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Production Constraints of Apple in Balochistan

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To identify the constraints that hinder fruits production in general and apple production in particular the present study was designed and conducted in Killa Saifullah, Pishin and Ziarat districts of upland Balochistan which is the main apple production area of province. Growers were enquired about the major apple production constraints/problems. Shortage of irrigation water was the most serious and common problem and ranked 1st by apple growers followed by low market prices of apple, attack of insects pests and diseases, expensive inputs (fertilizer, pesticides, packaging material, skilled labor), shortage of capital, low electricity voltage and its fluctuation, poor quality pesticides, poor farm to market roads, market gluts, expensive transport and shortage of technical knowledge about apple crop respectively.

Keywords: Apple, Marketing, Production, Constraints

Introduction

Apple (*Pyrus malus*) belongs to family Rosaceae. Some 5000-6000 varieties of apple have been described in the literature; however, only a few are important for any particular region (Chaudhery, 1994). Apple is an important source of vitamin A, B and C. Vitamin C ranges from 1.0 to 20.8 milligram per 100 grams in different varieties. Apples have widely been used as food since times and its curative powers are clearly illustrated by a proverb- an apple a day keeps the doctor away. It is used in different ways such as cooked; jams and jellies, fresh apple juice and vinegar etc. It is the most refreshing fruit and also has aesthetic and appetitive appeal.

In Pakistan, apple cultivation is limited to upland areas of Balochistan, hilly tracts of Punjab and NWFP. Balochistan produces a wide range of fruits and vegetables of good quality, and in quite sizeable volumes. From horticultural point of view, Balochistan can legitimately be called as the fruit basket of Pakistan. It excels in the production of a number of fresh and dry fruits, some of which are not grown anywhere in the country. Balochistan is the major contributor in apple production as well by producing 272,657 tones of apple, which is about 70 percent of country's produce. In the uplands, there is very little rainfall during fruiting season and hence high quality deciduous fruits like grape, apple, plum, apricot, and almond are grown.

Balochistan, with an area of 347,000 km2, is located between 61 to 70 degree E longitude and 25 to 32 degrees N latitude. In the north lies Afghanistan, in the west Iran, in the east Punjab and Sindh provinces and in the south Arabian Sea. It lies in the arid zone with variable climate during a year in different regions. The province is classified into five agro-ecological zones extending from sea level to high plateaus with successive zones lying at sea level to 457 m, 457-914 m, 914 -1219 m, 1219-1524 m, and above 1524 m. As climatic changes occur with elevation, agricultural practices and cropping patterns also vary. The diversity of climates in the province is a blessing for growing various fruit crops ranging from temperate to sub-tropical and tropical (FAO 1993).

Table-1: District Wise Area and Production of Apple in Balochistan

District	Area (ha)			Production (kg)	Yield (kg/ha)
	Bearing	Non Bearing	Total		
Quetta	2996	70	3066	18327	6117
Pishin	7846	1327	9173	57535	7333
Loralai	3293	546	3839	29900	9080
Ziarat	2401	163	2564	25066	10440
Zhob	5419	205	5624	41201	7603
Kalat	2746	789	3535	22726	8276
K-Saifullah	2858	621	3479	22121	7740
Mastung	4611	2109	6720	29925	6490

Source:GOB 1999-2000

The area and production of apple in Balochistan increased at the rate of 198 and 119 percent during the period 1989-1999 (GOB 1999-2000) mainly due to electrification of rural area and consequently installation

of tube wells and other deciduous fruits were replaced by apple.

The agriculture sector of Balochistan is confronted with many constraints, which are limiting the expansion of many crops. Indiscriminate pumping of ground water resulting in sharp declining of ground water table at the rate of 6-7 meters annually in different areas of upland Balochistan (Shah *et al.* 2001). The drought prevailed for about seven years has further worsened the situation. Usman *et al.* 1994 reported that the harsh and uncertain climatic conditions, land ownership and tenure system, inefficient utilization of water resources, improper use of agriculture inputs and inefficient marketing system are the main production constraints causing low yield. To identify the constraints that hinder fruits production in general and apple production in particular the present study was designed with the following objectives:

1. To identify the technical and socio-economic constraints in apple production.
2. To develop policy recommendations for improvement.

Materials and Methods

This study is based on primary and secondary data. Primary data was directly obtained through a well-structured and pre-tested questionnaire from respondents (apple growers), while secondary data and literature about apple production practices and marketing was collected from government departments, libraries, offices and other relevant sources. To support the primary data, personal observations and informal surveys were conducted at different levels of the study. A team of Agricultural Economists from TTI (Technology Transfer Institute) Quetta conducted the present study during the month of March 2003.

Selection of the Study Area

The study was undertaken in the district Killa Saifullah, Pishin and Ziarat of upland Balochistan. As these districts are famous for apple production and contstitute about 38 percent to the total provincial apple production (GOB 1999-2000).

Selection of apple growers

Fifty-five apple growers were selected randomly and interviewed. 12 (22 percent) of respondents from Killa Saifullah, 27 (49 percent) from Pishin and 16 (29 percent) from Ziarat district (Table 2).

Table-2: District Wise Distribution of Sample Farmers in the Study Area

S. No.	District	Number of Farmers	Percentage
1.	Killa Saifullah	12	22
2.	Pishin	27	49
3.	Ziarat	16	29
4.	All	55	100

Source:Survey data 2003

The distribution of sample apple growers is presented in Table-3. Majority of the sample farms were of small size (58 %), followed by large size (26 %) and medium size (16 %).

Table-3: Distribution of Sample Farmers by Farm Size

Farm size group	Killa Saifullah	Pishin	Ziarat	Overall
	Number			
Small (1-15 acres)	5 (41.67)	11 (22.22)	16 (100)	32 (58)
Medium(16-25acres)	3 (25.00)	6 (40.74)	--	9 (16)
Large (> 25 acres)	4 (33.33)	10 (37.04)	--	14 (26)
All	12 (100)	27 (100)	16 (100)	55 (100)

Source: Survey 2003, Figures in parenthesis is percentages

Method of Data Analysis

Data collected from different category of respondents was entered in the computer. Microsoft Excel was used to analyze the data. Arithmetic means and weighted averages were used for analysis and interpretation of data.

Limitations of the Study

The study is based on the primary data, collected through the field survey. Due to low literacy rate among the farmers community, no written records regarding their lands, crops etc. were available. They hesitate to provide information about personal questions and incomes from crops, they were doubtful about the purpose of the study despite the fact that they were explained about the situation. Therefore, the respondents might have under or over reported that figures about farm outputs and inputs, but great care was undertaken to collect reliable information. All the information collected was based on their memories and estimates.

Results and Discussion

The main focus of this chapter is on the results of the survey. This chapter is organized into two sections. The first section presents the socio-economic profile of sample farmers while section two presents the constraints/problems in apple production

Socioeconomic characteristics of sample farmers

The results of survey show that overall average age of the sample respondents was 42.87 years with the standard deviation of 6.78. The average age of sample farmers in Killa Saifullah, Pishin and Ziarat were 30.83, 51.59 and 37.19 years respectively. The age of the respondents helps in judging the experience and orchard managing ability of the farmers. (Table 3.1)

The overall average education level in the study area was 5.59 schooling years with standard deviation of 7.09, which is quite low. On average, the literacy level of respondents in Killa Saifullah, Pishin and Ziarat districts was, 9.33, 5.46 and 6.19 schooling years respectively. The literacy level was higher in Killa Saifullah district, followed by Ziarat and Pishin. The result of the survey clearly indicated that the education level of the sample respondent were very low in the study area (Table-4).

The overall average farming experience of sample respondents in the study area was 18.89 years with standard deviation of 7.07. The study results showed that fruit-growing experience was highest at Pishin 22.07 years, followed by Ziarat 17.75 years and Killa Saifullah 13.25 years (Table 4).

Table 4. Socioeconomic Characteristics of Sample Farmers in the Study Area

Characteristics	Killa Saifullah	Pishin	Ziarat	Overall
Age (years)				
Average	30.83	51.59	37.19	42.87
Standard deviation	8.64	9.92	7.64	6.78
Education (school years)				
Average	9.33	5.46	6.19	5.59
Standard deviation	5.07	5.45	4.92	7.07
Farming experience (years)				
Average	13.25	22.07	17.75	18.89
Standard deviation	6.66	7.37	6.88	7.07

Source: Survey Results 2003

Pattern of fruits grown by sample growers

The survey results revealed that overall majority of farm area i.e., 68 percent was covered by apple, which clearly showed its importance by the farmer's point of view. In Ziarat, 83 percent farm area was covered by apple, while in Killa Saifullah and Pishin 70 and 59 percent farm area were covered by apple. The other fruits, which follow apple on covered area basis, were grapes on 13 percent farm area, apricot 5.33 percent, plum 4.20 percent, peach 4 percent, cherry 3.20 and other fruits on 2.07 percent area. In district Ziarat apple was the major fruit followed by cherry while in district Pishin, apple was followed by grapes and in Killa Saifullah it was followed by apricot as far as its area covered is concerned (Table 5).

Table 5.Fruits Grown by Sample Farmers in the Study Area

S. #	*Fruits*	Killa Saifullah	Pishin	Ziarat	All
		Area Covered (%)			
1.	Apple	70	59	83	68
2.	Apricot	10	5.23	2	5
3.	Grapes	4.61	24	0.93	13
4.	Peach	2.25	5.58	2.81	4
5.	Plum	5	5.90	0.74	5
6.	Cherry	--	--	11	3
7.	Other	8.14	0.29	0.52	2

Source: Survey Result 2003

Table-6. Constraints & problems in apple production
Source: Survey Results 2003

Problem	Frequency	Rank
Irrigation water shortage	15	1
Low market prices of out put	11	2
Attack of Insects pests and diseases	7	3
Expensive inputs (fertilizer, pesticides, packaging material, skilled labor)	6	4
Lack / Shortage of Capital	4	5
Low voltage and fluctuation of electricity	4	6
Low quality of pesticides	3	7
Poor farm to market roads/Transport	3	8
Lack/ Shortage of technical knowledge	2	9
Total	55	-

Constraints & Problems in Apple Production

Balochistan is the largest but least developed province of the country. The major constraints in apple growing shown by the farmers are summarized in Table 3.

Growers constraints & problems in production of apples (ranking)

The survey results revealed that shortage of irrigation water was the most serious and common problem in the study area and ranked first by apple growers. It was followed by low market prices of apple, attack of Insects pests and diseases, expensive inputs (e.g. fertilizer,

pesticides, packaging material, and skilled labor), shortage of capital, low voltage and fluctuation of electricity, low quality of pesticides, poor farm to market roads, expensive transport and shortage of technical knowledge about apple production.

The constant drought during the last 5 years affected the production of apple badly. Several orchards dried and were uprooted. Some of the farmers irrigated their orchards with tractor mounted tanks for their survival. According to one estimate the water table was gone down for 7-20 meters a year, which was a serious constraint in apple production. Most of the farmers scheduled their irrigation program for one weak in advance than normal. Thus the trees could not maintain their vigorous growth affecting both yield and growth. After electrification of the rural areas in 1980's, a large number of tube wells were installed. The numbers of tub wells in Balochistan were 14125 in 1989, which increased to 21195 during 1999; hence an increase of 49.5 % was recorded in a decade (GOB 1999-2000). The frequent installation of tube wells caused pressure on ground water due to over pumping.

The over exploitation of ground water resources in many parts of the province has caused lowering of the water table which resulted in drying up of *karezes* and shallow wells and drilling more deep tube wells. Many tube wells have dried and farmers have installed more tube wells down the stream in another area and supply the water to orchards through long pipelines, which is a big burden on apple growers. Shah *et al* 2000 reported that water stress has caused great damage to fruit industry in Balochistan. It occurred due to three reasons, 1. Installation of tube wells in large numbers has dried the traditional *karezes* spring irrigation system in the province. 2. The locally used irrigation system in orchards (flood irrigation) causes inefficient use of scarce water and 3. Due to the flat rate of electricity bills, farmers run tube well day and night causing a lot of wastage.

Low Voltage and Fluctuation of Electricity

The tube wells in the study area run on electricity. The water was pumped out from the depth of 300-650 feet at different locations of the study area. The power related problems like, fluctuation, low voltage and load shedding, not only effected water supply to orchards but also caused damage to precious electric motors and pumps as reported by the sample respondents in the study area. The fruit in such a situation become shriveled and does not attain their full size and affected the taste, thus the earning of apple growers was lower than usual.

Glut in the Market due to Over Production

A marked increase in apple production has been noted in the study area. Area and production of apple has increased by 165 percent and 340 percent respectively during the last ten years (1989-1999). The increase in apple production was mainly due to electrification of rural areas and the installation of tube wells in large numbers. The farmers of uplands planted apples on their lands and those farmers who had other fruits on their lands replaced that with apples because apples were in short production at that time and were fetching higher prices in market. As a result of mass plantation of apples, which is evident from above given figures, the over production of apple has been taken place and its supply exceeded to the demand causing low prices or gluts in markets.

The increased production volumes of apple have led to the problem of glut in market, because the marketing machinery did not catch up with increase in production. Moreover, the export of apple to other countries was not encouraging. To face the problem of glut in production more outlets must be searched and facilities may be provided to private sector to enhance the export of apple. Due to this problem the farmers of area were suffering tremendous economic losses. Whereas apples were still lying in cold stores five months after harvest in other provinces.

Low Market Prices of Apple

There was a significant difference among the prices of apple received by the apple growers of different locations in the study area. In the study area farmers of comparatively low altitude areas (Pishin, Huramzai) located at 1572 meters from sea level, complaint low prices (150-300) per [1]crate for apple of "A" grade and its in-time disposal. While the apple growers of high altitude areas (Ziarat, Kan Mehtarzai) located at 2170-2454 meters from sea level, were satisfied with prices received (250-700) per crate for apple of A grade. There was a difference of 20-50 % for different apple varieties noted in the price of apple received by the apple growers of low and high altitude areas. The apple of high altitude having good color, size and shape are more desirable by consumers thus fetched higher prices while the apples of low altitudes were poor in color, size and shape due to which their prices were low in the market.

The reason for good color, shape and size of high altitude apples was simply the favorable climate. Chaudhery (1994) reported that apple needs a cooler climate because apple buds have the longest rest period and hence require more chilling. Apple thrives best and produces the best in a relatively long, cool and slow

[1] Crate = Wooden box of 16-18 kg weight

growing season, having a summer temperature of 27°C, the type of climate that usually prevails at altitude of 1700-2500 meters. It is further reported that apple grown at low altitude produces less yield of inferior quality due to high summer temperatures. Therefore, it can be concluded that farmers of low altitude upland Balochistan planted apple orchards without taking into consideration the climate of their areas and hence heavy apple production causes market gluts and low prices. Their apple cannot compete with that of high altitude upland, which was evident from the price, received by them (Table 7).

Table 7. Price received by apple growers in different locations of study area.

Location	Tor Kulu	Shin Kulu	Amri	Mashadi	Kaja	Kashmiri
	Rs./Crate of 18 kg					
a).Low altitude upland areas (1572 m²) (Pishin, Huramzai)	300	200	200	200	300	150
b).High altitude upland areas (2170-2454 m²) (Ziarat, Kan Mehtarzai)	600	400	325	300	700	250
c). Difference (%)= b-a / b*100	50.0	37.50	23.08	33.33	42.86	20

Source: Survey data 2003

Attack of Insects Pests and Diseases

Severe attack of insect pests and diseases was observed in the study area. Their attack had been intensified during the last few years due to low rainfall as reported by the apple growers. Spider mites attack especially increased due to long dry spell. Shah *et al* 2000 reported that due to prolonged dry spell, the deposition of dust over the leaf providing a cage for mites was the other momentous damage for orchards and vegetables. In the surveyed area, apple growers spray 7 to 8 times to control insects and diseases of apple which increased their cost of production. The cost of spray varied from Rs. 5000 to 8000 rupees per acre of mature apple orchard, which was a financial burden on apple growers. The major diseases of apple observed in the area were Apple Bark Split, Powdery Mildew, Die Back, Cholorosis, Root Rot and Canker. The major insects were; Borers, Mites, Codling Moth, Sanjose scale, Heliothus and Fruit flies.

Low Quality Pesticides and Their Improper Use

Private dealers in the area were reported to sale poor grade and expired pesticides/ insecticides. These expired pesticides/ insecticides were smuggled from across the borders of neighboring countries like Iran and Afghanistan.

The pesticides were also reported being wrongly used by farmers due to lack of awareness about their correct use. As pesticides were incorrectly used, one of the hazards was the exposure of general public to higher than recommended levels of pesticides on fruits and vegetable products. The increased used of pesticides cause a build up of toxic chemicals to their environment. Since users received little or no guidance on the use of these pesticides and many are unable to understand the instructions provided on the bottle, there is an ample scope for misuse.

As pesticides are widely used by farmers so an extension program should be implemented to ensure their correct use. Better control on sale of pesticides could be achieved by registering the stores keeper and improvement of product knowledge by training. The information on proper control of pest and diseases of crops were not available to the farmers and should be subjected to an intensive extension program. Government should ban the sale of expired, low quality and adulterated pesticides and if possible these should be removed from stores by force.

Shortage of Capital

Due to lack of on time credit facilities to farmers for purchasing inputs (fertilizer, pesticides, packaging material), their use by apple producers limited and hence production and yield of apple was affected. The farmers were compelled to take advances from commission agents, relatives/friends and use other sources for attainment of capital. The study revealed that majority of farmers (40 percent) got credit in the form of advances from commission agents for purchasing inputs and packing material for marketing their produce. Some 32.72 percent got credit from friends and relatives. Only 14.54 percent were availing this facility from ADBP and other commercial banks (Table 8). The reason told by respondents for not getting credit from institutional sources (banks) was due to its non-Islamic aspects and because the other non-institutional sources of credit provide interest free credit. The credit provided by commission agent was usually conditional with the obligation that their produce will be sold through them. The commission agents provided farmers with accommodation facility and free food etc.

Table 8. Sources of Credit Availed by Sample Farmers in the Study Area

Source	Killa Saifullah		Pishin		Ziarat		Average	
	Freq.	(%)	Freq.	(%)	Freq.	(%)	Freq.	(%)
Self marketing	9	75	12	44.44	14	87.50	35	63.64
Pre-harvest contractor	3	25	15	55.56	2	12.50	20	36.36

Source: Survey Results 2003.

Apple Sale Process

It was observed that 63.64 percent of farmers were self-marketing their produce while the remaining 36.36 percent were selling their orchards to pre-harvest contractors (Table- 9). Pre-harvest contractors buy apple orchards mostly at blossom stage and rarely at maturity. An increasing trend towards self-marketing was observed in the area. When the farmers were inquired about this, they responded that the following reasons compel them to market their produce directly. That were, 1.Lack of trust on pre-harvest contractors due to extensive violation of contract agreement. Some farmers also complaint that pre-harvest contractor's interest is limited to one season crop, he did not take proper care of orchard by spraying low quality and adulterated chemicals, and also break tree branches while harvesting the fruit. 2. The farmers having expert manpower to market his produce. 3. There was a general awareness among majority of farming community that by minimizing the role of one middleman his profit margin will ultimately increase. 4. Due to glut production and excess supply in markets, crop disposal at reasonable prices is a problem, the majority of pre-harvest contractors suffered heavy financial losses, which has forced them to leave this business.

The apple of the study area is marketed to almost all the major wholesale markets of the country. Islamabad, Karachi, D.G Khan, Lahore, Multan, Peshawar, Haiderabad, Gujranwala and Quetta markets are the major wholesale markets where the apple of the study area is sold.

Table 9.Mode of Sale of Apple Orchards of Sample Respondents in the Study Area

Source	Killa Saifullah		Pishin		Ziarat		Average	
	Freq.	(%)	Freq.	(%)	Freq.	(%)	Freq.	(%)
Banks	3	25	2	7.40	3	18.75	8	14.54
Comm. Agents	5	41.67	11	40.75	6	37.50	22	40
Friends/ Relatives	2	16.67	11	40.74	5	31.25	18	32.73
Other	2	16.66	3	11.11	2	12.50	7	12.73

Source: Survey Results 2003

Conclusion and recommendations

Balochistan is the largest but least developed province of the country. The development in agriculture sector is not up to the mark due to several reasons. The survey results indicated that shortage of irrigation water was the most serious and common problem in the study area. Followed by low market prices of apple, attack of insect pests and diseases, expensive inputs (fertilizer, pesticides, packaging material, and skilled labor), shortage of capital, low voltage and fluctuation of electricity, low quality of pesticides, and poor farm to market roads, expensive transport and lack of technical knowledge about apple crop.

Due to lack of planning, the sustainability of agriculture sector in uplands Balochistan is looking in danger because the most precious resource like water has been mined badly and the ground water resources are depleting. The current cropping pattern is not sustainable as ground water levels are falling rapidly, tube wells are starting to fail, and eventually access to ground water will thus become more expensive even for orchard crops. The farming community was well aware of this but could not implement required controls on ground water extraction under current social and legal conditions. So there is urgent need to look into this matter on part of the government to face this problem by taking necessary steps. The following recommendations are made for the improvement of this situation:

1.Introduction of low delta and stress resistant/low water requiring crops like olive, pistachio, almond and grapes that may replace the apple which is comparatively high delta crop. Almond and grapes already exists in area and are grown successfully. However, more research on olive and pistachio is needed to investigate the possibilities of their introduction in different climatic zones of Balochistan and find the most suitable areas.

2.Construction of check/delay action dams in the severely drought affected areas of the province on priority basis to save and conserve the rain runoff water.

3.There is need to increase efficient use of water at farm level. The water seepage losses are very high and

presently there is a need to minimize and control it. These losses occur mainly due to kacha and unlined water channels and kacha pounds. To face this problem, an on farm water management program may be initiated on large scale.

4.Due to financial constraints, the farmers of the area were unable to purchase inputs and apply as per recommended doses at right time caused low yield and affect apple production. The farmers due to lack of capital for marketing were forced to dispose off their apples at an early stage. Hence they cannot wait for high prices. It is suggested that the loan facilities either by ADBP or by commercial banks should be intensified in the area on easy terms and conditions.

5.Transportation charges were about 16 percent of farm gate price, which were very high. There is a need to construct farm to market roads either by government or by private agencies on self-help basis.

6.To compete at internationally, the quality of apple mûst be improved. An extension campaign should be initiated to convince the farmers to produce apple of high quality for export.

7.To face the glut production problem, the efforts for exploration of export markets for apple should be intensified. The private sector should be supported and encouraged for exporting apple. Processing units may be established/installed to process the surplus produce into different by-products.

8.Rising prices of different inputs (fertilizer, pesticides, electricity, labor, packing material, and transport) has increased the cost of production, which has ultimately reduced the profit margin of apple producers. The prices of above-mentioned inputs need control and check by government to save the interests of farming community.

9.At present, farmers are unaware about the selection of appropriate apple varieties according to their climatic requirements (chilling period). Farmers need training about the selection of an apple variety for a particular area. At high altitude areas varieties of high chilling requirement (Tor kulu, Shin kulu, Kaja, Mashadi, Amri, Kashmiri etc.) may be planted and at areas of low altitude the low chilling requirement varieties (Hanna, Summer red, Shakar saib etc.) may be planted so that quality apples may be produced.

10.The farmers should be trained about proper orchard management practices (proper use of chemical fertilizers, pesticides, pruning, and irrigation) by strengthening the extension services

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