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RESEARCH ARTICLE

PERFORMANCE OF GUAVA ORCHARDS PRODUCTION AND MARKETING IN SINDH PAKISTAN

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ABSTRACT

The result each guava grower of Sindh area obtained per acre 80 Mds on an average. Each selected guava growers of taluka Ratodero district Larkana Sindh area on revenue per acre earned of Rs. 104000.00 that obtained by the grower of guava. The guava growers on an average per acre earned during study, Rs. 148705.00 on net income, Rs. 104000.00 on gross income and Rs. 78054.00 on total expenditure in the study area. The selected guava growers on an average per acre gross income Rs. 104000.00 and total expenditure is Rs. 78054.00 in the study area therefore they availed input output ratio of 1:1.33 from guava growing in the study area.The selected guava growers on an net income per acre earned Rs. 25947.00 and total expenditure Rs. 78054.00 in the study area therefore they availed input output ratio of 1:0.33 from guava growing in the study area.

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1. INTRODUCTION

Guava (*Psidium guajava L.)* tree is local fruit of South Americans and Caribbean countries and it was brought to Asian countries by Portuguese in the 17th century. Guava is the member of family Myrtaceae; this plant has higher adaptability as well as productivity. This plant can produce high yield and good quality fruit with different weather seasons. Guava is purely edible fruit because it's a thought it is poor's man apple because of its low price. It is very nutritious and good in taste it has low price in the market it is available in the whole year because it bears two fruits in a single year and it has very low marketing cost. It appears attractive due to its proper size, nice shape, good taste and sweet fragrance. Guava contains very high nutritive value, flavor and more interesting this plant has also medicinal properties and it has the potential in the processing industry for producing quality products. It has a very short life but in the recent years there has been increased interest in this fruit in the domestic as well as international markets. But due to short shelf period is the main factor for the development of the guava market. Guava has attained as a fourth position in the fruit economy of the country and fourth major fruit in the Sindh province. In Sindh a good quality guava is produced with a narrow shaped and with less seeds in the districts of Larkana, Kamber Shahdad Kot, Mirpurkhas, Hyderabad, Matiari , Tando Allahyar, Khairpur ,Naushero Feroze , Shaheed Benazir Abad. In Punjab and Khyber Pakthunkhwa (K.P.K.) it is produced in the many districts produce the excellent quality of guava. So, this fruit is mostly grown all over the Pakistan. It is highly profitable fruit and it can be easily produced on wide range of temperature (Bhatti., 2011).

Guava (also famous as Zeetone/Amrood), the apple of tropics, is a common fruit in Pakistan. Guavas are a useful source of is grown in various parts of the Sindh province. It is a tropical tree that adapts itself to most conditions of soil and climate. There are two seasons of guava fruit; winter and summer. The winter season starts in November and continues till March. The summer fruit is available from April to the middle of August. It is the winter fruit which is considered to be more valuable and a higher value crop by the farmers. Larkana, Sindh is the largest guava producing district accounting for 45% of the total provincial production. It is followed by Hyder- abad, Nausheroferoz, Nawabshah and Mirpurkhas. The area from Madeji to Moenjodaro, is famous for best quality guava produces Thadharami (pink in colour), Riyali, Sindhi, Seedless, Ramzani, Allahabadi, Indian, Benazir

varieties of the fruit. The guava production earns about Rs. 1 billion annually. A large portion of the crop which goes to waste due to short shelf life could be saved if value addition and processing plants are set up in the guava producing areas. The invest- ment opportunities in guava sector exist in: Guava Pulping Facility, Guava Processing Plant and Guava Squash. Guava pulp has strong demand in local and international markets. The market size of Juice, Nectars and Still Drinks for the year 2009 was 461 million liters. Overall market growth from 2005 to 2009 was recorded at 126%. Establishment of guava processing facilities in Sindh will have a receptive local and export market for pulps (SBI, 2013).

Pakistan's guava production increased from 19,000 tons in 1958 to 552,000 tons in 2012 with an annual growth rate of 6.9 percent. The major destinations of Pakistani guava are UAE, UK, Saudi Arabia, Qatar and Canada, which is the largest importer of guava from Pakistan, accounting for 26 percent of the total guava exports of the country. Pakistan is the second largest guava producer after India. Guava is grown in all the provinces over an area of 58.5 thousand hectares with production of 468.3 thousand tons (GOP, 2012).

Guava fruit is best relished when perfectly ripe and freshly plucked from trees. It emits a sweet aroma and is pleasantly sweet and refreshingly acidic in flavor. It is wholly edible along with the skin which is papery thin and almost merges with the pulp. Guava is considered as one of the most delicious and luscious fruits. The fruit is richer in many respects like proteins, carbohydrates, minerals etc. than that of apple and contains 50-60 times vitamin C than the apple fruit. It is next to the India goose berry in vitamin C content. There are other fruits which contain vitamin C notably alma, citrus, mango etc. Except guava, no fruit is available throughout the year. Because of high calorie value, guava fruit has achieved fame as "Poor man's apple" in our country. Since human body is not capable of storing vitamin C in a small quantity must be taken daily for proper health. The daily requirement of vitamin C for an adult is 50-70 milli grams which can be met by including one or two guava fruits in daily diet. The major guava growing areas are Larkana, Hyderabad in Sindh; Shariqpur, Kasur, Lahore, Sangla Hills, Gujranwala in Punjab; Kohat, Haripur and Bannu in Khyber Pakhtunkhwa . District Larkana alone contributes 1557 acres for the cultivation of guava. Guavas are grown almost entirely for fresh consumption, but international market for fresh guavas is small, so usually processed guava products are exported such as juices and nectars, jams and jellies, fruit paste, canned whole and halves in syrup. Traders said that there is a good potential for fresh guavas and that demand would grow as more consumers became familiar with this fruit. Find Guava Prices in Pakistan, Online Web Directory, Manufacturers, Exporters, Suppliers, Buyers, Pakistan Guava Importers, Wholesalers, Traders B2B Profiles, Products , Contact numbers and Guava Buying Offers & Selling Offers in Pakistan and its major cities such as; Karachi, Hyderabad, Sukkur, Larkana, Sialkot, Faisalabad, Gujranwala, Lahore, Gujarat, Rawalpindi, Islamabad, Peshawar, Quetta, and Azad Kashmir respectively(DAWN,2014).

2. Objectives

1. To review present status of guava orchard production in Sindh Pakistan.
2. To determine the average per unit (40kg/acre) cost of production and cost benefit ratio incurred by guava growers in the study area.
3. To suggest the policy measures for sustainable guava production.

3. Methodology

This study is based on primary data, which was collected from guava farming in taluka Ratodero district Larkana Sindh. A detailed questionnaire was constructed to explore the research objective. A random selection of guava fruit farming in taluka Ratodero district Larkana Sindh was carried out to insure the generalization of research finding. The respondent selection from the selected area of in taluka Ratodero district Larkana Sindh was based on the simple random sampling technique. From the sample of 60 guava growers from areas in the study area where of guava fruit farms are existed.

3.1. Analysis

Collected data had both quantitative and qualitative information. So it was analyzed by following analytical measures. For data analysis Microsoft Office Excel software package and SPSS package were used.

3.2.Descriptive Statistics

To analyze the data, descriptive statistics technique was used to find out the mean and frequencies of different price of input and outputs. Average was calculated using following formula which was also used by Kyeyamwa et al. (2008).

$AM = \sum X / N$

Where,

AM =Arithmetic Mean

X = Value of Variables

N = Number of Observations

$\sum$ = Total Sum of variables

3.3.Percentages

Percentage is the proportion of fraction articulated in hundredth. It was computed by

$P = F / N^* 100$

Where,

P = Percentage

F = frequency of desired class

N = Total number of respondents

3.4.Data analysis

Data were analyzed using descriptive statistics, profit analysis, benefit-cost ratio analysis, resource use efficiency, as well as multiple regression analysis (Bhanumurthy, 2002).

In profit analysis,

$\pi = TR - TC$

Where

π = profit which is positive otherwise loss

TR = total revenue (calculated from total guava fruit output (kg) x unit price TC = total cost (calculated from summation of total variable cost and total fixed cost).

The Benefit-cost ratio analysis was measured using

$ROR = TR/TC$

Where

ROR = Benefit-cost ratio

TR = total revenue (calculated from total guava output (kg) x unit price.

TC = total cost (calculated from summation of total variable cost and total fixed cost).

In the Cobb-Douglass model, the dependent variable (Y) is related to the independent variables X_1, X_2... X_5, by

3.5.Cobb Douglas Production Function

This type of production function can be expressed in form of equation as under: In the Cobb-Douglass model, the dependent variable (Y) is related to the independent variables X_1, X_2... X_5, by (Zellner, 1966). $Y = AX_1ß_1 X_2 ß_2 X_3 ß_3 X_4 ß_4 X_5 ß_5$. This was linear zed by taking log of the equation to become: $\text{Log } A = ß_1 \log X_1 + ß_2 \log X_2 + ß_3 \log X_3 + ß_4 \log X_4 + ß_5 \log X_5$

Where

A is a constant term

Y is the total guava fruit output in kg

X_1 = quantity of feed used in kg/ culture time

X_2 = quantity of fertilizer used in kg

X_3 = quantity of lime used in kg

X_4 = labour in man-hour

X_5 = number of guava fruit stocked

$ß_1$... $ß_5$ = regression coefficients

The production function exhibits increasing, decreasing or contract return to scale as

$ß_1 + ß_2 + ß_3 + ß_4 + ß_5 > 1$, $ß_1 + ß_2 + ß_3 + ß_4 + ß_5 < 1$ or $ß_1 + ß_2 + ß_3 + ß_4 + ß_5 = 1$ respectively .

4. Results

This chapter provides results of the study including current status of guava fruit production practices and issues of guava 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. Generalization and conclusion are drawn on the basis of characteristics and attitudes of the respondents.

4.1. Current Status of Guava

Table 1: Area production and average yield of guava 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: Age group of the different categories of guava farmers

Age	No. of farmers	Percentage
21-30 years	16	26.66
31-40 years	12	20.00
41-50 years	20	33.33
More than 50 years	12	20.00
Total	60	100.00

Table-2 shows the association of the age of the respond with the percent of guava farmer s age group of 21-30 years 26. 66 %, 31-40 years 20.00% and 41-50 years, 33.33% of guava t growers age group. With more 50 years old farmers the percentage of guava growers age group 20.00%

4.3.Education

Table 3: Education level of the different categories of guava farmers

Education level	No. of farmers	Percentage
Illiterate	10	16.66
Primary	15	25.00
Middle	22	36.66
Matriculation	11	18.33
Collage/University	02	3.33
Total	60	100.00

Table-3 shows the association of the respondents with the percent of guava farmer s education level. In education level 16.66% farmers were illiterate, while about 25.00% farmers were primary level of education: the 36.66% were middle, 18.33% of matriculation and 3.33% bachelor/master education in the study area.

4.4. Experience

Table 4: Farming Experiment of the different categories of guava farmers

Farming experience	No. of farmers	Percentage
Up to 10 years	12	20.00
11-20 years	16	26.66
21-30 years	23	38.33
Above 30 years	10	16.66
Total	60	100.00

Table-4 shows that guava farmer's there 20.00% were Up to 10 years, 26.66% were 11-20 years, 38.33% were 21-30 years and 8.33% were above 30 years in th study area.

4.5. Marital status

Table 5: Marital status of the different categories of guava farmers

Marital Status	No. of farmers	Percentage
Single	17	28.33
Married	37	61.66
Divorced / Widow	5	8.33
Total	60	100.00

Table-5 shows that guava farmer's there were 28.33% were single marital status, 61.66% were married marital status, and 8.33% were widow/divorced.

4.6. Family type

Table 6: Family type of the different categories of guava farmers

Family type	No. of farmers	Percentage
Joint	34	56.66
Single	26	43.33
Total	60	100.00

Table-6 shows that guava farmer's there were 56.66% were joint family system and 43.33% were single family type.

4.7.Occupation

Table 7: Occupation of the different categories of guava farmers

Occupation	No. of farmers	Percentage
Farming	45	75.00
Labour	6	10.00
Job/business	9	15.00
Total	60	100.00

Table-7 shows that there were 75.00% guava farmers were engaged in farming, 10.00% of the respondents were engaged in labour and 15.00% of the respondents were engaged in the job/ business like having shopkeeper, govt. job and private jobs.

4.8.Irrigation Source

Table 8: Irrigation Source of the different categories of guava farmers

Irrigation Source	No. of respondents	Percentage
Canal	49	81.66%
Tube well	11	18.33%
Total	60	100

Table-8 shows that there were 30.00% guava farmers who have canal water, 18.33% farmer who have use tube well.

4.9.Working time

Table-9 shows about the number of working hours spent in fields by the guava farmers. 6-10 hours in their fields and they had 73.33%, the guava farmers spent up to 5 hours in their farming activities and had 11.66%. While only 09 of the guava farmers were spending 11-15 hours in their fields having 15.00% of the guava farmer's.

Table 9: Working time of the different categories of guava farmers

Working time	No. of farmers	Percentage
Up to 5 hrs	07	11.66
6-10 yrs	44	73.33
11-15 hrs	09	15.00
Total	60	100.00

4.10.Fixed Cost

Table 10: Per acre incurred on fixed costs of guava farmers

Particulars	Mean	S.D Error
Guava orchard land tax	700.00	0.00
Rent of guava orchard	30000.00	400.00
Total	30700.00	400.00

Table-10 indicated that on an average per acre guava growers spent for orchard land tax Rs.700.00 and rent of land Rs. 30700.00 in taluka Ratodero district Larkana .

4.11.Labour Inputs

Table 11: Per acre expenditure incurred on labour inputs of guava farmers

Particulars	Mean	S.D Error
Irrigation	1322.00	33.12
Thinning	1761.33	22.17
Weeding	700.00	24.99
Chemicals /Spray trees	1672.96	9.44
Soaking dose	613.58	7.54
Machine operating costs	5600.00	11.93
Paint trees	954.00	10.35
Application of FYM,	689.88	9.43
picked fruit/Cutting/ harvesting	3897.02	33.21
Miscellaneous	5140.73	58.00
Total	22351.50	220.18

Table-11 depicted that the Rs. 22351.50 on an average per/acre area of labour input which includes Rs. 1322.00 on Irrigation, Thinning Rs. 1761.33, Weeding Rs. 700.00, Chemicals /Spray trees Rs. 1672.96, soaking Rs.613.58, Machine operating costs Rs. 5600.00, Paint trees Rs. 954.00, Application of FYM, Rs. 689.88, picked fruit/Cutting/ harvesting, Rs. 3897.02 and Miscellaneous Rs. 5140.73 respectively in taluka Ratodero district Larkana Sindh.

4.12. Capital Inputs

Table 12: Per acre expenditure incurred on capital inputs of guava farmers

Particulars	Mean	S.D Error
Irrigate: (water)	1471.42	52.13
F.Y.M	2133.45	22.00
Fertilizer/ Urea	3250.00	32.80
Insecticide/Pesticides	3457.65	54.44
Packing Material	2871.42	62.19
Fuel - Diesel	3239.83	45.00
Spray machine	1114.45	52.30
Machinery repair	1114.45	70.00
Total	18168.54	389.34

Table-12 shows that each selected guava grower of Ratodero district Larkana Sindh on an average per acre of guava spent a sum of Rs. 18168.54that included Rs. 1471.42, Rs. 2133.45, Rs. 3250.00, Rs. 3457.65, Rs. 2871.42, Rs. 3239.83,Rs. 1114.45and Rs. 1114.45 on Irrigate: (water), F.Y.M, Fertilizer/ Urea, Insecticide/Pesticides, Packing Material, Fuel - Diesel, Spray machine, Machinery repair respectively.

4.13.Marketing Costs

Table 13: Per acre expenditure incurred on marketing cost of guava farmers

Particulars	Mean	S.D Error
Loading	2500.00	18.00
Transportation	5334.26	112.92
Unloading	2000.00	22.00
Total	9834.26	152.92

Table-13 it is clear that each selected guava grower of Ratodero district Larkana Sindh area on average per acre spent a sum of Rs. 9834.26, this included Rs. 4500.00 for loading, Rs. 12334.26 for transportation and Rs. 4000.00 of unloading.

4.14.Total Cost of Production

Table 14: per acre total cost of production of guava farmers

Particulars	Mean	S.D Error
Fixed Cost	30700.00	400.00
Labour Cost	19351.50	220.18
Capital Inputs	18168.54	389.34
Marketing Cost	9834.26	152.92
Total	78054.00	1162.44

Table-14 the results showed in this table that the selected guava grower of taluka Ratodero district Larkana Sindh area on average per acre spent a total cost of production of Rs. 103157.00 . This included Rs. 31200.00, Rs.19351.50, Rs.31771.00 and Rs. 20834.26 on fixed cost, labour costs marketing costs respectively on capital inputs.

4.15.Physical Productivity

Table 15: Per acre physical productivity of guava farmers

Particulars	Mean	S.D Error
Guava fruit	8Mds	2
Total	80 Mds	2

Table-15 it is clear form the result each guava grower of taluka Ratodero district Larkana Sindh area obtained per acre 80 Mds on an average.

4.16.Revenue productivity

Table 16: Per acre revenue productivity of guava farmers

Particulars	Mean	S.D Error
Guava fruit	104000.00	300.00
Total	104000.00	300.00

Table-16 depicted that each selected guava growers of taluka Ratodero district Larkana Sindh area on revenue per acre earned of Rs. 104000.00 that obtained by the grower of guava.

4.17.Net - Farm Income

Table 17: Per acre net income of guava farmers

Particulars	Mean
Gross Income (Rs) A	104000.00
Total Expenditure (Rs) B	78054.00
Net Income (Rs) A-B=C	25947.00

Table-17 the guava growers on an average per acre earned during study, Rs. 148705.00 on net income, Rs. 104000.00 on gross income and Rs. 78054.00 on total expenditure in taluka Ratodero district Larkana Sindh.

4.18.Input – Output ratio

Table 18: Per acre input-output ratio of guava farmers

Area sown	Gross Income(Rs.)	Total Expenditure(Rs.)	Input-output ratio
Acre	(A)	(B)	A/B=C
1	104000.00	78054.00	1:1.33

Table-18 showed that the selected guava growers on an average per acre gross income Rs. 104000.00 and total expenditure is Rs. 78054.00 in the study area therefore they availed input output ratio of 1:1.33 from guava growing in taluka Ratodero district Larkana Sindh .

4.19.Cost Benefit ratio

Table 19: Per acre cost benefit ratio of guava farmers

Area sown	Net income (Rs.)	Total Expenditure(Rs.)	Input-output ratio
Acre	(A)	(B)	A/B=C
1	25947.00	78054.00	1:0.33

Table-19 showed that the selected guava growers on an net income per acre earned Rs. 25947.00 and total expenditure Rs. 78054.00 in the study area therefore they availed input output ratio of 1:0.33 from guava growing in taluka Ratodero district Larkana Sindh.

5. CONCLUSION AND SUGGESTIONS

The research study on Economic Analysis of guava Production in taluka Ratodero district Larkana Sindh was concluded for the findings during study were the most efficient to cultivate the guava 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.

Guava is drought tolerant, highly nutritious and can be used as an important resource for local communities especially in arid and semi-arid areas. Guava has great potential for income generation and enterprise diversification. However, results of the survey confirmed that the fruit is neglected by research and development. The farmers lacked knowledge on importance of the crop and lacked knowledge on its nutritional value. They did not regard it as a commercial crop, they did not invest in good crop management. There is need to develop and disseminate appropriate technologies for production, processing and utilization of guava and guava by products. Validation of technologies for production, processing and utilization of guava and guava by products should be prioritized. Communication and sharing of knowledge on interventions in production, processing and utilization of guava and guava by products is recommended

- Awareness should be created among the farming through media and extension services regarding scientific farming of Guava.
- 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 guava 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 guava is more profitable compared to local variety; farmers should grow high yielding variety of guava.
- Farmers must themselves take up the task of marketing guava 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 guava 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 apple 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
- Finally, prospective investors of large units must realize that just because there is a lot of produce in a certain location, they are not necessarily processing variety or may not meet their specific requirements. They should start working with farmers and cultivators well before the start of production to ensure that they get the variety they desire when production starts.

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