



## Research Article

# Development of Chance Seedling Varieties of Date Palm from Exotic Cultivars at Agro-Climatic Conditions of Faisalabad, Pakistan

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**Abstract** | The goal of the current study was to evaluate the performance of various date palm cultivars in agro-climatic conditions of Faisalabad. Different vegetative parameters such as, No. of days taken to start of germination/survival percentage, number of fronds, number of seeds survived, plant height, leaf area, suckers evolved and other parameters were noted for better yield and quality of date palm for purpose of chance seedlings development. This research experiment was arranged at Progeny orchard of Horticultural Research Institute, Faisalabad during the year 2019-2021. The research was designed according to Randomized Completely Block Design (RCBD) with eighteen treatments having four replicates. The documented data was statistically assessed by using analysis of variance and means of treatments were compared by employing LSD test. Twenty different date palm cultivar seeds were put in sterilized soil. According to the outcomes, the Amber variety of date palm performed better than other date palm varieties in terms of many physical characteristics, including highest survival rate (100%) and plant height (126.5 cm), stem girth (38.3 cm) and leaf area (116.1 cm<sup>2</sup>). Another variety, Mabroon, demonstrated exceptional results in terms of the number of leaflets/frond (73.0) and the number of suckers (5.5). As a result, it can be concluded that among all the exotic date palm germplasm investigated, Amber and Mabroon were found best in the characteristic under study.

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## Introduction

Date palm (*Phoenix dactylifera* L.) is a member of Arecaceae family. It is a vital crop in Asia's desert regions, but it has recently gained popularity throughout the world. It is supposed to be native from North Africa and Arabian Gulf. Date fruit introduced in Indo-Pak subcontinent by Arab conquerors and

Alexander subsequently it extended as a food crop. It is major fruit crop in Pakistan and cultivated in 95619 hectares area with 560184 tones production (FV & CS, 2020-21). In Pakistan most substantial areas concerning dates production include; Punjab (Bahawalpur, Jhang, Dera Ghazi Khan Muzafar Garh, KPK (Dera Ismail Khan) Baluchistan (Khuzdar and Turbat) and Sindh (Khairpur). The

Date palm fruit is nutritious fruit especially in desert regions where few plants can grow because of the harsh weather circumstances. It is known as sugar palm in formal language (Al-Shahib *et al.*, 2003). The role of date palm in survival of people living in arid and hot regions as well as due to its distinctive characteristics it can be considered as “Tree of life”. Development and survival of human race in barren and hot regions of world was not possible without presence of date palm.

Date palm has countless religious worth in three of the leading religions of this world. It is cited many times in the Hadith and Holy book of Islam, consequently, making it the most often quoted plant among all plant species. In similar manner, date palm is also admired in Judaism as well as in Christian norms and believes, has significant value in many religious rituals including Passover Palm Sunday (Musselman, 2007).

Dates can be consumed in various ways. Primarily, they are simply consumed as a fresh (30-40%) or taken as dried (60-70%) at rutab stage (semi ripe) and tamar (full ripen) stage passing slight or no processing steps (Al-Hooti *et al.*, 1997). Dates are typically consumed alone or with milk, Arabian coffee, and yoghurt. These are used as jams, syrup, paste, jellies, and pickles as well as used in numerous confectionary or baking items with honey, vinegar coconut, chocolate, and many others (Besbes *et al.*, 2009).

An accelerating trend towards planting exotic varieties is leading to conserve the gene pool. Large number of dates seedling are known to develop through chance seedling in many dates growing areas. Many preferred date palm varieties presently used globally for food has been originated from chance seedling selections which were then preserved vegetative source through rooting of suckers. The genetic composition and growing environment affect productivity, chemical components, fruit physical measures and sensory traits. New cultivars are introduced from native locations to determine adaptation light of the environmental conditions and select suitable varieties were an utmost significance. Currently in Pakistan, the work on development of chance seedling varieties through exotic cultivars is scanty so, this research was done to:

- Determine the date palm accessions ability to germinate after being obtained from exotic sources.
- Evaluate the survival capability of seedlings of

these accessions

- Select appropriate chance seedling genotype from these exotic sources for further conservation and multiplication.

## Materials and Methods

### *Experimental site*

The study has been conducted during 2019-21 in Horticultural Research Institute, Ayub Agricultural Research Institute, Faisalabad. The study area progeny orchard Rasala no. 12 Faisalabad is situated about 184 m above the sea level. The geographic location of the study area is located at 31.37°N – 72.04°E. The research area's climate is classified as subtropical in nature. The winter is rather mild, beginning in November and ended until February, with very little temperature variation. The temperature varies between 8–15°C in winter and increases up to 26–34°C in summer, but very occasionally, it might rise up to 38–48°C. During the experiment, the air was between 16-30 °C and 70-89 % relative humidity.

### *Plant material source*

The seeds of the dates were extracted subsequently from fruits. Healthy and uniform seeds of all the varieties were selected for further use in experiment and deformed or undersize seeds were discarded in order to get maximum viable seeds for assessment. The details of varieties examined are given in Table 1.

**Table 1:** *Date palm germplasm evaluated for study.*

Sr. No.	Name of variety	Sr. No.	Name of variety
1.	Ajwa	10.	Sharifa
2.	Mabroom	11.	Ringro
3.	Amber	12.	DegletNour
4.	Kalma	13.	Baiza
5.	Tamar-ul-Wahdi	14.	Saugi
6.	Khudrawi	15.	Zaidhi
7.	Karbla	16.	Dakki
8.	Biarum	17.	Hallawi
9.	Pamazo	18.	Rubai

### *Procedural details and experimental design*

Healthy seeds were extracted from high quality fruits collected from market, size and viability were selected to perform a comprehensive study. In order to clean the seeds four to five washings with clean water were given to the freshly extracted seeds. After the cleaning operation, date palm seeds were dried for eight

hours in muslin cloth in shade. The experiment was conducted under 18 treatments. The seeds were sown in polythene bags filled with growing media (sand + silt + clay in equal ratio). Each treatment contained twenty seeds of each variety. The study was carried out under Randomized Completely Block Design (RCBD). The collected data was investigated through analysis of variance technique by statistical package Statistix version 10. However, the significance of the differences between means was checked through LSD with 5% probability level (Steel *et al.*, 1997).

*Data collection*

**Vegetative characteristics:** The vegetative characteristics were studied as number of mature leaves (fronds)/palm, survival (%), plant height (cm), stem girth (cm), No. of Leaflets/frond leaf area (cm<sup>2</sup>) and No. of suckers evolved.

**Results and Discussion**

*Survival (%)*

The average survival percentage was 97% and the range of survival percentages was 94 to 100%. Amber seeds had the highest germination rate (100%), while Dhakki seeds had the lowest survival rate (76.0%). Table 2 showed that relationships between varieties and survival percentage were not statistically significant (p>0.05). Our results are accordance with Azad *et al.* (2011) they observed the date palm seedlings survival % range from 0-96%. Results of same kind were also observed by (Oni, 2016; Okunlola *et al.*, 2011) who narrated that germination rate and seedling height were increased by soaking of seeds of some economic forest trees.

*Plant height (cm)*

The tallest plant was measured in Amber seedlings (126.3cm) followed by Ajwa exhibited height 116.5cm. Mabroon seedlings had the smallest plant height (68.01 cm). Different date palm seedlings data on plant height varied statistically. Variation in seedlings height may be due to their genetic makeup and climatic factors in the studied area as previously said by (Morton, 1987). The findings of the current study are in agreement of those of Azad *et al.* (2011) who reported that plant height increased variably in different date palm seedlings (Table 2).

*Stem girth (cm)*

There was a significant (p<0.05) variation in stem

girth values for the studied varieties. Table 2 showed that the stem girth values increase significantly. Amber seedlings are distinguished by the highest stem girth value (38.3 cm) following as Saugi and Khudrawi depicted highest range 34.0 cm and 33.3 cm, respectively. Although lowest stem girth was recorded in variety Karbla (26.5cm) and Ajwa (28.0cm). The genetic variability is indeed revealed by these phenotypic variations, but the impact of the climate was ignored. This diversity was due to inherent characters of seeds genotype (Elhoumaizi *et al.*, 2002).

**Table 2:** *Vegetative parameters of chance seedlings of 18 date palm varieties.*

Name of variety	Survival %age	Plant height (cm)	Stem girth (cm)	No. of fronds
Ajwa	95.0a	116.5a	28.0de	5.3c
Rubai	99.0a	96.5fgh	32.3abc	6.5bc
Mabroon	98.0a	68.0 l	30.0cde	8.0abc
Amber	100.0a	126.3a	38.3a	11.5a
Kalma	97.0a	94.8fgh	29.5cde	8.5ab
Tamur-ul-Wahdi	80.0bdc	86.8jk	29.5cde	7.8abc
Khudrawi	99.0a	111.5ab	33.3abc	9.0ab
Karbla	90.0ab	87.8ijk	26.5e	8.5ab
Biarum	97.0a	110.8ab	30.0cde	10.3a
Pamazo	89.0a	103.3cde	30.3bcde	8.8ab
Sharifa	95.0a	97.0efg	32.5abc	7.8abc
Ringro	89.0a	100.3def	33.0abc	6.8bc
DegletNour	98.0a	108.0bc	32.0abc	7.3bc
Baiza	94.5a	90.3hijk	31.3abcd	7.0bc
Saugi	95.0a	87.5ijk	34.0ab	6.3bc
Zaidhi	98.0a	92.0ghij	32.0abc	7.0bc
Dakki	76.0abc	93.5ghi	30.0cde	8.3ab
Hallawi	97.0a	85.5k	33.3abc	8.5ab

*Means followed by the same letters are not significantly different from each other at 5% level of significance probability at LSD test.*

*No. of fronds*

The information in Table 2 showed that the findings for seedlings were statistically insignificant (p>0.05). The variety Amber seedlings had the most fronds (11.5), while Ajwa seedlings had the fewest (5.3), with Saugi and Rubai variants having the fewest (6.3 and 6.5, respectively). Our results are in line with (Sherif *et al.*, 2010; Khan *et al.*, 2015).

*No. of leaflets/frond*

According to the data in Table 2, the results for seedlings were not statistically significant (p>0.05).

The Kalma had the fewest (52.8) fronds, followed by Mebroom seedlings with the fewest (54.0), and the variety Amber seedlings with the greatest (71.8). The result of the research is in line with [Soad et al. \(2013\)](#) who perceived that at mature stage of date palm plants of varieties Ajwa, Safawi and Ruthana showed leaflets/frond 129, 117 and 119, respectively.

*Leaf area (cm<sup>2</sup>)*

Between exotic seedlings, there were significant (p<0.05) differences in leaf area. The Amber variety's largest leaf area (116.1 cm<sup>2</sup>) was shown in the results. While Pamazo seedlings minimum leaf area was listed as 92.8 cm<sup>2</sup>. This significant difference amongst the various seedlings was noted in previous studies that approved the heritability of this parameter ([Belakud et al., 2015](#)).

*No. of suckers evolved*

Data analysis showed a statistically significant relationship between the number of suckers that evolved and exotic varieties. Shrifia developed the most suckers (4.8), followed by the Amber variety with the highest number (5.5), and Ringro and Saugi with the lowest number (1.5). The difference among the exotic seedlings performance might be due to the basic character of genotypes ([Table 3](#)).

**Table 3:** Data for No. of leaflets/frond, Leaf area and No. of suckers evolved in chance seedlings of 18 Date palm varieties.

Name of variety	No. of leaflets/frond	Leaf area (cm <sup>2</sup> )	No. of suckers evolved
Ajwa	66.8	106.9	2.0
Rubai	63.8	102.3	3.8
Mabroon	54.0	111.1	4.5
Amber	71.8	116.1	5.5
Kalma	52.8	112.3	3.0
Tamur-ul-Wahdi	66.5	96.2	3.0
Khudrawi	63.5	100.5	3.0
Karbla	55.5	63.1	4.0
Biarum	64.5	102.7	1.8
Pamazo	55.5	92.8	2.0
Sharifa	66.3	104.9	4.8
Ringro	71.0	109.5	1.5
Deglet Nour	63.3	109.6	4.0
Baiza	67.3	105.6	1.8
Saugi	61.8	105.1	1.5
Zaidhi	68.0	108.6	2.8
Dakki	71.0	96.3	3.8
Hallawi	65.3	103.7	3.5

Means followed by the same letters are not significantly different from each other at 5% level of significance probability at LSD test.

**Conclusions and Recommendations**

Therefore, among all the exotic date palm germplasm investigated in this climate, Amber and Mabroon chance seedlings were shown to have the greatest outcomes in the studied characteristics including plant height, survival %, number of fronds, leaf area, and number of suckers. From this experimental investigation, it is evident that exotic date palm varieties may be produced in Pakistan's Faisalabad with the same degree of success as in gulf nations.

**Novelty Statement**

This is unique & novel study for the adoptability study of exotic germplasm of date palm for the varietal screening for final recommendation to the growers.

**Author's Contribution**

**Muhammad Zahid Rashid:** Conducted research trial & main Investigator

**Amina:** Helped in research trial.

**Hafiz Wasif Javaad:** Removed plagiarism and did statistical work.

**Muhammad Asim Rashid:** Helped in write-up and assistance in the research

**Amina Rashid:** Designed the research study and conducted the biochemical analysis

*Conflict of interest*

The authors have declared no conflict of interest.

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