MOLEAER
ADVANCING NANOBUBBLE TECHNOLOGY

KIWIFRUIT: NANOBUBBLES INCREASE AVERAGE WEIGHT & BRIX

Client: Melo Fiorito Societa' Agrícola

Location	Dates	Unit	Soil Conditions	Results
Castel Bolognese, Italy	**April - September 2023**	**25 GPM XTB Nanobubble Generator with external oxygen installed inline**	**Medium texture, areas with silt**	**- 8.7% increase in fruit weight - 9% increase in Brix - 237.5% increase in DO levels**

Italy is the second largest producer of kiwis in the world with over 500,000 metric tons of kiwifruit produced per year. Growers in the region are looking for innovative technologies to help them improve crop production and reduce costs. In recent years, the Italian kiwi industry has been actively involved in research and development to address common challenges and explore new technologies.

Kiwi crops need moist soil but are sensitive to waterlogging at the roots, making irrigation and water quality key parameters for healthy, productive crops. Due to their sensitive root system, kiwi growers frequently encounter challenges with soil structure such as compaction that affects root development, reduces oxygen availability, and increases waterlogging.

Anaerobic pathogens that attack plant roots flourish in environments where oxygen levels are low in both the water and the root zone. To improve root zone conditions, growers require excellent water management, higher water quality and soil with good drainage.

Melo Fiorito Societa' Agricola, a kiwi cultivation company based in northern Italy, conducted a trial to assess the impact of Moleaer nanobubble technology on kiwi crop yield and quality, specifically focusing on the yellow variety. Half a hectare was irrigated with oxygen nanobubble-enriched water, while a control area received irrigation without nanobubbles.

During the study, the researchers measured Brix, dissolved oxygen (DO) levels, and yield or fruit weight. Brix, which measures the sugar content in fruit, is utilized to assess the flavor and quality of kiwis and various other fruits at different stages of production. It serves as a crucial parameter of fruit quality.

Increased Dissolved Oxygen: Better Root and Plant Health in Kiwi Crops

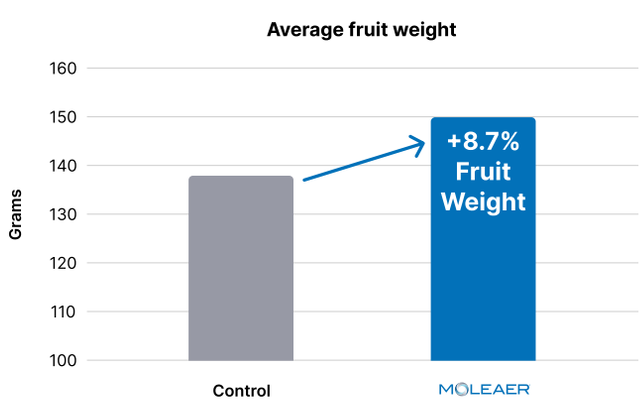
Dissolved oxygen (DO) levels in the water were monitored before, during, and after each irrigation measured at the drippers. In the Moleaer-treated section, DO levels increased significantly from 8ppm to 27ppm, a 237.5% increase. Moleaer's patented nanobubble technology efficiently transfer oxygen into water, a fact corroborated by studies at UCLA and various trials conducted by research institutions and growers in Europe, the United States, and Latin America.

Oxygen nanobubbles help improve water quality, reduce algae, control the proliferation of anaerobic pathogens, and foster a healthier ecosystem in the root zone. This promotes the activity of aerobic beneficial microorganisms, better nutrient uptake efficiency and improved plant development.

Reduced compaction, improved water infiltration and nutrient mobility promote better root development.

Advancing Kiwi Cultivation: Moleaer Nanobubbles Propel 8.7% increase in Fruit Size and 9% Surge in Brix Levels

The average fruit weight in the treated section was 150 grams, compared to 138 grams in the control section, representing an 8.7% increase. Improved yields can be attributed to enhanced water quality, root development, and soil structure, as well as more efficient nutrient uptake facilitated by Moleaer nanobubbles.



Graph 1: Average fruit weight in the section treated with Moleaer nanobubbles compared with the control.

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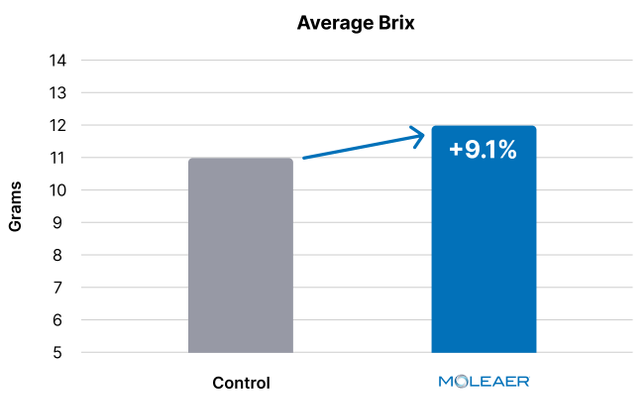
Nanobubbles, with unique properties such as a negative charge and a hard shell, alter the properties of water, aiding in better water infiltration, reduced compaction, salt leaching, and enhanced nutrient mobility. These benefits contribute to more vigorous and resilient plants and, consequently, superior yields and fruit quality.

Brix levels, indicative of sugar content in the fruit and crucial for taste and overall quality, were measured in the trial. The treated section exhibited a 9% higher Brix on average.



Graph 2: Average Brix level in the section treated with nanobubble water compared with the control.

Similar improvements in Brix and coloration were observed in previous trials with table grapes in Italy and Chile, emphasizing the positive impact of Moleaer nanobubbles on nutrient mobility and absorption, essential for sugar content and coloration.

Kiwi growers can face significant losses due to poor calibers and other fruit quality factors, so improving Brix and fruit caliber translates into more profitable operations. Brix, which measures the sugar content in fruit, directly affects the taste and quality of the kiwis.

Moleaer model XTB nanobubble generator installed in line

Higher Brix levels generally indicate sweeter, more flavorful fruit, which can command higher prices in the market. Additionally, fruit caliber, which refers to the size, shape, and uniformity of the fruit, influences consumer perception and market demand.

The Science Behind Moleaer Nanobubbles and Their Prolific Impact on Crop Yields

Nanobubbles measure between 70 and 120 nanometers in diameter, approximately 2500 times smaller than a grain of salt, which gives them unique physical and chemical properties different from microbubbles and other larger bubbles. Thanks to their neutral buoyancy, they move randomly and continuously through the water at all points of an irrigation system, staying submerged for weeks. Nanobubbles help reduce soil compaction through increased soil flocculation. Their negative charge and hard surface help to clean the biofilm from the irrigation lines, reducing obstructions and improving the distribution uniformity of irrigation.

High concentrations of negatively charged nanobubbles reduce the surface tension of water and improve the infiltration of soils as well as improve the capillary action of dissolved nutrients to get nutrients and water to the root zone where they are needed most. Better capillary root mass results in more efficient nutrient uptake.

The impact of Moleaer nanobubble technology on water quality, soil structure and plant health translates into higher yields, better fruit quality and more resilient crops, as it has been demonstrated through numerous independent studies in Europe, North America and Latin America.

Do you want to know all the benefits of nanobubbles in agriculture?

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