

Date Palm Research Center of Excellence (DPRCE), King Faisal University

Research Program

Date Palm Physiology and Production (DPPP)

Duration: Five Years

Funded by: Ministry of Higher Education, and KFU

Starting date: 2015

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Saudi Arabia

Research Program

Date Palm Physiology and Production (DPPP)

Introduction



Date palm, *Phoenix dactylifera* L., a monocotyledonous, dioecious, perennial plant belongs to the Arecaceae (Palmaceae) family, is considered as one of the world's first cultivated fruit trees. The worldwide date production was 1,852,592 tonnes (from 240,972 ha) in 1961 reached 7,548,918 tonnes (from 1,104,596 ha) in 2012. Dates are a major food and income source for local populations in the Middle East and North Africa. It plays significant role in the agro-ecosystem and socio-economic development of these areas. Thousands of date palm cultivars and selected lines exist in different date-growing countries. It is the major fruit crop of Saudi Arabia, which have 400 different date palm cultivars covering 75% of the total cultivated crops area. The estimated 2012 annual production of 23 million date palms, grown in 160,000 ha, is more than one million tonnes.

Plant physiology research has a central role in advancing knowledge for better understanding of plants and their interactions with surrounding environments. Several physiological factors have an effect on date palm production and quality such as propagating plant material, irrigation, fertilizers, pruning, pollination, thinning and harvesting techniques, plant interaction to its climate, and pre-and-post harvest fruit care.

Scope

Attempts have been made to explore the impact of pollination techniques, nutrient management, fruit setting and thinning, salinity, and irrigation management practices on date palm production. However, there is still need to approach these practices using novel tools



recycling.

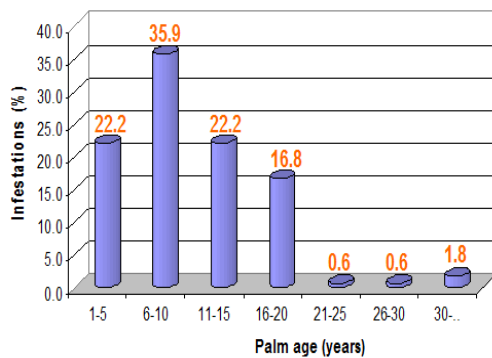
such as use of plant growth regulators for fruit thinning and producing seedless dates, use of remote sensing technology for water management, and understanding the orchard fertility using Global Positioning System (GPS) kits. Efforts are also needed to understand date palm physiological limitation under abiotic stress and its response to the global warming. A long-term sustainable research is also needed on date palm biomass



Effect of saline water through magnetic field to irrigate date palms



Enhancement of shelf-life of dates using modified atmosphere packing technique



Relationship between date palm age and red palm weevil infestation



Date palm head service

Vision

To be an outstanding program in developing strategical quality research in date palm production through advanced plant physiological tools.

Mission

To develop and dispense scientific outcomes as innovative strategies to enhance date palm productivity and quality.

Research Strategy

The program research strategy highlights the application and outcome of novel technology for the improvement of date palm production and quality.

Program Objectives

- To conduct interdisciplinary, innovative, applied research on important commercial cultivars of Saudi dates to enhance their productivity and quality
- To develop sustainable water conservation strategies
- To apply remote sensing technology in date palm orchards
- To reveal the climatic change effects on date palm
- To quantify soil and water salinity impact
- To design a workable plan for the recycling of date palm waste
- To build up collaboration with relevant scientists and research institutes at national and international level

Research Themes and Subthemes

Germplasm Establishment

1. Establishment of orchards of global date cultivars at DPRCE, weather produced through conventional or non-conventional techniques.
2. Every Palm matters: Creating database having detailed information of individual palm tree at DPRCE.

Date Palm Pollination and Thinning

1. Advanced techniques for pollination
2. Economical and effective methods of thinning

Plant Growth Regulators

1. Steps towards seedless dates
2. Roots initiation encouragement for suckers

Dates Ripening

1. Uniform in-situ fruit ripening (tamr)
2. Control of split dates cortex
3. Estimation of yield loss

Salinity and Water Conservation

1. Novel techniques to minimize soil and water salinity stress
2. Estimation of date palm water requirement
3. Remote- controlled efficient irrigation management system

Fertilizer and Fruit Quality

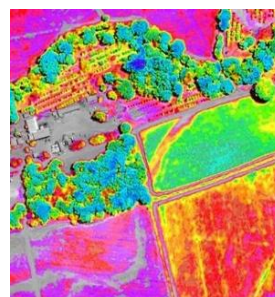
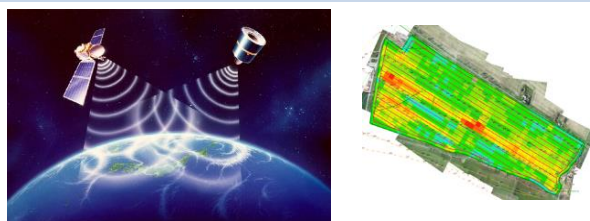
1. Role of Potassium in enhancing fruit quality
2. Impact of boron spraying on pollination

Macro and Micro Climate

1. Physiological limitations of date palm with particular reference to the climatic change
2. Date Palm physiology and flowering under varied temperatures, photoperiods and light intensities
3. A predicted flowering time model

Orchard fertility and Recycling

1. Mapping the Date Palm orchard fertility using GPS kits
2. Recycling of Date Palm waste material



Program Components

- Problem-solving suitable research approach
- Innovative tools and techniques
- Dissemination of research findings to date palm growers and industry
- Database on climatic variables and date palm growth parameters
- Periodically Program evaluation



Research Infrastructures

To run date palm physiology and production program, the DPRCE has a modern fruit quality, post-harvest and analytical chemistry laboratories. The equipment in our laboratories include portable open system LCi (ADC Bioscientific Ltd., UK) to measure gas exchange for photosynthesis, chlorophyll content meter, leaf area meter, water electric conductivity meter, flame photometer, etc. Eleven date palm orchards of different cultivars are established using traditional offshoots or plantlets regenerated through tissue culture. The program also have 1 greenhouses, 2 shade houses, and 3 cold storage rooms.



Portable open system LCi to measure gas exchange for photosynthesis



Greenhouse



Chlorophyll content meter

Program Organization and Management

The program is contained a series of research projects based on themes and subthemes of strategic importance. A comprehensive and integrated multidisciplinary research approach is adopted to accomplish the assumed goals. A high-level consultative committee and a peer review panel is constituted to review the project proposals and monitor the progress of the program.

The Program Research Plan (2015-2019)

The activities of the proposed research program falls into two categories:

- High impact research
- Research issues of scientific significance

The core emphasis of research will be to explore the physiological and production aspects of date palm cultivars using advanced tools as shown in the following table :

	Research Activity	Years 2015-2019				
		1 st	2 nd	3 rd	4 th	5 th
1	Macro and Micro climatic studies with particular reference to global warming	*	*	*	*	*
2	Environmental cues and date palm flowering		*	*	*	
3	Date palm orchard fertility scanning using GPS kit(s)		*			*
4	Establishment of new orchards of Date palm seedlings raised through traditional and non-traditional techniques	*	*	*	*	*
5	Salinity and water conservation	*	*	*	*	*
6	Post-harvest losses of Dates - Causes and Solutions	*	*			
7	Fertilization, pollination and fruit thinning	*	*	*	*	*
8	Cultural practices and their impact on biotic stress	*	*	*	*	*
9	Steps to develop seedless Dates	*	*	*	*	*
10	Uniform in-situ Dates ripening				*	*
11	Enhancement of Dates shelf-life at Besr/Rutab stages			*	*	*
12	Oil content in Date seeds and its nutritive value				*	*
13	Recycling of Date palm residues (trunk, leaves, floral bunch, seeds)			*	*	*
14	Dissemination of research findings	*	*	*	*	*

Team members of the program

Head of the program

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