Research Article

Knowledge Level of Farmers Regarding Producing, Processing and Marketing of Dates in Panjgur- Balochistan, Pakistan

Ejaz Ashraf[1]*, Hafiz Khurram Shurjeel[2] and Zafarullah Baloch[3]

[1]*Assistant Professor, Department of Agricultural Extension, College of Agriculture, University of Sargodha, Punjab–Pakistan;* [2]*Ph.D. Scholar, Department of Entomology, College of Agriculture, University of Sargodha, Punjab–Pakistan;* [3]*Progressive Farmer of District Panjgur–Balochistan, Pakistan.*

Abstract | This study was conducted to assess the knowledge level of the farmers for producing, processing and marketing of dates in Panjgur-Balochistan, Pakistan. Snowball sampling technique was used to select 90 respondents. The data revealed that average age of the farmers was 53.9 years with education from secondary to graduate level. The results of the study showed that many of the farmers on average have 10 acres of land under date palm cultivation with more than 57 date palm trees per acre on average. It is also observed that respondents generally get 76 kg of dates on average per tree. Many of the farmers use Radio and contact farmers as sources of knowledge for agricultural practices and date palm cultivation. However, more than 68% of the respondents do not get advisory services from government extension service institutions at all. Age and experience are significantly correlated variables with r = 0.951 at 1% alpha level. Results from regression analysis revealed that age, education and experience are strong predictors in the model to increase the knowledge level of the respondents for production, processing and marketing of the dates in district Panjgur.

Introduction

Date palm is an important fruit crop in the world and in Pakistan as well. Date palm cultivation is a unique and important agricultural practice and tradition dating back thousands of years old in human history. Different regions of the world are famous for date-palm cultivation in America's, Europe, Middle East, Africa, and Asia. Pakistan is also among high quality dates producing countries. According to one report, Pakistan stands 4th in the world for dates' production. Two provinces of the country Sindh and Balochistan are on top for date palm cultivation and production.

It is being cultivated in district Khairpur Mirs in Sindh, D. I. Khan in Khyber Pukhtunkhawa, Turbat and Pujgur in Balochistan, and D.G. Khan, Muzaffargarh and Multan in Punjab provinces of Pakistan. More than 300 different varieties are being cultivated in district Khairpur Mirs in province of Sindh (Markhand and Abulsoad, 2007). In one study, Hassan (2006) described that date palm is good choice for small and medium scale farmers due to its traditional agricultural practices and patterns, containing high nutritional values such as carbohydrates, minerals and vitamins, great economic returns than other fruit crops and environmental advantages. Dates have great significance in Muslim world especially in the Islamic month of Ramadan as well as in many other cultures.

Links
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Dates are extensively used in sweets, chocolates, baking products, salads, sauces and in breakfast cereals. Beside dates, date palm tree has large number of other products which are used in rural as well as urban communities of Pakistan such as the leaves of date palm are used for making huts, mats, manual fans, rugs, bread dishes, baskets and also provides packing material for fruits and vegetables (Pakistan Horticulture Development & Export Board, 2008). Date palm tree has many others industrial usages. According to Anwar (2006) various parts of date palm tree could be used for preparation of animal feed, construction materials, and paper. In spite of its significance in all parts of human life, in Pakistan few studies have been documented highlighting the problems, skills and knowledge level of date palm farmers. Present study was designed to classify the lack of knowledge level of the farmers of district Panjgur, Balochistan province for producing, processing and marketing of dates.

Research objectives

Following research objectives were assessed during the study:

- To describe demographic and farm characteristics of the respondents in the study area
- To identify the knowledge sources used by the respondents in the study area
- To evaluate the present knowledge level of the respondents in production, processing and marketing of dates in the study area

Materials and Methods

The study was conducted in Panjgur district, Balochistan province in September 2015. A cross-sectional survey research design was used for the study. The 5-point likert-type scale was applied for collection of data. The questionnaire was prepared for factors such as demographic and farm characteristics, existing knowledge level of the respondents in production, processing and marketing of dates. The contents and face validity of the instrument was checked. Following the recommendations of the panel of the experts of Extension education; the instrument was revised and tested with a sample of 20 respondents in a pilot study. The reliability of the instrument was also checked from the data obtained from pilot study by computing the value of Cronbach alpha which was 0.83 for all factors of knowledge level of the respondents in production, processing and marketing of the dates.

Study area

District Panjgur is remotely located and sparsely populated area of the province of Balochistan. The soil of the area is highly conducive for cultivation of date-palm. However, water scarcity for irrigation is looming threat not only for date-palm but also for other agricultural practices in the area. Majority of the respondents were small scale farmers. Temperature of the area varies from extremely hot to moderate cold all over the year. Metal road-network from farm to market is still a huge problem for farmers of the area. Although district Panjgur is producing high quality dates and stood high at ranks in dates' production in the country, but due to lack of modern processing and post harvest technologies, most of the dates consumed by local population in traditional ways.

Population and sample

The target population for the study was all date-growing farmers of district Panjgur, Balochistan province. However due to poor road network and lack of proper communication services in certain areas of the district, sampling frame and random sampling procedures had not been adopted. Therefore, in the absence of random sampling, the personal characteristics of the target population and overall law and order situation of the area, snowball non-random sampling technique was applied to achieve maximum sample size of 90 respondents from the district. Anol (2012) described that sometimes in the absence of sampling frame and inaccessible hard populations, snowball sampling is the only way to get a desired sample for data collection. Berg (2006) described that snowball or chain referral sampling is undertaken when qualified participants invite other subjects to be a part of the sample similar to them who fulfill the qualifications defined for the targeted population. Generally, snowball sampling technique is used to locate hidden, hard-to-reach or marginalized populations of the society.

Data collection and analysis

Data were collected through questionnaire. The collected data were later subjected to statistical analysis. Both descriptive and inferential statistical techniques were used to analyze the data and to draw reasonable conclusions for the target population of date-growing farmers of district Panjgur. Inferential statistics, such as multiple regression analysis, was also applied to check how much of the variance in the dependent variable was accounted by the use of number of independent variables. Multiple regression procedures further observe the relationships between each of

the independent variable and the dependent variable while controlling other variables in the model (Kerlinger, 1986; Urdan, 2001).

Regression model applied for the study was $y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6$, where y= Production knowledge level for dates, α=Constant/slope in the regression model, β_1=Age, β_2=Education, β_3=Experience, β_4= Knowledge sources, β_5= Processing knowledge, β_6= Marketing knowledge x_1=Observable overall change that may bring in the dependent variable of knowledge level of the respondents for dates production.

Results and Discussion

Before studying other researchable factors, understanding demographic characteristics of the target population is obligatory to see how these characteristics help to assess other factors.

Demographic characteristics such as age, education and experience of date palm farmers were examined during the study since these are the variables which play significant role in defining any farm population. The results of the demographic characteristics of the respondents have been summarized in Table 1.

Table 1: *Distribution of the respondents regarding their demographic characteristics*

Farmers' age in yrs	Frequency	Percentage
Up to 40	5	5.56
41 – 50	39	43.33
51 – 60	24	26.67
61 – 70	16	17.77
71 – 80	6	6.67
Farmers' education		
Illiterate	10	11.11
Secondary	20	22.22
Higher Secondary	18	20.00
Graduate	26	28.89
Post-graduate	16	17.78
Farming experience in yrs		
Up to 15	7	7.78
16 – 25	44	48.89
26 – 35	18	20.00
36 – 45	12	13.33
46 – 55	5	5.56
56 – 65	4	4.44

Source: *Field data*

Average age of the respondents was 53. 9 years. The data indicated that only old- age farmers are determined to stay in date-palm cultivation farming practices. It is found that education trend is encouraging from secondary to graduate level in the area since more than 46% of the respondents hold high education of graduate and post-graduate degrees. More than 68% of the respondents have had experience ranging from 16 to 35 years. This shows that experience counts a lot to enhance the knowledge and competencies of the date-palm farmers for having high yield. Moreover, it also indicated that date-palm cultivation requires determined and diligent farming practices and have to bear hard weather conditions in hot summer days. The results of the study consistent with those obtained by Ashraf et al. (2012) when they measured the competencies of agricultural officers for adoption of remote sensing and GIS technologies for precision agriculture and found that experience has vital role in improving knowledge level of agricultural officers in specific units of remote sensing.

Farm characteristics are important features to see the impact of conventional knowledge over the date palm farm practices and development. During the study, farm characteristics such as farm size, number of trees per acre, yield in kilograms per tree, labour used on the farm, time to time received extension services during the last one year from government extension department and available sources of knowledge or information used by respondents regarding date-palm cultivation were evaluated. The results were summarized in Table 2 for further description of the collected data.

The results in Table 2 indicated that more than 88% of the respondents have 6-15 acres with overall average farm size of approximately 10 acres. This trend in land holding shows that local farmers spare more land holding for date palm cultivation than any other crop. However, at many places intercropping practices were also observed as mentioned by respondents during the survey. On average, farmers plant more than 57 trees per acre. Planting as many trees as possible depends on financial and other resources of the farmers. The data from Table 2 indicated that 92% of the farmers had yield up to 95 kg per tree where as only 8% of the respondents had yield up to 110 kg per tree in the study area. Moreover, the average yield per tree in the study area was about 76 kg. These results imply that farmers may get high yield if they have good

Table 2: *Distribution of the respondents based on their farm characteristics*

Farm size in acres	Frequency	Percentage
Up to 5	10	11.11
6 --- 10	39	43.33
11 – 15	41	45.56
Number of trees per acre		
Up to 40	2	2.22
41 – 50	23	25.56
51 – 60	32	35.56
61 – 70	30	33.33
71 – 80	3	3.33
Yield per tree in kilograms		
Up to 35	1	1.11
36 – 50	7	7.78
51 – 65	18	20.00
66 – 80	27	30.00
81 – 95	30	33.33
96 – 110	7	7.78
Farm labor		
Family	55	61.10
Seasonal	8	8.90
Both	27	30.00
Extension services received		
None	62	68.90
During last 3 months	5	5.60
During last 6 months	7	7.80
During last one year	16	17.80
Sources of knowledge for date palm cultivation		
Radio	41	45.60
Television	12	13.30
Extension field staff	2	2.20
Seminars	2	2.20
Contact farmers	22	24.40
Agricultural festivals	11	12.20

Source: *Field data*

knowledge for production of dates. It is also implied that soil and environmental conditions of district Panjgur are highly conducive for high yield of best range of dates. Similar results were reported by Ahmad et al. (2004) in their study and concluded that high producing varieties such as Hillawi, Aseel and Shamran may give yield up to 70-80 kg per tree in hot conditions of Bahawalpur distirct, Punjab, Pakistan. While examining the factor of farm labour, the results in table2 shows that almost 61% majority of the respondents involve their families in different farming

activities for date palm cultivation in the study area. It shows that agriculture and date-palm cultivation is a whole family business rather an individual's job.

Extension advisory services have key role in transfer of improved agricultural knowledge and technology to the farmers. The triangle of success i.e. education, research and extension of knowledge cannot be completed unless the message delivered to the end users. The sole reason of existence of extension services in the world is to convey the latest up-to-date knowledge for better production of crops to farmers at grass root level. Similarly, Matanmi and Adesiji (2009) reported in their study that critical function of agricultural extension is to enhance diffusion of agricultural innovation at grass root level generated from research. However, by examining factor of extension services received by the respondents in the study area, ironically more than 68% of the respondents do not have access to government extension institutions at all. On the other hand, almost 32% of the respondents do have access to extension services time to time in three months, six months and may be in a year. These results are similar to the study of Ata (2012) conducted in district D.G. Khan to evaluate the factors hampering date palm production and found that almost 98% of the respondents did not have access to extension field staff.

According to Kabiru et al. (2016) farmers use sources of knowledge for any agricultural practice or crop depending on its creditability and accessibility. The results from Table 2 show that 70% of the respondents use Radio and contact farmers as sources of knowledge for agricultural practices and date palm cultivation in the study area. During study it was inferred that even though farmers frequently listen Radio but they believe on traditional knowledge from contact farmers or friends. They find more reliable and testable knowledge from contact farmers or friends and relatives for date palm cultivation than by any other source.

The main purpose of this study was to assess the knowledge level of respondents in the area regarding their production, processing and marketing skills for dates. Five-point likert scale was used ranging from none to very high in specific items asked during the survey. Production knowledge of the respondents was assessed by asking 28 specific questions. The results are appended in Table 3.

Table 3: *Means, Std. Devs. and Ranks for Dates Production Knowledge level of the Respondents*

Production Knowledge items	N	Mean	Std. Dev.	Rank
Agronomic practices for date palm cultivation	90	3.50	0.98	9
Date palm nursery preparation	90	2.17	0.91	20
Begum Jhangi variety	90	2.37	0.94	18
Dhakki variety	90	2.30	0.95	19
Aseel variety	90	1.53	0.69	27
Hillawi variety	90	2.52	0.80	16
Kaluth (Yellowish)	90	4.10	0.62	6
Jansore (Punjgur- thin and long)	90	4.23	0.65	4
Sabszoo (Yellowish)	90	4.20	0.71	5
Moza vati (Punjgur Ajwa type) variety	90	4.34	0.75	2
Kariba (Usually Mixed in sugar syrup with Moza vati)	90	3.65	0.81	8
Karoch (Punjgur)	90	4.34	0.58	2
Umbi (Punjgur)	90	2.81	0.60	13
Lungo(Punjgur)	90	4.45	0.67	1
Nursery management practices	90	2.14	0.57	21
Different growth stages of date palm	90	2.74	0.65	14
Integrated disease management practices	90	1.63	0.64	26
Integrated pest management practices	90	2.09	0.77	22
Maintaining nutritious value of dates	90	2.46	0.64	17
Date palm orchard management	90	2.68	0.47	15
Avoiding production losses	90	1.93	0.61	23
Dates protection from environmental contaminants	90	3.12	0.54	11
Protection for hazardous effects of insecticides	90	1.78	0.44	24
Protection from birds and pests those damage date crop	90	3.70	0.51	7
Prevention is better than cure	90	3.23	0.52	10
Pre-harvest dates practices	90	1.73	0.44	25
Post harvest dates practices	90	2.97	0.55	12
Use of latest production techniques	90	1.28	0.45	28

Mean: 1= none, 2= Low, 3= Moderate, 4= High, 5= Very high

Source: Field data

The results indicated that highest mean score was 4.45 for Lungo date variety following are Moza-vati and Karoch varieties with mean of 4.34. These results imply that respondents have moderate to high mean production knowledge level for locally produced varieties of dates as compared to others mentioned in the survey. This is because these are local varieties and many of the farmers use to cultivate at large scale. On the other hand, respondents have almost moderate knowledge level in post harvest practices with mean score of 2.97 and low knowledge level in pre-harvest practices of dates with mean score of 1.73. Overall, results from Table 3 indicated that respondents have no knowledge of latest production techniques with mean score of 1.28.

When asked 6 specific questions regarding processing knowledge of dates, respondents' mean response was not encouraging. The results from Table 4 showed that on average respondents' processing knowledge at local level was approaching high to very high with mean score of 4.71. However, in remaining 5 items their mean processing knowledge was none to moderate level. These results imply that respondents have to dates processing knowledge through governmental or private sector extension services on priority bases to overcome problems for processing of dates.

Table 4: *Dates Processing Knowledge level of the Respondents*

Processing Knowledge items	N	Mean	Std. Dev	Rank
Latest Processing techniques	90	2.32	0.47	4
Processing resources	90	3.02	0.58	3
Date-filled bakery products processing	90	1.30	0.46	5
Processing at commercial level	90	3.40	0.68	2
Processing at local level	90	4.71	0.45	1
Processing for export	90	1.28	0.45	6

Mean: 1= none, 2= Low, 3= Moderate, 4= High, 5= Very high
Source: Field data

The results from Table 5 indicated that respondents have moderate to high mean marketing knowledge level in "avoiding losses due to transportation for marketing of dates", "grading before marketing" and "use of appropriate containers for marketing" with mean response score of 3.83, 3.64 and 3.63 respectively. However, respondents do not know how to store dates in "controlled temperature before market-

ing" and broker's role in the market". Their knowledge level was none to low for "middle man's role at farm level for marketing. They do have low level of knowledge for "good transportation for marketing". It is evident from these results that after production and processing, marketing is also another significant factor which needs immediate attention of concerned department so that farmers of the area may be able to sell their products in the market and could get maximum return.

Table 5: *Dates Marketing Knowledge level of the Respondents*

Marketing Knowledge items	N	Mean	Std. Dev	Rank
Dates packaging for marketing	90	2.72	0.56	5
Storage techniques for marketing	90	1.74	0.48	8
Use of appropriate containers for marketing	90	3.63	0.48	3
Controlled temperature storage before marketing	90	1.41	0.49	10
Grading before marketing	90	3.64	0.53	2
Good transportation for marketing	90	2.00	0.54	6
Avoiding losses due to transportation for marketing	90	3.83	0.37	1
Middle man's role at farm level for marketing	90	1.79	0.41	7
Daily price information of market	90	2.74	0.44	4
Broker's role in the market	90	1.42	0.49	9

Mean: 1= none, 2= Low, 3= Moderate, 4= High, 5= Very high
Source: Field data

Complete regression model was applied with independent factors such as age, education, experience in date palm cultivation, knowledge sources, processing knowledge and marketing knowledge.

The results of the model were significant at 5% level of significance *as F (6, 83) = 4.55; p< 0.05* and explained 24.8% of the variation in dependent factor of production knowledge level of the respondents.

The individual coefficients analysis in the model indicated that age, education, experience, and processing knowledge of the respondents were strong predictors in the model and need to exert more emphasize on these issues to improve latest production knowledge of the respondents in the study area. The results from

correlation analysis showed that only age and experience have significant correlation with r = 0.951 at 1% alpha level. This implies that with age of the farmers, experience in date palm cultivation also increases significantly.

Table 6: *ANOVA*

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	290.319	6	48.387	4.555	.000[b]
Residual	881.636	83	10.622		
Total	1171.956	89			

Table 7: *Coefficients*

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	59.963	7.240		8.282	.000
Age	.275	.126	.828	2.185	.032
Edu	.601	.293	.213	2.050	.044
Exp	-.242	.118	-.762	-2.055	.043
Knowledge sources	-.248	.173	-.153	-1.440	.154
Processing knowledge	1.202	.293	.420	4.104	.000
Marketing knowledge	-.364	.237	-.164	-1.538	.128

Dependent Variable: Production knowledge level for dates
Predictors: (Constant), Marketing knowledge level for dates, Education, Experience, Processing knowledge level for dates, Knowledge sources, Age
R^2 = 0.248; Adj. R^2 = 0.193

Conclusions

Dates' producing is a time consuming and hard-working job for farmers. In spite of that generally farmers do not get their due share in income. They are lacking in all types of knowledge and technologies related to dates' production, processing and marketing. The farmers in the study area do not know latest transplanting techniques, fertilizer requirements, the irrigational requirements and other plant protection measures of the date palm plant. The frequency of visits of extension field staff is not up to standard. Farmers generally get information from fellow farmers or friends and relatives. Consequently they remain hand to mouth to earn their livelihoods. There is a dire need to invest by money and expert knowledge to bring

the change in the date-palm cultivation practices of the farmers.

Recommendations

Following are few recommendations for policy makers for revolutionary changes in dates' industry:

- Extension department should transfer improved knowledge for date palm cultivation to end users as a regular feature.
- Extension field staff must encourage farmers for adoption of new nursery technologies for date palm cultivation.
- Farmers must be given credits and loans for establishment of date palm orchards with the help of government extension services.
- Strong linkages need to establish among research, extension and farmers for growth and development of dates' industry in the country.
- Middle man's role must be minimized by organizing farmers to sell their products collectively to avoid loss in marketing.
- Training should be given to farmers to meet international standards for export of dates.

Author's Contribution

Ejaz Ashraf conceived, designed and supervised the complete research process; Hafiz Khurram Shurjeel contributed in designing of the interview schedule, analysis, and edit work of the manuscript; Zafarullah Baloch contributed in the data collection phase of the study.

Conflict of Interest

The main author declares that there is no conflict of interests regarding the publication of this article.

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