ASSESSMENT OF APPLE PRODUCTION IN KILLA SAIFULLAH, BALOCHISTAN: CURRENT PRACTICES, CHALLENGES, AND PROSPECTS

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ABSTRACT

The study was arranged to guestimate the production status of apples in the district of Killa Saifullah, Baluchistan. District Killa Saifullah mainly consists of three tehsils i.e. Tehsil Killa Saifullah (KSF), Tehsil Muslim Bagh (MB), and Tehsil Loi Band (LB). In this study area, tehsil KSF contributed 30.85% of acres of apple cultivated, while Tehsil MB was 15.57% of acres, and tehsil LB was 15.8% of acres. The most grown variety was Tur Kulu (Red Delicious), which was cultivated in 76.67% of the total average area. The second most grown variety was Gaja (Honeycrisp), which contributed 25% of the area, Shin Kulu (Golden Delicious), which contributed 6.67% area, and Golden (Macoun) contributed 1% of the total average area of apple cultivated land. The total average area of apple production is 10.30 tons per acre. Simply produce 278 maunds per acre. While the average age limit of the apple grower in tehsil KSF 33.8% was 33.8 years old, in tehsil MB 39.8% was 39.8 years old, while in tehsil LB 37.05% was 37 years old. The education level in the study area of the apple grower tehsil KSF was 6.35% educated, tehsil MB was 5.3%, and tehsil LB was 5.45% educated.

Keywords: Apples, Cultivation, Verities, Production, Education, Killa Saifullah

INTRODUCTION

Apple (Malus domestica L.) is the fruit of the cultivated tree, classified under the Rosaceae family, and is the most extensively grown tree fruit. The genus Malus has around 30 species and several subspecies; nonetheless, its taxonomy is intricate, ambiguous, and subject to future revision (Harris *et al*., 2002). The main area of origin for Malus cultivars is Asia Minor, the Caucasus, Central Asia, Himalayan India, Pakistan, and western China, where at least 25 indigenous Malus species are present. The Old Silk Road, stretching from the Black Sea to western China, profoundly impacted the evolution of the cultivated apple. Since the Neolithic period, pedestrian travelers and caravans of camels and pack-horses have certainly traversed there. The animals ingested several fruits, and seeds from numerous Malus species would have been disseminated in a fertile substrate along the path. The

likelihood of hybridization among once isolated species would have been significant. Selected cultivars, derived from random hybridizations and perpetuated by grafting, were probably well-established in Near Eastern society by 4,000 BC and were later documented by Roman authors. Consequently, the apple types in Western Europe were significantly estranged from their ancestral origins and evolved in relative isolation (Hassain et al., 2021). More than 7,500 apple varieties have been recorded from several countries. Nonetheless, only a restricted quantity has sufficient quality and production (Ahmadi and Afzadi, 2012). The cultivated apple is a hybrid species resulting from intricate inter- and intraspecific hybridization (Korban and Skirvin, 1984). The hybridization of apples results from the absence of interspecific breeding barriers, self-incompatibility, and the cultivation of apples alongside naturally occurring wild apple populations (Harris et al., 2002).

Most temperate-zone deciduous plants, such as apples, need a certain degree of freezing accumulation throughout winter to terminate bud endodormancy before the onset of active shoot development in spring and to ensure proper growth (O'Rourke, 2003). Consequently, apples are mostly suited for cultivating in temperate regions. Apples may also be cultivated in many conditions, including subtropical and tropical regions at elevated heights, where it is possible to yield two harvests per year (Pereira Lorenzo, 2009). The apple tree has hermaphroditic flowers that demonstrate a gametophytic kind of self-incompatibility governed by a single multiallelic locus (Pereira-Lorenzo, 2009). Therefore, at least two different cultivars must be interplanted in the orchard to provide significant cross-pollination for optimum fruit development. Alternatively, wild Malus species may be interplanted among or grafted onto certain trees in the row. The flowering and maturity times of different cultivars vary considerably, classifying them into early, mid-season, and late-blooming or ripening types. The blossoming of apple trees arises from several physiological changes transitioning from the vegetative to the reproductive stage. Similar to several other fruit crops, newly developed apple buds undergo dormancy in late summer or early autumn. Winter chilling is crucial for the cessation of bud dormancy. If cooling is insufficient, both floral and vegetative buds have delays. The flowering cycles of several cultivars must substantially align for successful pollination. The interval between pollination and fruit ripening varies considerably due to inherent cultivar differences and environmental factors. Physiological activity includes cell division and growth, starch accumulation, ethylene generation, and chromatic changes transpire during this period. (Janssen et al., 2008).

Apple is among the most nutritious foods in a balanced diet, owing to its composition of water, carbohydrates, organic acids, vitamins, minerals, and dietary fibers (Kiczorowska & Kiczorowski, 2005; Cannella, 2008). Apples are acknowledged for their high polyphenol antioxidant levels, ranking second to cranberries, and account for 20–25% of total fruit polyphenols consumed in the US, as well as 10–30% of the daily fiber and potassium intake (Aprikian et al., 2003; Boyer and Liu, 2004; Drogoudi et al., 2008). The principal phenolic compounds found in apples are chlorogenic acid, epicatechin, procyanidins, phloretin, and quercetins, with their composition affected by variety, environmental conditions, farming practices, ripeness, and storage time (Pissard et al., 2013). The allergenic potential is contingent upon the variety; cultivars with less allergenic qualities will be prioritized for breeding purposes (Botton et al., 2008).

Externally, an apple is a vibrant fruit. It is available in a spectrum of hues, including green, red, and gold. An apple is flavorful and succulent, exhibiting a range of flavors from tart to sweet. Apples are beneficial for health. A common English proverb states: "An apple a day keeps the doctor away. "An apple benefits digestion and contains essential vitamins and minerals. Apples assist in cleansing the teeth post-meal. No other fruit has such a multitude of beneficial attributes (Anon, 2010). Apples are a commonly eaten, abundant source of phytochemicals, and epidemiological studies have associated apple intake with a decreased risk of some malignancies, cardiovascular disease, asthma, and diabetes. Research indicates that apples have significant antioxidant activity, limit the development of cancer cells, reduce lipid oxidation, and lower cholesterol levels. Apples include a range of phytochemicals, such as quercetin, catechin, phlorizin, and chlorogenic acid, all of which serve as potent antioxidants (Boyer and Liu, 2004).

In 2021, the global area harvested for apples was 4,822,226 hectares, reflecting a 0.8% increase from 4,782,734 hectares in 2020. In 2021, the projected global apple output reached 93,144,358 metric tonnes, reflecting a 2.9% increase from 90,490,295 tonnes in 2020. China, Turkey, the USA, Poland, India, and Iran dominate apple production. Pakistan is ranked 20th globally (FAO, 2023).

Pakistan ranks fourth in apple production among major horticulture nutritious fruits, with an output of 590,039 tons (FAO, 2017). Apple cultivation occurs in the mountains of Balochistan, Khyber Pakhtunkhwa, and the Northern Areas of Pakistan. Balochistan has 64% of the national apple production (GOP, 2006). Pakistan cultivates many apple varieties, including Kala Kulu, Golden Delicious, Super, Gaja, Red Delicious, and Mashadi (Muhammad et al., 2011). The main apple producing areas in Balochistan are Ziarat, Kalat, Killa Saifullah, Zhob, Quetta, and Loralai (Khan et al., 2007). In 2011, around 315.4 thousand tons of apples were cultivated over 47.7 thousand hectares, resulting in a yield of 6.6 tons per hectare. Pakistan is lucky to have varied agro-climatic conditions that allow the production of both tropical and temperate fruits. The ideal soil and climatic conditions for apple cultivation are mostly located in the mountainous areas of Balochistan and NWFP provinces. In 2011, Pakistan allocated 47.7 thousand hectares to apple cultivation, producing 315.4 thousand tons annually, which corresponds to an average yield of 6.6 tons per hectare (Ali et al., 2011).

Balochistan is acknowledged as the fruit basket of Pakistan (Khair et al., 2006). It is distinguished for the cultivation of apples, date palms, apricots, grapes, and peaches. In Balochistan, over 60% of peaches, pomegranates, and apricots; 34% of apples; 70% of dates; and 90% of grapes are farmed (Fazl-e-Haider, 2017). Apple cultivation occurs in the highlands of Balochistan, over 0.101 million hectares, yielding 0.224 million tons, with a retail value of around Rs6.7 billion. The Tur-Kulu (Red Delicious) and Shin-Kulu (Golden Delicious) are renowned kinds in Pakistan, celebrated for their appealing colour and flavour. Therefore, it is not surprising that the apple is regarded as the "King" of all fruits (GOP, 2013). Due to little or no precipitation in the highlands of Balochistan, high-quality apples, grapes, plums, and apricots are produced. The benefit minimizes or eliminates damage against fungal infections on tree fruits, hence enhancing their shelf life post-harvest (Khair et al., 2006). It was stated that apple output in Baluchistan had a substantial reduction owing to bug infestations and the choice of pollinators. Consequently, the genetic polymorphism of current types is precisely recognized and assessed, which is crucial for effective apple breeding operations (Jasra et al., 2001).

MATERIAL AND METHODS

This research aimed to examine the current apple marketing and production in the Killa Saifullah area. The devised method was used to examine the area, kind, and quantity of respondents; without it, the Endeavor would be futile. Consequently, it is essential to delineate the variables included in the study to enhance its scientific rigor and objectivity.

Research/Survey

The study was carried out in the district of Killa Saifullah. Keeping in view the Geographical position of the Area, the Killa Saifullah is one of the central cities of Baluchistan. It has great value because of its agricultural products. Apple varieties studied in the area are Red Delicious, Golden Delicious, Honeycrisp, and Macoun, The Red Delicious and Honeycrisp variety is grown mostly for its profitability, followed by golden delicious.

Sampling Technique and Sample Size
Study Area

The research was mostly confined to the collection of primary data from the Killa Saifullah area. The site was chosen for the research due to its representation of apple producing operations.

Data Collection

A multistage sampling technique was applied to select a sample of growers in the area.

In the first stage, District Killa Saifullah was chosen purposively on the basis of production.

In the second stage, three major producing tehsils were selected from the district.

In the third stage, the main producing areas were selected from tehsil in which villages were selected on the base of apple gardens.

In the fourth stage, the farmers were randomly selected from the chosen districts.
A random sample of 60 progressive farmers was selected.

Questionnaire Development
The interview used a well- designed questionnaire. Extensive information was gathered from apple-producing farms and recorded by the interviewer. The questionnaire was created in English, however the interviews with respondents were conducted in the local language, Pashtu. The questionnaire addressed several elements. Data Examination The gathered data included both quantitative and qualitative information.

Sample Size
The sample was supposed to contain apple farmers. A sample size of 60 formers was selected through random sampling.

Age of Apple growers in the study area
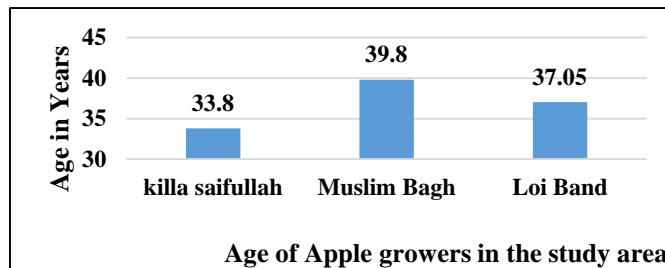
In the study area, the average age limit of the apple grower in tehsil Killa Saifullah is 33.8% in tehsil Muslim Bagh the average age limit of apple growers is 39.8%, and in the tehsil Loi Band the average age limit of former is 37.05%. It means that the farmers of tehsil Muslim Bagh are older than the other tehsils farmers.

Table: 3.1. The number of apple growers selected.

DISTRICT	TEHSILS	UNION COUNCILS	TOTAL GROWERS	SAMPLED GROWERS
Killa Saifullah	Killa Saifullah	Sadar	290	7
		Town	742	13
	Muslim Bagh	Kan Mehtarzai	422	20
	Loi Band	Main Bazar	652	20
		Total	2106	60

Statistical analysis
Collected data was then inserted into a statistical package for social sciences SPSS and Microsoft Office Excel to analyze. The descriptive analysis method was used to analyze the data the results were obtained which are followed by a section.

To support the primary data personal observations and informal surveys were conducted at different levels of the study. In this regard, the cost of various inputs used in production and the value of various products obtained need to be clearly defined. The methodology adopted to estimate various costs in production is as under.
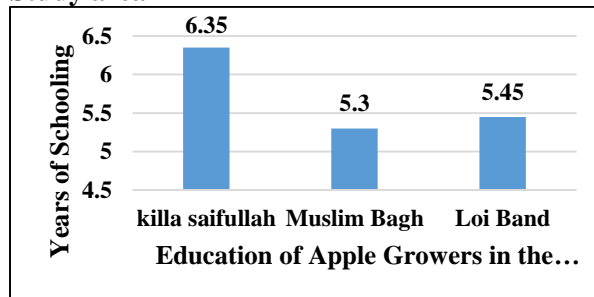
RESULTS AND DISCUSSION
Age of Apple growers in the study area
Figure4.1: Age of Apple growers in the study area

Education of Apple Growers in the Study area
Figure4.2: Education of Apple Growers in the Study area

Education of Apple Growers in the…

In the study area, the education level of the average apple grower in tehsil Killa Saifullah is 6.35% in tehsil Muslim Bagh the education level of average apple growers is 5.3% and in the tehsil Loi Band the average education level of former is 5.45%. It means that the former of tehsil Killa Saifullah is more

educated than other tehsil formers. The farmers of tehsil Muslim Bagh and tehsil Loi Band belong to rural areas the literacy rate less as compare to tehsil Killa Saifullah.

Average Area in acres Under Apple Fruit

Tehsil	Cost and Revenue of Apple Production					
	Gross Revenue (Rs)	Cost of Production (Rs)	Total Expenditure	Total Profit without Expenditure (Rs)	Cost per Acre (Rs)	Profit per Acre (Rs)
Killa Saifullah	8994737	2655000	6367500	7397250	416296	195571
Muslim Bagh	1949947	496100	1688500	1287450	319593	123369
Loi Band	2874375	821600	2641625	2486725	314547	146233
Total	**13819059**	**3972700**	**10697625**	**11171425**	**1050436**	**465173**

Figure4.3: Average Area in acres Under Apple Fruit

Average Area in acres Under Apple Fruit

15.8
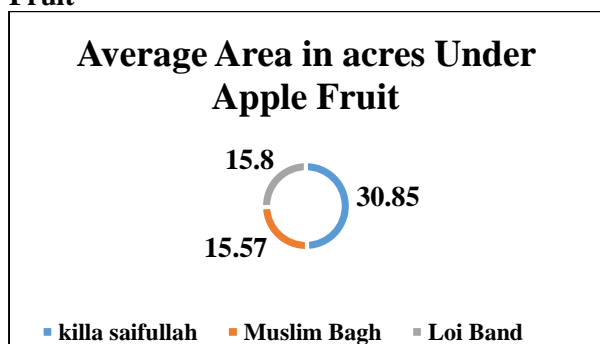30.85
15.57

■ killa saifullah ■ Muslim Bagh ■ Loi Band

Figure 4.3 shows that the average apple cultivated area is 30.85% acres' tehsil Killa Saifullah, while the contribution of tehsil Muslim Bagh in apple cultivation is 15.57% acres, whereas tehsil Loi band's contribution is 15.8% acres. The tehsil Muslim Bagh and Loi Band are generally mountainous areas so that they have less apple cultivation as compared to tehsil Killa Saifullah.

Apple Varieties in the Study area
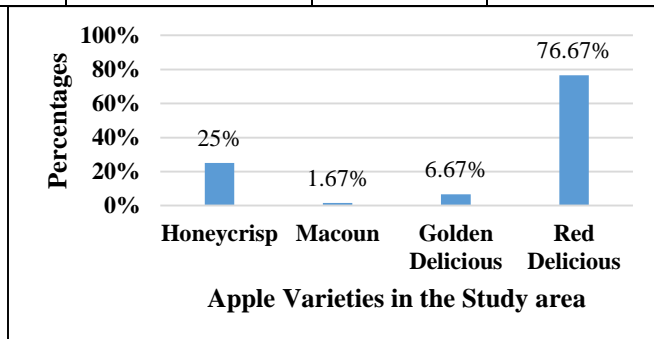**Figure4.4: Apple Varieties in the Study area**

Figure 4.4 shows that the apple varieties have grown in the study area. The most grown variety was Tur Kulu (Red Delicious), which was cultivated in 76.67% area. While the second most grown variety was Gaja (Honeycrisp), which contributed 25%, whereas Shin Kulu (Golden Delicious) was cultivated in 6.67% area, while Golden (Macoun) contributed 1% of the total area of apple cultivated land. The total average area of apple production is 687 corrugated cotton per acre, one cotton is equal to 15kg (687 × 15 = 10305kg). In the study area per acre, apple production is (10305÷1000= 10.30 tones). Simply produce 278 maunds per acre.

Cost and Revenue of Apple Production
In the study area District Killa Saifullah per orchard gross revenue was PKR 13819059, cost of production PKR 3972700, per orchard total cotton expenditure PKR 10697625, total profit without expenditure was PKR 11171425, cost per acre PKR 1050436, and profit per acre PKR was 465173.Explanation in figure 4.5 below.

Figure4.5: cost and Revenue of Apple Production
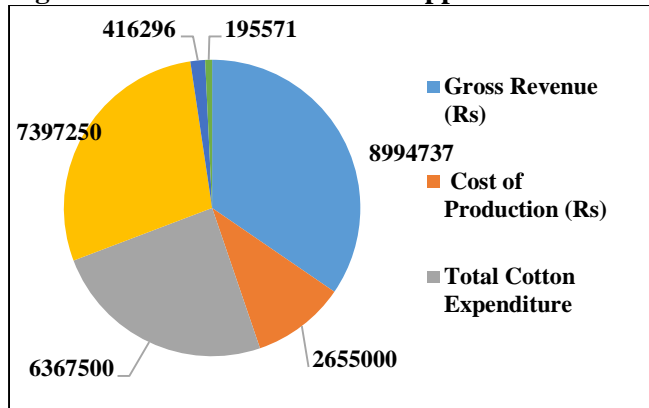
CONCLUSION

The research Study on Economic Analysis of Apple Production District Kila Saifullah Baluchistan Concludes the results obtained during 2021 show that 2020 was a very fruitful year for the apple crop. This year crop yields are better than in previous years, which have never been seen in past years. Studies have also shown that a good apple crop depends on rainfall and snowfall. There was a lot of rain and snow in 2020. Killa Saifullah is very fertile soil Agriculture zone as compared to other districts of Baluchistan Therefore, the production capacity in the district is very high. There is also needed to study the efficient production of more fruits and apples to meet the demand of the growing population. In this way, along with increasing the apple crop, the basic needs of the farmers should be emphasized in which training, education and other basic needs of farmers are met. There is also need for study the efficient apple fruits production practices and issues in the production process for policy making. At the same time, the fertility of the land has to be monitored and when planting apple seedlings, priority should be given to registered nurseries instead of local nurseries. Which not only gives a good crop but also gets rid of diseases and there has been a significant increase in the age of trees. Organic fertilizers should be preferred over chemical fertilizers. The use of organic fertilizers provides good crops and fertile soil the use of organic fertilizers also saves costs and maintains the fertility of the land which increases the value of the land.

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