



## Review Article

# A Review: Fruit Production Industry of Pakistan Trends, Issues and Way Forward

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**Abstract** | Pakistan have an excellent environment for fruit production. Climatic conditions and different altitude level support production of excellent quality fruits in coastline, tropical, subtropical and temperate regions. Pakistan is one of the top fruits producing country globally. Pakistan ranks 4<sup>th</sup> in Mango (1.880M Tones), 6<sup>th</sup> in Guava (2.4 M Tones), Dates (0.72 M Tones) and Citrus (2.1 M Tones) production around the globe. Since the year of 1969 Pakistan builds the infrastructure for agricultural development due to that; significant increase in production were observed during second, third and fourth development plan. Small land holdings, poor quality/low quantity of inputs and lack of crop improvement programs with respect to the disease, lack of disease and problem oriented research in major fruits such as Guava, Grapes and Banana. Addressing these challenges of fruit production industry can further improve yield and quality of fruits local fruits. Secondly the nurseries stocks of fruit plants should be certified, the small land holders should be supported by the government incentives for specific fruit production. Research according to the modern steps regarding plant protection measures, introduction of exotic varieties and use of Biotechnological tools for crop improvement should be adopted for better yield and production.

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## Introduction

Pakistan is one of the largest Agricultural country around the globe wise agriculture. Pakistan's climate is the best for commercial yield of various

fruit crops. Around 37.1 % of the Pakistani soils are cultivated for various crop of Agronomic and Horticultural importance. However total area under the horticultural crops are less than 6%. The average farm size is 3.1 ha<sup>-3</sup> (Anonymous, 2021) for various

horticultural crops from Floriculture/fruit nurseries to orchards. Analysis of province wise fruit production and area showed that the Punjab province is leading in area and production (47.4%, 63.2%), followed by Balochistan (13%, 15%), Sindh (25%, 14%) and KPK (13%, 10%). The current production ranking of major fruits is: citrus, mango, date, apple, guava, Banana and apricot. During past decades Pakistan took significant measures to ensure the better and consistent yield of horticultural crops especially of fruits (Anonymous, 2001). Govt. Established some prime institute for exclusive research on important fruits e.g., MRI (Mango Research Station, Multan), CRI (Citrus Research Station, Sargodha and Sahiwal), DPRSS (Date Palm research sub-station Jhang, Punjab and Shah Abdul Latif Bhati Uni., Mirpur, Sindh), Hill Fruit Research Station (Murree) and several research programs in Main and sub-research stations around the country. Fruit production in Pakistan is supported by excellent and diverse climatic conditions in Pakistan. Naturally some fruits are produced in specific pockets in the tropical/sub-tropical or temperate regions. Citrus, Mango, Guava and Date palm are produces in the plain, dry and hot regions of Punjab and Sindh from Multan to Hyderabad. Banana is produced in the coastline Region of Province of Sindh. Apple, pear, peach and plums are cultivated exclusively in the temperate regions of the KPK and Punjab. Balochistan is known as the Fruit basket of Pakistan (Khair *et al.*, 2006). It is famous in Apple, Date palm, Apricot, Grapes and peach cultivation. More than 60% of peach, pomegranate and apricot, 34 % of apple, 70 % of date and 90% of the Grapes are produced in the Blochistan (Fazl-e-Haider, 2017). Due to very little or no rainfall on high lands of Blochistan the high-quality Apple, grapes, plum and apricot are yielded. Due to this advantage the fungal diseases are little or did not damage the fruits on trees and provide improved shelf life after harvest (Khair *et al.*, 2006). Punjab is the hub of Citrus, Guava and Mango production. Almost 40 % of all the fruits are produced in Punjab. The northern and hilly areas of the Malakand region are excellent for apple, peach and pear production. Plain valley of Peshawar and rain fed areas are suitable for Almond and loquat production. However, a little amount of date palm and Guava is also produced in dry and hot regions of Bennu and D.I. Khan (Anonymous, 2008). Sindh is significantly known for Mango, Banana, Date and Guava production. Coastline/Sub-tropical climate of Hyderabad favor banana production. While

dry and hot areas of internal Sindh e.g., Nawabshah and Sukkur, Mirpur and Khirpur are good for Date palm, mango and Guava production. Shah Abudl Latif University, Mirpur developed an excellent program on production of Date palm through *in vitro* Micropropagation for several years (Abul-Soad, 2010). Horticultural commodities generally and fruits are specifically are very good for health. The dates are very rich in Calories production in human body after consumption (1275 kJ/Kcal in each 100g). The guava is an excellent source of ascorbic acids (NEVO, 1996). Fruits generally, while date palm specifically have the tannins at immature stages that possess anti-infective, anti-inflammatory, and anti-hemorrhagic (prevent easy bleeding tendencies) properties. The dates are natural candies. It possesses the large amount of sugar and energy which are useful after fasting in Islamic culture. Most of the cancers can be prevented by including the fruits in the daily diet (Gallus *et al.*, 2005). The consumption of a medium size apple daily provides thirteen different pure substances to the human body amongst that tri-terpenoids is also included which have anti-proliferative activity against human liver cancer cells (HepG<sub>2</sub>), as well as colon cancer cells and female breast cancer (MCF-7 and Caco-2, respectively). Citrus fruits are also high in vitamin C, and are good sources of folate and thiamin. Vitamin C is a powerful antioxidant and protects the body from damaging by free radicals. It is also required for the synthesis of collagen, which help in wounds healing and blood clotting. It also promotes the coordination amongst tendons, ligaments and bone together. Folate is necessary for cell division and DNA synthesis. Thiamin found abundantly in apple which is important in catabolism of sugar and amino acids due to which it prevent obesity (Benzei and Chloi, 2004). Guava is rich in ascorbic acid which is beneficial for the cure of the injuries and delay aging. The present review will focus on the chronological development of the fruit production industry in Pakistan and its progress during last 60 years. The data for this study was collected from the different websites and internet sources with the references of yearly publish data of Agriculture statistics, Bureau of Statistics of Pakistan since 1957-2020 and Fruits, vegetables and condiment statistics of Pakistan 2008-15. While the yield Tons/ acres were calculated by the following formula.

$$\text{yield (tons. per acre)} = \frac{\text{Productoin (000 tons.)}}{\text{Area (000 acres)}}$$

### *Chronological fruit production, area and yield (tons/acre) in Pakistan*

The data showed average production of different fruits in Pakistan. The average production of different fruits is shown in [Table 1](#). The main fruits Produced in Pakistan is Citrus followed by Mango, Dates, Apple, Guava, Banana, Apricot, Peach, Plum, Pomegranate, Grapes and Pear. The sudden increase in any fruit is not observed since 1957-60 during first development plan. Generally, fruits production become significantly increased duration of 1960-65. The citrus production in the country become significantly increased since 1980-85 when the production increases double fold (722.64-1200 Thousand Tons). Date palm increasing trends were increases during 2005-10 (1157.73-1760.04 Thousand Tons). Apple and Guava were significantly increased during 1995-2000. However, the sudden and major increase was observed in the production of Banana, Apricot, Peach, Plum, Pomegranate, Grapes during the year on 1990-95. Average area of fruit production also showed the same trends as the production of the major fruits increased in 1960-65. The area was significantly increased under Citrus, Mango, Apple, Dates, Guava and Banana as well. However, in the subsequent years it did not increased with the same pace. While area under fruit production became greatly increase after 1975-80. During the years of 1960-65 the area under the major (Citrus, Mango, Date and Guava) fruits, increased double folds. While the double fold increase were observed after the year of 1975-80. Area under major fruit production remains consistent or grown slowly since 1990 to 2015. However, the per acre yield of the major fruits remain consistent with narrow changes. Production, area and yield (tons/acre) of fruit production trends in each province of Pakistan are discussed below.

#### *Punjab*

The average production of citrus, Mango, Guava, Dates, pomegranate and apple has been showed in [Table 2](#). The significant increase was observed during 1960-65 (326.26) in the citrus fruit production. Mango production was not increased in comparison to Guava and Citrus. However major changes were again observed during the year of 1980-85. Citrus production increased significantly during 1137.38-1422.61 during the same years. However, since 1957-2015 total production of the citrus, Mango and Guava increased almost 10-20 folds. The average production of citrus, Mango and Guava increased

2-3 time in Punjab compared with Sindh. The sudden increases were observed after the 1960 in the production area of major fruits in Punjab. The areas regularly increased since 1975-80 till 1995-2000 while it remain fluctuating continuously until 2015. However, the yield (tons/acre) remained constant or little fluctuating since 1957-2015.

#### *Khyber Pakhtunkhwa (KPK)*

Khyber Pakhtunkhwa (KPK) has the diverse and excellent climate for temperate fruits. This province of Pakistan is the home of temperate fruits due to the presence of wide range of temperate areas are attached with AJK or Northern areas attached with the borders of China, Afghanistan and India. Significant amount of apples (97.64 thousand tons) are produced in the provinces followed by the cold and dry regions of Balochistan. Significant amount of Guava (41.72 thousand tons) and Citrus (32.12 thousand tons) were also produced in KPK during 2010-15. However, fruit production of Citrus, Guava and apples was remained consistent since 1957-2015 in KPK. No sudden increase was observed in average fruit production after each five years. Meanwhile temperate fruits i.e., Peach, Plum, Pear, Banana and Apricot was regularly increased. However, during 2010-15, sudden decrease in production of temperate tropical/subtropical and major fruits was observed ([Table 3](#)). Data showed that the average production area were non-consistent. On the other hand, it increased/decreased under Apple, Guava and Citrus cultivation. However, area under temperate fruits was consistently increasing. Production of the plum started from 1975-80, since that time the area remained consistent under the plum production. Peach, Apricot, Pear and Banana showed no significant change in production area while it decreased during 2010-15. The average yield (tons/acres) remain same since 1957-2000.

#### *Sindh*

Sindh is the exclusive producer of banana and second largest producer of the Mango, Citrus, Dates and Guava followed by Punjab. The sudden increase in the fruit production were observed during 1960-65. Sudden increase in the fruit production in Sindh is observed during 1995-2000 ([Table 4](#)). Decrease in banana production was observed during 2010-15 (128.88-102.62 thousand tons). The Banana production was severely decreased up the 50-60 % during 1990-2000 (170.90 to 59.02 and 63.78 thousand tons). This sudden decrease was may be due to the banana bunchy

**Table 1:** Chronological fruit production, area and yield in Pakistan since 1957–2020.

Year		Citrus	Mango	Apple	Dates	Banana	Apricot	Peach	Plum	Pomegranate	Grapes	Pear
1957-60	P	164	178	10.47	24.7	2	6.9	2.4	0	14.6	1.73	6.27
	A	49.3	67	3.5	11.17	2.33	4.43	1.13	0	4.07	1.73	1.8
	t./Acre	3.33	2.66	2.99	2.21	0.86	1.56	2.12	0	3.59	1	3.48
1960-65	P	362.7	305.6	10.64	72.96	22.8	9	6.66	0	18.26	5.04	18.74
	A	92.9	102.6	5.76	24.56	6.8	5.4	4.44	0	5.44	5.04	3.18
	t./Acre	3.9	2.98	1.85	2.97	3.35	1.67	1.5	0	3.36	1	5.89
1965-70	P	460.3	575.2	22.42	132.38	49.4	12.66	9.62	0	21.44	6.04	19.82
	A	114.5	132.2	8.88	41.96	15.2	4.38	3.04	0	4.98	6.04	5.22
	t./Acre	4.02	4.35	2.52	3.15	3.25	2.89	3.16	0	4.31	1	3.8
1970-75	P	526.98	558.04	42.32	166.24	100.58	19.26	8.8	0	25.68	5.83	22.26
	A	116.88	141.18	13.44	52.24	26.84	5.09	2.62	0	5.04	5.83	5.39
	t./Acre	4.51	3.95	3.15	3.18	3.75	3.78	3.36	0	5.09	1	4.13
1975-80	P	722.64	563.93	84.44	192.88	124.44	29.8	9.94	30.5	28.1	6.13	31.26
	A	185.87	143.27	23.53	57.03	34.74	7.02	2.87	6.27	5.09	6.13	7.66
	t./Acre	3.89	3.94	3.59	3.38	3.58	4.25	3.47	4.86	5.52	1	4.08
1980-85	P	1200.88	649.18	124.16	219.44	133.64	43.04	10.92	40.68	30.68	6.62	33.6
	A	305.23	165.27	31.78	73.19	37.71	9.54	2.92	9.09	6.77	6.62	7.36
	t./Acre	3.93	3.93	3.91	3	3.54	4.51	3.74	4.47	4.53	1	4.56
1985-90	P	1490.84	732.78	204.22	277.44	192.56	65.8	15.92	46.88	36.52	7.42	33.72
	A	397.01	195.31	48.98	100.08	53.57	13.89	4.55	10.53	9.09	7.42	7.02
	t./Acre	3.76	3.75	4.17	2.77	3.59	4.74	3.5	4.45	4.02	1	4.8
1990-95	P	1737.28	815.98	370.6	393.1	86.14	128.52	32.44	63.66	68.88	13.25	33.22
	A	445.49	211.57	80.01	134.58	40.92	22.73	7.66	13.64	12.8	13.25	6.47
	t./Acre	3.9	3.86	4.63	2.92	2.11	5.65	4.23	4.67	5.38	1	5.13
1995-00	P	1960.76	918.64	532.32	581.18	95.66	175.8	43.68	74.36	96.7	22.19	36.2
	A	483.74	227.49	112.43	185.78	64.35	29.8	10.77	16.51	15.97	22.19	7.02
	t./Acre	4.05	4.04	4.73	3.13	1.49	5.9	4.05	4.5	6.06	1	5.16
2000-05	P	1826.88	1157.73	361.42	583.41	148.82	159.26	58.52	63.52	59.46	31.5	32.36
	A	461.99	273.5	186.23	193.46	77.06	47.8	24.83	18.24	22.82	31.5	6.34
	t./Acre	3.95	4.23	1.94	3.02	1.93	3.33	2.36	3.48	2.61	1	5.1
2005-10	P	2101.52	1760.04	389.74	515.61	156.8	209.31	72.33	63.64	53.66	36.01	25.06
	A	485.92	410.8	277.88	216.52	85.9	74.42	38.22	18.09	33.18	36.01	5.88
	t./Acre	4.32	4.28	1.4	2.38	1.83	2.81	1.89	3.52	1.62	1	4.27
2010-15	P	2138.91	1728.38	580.77	533.62	123.69	181.26	58.05	54.94	46.47	45.69	11.76
	A	478.32	425.32	261.86	224.1	66.79	69.1	32.29	15.49	28.34	37.78	3.84
	t./Acre	4.47	4.06	2.22	2.38	1.85	2.62	1.8	3.55	1.64	1.21	3.06
2015-20	P	2347.95	1719.03	480.94	538.37	133.24	151.81	73.92	49.79	38.98	66.71	16.32
	A	187.42	167.12	966.80	65.22	29.06	23.78	14.28	6.48	8.08	15.20	1.72
	t./Acre	12.53	10.29	0.50	8.25	4.59	6.38	5.18	7.68	4.82	4.39	9.49

1: Fruits vegetables and condiments statistics of Pakistan, 2008–15; 2: Statistical Year Book 2008; 3: Agriculture Marketing information Services, Directorate of Agriculture (Economics and Marketing) Punjab, Lahore. P: Production (000 tons.), Area: (000 acre.) and Yield: tons/acre.

top virus (Anonymous, 2002). While the area under the fruit production was consistently increasing since 1957–2015. While area under banana production decreased during 1990–2000. However, yield per acre

were remained consistent since 1957 to 2015 while negligible variation were observed during different time spans in the tons/acres.

**Table 2:** Chronological fruit production, area and yield in Punjab since 1957-2020.

Year		Citrus	Mango	Dates	Pomegranate	Apple
1957-60	P	151.33	127.33	13.83	7.23	1.77
	A	41.77	27.33	3.5	2.27	0.83
	t./Acre	3.62	4.66	3.95	3.19	2.12
1960-65	P	326.26	143	14.26	8.78	1.52
	A	83.5	40.4	5.04	3.18	2.2
	t./Acre	3.91	3.54	2.83	2.76	0.69
1965-70	P	417.5	252	20.86	4.78	1.6
	A	100.2	50.4	10.68	2.1	1.44
	t./Acre	4.17	5	1.95	2.28	1.11
1970-75	P	482.34	340.54	33.3	4.12	2
	A	106.01	62.97	14.33	1.88	0.89
	t./Acre	4.55	5.41	2.32	2.19	2.25
1975-80	P	668.2	305.46	42.44	5.46	3.1
	A	171.99	59.85	16.16	2.17	1.19
	t./Acre	3.89	5.1	2.63	2.51	2.61
1980-85	P	1137.38	383.02	63.46	8.7	3.58
	A	287.19	80.81	23.28	3.56	1.33
	t./Acre	3.96	4.74	2.73	2.45	2.68
1985-90	P	1422.64	465.68	92.14	11.92	8.32
	A	376.99	109.27	34.64	4.8	2.92
	t./Acre	3.77	4.26	2.66	2.48	2.85
1990-95	P	1658.52	530.06	90.44	13.6	3.62
	A	422.41	115.15	29.7	5.04	0.99
	t./Acre	3.93	4.6	3.04	2.7	3.67
1995-00	P	1872.06	594.8	92.46	15.3	2.46
	A	457.35	119.16	27.43	5.29	0.74
	t./Acre	4.09	4.99	3.37	2.89	3.32
2000-05	P	1749.7	797.83	67.71	16.59	3.22
	A	435.96	152.77	21.17	5.68	0.86
	t./Acre	4.01	5.22	3.2	2.92	3.73
2005-10	P	2028.45	1380.41	43.88	15.98	3.56
	A	460.86	273.78	14.63	5.54	0.95
	t./Acre	4.4	5.04	3	2.89	3.75
2010-15	P	2068.94	1330.64	43.66	11.24	3.54
	A	452.53	270.17	14.32	3.98	0.98
	t./Acre	4.57	4.93	3.05	2.83	3.62
2015-20	P	2281.42	1315.22	41.20	8.90	3.54
	A	177.23	104.67	5.43	1.33	0.38
	t./Acre	12.87	12.56	7.59	6.66	9.31

1: Fruits vegetables and condiments statistics of Pakistan, 2008-15; 2: Statistical Year Book 2008; 3: Agriculture Marketing information Services, Directorate of Agriculture (Economics and Marketing) Punjab, Lahore. P: Production (000 tons.), Area: (000 acre.) and Yield: tons/acre.

**Table 3:** Chronological fruit production, area and yield in Khyber Pakhtunkhwa since 1957-2020.

Year		Apple	Peach	Citrus	Plum	Pear	Banana	Apricot
1957-60	P	0.43	1.1	8	0	2.3	0	3.37
	A	0.57	0.73	3.4	0	2	0.33	4.5
	t./Acre	0.76	1.5	2.35	0	1.15	0	0.75
1960-65	P	1.5	3.02	19.92	0	11.02	1.4	4.66
	A	0.88	0.88	4.68	0	1.82	1	3.4
	t./Acre	1.7	3.43	4.26	0	6.05	1.4	1.37
1965-70	P	3.36	3.66	20.34	0	18	1	3.42
	A	1.96	0.84	5.48	0	2.72	1	1.22
	t./Acre	1.71	4.36	3.71	0	6.62	1	2.8
1970-75	P	11.72	2.08	18.68	0	14.32	9.72	5.78
	A	3.07	0.79	5.98	0	2.42	1.14	1.43
	t./Acre	3.82	2.63	3.12	0	5.92	8.53	4.04
1975-80	P	35.12	1.68	22.48	21.34	21.4	7.52	6.18
	A	8.4	0.49	6.67	4.5	4.25	1.09	1.58
	t./Acre	4.18	3.43	3.37	4.74	5.03	6.9	3.91
1980-85	P	50.28	2.12	27.38	28.5	28.32	9.36	8.08
	A	11.02	0.74	8.1	6.57	5.63	1.28	2.27
	t./Acre	4.56	2.86	3.38	4.34	5.03	7.29	3.55
1985-90	P	84.32	3.34	29.76	30.44	30.72	9.2	14
	A	16.41	1.14	8.8	6.97	6.18	1.24	3.21
	t./Acre	5.14	2.93	3.38	4.37	4.97	7.42	4.36
1990-95	P	88.84	8.84	33.2	34.62	29.96	11.22	17.26
	A	19.08	2.07	9.64	7.96	5.54	1.48	3.85
	t./Acre	4.66	4.26	3.45	4.35	5.41	7.56	4.48
1995-00	P	88.48	12.5	38.12	37.08	32.54	12.42	19.44
	A	21.1	2.72	11.22	8.5	5.93	1.48	4.35
	t./Acre	4.19	4.6	3.4	4.36	5.49	8.39	4.47
2000-05	P	110.59	40.73	37.95	37.14	31.83	12.58	21.2
	A	22.8	9.52	11.04	8.55	5.85	1.58	4.98
	t./Acre	4.85	4.28	3.44	4.34	5.44	7.98	4.26
2005-10	P	127.03	50.29	35.38	32.4	25.88	13.5	18.2
	A	23.16	14.52	10.62	8.4	5.08	1.69	5.58
	t./Acre	5.48	3.46	3.33	3.86	5.1	7.98	3.26
2010-15	P	97.46	38.02	32.12	26.94	18.2	12.5	13.56
	A	19.77	15.84	9.95	7.5	4.92	1.57	5.82
	t./Acre	4.93	2.4	3.23	3.59	3.7	7.97	2.33
2015-20	P	79.27	56.68	30.90	24.67	15.78	29.75	11.38
	A	7.37	8.63	3.92	2.81	1.57	0.68	2.72
	t./Acre	10.74	6.56	7.88	8.75	10.03	43.31	4.18

1: Fruits vegetables and condiments statistics of Pakistan, 2008-15; 2: Statistical Year Book 2008; 3: Agriculture Marketing information Services, Directorate of Agriculture (Economics and Marketing) Punjab, Lahore. P: Production (000 tons.), Area: (000 acre.) and Yield: tons/acre.

**Table 4:** Chronological fruit production, area and yield in Sindh since 1957-2020.

Year		Mango	Dates	Banana	Citrus
1957-60	P	50.67	13.87	1	4.67
	A	39.67	5.67	2	4.13
	t./Acre	1.28	2.45	0.5	1.13
1960-65	P	161.6	35.28	20.2	16.16
	A	62	10.94	5.6	4.56
	t./Acre	2.61	3.22	3.61	3.54
1965-70	P	320.2	39.16	46.8	21.64
	A	80.8	13.8	14.2	8.44
	t./Acre	3.96	2.84	3.3	2.56
1970-75	P	215.08	57.9	87.74	25.08
	A	77.15	15.81	24.22	4.4
	t./Acre	2.79	3.66	3.62	5.7
1975-80	P	255.04	67.98	109.7	30.92
	A	82.14	19.42	30.3	6.57
	t./Acre	3.1	3.5	3.62	4.7
1980-85	P	260.62	71.86	114.24	34.18
	A	82.78	28.42	31.73	8.8
	t./Acre	3.15	2.53	3.6	3.89
1985-90	P	260.44	94.68	170.9	34.8
	A	83.77	40.67	46.46	9.59
	t./Acre	3.11	2.33	3.68	3.63
1990-95	P	273.38	67.48	59.02	35.28
	A	92.81	47.4	33.06	10.18
	t./Acre	2.95	1.42	1.79	3.47
1995-00	P	306.48	158.42	63.78	34.62
	A	103.14	52.78	55.25	10.18
	t./Acre	2.97	3	1.15	3.4
2000-05	P	347.13	253.73	116.7	28.77
	A	115.44	62.9	67	10.11
	t./Acre	3.01	4.03	1.74	2.85
2005-10	P	368.68	249.99	128.88	30.57
	A	132.5	78.57	79.29	11.06
	t./Acre	2.78	3.18	1.63	2.76
2010-15	P	394.18	278.1	102.62	30.74
	A	151.02	82.46	61.17	12.32
	t./Acre	2.61	3.37	1.68	2.49
2015-20	P	399.33	236.06	109.15	28.42
	A	61.75	36.96	27.27	4.72
	t./Acre	6.47	6.39	4.00	6.02

1: Fruits vegetables and condiments statistics of Pakistan, 2008-15; 2: Statistical Year Book 2008; 3: Agriculture Marketing information Services, Directorate of Agriculture (Economics and Marketing) Punjab, Lahore. P: Production (000 tons.), Area: (000 acre.) and Yield: tons/acre.

### Balochistan

During the years of 1965-70 the sudden increase in

the production of the fruits especially Apples, Dates, Citrus and Apricots was observed. During 1985-90 significant increase was seen in fruit production in the province of Blochistan. The province produces almost 80% of the apples in the country. It produces almost 50 % of the dates with significant share followed by Sindh. During 2010-15 the apples were increased significantly (262.30-483.62 thousand tons) while the dates were produced in less quantity during the same time span (226.53-201.50). While other fruits e.g., Apricot, grapes, pomegranates and plums were slightly decreased or produced in same quantity (Table 5). The Balochistan is the largest producer of Pomegranate throughout the Pakistan. The dry and hot climate supports the pomegranate production in the province. The average production area under the fruit crops cultivation was also increases during 1975-80, while area under apple production (9.24-13.69) was also increased. During the period of 2000-05, increase in the production area of fruit production was observed in the province. The average yield (tons/acre) is continuously fluctuating since 1957-2015. Moreover, the political scenario of the province remains unstable since 1947 to date. That might be the cause of staggering yield and unstable fruit production and acreage. During 2000-20 the American invasion and short period of peace is also be the reason of diverting the interests of farmers from fruit production in the province.

Generally, after 1960 the production of the fruits and area under the cultivation of the different fruit crop increased. It may be due to the diversion of the attention of the govt. towards the economy of the farmer. The major success of the first five-year plan was to develop the institutions at national level. The prime achievement in this regard was to establish the WAPDA (Water and Power Development Authority) in 1958. The charter of the WAPDA include research, planning and execution of the schemes in the fields of irrigation, water supply, drainages, prevention of water logging and reclamation of water logged, saline soils and flood control (Anonymous, 1999). However according to Indus water treaty with India, Pakistan had the right to use the water of three western rivers of Indus (Sindh), Chenab and Jhelum. It allowed the Pakistani establishment to develop the world's largest irrigation system in the country. Mangla and Tarbela Dams were built after the long-term Indus water treaty during 1960-80 (Anonymous, 1999). These both dams plays significant role in the agricultural

**Table 5: Chronological fruit production, area and yield in Balochistan since 1957–2020.**

Year		Apple	Dates	Apricot	Peach	Grapes	P.G.	Plum	Citrus
1957-60	P	8.03	3	3.13	0.6	1.73	6.2	0	0
	A	2	2	0.67	0.37	1.73	1.03	0	0
	t./Acre	4.02	1.5	4.7	1.64	1	6	0	0
1960-65	P	7	27.32	4.12	1.66	4.7	7.82	0	0.36
	A	2.6	7.44	1.32	2.98	4.7	1.42	0	0.16
	t./Acre	2.69	3.67	3.12	0.56	1	5.51	0	2.25
1965-70	P	15.56	71.66	8.38	4.24	5.76	15.08	0	0.82
	A	5.24	19.66	2.22	1.18	5.76	2.22	0	0.38
	t./Acre	2.97	3.64	3.77	3.59	1	6.79	0	2.16
1970-75	P	26.06	72.1	13.44	5.42	5.58	20.94	0	0.88
	A	9.24	20.9	3.66	1.24	5.58	2.72	0	0.49
	t./Acre	2.82	3.45	3.67	4.38	1	7.7	0	1.8
1975-80	P	41.42	81.7	23.32	6.76	5.83	22.1	8.98	1.04
	A	13.69	21.65	5.19	1.58	5.83	2.72	1.78	0.64
	t./Acre	3.03	3.77	4.49	4.28	1	8.13	5.04	1.63
1980-85	P	67.42	81.98	34.64	8.34	6.42	21.16	11.36	1.94
	A	19.18	22.44	7.02	1.93	6.42	2.97	2.27	1.14
	t./Acre	3.52	3.65	4.94	4.33	1	7.12	5	1.7
1985-90	P	103.5	85.58	51.28	12.12	7.32	23.24	15.16	3.64
	A	29.41	23.38	10.43	3.16	7.32	4.05	3.16	1.63
	t./Acre	3.52	3.66	4.92	3.83	1	5.73	4.79	2.23
1990-95	P	280.7	216.2	110.86	22.8	13	53.34	28.52	10.28
	A	59.7	56.49	18.63	5.29	13	7.27	5.44	3.26
	t./Acre	4.7	3.83	5.95	4.31	1	7.34	5.24	3.15
1995-00	P	437.76	370.94	155.88	30.06	21.85	79.08	36.66	15.96
	A	90.34	104.87	25.21	7.56	21.85	10.18	7.76	4.99
	t./Acre	4.85	3.54	6.18	3.98	1	7.77	4.72	3.2
2000-05	P	242.21	239.47	137.69	16.81	30.97	39.98	25.84	10.46
	A	162.41	108.22	42.65	14.92	30.97	16.49	9.44	4.89
	t./Acre	1.49	2.21	3.23	1.13	1	2.42	2.74	2.14
2005-10	P	262.3	226.53	190.88	21.59	35.48	35.95	30.92	7.13
	A	253.73	122.82	68.7	23.49	35.48	26.98	9.59	3.38
	t./Acre	1.03	1.84	2.78	0.92	1	1.33	3.23	2.11
2010-15	P	483.62	201.5	167.44	19.78	42.94	33.02	27.78	7.08
	A	241.1	123.44	64.48	20.02	37.41	23.92	9.44	3.51
	t./Acre	2.01	1.63	2.6	0.99	1.15	1.38	2.94	2.02
2015-20	P	520.28	190.83	140.18	16.99	65.89	27.94	24.95	7.20
	A	84.8552	52.6398	21.0322	5.6436	15.1128	6.5734	3.6314	1.6246
	t./Acre	6.13	3.63	6.66	3.01	4.36	4.25	6.87	4.43

1: Fruits vegetables and condiments statistics of Pakistan, 2008–15; 2: Statistical Year Book 2008; 3: Agriculture Marketing information Services, Directorate of Agriculture (Economics and Marketing) Punjab, Lahore. P: Production (000 tons.), Area: (000 acre.) and Yield: tons/acre.

development of the country. Due to institutional reforms the agriculture growth becomes 3.8 percent during the second development plan (1960-65) while it increases up to 6.3 % during third five-year plan (1965-70). During the ad-hoc plan period (1970-

78), the growth rate declined shapely to 1.7 percent due to a combination of factors particularly war with India on the Eastern part of the country (Presently Bangladesh), floods, drought conditions, Tarbela mishap of 1974-75, OPEC oil price hike and the

extremely disturbed political and social conditions of the country. Following are the main barriers of fruit production industry in Pakistan (Choudhry and Choudhry, 1997).

1. Majority (more than 80%) of the Pakistani fruit growers are small land holders. Mechanize fruit production is not economically suitable for such growers, ultimately it is difficult to bring innovations in the fruit production and export. Small landholding is also the main reason of intercropping and lowering the yield by miss scheduling of the irrigation and fertilizer. More than 80% of the fruit orchards are intercropped by different crops e.g. Berseem, Wheat, sorghum, sugarcane and cotton.
2. Soil and available water for Agriculture in Pakistan is unfit for Agronomic crops generally and for fruit crops specifically. Soil and water salinity and alkalinity holds many nutrients and salts available for plants roots. Moreover the less water is available for crops, resultantly force to install large number of tube well in the irrigated areas of Sindh and Punjab. The underground water is unfit in wide areas of Punjab due to lack of appropriate salt level for plant growth. Usually, it is recommended to mix the half quantity of water into the tube well water. The pathogenic contamination of water by urban and industrial waste is the matter of concern for plant and consumer health. Flooding for irrigation of the orchards is the most prominent method which is helpful in soil reclamation against salinity and alkalinity (Waqar *et al.*, 2013).
3. Diseases are significant factor for lowering the orchard yield. The main cause of the pathogen dissemination and spreading is infected nursery. Poor/uncertified nurseries are the root cause of the several orchards problems. Nurseries are unregulated and nurserymen are untrained and non-technical. The Nurseries are not concern with the provisions of the true to type material provision to the farmers which decline the original potential of the elite fruit varieties. Exotic plant material is never been evaluated against the diseases and hazardous for human health. Unavailability of quality seeds and vegetate plant material are also the key limiting factor for good yield and quality of major fruits.
4. Proper nutrition and pest management is the key to success for fruit crops. This area is very weak, mainly due to the lack of education and technical

support by extension department and allied research organizations (Aujla *et al.*, 2007).

5. Lack of availability of the cold chain at farm and physical infrastructure (roads) linking farms to markets is the major threat for lowering yield of orchards.

There are following steps which can improve the condition of fruit production industry.

1. Small farm size is limitation in the cultivation of tropical fruits in hot areas e.g. Mango, Guava and Date palm. This issue can be resolved by the Govt. initiatives and support. The state land was allotted to the small land holders of Sindh and Punjab through Land reform regulation of 1959, 1972 and 1977. Due to which the yield of Horticultural crops and agronomic crops were significantly improved. While the mechanized farming were also introduced in Pakistan (Anonymous, 2010).
2. The Govt. should support the farmers in establishing the Cold chain and freezing facilities at their farm level for introduce the export culture. Due to this initiative of the government postharvest losses can be reduced.
3. The morphogenetic characterization of the existing varieties may help to know the true potential of the varieties. Exotic varieties can be introduced to support the old and native fruit strains for research and breeding. Hybrid varieties and cross breeding programs can be carried out against the climate change and other edaphic problems for different regions. Biotechnological tools can also be used for improving the existing desirable varieties (Sajid and Jabbar, 2015).
4. Modern pest control techniques with an aid of Biological control can be introduced. Present fruit varieties should be tested against the diseases and physiological problems. Biotechnological and hybridization can be used for introducing the disease resistant gene. Rootstocks of guava local/Desi Round and local/Desi Oval shaped were identified by selection at morphological level against GWD in Pakistan (Monis, 2018).
5. Improved practices of application of optimum fertilizer and irrigation after soil and water analysis to improve the yield can be better strategy for better yield. Nursery certification should be followed by the both Govt. and private sector. Nursery sanitation protocols can also help in developing the healthy and long last orchards for long term farmer's economy. Soil sterilization



is an essential part of the process of producing healthy plants. The aim of the soil sterilization is to control soil-borne fungal diseases and in addition nematodes and weeds (Aujla *et al.*, 2007).

6. New mediums of extension services for improving the fruit orchards yield should be used. The awareness should be given about to use the government facilities for the betterment of the orchards by extension services and person to person contact in farming community. Extension services shall be introduced with special concern to the fruits production and problem oriented suggestions (Sajid and Jabbar, 2015).
7. Investments should be done in the research sector for addressing the current and future problems for fruit production industry. New Infrastructure should be build and new breeding and crop improvement programs should be started on different aspects of fruit production industry e.g. postharvest management, in vitro propagation and multiplication of the elite germplasm and screening against current edaphic and biological problems (Wilke *et al.*, 2007).

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## Novelty Statement

The current review is based data published in various sources for policy development for the govt. of Pakistan. However no comprehensive policy is made so far for the betterment of fruit production industry. Fruit production industry of Pakistan is based on natural zoning according to the climate with no specific production targets and national needs for local consumption and export. This review will present an eye-opening scenario for the directional development of the local fruit production industry.

## Author's Contribution

All authors share equal contribution in the research, data collection and writing.

## Conflict of interest

The authors have declared no conflict of interest.

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