

# Export Performance and Trade Direction of Fresh and Dried Grapes (Raisin): Evidence from Afghanistan

## ABSTRACT

Grapes is one of the most delicious refreshing and nourishing fruits. Afghanistan produces 9.84 lakhtonnes of Grapes during 2018 (FAO statistics). It is one of the important commodities in the export basket of Afghanistan. The major export markets for Afghan's fresh grapes are Pakistan and India. The major export markets for dried grapes (raisin) are India, Russia, Belarus, USA, Pakistan and UK. The present study aims to quantify the export performance and changing the structure of Grapes and raisin exports from Afghanistan. Secondary data on area, production and country-wise quantity exports of fresh and dried grapes were collected from FAO statistics, ITC and APEDA for a period of 13 years from 2006 to 2018. Compound Annual Growth Rate was computed for studying the trend in the area, production, yield, export quantity and export value for fresh and dried (raisin) grapes. Markov chain analysis was attempted to assess the direction of change in exports. Markov chain analysis results showed that Pakistan is the stable market for Afghan fresh Grapes and India and France are less stable markets. The major reasons are a geographical advantage for Pakistan which gave a competitive advantage over other countries concerning fresh grapes. India, Russia and Pakistan are stable markets for dried grapes and USA, UK, Germany and Belarus are less stable markets. India is the main country to import dried grapes (raisin) in the next five years. It shows a high value in terms of quantity and percentage which is more than 50 percent of all Afghanistan's dried grapes (raisin) export.

*Keywords: Grapes; compound annual growth rate; direction of trade; markov chain.*

**JEL classification:** F 34, F 35

## 1. INTRODUCTION

Afghanistan is a landlocked country that its economy depends on agricultural products. Its economy is largely agrarian and the agriculture sector makes important contributions to economic growth, employment creation, poverty reduction, food security, and the fiscal health of the nation. Agriculture serves as one of the pillars of the economy. The agriculture sector employs around 40 percent of the country's

working force and provides support to approximately 80 percent of its population. Generally, the agriculture sector in Afghanistan is characterized by small-scale farmers, 75 percent of the farmers own one Jereb (one-fifth of a hectare) or less. Afghanistan's climatic and geographical conditions have provided the best ways to produce horticultural products. Horticulture is a key contributor to jobs and economic growth in Afghanistan. Afghan farmers

produce apples, pomegranates, apricots, grapes, melons and watermelons.

Along with melons, the grapes and raisin has been the country's most important crop throughout the history. Grapes was grown in 87,517 hectares and produced 9.84 lakh tonnes which accounted for 36 per cent of the total fruit-growing area in Afghanistan and more than half of the production in 2018 [1]. (Statistical Year Book, Afghanistan). At Global level, Afghanistan is 18<sup>th</sup> producer, accounting for about 1.24 percent share of the global grapes production. Afghanistan exported 2.91 lakh tonnes of fresh fruits and 1.58 lakh tonnes of dried fruits in the year 2018 [2,3]. Afghanistan has the greatest potential and demand in domestic as well as in international markets for grapes (fresh and dried). Major grapes growing provinces are Kabul, Parwan, Kandahar, Herat, Ghazni and Takhar. Peak arrival season for Grapes is from July to October.

Raisins are the important high value crop and ranks number one in the export earnings of the country [4]. The central provinces including Kabul contributed 22 per cent of production and Parwan contributed 15 per cent of total production. The major varieties for raisin are Shondakhanai, Keshmeshi, Black Keshmeshi, Lal and Mehramaldi. Afghanistan produced two main types of raisins. Green raisin (Kishmish) are dried in shaded and ventilated houses while red raisins (AftabiKishmish) are type of sun dried on the ground and roofs. Raisin production tends to track grape production closely each year [5].

In the total exports of fruits from Afghanistan, 44 per cent is contributed by fresh Grapes and 17 per cent was dried grapes (raisin). The top export destinations of fresh and dried (raisin) grapes are India, Pakistan, Russia, US, UK, Germany and France [6,7]. The United States, European Union and other destinations with strict standards enforcement are complicated export destinations for Afghan raisins because of poor quality and lack of adherence to international food safety standards by processors. This is traded at deep discounts compared with those from neighboring countries because of shortfalls in technical expertise, quality and food safety standards. About 70 percent of exported raisins are traded with little or no processing, and at deep discounts relative to those from neighboring countries. Lack of good and standard processing, lack of machineries, lack of professional persons, lack of good strategy in exporting of grapes and raisin are the main reason for these problems. Hence

the present study is conducted with the general objective of analyzing the export performance of select horticulture crops from Afghanistan.

The specific objectives are:

- to study the trend in area, production and export of fresh and dried grapes(raisin) in Afghanistan
- to analyze the stability in export of fresh and dried grapes(raisin) from Afghanistan
- to study the direction of trade of fresh and dried grapes(raisin) in Afghanistan

## 2. REVIEW

Sivasankari and Rajesh [8] made a study on growth and direction of black pepper trade in India which revealed that the growth rate of area, production, productivity and unit value were found higher during pre-liberalization period than post-liberalization due to stiff competition from different black pepper producing countries. Markov chain analysis revealed that the major Indian black pepper export markets were categorized as stable market based on magnitude of transition properties.

Prakash and Hosamani [9] analyzed the changing direction of trade of Indian grapes. Bangladesh, UK and Netherlands were the most stable markets for Indian fresh grapes and Germany was the most unstable market tending to lose its entire share to other countries. The results showed Bangladesh, UK, Netherlands, Saudi Arabia, UAE and other countries were important markets for fresh grapes.

Joshi et al. [10] studied the stability of Indian spices export, using Markov chain. Indian spices exports have been able to record strident gains in both quantity and value. It was observed that the countries which were stable destination for Indian spices export were UK country for chilli, Canada for black pepper, Bangladesh for turmeric, UAE for cumin and Malaysia for coriander as the transition probabilities matrix.

Kusuma and Shreeshail [11] in their study on production and export performance of Onion using Markov chain analysis estimated the direction in trade and concluded that Bangladesh was the most stable market of Indian onion followed the Singapore and Malaysia were the medium stable markets.

Bala and Sudhakar [12] viewed on Export Performance of Agricultural Products in India. The study had analyzed the trend in exports of agricultural commodities from India during the past decade and examined the prospects of boosting it. The results of the study showed that there was an increasing trend in the export of agricultural commodities, but this was because of shifting in the composition of commodity.

Patil [13] studied the Export Performance of Mango in India. Positive and significant growth of area, production and productivity of mango was observed. Highest variation was observed in case of production i.e. 15.88 per cent. Highest growth rates in case of area and production were found in Odisha state, where as highest variation in case of area and production was observed in Maharashtra. Highest growth i.e. 23.79 per cent of mango exported from India to Kuwait was observed. It was also observed that the most stable importer of Indian mango was Bangladesh country followed by UAE, Bahrain and other countries respectively.

Mansour Rasoly [14] studied the Export Performance of Dried Fruits from Afghanistan during 2010-2017. The results of the study showed that dried fruit contributed the large share of export and incomes by exporting to many countries. India for almonds and Russia for dried apricots are natural regional markets. The export share of dried fruits composed 27% of the total export in 2012-13 and it increased to 31.5% in 2015-16.

### 3. DATA AND METHODOLOGY

The study is based on the secondary data on area, production, productivity and exports of fresh and dried grapes(raisin)from Afghanistan obtained from FAOSTAT for a period of 18 years, from 2001 to 2018 for area, production and productivity. Export data is for a period of 13 years from 2006 to 2018 (APEDA) and Statistical Year books of Afghanistan.

#### 3.1 Compound Annual Growth Rate

The compound annual growth rate was used to study the trend in area, production, productivity and exports of fresh and dried grapes(raisin)from Afghanistan. Growth rate of above parameters are estimated by using the exponential growth function of the form:

$$Y_t = a b^t U^t \quad (1)$$

Where,

$Y_t$  = Dependent variable for which growth rate was estimated  
 $a$  = Intercept  
 $b$  = Regression coefficient  
 $t$  = Year which takes values 1, 2... n.  
 $U_t$  = Disturbance term in year 't'.

The equation (1) will be transformed in to log-linear and written as:

$$\log Y_t = \log a + t \log b + \log U_t \quad (2)$$

Equation (2) will be estimated by using Ordinary Least Square (OLS) technique.

The compound growth rate ( $g$ ) will be then estimated by the identity given in equation (3)

$$g = (b-1) \times 100 \quad (3)$$

Where,

$g$  = Estimated compound growth rate per annum in percentage.

$b$  = Antilog of  $\log b$

#### 3.2 Markov Chain Analysis

Annual export data for the period from 2006 to 2018 were used to analyze the direction of trade and changing pattern of Afghanistan's fresh and dried grapes(raisin)export. The major importing countries considered were India, Russia, Pakistan, USA, UK, Germany and Belarus. Markov chain analysis was employed to analyze the structural change and direction of change in the export of fresh and dried grapes(raisin). In the present study, the dynamic nature of trade patterns, that is, the gains and losses in export of Afghan fresh and dried grapes(raisin)in major importing countries was examined using the Markov chain model. Markov chain analysis involves developing a transitional probability matrix 'P', whose elements,  $P_{ij}$  indicate the probability of exports switching from country 'i' to country 'j' over time. The diagonal element  $P_{ij}$  where  $i=j$ , measures the probability of a country retaining its market share or in other words, the loyalty of an importing country to a particular country's exports. In the context of current application, structural change was treated as a random process with three importing countries for fresh grapes and seven countries for dried grapes(raisin). The assumption was that the average export of dried grapes (raisin) from Afghanistan amongst importing countries in any period depends only on the export in the

previous period and this dependence was same among all the periods. This was algebraically expressed as:

$$E_{jt} = \sum_{i=1}^r E_{it-1} P_{ij} + e_{jt}$$

Where,

$E_{jt}$  = Exports from Afghanistan during the year t to  $j^{\text{th}}$  country,

$E_{it-1}$  = Exports to  $i^{\text{th}}$  country during the year t-1,

$P_{ij}$  = The probability that exports will shift from  $i^{\text{th}}$  country to  $j^{\text{th}}$  country,

$e_{jt}$  = The error term which is statistically independent of  $e_{ij-1}$  and,

r = Number of importing countries

The transitional probability matrix, which can be arranged in a (c × r) matrix, has some properties. The diagonal elements of matrix P indicate the probability that the export share of a particular country will remain the same from one period to another. The off-diagonal or transfer probabilities indicate the probability that the export share of a particular country will shift to another country over time. Thus, the export share of a country during the period 't' will be obtained by multiplying the actual exports in the previous period (t-1) with transitional probability matrix. The transitional probability matrix has been estimated in the linear programming (LP) framework by a method referred to as minimization of mean absolute deviation (MAD) which is stated as:

$$\text{Min } OP^* + Ie$$

Subject to:

$$XP^* + V = Y$$

$$GP^* = 1$$

$$P \geq 0$$

Where:

$P^*$  is a vector in which probability P are arranged,

0 is a vector of zeros,

I is an appropriately dimensioned vector of area,

e is the vector of absolute errors (|UI|),

Y is the vector of export to each country,

X is a block diagonal matrix of lagged values of Y and

V is a vector of errors,

G is a grouping matrix to add the row-elements of P arranged in  $P^*$  to unity.

Markov chain analysis is employed to find the structural change in any system through time in terms of single outcome variable by using transitional probability matrix which can predict the changes for future year also. The dynamics in the direction of exports and the pattern in the trade of fresh and dried grapes from Afghanistan by shift in export shares from one country to another country over a period of time were analyzed by employing the first order Markov chain model. The trend in sustaining the existing markets and the gains and losses in export share of fresh and dried (raisin) grapes from Afghanistan by the major importing countries were obtained from the transitional probability matrix.

The actual promotion of exports to different countries had been considered in computing the transitional probability matrix for the period under study. The matrix explained the switching behavior of fresh and dried (raisin) grapes among the major importing countries over a period of time indicating the change in direction. The row elements in the transitional probability matrix provided the information on the probability retention in the volume of trade and extent of loss in trade on account of competing countries. The column elements indicated transitional probability of the gains in the volume of trade form other competing countries. The diagonal elements indicated the probability retention of Afghanistan's exports to a particular country as of previous year.

## 4. RESULTS AND DISCUSSION

### 4.1 Results of Trend Analysis

Compound Annual Growth Rate was used to study the trend in area, production, productivity and Export of fresh grapes from Afghanistan. The results are presented in Table 1.

**Table 1. Compound annual growth rate in area, production, yield and export of fresh Grapes in Afghanistan (2001 to 2018)**

S. No.	Variable	Growth rate (in %)
1	Area	3.58***
2	Production	6.88***
3	Yield	3.17***
4	Fresh Grapes Export	20.76***

(\*\*\* 1% level of significance)

The results showed that increasing trend in area, production and productivity of grapes 3.58, 6.88 and 3.17 per cent per annum respectively. Area, production and productivity of Grapes showed significant increase from 2001 to 2018. The trend in export showed that from 2006 to 2018 the export quantity increased to 20.76 per cent for fresh grapes.

## 4.2 Results of Markov Chain Model – Fresh Grapes

### 4.2.1 Direction of trade

The major importing countries taken for the analysis of trade in fresh grapes exports during the 2006-18 were Pakistan, India and France along with the remaining importing countries grouped under others.

From the Table 3. It could be inferred that in the study period (2006-18) of export, Pakistan remained as the most stable market among the major importers of Afghanistan's fresh grapes as reflected by the higher probability of retention as 0.9993 i.e., the probability that Pakistan retains its export share over the study period was 99.93 per cent. The remaining 0.07 per cent, 0.06 per cent was diverted to India and 0.01 per cent to Others countries put together. At the same time Pakistan gained 79.17 per cent market share of India, 100 percent share of France and 60.6 per cent share of Others. Afghanistan could retain only 0.05 per cent of its previous export to India. India lost 79.17 per cent of its previous market share to Pakistan, 16.72 per cent of its share to France and 4.06 per cent of its share to 'Others' countries put together. It gained 21.46 per cent

market share of Others and 0.06 per cent share of Pakistan.

Afghanistan could not retain its previous export share of fresh grapes to France, France lost all its market share to Pakistan and gained 16.72 per cent market share of India and 0.01 per cent share of Pakistan. Afghanistan's previous fresh grapes export to Others could be retained to the tune of 17.94 per cent. Out of the remaining 82.06 per cent, 60.60 per cent was lost to Pakistan and 21.46 per cent to India. However, Others gained 4.06 per cent market share of India. Stringent quality requirements by other countries are also one of the reasons for less stability in exports. (USAID-CHAMP, 2016).Pakistan is the stable importer of Afghan fresh Grapes. Direction of trade remains towards Pakistan for fresh grapes and no change in direction is observed with regard to export of Grapes.

### 4.2.2 Projections for fresh grapes

With the help of transitional probability matrix, market share proportion of Afghanistan's fresh grapes to major importers overseas were computed from 2019 up to 2023 for 5 years.

Pakistan remained as a single and largest importer of fresh Grapes from Afghanistan as shown in Table 3. Pakistan imports Afghan grapes both for home consumption and for resale to other overseas markets. Pakistan also re-exports imported fruits from Afghanistan to other international markets. Over the years it remained as a single largest importer for fresh grapes [15].

**Table 2. Transitional probability matrix for Afghanistan's export of fresh grapes**

	<b>Pakistan</b>	<b>India</b>	<b>France</b>	<b>Others</b>
<b>Pakistan</b>	<b>0.9993</b>	0.0006	0.0001	0.0000
<b>India</b>	0.7917	<b>0.0005</b>	0.1672	0.0406
<b>France</b>	1.0000	0.0000	<b>0.0000</b>	0.0000
<b>Others</b>	0.6060	0.2146	0.0000	<b>0.1794</b>

**Table 3. Projections of fresh grapes**

<b>Year/ Country</b>	<b>Pakistan</b>	<b>India</b>	<b>France</b>	<b>Others</b>	<b>World total</b>
2019	135334 (99.48)	508 (0.37)	23 (0.02)	170 (0.13)	136035 (100)
2020	146869	572	22	186	147649

	(99.47)	(0.39)	(0.02)	(0.13)	(100)
2021	158403	637	22	202	159264
	(99.46)	(0.40)	(0.01)	(0.13)	(100)
2022	169938	701	21	218	170878
	(99.45)	(0.41)	(0.01)	(0.13)	(100)
2023	181473	766	20	234	182493
	(99.44)	(0.42)	(0.01)	(0.13)	(100)

(Figures in parenthesis indicate percent share)

#### 4.2.3 Trend analysis dried grapes (raisin)

Compound Annual Growth Rate was used to study the trend in export of raisin from Afghanistan. The results are presented in Table 4.

The trend in export showed that from 2006 to 2018 the export quantity increased to 4.48 per cent for dried grapes which is positive and significant.

#### 4.2.4 Direction of Trade – Dried Grapes (Raisin)

The major importing countries taken for the analysis of trade in dried grapes (raisin) export during 2006 to 2018 period were India, Pakistan, Russia, USA, UK, Germany and Belarus along with the remaining importing countries grouped under 'Others'.

From the Table 5 it is clearly evident Russia remained as the most and first stable market among the major importers of Afghanistan's dried grapes (raisin) as reflected by the higher probability of retention at 0.8602 i.e., the

probability that Russia retains its export share over the study period was 86.02 percent. At the same time Russia gained 66.78 percent market share of Belarus.

In Afghanistan's export of dried grapes (raisin) during 2006-18, India remained as the second stable market among the major importers of Afghanistan's dried grapes (raisin) as reflected by the higher probability of retention at 0.6127 i.e., the probability that India retains its export share over the study period was 61.27 per cent. The remaining of 38.73 per cent, 38.37 was diverted to 'Others'. At the same time India gained 5.58 per cent market share of Pakistan, 8.36 per cent share of Russia and 87.01 per cent share of 'Others' countries put together. Pakistan was the third stable major importers of Afghanistan's dried grapes (raisin) as reflected in probability of retention at 0.6093 i.e., the probability that Pakistan retained its import share from the study period was about 60.93 per cent. Out of the remaining 39.07 per cent, 26.13 per cent of its market share lost to USA. It gained only 0.61 per cent market share of Others.

**Table 4. Compound annual growth rate in export of dried (Raisin) Grapes in Afghanistan (2006 to 2018)**

S. No.	Variable	Growth rate (in %)
1	Dried grapes Export	4.48***

(\*\*\* 1% level of significance)

**Table 5. Transitional probability matrix for Afghan's export of dried grapes (raisin)**

	India	Pakistan	Russia	USA	UK	Germany	Belarus	Others
India	<b>0.6127</b>	0.0000	0.0000	0.0000	0.0000	0.0036	0.0000	0.3837
Pakistan	0.0558	<b>0.6093</b>	0.0000	0.2613	0.0081	0.0654	0.0000	0.0000
Russia	0.0836	0.0000	<b>0.8602</b>	0.0003	0.0008	0.0053	0.0499	0.0000
USA	0.0000	0.0000	0.0000	<b>0.0000</b>	0.0000	0.0000	0.0000	1.0000
UK	0.0000	0.0000	0.0000	0.0538	<b>0.5754</b>	0.0000	0.0000	0.3708
Germany	0.0000	0.0000	0.0000	0.0000	0.0000	<b>0.0620</b>	0.0000	0.9380
Belarus	0.0000	0.0000	0.6678	0.0000	0.0000	0.0000	<b>0.3322</b>	0.0000
Others	0.8701	0.0061	0.0000	0.0000	0.0000	0.0000	0.0000	<b>0.1239</b>

**Table 6. Projections of dried grapes (raisin)**

Year/ Country	India	Pakistan	Russia	USA	UK	Germany	Others	World Total
2019	18824	1156	2771	2568	464	332	11120	37235
	(50.55)	(3.1)	(7.44)	(6.9)	(1.25)	(0.89)	(29.87)	(100)

2020	19998 (51.71)	1265 (3.27)	1786 (4.62)	2831 (7.32)	475 (1.23)	347 (0.9)	11974 (30.95)	38676 (100)
2021	21173 (52.78)	1374 (3.42)	800 (1.99)	3094 (7.71)	485 (1.21)	363 (0.9)	12828 (31.98)	40117 (100)
2022	22347 (53.54)	1482 (3.55)	0	3357 (8.04)	495 (1.19)	378 (0.91)	13682 (32.77)	41741 (100)
2023	23522 (53.26)	1591 (3.6)	0	3620 (8.2)	505 (1.14)	393 (0.89)	14536 (32.91)	44167 (100)

*(Figures in parenthesis indicate percent share)*

Afghanistan could not retain its previous export share of dried grapes (raisin) to USA. USA lost its entire market share to 'Others' countries put together. USA gained 26.13 per cent market share of Pakistan, 5.38 per cent share of UK and 0.03 per cent share of Russia. Export of dried grapes (raisin) to UK was retained to the tune of 57.54 per cent. Out of the remaining 42.46 per cent, 37.08 per cent of its previous share lost to Others and 5.38 per cent to USA. UK gained 0.81 per cent market share of Pakistan and 0.08 per cent share of Russia.

Afghanistan could retain only 6.20 per cent of its previous export to Germany. It lost 93.80 per cent of its previous share to 'Others' countries put together. Afghanistan's dried grapes (raisin) export to Belarus was 33.22 per cent. The remaining 66.78 per cent diverted to Russia. It gained 4.99 per cent market share of Russia also. Others could gain 12.39 per cent of its share and the remaining 87.01 per cent of its share lost to India and 0.61 per cent to Pakistan.

#### 4.2.5 Projections for dried Grapes (Raisin)

With the help of transitional probability matrix, market share proportion of Afghanistan's dried grapes to major importers overseas were computed from 2019 up to 2023 for 5 years.

Table 6 shows the estimated shares of dried grapes (raisin) to some selected countries, India is the main country to import dried grapes (raisin) in the next five years. It shows high value in terms of quantity and percentage which is more than 50 per cent of all Afghanistan's dried grapes (raisin) export. USA is the second destination for dried grapes (raisin) export, which shows the value of 6.91 per cent to 8.53 per cent. Pakistan is third destination which shows a consistency value of 3.5 per cent in the next five years.

## 5. CONCLUSION

The growth rate of area, production and yield of fresh grapes has shown positive and high value of 3.58, 6.88 and 3.17 and per cent respectively

during 2001-2018. Export quantity of fresh and dried (raisin) grapes increased by 20.76 and 4.48 per cent per annum respectively from 2006-2018. The growth rates for export quantity and export value worked out to be in increasing trend. Pakistan remains as the most stable country in import of fresh grapes. There was no change in direction of trade is observed for fresh grapes. In case of raisin exports, Russia remained as the most and stable market among the major importers of Afghanistan's dried grapes There observed change in direction of trade for raisin in afghan. Focus on policies and strategies that could lead Afghanistan's export to new heights of growth. At present, neighboring countries such as Pakistan, India are the most stable market for Afghan's fresh and dried fruits. Afghanistan can concentrate on other major markets by the way of scientific production of dried grapes and apricot, since Pakistan pays very less for Afghan Grapes. Focus on policies and strategies that could lead Afghanistan's export to new heights of growth. Farmers and exporters could use the opportunities provided by Government and other International agencies to spread the fragrance of Afghan fruits all over the world. Further research can focus on studying the performance of fresh and dried grapes exporters of Afghan using primary data to have an in depth research.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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