Export Potentiality of Major Fruits of India- An Economic Analysis

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Abstract
The study pertains to export of banana and mango as a whole from India. However, for estimation of export competitiveness, Tamil Nadu and Uttar Pradesh states were chosen as these are the leading states in the Country for the production of these crops. In the present study, an attempt was made to analyse the trend and growth pattern in the export of banana and mango from India using compound growth function and direction of International trade using Markov Chain analysis method. During the post-NHM period, the export competitiveness of banana and mango enhanced considerably. Hence, to take advantage of this, newer markets especially USA, Japan, Poland, CIS and other countries, where mango is in good demand need to be explored for augmenting the exports. In order to achieve this goal it is essential that consumer preferences in newer markets, market intelligence and impediments for augmenting exports need to be researched. Further, it is essential to make available to exporters the new markets’ requirement of SPS restrictions. Export of fruits from the Country is highly competitive in the International markets. To take advantage of this and encourage export growers, strengthening of a federation of ‘fruits growers and exporters’ could facilitate better promotion of production, processing, marketing and export of quality fruits besides outsourcing the required technologies.

Key Words: Competitiveness, Potentiality, Export, Fruits

JEL Classification: F02, M16, P4, Q17
1. Introduction

India is the second largest producer of fruits in the World after China with a production of 81.2 million tonnes of fruits from an area of about 6.9 million hectares, with a per capita consumption of 85 grams per day. A large variety of fruits are grown in India, of which banana, citrus, guava, grape, pineapple and apple are the major ones. Apart from these fruits, papaya, sapota, annona, phalsa, jackfruit, ber and pomegranate are grown in the temperate region under sizeable area. The major fruit growing states are Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh, Uttar Pradesh and Gujarat. Among all the horticultural crops, fruit were second to best only after vegetable crops in the Country (NHB, 2012-2013).

Trade in fruits has become steadily more important over the last decade. The composition, volume, and direction of this trade have changed as incomes and insistence on quality have grown on the demand side, while technology and trade agreements have influenced the supply side. Lower prices together with availability of produce year-round, in tandem (alongside) with increasing incomes; have enhanced the array of fruits in the global consumer’s basket of goods. Other factors, such as concern for a healthy diet and improved handling and transportation, have furthered the globalization of fruit trade. Globalization of markets is likely to continue as the basic factors of supply are combined with innovations in the technology and lower trade barriers, enabling suppliers to meet the preferences of a more affluent clientele. Developed countries will continue to dominate global trade in fruits, but xnew varieties will find their way into the diets of the relatively affluent everywhere.

The leading states in the production of banana in the Country are Tamil Nadu, Gujarat, Maharashtra, Andhra Pradesh, and Karnataka, while the importers of Indian bananas are the UAE, Saudi Arabia, Oman, Bahrain and Nepal.

India is leading the World in the production of banana with 77.5 million hectares of land and a corresponding 26.5 million of production. Other major banana producing countries are China, Philippines, Ecuador and Brazil. India produces a whopping total of 25.6 per cent of the entire World production of banana (NHB, 2012-2013).

The leading states in the production of mango in India are Uttar Pradesh, Andhra Pradesh, Karnataka, Bihar, and Gujarat. Indian mango is mainly patronized in UAE, UK, Saudi Arabia, Qatar, and Kuwait. Truly speaking Indian fruits are highly patronized mostly in West Asia Nations Association (WANA) countries. The major mango and guava, producing countries in the World are India (44.1%), China (9.1 %), Kenya (5.8 %) and Nigeria with a distant (1.8 %) (NHB, 2012-2013).

1.1 Importance of the Study

It has been argued that India with its integration into the global markets through WTO could benefit substantially from International trade in agricultural and horticultural
 commodities. In order to take advantage of these opportunities, it is essential to analyse current export performance of fresh fruits and vegetables, International markets are targeted and export competitiveness of Indian fresh fruits and vegetables. However, there are some evidences available in respect of export trends in agricultural and horticultural commodities. But not much information is available with respect to export competitiveness of major Indian fresh fruits, direction and magnitude of change in exports and constraints faced by various players in the area of export of fresh banana and mango.

2. Literature Review

2.1 Growth Rate in Export

Veena (1992) estimated the growth in export of Indian coffee for the pre-liberalization period (1965-1990) using exponential function of the form $Y=ab^t$. The results indicated that export of plantation type coffee exhibited a compound growth of 3.6 per cent annun while Arabica grew at a growth rate of 3.0 per cent. However, Robusta exports registered a marked increase of 10.7 per cent.

Jalajakshi (1994) analysed the growth of exports of shrimps from India for the pre-liberalization period (1966-91). Exponential model, $Y=ab^t$ was used to work out the growth rates. Frozen shrimp recorded a positive growth rate due to high demand in the importing countries. Negative growth was observed for dried and canned shrimps which was attributed to the declining demand in the importing countries and increased cost of production in India.

Negi et al. (1994) observed that Country’s horticultural exports increased at a compound growth rate of 14.8 per cent per annum during pre-liberalization period between 1976-77 and 1990-91. The growth rate in export of potatoes was found to be positive (30.8%) while that of dry onion was negative (-3.9%) in value terms. However, it was 23.1 per cent and 9.7 per cent, respectively in terms of quantity.

Mamatha (1995) evaluated the growth rates in production and export of selected spices (pepper, chillies turmeric and ginger) for the pre-liberalization period from 1970-71 to 1991-92 and reported that positive growth rates in both production and export of the selected spices were observed mainly due to the increased domestic production as well as increased demand for produce.

Gupta (1998) reported that India’s share in World export has increased over a decade from 1970 to 1994 on rice (0.6 to 6.6%), feeding stuffs for animals (1.6 to 3.1%) and cereals (0.1 to 0.9 %). Similarly, the share of fruits and vegetables increased from 1.2 per cent in 1974 to 1.7 per cent in 1994. Further, it was observed that former USSR, UAE, United Kingdom, USA, Italy, Singapore, Indonesia, Republic of Korea, Belgium, Saudi Arabia, Holland and Nepal were the important destinations for Indian agricultural products. Thus, if
India thinks of augmenting export earnings, it can safely give greater emphasis of agricultural exports and development of new markets should be the primary goal.

2.2 Study the Changes in Size, Composition and Direction of Exports

Shivaraya (2000) studied the changes in trade directions of exports of selected vegetables using Markov chain analysis. The results of the study revealed that UAE and Malaysia were the loyal markets for the Indian onion. In case of potato, Sri Lanka and Nepal were found to be the most loyal markets whereas; Bangladesh and Nepal were the most stable importers of Indian fresh tomatoes.

Mahesh (2000) analysed the structural changes in Indian tea exports by employing the first order Markov model. The transitional probability matrix indicated that the countries like United Kingdom, USSR, Iran, UAE, Saudi Arabia and other importing countries retained their previous shares of Indian tea while rest of the countries like Germany, Poland and USA could not retain their previous shares of Indian tea.

Angles et al. (2001) used Markov chain model for assessing the direction of trade and destination of Indian turmeric. The results of Markov Chain analysis showed that previous export share retention for Indian turmeric was high in UK (42.99%) and countries pooled under others category (58.77%). The countries such as USA, Iran, Japan and UAE were not stable importers of Indian turmeric. The plans for export may be oriented towards those two and also plans should be formulated for stabilizing the export to other countries.

Desai (2001) used Markov Chain model to analyse the trade direction of export of Indian fresh mango and mango products. Japan was one of the most stable countries, among major importers of Indian fresh mango as reflected by its high probability of retention (1.00). In the case of mango pulp, other countries had the highest probability of retention (42.90%) followed by Saudi Arabia (24.00%) while, Netherlands, UK, Kuwait and UAE were unable to retain their share as reflected by their probability of retention of zero. The transitional probability estimated for mango slices in brine showed that UK was the most stable Country among major importers of Indian mango slices in brine which was reflected by its high probability of retention (0.782).

Jayesh (2001) used Markov chain analysis to study the direction of trade and changing pattern of pepper and cardamom exports from India. The results of Markov chain analysis indicated that exports of Indian pepper were likely to be concentrated in USA and Russia. Similarly, cardamom export was likely to be concentrated in Japan and Saudi Arabia. A high dependence on one or two export markets would increase the trade risk in the long run. Hence, it was suggested to evolve appropriate export promotion strategies to diversify the geographical concentration. Especially in case of cardamom exports, steps should be taken to enhance Indian exports to other countries of Middle East along with Saudi Arabia, since this region was the major consumer of cardamom in the World.
3. Methodology

3.1 Research Questions

As indicated in introduction, we have two major research questions. One of them is to analyse the trend and growth pattern in the export of banana and mango from India. Second is to study the changes in size, composition and direction of exports of banana and mango fruits from India. We will examine the growth rates of banana and mango which were arrived by using the compound growth function of the form (Bhowmick and Ahmed, 1993) in order to answer the first question. The dynamic nature of trade pattern was analyzed by employing the first order Markov process by examining gains and losses in respect of export shares of Indian banana and mango to different countries. In the present study only the major importing countries of banana and mango from India were considered.

3.2 Modeling Volatility

In this paper, we use the compound growth function to analyse the trend and growth pattern in the export of banana and mango from India and secondly Markov Chain Analysis is employed to study the changes in size, composition and direction of exports of banana and mango fruits from India. The model used for the analysis is as follows:

3.2.1 Growth Rate Analysis

The growth rates of banana and mango were arrived by using the compound growth function of the form (Bhowmick and Ahmed, 1993).

\[ Y = ab^t e_t \]  \hspace{1cm} (3.1)

Where \( Y \) = Dependent variable for which growth rate is to be estimated
(Quantity exported/ total export earnings/ unit prices)
\( a \)= Intercept
\( b \)= Regression coefficient
\( t \)= Time variable
\( e_t \)= error term

The equation (3.1) was estimated after transforming it to logarithmic form as follows:

\[ \log Y = \log a + t \log b + \log e_t \]  \hspace{1cm} (3.2)

The percent compound growth rate \( (g) \) was computed using the relationship

\[ g = \text{antilog of (b-1) X 100} \]  \hspace{1cm} (3.3)

3.2.2 Markov Chain Analysis

The dynamic nature of trade pattern was analyzed by employing the first order Markov process by examining gains and losses in respect of export shares of Indian banana and mango to different countries. In the present study only the major importing countries of banana and mango from India were considered.

The average prospective export to a particular Country was considered to be a random variable, which depends on its past exports to that Country which can be denoted algebraically as,
\[ E_{jt} = \sum_{i=1}^{r} E_{ji(t-1)} P_{it} + e_{jt} \]

- \( E_{jt} \) = Exports from India to \( j^{th} \) Country during the year ‘t’
- \( E_{ji(t-1)} \) = Exports to \( i^{th} \) Country during the period (t-1).
- \( P_{it} \) = Probability that exports will shift from \( i^{th} \) Country to \( j^{th} \) Country
- \( e_{jt} \) = The error term which is statistically independent of \( E_{ji(t-1)} \), and
- \( t \) = Period considered for the analysis in units of years
- \( r \) = Number of importing countries.

The transitional probability \( P_{ij} \), which can be arranged in a \([c \times r]\) matrix has the following properties:

\[
\begin{align*}
O & \leq P_{ij} \leq 1 \\
\sum_{i=1}^{r} P_{ij} & = 1 \text{ for all ‘i’}
\end{align*}
\]

The diagonal elements of the 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 transitional probabilities, on the other hand, indicate the probability that the share of exports in a particular Country will shift to another Country over time. Thus the export share of a Country during the period ‘q’ can be obtained by multiplying the actual exports in the previous period (t-1) by the transitional probability matrix.

The transitional probability matrix is estimated in a linear programming (LP) frame by a method referred to as Minimization of mean Absolute Deviation (MAD). The LP formulation is stated as:

\[ \text{Min } OP + e \]

Subject to

\[
\begin{align*}
XP^* + V &= Y \\
GP^* &= 1 \\
P^* &\geq O
\end{align*}
\]

Where

- \( P^* \) = Vector in which probabilities \( P_{ij} \) are arranged
- \( O \) = Vector of Zero’s
- \( I \) = appropriately dimensional vector of quantity exported
- \( e \) = Vector of absolute error (IUI),
- \( Y \) = Vector of export to each Country
- \( X \) = Block diagonal matrix of logged values of \( Y \) and
- \( V \) = Vector of errors
- \( G \) = Grouping matrix to add the row elements of \( P \), arranged in \( P^* \) to unity
Using the estimated transitional probabilities the export of mangoes and mango processed products to various destinations were predicted, multiplying the same with the respective market shares of the base year.

The export shares of banana and mango from India to different countries were predicted for the years 2017, 2019, 2021 and 2023 by using 2 step, 4 step and 8 step transitional probabilities for predicting export shares 4 years, 6 years and 8 years from the base year.

3.3 Data

The present study is based solely on secondary data. The secondary data pertaining to export quantity and value for selected fruits were collected from FAO and APEDA annual reports, Indian Economic Survey Reports and Karnataka State Agricultural Marketing Board. Data pertaining to the macro economic variables like quantity exported (tonnes), Value of export (000US $), Country Wise exports (Qty) and Exchange rate were collected. The data for export quantity of fresh banana and mango was collected from the Agricultural Processed Foods and Export Development Authority (APEDA) and the Directorate General for Commerce Intelligence and Statistics (DGCIS), National Horticultural Board (NHB) and Karnataka State Agricultural Produce Processing and Export Corporation Limited KAPPEC, Bangalore.

4. Results and Discussion

4.1 Growth in Export of Banana and Mango

To comprehend the trends in quantity of exports and value of exporting banana and mango, growth rates (CGR) were computed for the two periods as discussed previously. The exponential growth functions were employed to find out the growth rates of the exports for the two periods. The results of estimated growth rates are presented in Tables 4.1, 4.2 and 4.3 for the pre-NHM period, post-NHM period and the overall period, separately. The results are presented separately for banana and mango.

The contribution of agriculture and allied sectors to the national export earnings is declining in percentage terms but in terms of quantity, it is showing an increasing trend over the years (Table 4.1). Over a period of 14 years (1998-99 to 2012-13), agricultural national export had registered a compound growth rate of 5.9 per cent per annum whereas the total national exports has recorded 10.09 per cent growth rate. The share of fruits in the agricultural exports was only about 4.5 per cent. At present India has remained a marginal player in World agriculture and horticultural trade having a share of less than one per cent of the World trade in agriculture.

4.1.1 Export Growth Rates for Banana

India exported banana mainly to U.A.E., Nepal, Saudi Arabia, Bahrain and Kuwait. However, the two major countries that import most of India’s banana are UAE and Saudi
Arabia. Export of banana, which was 1086 tonnes during the year 1992-93, increased to 54004 tons by 2012-13 (Table 4.2).

The compound growth rates for export quantity and export value of banana for the period 1992-1993 were 26.64 and 23.46 per cent per annum respectively. However, only export value was statistically significant.

The respective values for the second period (2006-2013) were lower than those of first period at 17.87 for export quantity and 16.61 per cent for export value. Both export quantity and export values were statistically significant.

The growth rates for overall period (1993-2013) showed that the growth rate of export quantity and export values were 26.59 and 29.81 per cent respectively and these growth rates were statistically significant. The growth rate per unit value realized for the overall period (1993-2013) was 2.64 per cent, but, it was statistically non-significant (Table 4.2).

### 4.1.2 Export Growth Rates for Mango

Mangoes are mainly exported to UAE, Saudi Arabia and Bangladesh and in recent years to UK and USA. Export of mango, which was 23,405 tonnes during the year 1992-93, increased to 5,55,850 tonnes by 2012-13 (Table 4.3). The growth in export quantity of mango during the first period was lesser than that of export value.

The growth rates were 20.26 and 23.59 per cent for export quantity and value respectively for the first period (1992-1993). Both export quantity and export value was statistically significant.

The compound growth rates calculated for the second period (2006-2013) for export quantity and value was 35.86 and 10.64 per cent respectively and these growth rates were statistically significant at 5 per cent.

The growth rates for the study period (1993-2013) showed that export quantity and export value was 24.54 and 28.69 per cent, respectively and these growth rates were statistically significant. The growth rate per unit value for the overall period (1993-2013) was positive at 2.78 per cent and it was statistically significant at 5 per cent level (Table 4.3).

### Table 4.1: Export of Agricultural Commodities Vis-À-Vis Total National Exports from India during the Period 1998-99 to 2012-13

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Years</th>
<th>Agricultural Exports</th>
<th>Total National exports</th>
<th>Agricultural Exports To Total Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1998-1999</td>
<td>25510.64</td>
<td>139751.8</td>
<td>18.25</td>
</tr>
<tr>
<td>2</td>
<td>1999-2000</td>
<td>25313.66</td>
<td>159095.2</td>
<td>15.91</td>
</tr>
<tr>
<td>3</td>
<td>2000-2001</td>
<td>28657.37</td>
<td>201356.5</td>
<td>14.23</td>
</tr>
<tr>
<td>4</td>
<td>2001-2002</td>
<td>29728.61</td>
<td>209019</td>
<td>14.22</td>
</tr>
<tr>
<td>5</td>
<td>2002-2003</td>
<td>34653.94</td>
<td>255137.3</td>
<td>13.58</td>
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<tr>
<td>6</td>
<td>2003-2004</td>
<td>37266.52</td>
<td>293366</td>
<td>12.70</td>
</tr>
<tr>
<td>7</td>
<td>2004-2005</td>
<td>39863.31</td>
<td>356068.9</td>
<td>11.20</td>
</tr>
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</table>
## Table 4.1: Agricultural Export from India

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity Exported (Tonnes)</th>
<th>CAGR (%)</th>
</tr>
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<tbody>
<tr>
<td>2005-2006</td>
<td>40521.64</td>
<td>10.83</td>
</tr>
<tr>
<td>2006-2007</td>
<td>41232.56</td>
<td>10.49</td>
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<tr>
<td>2007-2008</td>
<td>43441.4</td>
<td>10.23</td>
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<tr>
<td>2008-2009</td>
<td>47820.18</td>
<td>10.51</td>
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<tr>
<td>2009-2010</td>
<td>49512.25</td>
<td>10.34</td>
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<tr>
<td>2010-2011</td>
<td>51216.49</td>
<td>10.29</td>
</tr>
<tr>
<td>2011-2012</td>
<td>53454.66</td>
<td>10.35</td>
</tr>
<tr>
<td>2012-2013</td>
<td>54581.52</td>
<td>10.14</td>
</tr>
</tbody>
</table>

Source: Various Issues of FAO yearbook

### Figure 4.1: Agricultural Export from India

![Agricultural Export from India](image)

### Figure 4.2: Total National Exports

![Total National Exports](image)
Figure 4.3: Agricultural Export to Total National Exports
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Years</th>
<th>Quantity (Tonnes)</th>
<th>Value (US $)</th>
<th>Unit value (US$/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1992-1993</td>
<td>1086</td>
<td>471</td>
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<tr>
<td>2</td>
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<td>3</td>
<td>1994-1995</td>
<td>1744</td>
<td>688</td>
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<td>303</td>
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<td>4009</td>
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<td>14380</td>
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<td>2005-2006</td>
<td>14380</td>
<td>5108</td>
<td>355.2</td>
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<tr>
<td></td>
<td><strong>Pre-NHM</strong></td>
<td>*<em>26.64 <em>(3.39)</em></em></td>
<td>*<em>23.46 <em>(2.95)</em></em></td>
<td>*<em>11.09 <em>(2.95)</em></em></td>
</tr>
<tr>
<td>15</td>
<td>2006-2007</td>
<td>20525</td>
<td>5382</td>
<td>262.2</td>
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<td>16</td>
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<td>54004</td>
<td>13064</td>
<td>242.0</td>
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<td></td>
<td><strong>Post-NHM</strong></td>
<td>*<em>17.87 <em>(1.33)</em></em></td>
<td>*<em>16.61 <em>(2.91)</em></em></td>
<td><strong>-1.08 NS (1.00)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Overall Period</strong></td>
<td>*<em>26.59 <em>(2.72)</em></em></td>
<td>*<em>29.81 <em>(3.44)</em></em></td>
<td><strong>2.64NS (5.8)</strong></td>
</tr>
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</table>

Note: Figures in parentheses indicate standard errors
*significance at 5 per cent
NS Non-significant
PUV- per unit Value
Figure 4.4: Quantity Exported and Export Value of Banana

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<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Years</th>
<th>Quantity (Tonnes)</th>
<th>Value (US $)</th>
<th>Unit Value (US$/Tonnes)</th>
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<td>1993-1994</td>
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<td>1994-1995</td>
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<td>2002-2003</td>
<td>179179</td>
<td>85309</td>
<td>476.1</td>
</tr>
<tr>
<td>12</td>
<td>2003-2004</td>
<td>156222</td>
<td>93100</td>
<td>595.9</td>
</tr>
<tr>
<td>13</td>
<td>2004-2005</td>
<td>222568</td>
<td>126364</td>
<td>567.7</td>
</tr>
<tr>
<td>14</td>
<td>2005-2006</td>
<td>251431</td>
<td>128111</td>
<td>509.5</td>
</tr>
</tbody>
</table>

**Pre NHM**

<table>
<thead>
<tr>
<th></th>
<th>20.26 * (3.25)</th>
<th>23.59 * (3.32)</th>
<th>-0.30 NS (1.25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>622303</td>
<td>141939</td>
<td>228.0</td>
</tr>
<tr>
<td>16</td>
<td>643902</td>
<td>127417</td>
<td>197.8</td>
</tr>
<tr>
<td>17</td>
<td>837032</td>
<td>170712</td>
<td>203.9</td>
</tr>
<tr>
<td>18</td>
<td>744606</td>
<td>200539</td>
<td>269.3</td>
</tr>
<tr>
<td>19</td>
<td>592208</td>
<td>164846</td>
<td>278.3</td>
</tr>
<tr>
<td>20</td>
<td>634414</td>
<td>209742</td>
<td>330.6</td>
</tr>
<tr>
<td>21</td>
<td>555850</td>
<td>264750</td>
<td>476.2</td>
</tr>
</tbody>
</table>

**Post NHM**

|         | 35.86          | 10.64          | 13.50           |

**Overall period**

|         | 24.54*(1.67)   | 28.69* (1.62)  | 2.78* (2.11)    |

Note: Figures in parentheses indicate standard errors

*significant at 5 per cent
NS- non- significant

Source www.fao.org
Figure 4.5: Quantity Exported and Export Value of Mango
4.2 Direction of Trade

4.2.1 Instability in Export of Banana

The instability in export of banana from India to different countries was analyzed by calculating the Co-efficient of variation and the results are presented in Table 4.4.

It was observed from the table that, the export of banana in terms of quantity to UAE, Bahrain and Nepal was relatively unstable compared to other countries as indicated by their co-efficient of variation (53.00%), While export of banana to Kuwait was most stable (18.29%) followed by other countries and Saudi Arabia with a co-efficient of variation of 30.47% and 31.38% respectively.

The value earned by the exports of banana from India was unstable for UAE, Bahrain and Nepal with a Co-efficient of variation of 69.00 percent, 68.25 percent and 64.04 percent respectively. Whereas, for other countries, the export of banana in terms of value was found to be most stable (26.93%) followed by Kuwait (33.13% and Saudi Arabia (38.70%).

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Country</th>
<th>Average quantity</th>
<th>Co-efficient of variation (%)</th>
<th>Average value (Rs. In Lakhs)</th>
<th>Co-efficient of variation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UAE</td>
<td>2736</td>
<td>52.85</td>
<td>298</td>
<td>69.00</td>
</tr>
<tr>
<td>2</td>
<td>Saudi Arabia</td>
<td>436</td>
<td>31.38</td>
<td>166</td>
<td>38.70</td>
</tr>
<tr>
<td>3</td>
<td>Bahrain</td>
<td>478</td>
<td>53.30</td>
<td>80</td>
<td>68.25</td>
</tr>
<tr>
<td>4</td>
<td>Kuwait</td>
<td>130</td>
<td>18.29</td>
<td>38</td>
<td>33.13</td>
</tr>
<tr>
<td>5</td>
<td>Nepal</td>
<td>577</td>
<td>53.94</td>
<td>41</td>
<td>64.04</td>
</tr>
<tr>
<td>6</td>
<td>Other Countries</td>
<td>88</td>
<td>30.47</td>
<td>17</td>
<td>26.93</td>
</tr>
</tbody>
</table>

4.2.2 Instability in the Export of Mango

In order to study the variability in the export of Indian fresh mangoes, an attempt was made to analyze the instability by calculating the coefficient of variation and the results are presented in Table 4.5.

The instability was the highest in case of U.K. (194.60%) with respect to the quantity and observed to be relatively low in terms of export value (45.25%) and on the other hand, quantity of mango exported to and value earned from Kuwait were highly unstable due to changes in the volumes traded (157% and 158%) during the study period. Similar trend was noticed with respect to Bangladesh and other countries. While mango exports to UAE were stable with a variability value of 9.74 percent for the quantity and 12.74 percent for value. Furthermore, variability assessed for Saudi Arabia (27.48%) was observed to be stable for the quantity than the values (41.51%) realized from fresh mango exports. It is interesting to note...
that, whenever the average quantity and the average value of exports were higher, the variability co-efficient were low indicating stability in exports.

**Table 4.5: Instability in Export of Fresh Mangoes from India (2000 to 2013)**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Country</th>
<th>Average quantity</th>
<th>Coefficient of variation (%)</th>
<th>Average value (Rs. In Lakhs)</th>
<th>Coefficient of variation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UAE</td>
<td>17373</td>
<td>9.74</td>
<td>7622</td>
<td>12.74</td>
</tr>
<tr>
<td>2</td>
<td>Saudi Arabia</td>
<td>10584</td>
<td>27.48</td>
<td>776</td>
<td>41.51</td>
</tr>
<tr>
<td>3</td>
<td>Bangladesh</td>
<td>4290</td>
<td>44.13</td>
<td>265</td>
<td>52.76</td>
</tr>
<tr>
<td>4</td>
<td>U.K</td>
<td>2925</td>
<td>194.60</td>
<td>140</td>
<td>49.25</td>
</tr>
<tr>
<td>5</td>
<td>Kuwait</td>
<td>1992</td>
<td>157.00</td>
<td>347</td>
<td>158.00</td>
</tr>
<tr>
<td>6</td>
<td>Other Countries</td>
<td>3635</td>
<td>53.70</td>
<td>2760</td>
<td>54.37</td>
</tr>
</tbody>
</table>

**4.2.3 Transitional Probability for Export of Banana and Mango**

The dynamics of changes in the export trade of Indian fresh banana and mango were studied through the estimation of a Markov probability matrix. The probability of retaining the previous period market share (gain or loss) is interpreted by studying the diagonal and off diagonal elements of transitional probability matrix.

**4.2.3.1 Probability Change for Banana**

The major importing countries taken for the analysis of trade in fresh banana exports during the pre-NHM period were UAE, Saudi Arabia, Bahrain, Kuwait, Nepal and Oman along with the remaining importing countries grouped under ‘others’.

From the Table 4.6 it is clearly evident that India’s export of fresh banana in the pre NHM Period to UAE was retained to the tune of 82.93 per cent. The remaining 17.07 per cent was diverted to ‘other’ Country put together. At the same time, UAE gained 67.74 per cent share of Saudi Arabia, 70.39 per cent share of Bahrain and 51.46 per cent share of Kuwait.

Exports of fresh banana to Saudi Arabia were retained to the tune of 13.96 per cent. Of the remaining, 67.74 per cent was diverted to UAE and 18.31 per cent to Oman.

However India could retain only 5.56 per cent of its previous export to Bahrain. It lost 70.39 per cent of its previous share to UAE and 24.06 per cent of its share to Nepal. India’s previous exports to Nepal could be retained to the tune of 23.41 per cent. The remaining 76.59 per cent was lost to ‘other’ countries put together.

India could not retain its previous share to Kuwait, Oman and ‘others.’ Kuwait lost almost half of its previous share to UAE and the remaining half to ‘other’. Oman lost all its share to
‘others’ and ‘others’ lost their previous share to Saudi Arabia, Bahrain, Kuwait, Nepal and Oman.

In post NHM period (Table 4.7) UAE, Saudi Arabia, Bahrain, Kuwait, Nepal and Oman were the major importers of Indian fresh banana. The remaining countries importing Indian banana were clubbed together and put as ‘others’.

The Perusal of the table showed that UAE retained only 29.84 per cent of its previous share. Out of the remaining 70.16 per cent, 32.10 per cent was lost to Bahrain, 19.40 per cent to Saudi Arabia and 18.66 per cent to Nepal. However, UAE gained 75.88 per cent of the market share of ‘others’.

India retained 68.75 per cent of its previous export shares to Saudi Arabia. India could retain only 25.16 per cent of its previous share to Bahrain, 11.41 per cent of the previous export shares to Oman and 13.05 per cent of its export shares to other countries. However, India retained 100 per cent of its previous export share to Kuwait.

India could not retain its previous export share to Nepal. The share of Nepal’s market was lost to Oman (51.65%) and ‘others’ countries (48.35%).

Table 4.6: Transitional Probability Matrix of Banana During Pre-NHM Period (1993-2005)

<table>
<thead>
<tr>
<th>Destination</th>
<th>UAE</th>
<th>Saudi Arabia</th>
<th>Bahrain</th>
<th>Kuwait</th>
<th>Nepal</th>
<th>Oman</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAE</td>
<td>0.8293</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.1707</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0.6774</td>
<td>0.1396</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Bahrain</td>
<td>0.7039</td>
<td>0.0000</td>
<td>0.0556</td>
<td>0.0000</td>
<td>0.2406</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Kuwait</td>
<td>0.5146</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.4854</td>
</tr>
<tr>
<td>Nepal</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.7659</td>
</tr>
<tr>
<td>Oman</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Others</td>
<td>0.0000</td>
<td>0.3241</td>
<td>0.3423</td>
<td>0.1452</td>
<td>0.0000</td>
<td>0.0993</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Table 4.7: Transitional Probability Matrix of Banana Export during Post-NHM Period (2006-2013)

<table>
<thead>
<tr>
<th>Destination</th>
<th>UAE</th>
<th>Saudi Arabia</th>
<th>Bahrain</th>
<th>Kuwait</th>
<th>Nepal</th>
<th>Oman</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAE</td>
<td>0.2984</td>
<td>0.1940</td>
<td>0.3210</td>
<td>0.0000</td>
<td>0.1866</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0.0000</td>
<td>0.6875</td>
<td>0.0000</td>
<td>0.3125</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Bahrain</td>
<td>0.0000</td>
<td>0.4619</td>
<td>0.2516</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.2865</td>
</tr>
<tr>
<td>Kuwait</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>1.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Nepal</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.5165</td>
<td>0.4835</td>
</tr>
<tr>
<td>Oman</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.1472</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.1141</td>
<td>0.7387</td>
</tr>
<tr>
<td>Others</td>
<td>0.7588</td>
<td>0.1089</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0018</td>
<td>0.1305</td>
</tr>
</tbody>
</table>
4.2.3.2 Probability Change for Mango

The major importing countries taken for analysis of direction of export of fresh mango during pre NHM period were UAE, Saudi Arabia, United Kingdom, Qatar, Kuwait and Bahrain. The remaining countries were put together as ‘others’.

An analysis of direction of trade (Table 4.8) revealed that India did not retain its previous export share to UAE, UK and Qatar, the entire share of UAE export market of mango was lost to Saudi Arabia (80.29%) and Qatar (19.17%) in case of UK, the share was directed towards UAE (12.99%) and ‘others’ (87.01%). Similarly, entire share of Qatar market was lost to UAE.

India could retain only 10.87 per cent, 2.35 per cent, 13.49 per cent and 15.71 per cent of its previous export share to Saudi Arabia, Kuwait, Bahrain and ‘Others’, respectively.

During post NHM period (Table 4.9), UAE, Saudi Arabia, UK, Qatar, Kuwait and Pakistan were taken as the major importing countries for analyzing the direction of trade for mango exports.

From Table 4.9 it is evident that India exports of fresh mango was retained to the tune of 51.89 per cent to UAE, 28.70 per cent to Saudi Arabia and 24.66 per cent to Qatar. However, India could not retain its previous export share to UK, Kuwait, Pakistan and others.

UAE gained 73.68 per cent market share of Kuwait followed by 60.05 per cent share of Saudi Arabia and 32.47 per cent market share of ‘others’. Saudi Arabia, on the other hand gained 37.07 per cent of the market share of UK and 31.76 per cent of the market share of ‘others’. Major gains for UK were from Kuwait (11.73%) Saudi Arabia (10.49%) and UAE (6.82%).

A major part of India’s share of UK (56.97%) and Qatar’s (57.27%) market was lost to ‘other’ countries. The entire share of Pakistan’s mango market was lost to Qatar. India’s share of ‘Other’ Country’s market was lost to Kuwait (35.77%), UAE (32.47%) and Saudi Arabia (31.76%).

Table 4.8: Transitional Probability Matrix of Fresh Mango Export during Pre NHM Period (1993-2005)

<table>
<thead>
<tr>
<th>Destination</th>
<th>UAE</th>
<th>Saudi Arabia</th>
<th>UK</th>
<th>Qatar</th>
<th>Kuwait</th>
<th>Bahrain</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAE</td>
<td>0.0000</td>
<td>0.8029</td>
<td>0.0000</td>
<td>0.1971</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0.0000</td>
<td>0.1087</td>
<td>0.4082</td>
<td>0.0868</td>
<td>0.1161</td>
<td>0.0473</td>
<td>0.2327</td>
</tr>
<tr>
<td>UK</td>
<td>0.1299</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.8701</td>
</tr>
<tr>
<td>Qatar</td>
<td>1.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Kuwait</td>
<td>0.6346</td>
<td>0.0000</td>
<td>0.3418</td>
<td>0.0000</td>
<td>0.0235</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Bahrain</td>
<td>0.0000</td>
<td>0.5625</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.1349</td>
<td>0.0000</td>
<td>0.3027</td>
</tr>
<tr>
<td>Others</td>
<td>0.5088</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0463</td>
<td>0.1571</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
Table 4.9: Transitional Probability Matrix of Fresh Mango Export during Post-NHM Period (2006-2013)

<table>
<thead>
<tr>
<th>Destination</th>
<th>UAE</th>
<th>Saudi Arabia</th>
<th>UK</th>
<th>Qatar</th>
<th>Kuwait</th>
<th>Pakistan</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAE</td>
<td>0.5189</td>
<td>0.0000</td>
<td>0.0682</td>
<td>0.0258</td>
<td>0.0029</td>
<td>0.0000</td>
<td>0.3841</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0.6005</td>
<td>0.2870</td>
<td>0.1049</td>
<td>0.0000</td>
<td>0.0076</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>UK</td>
<td>0.0000</td>
<td>0.3703</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0600</td>
<td>0.0000</td>
<td>0.5697</td>
</tr>
<tr>
<td>Qatar</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.2466</td>
<td>0.1806</td>
<td>0.0000</td>
<td>0.5727</td>
</tr>
<tr>
<td>Kuwait</td>
<td>0.7368</td>
<td>0.0000</td>
<td>0.1173</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.1459</td>
<td>0.0000</td>
</tr>
<tr>
<td>Pakistan</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>1.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Others</td>
<td>0.3247</td>
<td>0.3176</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.3577</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

5. Conclusions and Recommendations

Horticulture is an important component of agriculture accounting for a very significant share in the economy of the Country. A special emphasis has been given for promotion of horticultural production and processing with special stress on export. Horticultural crops cover approximately 8.5 per cent of total cropped area (20 Mha) with annual production of 184.9 MT, and productivity of 9.24 tonnes per hectare. One of the objectives of setting up the National Horticulture Mission (NHM) in the Country among other things was: to provide holistic growth of the horticulture sector through an area based regionally differentiated strategies which include research, technology, production, extension, post-harvest management, processing and marketing in consonance with comparative advantage of each state/region and its diverse agro-climatic features; to enhance horticulture promotion, improve nutritional security and income support to farm households. Considering our findings from the research work, it is worth saying that the NHM has been able to keep faith with the set objectives. It is also important to note that Indian fruits are technically excellent and moderately competitive.

Policy Recommendation

- During the post-NHM period, the export competitiveness of banana and mango enhanced considerably. Hence, to take advantage of this, newer markets especially USA, Japan, Poland, CIS and other countries where mango is in good demand need to be explored for augmenting the exports. In order to achieve this goal it is essential that consumer preferences in newer markets, market intelligence and impediments for augmenting exports need to be researched. Further, it is essential to make available to exporters the new markets’ requirement of SPS restrictions.
- Export of fruits from the Country is highly competitive in the International markets. To take advantage of this and encourage export growers, strengthening of a
federation of ‘fruits growers and exporters’ could facilitate better promotion of production, processing, marketing and export of quality fruits besides outsourcing the required technologies.

References


