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RESEARCH PAPER

A study on the trade direction of fresh and dried figs : Export from Afghanistan

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Abstract : Figs is one of the most important and delicious fruits. Afghanistan produces 24319 tonnes of figs during 2019 (FAO statistics). It is one of the important commodities in export basket of Afghanistan. The major export markets for figs are India, Pakistan USA, Canada and U Arab Emts.The present study aims to quantify the export performance and changing structure of figs exports from Afghanistan. Secondary data on area, production and country wise quantity exports of figs was collected from FAO statistics, and APEDA for a period of 10 years from 2010 to 2019. Compound annual growth rate was computed for studying the trend in area, production, yield, export quantity and export value for figs. Markov chain analysis was attempted to assess the direction of change in exports. Markov chain analysis results showed that, India is the stable market for Afghan figs and U Arab Emts are less stable markets. The major reasons are geographical advantage and good relations for India which gave competitive advantage over other countries with reference to fresh and dried figs export. India is the main country to import figs in the next five years. It shows high value in terms of quantity and percentage which is more than 90 per cent of all Afghanistan's figs export.

Key Words : Figs, Compound annual growth rate, Direction of trade, Markov chain

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INTRODUCTION

Afghanistan is an agricultural country, of the total area 3 per cent is forest and arable area is 12 per cent and land under permanent pastures is 46 per cent. Remaining is mountain and constructions is 39 per cent (Afghanistan Statistical Yearbook, 2018-19). Economy of Afghanistan is still 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 (excluding the opium poppy economy) accounts for about a quarter of national GDP (The world bank, 2014). Afghanistan's climate diversity enables the production of a wide range of high-quality crops, the country's geography impedes the trade of such crops. Approximately 10 per cent of Afghanistan's total land area is devoted to the cultivation of horticultural crops, of which fruits and vegetables dominate (Akbari *et al.,* 2017). Horticulture is a key contributor to jobs and economic growth in Afghanistan. Afghan farmers produce apples, pomegranates, apricots, grapes, figs, melons and watermelons. Agriculture accounts for approximately half of Afghanistan's gross domestic product and the

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country has comparative and competitive strengths in horticultural and livestock production. Orchard fruits (fresh and dried) are key exports (The world bank, 2011).

Along with melons, grapes and raisin, fig has been the country's most important crop throughout the history. Fig is grown in 3529 hectares and produced 24319 tonnes which accounted for a remarkable per cent of the total fruit-growing areaand production in Afghanistan. (FAOSTA). Afghanistan exported 12679 tonnes of fresh and dried figs in the year 2019(APEDA). Afghanistan has the greatest potential and demand in domestic as well as in international markets for figs. Major figs growing provinces are Nangarhar, Laghman, Balkh, Herat and Kandahar.

Afghan dried fruit and nuts have a mixed reputation. In India, with potentially the largest demand for Afghan produce, Afghan (dried) fruit and nuts are popular. Indian consumers pay premiums for Afghan dried fruit and nuts. India has population of over 1.3 billion people and represent a rapidly growing market for high value products like figs. Export of fig was 12679 tonnes in 2019 which accounted for a remarkable per cent of total fruits exports. The top export destinations of fresh and dried figs are India, Pakistan, USA, Canada and U Arab Emts.The United States, European Union and other destinations with strict standards enforcement are complicated export destinations for Afghan figs because of poor quality and lack of adherence to international food safety standards by processors. However, the implementation of international Codex standards for figsand other fruits has increased the ability to market to such places (GAIN report, 2014). Under this scenario the present study was conducted to analyze the export performance of fresh and driedfigs from Afghanistan.

The specific objectives are :

– To study the trend in area, production and export of figs in Afghanistan

– To study the direction of trade of figs in Afghanistan.

MATERIAL AND METHODS

The study is based on the secondary data on area, production, productivity and exports of fresh and dried figs from Afghanistan, obtained from FAOSTAT for a period of 10 years, from 2010 to 2019 for area, production and productivity. Export data is for a period of 10 years from 2010 to 2019 (APEDA) and Statistical Year books of Afghanistan.

Compound annual growth rate :

The compound annual growth rate was used to study the trend in area, production, productivity, export quantity and value of fresh and dried figs from Afghanistan. Growth rate of above parameters are estimated by using the exponential growth function of the form:

$$Yt = a\, b^t U^t \quad \text{.....(1)}$$

where,

Yt = Dependent variable for which growth rate was estimated

a = Intercept

b = Regression co-efficient

t = Year which takes values 1, 2… n.

U_t = Disturbance term in year 't'.

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

$$\log Y_t = \log a + t \log b + \log U_t \quad \text{.....(2)}$$

Eq. (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 eq. (3)

$$g = (b-1) \times 100 \quad \text{.....(3)}$$

where,

g = Estimated compound growth rate per annum in percentage.

b = Antilog of log b.

Markov chain analysis :

Annual export data for the period from 2010 to 2019 were used to analyze the direction of trade and changing pattern of Afghanistan's figs export. The major importing countries considered were India, Pakistan, USA, Canada and U Arab Emts. Markov chain analysis was employed to analyze the structural change and direction of change in the export of figs. In the present study, the dynamic nature of trade patterns, that is, the gains and losses in export of Afghan fresh and dried figs in major importing countries was examined using the Markov chain model. Markov chain analysis involves developing a transitional probability matrix 'P', whose elements, Pij indicate the probability of exports switching from country 'i' to country 'j' over time. The diagonal element Pij 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 five importing countries for freshand dried figs.The assumption was that the average export of figs 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^{th} country,

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

P_{ij} = The probability that exports will shift from i'^{th} country to j'^{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:

Min OP* + Ie

Subject to:

XP* + V = Y

GP* = 1

P ≥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 (IUI),

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.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Trend analysis of figs area, production and yield in Afghanistan :

To study the trend in area, production and productivity of figs from Afghanistan, compound annual growth rate was used. The results are presented in Table 1.

Table 1 : Compound annual growth rate in area, production and yield of figs in Afghanistan (2010 to 2019)

Sr. No.	Variable	Growth rate (in %)
1.	Area	0.64
2.	Production	6.15***
3.	Yield	6.84***

*** indicate significance of value at P=0.01

The results showed that increasing trend in area, production and productivity of figs 0.64, 6.15 and 6.84 per cent per annum, respectively. The results of Compound annual growth rate showed that production and productivity of figs had significant increase from 2010 to 2019.

Trend analysis of figs export from Afghanistan (2010-19):

Compound annual growth rate was used to study the trend in export of fresh and dried figs from Afghanistan. The results are presented in Table 2.

Table 2 : Compound annual growth rate in export of fresh and dried figs in Afghanistan (2010 to 2019)

Sr. No.	Variable	Growth rate (in %)
1.	Figs qty export	15.63***
2.	Figs value export	17.89***

*** indicate significance of value at P=0.01

The trend in export showed that from 2010 to 2019 the export quantity and value increased to 15.63 and 17.89 per cent for figs, respectively. However, export quantity and value of figs were statistically and positively significant.

Direction of trade of figs export from Afghanistan:

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 figs 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 figs 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 behaviour of figs 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.

Transitional probability change for figs:

The major importing countries taken for the analysis of trade in figs exports during the 2010-19 were India, Pakistan, USA, Canada and U Arab Emtsalong with the remaining importing countries grouped under Others.

From the Table 3. It could be inferred that in the study period (2010-19) of export, India remained as the most stable market among the major importers of Afghanistan's figs as reflected by the higher probability of retention as 0.9843 *i.e.,* the probability that India retains its export share over the study period was 98.43 per cent. The remaining 1.57 per cent, 0.23 per cent was diverted to Pakistan, 0.11 per cent to USA, 0.12 per cent to Canada, 1.06 per cent to U Arab Emts and 0.06 per cent to Others countries put together. At the same time India gained 100 per cent share of Pakistan. U Arab Emts remained the second stable market for export of figs from Afghanistan, as reflected by the probability of retention as 0.6539 *i.e.*, the probability that U Arab Emts retains its export share over the study period was 65.39 per cent. the remaining 34.61 per cent, 29.97 per cent diverted to Pakistan, 1.03 per cent to Canada and 3.62 per cent to Others countries put together.

Afghanistan could not retain its previous export share of figs to Pakistan, USA and Canada, Pakistan lost all its market share to India and gained 0.23 per cent market share of India, 88.13 per cent market share of USA, 74.59 per cent market share of Canada and 29.97 per cent share of U Arab Emts. USA lost 88.13 per cent market share to Pakistan and 11.87 per cent to Canada and gained 0.11 per cent market share of India, 16.58 per cent market share of Canada and 19.18 per cent market share of Others. Canada lost 74.59 per cent market share to Pakistan, 16.58 per cent to USA and 8.83 per cent to others and gained 0.12 per cent market share of India, 11.87 per cent share of USA, 1.03 per cent share of U Arab Emts and 5.81 per cent market share of others. Afghanistan could not retain its previous figs export share to others.The others lost 19.18 per cent market share to USA, 5.81 per cent to Canada and 75.02 per cent to U Arab Emts. However, others gained 0.06 per cent market share of India, 8.83 per cent share of Canada and 3.62 per cent market share of U Arab Emts. Stringent quality requirements by other countries are also one of the reasons for less stability in exports (USAID-CHAMP, 2016).

Projections for figs:

With the help of transitional probability matrix, market share proportion of Afghanistan's figs to major importers overseas were computed form 2020 upto 2024 for 5 years. India remained as a single and largest

Table 3 : Transitional probability matrix for Afghanistan's export of figs

	India	Pakistan	USA	Canada	U Arab Emts	Others
India	0.9843	0.0023	0.0011	0.0012	0.0106	0.0006
Pakistan	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
USA	0.0000	0.8813	0.0000	0.1187	0.0000	0.0000
Canada	0.0000	0.7459	0.1658	0.0000	0.0000	0.0883
U Arab Emts	0.0000	0.2997	0.0000	0.0103	0.6539	0.0362
Others	0.0000	0.0000	0.1918	0.0581	0.7502	0.0000

importer of figs from Afghanistan as shown in Fig.1. India imports Afghan figs both for home consumption and for resale to other overseas markets. India also re-exports imported fruits from Afghanistan to other international markets. Over the years it remained as a single largest importer for figs.

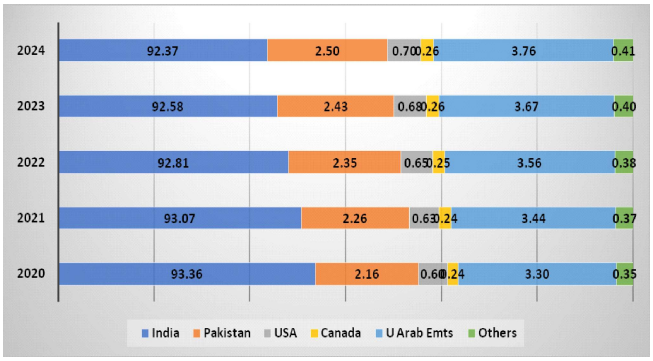

Fig. 1 : Projection of figs export from Afghanistan (2020-24)

Conclusion :

Figs area, production and productivity in Afghanistan showed increasing trend over years. Export of figs is also in increasing trend from 2010 -19. India remained as the most stable market among the major importers of Afghanistan's figs by retaining 98.43 per cent of export share from 2010-19. U Arab Emts remained as the second stable market among the major importers of Afghanistan's figs with 65.39 per cent probability of retention. Various international agencies and the Government of Afghanistan are making efforts to encourage export of figs to non traditional countries through various schemes and policies (World bank report). Increasing the quality of figs through proper post harvest methods will helps to explore new markets and retain the share in the existing markets. There is a possibility to find new export market/buyers in Germany, USA and Canada for figs. India is the main country to import figs in the next five years. It shows high value in terms of quantity and percentage which is more than 90 per cent of all Afghanistan's figs export. It is need to explore more information and facilitate to link local figs exporters with buyers in Germany, USA and Canadamarket (ILO report, 2015).

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