

Role of Date Palms in Sustaining Heritage and Nurturing Future.

The Fifth International Dates Conference and Exhibition.

Riyadh, Saudi Arabia 20 - 21 November 2024

BOOK OF ABSTRACTS

Riyadh, Saudi Arabia 20 - 21 November 2024

Edited by

Prof. Hala Hazam Al-Otaibi, Dr. Ammar Edrees.

Publisher

Representation in whole or in part by any means is not permitted without consent of the editors.

Authors

Multiple

Title

Book of Abstracts of the Fifth International Dates Conference and Exhibition.

The editors are not responsible for any author's errors in spelling, grammar, or scientific facts. The content of Abstracts is the sole responsibility of the authors.

© Copyright: The Fifth International Dates Conference and Exhibition, 2024.

Forward

The Fifth International Dates Conference and Exhibition, themed “*Role of Date Palms in Sustaining Heritage and Nurturing the Future*,” reflects a commitment to honoring the profound role of date palms in Saudi Arabia's cultural heritage while advancing their potential for future sustainability. Organized by the National Centre for Palms & Dates in collaboration with King Faisal University, this event held in Riyadh, brings together experts, policymakers, industry leaders, and innovators to chart a future for the date palm industry that integrates tradition with innovation.

Date palms are a symbol of resilience and prosperity, an integral part of Saudi Arabia's agricultural landscape that supports food security, economic growth, and environmental sustainability. With the objectives of this conference, we aim to highlight national efforts to strengthen the date palm sector, embrace smart solutions for socioeconomic growth, and promote sustainable practices that align with Saudi Arabia's Vision 2030. This aligns with our vision to maintain the legacy of date palms while fostering economic diversification and environmental stewardship.

This conference addresses a range of critical themes, including the role of date palms within the Vision 2030 framework, their impact on environmental sustainability, and their potential in global markets. Sessions will showcase the latest innovations in smart farming, nutritional applications, and e-commerce. The event will also feature an interactive workshop, “Coffee & Conversations,” allowing participants to exchange innovative success stories and insights on advancing the date palm sector.

Our shared goal is to ensure that this essential agricultural resource not only continues to represent our cultural heritage but also becomes a beacon of sustainable development. Through collaborative dialogue and international partnerships, we aim to support the growth of the date palm industry and inspire new opportunities for a prosperous future.

Riyad , Saudi Arabia 20 - 21 November 2024.

Dr. Mohammed Alnuwairan

Conference Chairman

Conference Chair

Dr. Mohammed Alnuwairan

Scientific Committee

Prof. Hala Hazam Al-Otaibi, College of Agriculture and Food Science, King Faisal University. Saudi Arabia.

Prof. Salah M. Aleid, College of Agriculture and Food Science, King Faisal University. Saudi Arabia.

Dr. Randah Alqurashi, College of Agriculture and Food Science, King Faisal University. Saudi Arabia.

Prof. Maged E. Mohamed, College of Clinical Pharmacy, King Faisal University, Saudi Arabia.

Dr. Ammar Edrees, National Centre for Palms & Dates, Saudi Arabia.

Dr. Abid Muhammad Hussain, Ministry of Environment, Water and Agriculture , Saudi Arabia.

Sustainable Cultivation of Date Palms - Lessons from the USA and Beyond

Dr. Glenn C. Wright, Associate Professor and Extension Specialist, University of
Arizona, Yuma, AZ, USA
gwright@arizona.edu.

Date palms are the most important fruit-growing tree grown in the Middle East and North Africa but are relative newcomers to the United States. ‘Mejhoul’ and ‘Deglet Noor’ cultural practices in the US are becoming increasingly sustainable and rely on advanced technology rather than traditional methods. Water scarcity is leading to the adaption of irrigation innovations. Pests and diseases are few and can often be controlled in ways that do not require conventional pesticides. Much of the industry expects to become 100% organic due to customer demand. The high cost of labor required for pollination, thinning, harvest and processing is leading to increased mechanization. The University of Arizona is cooperating with the Sultanate of Oman to develop best practices at a tissue culture laboratory, as well as establish a diagnostic lab an analytical chemistry lab and a food science lab dedicated solely to dates. Residents of the Middle East know that dates are a “superfood” and the qualities that make them so are soon to be promoted with the goal of increasing levels of consumption in the USA. I encourage international collaboration to improve the sustainability of date growing and increase worldwide consumption of this valuable fruit.

Governmental Efforts about Dates for Food Security and Nutrition

Abdulrahman Al Habib
International Date Council; Saudi Arabia
alhabeeb1963@gmail.com

Abstract: The date palm sector in the producing countries is of great economic, social and environmental importance. The sector plays an important role in improving the income and living standards of workers in the field and in improving the level of food security in producing countries. Therefore, there are many governmental efforts to support this sector. One of the most important support efforts is the establishment of research centers specialized in date palms. In addition, local and international date exhibitions and festivals are held annually. Scientific conferences, seminars, workshops, agricultural extension and training courses are also held. Governments also support the private sector, whether in palm cultivation or date processing and marketing. There are also other methods of support, such as creating special international awards for dates, and efforts of Saudi governmental resulted in dates being classified as an exceptional fruit by Food and Agriculture Organization of the United Nations (FAO), and the FAO's declaration that 2027 will be the International Year of Dates. Finally, to support the dates sector, nine countries came together to establish an International Dates Council based in Riyadh on February 16, 2022, which now includes 15 countries and several international organizations. The most important recommendations that can be made are to support creative applied research in palm cultivation, date processing and marketing, and to support the private sector.

Saudi Good Agricultural Practices (Saudi G.A.P.) for Improving Date Palms Farm Management.

Eng. Saleh Abdulrahman Alshuhail

Manager Saudi G.A.P. unit, Ministry of Environment, Water & Agriculture, Riyadh, Kingdom of Saudi Arabia, salshuhail@mewa.gov.sa

Abstract: Saudi Arabia's agriculture sector faces unique challenges, including water scarcity, harsh climatic conditions, and the need to balance food security with environmental sustainability. Recognizing these challenges, the Saudi Good Agricultural Practices (Saudi G.A.P.) initiative was announced on 05/12/2018 to promote sustainable agriculture across key sectors: fruits and vegetables, date palms, poultry, livestock, and aquaculture. Date palms are a major focus, with the Kingdom's production exceeding 1.9 million tons annually, underscoring importance of sustainable practices in this sector. Saudi G.A.P. focuses on four main objectives: ensuring food safety and traceability; protecting environment; improving animal welfare; and enhancing farmer health and safety. Through training, certification, and compliance checks, Saudi G.A.P. helps farmers adopt practices that meet high food safety standards and environmental stewardship. The initiative also promotes efficient resource use and humane treatment of animals, and aquaculture, which are critical to overcoming agricultural challenges in Saudi Arabia. By achieving Saudi G.A.P. certification, farmers gain access to new markets, improve productivity, and contribute to Kingdom's sustainable development goals. Saudi G.A.P. demonstrates Saudi Arabia's commitment to promote a resilient agricultural sector, supporting long-term food security, and protecting natural resources. As the initiative expands, it continues to strengthen sustainable farming practices, benefiting the economy, environment, and public health.

Organic Farming: Opportunities for Transforming Date Palm Cultivation Practices.

Mohamed Hussien

National Organic Agriculture Center, Qassim.

kkk9932001@yahoo.co.uk

Abstract: Organic agriculture represents a comprehensive system of practices designed to minimize reliance on pesticides and synthetic fertilizers, to produce safe and healthy food. This approach emphasizes using natural and organic inputs to reduce environmental pollution and promote sustainability. Specific agricultural practices are essential in the cultivation of date palms including irrigation, fertilization, and integrated pest and weed management. Moreover, horticultural techniques such as pruning, trimming, pollination, thinning, bending, and bagging are advisable to be adopted. Employing the best practices in these areas can substantially lower the incidence of pests and diseases. Such improvements not only enhance crop yield but also improve fruit quality and marketability, particularly for export. In essence, organic date palm cultivation serves as a transformative model, advancing sustainable agricultural practices and reinforcing environment in date production systems.

Climate-smart approaches for date palm cultivation

Hassan Ali-Dinar

Date Palm Research Center of Excellence, King Faisal University, Saudi Arabia;

hdinar@kfu.edu.com

Abstract: Date palm (*Phoenix dactylifera* L.) cultivation is vital to the economies and livelihoods of many people in arid and semi-arid regions. Despite its importance, climate change poses significant challenges to its sustainability. This speech will explore climate-smart approaches for date palm cultivation that not only ensure productivity but also enhance resilience to climate impacts such as rising temperatures, drought, erratic rainfall, pests and diseases and soil degradation. The presentation will focus on key strategies that integrate sustainable agricultural practices with climate adaptation and mitigation measures. These include optimizing water use through efficient irrigation techniques like drip and subsurface irrigation and the use of treated wastewater, improving soil health through organic amendments and agroforestry systems, and selecting drought- and heat-resistant date palm varieties. We will also examine how integrating date palms into diversified cropping systems can reduce climate-related risks while improving yields and resource efficiency. Climate-smart innovations, such as the use of remote sensing and digital technologies for precision agriculture, will also be discussed for their ability to optimize resource use and monitor crop health. The speech is expected to contribute with insights into how farmers, policymakers, and researchers can collaborate to implement climate-smart solutions that increase the sustainability and resilience of date palm cultivation, ensuring food security and environmental benefits for future generations.

Satellite Earth Observation for Agricultural Monitoring.

Eng Lee Annamalail

Saudi Space Agency, Director of Earth Observation

annamalail@ssa.gov.sa

Abstract: Remote sensing is emerging as an essential tool which responds to modern agricultural requirements within dynamic climatic and economic environments, as it offers a means of providing recurrent information from the local to the global scale in a systematic way. This data, most often provided by cost effective low earth orbiting satellites is enabling the characterization of crucial spatiotemporal variables, as well as deriving much needed insights that help in tactical (at farmer level) and strategic (at government level) decision making. Advances in sensing technology, now coupled with advances in data analytics is enabling new forms of insights to be delivered at increasing frequency. We are seeing that through space technology enhancing and supporting precision agriculture, achieving and maintaining better plant health has the potential to reduce costs and improve yields. Long terms problems like pests and disease can now be detected at scale across all farms in the country on a daily to weekly basis enabling quicker response times at reduce costs. This then enables budgets to be moved from inspection and detection to mitigation and remediation. We discuss the trends and advances in modern satellite remote sensing as a means to enhance agricultural practices within the Kingdom, introducing the new sensor available and the application of advanced data analytic techniques which enable decision making through insights.

Emerging Trends in Research: By-Products, Innovative Packaging, Strategic
Branding, and Financing in the Date Industry

Randah Alqurashi

Department of Food and Nutrition, College of Agriculture and Food Sciences, King Faisal
University, P.O. Box 31982, Al- Ahsa 380, Kingdom of Saudi Arabia,
ralqurashi@kfu.edu.sa.

Abstract: The date industry is experiencing a transformative phase driven by sustainability and innovation, with two key areas leading to this change: by-product utilization and innovative packaging solutions. By-products such as date seeds, pits, and fibers are being repurposed into high-value products like dietary supplements, natural sweeteners, and bioactive compounds, creating new revenue streams while minimizing waste. This approach aligns with circular economy principles, enhancing both economic value and sustainability. In Saudi Arabia, the evolution of the date industry is closely tied to Vision 2030, which emphasizes sustainability, economic diversification, and non-oil sector growth. Current research trends in the sector focus on maximizing by product utilization, developing innovative packaging solutions, strategic branding, and exploring new financing opportunities. Innovative packaging is revolutionizing how dates are preserved, marketed, and consumed, reflecting the sector's commitment to sustainability and evolving consumer preferences. Biodegradable, compostable, and smart packaging technologies are increasingly being adopted to meet the demand for eco-friendly solutions and extend product shelf life. Sustainable materials, including biodegradable options, reduce the environmental footprint, while smart packaging technologies, such as freshness indicators or RFID tracking, enhance product quality and provide added value. Moreover, consumer perceptions and market trends are vital for strategic branding efforts. By understanding consumer preferences and cultural influences on date consumption, branding can emphasize health benefits, sustainability, and local heritage, especially in premium and international markets. This insight will enable Saudi dates to stand out in a competitive global market, positioning the industry for sustainable growth and innovation.

Ensuring Excellence: Quality Management and Standards in the Date Industry.

Siddig H. Hamad and Salah M. Aleid

College of Agricultural and Food Sciences, King Faisal University

shamad@kfu.edu.sa

Abstract: Saudi Arabia is one of the leading countries in the world in date fruit production. The fruit is the most important staple food produced in the country and maintained throughout history its importance as a crop of economic, cultural and religious significance. Microbial contamination is one of the most important factors that affect food safety and quality. This article reviews results of studies conducted by the authors on the microbial contamination and spoilage of date fruits at both the Rutab and the Tamr stages. The fruits, like any field crop, is exposed to microbial contamination before and during harvest and handling. Microorganisms that contaminate and spoil date fruits were enumerated, isolated and identified using cultural and molecular typing techniques. Microbial spoilage occurs at the Rutab stage because of the high moisture content, on the other hand, the low moisture content of Tamr inhibits microbial growth and spoilage, but the microbes can persist on the fruit for months during storage. This situation can negatively affect chances of international marketing of the fruit because of the stringent microbiological standards imposed in many countries in the world. Rutab is spoiled by molds, yeasts and bacteria, while the main contaminants at the Tamr stage are molds and yeasts.

Success Story of Al Rajhi Endowment, Al Batin Palms Project

Saud bin Abdulkarim Al-Fadda

General Manager of the Sheikh Saleh Al-Rajhi Endowment Management.

s-alfadd@rajhiawqaf.org

Abstract: Al-Batin Date Palm Project, affiliated with the Agricultural Division of the Sheikh Saleh Al Rajhi Endowment Management in Buraydah, Qassim Region, Saudi Arabia, is the largest date palm project in the world, as recognized by Guinness World Records in 2005. Covering 5,466 hectares, the project includes 200,000 date palms from 44 of the finest varieties. It aims to produce around 15,000 tons of dates annually, with 2,500 tons under organic farming, adhering to sustainable and good agricultural standards, such as Saudi and global Good Agricultural Practices and organic certifications.

The work strategies focused on improving agricultural infrastructure and cultivated date varieties, leading to increased production of high-quality, pesticide-free dates. Beyond its production achievements, the project has contributed to scientific and extension production such as publishing five books on date palm cultivation and date production. It has also earned 15 specialized quality certificates and received 9 local, regional, and international awards.

The lessons learned emphasize the importance of selecting economically suitable date varieties, applying sustainable farming practices to protect resources for future generations, and the critical role of documentation for continuous improvement. Additionally, the project highlights the significance of research and experimentation to drive ongoing innovation and development in the agricultural sector.

Understanding Consumer Trends: Perceptions, Preferences, and Requirements in the Date Market

Mohammed Alomair

King Faisal University

maalomair@kfu.edu.sa

Abstract: Palm trees and dates are fundamental elements of Saudi Arabia's cultural identity, embodying the Kingdom's originality. This aspect of Saudi culture has been cherished and passed down through generations. Given the importance of dates, it is vital to delve into their various dimensions, particularly the economic opportunities they offer. The marketplace for buying and selling dates and related products has transformed significantly with advancements in technology. Social media, in particular, exposes consumers in Saudi Arabia to a wealth of product-related information daily. As consumer behavior continues to evolve, understanding these changes becomes increasingly essential. Consequently, effectively presenting date products and making them enticing to consumers has become a challenge. Thus, it is imperative to explore the shifts in consumer perceptions, preferences, and requirements surrounding this cultural product.

Success Story of date-based Dairy product.

Bashar AL-Johar

SADAFCO

basab@hotmail.com

Abstract: Background: The current trend towards more natural and wholesome ingredients in the food industry has resulted in the use of dates as a Dates fruit with dairy products due to their high nutritional value. This study aims to investigate the efficacy of adding dates to dairy products and its effect on their nutritional value. Methods: Various formulations of dairy products such as milk, yogurt, and Protein milk were prepared with the addition of dates as a fruit flavour. Results: The study showed that incorporating dates as a fruit flavour in dairy products resulted in a significant reduction in the use of added sugar while increasing the fiber content and essential nutrients present in these products. Furthermore, the products were of high quality and delivered a distinctive pleasant taste. Conclusions: The use of dates with dairy products can increase their nutritional value and improve product quality, reflecting the growing interest among consumers in natural and wholesome foods. This study demonstrates how adding dates to dairy products can help food manufacturers meet consumer expectations for better quality and nutritionally rich products. Hence, incorporating dates into dairy products can have a positive impact on both consumer health and the food industry.

Success Story of Producing the First Date Certified Reference Material

Abubakr M. Idris

Department of Chemistry, College of Science, King Khalid University

aadres@kku.edu.sa

Abstract: Background: The safety, followed by quality of food, is always of high priority across the globe; an issue that requires reliable approaches for testing food. Certified Reference Materials (CRM) are considered the corner stone of controlling the quality of analytical results. For the first all over the world, a new CRM of dates (*Phoenix dactylifera L.*) has been developed. (2) Methods: The process of the CRM development followed the ISO Guide 34 Standards. For sterilization and preservation purposes, the dates CRM was irradiated by gamma-ray with a dose rate of 4.1 kGy/hr at 25 kGy of absorbed dose. The homogeneity and stability tests were carried exploiting various qualitative and semi-quantitative techniques including PIXE, RBS, XRD, SEM, and SEM-EDX. The certification was carried out by quantitative and semi-quantitative elemental analytical techniques including ICP-MS, ICP-OES, INAA, ETAAS, FAAS, XRF, and PIXE-RBS. Comprehensive statistical analyses were carried out to test the quality of analytical results and to comprise between element contents obtained from different laboratories. (3) Results: The development and validation of home analytical methods following IUPAC guidelines resulted in well-established certified values and indicative properties. Additionally, the collaboration with sixteen laboratories across ten countries across the globe followed rigorous criterion such as lab. accreditation, PT, and UK Pass; an issue that strengthened the quality of the certified values; (4) Conclusions: The newly developed dates CRM is recommended for controlling the analysis of major, minor, trace and ultra elements for environmental, nutritional, agricultural and toxicological concerns.

Assessment and Comparison of Cytogenotoxicity of ATCBRA Insecticide and Cardamom

Extract on Plant Roots

May AlSaleh

Plant Science Researcher

Mayalsaleh0@gmail.com

Abstract: Red palm weevil [*Rhynchophorus ferrugineus* (Olivier)] is an important plant pest causing huge economic losses by infesting date palm plantations in the Middle East region. Furthermore, several insecticides are found to be potent, however, environmental pollution and the development of insecticide resistance limit their efficacy against red palm weevil and the indiscriminate use of synthetic pesticides is mainly responsible for pesticide residues in dates, in contrast to Bio-pesticides, in fact, any plants have evolved naturally, biochemical defenses. By studying, scientists have distinguished many useful compounds that can be used as bio-pesticides. In this current research we tried to have an alternative to minimize the harmful effects of using Insecticides by using plant extract and biosynthesized AgNPs as a biopesticide to control red palm weevils *Rhynchophorus ferrugineus*. Therefore, this thesis is based on the Assessment and Comparison of ATCBRA Insecticide, Cardamom Extract, and Cardamom AgNPs from the Cytological aspect, Due to the lack of prior research studies on this topic. Plant roots were treated for 24 and 48h with (0.1, 0.3, and 0.5%) concentrations of ATCOBRA insecticide, (3, 4, and 5%) concentrations of Cardamom aqueous extract, and (12, 25 and 60mg) of Cardamom AgNPs. Through this thesis, the decrease in mitosis, the increase in the percentage of chromosomal abnormalities and the percentage of DNA damage by exposing plant roots to the insecticide AT COBRA EC proved to have cytotoxic and genotoxic activity, and the results showed its potential harmful effects, which include crops exposed to this insecticide, and that the accumulation of these chemicals in plant parts may be harmful to human health, and it is suggested to replace pesticides with plant extracts that have insecticidal properties in order to control insect pests in a relatively non-toxic way.

Sustainable and Scientific Approach to Managing Date Palm Pests and Diseases.

Dr. Mohammed Al-Khuraiji

The National Center for the Prevention and Control of Plant Pests and Animal Diseases
(WEQAA CENTER)

malkuriji@weqaa.gov.sa

The Good Agricultural Practices with the preventive practices of plant pests having economic impact through Integrated Pest Management (IPM) methods ensure the high-quality and quantity in date production. The IPM includes preventive and curative measures by following an appropriate management of plant protection components as needed, for reducing chemical pesticide use to reach a level of compliance that meets the allowable level of pesticide residues in production. In this context, the Weqaa Center has elaborated an Integrated Management Programs for priority pests on palm trees and their production based on local and regional experiences, research and studies, and recommendations of regional and international organizations in accordance with the climatic conditions in the Kingdom and their impact on the biology and behaviour of these pests. These programs included monitoring using various types of traps, visual examination, and then intervening with the appropriate method, and continuous evaluation to ensure that pest levels remain without the economic threshold with the preservation of biodiversity and the protection of environment, health, and sustainability. After the program's implementation in pilot fields for capacity building and evaluation in all regions and their extension of application to different areas in important productive regions, the requirements of date importers from the Kingdom were met in terms of date quality, standards of pesticide residue limits, and empowerment of the components of Integrated Pest Management.

In this context, the National Center for the Prevention of Plant Pests and Animal Diseases (Weqaa) has been focused on the implementation of the Integrated Management using specific tools and methods in the programs according to procedural guides developed for target pests.

Efficient IoT-Based and Smart Irrigation Systems to Optimize and Operationally Enhance. The
Management of Water Resources Under Date Palm

Majed Mohammed Al-Anazi

The Saudi Irrigation Organization, m.alanazi@sio.gov.sa

Abstract: In this presentation, we provide a simple introduction to Internet of Things (IoT) technology, it's impact on the Agriculture and Irrigation sector, short discussions of the main advantages of this technology, and the experience of the Saudi Irrigation Organization (SIO) in applying it on Sider and palm trees.

Potential use of date palm in carbon capture and carbon sequestration in alteration of climate change

Muhammad Munir

Date Palm Research Center of Excellence, King Faisal University, Al-Ahsa, Kingdom of Saudi Arabia; mmunir@kfu.edu.sa

Abstract: The date palm (*Phoenix dactylifera*) presents a promising avenue for carbon capture and sequestration (CCS) in the context of climate change mitigation. As a drought-resistant species, the date palm thrives in arid and semi-arid regions, where traditional carbon-sequestering trees may struggle to survive. This talk will explore how date palms can be strategically utilized for carbon storage, highlighting their role in absorbing atmospheric carbon dioxide (CO₂) and storing it in their biomass and soils. With their deep root systems, extensive canopy, and high biomass production, date palms can sequester substantial amounts of carbon, contributing to reduced atmospheric CO₂ levels. We will examine current research on the carbon sequestration capabilities of date palm plantations, focusing on their potential to enhance soil carbon stocks in degraded arid lands. The talk will also address the co-benefits of using date palms in agroforestry systems, such as improving soil fertility and enhancing biodiversity. Furthermore, we will discuss how integrating date palm cultivation with other climate-smart agricultural practices can support to combat climate change. Finally, the presentation will offer insights into policy implications and future research directions needed to maximize the role of date palms in global CCS strategies. By utilizing the environmental and economic benefits of date palm cultivation, this approach presents a promising, nature-based solution to help mitigate the effects of climate change.

The Green Initiative: The role of date palm in mitigation and adaptation to climate change in the Saudi Arabia.

Eng. Samir Ali Malaika

National Center for Vegetation Cover Development and Combating Desertification

Smlaekah@ncvc.gov.sa

Abstract: National Afforestation Program: The Role of Date Palms in Climate Mitigation and Adaptation in Saudi Arabia in alignment with the Green Saudi Initiative. The presentation covers seven main points: -1 Climate Change: An overview of climate change impacts. -2 National Afforestation Program: Goals and initiatives within the program. -3 Role of Date Palms in Climate Mitigation and Adaptation in Saudi Arabia: How date palms contribute to climate change mitigation and adaptation. -4 Date Palms' Role in Achieving Afforestation and Climate Goals: How date palms support the goals of afforestation programs and climate strategies. -5 Carbon Sequestration and Date Palms: The role of date palms in environmental sustainability through carbon capture. -6 Limitations of Using Date Palms in Afforestation Programs: Factors affecting the use of date palms in afforestation initiatives. -7 Challenges of Date Palm Cultivation in Afforestation Programs: Specific challenges in integrating date palms into afforestation efforts.

Role of AI in the Post-Harvest Management of Date Palm Fruits

Abdullah M. Alhamdan

Chair of Dates Industry and Technology (CDIT), Dept of Agric Eng.,

College of Food and Ag Sciences, King Saud University

alhamdan@ksu.edu.sa

Abstract: The palm date is an essential fruit in the MENA region. The world production of dates reaches 10 million tons annually, where Saudi Arabia is a leading producer exceeding 1.6 million tons. Nonetheless, several challenges facing this sector, including the high losses/waste of dates, that reach 26%. Some factors leading to these losses include improper techniques and management of postharvest operations, such as harvesting, handling, storage, transportation, and distribution. Artificial intelligence (AI) can potentially revolutionize the current post-harvest practices by providing intelligent solutions to these challenges. AI can optimize harvesting, predict fruit quality, automate sorting, facilitate packaging, monitor storage conditions, and possibly detect and prevent pests and contamination. Automation and online monitoring and adjusting variables will enhance the efficiency of such AI dates processes. On the other hand, AI implementation has several challenges, including high investment costs, expertise, data dependency, technical complexity, and potential for errors (algorithm and human). Extensive efforts from research centers and private sectors are needed to overcome these challenges. A case study of the role of AI in a dates syrup processing plant will be illustrated. Programs/systems such as HACCP, ISO, and GAP should be implemented within the AI scheme. It is hoped that researchers and relevant private and public sectors would focus on introducing AI in postharvest operations to enhance such processes and reduce labor, thus minimizing waste, improving overall profitability, and optimizing efficiency. Leveraging AI can enhance the overall quality and improve economic outcomes for producers, processors, and consumers of dates.

Non-Invasive Acoustic Sensing for Early Red Palm Weevil Detection in Date Palm: A Trial at a
Farm in NEOM

Andrew Yip

Topian, the NEOM Food Company

andrew.yip@neom.com

Abstract: The Red Palm Weevil (RPW) is a destructive pest impacting date palm agriculture, with early detection critical to prevent crop losses. In response, we trialed a novel, non-invasive acoustic sensing technology at a farm in NEOM, designed to detect RPW infestations without direct contact. This system uses passive fiber-optic sensors and advanced data analysis with machine learning to isolate RPW sounds from environmental noise, enabling accurate detection even in challenging conditions. The technology was deployed on 664 date palms, with data collection prioritized during low-wind conditions for optimal accuracy. Results also show successful infestation detection in moderate-wind areas, confirmed by visual inspection. Future system optimizations are planned to improve adaptability in varied environments, positioning this approach as a sustainable and scalable solution for maintaining healthy cultivation. The trial validates the feasibility of using acoustic sensing for RPW monitoring and highlights the potential for broader applications, such as water leak detection and perimeter surveillance in agriculture.

Economic Impact of Artificial Intelligence in Date Palm Cultivation and Industry

Abdullah Sultan Al Shammre

Economics Department, School of Business, King Faisal University, Al-Ahsa 31982, Saudi Arabia,
ashammre@kfu.edu.sa

Abstract: Date palm cultivation holds deep cultural and economic significance in many regions, particularly in the Middle East. By integrating AI into this ancient agricultural practice, we can bridge tradition with innovation, ensuring the date palm industry not only sustains but thrives in the future. Artificial intelligence in agriculture has become a game-changer, especially for crops like date palms, which have complex cultivation needs and long growth cycles. Through AI, farmers are empowered with tools for real-time monitoring and decision-making, increasing productivity while respecting the cultural heritage of date farming. The economic impact is clear: reducing labor demands, improving product quality, and enabling farmers to meet global demand with confidence. AI is thus crucial for making date palm farming more resilient, efficient, and profitable, driving growth while preserving invaluable traditions.

Detecting Red Palm Weevil Pests from Satellite Remote Sensing.

Abdulaziz Alwatban

Saudi Space Agency; watbana@ssa.gov.sa

Abstract: The Red Palm Weevil (RPW), *Rhynchophorus ferrugineus*, poses a severe threat to date palm farms in the Middle East, especially in Saudi Arabia, where it impacts both agriculture and the economy. Traditional detection methods rely on manual inspection, which is costly, labor-intensive, and challenging to scale over large areas. Satellite remote sensing offers a promising alternative for RPW detection at scale. This study leverages high-resolution Worldview-3 satellite imagery to detect RPW-induced stress in date palms. By analyzing spectral indicators like water stress signals, the model identifies infestations in three classes (low infestation, medium infestation, and high infestation). Ground-truth data from infested and healthy palm trees were used to train a machine learning model, enhancing detection accuracy. The model achieved a detection accuracy of #%, demonstrating the potential of high-resolution satellite imagery for RPW monitoring. This approach allows for early infestation detection, minimizing the need for manual inspections, and reducing costs and time required for large-scale monitoring. Satellite remote sensing can thus be a vital tool in controlling RPW spread across vast agricultural farms efficiently and effectively.

Roots of Tradition: The Cultural Identity of Date Farmer Communities.

Fahd bin Ali Al-Hussein

King Saud University, College of Tourism and Archaeology

d.fahad27@hotmail.com

Date palms(Phoenix dactylifera L.) have been one of the most important fruit crops in the arid regions of the Arabian Peninsula since ancient times. Dates are a major source of income and a staple food for the local population, and have played an important role in the subsistence economy. The first beginnings date back to the cultivation of oases in Saudi Arabia led to links that developed between fishing communities, Date palms and the fruits of some wild plants from the Poaceae family. As a result of the pressures of climate changes that affected the lifestyle, the oasis groups resorted to changing their livelihood strategy and turning to domesticating some plants, including date palm trees. The cultural context of the archaeological evidence provides indications that the early beginnings of palm cultivation went through three stages:

The first stage: collecting and harvesting wild plants: Agricultural activity during this stage was characterized by picking wild palm dates, so it was not One of the morphological features of an early Neolithic living system, which continued until about 7000 BC. The second stage: Domestication of wild plants: The first attempts to domesticate palm trees appeared, thanks to the dedication of expertise in dealing with palm trees, and the increased demand for them as part of the food of the ancient inhabitants of the Kingdom; and based on the results of the C14 radiocarbon analysis, the first beginnings of agriculture were estimated. In the Al-Ahsa Oasis, within the period between the year 6220 - 4935 BC. The third stage: Complete transition to agriculture: The late 4000s - 3000 BC witnessed a complete transition to a lifestyle based on palm cultivation.

Dates remained a staple food for the people of the Kingdom, and the tradition of storing and preserving them in huge clay jars was established. However, since the dawn of the dynasties, dates were the most important export outside the Kingdom, as dates were referred to around 2500 BC as Sulum Dilmun dates. Dilmun meant the lands of eastern Arabia, and it is certain that these dates were not taken suddenly, but were plucked from the tops of palm trees, packed, brought to the shore and prepared for shipping.

Green Tourism: Ecotourism and the Date Palm Experience.

Moteab Ibrahim Alsaloum

College of Tourism and Archaeology. KSU

mosaloom@ksu.edu.sa

Abstract: Dates, a symbol of Saudi Arabia's rich agricultural heritage, play a pivotal role in the country's economy and culture. As a leading global producer and exporter, Saudi Arabia's date industry contributes significantly to food security and sustainable development. The kingdom's diverse date varieties, renowned for their exceptional quality and taste, cater to both domestic and international markets.

To further elevate the importance of dates and attract global attention, the Saudi Date Festival offers a unique platform to showcase the country's date heritage, promote sustainable agricultural practices, and foster cultural exchange. By incorporating elements such as cultural performances, culinary demonstrations, and interactive workshops, the festival can engage visitors and create a memorable experience.

Moreover, the festival can serve as a catalyst for eco-tourism by highlighting the natural beauty of Saudi Arabia's date palm oases. By organizing guided tours, nature walks, and educational programs, visitors can gain insights into the traditional methods of date cultivation and appreciate the ecological significance of these oasis ecosystems. In conclusion, the Saudi Date Festival especially in Al Qassim Province and Al-Ahsa Governorate has the potential to position Saudi Arabia as a global destination for eco-tourism. By emphasizing the country's rich date heritage, promoting sustainable practices, and offering immersive experiences, the festival can attract tourists from around the world and contribute to the kingdom's economic and social development.

A Culinary journey: Tradition and Innovation in Date Cuisine

Mohammad Almansouri

Assistant professor at Tourism and Hospitality Management Department

Tourism and Archeology College, King Saud University

malmansouri@ksu.edu.sa mohd.ksu@hotmail.com

Abstract: Heritage food is a crucial link to cultural identity and regional authenticity, particularly highlighted in the diverse date dishes of Saudi Arabia. This presentation examines the interplay between heritage and innovation in Saudi Arabian date cuisine, a vital aspect of the nation's culinary landscape. Dates, deeply rooted in Arabian culture, serve as a symbol of hospitality and tradition. We will explore traditional practices of date cultivation and preparation, showcasing how these methods influence contemporary culinary expressions. Each region of Saudi Arabia offers unique recipes that reflect local ingredients and traditional cooking techniques, contributing to a rich culinary tapestry. While date-based dishes are nutritious, they often pose challenges related to portion sizes and resource-intensive preparation. Innovative chefs and food artisans are reimagining these dishes by blending traditional flavors with modern techniques and global influences, revitalizing the role of dates in both everyday meals and fine dining. This presentation will highlight contemporary approaches to date dish production, emphasizing the potential for reducing portion sizes without sacrificing nutritional value or cultural significance. Through this exploration, we aim to foster a culinary journey that honors heritage while embracing innovation.

Potential Health Benefits of Dates

Muneera Al-Mssallem

King Faisal University; mmssallem@gmail.com

Abstract: Background: Date palm (*Phoenix dactylifera* L.) fruit (DPF) is an essential part of the diet and culture of Saudi Arabia and contributes significantly to improving human health. Methods: Most of the work carried out on health benefits of DPF published in English during the last 15 years were considered, including cross-sectional studies, randomized controlled trials, critical and literature review, and in vitro nutrients analysis. Results: Date palm fruit is considered a major source of easily absorbed sugars providing instant energy and recommended for breaking fast with and for treating hypoglycaemia. However, no detrimental impact was observed on blood glucose and triglycerides levels when the DPFs were consumed (quantity vs. quality). Additionally, the vital action of DPF components contributes significantly in reducing physiological cellular damage and protecting the human against oxidative stress-related diseases such as cardiovascular diseases, neurodegenerative diseases and cancer. DPF can also improve gastrointestinal functions, controlling weight, lowering glycaemic response of sugar, and delaying gastric emptying due to its content of non-starch polysaccharides (7 pieces can secured approximately fourth of RDA for NSPs). Conclusions: Despite the fact that DPF consists mostly of glucose and fructose, its contents of nutraceutical constituents exert important role for protecting human from some chronic diseases.

Utilization of Dates in the Manufacture of New Probiotic Dairy Foods

Fahad Aljasass¹ and Salah Aleid²

¹King Abdulaziz City for Science and Technology, Advanced Agricultural & Food Technology Institute. Riyadh, Saudi Arabia, P. O Box 6086, Riyadh 11442., aljasass@kacst.gov.sa

²King Faisal University, Department of Food and Nutrition Science, Saudi Arabi, P. O Box 400, Al-Hassa, 31982, Saudi Arabia

Abstract: The present study aimed to produce a new functional probiotic soft cream cheese of higher nutritive value and health benefits flavored with Date Syrup. Evaluation of main chemical composition of the product, nutritive value, and microbiological contents of the products as well as evaluation of quality characteristics during storage period. Probiotic soft cream cheese was prepared using both *Bifidobacterium infantis* DSM 20088 and *Bifidobacterium angulatum* DSM 20098 cultures. Date syrup was mixed with the probiotic soft cream cheese at concentrations of 0, 10, 15, 20, 25 and 30%. Gelatine was added as a stabilizer. Products were filled into plastic cups and stored at 4±1°C for 15 days. Addition of date syrup to probiotic soft cream cheese showed significant ($p < 0.05$) increase in Bifidobacterial and lactic acid bacterial counts in compare with control. Date syrup enhanced survival of bifidobacteria during storage, whereas cheese samples showed Bifidobacterial counts more than the recommended number for the health benefits at the end of storage for 15 days. Addition of date syrup decreased the total bacterial counts in cheese. Molds, yeasts and coliforms did not detect in of all treatments up to the end of storage. Addition of date syrup significantly ($p < 0.05$) decreased Lightness (L) and color exchange of the products and this was in proportion to the concentration. Redness (a) and Yellowness (b) were significantly ($p < 0.05$) increased due to the date syrup addition. Date syrup significantly ($p < 0.05$) increased the sensory scores of the products prepared using both the two bifid cultures.

Sweet Sustainability: Role of Dates Food industry in boosting children health.

Dr Suhad Alarifi

Shaqra University; snalarifi@su.edu.sa

Abstract: Date palm cultivation is crucial to food security and sustainability in Saudi Arabia, aligning with the goals of Saudi Vision 2030. The date palm fruit industry is of considerable significance due to its nutrients composition and broad applications. Originating from arid regions, particularly the Middle East, date fruits thrive in hot and dry climates. These fruits are rich in carbohydrates, dietary fibres, proteins, and essential minerals like potassium, magnesium, and iron. They also contain phenolic compounds and antioxidants, contributing to health benefits such as cardiovascular protection, improved digestion, and anti-inflammatory effects. Future directions for the date industry focus on broadening its applications in the food sector, refining cultivation methods, and innovating in the development of date-based products. Genomic studies and modern processing techniques are fostering the creation of healthier food alternatives and new market opportunities. As the demand for natural, functional foods rises, dates are positioned to become integral to global food security and nutrition. Their natural sweetness and nutrient richness make them a healthier substitute for refined sugars in children's snacks and confections, improving the nutritional profile of these products and fostering sustainability in food production.

Unlocking Growth in the Fruits Industry through E-commerce and Digital Transformation:
Opportunities and Challenges with a Focus on the Dates Industry in Saudi Arabia

Abdulaziz S. Alqahtani

Marketing & Ecommerce Department, Business College, Jazan University,

Saudi Arabia; azalqahtani@jazanu.edu.sa

Abstract: The fruits industry in Saudi Arabia, particularly the dates sector, plays a crucial cultural and economic role, contributing approximately 17% to the global date market. As the industry evolves, e-commerce and digital transformation are proving to be key drivers of growth. With Saudi Arabia experiencing exponential growth in internet penetration, mobile usage, and consumer trust in online transactions, the government's Vision 2030 initiative emphasizes the importance of digital transformation to diversify the economy and boost the agricultural sector. E-commerce offers several opportunities for the dates industry, such as expanded market reach through global platforms like Amazon Saudi Arabia and Noon, as well as data-driven marketing using social media platforms like Instagram and TikTok. In addition, Vision 2030 aims to modernize the sector, increasing production from 1.3 million to 1.7 million tons by 2030. Despite these opportunities, challenges persist, including logistics related to the cold chain, digital literacy gaps among rural producers, and consumer trust issues in the quality and delivery of perishable goods. Additionally, while e-payment systems like Mada and STC Pay are widely accepted, some consumers, especially in rural areas, remain hesitant about online transactions. Statistics show that in 2023, Saudi Arabia's e-commerce market was valued at over \$7 billion, with agriculture, particularly the dates industry, becoming a key part of this growth. For sustained success, producers must invest in digital tools, build consumer trust, and leverage government support to navigate a competitive marketplace.

Global Overview of E-commerce and Digital Trading in the Fruits Industry

Ghadeer R. Alsaeed

Assistant Professor of E-Business, College of Business, King Faisal University gsaeed@kfu.edu.sa

Abstract: Electronic commerce (e-commerce) platforms have transformed global trade that impact diverse sectors, including the fruit industry. Particularly, e-commerce has emerged as a promising channel for date fruit trading, a market that continues to grow rapidly. This expansion motivates an in-depth examination of e-commerce's trading opportunities and challenges to support the sustainable growth of this domain. This research presents a comprehensive literature review of the current studies on digital fruit trading. The findings identify key factors that can be used to design an optimal e-commerce model for date fruit trading. Additionally, the study highlights potential elements that influence consumers' perceptions to adopt e-commerce for purchasing date fruits online. Understanding these factors is crucial for expanding e-commerce within the date fruit industry, facilitate transactions between customers and stakeholders, and understating how to enhance trust levels across the date fruit digital marketplace.

Logistics and Supply Chain Management in E-commerce for Fruits with a Focus on Dates Fruit

Ali Medabesh

Business College, Jazan University,

Saudi Arabia; amedabesh@jazanu.edu.sa

Abstract: Logistics and supply chain management are crucial to the success of e-commerce, particularly for perishable goods like fruits. This study examines the specific challenges and strategies involved in the e-commerce logistics of fruits, with a focus on dates, a high-demand commodity worldwide. Efficient supply chain processes are essential to maintain the quality, freshness, and nutritional value of dates. Key elements such as cold chain logistics, inventory management, transportation, and last-mile delivery are vital for minimizing spoilage and ensuring customer satisfaction. The integration of technology, including real-time tracking and data analytics, provides significant advantages in optimizing logistics operations. In the case of dates, where shelf life and transportation conditions are critical, innovations in packaging, warehouse management, and route optimization are important for reducing costs while meeting consumer expectations. This paper explores how e-commerce platforms can utilize these strategies to enhance the supply chain efficiency for dates, ensuring sustainability and profitability for stakeholders in both domestic and international markets. Additionally, it emphasizes the importance of adhering to international food safety standards to maintain competitiveness in global trade.