



TABLE GRAPES: NANOBUBBLE-ENRICHED WATER IMPROVES COLOR AND BRIX

LOCATION

Mazzarrone, Sicily, Italy

UNIT

Bloom 50 with external O₂ installed in line

TIME

Apr - Sep 2023

CROP

Table Grapes var. Red Globe

CONDITIONS

clayey soil with drip irrigation

RESULTS



Significantly better coloration at harvest time (64% vs. 15% of bunches with ideal coloration)

Significantly improved water infiltration and reduced salinity

14.6% higher Brix (17.53 vs. 15.30)

Landlab, an agricultural research institution in Italy, conducted a study comparing the effects of oxygen nanobubble-enriched irrigation water, utilizing Moleaer's technology, on 2 hectares of table grapes against a control group. Baglieri, a renowned table grape farm in the South of Sicily boasting over 27 hectares of produce, has grappled with coloration issues in recent years, leading to the inability to sell a significant portion of its production, ranging from 30% to 70% annually.

HEALTHIER VINES LEAD TO BETTER BRIX & COLORATION WITH NANOBUBBLE TECHNOLOGY

During the Landlab study at Baglieri, the section treated with nanobubble technology had better coloration and brix when compared to the control. Landlab researchers assessed the color at two different times, at veraison, when grapes start ripening, and at harvest time.

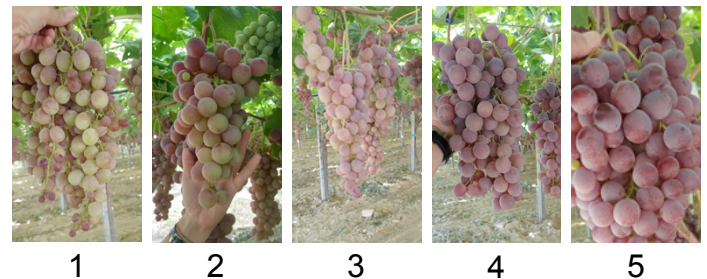
The table grape color classes, often categorized from 1 to 5, generally refer to the different shades or colors of grapes, particularly in commercial classification systems. In this case, they were classified on a scale from 1 to 5 as per the image and the table below.

A staggering 64% of the total bunches from the section treated with nanobubbles had a coloration of 5 based on this scale, with another 33% reaching a 4 out of 5. Only 15% of the grapes in the control group reached the ideal coloration, with 51% reaching a coloration between 2 and 3. The comprehensive benefits of nanobubble technology

ensure the cultivation of premium table grapes with exceptional quality and yield. This case study highlights the transformative impact of integrating traditional viticultural practices with innovative nanobubble technology, offering a reliable solution for growers to enhance grape quality and meet high standards of taste, appearance, and market preferences.

Following the implementation of nanobubble technology, Baglieri observed notable enhancements in grape coloration and a simultaneous increase in the sugar content, measured in Brix, of the vines. Previous trials carried out in Chile on table grapes var. Crimson also showed better coloration, higher brix, and faster fruit development, advancing the harvest up to 3 weeks.

% of grapes with ideal color at harvest				
1	2	3	4	5
5-10%	15-30%	35-50%	55-70%	75-100%

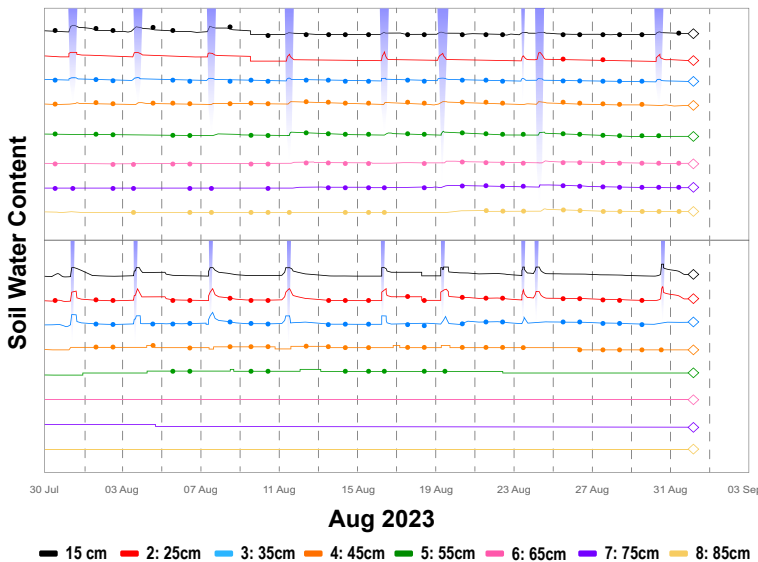


The information and data contained herein are deemed to be accurate and reliable and are offered in good faith, but without guarantee of performance. Moleaer assumes no liability for results obtained or damages incurred through the application of the information contained herein. Customer is responsible for determining whether the products and information presented herein are appropriate for the customer's use and for ensuring that customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Specifications subject to change without notice. Copyright © 2023 Moleaer. All trademarks stated herein are the property of their respective company. All rights reserved. This document is confidential and contains proprietary information of Moleaer Inc. Neither this document nor any of the information contained herein may be reproduced, redistributed or disclosed under any circumstances without the express written permission of Moleaer Inc. Rev. 01-29-24 V1.6

INNOVATIVE NANOBUBBLE TECHNOLOGY ADVANCES TABLE GRAPE CULTIVATION

The pursuit of growing premium table grapes necessitates a meticulous approach, addressing factors such as soil health, nutrient availability, and irrigation management to ensure the optimal development of vines and high-quality fruit. Recognizing the critical interplay of these factors, growers face challenges, especially in the context of soil quality and structure. Well-aerated and appropriately textured soil fosters optimal root development and water infiltration, whereas compacted soils hinder pore space, impacting water and nutrient uptake, and consequently influencing grape quality, coloration, and ripening uniformity. In response to these challenges, technological innovations like Moleaer's nanobubble technology emerged as cost-effective solutions. This innovation addresses the complexities of soil health and nutrient management.

Moleaer's nanobubble technology's proven efficiency in transferring oxygen into water, exceeding 85%, facilitates higher and more stable dissolved oxygen concentrations, promoting superior root development, increased nutrient uptake efficiency, and healthier soil microbiome while helping to mitigate pathogens and algae. The distinctive physical and chemical properties of nanobubbles, measuring 70 to 120 nanometers, set them apart, with Moleaer's patented technology.



Graph 1: Comparison of soil humidity (violet cascades) and root activity (colored circles) at different depths when treated with Moleaer nanobubbles (top) vs. Control (bottom). Results shown both higher water infiltration and increased root activity at more depth on the treatment with Moleaer nanobubbles.

These unique properties of oxygen nanobubbles help to reduce soil compaction and help leach salts below the root zone. The lower surface tension of nanobubble-enriched water aids in penetration and infiltration, minimizing runoff and evaporation, ultimately optimizing water delivery to the root zone.

The electrochemistry of nanobubbles enables the transport of cations to the root zone, enhancing nutrient mobility and stability. Grape coloration, especially for red varieties, is significant as many growers experience sales losses of 30-50% due to poor coloration. Brix levels, indicating sugar content, are essential for taste and grape quality, with ideal values of 17-19 indicating quality crops. Essential nutrients, including potassium, magnesium, boron, zinc, and copper, play pivotal roles in grape coloration by contributing to pigment synthesis.

The negative charge of nanobubbles aids in cation transport, supporting the uptake of these crucial nutrients. Imbalances or deficiencies in these nutrients can adversely affect grape coloration, impacting overall fruit quality and appearance.

Better water infiltration and soil flocculation, facilitated by nanobubbles, support nutrient uptake, emphasizing the importance of oxygen in enhancing nutrient uptake efficiency from the roots.

These considerations align with the comprehensive approach of integrating traditional viticultural practices with innovative nanobubble technology, ensuring the cultivation of premium table grapes that meet high standards of quality, taste, and appearance.

The color classes used by producers, marketers, and retailers further underscore the significance of this integrated approach, allowing consumers to easily identify and choose grapes based on color preferences.



To learn more about how irrigation water infused with nanobubbles helps to improve soil health and structure, download our eBook: <https://www.moleaer.com/soil-ebook>

The information and data contained herein are deemed to be accurate and reliable and are offered in good faith, but without guarantee of performance. Moleaer assumes no liability for results obtained or damages incurred through the application of the information contained herein. Customer is responsible for determining whether the products and information presented herein are appropriate for the customer's use and for ensuring that customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Specifications subject to change without notice. Copyright © 2023 Moleaer. All trademarks stated herein are the property of their respective company. All rights reserved. This document is confidential and contains proprietary information of Moleaer Inc. Neither this document nor any of the information contained herein may be reproduced, redistributed or disclosed under any circumstances without the express written permission of Moleaer Inc. Rev. 01-29-24 V1.6