ICBA's study reveals positive effects of salt water on date quality

- ICBA's latest research shows that low to moderate levels of water salinity increase sugar content in some date varieties and improve their quality.
- The study has major implications for date palm irrigation in water-scarce regions.

Dubai, UAE, April 26, 2024 – A new study by scientists at the International Center for Biosaline Agriculture (ICBA) has found that certain common date varieties can benefit from low to moderate levels of water salinity.

Published in *Frontiers in Sustainable Food Systems*, an open-access peer-reviewed journal with an impact factor of 4.7, the study provides fresh insights into the correlation between salinity and varietal response by date palm. The findings offer considerable promise for more sustainable water management in date production in arid ecosystems.

Dr. Tarifa Alzaabi, Director General of ICBA, said: "Date palm is a crucial element of agrifood systems in the Middle East and North Africa as date production contributes to job creation and income generation in the agricultural sector. This means it is important to develop effective solutions for dealing with biotic and abiotic stresses that undermine date palm cultivation. This rationale has informed ICBA's research program on date palm since 2001. Our center has conducted different experiments in the UAE to determine the long-term effect of saline water irrigation on date palm growth, productivity, fruit quality, and the impact of salinity on the soil. The experiments have been carried out with 18 common date varieties from Saudi Arabia and the UAE, including Ajwa Al Madinah, Khalas, and Lulu. And results to date show that it is possible to grow salt-tolerant varieties of date palm using saline water along with best practices in salinity management."

During an experiment at ICBA, scientists assessed the impact of irrigation with saline water at three levels – 5, 10, and 15 deciSiemens per meter - on the fruit quality of five varieties: Lulu, Sukkari, Fardh, Ajwa Al Madinah, and Khalas. These varieties were selected as they are the most common varieties available in the market in the UAE and are generally preferred by consumers.

The fruits were harvested during *Tamar*, the final stage of date maturity, and compared with the dates from the market on physical parameters like weight, size, dimension, color, volume, Brix, protein, sugar, sodium, and potassium.

The study also included a survey to evaluate consumer perceptions of date quality. In particular, the survey looked at such traits as texture, flavor, aroma, taste, color, and appearance using a five-point scale.

While salt was found to be detrimental to some varieties, it had the opposite impact on some others.

The results of the experiment demonstrated that the sugar content of Khalas, Ajwa Al Madinah, and Lulu dates irrigated with saline water of 5 deciSiemens per meter was comparable to that of the commercial varieties available on the market. They also revealed that irrigation with saline water of 10 deciSiemens per meter had a positive effect on Sukkari, Fardh, and Ajwa Al Madinah dates, increasing their sugar content.

The survey of the consumer preferences showed that the sensory attributes such as flavor, aroma, taste, color, and appearance at water salinity levels of 5 and 10 deciSiemens per meter were similar to those of the dates irrigated with fresh water with a salinity level of 0.4 deciSiemens per meter and those available on the market.

Overall, the study confirmed the well-known fact that high salinity negatively impacts date palm. However, it was also established that salinity stress could increase sugar concentration in specific varieties. This is a significant finding for farmers who want to increase their income from date production in saline conditions as sugar content should also be considered as one of the main selling criteria on the market.

Dr. Zied Hammami, an agronomist at ICBA and lead author of the paper, said: “Our findings indicate that there is marked variation in varietal response to water salinity. They are also consistent with previous research showing that abiotic stress such as salinity and water scarcity during specific growth stages may enhance fruit quality provided that the right variety is cultivated and appropriate farming practices are followed. We hope our study will contribute to a better understanding of how date palm responds to water and salinity stress and guide efforts to enhance date palm irrigation and water management in desert environments.”

While date production has great cultural, economic, and social significance in the Middle East and North Africa, it is constrained by a range of factors, including water scarcity and salinity. Around 90 percent of the world’s date palm trees are grown in the region and many farmers depend on date production for their livelihoods. ICBA’s research work is focused on developing integrated

date palm management solutions and improving the livelihoods of date producers in the region and beyond.

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About ICBA

The International Center for Biosaline Agriculture (ICBA) is a unique applied agricultural research center in the world with a focus on marginal areas where an estimated 1.7 billion people live. It identifies, tests, and introduces resource-efficient, climate-smart crops and technologies that are best suited to different regions affected by salinity, water scarcity, and drought. Through its work, ICBA helps to improve food security and livelihoods for some of the poorest rural communities around the world.
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