

Performance of Date Palm Production under Contract Farming in Khairpur Sindh Pakistan

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Abstract

Date palm is possibly the most ancient cultivated tree in the world. This tree is considered as an important constituent of farming system in dry and semi-arid regions and is suitable for both small and large scale farming. Dates are a very nutritious and delicious fruit containing mainly carbohydrates and several types of sugars but also proteins, vitamins, and minerals. A kilogram of dates contains 2500-3000 calories. Pakistan is the 4th largest producer of dates with total annual production at around 650,000 tons in the form of over 300 varieties produced in Pakistan, Aseel, Karblain, and Kupro are considered the best varieties of Sindh. Begum Jhangi and Mozavati are the best varieties of Balochistan while Dhakki is the best variety of Dera Ismail Khan in KPK. Sindh alone contributes more than 55% of the total date's production in Pakistan and the share is on the rise. In Sindh, the highest concentration of date palm is in Khairpur district where date palm trees grow like weeds and produce about 90% of dates in the province.

Keywords: Date palm, farming system, varieties, nutritious, semi-arid, calories, Khairpur.

1. Introduction

Date Palm (*Phoenix dactylifera* L.) or Khajoor" in Sindhi language the date palm tree provides communities in the desert oases and rural areas with many benefits. For thousands of years people travelling across the desert have carried dates with them as high energy food. Wood from the tree was used to build homes, to make artifacts and burned for fuel. During Ramadan, Muslims break their fast each day by eating dates. Dates are an iconic part of Muslim culture and one of the few fruits mentioned repeatedly in the holy Quran. In fact, dates production is mainly concentrated in the Muslim world especially the Middle East. Dates are a very nutritious and delicious fruit containing mainly carbohydrates and several types of sugars but also proteins, vitamins, and minerals. A kilogram of dates contains 2500-3000 calories. Pakistan is the 4th largest producer of dates with total annual production at around 650,000 tons in the form of over 300 varieties produced in Pakistan, Aseel, Karblain, and Kupro are considered the best varieties of Sindh. Begum Jhangi and Mozavati are the best varieties of Balochistan while Dhakki is the best variety of Dera Ismail Khan in KPK. Sindh alone contributes more than 55% of the total date's production in Pakistan and the share is on the rise. In Sindh, the highest concentration of date palm is in Khairpur district where date palm trees grow like weeds and produce about 90% of dates in the province (SBI, 2013).

Sindh produces 350,000 tons of dates annually with each date palm carrying a weight of about 80-90 kg on average. Dates are produced in two forms as either fresh dates or dried dates. Fresh dates are exported to the USA, Canada, France, Bangladesh, Indonesia, Malaysia, and UAE while 90% of dried dates are exported to India usually via Lahore. Dates processing has not been able to gain a foothold in Pakistan because of which true potential of dates production has not been fully realized. Processing occurs at two levels. One is basic processing consisting of the simple steps of fumigation, washing, drying, weighing and packaging in order to convert dates into table fruit. The whole date can also be processed to make unspotted or nut-stuffed dates for higher price. Further processing can be done for value addition by making date paste, date vinegar, date syrup, and a wide range of confectioneries derived from dates. Because of lack of modernized processing and prevalence of age-old methods, Pakistani fresh dates are considered industrial quality by the developed world and fetch only one-third the price of processed dates at only \$ 600 per ton. However, fresh dates generally earn double the export price of dried dates, which are in reality a devalued form of dates. In Sindh, about a dozen basic-level processing plants exist in Thehri area of Khairpur some of whom have managed to get ISO certifications. The consumption of dates increases manifold during the holy month of Ramadan. However, Pakistan has not been able to take full advantage of this market. In fact, Pakistan imports dates during Ramadan because of lack of cold storage and processing facilities (PHDEB, 2008).

About 0.1 Million Hectar date palm orchards are in Pakistan. Pakistan produces more than seven lac metric ton dates per year. Pakistan stands number 06 in date production in world. He said that monsoon rains damages aseel variety in severity. Worldwide there are 5,000 varieties of dates are available. It is believed that Mohammad Bin Qasim brought the date from Arab to here in Sindh is not true, because, the date palm was

available in Sindh from its earlier conquest. The post harvest loss may be reduced with the help of solar dryer technology. There is need of sustainable funds for the installation of solar technology and research on date palm. That training programs for the maintenance of temperature of dryer solar may be given to farmers and annually we are wasting 05 trillion rupees of date production. About 80 million Rupees has been sanctioned to PARC to embark upon research on date and banana for Pakistan, India and Bhutan on the platform of SAARC (FAOSTAT, 2013).

Date crop found in all four provinces of Pakistan and total area is about 90,100 hectares and production 557,500 tons annually. In Sindh province date palm occupies an area of 30,000 hectares and production is more than 2, 00,000 tons. Pakistan is 4th largest date palm production country throughout the world Dowson (1982). Khairpur district is the biodiversity centre having more than 300 Date Palm varieties. In this area date palm occupies over 22,310 hectares and its production is 158775 tons. The date palm has very strong effect on the socio-economic conditions of the Khairpur district. The date palm is also distributed in Khairpur and Sukkur districts of Sindh Province. The main areas for date palm are Baberloe, Garhi Mori, Pir-jogoth, Ahmed Pur, Kot Diji, Kot Banglo, Kingri, Therhi etc. in Khairpur district. A date tree produces approx: 150 kg fruit (Anonymous 2010).

2. Objectives

1. This study examines the following objectives:
2. To review current status of date palm orchard production in Pakistan.
3. To describe socio-economic status of date palm orchard farmers in the study area.
4. To study the economics of production and marketing.
5. To identify issues and suggest policy measures for promoting on date palm production.

3. Methodology

This study was used the primary data in present study. Primary data was collected from sample of 60 respondents. A list of date palm farmer of each selected farmers were prepare selection was made on proportional random sampling method. They were purposively selected from Khairpur district Sindh. The selected respondent were interviewed through a well designed questionnaire prepare for the purpose. The Secondary data was collected from literature and publication including report, research papers etc. Data so collected was analyzed tabulated, and interpreted in thesis through SPSS, Ms Excel and other computer software.

3.1. Data Collection

Primary data was collected through a well structured questionnaire to get the information related to the date palm fruit production.

3.2. Secondary Data

Secondary data collected from various agricultural departments used to determine the overall growth rate of date palm fruit production.

3.3. Final Survey

After pre-testing and making some improvements in the questionnaire, final survey was conducted in study area to obtain the required information from respondents. The respondents were selected randomly from each respondent.

3.4. Data Editing and Coding

After data collection, the questionnaires were properly checked to make sure that all the responses had been recorded accurately. Sequentially all questionnaires were numbered in a serial order. After editing the questionnaires, data were transferred from.

3.5. Socio economic Characteristics

Socio economic characteristics determine the status of individual. For the purpose of present study following indicator of socio economic characteristics have been used:

3.6. Data Analysis

For data analysis Microsoft Office Excel software package and SPSS package were used. Following statistical techniques were used to analyze and interpret data.

3.7. Descriptive Statistics

To analyze the results of present study the descriptive statistics was used to find out the percentage and frequencies of different characteristics of date palm farmer.

3.7.1. Average

Average was calculated by using following formula

$$AM = \sum X / N$$

Where;

AM = Arithmetic Mean

$\sum X$ = Total sum of variables

N = Total number of observations

3.7.2. Percentage

Percentage was calculated by using following formula

$$P = F / N * 100$$

Percentages were calculated in the simple table for the purpose of comparison.

Where;

F = Frequency of a class

N = Total number of observations

4. Results

This chapter provides results of the study including current status of Date Palm fruit production practices and issues of Date Palm farmers. Analysis and interpretation of data are the most important step in scientific research. Without these steps generalization and prediction cannot be achieved which is the target of scientific research.

4.1. Current Status of Date palm

The area, production and average yield of Date Palm in Pakistan is given in Table-1. The area under date palm fruit has increased from 10 to 30 thousand hectares and production has increased from 558.5 to 674.2 thousand tons. To obtain a potential yield, high yielding varieties and improved production technology have to be adopted.

Table 1: Area production and average yield of Date Palm in Pakistan (2001-02 to 2012-13)

Year	Area(000, ha)	Production(000, tonnes)	Yield(tonnes/ha)
2001-02	60.3	558.5	8746
2002-03	60.8	543.2	8338
2003-04	61.6	570.6	8950
2004-05	62.5	538.9	8223
2005-06	61.6	650.6	8950
2006-07	62.5	538.9	8223
2007-08	61.6	570.6	8950
2008-09	62.5	538.9	8223
2009-10	63.3	674.2	8799
2010-11	62.8	536.9	8423
2011-12	61.5	580.5	8899
2012-13	63.5	588.9	8998

Source: Agricultural Statistics of Pakistan, Government of Pakistan, Islamabad (2012-13).

4.2. Age

Table 2: Distribution of the respondents according to their age

Age of respondents	No. of farmers	Percentage
Young (< to 30)	22	36.66
Middle aged (30-50)	28	46.66
Old (> 50)	10	16.66
Total	60	100.00

Table-2 shows that half (46.66%) of the respondents were middle aged followed by young (36.66%) and old (16.66%). It means that half of the respondents belonged to middle age category.

4.3. Literacy level

Table 3: Distribution of the respondents according to their literacy level

Literacy level	No. of farmers	Percentage
Illiterate	22	36.66
Primary	15	25.00
Middle	12	20.00
Matric and above	11	18.33
Total	60	100.00

Table-3 depicts that more than (36.66%) of the respondents were illiterate while (25.00%) had literacy level up to primary, (18.33%) were "Matric and above" and only (20.00%) middle.

4.4. Farming experience

Table 4: Distribution of the respondents according to their Farming experience

Farming experience	No. of farmers	Percentage
Up to 10 years	18	30.00
11-25 years	27	45.00
Above 26years	15	25.00
Total	60	100.00

Table-4 shows that date palm farmer's there (30.00%) were Up to 10 years, (45.00%) were 11-20 years and (25.00%) were above 26 years in the study area.

4.5. Type of tenure

Table 5: Distribution of the respondents according to their type of tenure

Type of tenure	No. of farmers	Percentage
Tenant	23	38.33
Owner	37	61.66
Total	60	100.00

Table-5 shows that (61.66%) of the respondents was owner and only (38.33%) were tenant.

4.6. Total area of the land

Table 6: Distribution of the respondents according to their total area of the land

Total area (acres)	No. of farmers	Percentage
Up to 10	34	56.66
11-20	23	38.33
Above 20	03	5.00
Total	60	100.00

Table-6 reveals that more than half (56.66%) of the respondents had a land up to 10 acres, (38.33%) had 11-20 acres and while only (5.00%) had more than 25 acres of land.

4.7. Annual net income

Table 7: Distribution of the respondents according to their annual net income

Annual income	No. of farmers	Percentage
Up to 100,000 Rs	45	75.00
100,001-150,000	6	10.00
150,001 Rs. and above	9	15.00
Total	60	100.00

Table-7 depicts that (75.00%) of the respondents had 100,000 Rs, (10.00%) had up to 100,001-150,000 Rs and (15.00%) had 150,001 Rs and above annual income.

4.8. Crops grown

Table 8: Distribution of the respondents according to the crops grown

Crops grown	No. of respondents	Percentage
Wheat	28	46.66
Cotton	20	33.33
Maize	5	8.33
Barseem	4	6.66
Sorghum	3	5.00
Total	60	100

Table-8 shows that wheat was grown by (46.66%) of the respondents, cotton was grown by (33.33%) of the respondents while maize, barseem and sorghum was grown by (8.33%), (6.66%) and (5.00%) of the respondents respectively.

4.9. Pattern of date palm cultivation

Table 9: Distribution of the respondents according to their pattern of cultivation

Pattern of cultivation	No. of farmers	Percentage
Orchard	07	11.67
Scattered trees	44	73.33
Intercropping	09	15.00
Total	60	100.00

Table-9 shows about majority of the respondent had scattered date palm trees (73.33%) while only (11.67%) had well developed orchards.

4.10. Total number of mature date palm trees

Table 10: Distribution of the respondents according to total no. of mature date trees

No. of date palm trees	No. of farmers	Percentage
20-40	13	21.67
41-60	12	20.00
61-80	27	45.00
Above 81-100	8	13.33
Total	60	100.00

Table-10 indicated that (21.67%) of the respondents had 20-40 date palm trees, (20.00%) had 41-60 trees, (45.00%) had 61-80 trees and (13.33%) of the respondents had 81-100 and more than 100 date palm trees respectively.

4.11. Varieties grown

Table 11: Distribution of the respondents according to varieties grown

Varieties grown	No. of farmers	Percentage
Aseel	32	53.33
Fasli	6	10.00
Thothar	6	10.00
Karbalain	4	6.67
Don't know	12	20.00
Total	60	100.00

Table-11 shows that (53.33%) of the respondents had aseel variety, (10.00%) of the respondents had fasli variety, (10.00%) of the respondents had thothar varieties, (6.67%) of the respondents had karbalain variety (20.00%) of the respondents were unaware about the exact name of the date varieties grown in their fields and only few, who had well developed orchards, had improved varieties. Local people often named the dates according to their colour.

4.12. Distance from market

Table 12: Distribution of the respondents according to the distance from suitable market

Distance from market	No. of farmers	Percentage
Up to 10 Km	24	40.00
10-20 Km	13	21.67
21-40 Km	12	20.00
Above 40 Km	11	18.33
Total	60	100.00

Table-12 shows that the respondents had a suitable market upto 10 km away from their fields while (40.00%), (21.67%), (20.00%), had 10-20 km, 21-40 km and above 40 km market distance.

4.13. Duration of date preservation

Table 13: Distribution of the respondents according to the duration of date palm preservation

Preservation duration	No. of farmers	Percentage
1-2 weeks	15	25.00
1-2 months	26	43.33
2-3 months	11	18.33
More than 4 months	8	13.34
Total	60	100.00

Table-13 about (43.33%) of the respondent could preserve their dates for a period of 1-2 months, (25.00%), (18.33%) and (13.34%) of the respondents preserved dates for 1-2 week, 2-3 months and more than 4 months respectively.

4.14. Methods of date preservation

Table 14: Distribution of the respondents according to method of date preservation

Preservation methods	No. of farmers	Percentage
Sun drying	39	65.00
Processing	7	11.67
Chemical treatment	14	23.33
Total	60	100.00

Table-14 showed that an overwhelming majority (65.00%) of the respondent's sun dried their dates, (23.33%) chemically treat the dates in order to preserve them and (11.67%) processing in the study area therefore farmers used traditional method of sun drying for the preservation of dates due to which there was high rate of post harvest losses.

4.15. Yield of date palm tree

Table 15: Distribution of the respondents according to yield of date palm trees

Yield (kg per tree)	No. of farmers	Percentage
30-50	6	10.00
51-70	4	6.66
71-90	33	55.00
91-100	11	18.33
Above 100	9	15.00
Total	60	100.00

Table-15 about (55.00%) of the respondents had an average yield of 71-90 kg per tree, followed by (10.00%), (6.66%), (18.33%) and (15.00%) had an average yield of 30-50, 51-70, 91-100 and more than 100 kg per tree. Ahmad et al. (2004) reported yield of Halini, Aseel and Shamran varieties 81 kg, 79 kg and 71 kg per plant respectively. It means that the yield of date palm in the study area was very high.

4.16. Fixed Cost

Table 16: Per acre expenditure incurred on fixed costs in the study area

Particulars	Mean	S.D Error
Maintenance cost (Rs/ac)	5000.00	300.11
Contract/ Rent of farm	70487.00	267.53
Total	75487.00	567.64

Table-16 indicated that on spent a sum of Rs. 75487.00 in district Khairpur during the 2013 this included Rs. 5000.00 for maintenance cost, Rs. 70487.00 for contract/rent of land.

4.17. Labour Inputs

Table 17: Per acre expenditure incurred on labour inputs in the study area

Particulars	Mean	S.D Error
Making of bunds and channels	672.96	9.44
Operating	857.62	23.33
Irrigation	966.15	10.35
Weeding	859.13	8.75
Digging pits and planting of suckers	1787.50	5.82
Application of FYM,	689.88	9.43
Watch and ward	665.53	3.39
Tank silt and Chemical fertilizers	1897.02	72.10
Digging fruit/Cutting/ harvesting	5140.73	54.85
Total	13532.75	79.24

Table-17 depicted that each selected Date palm growers of district Khairpur Sindh on an average area of acre labour cost Rs. 13532.75 the grower of date palm.

4.18. Capital Inputs

Table 18: Per acre expenditure incurred on capital inputs in the study area

Particulars	Mean	S.D Error
FYM	4871.42	162.19
Plant protection measures	4114.45	52.30
Irrigation	5233.83	32.80
Miscellaneous	2245.65	11.34
Maintenance cost (Rs/ac)	5233.83	32.80
Total	21696.65	380.34

Table-18 shows that spent a sum of Rs. 21696.65, which included Rs. 4871.42, Rs. 4114.45, Rs. 5233.83, Rs. 2245.65, Rs. 5233.83 on FYM, Plant protection measures and Miscellaneous.

4.19. Marketing Costs

Table 19: Per acre expenditure incurred on marketing cost in the study area

Particulars	Mean	S.D Error
Loading	1972.22	0.89
Transportation	5334.26	112.92
Unloading	1885.32	0.89
Total	9191.73	114.70

Table-19 average per acre spent a sum of Rs. 9191.73, this included Rs. 1972.22 for loading, Rs. 5334.26 for transportation and Rs. 1885.32 of unloading.

4.20. Total Cost of Production

Table 20: Per acre total cost of production in the study area

Particulars	Mean	S.D Error
Fixed Cost	75487.00	567.64
Labour Cost	13532.75	79.24
Marketing Cost	9191.73	114.70
Capital Inputs	21696.65	380.34
Total	119908.00	1141.92

Table-20 the results showed in this table that the selected date palm grower in Khairpur area on average per acre spent a total cost of production of Rs. 119908.00 during 2013 this included Rs. 75487.00, Rs. 13532.75, Rs. 9191.7373 and Rs. 21696.65 on fixed cost, labour costs marketing costs respectively on capital inputs.

4.21. Physical Productivity

Table 21: Per acre physical productivity of date palm farmers in the study area

Particulars	Mean	S.D Error
Date palm	142.00	3.62
Total	142.00	3.62

Table-21 it is clear from the result each date palm grower obtained per acre 142.00 in Mds on an average.

4.22. Revenue productivity

Table 22: Per acre revenue productivity of date palm farmers in the study area

Particulars	Mean	S.D Error
Date palm	198800.00	220.00
Total	198800.00	220.00

Table-22 depicted that each selected Date palm growers of district Khairpur Sindh area on revenue per acre earned of Rs. 198800.00 that obtained by the grower of date palm.

4.23. Net Income

Table 23: Per acre net income of date palm farmers in the study area

Particulars	Mean
Gross Income (Rs) A	198800.00
Total Expenditure (Rs) B	119908.00
Net Income (Rs) A-B=C	78892.00

Table-23 the date palm growers on an average per acre earned during study, Rs. 78892.00 on net income, Rs. 198800.00 on gross income and Rs. 119908.00 on total expenditure in district Khairpur Sindh.

4.24. Input – Output ratio

Table 24: Per acre input-output ratio of date palm farmers in the study area

Area Sown	Gross Income Rs.	Total Expenditure Rs.	Input-Output Ratio
Acre	(A)	(B)	A/B=C
1	198800.00	119908.00	1:1.65

Table-24 showed that the selected date palm growers on an average per acre gross income Rs. 198800.00 and total expenditure is Rs. 119908.00 in the study area therefore they availed input output ratio of 1:1.65 from date palm growing in district Khairpur .

4.25. Cost Benefit ratio

Table 25: Per acre cost benefit ratio of date palm farmers in the study area

Area Sown	Net income Rs.	Total Expenditure Rs.	Input-Output Ratio
Acre	(A)	(B)	A/B=C
1	78892.00	119908.00	1:0.65

Table-25 showed that the selected date palm growers on an net income per acre earned Rs. 78892.00 and total expenditure Rs. 119908.00 in the study area therefore they availed input output ratio of 1:0.65 from date palm growing in district Khairpur Sindh.

5. Conclusion and suggestions

The research study on Economic Analysis of date palm Production in Khairpur district Sindh was concluded for the findings during study were the most efficient to cultivate the date palm at remunerative level. The agricultural infrastructure is the web of personal, economic, social and legal relationships that support the production of agricultural commodities. It includes, most visibly, agricultural input suppliers and output processors. However, it also includes the formal and informal business relationships between individual farms. Infrastructure provides access to input and output markets, access to agricultural services ranging from continuing education to consulting, as well as including institutional arrangements, such as the legal and monetary systems.

In district Khairpur Sindh is fertile in agricultural production. Thus, the district can have a potential to produce more fruits for demand of growing population, there is also need for study the efficient date palm fruits production practices and issues in the production process for policy making.

- Awareness should be created among the farming through media and extension services regarding scientific farming of date palm.
- Agricultural loans should be provided on soft and simple terms and conditions to small farmers.
- The required inputs should be made available for farmers in required amount and at the right time.
- The cold storage facility will also positively contribute to enhance date palm productivity.
- Processing and manufacturing plants should be installed for easy access of the farmers.
- Market infrastructure should be improved through setting up of storage facilities, cold-chain facilities, and airport and port infrastructure for shipping and cold storage in public private partnership.
- Has the high yielding variety of date palm is more profitable compared to local variety; farmers should grow high yielding variety of date palm.
- Farmers must themselves take up the task of marketing date palm in the nearby wholesale market than giving it to pre-harvest contractors which will help them in enhancing their income.
- A marketing need to be established exclusively for the marketing of date palm to rescue the farmers from the exploitation by the pre-harvest contractors.
- The state government should give due attention for providing proper approach roads to the villages, and also providing scientific storage facilities to help the farmers to store the fruits.
- Value addition and export promotion, particularly of date palm are drawing due attention of the developmental agencies in Pakistan.
- Adoption of post-harvest management practices and infrastructure development for grading, packaging, pre-cooling and storage of the produce needs focused developmental attention

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