

# Date palm Research Center of Excellence King Faisal University

P.O. Box 400  
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Saudi Arabia

## Research Program

**Title** : Biotechnology of Date Palm Program (BDPP)

**Duration** : Five Years

**Funded by** : Ministry of Higher Education, and KFU

**Starting Year** : 2015



# Research Program

## Biotechnology of Date Palm (BDPP)

### Overview

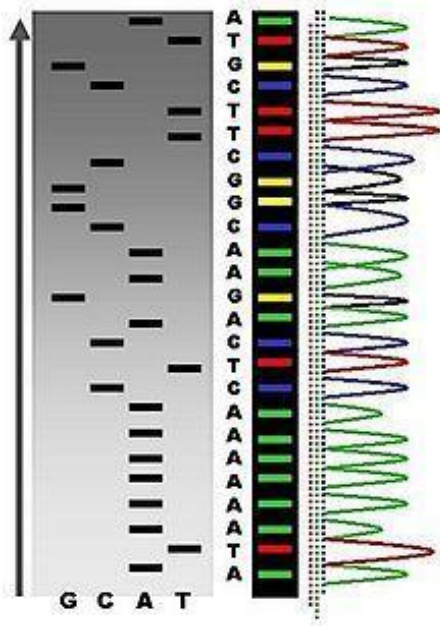


Date palm (*Phoenix dactylifera* L.) is a perennial polyploid ( $2n= 26$  to  $36$ ) monocotyledonous plant with more than 3,000 cultivars with different morphologic and physiological characters. The production rate has to be increased in quality and quantity for the growing population. Cultivars being affected by biotic factors like pest and diseases and abiotic factors like drought and salinity which leads to the reduction in yield. Lengthy life cycle and strong heterogeneous nature of date palm restricts the scope of traditional breeding strategies for the selection of high yielding varieties.

Though tissue culture industries are producing identical and disease free plantlets for farming, it is difficult to differentiate male and female plants before 5 years of age. Such a long cultivation time consumes more energy, area, labor, extra care, etc. Moreover, every cultivar has indefinite characteristics in fruit quality and nutritional characters. These problems have to be solved by selecting a potent male for pollination by using molecular biology tools.

Hence there is an urgent need to apply biotechnological means to conserve, protect and improve cultivars that poses nutritional importance. The application of transgenics and functional genomics in date palm would have greater significance for genetic improvement and ultimately for productivity. Saudi Arabia, being a base for world's most of the date palm cultivars in its land, there is a great scope to produce commercial varieties with resistance to biotic and abiotic threats by means of modern molecular biology approaches.

## Scope



Number of attempts are being made by scientific community to identify gender before planting, verify true type cultivar, combat biotic and abiotic stresses and to develop eco-friendly genetic engineering methods which are not successful elsewhere. Enormous amount of waste is being produced from date palm industry that is invaded by pests and diseases, which can be used by livestock. Hence, an intensive focus and in-depth research is necessitated to solve fatal problems with respect to date palm growth & productivity and innovation needed to develop value added products from date palm waste.

## Vision

**BDP Program is committed to innovate novel technologies for genetic analysis, engineering and *in vitro* research in the field of date palm biotechnology**

## Mission

**To serve the field of Date Palm Biotechnology and by-products industry with innovative technologies & methods for genetic analysis, improvement of nutritional quality, combating biotic and abiotic stresses and for novel products development**

## Program Objectives

- To conduct multidisciplinary, innovative, *in vitro* and molecular biology research in economically important Saudi date palm cultivars for their healthy growth and productivity
- To empower BDPP by collaborating with relevant researchers and research centers at National and International level

## Research Strategy

The program research strategy emphasizes technological innovations, products and productivity - driven approach

## Program Components of BDP

- ❑ Capacity building
- ❑ Innovation of new methods and protocols
- ❑ Technology transfer
- ❑ Technical support to date palm research community and its related industry
- ❑ Steering committee and periodical evaluation of the program

# **Research Themes and Sub Themes**

## **1. Functional Genomics (3)**

**1.1. Functional genomics for drought & salinity tolerance**

**1.2. Functional genomics for disease resistance**

**1.3. Functional genomics for nutritional characters**

## **2. Proteomics (3)**

**2.1. Proteomics for abiotic stresses**

**2.2. Proteomics for biotic stresses**

**2.3. Proteomics for nutritional characters**

## **3. Plastid Engineering (3)**

**3.1. Plastid engineering for abiotic stresses**

**3.2. Plastid engineering for biotic stresses**

**3.3. Plastid engineering for nutritional characters**

## **4. Biofuels and Biomolecules Research (2)**

**4.1. Cost effective production of biofuels**

**4.2. Metabolic engineering to produce of human health  
related substances**

# BDPP Organization and Management

The program will comprise number of research projects based on themes and subthemes of strategic significance. Multidisciplinary research will be adopted to achieve the objectives with a holistic perspective. A high-level steering committee and a peer review panel will be formed which are responsible for the review of proposals and project progress in the program.

## BDP Program Research Plan

### 1. Niche area of greater significance

A total of 4 main research themes and 11 sub themes are designated in the BDPP program. Two important sub themes requires immediate attention and termed as primary research area. Drought and Salinity is the major agriculture problem in Saudi Arabia and gulf countries. Hence, research focuses on deep understanding of how certain date palm cultivars tolerate high temperature, low humidity, and low soil moisture in order to engineer economically important cultivars.

## Primary Research Area of BDP Program

S. No	Sub Theme No.	Tentative Title / Topic	2015 SAR (M)	2016 SAR (M)	2017 SAR (M)	2018 SAR (M)	2019 SAR (M)	Total
1.	3.1	Initiation of tissue culture and genetic engineering trail experiments	3.5	0.5	0.5	0.5	0.5	5.5
2.	1.1	Functional genomics for Salinity and Drought tolerance research	2.0	0.75	0.75	0.75	0.75	5.0
Year wise Total			5.5	1.25	1.25	1.25	1.25	
Grant total							10.50	

(M) – Million Saudi Riyals

**Note:** (1). The tentative budget includes necessary Chemicals / Equipment / and the recruitment of Researchers / Technicians / Laborers.

(2). Establishment of Germplasm facility (permanent) at DPRCE's field in cooperation of biotechnology research group with the supervision (Principal Investigator) of the DPRCE director forever.

## Secondary Research Area of BDP Program

S. No	Sub Theme No.	Tentative Title / Topic	2015 SAR (M)	2016 SAR (M)	2017 SAR (M)	2018 SAR (M)	2019 SAR (M)	Total
1.	2.1	Proteomics for abiotic stresses	--	--	2.0	1.0	1.0	4.0
2.	1.3 & 3.3	Functional Genomics & genetic engineering for nutritional characters	--	--	1.0	0.4	0.4	1.8
3.	2.3	Proteomics for nutritional characters in date palm fruits	--	--	1.0	0.5	0.5	2.0
4.	4.2	Metabolic engineering for human health related molecules	--	--	--	0.7	0.5	1.2
5.	6.2 & 6.3	Farmers education program & conferences	--	--	--	*	--	--
Year Wise Total			--	--	4.0	2.6	2.4	9.0
Grant total							9.0	

**(M)** – Million Saudi Riyals

\* - depends on the availability of institutional / external funds

**Note:** The tentative budget includes necessary Chemicals / Equipment / and the recruitment of Researchers / Technicians / Laborers.



## Team Members of the Program

### Head of the program

*Balakrishnan Sudhakar, Ph.D, Genetic Engineering (CV. Synopsis)*

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### Academic Staff

*Hisham Sayed Ghazza wy, Ph.D. Horticulture*

### Technical Staff:

*Mubarak Al-Muiweed, B.Sc, Horticulture, (CV. Synopsis)*

## Contact

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