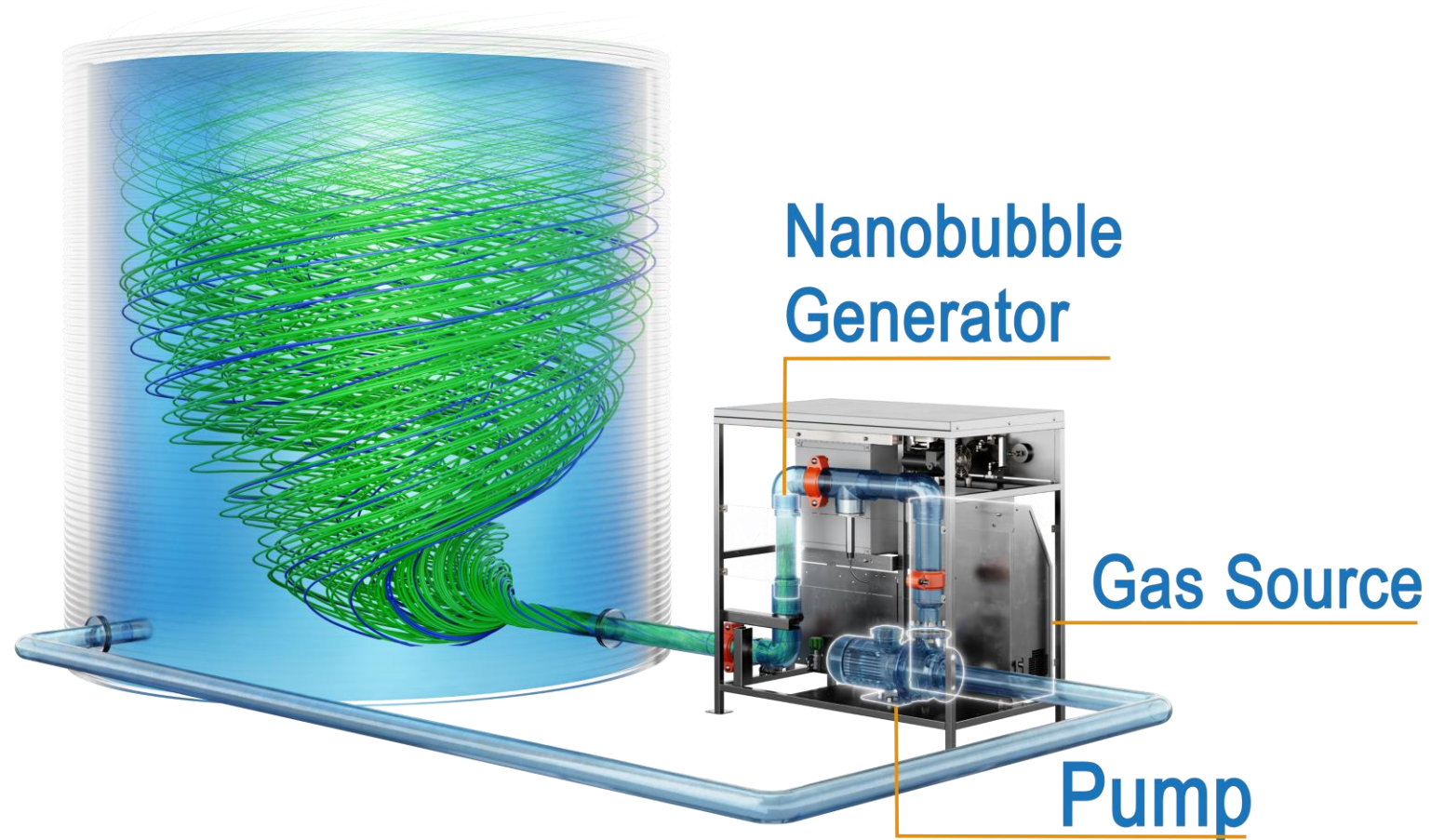


Moleaer's Patented Technology

Compressed gas is diffused into flowing water from 25-to-1000 gpm in our “Nanobubble Generator (NBG)” forming 200M-to-1B nano-sized bubbles/ml

Patented Technology

Introduces **two forms of gas** into the water: dissolved and nanobubbles



Robust, scalable, easy-to-install, technology with best-in-class over 85% oxygen transfer efficiency

Moleaer Nanobubble Generator vs. Alternatives



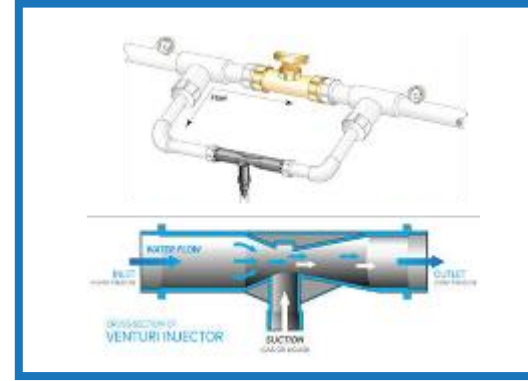
Diffusers

- 1-2% oxygen transfer efficiency per foot of water
- Susceptible to fouling
- High replacement rate
- Inefficient in shallow water



Cone

- High oxygen transfer efficiency
- High energy requirement
- Poor ramp up / down capability
- Frequent maintenance issues with pumps



Venturi

- 20-40% oxygen transfer micro & macro bubbles
- Inefficient and not economical when combined with pure oxygen



Sparger

- 20-40% oxygen transfer micro & macro bubbles
- Inefficient and not economical when combined with pure oxygen

Benefits of Nanobubbles in Cultivation



Benefits of Oxygen Nanobubbles for Cultivation



- Improve infiltration and drainage
- Flocculation and salts leaching
- Better rhizosphere health



- Control of algae, E. coli and biofilm
- Prevent mineral buildup
- Reduce irrigation blockages



- Improve crop production and quality
- Increase water and nutrient uptake efficiency
- Better root and vegetative growth

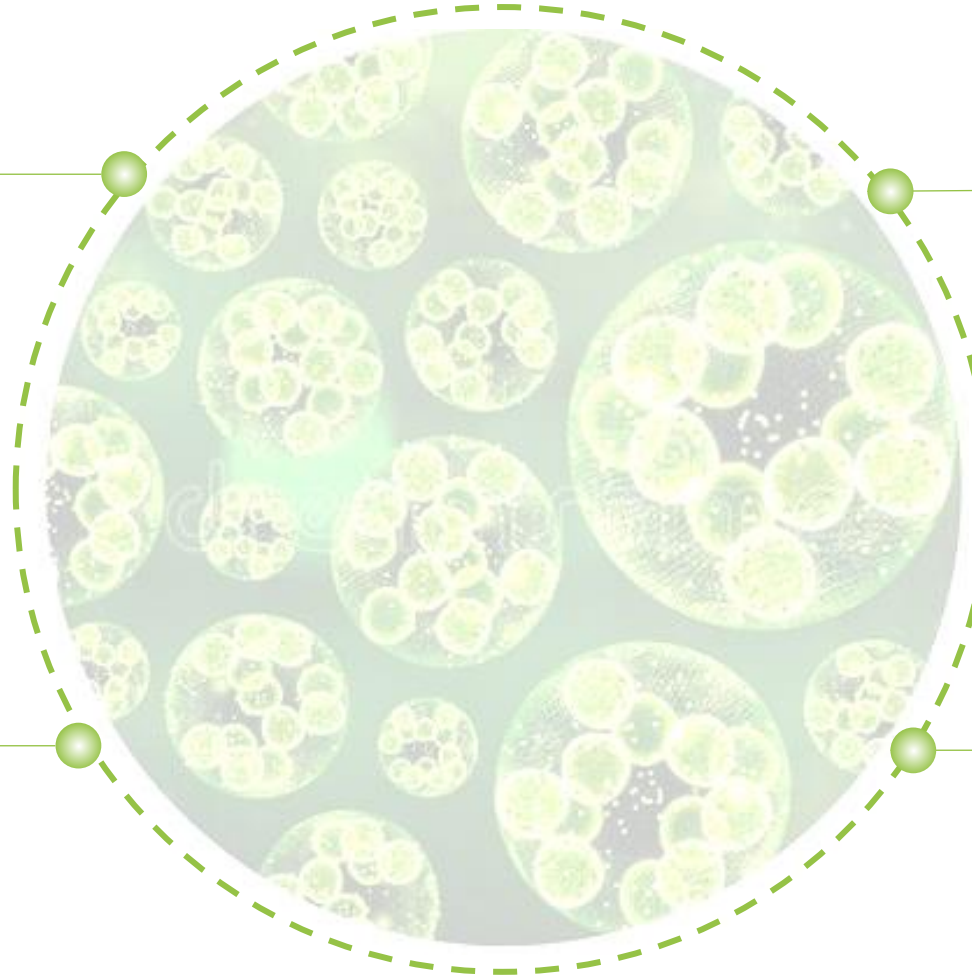
How Nanobubbles Prevent & Destroy Algae

Oxidation

- Produces hydroxyl radical and reactive oxygen species that inactivates algae through mild cell wall oxidation
- No impacts on non-target organisms, such as diatoms and fish

Dissolved Oxygen

- Stabilizes dissolved oxygen levels providing healthy fish habitat and a more balanced ecosystem



Nutrient Sequestration

- Reduces nitrogen and phosphorus levels that promote algae blooms
- Promotes aerobic bacteria to enable healthy sediment and reduce muck

ORP

- Raises ORP levels to promote metal oxidation, rapid organic digestion, and improve water clarity

Benefits of Scouring & Bubble Charge

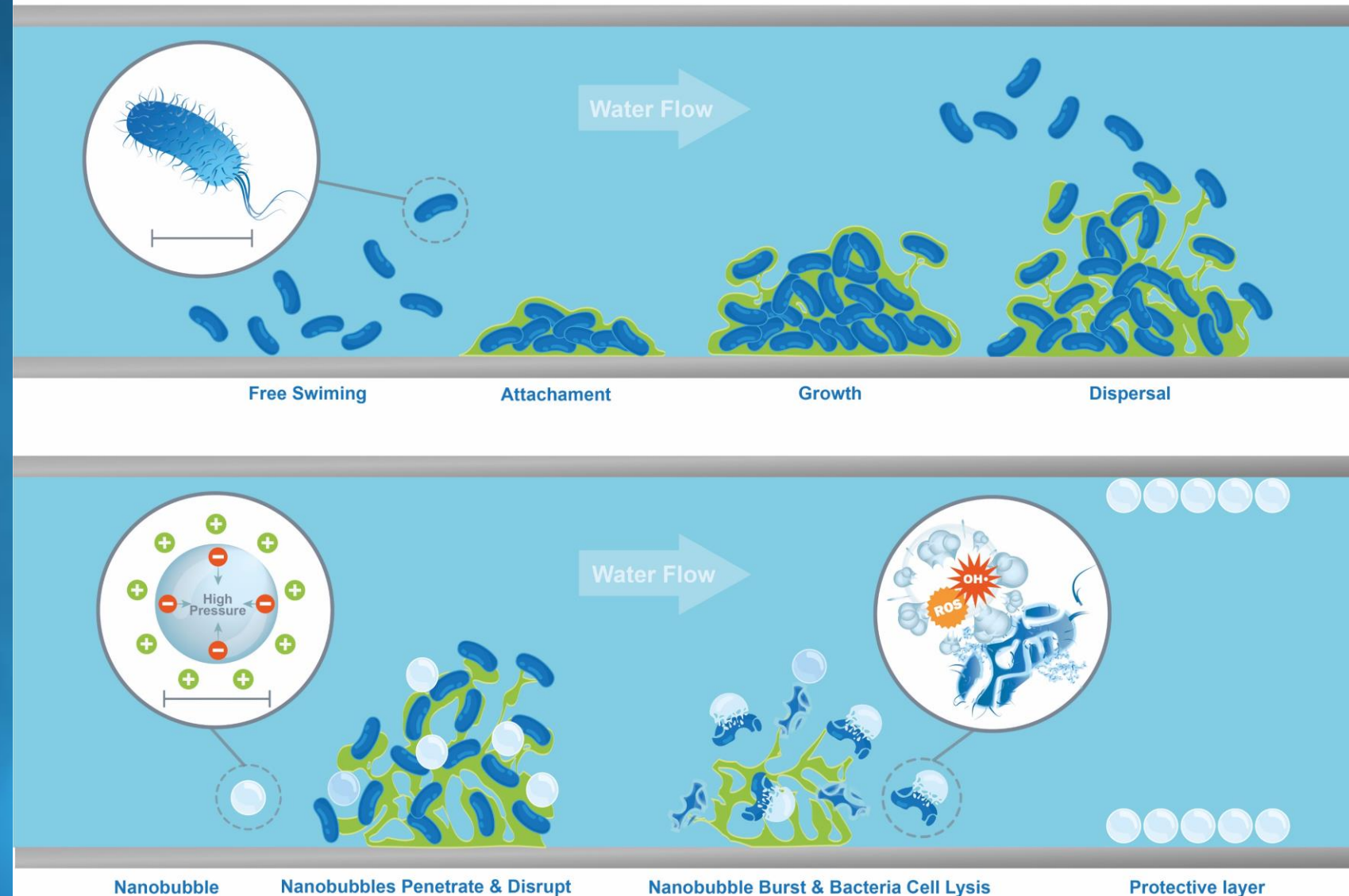
Nanobubbles have a strong negative surface charge and are attracted to hydrophobic surfaces

Anti-Biofouling & Scale Inhibitor

- Bubble surface charge attracts and binds contaminants
- Biofilm and algae is scoured from surfaces

Disease Control

- Prohibits disease-causing bacteria from forming on surfaces
- Promotes aerobic/beneficial microbial activity

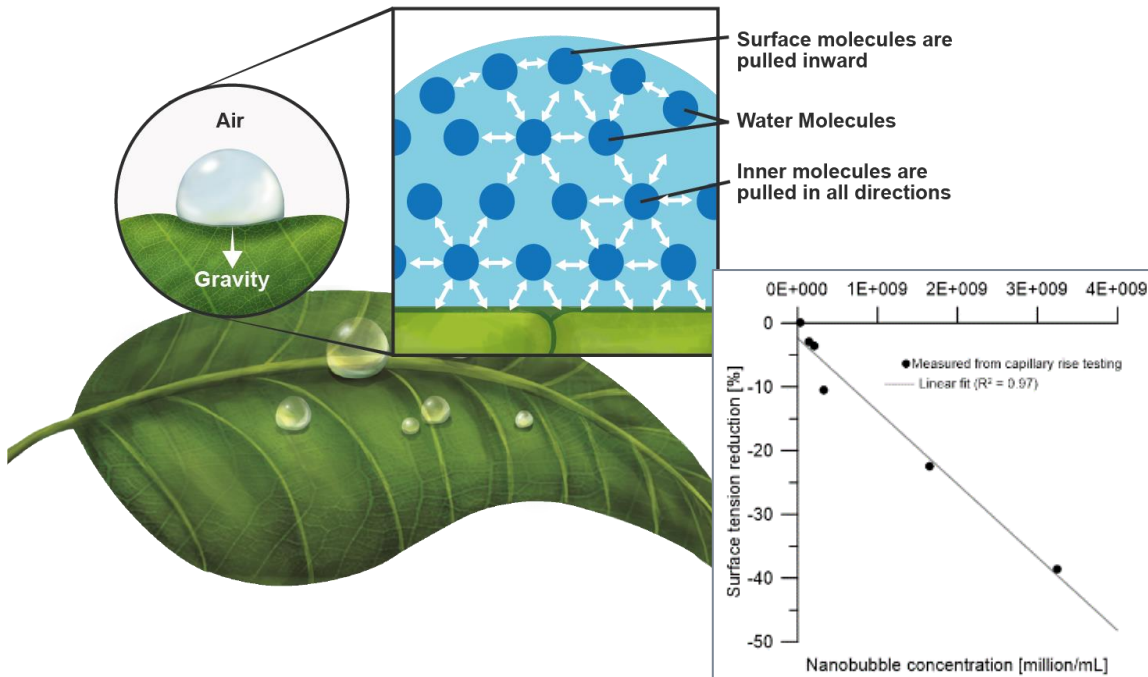


Nanobubbles Change the Way Water Interacts with Soil

Nanobubbles Reduce Surface Tension

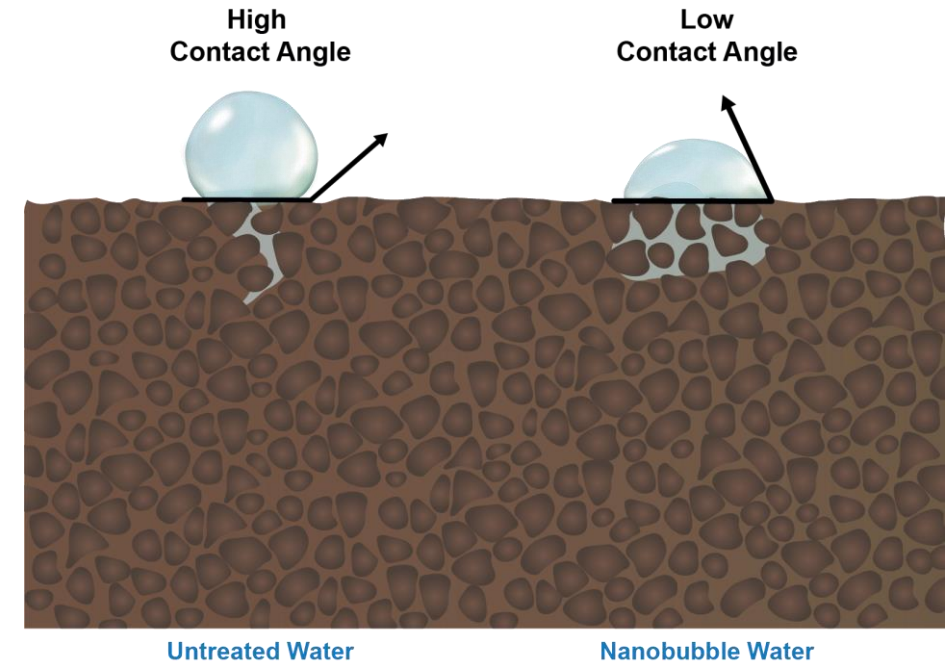
Air nanobubbles act like a surfactant to reduce the intermolecular forces of water and reduce surface tension

Surface Tension



Nanobubbles Decrease Contact Angle

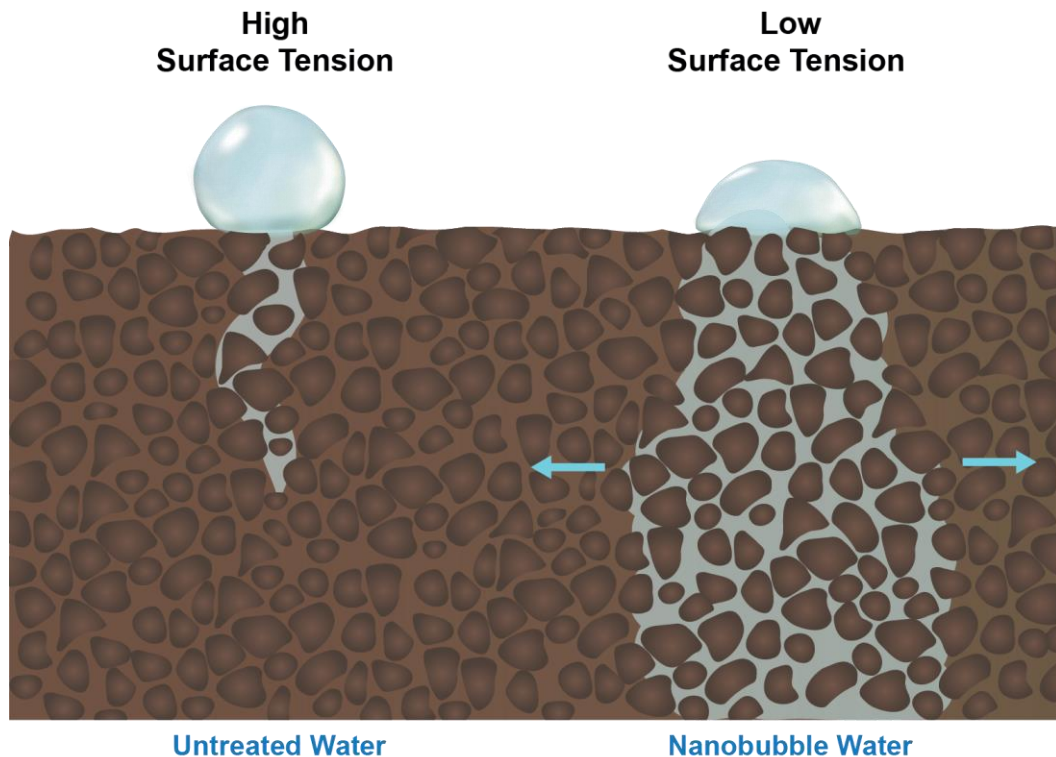
Reduced contact angle improves water penetration, enabling better water distribution in hydrophobic soils



Nanobubbles Reduce Water & Nutrient Loss From Runoff

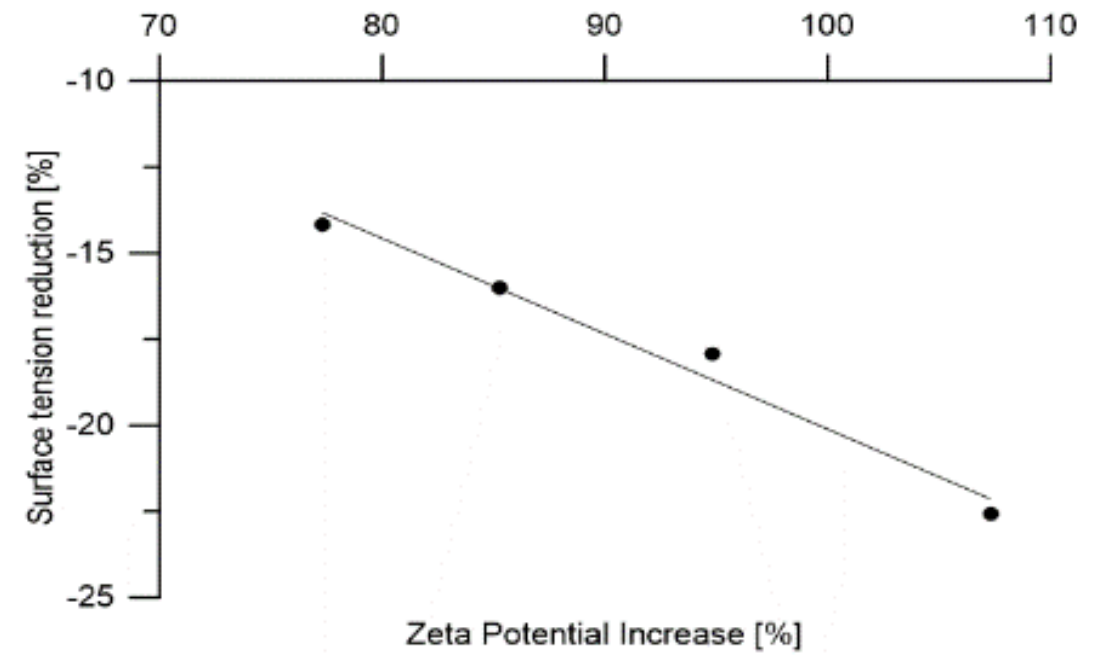
Nanobubbles Improve Wettability / Infiltration

Reduced surface tension increases soil moisture and increases nutrient uptake. The water is held near the root zone longer

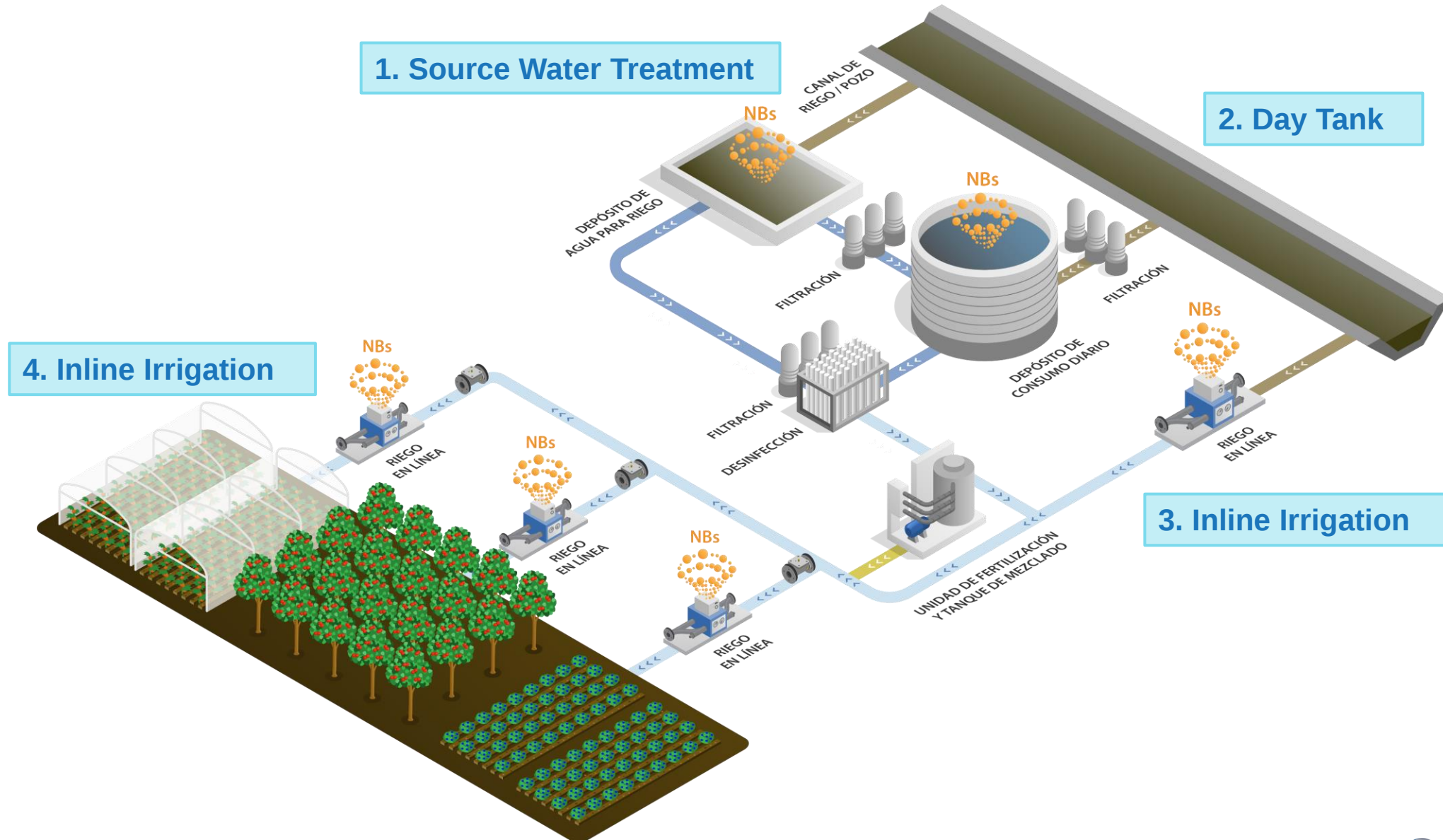


Nanobubbles Possess Ionic Mobility

Nanobubbles increase the electric charge which increases the dispersion of ions in the liquid volume and “dilutes” the nutrients to achieve more homogeneous concentration in the water



Easy to Size & Install Based on the Volume of Water



Primary Crops

BLUEBERRIES



AVOCADOS



CITRUS



NUTS



STRAWBERRIES



TOMATOES



CHERRIES



FLOWERS



Portfolio Range Adapts to Every Type of Installation

Irrigation Reservoirs
Algae Control & Prevention for
Source Water Treatment

Clear™



Drain & Irrigation Water Tanks
Large-scale Greenhouses

Neo™



Inline
High Flow Irrigation Systems

Nexus™



Strawberries: 41% Yield Increase

Location: Mexico

Purpose: Improve growing conditions for inground strawberries

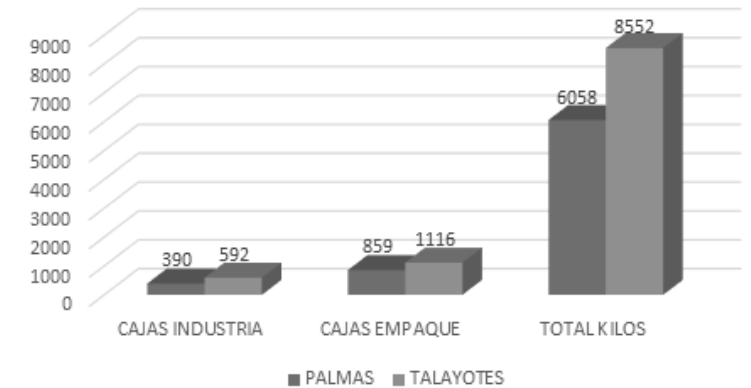
Specifications:

- Unit: Neo 250 O₂
- Reservoir

Key Findings:

- **Yield** - 41% increase with oxygen nanobubbles
- **Profit** - 32% increase per ha
- **Plant Health** - Overall better plant health and lower instances of disease

Production per Hectare



Blueberries: 20% Decreased Soil Compaction

Location: Chile

Purpose: Evaluate the impact of oxygen nanobubbles on Magnifica blueberries grown in soil

Specifications:

- Bloom 25 IQ
- Inline



Results:

- Decreased compaction by more than 20%
- Increase new shoot development by 20%
- Overall increase in caliber registers by 17%
 - Small fruits: increase 21% and increase of more than 70% on the last date
 - Colored fruits: increase of more than 20% and a large increase at the last date (35%)
 - Fruits 25% blue: increase by 8%
- 75% of fruits reached final stage in same time span

Blueberries: 18% Yield Increase

Location: Chile

Purpose: Improve
blueberries grown in coco
coir

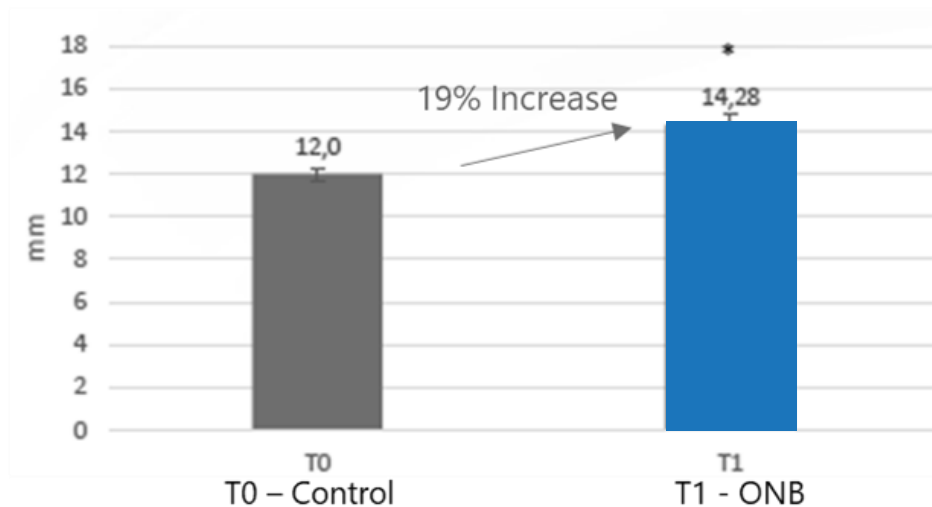
Specifications:

- Bloom 25 IQ
- Inline
- Treatment Area: 1 Ha

Key Findings

- Plants treated with ONB water showed significantly better vegetative growth
- Fruit size and quality was improved with ONB
- **18% yield improvement with ONB**

Harvested Blueberry Size



Blueberries: Improved Fruit Weight & Caliber

Location: Chile

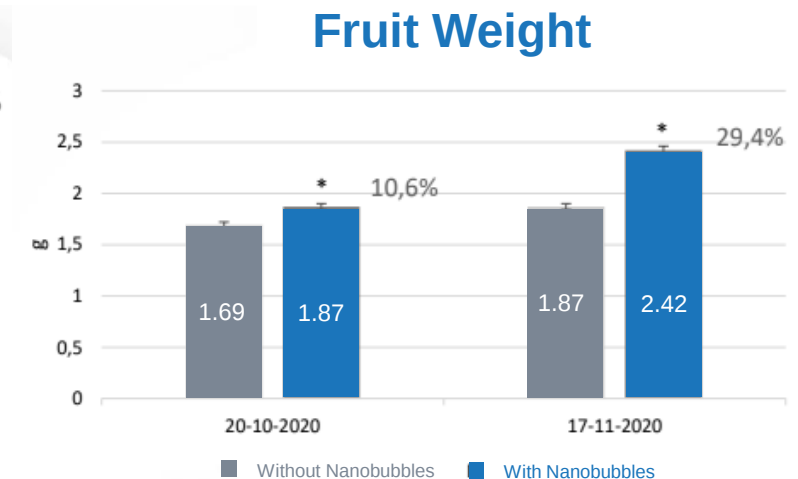
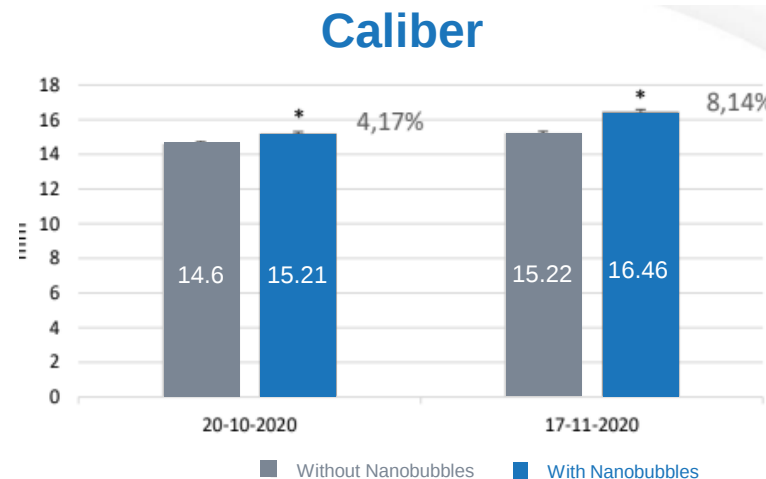
Purpose: Run two period trials with oxygen nanobubbles

Specifications:

- Bloom 150
- Inline

Key Findings:

- Increase in Fruit Weight:
 - Period 1: 10.6% increase
 - Period 2: 29.4% increase
- Increase in Caliber:
 - Period 1: 4.17% increase
 - Period 2: 8.14% increase



Blueberries: Increased Crop Productivity

Location: Trujillo, Perú

Objective: Improve
Rizosfera conditions and
production

Installation:

- Neo 150 O₂
- Reservoir (1.3 million gallons)



Key Findings

- Increased dissolved oxygen
- Increased productivity

Blueberries: 56.7% Yield Increase

Location: VI Región, Chile

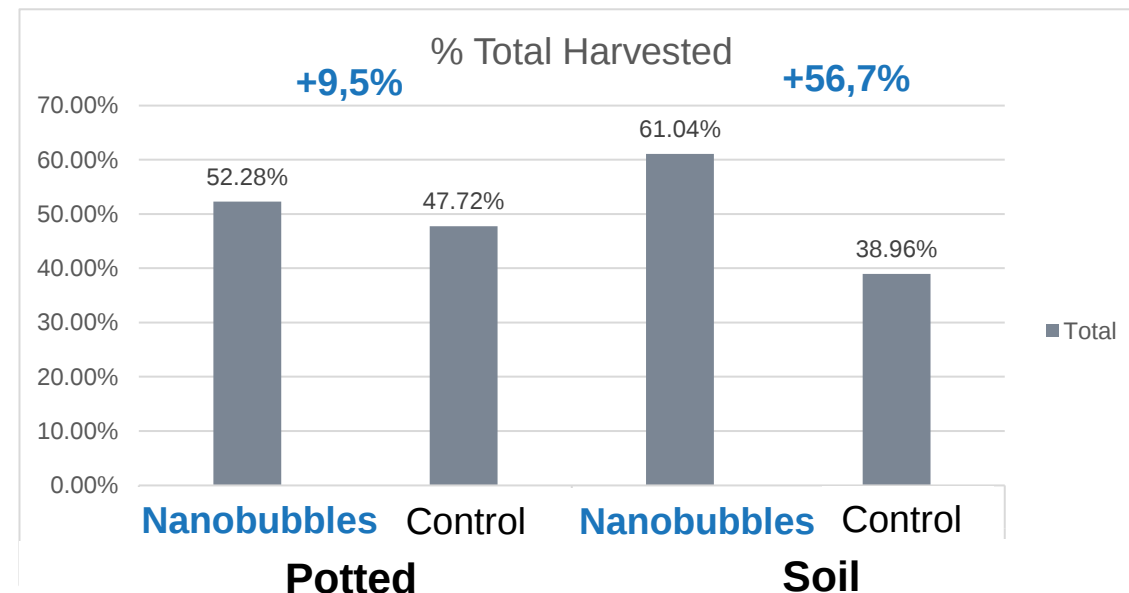
Objective: Improve crop conditions under soil and substrate cultivation

Installation:

- XTB 50
- Inline

Key Findings

- Increased Harvest Yield
 - 9.5% on pots
 - 56.7% on soil



Flowers: Reduced Growth Cycle

Location: Ontario, Canada

Purpose: Improve growth
cycle consistency

Specifications:

- Bloom 50
- 2000-gallon tank

Results:

- Reduced violet growing time by 20%
- Achieved consistent 6-week growth cycle
- Increased irrigation water DO to 21 PPM
- Increase production and profitability



Greenhouse Peppers & Cherry Tomatoes: 18% Yield Increase

Location: Guatemala

Purpose: increase crop quality and yield

Specifications:

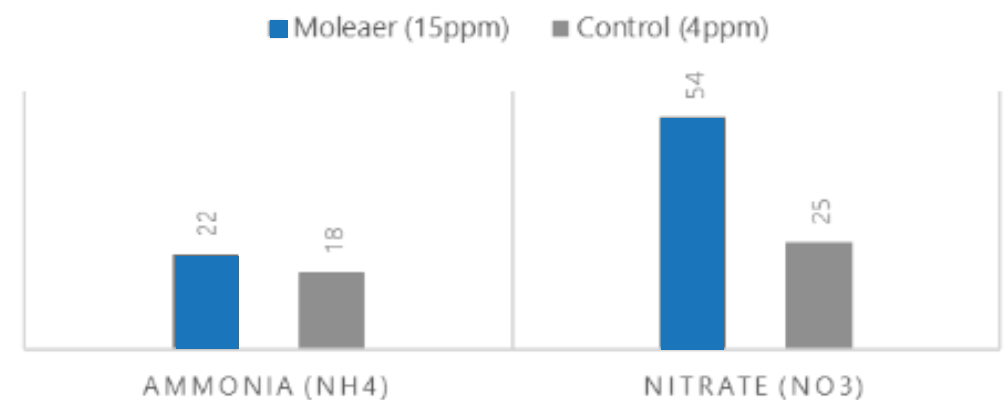
- Bloom 150
- Treatment Volume: 66,000 gallons



Key Findings:

- **Dissolved oxygen:** 15 mg/l
- **Yield:** 18% increase
- Improve vegetable density per plant
- Sustained production through month 11
- 2X more efficient nitrification

Improved Nitrification in Leachate Samples



Organic Peppers: 10% Yield Increase

Location: Chile
Specifications:

- Neo 150
- Reservoir



Key Findings:

- **Yield:** 10% increase in production
- **Caliber:** higher percentage of Large – XL calibers - the highest value
- **Disease:** Significant reduction in Phytophthora and Pythium
- **Root Development:** Stronger capillary root growth
- **Soil Health:** Increased soil flocculation. Improved beneficial microorganism activity

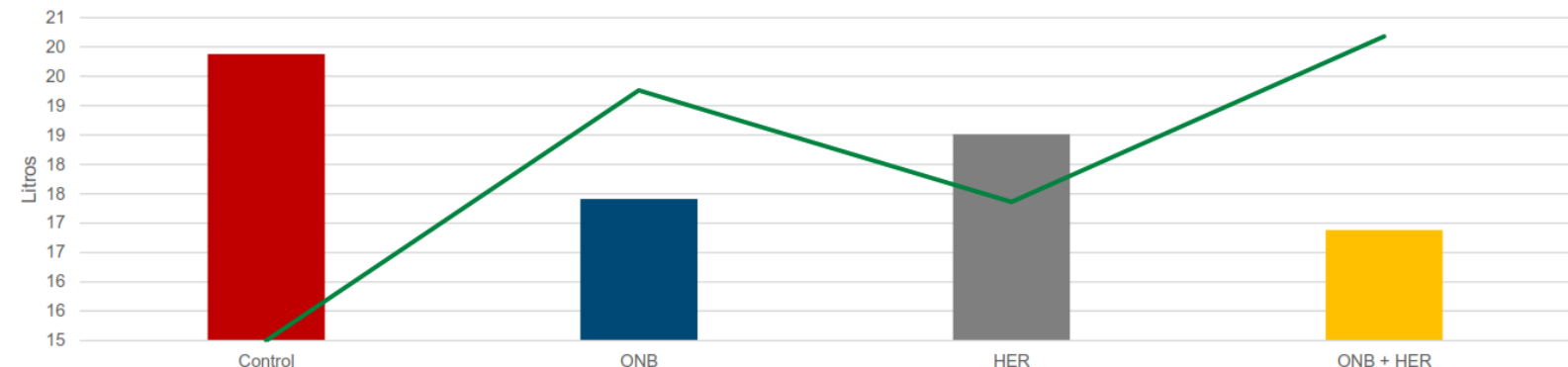
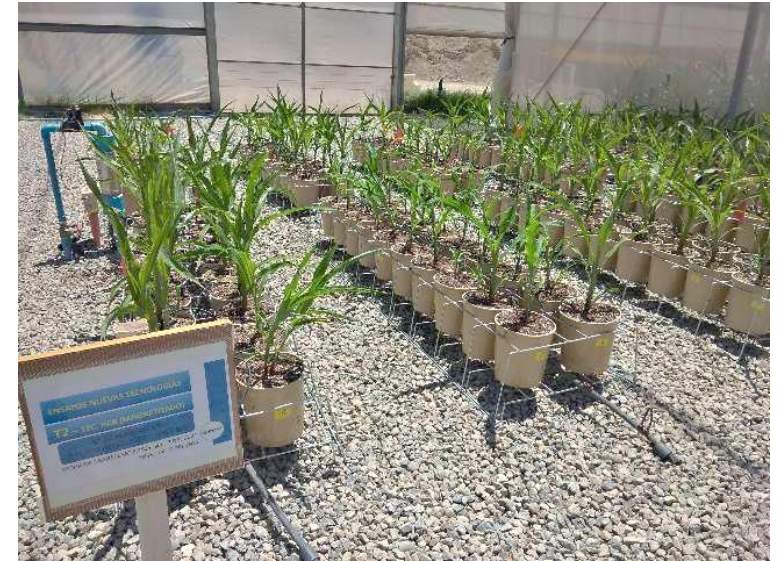
Double Haploid Corn: Improving Irrigation Water Efficiency

Location: Chile

Purpose: Study the impacts of oxygen nanobubbles and magnetism treated irrigation water on water uptake efficiency

Key Findings:

- Oxygen Nanobubbles reduced water loss by 12.4%
- Magnetism reduced water loss by 6.87%
- Magnetism and oxygen nanobubbles reduced water loss by 15.08%



- T0: Control
- T1: ONB (oxygen nanobubbles)
- T2: HER (magnetism)
- T3: ONB + HER

Table Grapes: Improved Fruit Quality

Naturahill

Location: Los Andres, Chile

Purpose: Improve berry color, sugar content and vegetative growth

Specifications:

- Bloom 25 IQ
- Inline

Key Findings:

- Better vegetative growth in both young and mature plants
- Advanced coloring of the grapes
- Higher Brix (soluble sugar) levels in ONB
- Advanced fruit development and ripening led to a two-week earlier harvest

Control



Nanobubbles



Avocados: 40% Caliber Increase ≥ 50

Location: Chile

Objective: Study avocado crop with nanobubble treatment

Specifications:

- XTB 50
- Inline

Key Findings

- Significant improvement in plant vigor
- 6% significant total production increase
- 40% production increase in fruit caliber ≥ 50 (199 + grams)
- Good postharvest parameters
- Lower soil compaction

		Distribution of Calibers in Kilos	
Calibers (grams)		Untreated	Nanobubble Treated
Over Size	>391	0.0	0.0
32	332-391	0.0	0.2
36	307-331	0.0	0.2
40	262-306	0.8	1.4
50	199-261	9.7	12.9
60	168-198	13.9	15.1
70	138-167	12.0	9.8
84	124-137	2.5	1.9
Under Size	<124	2.6	1.5
Sum (Kilos)		41.5	43.0
Calibers ≥ 50		10.5	14.7
Calibers ≤ 50		31.0	28.3

Avocados: Improved Fruit Development

Location: San Jose Farms,
Chile

Purpose: Improve avocado
fruit development

Specifications:

- Bloom 150
- Inline

Key Findings:

- Reduced tip burn on trees, typically caused by salt accumulation in the soil
- Increased length and circumference of fruit
- Larger fruit = yield increase at harvest

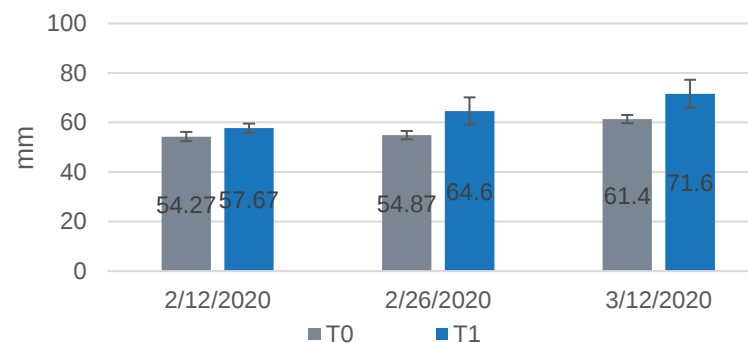
Control



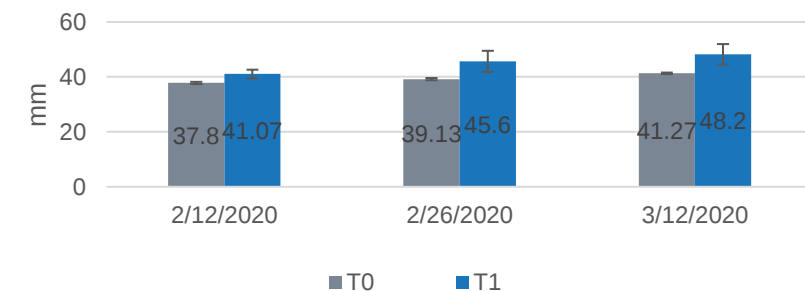
Moleaer



Grade A – Length Measurements



Grade A – Circumference Measurements



Avocados: Improved Root Development

Location: San Jose Farms,
Chile

Purpose: Improve avocado
root development

Specifications:

- 2 Bloom 150
- Irrigation dam 3.9 million gallons

Key Findings:

- Superior Lateral Root Development



Control



Moleaer



Avocados: Improved Shoot Development

Location: San Jose Farms,
Chile

Purpose: Improve avocado
shoot development

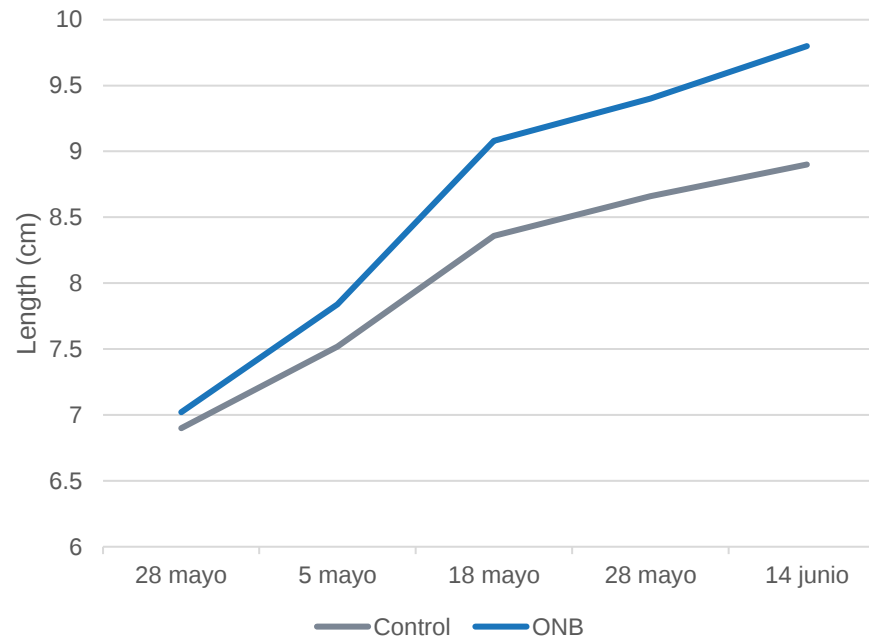
Specifications:

- 2 Bloom 150
- Irrigation dam 3.9 million gallons

Key Findings

- 10% longer shoots in trees treated with oxygen nanobubbles

SHOOT LENGTH DEVELOPMENT



Santina Cherries: Up to 10.5% Yield Increase

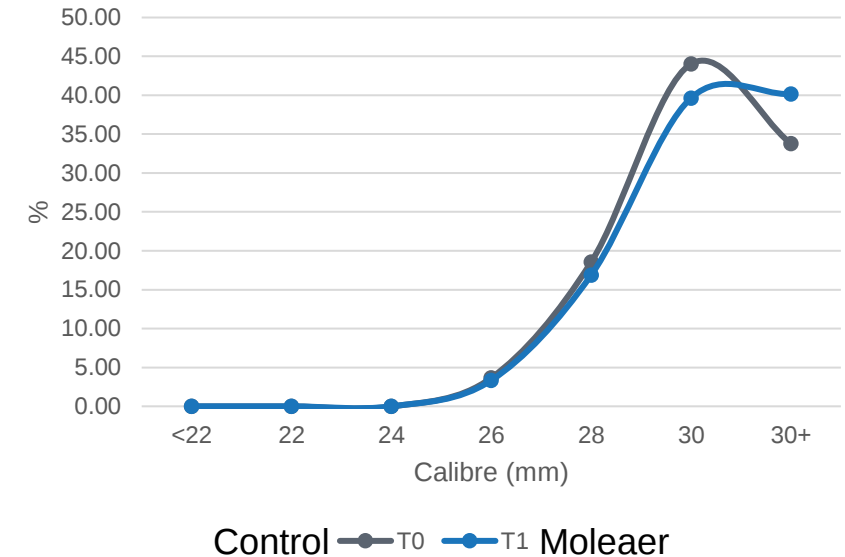
Location: Chile
Purpose: Track size and
quality of fruit

- Specifications:**
- Bloom 150
 - Reservoir

Key Findings:

- Fruit yield increase between 2.5 and 10.5%
- Significant increase in the ratio of premium Super Giant fruit sizes
- Increase in profit per hectare

Size Distribution



Category Size Distribution

Tratamiento	Bajo Calibre (<22)	Large (22)	Extra Large (24)	Jumbo (26)	Super Jumbo (28)	Giant (30)	Super Giant (30+)
T0	0.00	0.00	0.00	3.67	18.54	44.01	33.78
T1	0.00	0.00	0.00	3.34	16.87	39.64	40.16

Royal Dawn Cherries: Up to 2.5% Yield Increase

Location: Chile

Purpose: Track size and quality of fruit

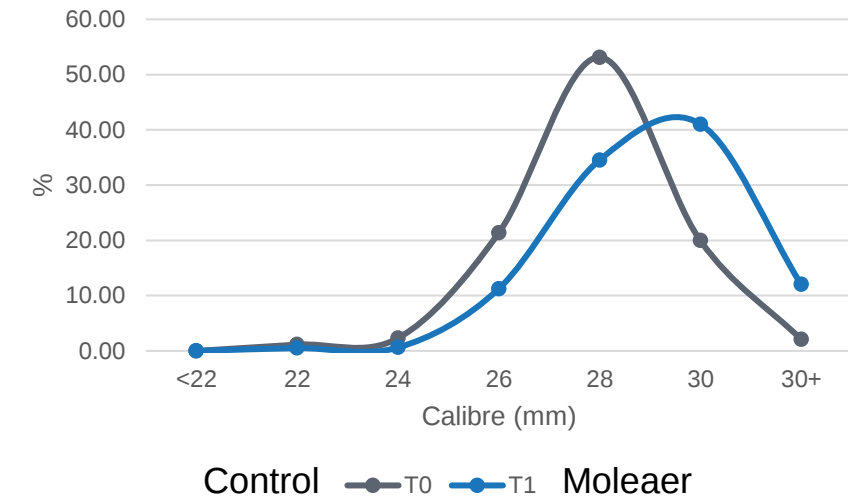
Specifications:

- Bloom 150
- Reservoir

Key Findings:

- Fruit yield increase between 2.5%
- Significant increase in the ratio of premium Super Giant fruit sizes
- Increase in profit per hectare

Size Distribution



Category Size Distribution

Tratamiento	Bajo Calibre (<22)	Large (22)	Extra Large (24)	Jumbo (26)	Super Jumbo (28)	Giant (30)	Super Giant (30+)
T0	0.00	1.14	2.30	21.35	53.15	19.96	2.09
T1	0.00	0.52	0.63	11.25	34.53	41.04	12.03

Cherries: Improved Soil to Combat Drought Conditions

Location: VII Región,
Chile

Objective: Improve growth
and production of mature
and sick orchards

Installation:

- Neo 250 O₂
- Reservoir (52,000 gallons)

Key Findings

“Our orchard was sick, devastated by diseases, which were even worst with the drought conditions that we were facing. We had 30% of our plants die. We asked many crop advisors, and they concluded the soil rhizosphere was lacking.

We strongly believe that nanobubbles, in combination with soil amends and microbes, such as mycorrhiza, have **improved the soil structure**, which can be seen in improved and **new root development, better water infiltration and water retention**.

In our first season using nanobubbles, our **caliber distribution improved exponentially**, with only 10% of XL size and without decreasing production.

We expect to continue our orchard improvement through irrigation efficiency in order to face these drought conditions.”

- Juan Pino, Production Manager



Cherries: Increased Crop Productivity

Location: VII Región,
Chile

Objetivo: Improve crop of
different types of orchards

Installation:

- Neo 250 O₂
- Reservoir (52,000 gallons)

Key Findings

- Increased productivity
- Better crop health
- Improved fruit uniformity
- Better plant vigor

“In our second season using nanobubble technology, we had positive results, that we believe will continue in the long term. In the short term, we are seeing increased productivity, as well as, better crop health, fruit uniformity and plant vigor.”

- Sebastián Fresno, Production Manager



Drip Irrigation: Root Development

Location:

Purpose: To measure lateral root development

Specifications:

- Metal cage buried at beginning of season and removed at end of season
- Soil removed and root mass measured in cubic area

Key Findings:

- **Cherries:** 257.5% increase in root mass
- **Blueberries:** 30.3% increase in root mass

CHERRIES			
TREATMENT	REPLICANT	ROOT WEIGHT (GRAMS)	ROOT WEIGHT (AVG)
Control	1	83	58.75
	2	23	
	3	52	
	4	77	
Moleaer ONB	1	76	151.25
	2	102	
	3	356	
	4	71	
BLUEBERRIES			
TREATMENT	REPLICANT	ROOT WEIGHT (GRAMS)	ROOT WEIGHT (AVG)
Control	1	15	16.5
	2	18	
Moleaer ONB	1	31	21.5
	2	12	

Mandarins: Improved Crop Quality & Timing

Location: Agricola Citopal,
Chile

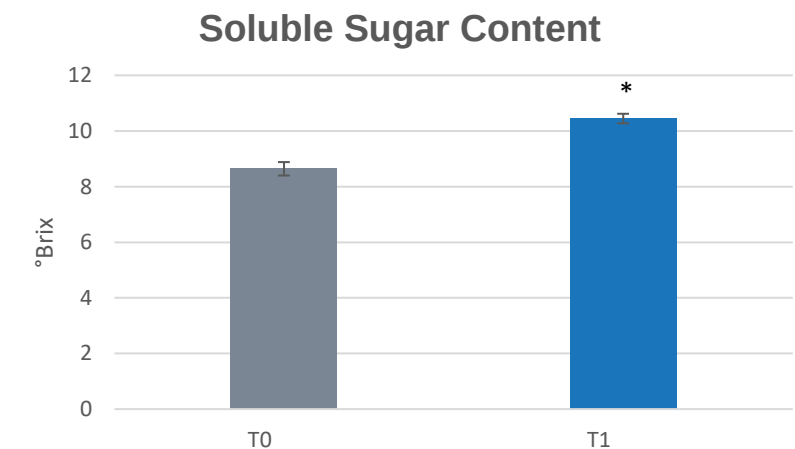
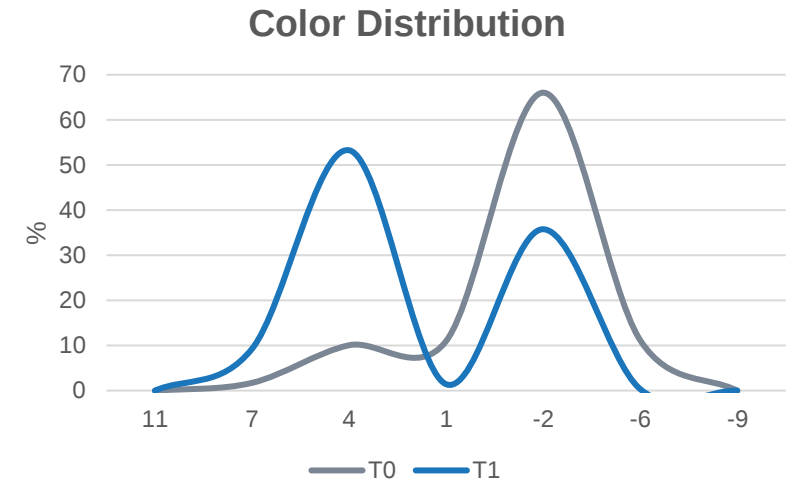
Purpose: Track color and
sugar content of mandarins

Specifications:

- Bloom 150
- Inline

Key Findings:

- 55% of oxygen nanobubble fruit at stage 4 versus 66% of control at stage -2
 - Nanobubble treated trees have an earlier harvest with the potential to attain better market prices
- Increased Brix in oxygen nanobubble fruit



Almonds: 27% Caliber Increase

Location: Chile

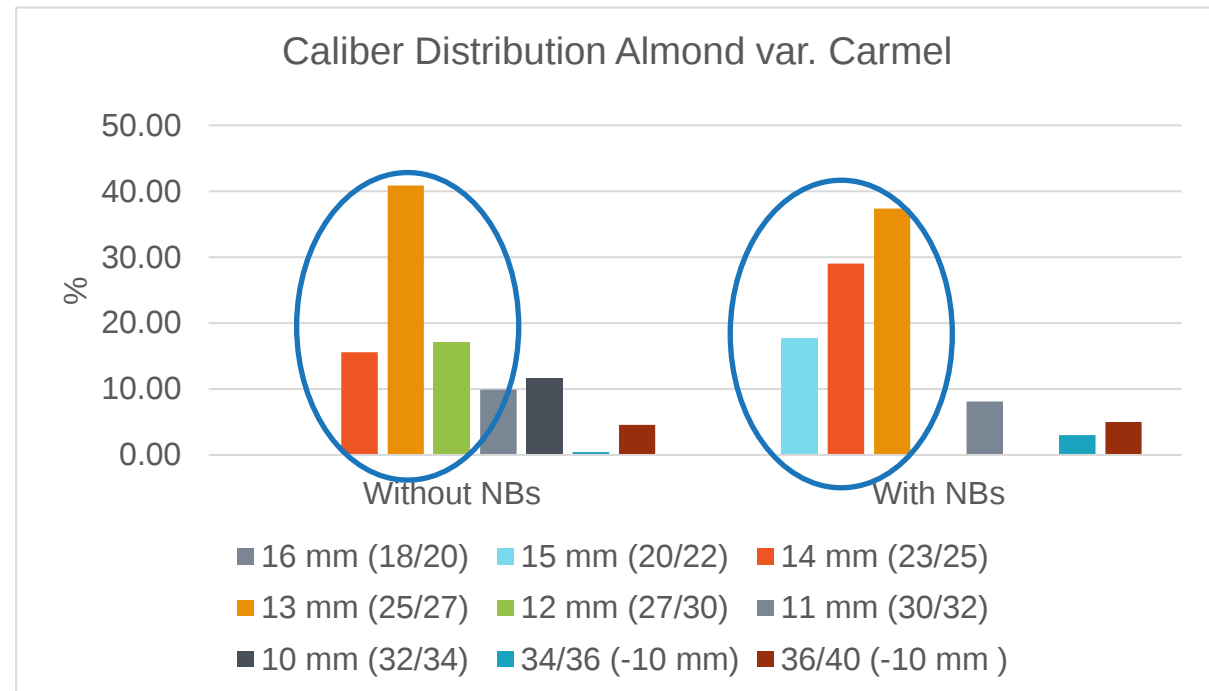
Objective: Improve growth and production of mature orchards

Installation:

- 2 Bloom 150
- Reservoir (6.6 million gallons)

Key Findings

- Significant improvement in the renewal of spurs and shoots
- 61.3% total production increase (field run) var. Non-Pareil
- 83% vs 56% = 27% cumulative production over caliber 25/27 (13 mm) var. Carmel



Pistachios: Infiltration & Sodium Leaching

Location: California, USA

Application:

Maricopa Orchards installed a Moleaer nanobubble generator to improve soil infiltration and water quality

Specifications:

- XTB 50 with external oxygen
- Inline

Project Overview:

Heavier use of ground water for irrigation at a pistachio orchard has diminished soil quality due to salinity accumulation in the root zone. The high salinity has also caused soil compaction and irrigation runoff.

An oxygen nanobubbles were injected into a lateral drip line to reduce water surface tension, improve infiltration and leaching of sodium.

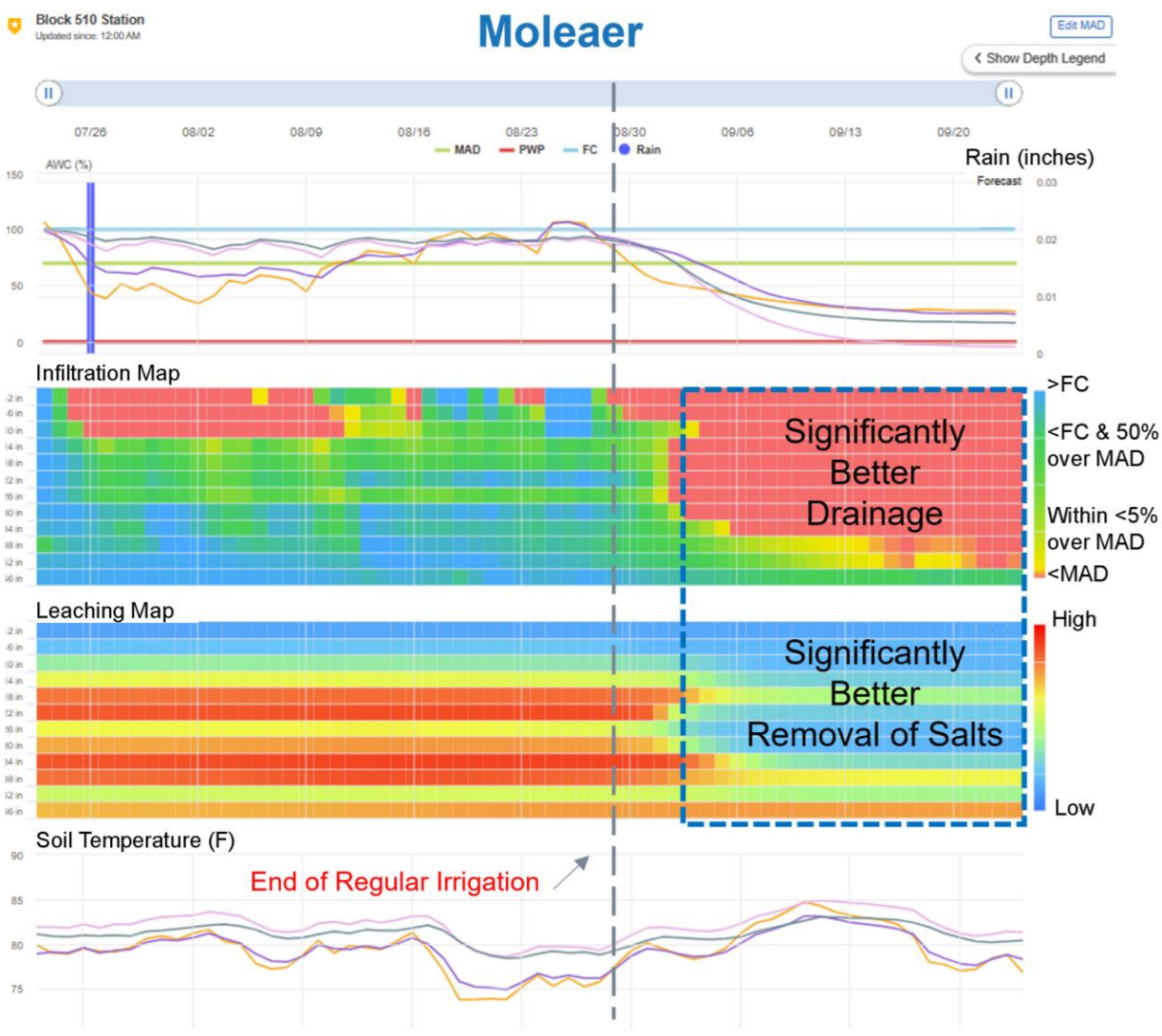
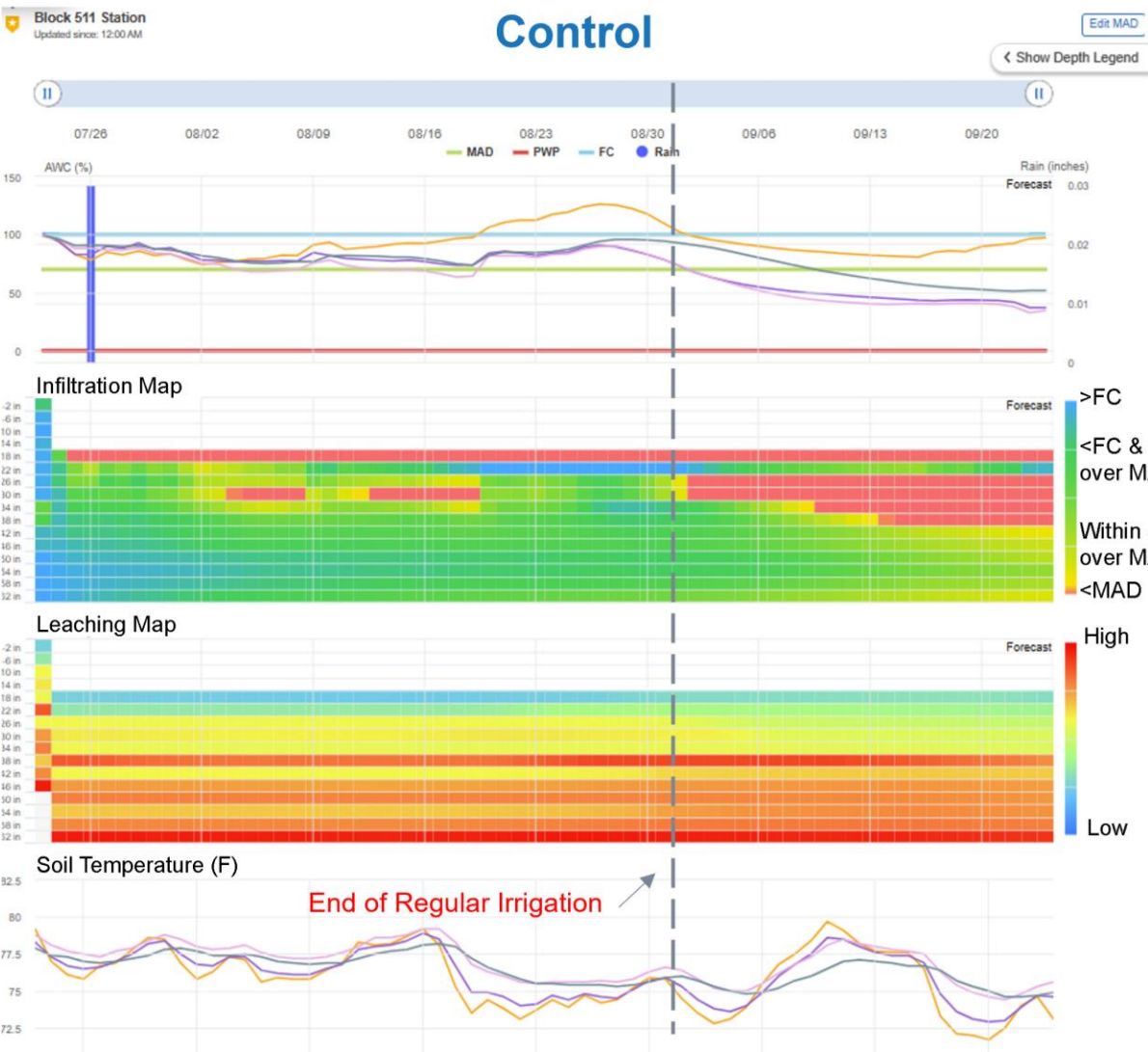


Key Findings:

- Suppression of Root Diseases – \$20 / acre / year savings
- Reduction in Fungicide Application - \$60 / acre / year savings
- Biofilm Removal & Chlorine Reduction - \$60 / acre / year savings
- Reduction in Soil Compaction and Gypsum Application - \$45 / acre / year savings

Total Estimated Yearly Input Savings / Acre: \$185

Pistachios: Infiltration & Sodium Leaching



Nanobubble Infused Fertilizers

Location: Various

Purpose: RainAg field trials with nanobubble infused liquid or granular fertilizers to increase nutrient uptake

Specifications:

- Small particulate technology (SPT)

Trial Results to Date:

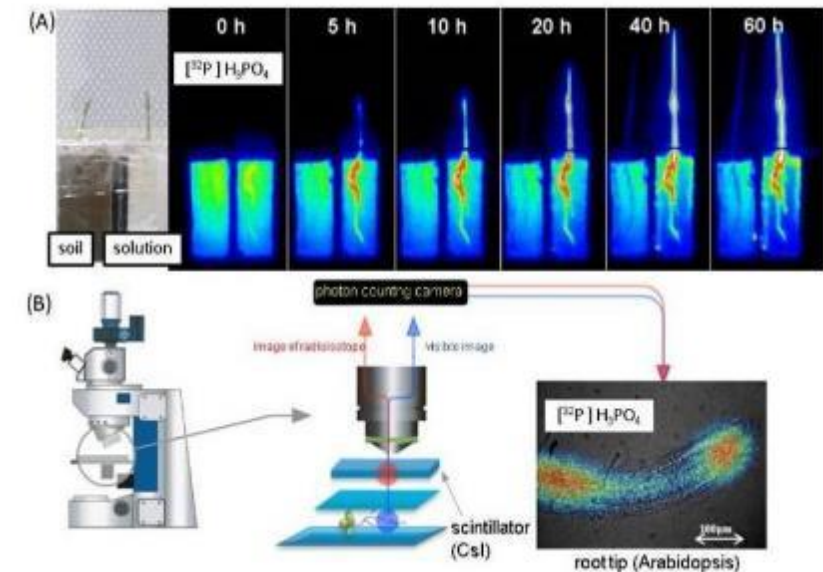
- **Corn:** 16% yield increase
- **Cotton:** 12% yield increase
- **Tomatoes:** 43% yield increase & \$5,100 profit increase per acre of
- **Strawberries:** 15% yield increase & 110% increase in grade and marketable fruit

Phosphorus Uptake:

In less than 5 hours, plant assimilated the soil phosphorus throughout the entire plant

RainAg

Control



Irrigation Reservoir Treatment: Improved Clarity

Location: Ontario Canada

Purpose: Irrigation reservoir
algae treatment

Specifications:

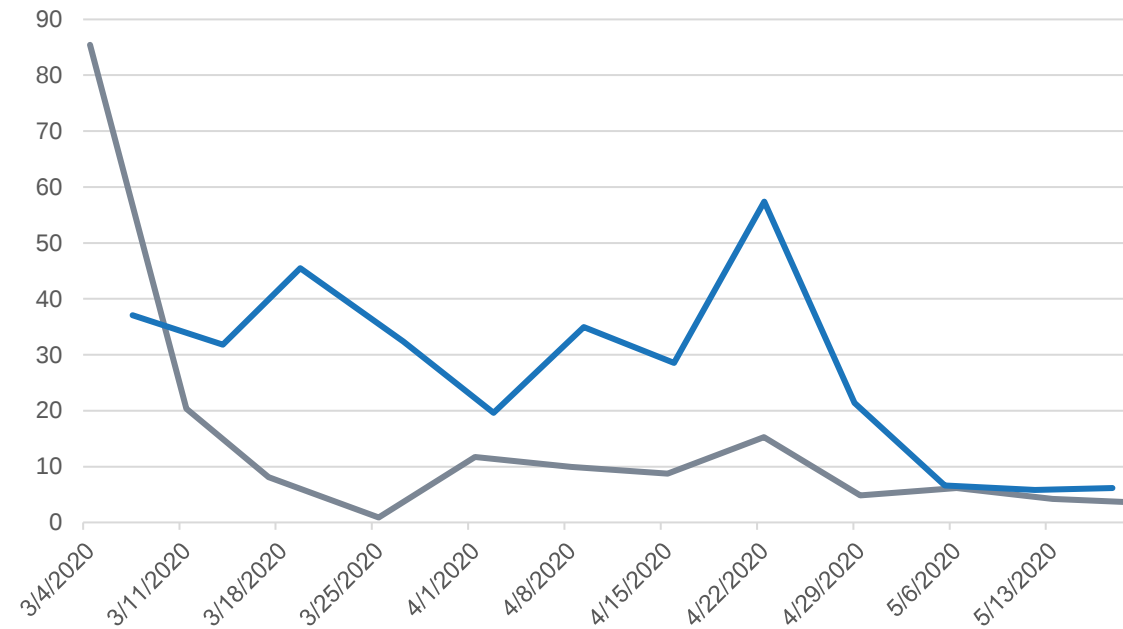
- Clear 150
- Reservoir (5 million gallons)

Additional Benefit:

- 50% higher H₂O₂ residual



Turbidity (FNU) & Chlorophyll



Irrigation Reservoir Treatment: Algae Control

Location: Almeria, Spain

Purpose: Control algae, improve filtration efficiency, reduce chemical treatment

Specifications:

- 2 Clear 150
- 8 Million Gallons

Media Filtration

- Less Backwashing
- Less Downtime

Chemical Treatment

- Less Chemistry
- More Residual
- Better Treatment & Sanitation

UV Treatment

- Better Transmission Value
- Less Fouling & Scaling
- Lower Energy
- Improved Sanitation



Irrigation Reservoir Treatment: Algae Control

Location: Chile

Purpose: Control algae, improve filtration efficiency, control pathogens

Specifications:

- 2 million gallons

Plant Health

- Less Root Disease

Media Filtration

- Less Backwashing
- Less Downtime

Irrigation System Hygiene

- Less Biofilm
- Less Blockages
- Better Irrigation Uniformity



Thank You



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