

Research Paper

Structural Changes in Basmati Rice Exports from India: A Markov Chain Analysis

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ABSTRACT

Basmati rice is considered a “strategic” agricultural export commodity from India and has consequently remained subject to a wide range of government interventions. Basmati rice is exported from India to many countries, especially to the Gulf and European countries. A steady increase in basmati rice production, availability of buffer stocks, and growing demand for basmati rice in the international market made India a vital rice exporting country of the world. The present study explored the structural changes in basmati rice exports from India from 1991 to 2020. The stability in the importing partners of basmati rice from India was analyzed using first-order Markov chain analysis. The compound annual growth rate for the export quantity of basmati rice varied from 5.74 to 12.65 percent per annum. In contrast, the export value of basmati rice ranged between 4.40 to 21.06 percent per annum during the three selected decades. Further, the basmati rice export value showed higher instability than export quantity. Saudi Arabia, Iran, and the United Arab Emirates served to be the stable importers. In contrast, the United States and the United Kingdom served as the most unstable markets for Indian basmati rice according to the transitional probability matrix. Therefore, to reduce variability in exports of basmati rice, India should maintain long-term stable trading partners further to increase the export earnings.

Highlights

- ① Increase in production and distinguishing fragrant quality features of basmati rice made India a promising country in the world export market.
- ② Annual compound growth rate varied from 5 to 12 percent in terms of export quantity of basmati rice during the last three decades.
- ③ Saudi Arabia, Iran, and the United Arab Emirates served to be the stable importing countries. In contrast, the United States and the United Kingdom served as the most unstable markets for Indian basmati rice export.

Keywords: Basmati rice, structural changes, trading partners, export and Markov chain analysis

India is the second-largest global agricultural producer country globally and ranked eighth in total agricultural exports with a value of 39 billion .S.U.S. dollars during the year 2019. Recently to realize the vision of doubling farmer’s income, the Indian Chamber of Food and Agriculture established Indian Agricultural Export Council further to increase the agricultural exports up to 60 billion .S.U.S. dollars by 2024-25 (Indian Chamber of Food and Agriculture, 2019). Rice varieties, Basmati, and non-basmati rice served to be an essential

contributor to the total agricultural export earnings of the country.

India is the world’s largest rice producer country, next only to China (Najeeburahman, 2017). High yielding varieties, efficient technologies, and various other factors followed under the green revolution

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in the country resulted in a significant increase in rice production. This helped the country socially and economically in two ways; first, by reducing the starvation in the country and secondly, made the country self-sufficient by reducing dependency on imports from other countries (Pingali, 2012). In addition, the country gained the highest rank among rice exporting nations due to trade liberalization measures adopted by the government (Satishkumar *et al.*, 2016).

Basmati rice is an essential aromatic rice varieties, contributing a considerable share in export earnings of agricultural commodities (Adhikari and Sekhon, 2014). Extra-long slender grains, distinct flavor, and superior aromatic quality make India's basmati rice unique and highly competitive in the global market (Sadavatti, 2006). Global trade environment for basmati rice always remained dynamic and highly influenced by the macro and micro policies. The export of Basmati is also influenced by the buffer stock held by the government. There was a strong demand for Indian rice in the international markets. High demand for basmati rice in the international market leads to an increase in the export of basmati rice from ₹ 154.04 million .S.U.S. \$ in 1990-91 to ₹ 4330.69 million .S.U.S. \$ in 2019-20. The increase in export implies that basmati rice exports from India had a reasonable prospect of consolidating its position globally (Singh, 2001). India's strength for the production of Basmati, high consumer demand coupled with liberal export policies, and large public stock created ample scope for basmati rice export (Chandrashekhar, 2013). The significant share of Indian basmati rice export has been highly concentrated in few countries. Iran, Saudi Arabia, Iraq, United Arab Emirates, and Kuwait are the countries that hold a promising position among Indian basmati rice importers in the global market (Singh, 2001; Sadavatti, 2006; Mukhtar, 2008; Adhikari and Sekhon, 2014 and Shailza *et al.* 2015). Due to .S.U.S. economic sanctions on Iran in 2019, India stopped importing crude oil from Iran, which impacted trading relations with Iran. Therefore, Iran might restrict importing basmati rice from India in few upcoming years until a political resolution is in place. For developing countries like India, it is necessary to assess basmati rice export in terms of stability, identify the major export markets and estimate their future share in total basmati rice

exports from the country (Adhikari *et al.*, 2016). Therefore, in the present study, an attempt has been made to assess the structure of basmati rice export over time, along with the study of the direction of its trade in the international market.

MATERIALS AND METHODS

The study was based on secondary data collected from various publications and websites of APEDA, Ministry of Agriculture, Government of India, Director General of Commercial Intelligence and Statistics, Kolkata, and Ministry of Statistics and Programme Implementation, New Delhi. The time-series data was obtained for the post-liberalization era for 30 years from 1990-91 to 2019-20.

The annual compound growth rates of basmati rice export, in quantity as well as in value terms, were worked out by using the exponential growth function of the form (Patil and Yeledhalli, 2016):

$$Y = ab^t e^{U_t}$$

where, Y = Export quantities of basmati rice, a = intercept, b = regression coefficient, t = time variable and U_t = error term

The instability in basmati rice export was calculated by using the Coefficient of variation method (Bagal *et al.* 2020 and Kaur and Kapoor, 2018).

$$C.V. = \frac{SD^*}{AM^*} \times 100$$

Where, C.V. = coefficient of variation, S.D.* = standard deviation, and AM* = arithmetic mean

Markov Chain Analysis

The export performance was analyzed based on time-series data from 2011 to 2020 available at APEDA website. The first-order Markov chain analysis was used to study the trade directions of basmati rice export. A similar study was conducted by Mahadevaiah *et al.* (2005), Tejaswi *et al.* (2006), Satishkumar *et al.* (2016) and Yogesh and Srivastava (2020). The average export to a particular country was assumed as a random variable following the first-order Markov process.

$$E_{jt} = (i=1 \text{ to } r) \sum E_{it-1} P_{ij} + e_{jt}$$

Where,

E_{jt} = Export of basmati rice from India during the year t to j^{th} country; $E_{i,t-1}$ = Exports of basmati rice from India to i^{th} country during the period $t-1$; P_{ij} = Probability that exports shift from i^{th} country to j^{th} country; e_{jt} = The error term which is statistically independent of $E_{i,t-1}$ and r = Number of importing countries

The transitional probability P_{ij} was then arranged in $(c \times r)$ matrix, having the following properties:

$$0 \leq P_{ij} \leq 1$$

$$\sum P_{ij} = 1, \text{ for all } i$$

The diagonal elements of the matrix measure the probability of the export share of a country being retained. Therefore, the examination of diagonal

elements of .P.T.P. matrix indicates loyalty towards a particular country's export of an importing country. The expected export share of a country during the period ' t ' was obtained by multiplying the actual exports in the previous period ($t-1$) by the transitional probability matrix.

RESULTS AND DISCUSSION

Exports have played an increasingly important role in transforming the economy and served as a source of absolute gains for the trading partners involved (Ospina and Beltekian, 2018). Exports also proved fruitful to serve as the backbone of our modern commercial world because producers of various commodities in different nations always tried to profit from an expanded market, rather than limiting their sales within their boundaries (Devarajaiah and Nataraju, 2010). Buoyancy in the export of basmati rice is visible in Table 1.

Table 1: Export of Basmati Rice from India (1990-2020) (Value in million .S.U.S. \$)

Year	Basmati Rice Export from India	Total Agri Exports from India	Total Exports from India	Percentage share of Basmati rice in Total Agri Export	Percentage share of Basmati rice in Total Export
1991	154.04	3356	18146	4.59	0.85
1992	177.79	3207	17849	5.54	1.00
1993	228.34	3133	18552	7.29	1.23
1994	338.35	4031	22230	8.39	1.52
1995	275.61	4220	26339	6.53	1.05
1996	254.31	6082	31795	4.18	0.80
1997	351.44	6863	33470	5.12	1.05
1998	453.45	6626	35006	6.84	1.30
1999	446.14	6035	33219	7.39	1.34
2000	410.87	5608	36822	7.33	1.12
2001	474.16	5973	44560	7.94	1.06
2002	391.87	5901	43827	6.64	0.89
2003	425.53	6710	52719	6.34	0.81
2004	442.8	7533	63843	5.88	0.69
2005	629.35	8475	83536	7.43	0.75
2006	687.39	10214	103091	6.73	0.67
2007	619.52	12683	126414	4.88	0.49
2008	1073.75	18432	163132	5.83	0.66
2009	2060.67	17534	185295	11.75	1.11
2010	2294.24	17735	178751	12.94	1.28
2011	2491.14	24696	251136	10.09	0.99
2012	3146.15	37420.8	217664	8.41	1.45
2013	3564.04	42356.5	300400.7	8.41	1.19
2014	4866.3	43357.92	314415.7	11.22	1.55
2015	4518.12	39290.56	310352	11.50	1.46
2016	3477.98	34503.42	262003.7	10.08	1.33
2017	3216.59	33696.8	275800	9.55	1.17
2018	4169.48	38897.2	303521	10.72	1.37
2019	4722.52	39203.5	330072	12.05	1.43
2020	4330.69	35600.5	314310	12.16	1.38

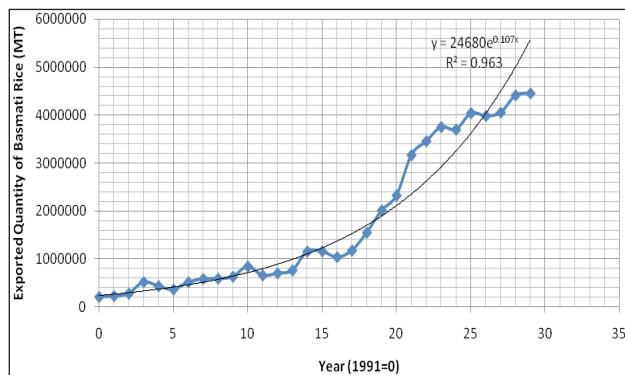
Source: APEDA.com& DICGC, Bhumali and Chakraborty, 2018.

Basmati rice has been occupying an essential place in the agricultural export basket of India. The performance of basmati rice export was entirely satisfactory during post .T.O.W.T.O. period (Bhualmi and Chakraborty, 2018). In total exports from India, basmati rice exports varied between 0.49 percent in 2007 to 1.55 percent in 2014 during the study period. The percentage share of basmati rice in total agricultural exports remained in single digit from 1991 to 2008. After that, it reached upto 12.94 percent in 2010 of the total agricultural exports. Thus, it is a promoting export commodity for India with the potential to increase further.

Over the last three decades, the exports of Indian basmati rice captured positive growth. 1991-2020 export quantity fluctuated between 2 lakh metric tons to about 44 lakh metric ton 1991-2020 export quantity of basmati rice fluctuated between 2 lakh metric tons to about 44 lakh metric tons. The export earnings from basmati rice were varying between 154 million .S.U.S. dollars in 1991 to ₹ 4330 million .S.U.S. dollars in 2020. Thus, Indian basmati rice had made its unique position worldwide and fetched reasonable export prices in the international market (Ramakrishna and Degaonkar, 2016). Although basmati rice exports from India showed positive growth over the years, 'S.A. strong intense competition from Pakistan's Basmati, U.S.A. U.S.A still exists. Texamati and Thailand's Siamati in the world market (Davor and Singh, 2013).

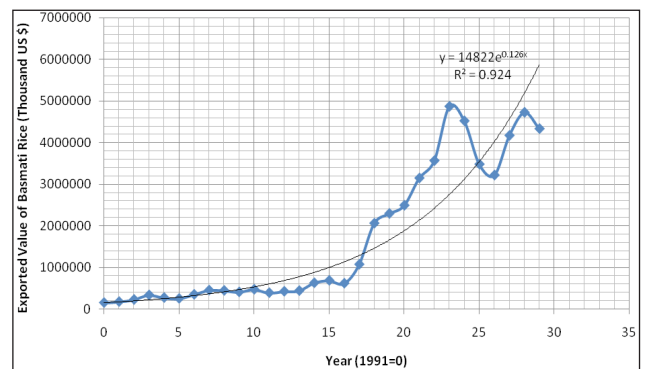
Growth Trend of Basmati Rice

Exponential trend was selected as the best fit for both export quantity as well as export value of basmati rice from India (Fig. 1 and 2).



Note: ** significant at 5 percent level of significance.

Fig. 1: Exponential trend in export quantity of basmati rice (1991-2020)



Note: ** significant at 5 percent level of significance.

Fig. 2: Exponential trend in export value of basmati rice (1991-2020)

Exports of basmati rice from India (in quantity and value terms) show exponential growth during the study period. Growth was more prominent between 2007 to 2016. However, the foreign exchange earnings from the export of basmati rice show a sudden downfall between 2014 to 2017, after which it has recovered to the previous level. This was the result of a fall in international prices of Indian basmati rice. The export prices showed a positive correlation with the domestic prices, resulting from which farmers decreased the area under basmati rice cultivation during the upcoming years (Anonymous, 2019). This changed scenario led to an increase in prices during the financial year 2017-18, which helped recover the Indian basmati rice status in the international market.

Compound Annual Growth Rate (CAGR) for Export of Basmati Rice

The compound annual growth rate of basmati rice export in quantity and value terms was analyzed for the last three decades (Table 2). During Decade I, i.e. 1990-91 to 1999-2000, basmati rice recorded a positive and significant growth rate of 12.65 percent per annum in quantity terms and 12.02 percent per annum in value terms. The higher quality demand, comfortable production level of basmati and trade liberalization measures led further increase in the export of basmati rice from the country (Adhikari et al. 2016). During Decade II, the exported quantity of basmati rice experienced significant growth at 10.96 percent per annum due to increased competition whereas the export value reported 21.06 percent per annum significant growth rate due to better prices fetched by Indian Basmati rice in the international

Table 2: Compound Annual Growth Rate (CAGR) for Export of Basmati rice from India (percent per annum)

Commodity	CAGR (Quantity of exports)	CAGR (Value of exports)
Decade- I (1991-2000)	12.65**	12.02**
Decade- II (2001-2010)	10.96**	21.06**
Decade- III (2011-2020)	5.74**	4.40

**significant at 5 percent level of significance.

Table 3: Instability in export of Basmati Rice from India (values in percent)

Commodity	Instability in quantity of exports	Instability in value of exports
Decade- I (1991-2000)	35.36	34.88
Decade- II (2001-2010)	37.58	76.76
Decade- III (2011-2020)	16.95	20.37

market. Consistent policies for the export of basmati rice and a hike in domestic production helped in making comfortable stock of basmati rice in the central pool for further export promotion (Gangwar and Rai, 1995 and Shende *et al.* 1998).

During Decade III, although it remained the principal exporting commodity and reported an increase in export in absolute terms the CAGR observed of exported basmati rice reduced both in quantity as well in value terms. The fall in CAGR during the third Decade was the result of a higher cost of production as well as marketing and high rate of various taxes imposed on rice exporters such as Purchase Tax on indirect exports, Market fees, Rural Development fund, Administrative charges, etc. which made Indian Basmati rice costlier than its competing nations like Pakistan, Thailand, Vietnam, etc. (Ramakrishna and Degaonkar, 2016).

Apart from above India also faced a downfall in exports to its most traditional market i.e., Iran. Recently, Iran declared itself as self-sufficient in basmati rice production. Secondly, there existed positive signs for an increase in Pakistan basmati rice demand by Iran (Report on Basmati Rice, APEDA, 2020).

Instability in Export of Basmati Rice

In order to study the variation in the export trade of basmati rice of India, an attempt was made to analyze the instability in the export of basmati rice over the period 1990-91 to 2019-20 by splitting it into three decades. The instability during Decade II was observed to be highest (more than 30 percent) for quantity as well as the value of basmati rice export, followed by decade I and decade III, respectively

(Table 3). The variability in quantum exported, varying demand, etc., might be the reasons for higher instability during decade II and I. Similarly, variability in quantum exported, devaluation of the Indian rupee, change in export policies, and volatile world prices in the global market might be the reasons for the variable export earnings from basmati rice (Adhikari *et al.* 2016 and Satishkumar *et al.* 2016). In the last decade (2011-2020), the exports of basmati rice have stabilized in exports and export earnings compared to previous decades. Therefore, it can be concluded that basmati rice was highly-priced sensitive because of which instability in terms of exported value (20.37 to 76.76 percent) was more as compared to exported quantity (16.95 to 37.58 percent).

Major destinations of Indian Basmati Rice Export

Basmati rice is a traditionally exported agricultural commodity from India. Indian Basmati rice is known for its fragrant aroma, high quality, and nutrient-rich properties (Paramasivan and Pasupathi, 2017). The major importers of Indian basmati rice were Iran, Saudi Arabia, Kuwait, Iran, United Kingdom, United States of America, United Arab Emirates, and Yemen (Table 4). More than 50 percent of the Indian basmati rice was exported to these countries only since 2011 (Adhikari *et al.* 2016 and Satishkumar *et al.* 2016).

During 2020, Iran accounted for 29.61 percent share in total basmati rice import from India, followed by Saudi Arabia (21.87 percent), U.A.E. (4.68 percent), Yemen (4.56 percent), Kuwait (4.42 percent), U.S.A. (3.33 percent), U.K. (2.60 percent)

Table 4: Destination of Indian Basmati Rice Export (Values in M.T.)

Year	Countries								Total
	Saudi Arabia	Iran	Kuwait	United Kingdom	U.S.A.	U.A.E.	Yemen	Other	
2011	623666 (26.76)	452542 (19.42)	170068 (7.30)	77431 (3.32)	44809 (1.92)	625582 (26.85)	69934 (3.00)	266218 (11.43)	2330250 (100.00)
2012	721245.48 (22.76)	614645 (19.39)	199869 (6.31)	141667 (4.47)	86252 (2.72)	726901 (22.93)	92112 (2.91)	586754.5 (18.51)	3169446 (100.00)
2013	681193 (19.69)	1082219 (31.28)	163317 (4.72)	192435 (5.56)	91544 (2.65)	234640 (6.78)	172350 (4.98)	842131 (24.34)	3459829 (100.00)
2014	826119 (22.01)	1440454 (38.37)	175537 (4.68)	118852 (3.17)	103391 (2.75)	147903 (3.94)	146840 (3.91)	795006 (21.17)	3754102 (100.00)
2015	966931 (26.12)	935568 (25.27)	166469 (4.50)	136396 (3.68)	89223 (2.41)	278601 (7.53)	174370 (4.71)	954726 (25.78)	3702284 (100.00)
2016	948845 (23.47)	695311 (17.20)	180730 (4.47)	187703 (4.64)	120688 (2.99)	612152 (15.14)	142162 (3.52)	1155339 (28.57)	4042930 (100.00)
2017	809342.72 (20.31)	719478 (18.05)	162675.5 (4.08)	150537.2 (3.78)	108990.9 (2.73)	614657 (15.42)	130652.8 (3.28)	1288861 (32.34)	3985196 (100.00)
2018	792480.09 (19.53)	877420 (21.63)	166873.9 (4.11)	180507.9 (4.45)	126791.2 (3.13)	429325.7 (10.58)	167687.6 (4.13)	1315672 (32.43)	4056759 (100.00)
2019	867740.85 (19.66)	1483697 (33.61)	154748.2 (3.51)	111924.7 (2.54)	135607.7 (3.07)	282377.7 (6.40)	201927.3 (4.57)	1176561 (26.65)	4414584 (100.00)
2020	974125.09 (21.87)	1319156 (29.61)	197104 (4.42)	115712.6 (2.60)	148391.3 (3.33)	208519.4 (4.68)	203330.4 (4.56)	1288318 (28.92)	4454657 (100.00)

Figures in parenthesis denotes percentage share in the total exported quantity.

and other countries (28.90 percent). Iran has served as the primary buyer of Pusa 1121, a new notified variety of basmati rice, since 2008 due to its low-cost vis-à-vis of other basmati varieties (Sidhu *et al.* 2014). Along with Iran, Saudi Arabia also served as a significant export destination because rice is not produced in Saudi Arabia. Therefore, in order to meet the consumer demand country imported a substantial quantity of basmati from India. Also, the country did not impose any tariff on the imported quantity provided the product was not for further export (Adhikari *et al.* 2016). The long-term trading relations, high demand in the countries, and world export prices led to the consistent destinations of basmati rice export (Rangi and Sidhu, 2001; Bilal and Rizvi, 2013; Shailza *et al.* 2015 and Shailza *et al.* 2018). Similar results were observed in the analytical studies of Adhikari and Sekhon, 2014; Sidhu *et al.* 2014), and Satishkumar *et al.* 2016).

Trade Directions of Indian Basmati Rice Export

Trade directions of Indian basmati rice export were analyzed with the help of Markov chain analysis by using time series data from 2000-01 to 2019-20. Singh (2010), Bisht (2015), Satishkumar (2016),

Bagalkoti (2019), and Yogesh and Srivastava (2020) had also employed Markov chain analysis to study the directions of trade for different agricultural commodities. Three transitional probability matrices (TP-I, II and III) were constructed for the year 2000-06, 2007-13, and 2014-20 and presented under Table 5, 6, and 7, respectively. The six major importer countries of Indian basmati rice were presented under TP-I, II, III, and the rest under other categories.

The elements presented in rows of transitional probability (T.P.) matrix provided information regarding probability of retention in a volume of trade and the extent of loss in trade on account of competitive nations. On the other hand, elements of the column represented the probability of gains in trade from other competing nations (Kusuma and Basavaraja, 2014).

On examination of Transitional probability matrix I (Table 5), it was observed that during the period 2000-2006, the highest retention capacity was 78.68 percent which signified that Yemen retained 78.68 percent of its previous year exports in the current year. Saudi Arabia served as the largest importer, but Yemen served as the most stable importer of

Table 5: Transitional probability matrix (TP I) of Indian Basmati Rice Export, 2000-2006

Year	Saudi Arabia	Kuwait	United Kingdom	U.S.A.	U.A.E.	Yemen	Other Countries
Saudi Arabia	0.56810	0.09456	0.04467	0.00000	0.05876	0.00000	0.23391
Kuwait	0.00000	0.00000	0.35438	0.34224	0.00000	0.00000	0.30339
United Kingdom	0.86014	0.13986	0.00000	0.00000	0.00000	0.00000	0.00000
U.S.A.	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000
U.A.E.	0.90418	0.00000	0.00000	0.00000	0.09582	0.00000	0.00000
Yemen	0.00000	0.00000	0.00000	0.00000	0.01426	0.78681	0.19893
Other Countries	0.71913	0.08666	0.00000	0.02307	0.09601	0.07513	0.00000

Table 6: Transitional probability matrix (TP II) of Indian Basmati Rice Export, 2007-2013

Country	Saudi Arabia	Kuwait	United Kingdom	U.S.A.	U.A.E.	Iran	Others
Saudi Arabia	0.7397	0	0	0	0.2602	0	0
Kuwait	0.0969	0.8194	0	0.0836	0	0	0
United Kingdom	0.6415	0	0	0	0.2834	0.0750	0
U.S.A.	0	0	0	0	0	1	0
U.A.E.	0	0.0122	0	0.0182	0.5914	0.3781	0
Iran	0	0	0.0512	0.0023	0	0.3370	0.6092
Others	0.0087	0	0.2131	0.0774	0	0.0362	0.6644

Table 7: Transitional probability matrix (TP III) of Indian Basmati Rice Export, 2014-2020

Country	Saudi Arabia	Kuwait	United Kingdom	U.S.A.	U.A.E.	Iran	Others
Saudi Arabia	0.3798	0.0703	0.1511	0.0355	0.1559	0	0.2071
Kuwait	1	0	0	0	0	0	0
United Kingdom	0	0	0	0	1	0	0
U.S.A.	0	0	0	0	0	0	1
U.A.E.	0.0627	0.0131	0.0894	0	0.2356	0	0.5989
Iran	0.3247	0.0463	0	0	0	0.3769	0.2519
Others	0.0121	0.0446	0	0.0676	0	0.4307	0.4449

Indian basmati during the year 2000-2006. Saudi Arabia has a retention probability of 0.5681, which implies that it retained a 57 percent share of its previous year's exports in the current year. On the other hand, Saudi Arabia gained 86 percent of its share from the United Kingdom and 90 percent of its share from the United Arab Emirates. U.A.E. was observed to have 0.095 probability of retention. In contrast, the countries like Kuwait, United Kingdom, U.S.A. had zero probability of retention served to be the most unstable during the period 2000-06. The results are in line with the findings of Satishkumar *et al.* (2016).

Transitional probability matrix II (Table 6) for the period 2007-13 shows that Kuwait was having the highest probability (0.81) of retention, gaining 1.22 percent from U.A.E. and losing 8.36 percent and 9.60 percent of its share to U.S.A. and Saudi Arabia, respectively. Saudi Arabia was next in order retaining 73.97 percent of its previous year's

exports in the current year gained mainly from Kuwait (9.69 percent) and United Kingdom (64.15 percent). Further, it lost 26.02 percent of its previous year's export to U.A.E. U.A.E. (59.14 percent) and Iran (33.70 percent) are also reported to be the stable importers of basmati rice from India. On the other hand, the United Kingdom and U.S.A. were observed to be the most unstable partners during 2007-13. The results are in corroboration with Adhikari and Sekhon (2014).

On perusal of Transitional probability matrix III (Table 7) for export of basmati rice from India during 2014-20, it was concluded that Iran (38 percent), Saudi Arabia (38 percent), and U.A.E. (24 percent) served as stable trading partners while Kuwait, U.K., and the U.S.A. were reported to be highly unstable importers of basmati rice.

Iran gained 43 percent of its share from countries pooled under other importer category and lost 32 percent of its previous year share to Saudi

Table 8: Projected Exported Quantities of basmati rice from India

Year	Saudi Arabia	Kuwait	United Kingdom	U.S.A.	U.A.E.	Iran	Other Countries
2021	836574.3	164050.9	566063.2	222559.1	409578.7	398823.8	1856275
2022	1013990.0	139420.2	415991.9	165761.9	620323.8	621476.3	1476272
2023	1043260.0	121808.9	346413.2	138638.3	748591.7	694384.3	1359439

Arabia, whereas Saudi Arabia gained from U.A.E. (6.27 percent) and Iran (32.47 percent) and lost its previous year share to Kuwait (7.03 percent), U.K. (15.11 percent), U.S.A. (3.55 percent), U.A.E. (15.59 percent) and other importer countries (20.71 percent). Under TP-III also, U.K., U.S.A. along Kuwait reported being highly unstable importers of basmati rice from India.

On the basis of the transitional probability matrix obtained for the period 2014-20, the projected export quantities of basmati rice were worked out and presented in Table 8.

The projections showed that Saudi Arabia would likely to remain as leading importer of basmati rice from India. The other importers' countries like Kuwait, U.K., U.S.A., U.A.E. and Iran would also maintain an important position among top importers of Indian basmati rice. Hence, these countries would serve a significant position in the total export earnings of India from Basmati rice. Similar results have been obtained in the study of Adhikari et al. (2016).

CONCLUSION

Basmati rice contributes substantially to the national income of our country. Export of basmati rice served to be the primary source of agricultural export earnings. The present study revealed that Indian basmati had a fabulous performance during the study period. It registered favorable growth rates in terms of export quantity as well as value. The compound annual growth rate for the export quantity of basmati rice varied from 5.74 to 12.65 percent per annum. In contrast, the export value of basmati rice ranged between 4.40 to 21.06 percent annum for the three selected decades. This showed that basmati rice is a prospective export commodity from India, increasing its share in total agricultural exports from India. To reduce the instability and to improve the basmati rice export from India, it is imperative to reduce year-on-year variations in exports. Indian basmati rice faced competition from

countries like Pakistan, Thailand, and Vietnam. Saudi Arabia, Iran, and United Arab Emirates served to be the stable importers, whereas the United States and the United Kingdom served as the most unstable markets for Indian basmati. Therefore, India should maintain long-term stable trading partners to reduce the instability and increase export earnings. Further, appropriate export promotion strategies must be envisaged to reduce risk and encourage export.

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