# Growth, Instability, and Structural Changes of Non-Basmati Rice Exports from Tamil Nadu Ports

** M. Velmurugan*
*** C. Velavan*
**** S. D. Sivakumar*

## Abstract

**Tamil Nadu is one of the major non basmati rice producing state. About 5% of non basmati rice is exported through the ports in Tamil Nadu. Export of non basmati rice is increasing over the years. In this context, the present study aimed to measure the growth, instability, and structural changes in the export of non-basmati rice from Tamil Nadu ports. The study found that the export of Matta, Sonamasuri, Idly rice, Ponni varieties had grown with high instability. In terms of milling type, full boiled and raw rice had grown significantly at 9.4% and 8.65% per annum, respectively with high instability. Sonamasuri and Ponni varieties, parboiled and raw rice milling types had high probability of retention than other varieties and milling types in export trade. The instability in export quantity and value was higher after rice export ban period than the pre ban period. Among the importing countries, it was found that Singapore, UAE, and Sri Lanka had higher probability of retention of share of non basmati rice exports.**

***Keywords :*** **non basmati rice, export, growth, instability, structural changes**

**JEL Classification : F14, F17, F19**

**Paper Submission Date : January 10 , 2016 ; Paper sent back for Revision : July 5 , 2016 ; Paper Acceptance Date : July 28, 2016**

India is a traditional exporter of high-quality basmati rice. Due to high domestic requirements and less competitiveness of non basmati rice, India did not become a major non-basmati rice exporting country until the mid-eighties. However, non basmati rice exported from India was mere 4.12 lakh tonnes in 1991-92 which rose to 52.86 lakh tonnes in 2007-08 and increased phenomenally to a record level of 70.19 lakh tonnes in 2013-14. Similarly, the value too rose from ₹ 256 crores in 1991-92 to ₹ 17,493 crores in 2013-14 (Government of India, 2015). The percentage share of non-basmati rice in total rice exports from India reached the maximum of 82% in 2007-08. India's non- basmati rice exports depended on global demand for Indian rice at remunerative prices on the one hand, and the availability of exportable surpluses from India on the other (Sekhar, 2003). Moreover, comparative advantage of Indian rice exports remained inferior to major Asian competitors during most of the years (Shinoj & Mathur, 2008).

* *Post Graduate Scholar,* Department of Agricultural and Rural Management, Tamil Nadu Agricultural University, Coimbatore -641 003, Tamil Nadu. E-mail : venmukilanmukilan@gmail.com
** *Assistant Professor,* Department of Trade and Intellectual Property, Tamil Nadu Agricultural University, Coimbatore- 641 003, Tamil Nadu. E-mail : velavanc@tnau.ac.in,
*** *Professor and Head,* Department of Agricultural and Rural Management, Tamil Nadu Agricultural University, Coimbatore -641 003, Tamil Nadu. E-mail : sdsiva@tnau.ac.in,

*Revised version of the research paper was presented in 23rd Annual Conference of the Agricultural Economics Research Association (AERA) held at Central Institute of Fisheries Education (CIFE), Mumbai, December 2- 4, 2015.

While India enjoyed a varied level of global competitiveness in rice exports during the last decade, the Indian government banned the export of non-basmati rice in 2007 to secure food grain availability in domestic markets. The ban was mainly imposed when the world prices increased by over 160% in contrast to the increase in domestic prices by only 7.9%. The ban was relaxed in 2011 when Indian non-basmati price parity improved (Slayton, 2009). The ban on export of non basmati rice made uncertainty among the exporters in India. However, after the removal of export ban, the export of non-basmati rice increased to ₹ 8659 crores, which accounted for 13.37% of the total value of agricultural exports from India in 2011-12. Thus, there is a fluctuation in exports of non basmati rice from the country due government policy, price parity, and export surplus over the years.

Further, instead of analyzing export of non basmati rice from the country as a whole, a state or region wise analysis will be helpful to the producers, traders, and policy makers in rice trade. Hence, Tamil Nadu state was purposively selected for this study, since it is an important non- basmati rice producing state and ranks second in area and production in South India. In this context, the present study was made to examine the growth, instability, and structural changes of non-basmati rice exports from Tamil Nadu ports.

## Data and Methodology

The non-basmati rice export quantity, value, and destination from Chennai and Tuticorin ports were collected from Tamil Nadu Small and Tiny Industries Association (TANSTIA) FNF Service Centre, Chennai. Due to the government regulations, the origin of rice that was exported from the ports was not available to us. Hence, the non-basmati rice exports from Chennai and Tuticorin ports was considered to represent Tamil Nadu for the study. The data from January 1998 to December 2013 were collected for the study. The research was conducted during 2014.

**(1) Trend Analysis :** To analyze the growth in export of non-basmati rice, the compound growth rate was calculated. Exponential growth function form was used for the purpose since it was assumed that the series would increase with constant percentage changes, rather than constant absolute changes.

**(2) Coppock's Instability Index :** The export performance of a country for any commodity during any given period was measured not only from the point of increase in export quantity or value, but also on the extent of fluctuations on the above aspects. Instability in exports would hamper the process of export market development. Hence, an analysis was done to assess the fluctuations in export of non-basmati rice during 1998-2006 and 2007-2013. Coppock's Instability (CI) Index was estimated to measure the variations in the export of non-basmati rice (Coppock, 1962).

CI index is algebraically expressed as the following estimable form (1) :

$$Coppock's\ Instability\ Index = (antilog \sqrt{Vlog} - 1) \times 100 \quad \text{..... (1)}$$

$$Vlog = \frac{\{\log \frac{X_{t+1}}{X_t} - m\}^2}{N - 1}$$

where,

$X_t$ = Export quantity/value in year $t$,

$N$ = Number of years,

$m$ = Arithmetic mean of the difference between the logs of $X_t$ and $X_{t-1}$ etc.,

$V log$ = Logarithmic variance of the series.

**(3) Direction of Non-Basmati Rice Exports from Tamil Nadu Ports :** The trade direction of non-basmati rice exports was analyzed using the first order Markov chain approach. Estimation of the traditional probability matrix *P* was considered as the most important aspect of Markov Chain Analysis. The elements $P_{ij}$ of the matrix *P* indicated the probability that export will switch from country *i* to country *j* with the passage of time. The diagonal elements of the matrix measured the probability that the export share of a country will be retained. Hence, an examination of the diagonal elements indicated the loyalty of an importing country to a particular country's export.

In the context of the current application, five major importing countries of non-basmati rice through Tamil Nadu ports were considered. The average exports to a particular country were considered to be a random variable which depended only on the past exports to that country.

Symbolically,

$$E_{jt} = \Sigma^{r}_{i=1} E_{it\text{-}1} P_{ij} + e_{jt} \quad \text{.....(2)}$$

where,

$E_{jt}$ = Export shift from country *i* during the year *t* to $j^{th}$ country,

$E_{it\text{-}1}$ = Export to $i^{th}$ country during the period *t*-1,

$P_{ij}$ = Probability that the export will shift from $i^{th}$ country to $j^{th}$ country,

$e_{jt}$ = the error term which is statistically independent of $E_{it\text{-}1,}$

*t* = number of years considered for the analysis,

*r* = Number of importing countries.

The transitional probability $P_{ij}$ that can be arranged in a (*c* * *r*) matrix have the following properties (3&4).

$$0 \leq P_{ij} \leq 1 \text{ for all } i \text{ and } j \quad \text{..... (3)}$$

$$\Sigma^{n}_{i=1} P_{ij} = 1 \text{ for all } i \quad \text{..... (4)}$$

Thus, the expected export shares of each country during period *'t'* were obtained by multiplying the export to these countries in the previous period (*t*-1) with the traditional probability matrix (Lee, Judge, & Takayama, 1965; Veena, Suryaprakash, & Achoth, 1994).

## Results and Discussion

**(1) Growth Analysis of Exports of Non-Basmati Rice in Terms of Variety and Milling Type :** The compound growth rate of export quantity of non-basmati rice from Tamil Nadu ports is presented in the Table 1. The results show that export quantity of Matta, Sonamasuri, Idly rice, and Ponni increased during the study period. The export of Matta rice variety showed higher growth both in quantity and value (30.58% and 41.44%, respectively) than other varieties. However, the average quantity of export of Matta rice was only 0.003 lakh tonnes as compared to 0.009 lakh tonnes during 2013. Sonamasuri was the second major variety exported, which grew at 25.87% per annum, with a mean annual export of 0.26 lakh tonnes. But the instability of Sonamasuri was the highest among exportable varieties of non basmati rice. The growth rate of Idly rice and Ponni was 5.12% and 2.10%, respectively with comparatively less variation. In contrast, Red rice and Samba showed a declining trend (-0.85% and -2.06%, respectively) during the study period. Unspecified rice is the unclassified rice varieties which were exported in large quantity during the study period. The growth rate of unspecified rice varieties was the highest than all specified varieties (31.84% per annum).

**Table 1. Compound Growth Rate of Export (Quantity) of Non-Basmati Rice Variety (2001-2013)**

| Rice variety | Mean Annual Export (lakh tonnes) | Coefficient variation (%) | Compound Growth rate (%/annum) |
|---|---|---|---|
| Ponni | 0.3340 | 72.40 | 2.10** |
| Red rice | 0.0156 | 175.55 | -0.85*** |
| Matta | 0.0031 | 112.60 | 30.58*** |
| Samba | 0.0006 | 71.36 | -2.06*** |
| Sonamasuri | 0.2605 | 222.28 | 25.87*** |
| Idly rice | 0.0307 | 98.66 | 5.12*** |
| Unspecified rice | 0.6729 | 106.39 | 31.84** |

**and *** denote significance at 5% and 1% levels, respectively.

**Table 2. Compound Growth Rate of Export (Value) of Non-Basmati Rice Variety (2001-2013)**

| Rice variety | Mean Annual Export (₹ in Crores) | Coefficient variation (%) | Compound Growth rate (%/annum) |
|---|---|---|---|
| Ponni | 58.89 | 65.33 | 7.56* |
| Red rice | 2.22 | 153.18 | 13.80*** |
| Matta | 0.78 | 119.14 | 41.44*** |
| Samba | 0.17 | 94.04 | 4.53*** |
| Sonamasuri | 50.03 | 240.83 | 35.42* |
| Idly rice | 4.76 | 127.31 | 28.34*** |
| Unspecified rice | 141.40 | 133.97 | 42.76* |

*and *** denote significance at 10% and 1% levels, respectively.

**Table 3. Compound Growth Rate of Export (Quantity) of Non-Basmati Rice Based Milling Type for the Years 1998-2013**

| Rice type | Mean Annual Export (lakh tonnes) | Coefficient variation (%) | Compound Growth rate (%/annum) |
|---|---|---|---|
| Parboiled rice | 0.51 | 84.37 | 5.83 |
| Full boiled rice | 0.13 | 115.66 | 9.40*** |
| Raw rice | 0.09 | 141.22 | 8.65*** |
| Unspecified rice | 0.76 | 116.04 | 2.19 |

*** denotes significance at the 1% level

It can be observed from the Table 2 that the growth rate of export value of Matta was the highest with 41.44% per annum with average annual export value of ₹ 0.78 crores. Similar to export quantity, growth of the export value of Sonamasuri was high with 35.42% per annum. The growth of export value of other rice varieties such as Idly rice, Red rice, Ponni, and Samba was 28.34%, 13.80%, 7.56%, and 4.53%, respectively. Export growth was high in value terms when compared to the quantity terms during the study period, reflecting an increase in export price of the commodities. Similar to export quantity, growth of export value of unspecified rice was more than it was for all specified varieties. The growth rate of unspecified rice was 42.76% per annum.

The results of growth rate of exports of different milling types of non-basmati rice in terms of quantity and value are presented in the Table 3 and Table 4. The export quantity and value of full boiled rice and raw rice showed a statistically significant increasing trend during the study period. However, the growth rate of parboiled

**Table 4. Compound Growth Rate of Export (Value) of Non-Basmati Rice Based on Milling Type for the Years 1998-2013**

| Rice type | Mean Annual Export (₹ in Crores) | Coefficient variation (%) | Compound Growth rate (%/annum) |
|---|---|---|---|
| Parboiled rice | 84.41 | 130.59 | 18.97 |
| Full boiled rice | 17.73 | 72.70 | 16.89*** |
| Raw rice | 12.84 | 150.93 | 17.72*** |
| Unspecified rice | 106.32 | 142.88 | 22.29 |

*** denotes significance at the 1% level

rice too showed an increasing trend, but it was statistically insignificant. The export quantity of full boiled rice showed higher growth (9.40%) than other varieties. In case of value of exports, the growth rate of raw rice was the highest, with 17.72% followed by full boiled rice (16.89%). In 2013, the exported quantity and value of full boiled rice were 8.27 thousand tonnes and ₹ 27.67 crores, respectively. Similar to the growth rate of varieties, the export value growth was more than the quantity growth in milling type too. Adhikari, Sekhon, and Kaur (2016) also concluded that the growth rate of export value (17.74%) was more than the export quantity (10.87 %) from India. It is evident from the results that export of raw rice was highly unstable with 141.22% and 150.93% in terms of export quantity and value, respectively.

**(2) Change in the Structure of Non-Basmati Rice Exports from Tamil Nadu Ports :** The Markov transition probability of non-basmati rice exports in terms of variety and milling type are presented in the Table 5 and Table 6. The transition probability matrix indicates that the probability of retaining the share of export of Ponni rice was high (85.65%) than other varieties. The probability of unspecified rice to get the market share of Ponni rice was 11.68%. However, the probability of Ponni rice to get the market share of red rice was 99.03%. The probability of retention of export share of Sonamasuri rice was 34.90%. The probability of gain of Sonamasuri

**Table 5. Transition Probability Matrix of Non-Basmati Rice Variety Exports (2001-2013)**

| Particulars | Ponni | Red rice | Matta | Samba | Sonamasuri | Idly Rice | Unspecified |
|---|---|---|---|---|---|---|---|
| Ponni | **0.8565** | 0.0094 | 0.0011 | 0.0001 | 0.0000 | 0.0161 | 0.1168 |
| Red rice | 0.9903 | **0.0000** | 0.0000 | 0.0000 | 0.0000 | 0.0097 | 0.0000 |
| Matta | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0000 | 0.0000 | 1.0000 |
| Samba | 1.0000 | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0000 | 0.0000 |
| Sonamasuri | 0.1253 | 0.0020 | 0.0028 | 0.0001 | **0.3490** | 0.0254 | 0.4954 |
| Idly Rice | 0.0660 | 0.0000 | 0.0000 | 0.0219 | 0.3466 | **0.0781** | 0.4875 |
| Unspecified | 0.0000 | 0.0009 | 0.0004 | 0.0001 | 0.0124 | 0.0136 | **0.9725** |

**Table 6. Transition Probability Matrix for Rice Variety Exports in Terms of Milling Type (1998-2013)**

| Particulars | Parboiled rice | Full boiled rice | Rawrice | Unspecified rice |
|---|---|---|---|---|
| Par boiled rice | **0.5599** | 0.4401 | 0.0000 | 0.0000 |
| Full boiled rice | 0.3085 | **0.0276** | 0.0000 | 0.6639 |
| Raw rice | 0.5596 | 0.0000 | **0.4404** | 0.0000 |
| Unspecified rice | 0.1520 | 0.0000 | 0.1054 | **0.7426** |

was 34.66% from Idly rice and 1.24% from unspecified rice. However, the probability of loss of share of Sonamasuri was 49.54 % to Unspecified rice and 12.53 % to Ponni rice. Though the growth rate of export quantity and value of Matta was the highest among the exportable rice varieties, there would not be any retention of export share. There was no probability of retention of export share of Red rice and Samba. The probability of retention share of unspecified rice was the highest (97%) than the specified varieties.

Transition probability matrix indicates that the share of exports of parboiled rice that could be retained was 55.99%. The probability of gain of export share from the full boiled rice to the par boiled rice was 30.85% and to raw rice was 55.96%. However, full boiled rice, which showed the highest growth rate, reported the retention probability of only 2.76%. The share of exports of raw rice that would be retained was 44.04 %. In case of unspecified rice, 74.26% of its export share would be retained. The results indicate that there would be stability in exports of Ponni and Sonamasuri varieties as well as par boiled and raw rice from Tamil Nadu ports in the international markets.

**(3) Instability in Export Quantity and Value of Non-Basmati Rice from Tamil Nadu Ports :** The results of the instability index for export quantity and value are presented in the Table 7. The instability was higher in the post-ban period than in the pre-ban period. The instability in value of non-basmati rice exports during the post-ban period was due to fluctuation in export quantity due to restriction of exports. During the ban of non-basmati rice exports, the quantity was very low till the removal of ban in September 2011. The quantity and value of non-basmati rice exports during 2012 increased to 2.94 lakh tonnes and ₹ 614.99 crores, respectively. During 2013, rice exports increased to 7.34% and 34.31% in quantity and value terms, respectively over 2012. This reflects the demand for Indian non-basmati rice in the global market.

**Table 7. Instability in Export Quantity and Value of Non-Basmati Rice from Tamil Nadu Ports - Coppock's Instability Index**

(%)

| Particulars | 1998 to 2006 | 2007 to 2013 |
|---|---|---|
| Export quantity (lakh tonnes) | 85.01 | 264.48 |
| Export value (₹ Crores) | 24.51 | 255.17 |

**(4) Growth in Export of Non-Basmati Rice to Major Importing Countries :** The results of change in export of non-basmati rice from Tamil Nadu ports to major importing countries are presented in the Table 8. The export of non-basmati rice from Tamil Nadu ports to major importing countries except Singapore and Malaysia showed an increasing trend. The negative growth rate of export of rice to Malaysia and Singapore could be due to the export competitiveness of Vietnam as reported by Davar and Singh (2013). The export quantity was the highest to

**Table 8. Change in Export of Non-Basmati Rice from Tamil Nadu Ports to Major Importers During 2001-2012 (Triennium Average)**

(Lakh tonnes)

| Year | Malaysia | Singapore | Sri Lanka | U A E | U S A | Others | Total |
|---|---|---|---|---|---|---|---|
| 2001-03 | 0.12 | 0.15 | 0.04 | 0.02 | 0.10 | 0.12 | 0.55 |
| 2004-06 | 0.07 | 0.19 | 0.28 | 0.07 | 0.04 | 0.41 | 1.06 |
| 2007-09 | 0.03 | 0.12 | 0.31 | 0.08 | 0.02 | 0.32 | 0.88 |
| 2010-12 | 0.09 | 0.59 | 0.06 | 0.19 | 0.36 | 0.72 | 2.01 |

**Table 9. Compound Growth Rate of Non-Basmati Rice Exports to Major Importing Countries (1998-2013)**

| Country | Mean (lakh tonnes) | Coefficient of Variation (%) | Compound Growth Rate (%/annum) |
|---|---|---|---|
| Malaysia | 0.06 | 93.71 | -1.02 |
| Singapore | 0.58 | 155.42 | -9.76 |
| Sri Lanka | 0.15 | 144.11 | 9.89* |
| U A E | 0.09 | 130.45 | 16.45*** |
| U S A | 0.10 | 242.11 | 18.24* |
| Others | 0.42 | 123.99 | 22.85*** |
| **Total** | **1.40** | **84.89** | **-0.20** |

*and *** denote significance at 10% and 1% level, respectively

Singapore (0.59 lakh tones) followed by USA and UAE with 0.36 lakh tonnes and 0.19 lakh tonnes, respectively during the 2010-12 triennium.

The compound growth rate was calculated to assess the growth of export of non-basmati rice to major importing countries from Tamil Nadu and the results are presented in the Table 9. The growth of non-basmati rice exports to U.A.E. were higher than it was for other major importing countries. In case of Malaysia, the exports declined at the rate of -1.02% per annum. Export of non-basmati rice to USA was highly unstable (242.11 % ) than it was for other importing countries. Though the major export destination for non-basmati rice was Singapore during the study period, it had been declining at the rate of -9.76 % per annum.

**(5) Change in Direction of Trade in Exports of Non-Basmati Rice from Tamil Nadu Ports :** The major importing countries considered for analysis were Malaysia, Singapore, Sri Lanka, U.A.E., and U.S.A. while the remaining importing countries were grouped as others (Yeledhalli & Kulkarni, 2009). The results of the transitional probability matrix for non-basmati rice exports from Tamil Nadu ports to major importing countries are presented in the Table 10. The probability of retention of Singapore was high with 0.8267, which indicated that the Singapore market would retain 82.67 % of the share of non basmati rice from the state. Market share of Singapore would be absorbed by U.A.E. (2.46%) and other countries (4.8%). However, Singapore gained 29.67 % of Sri Lanka, 25.18%of U.S.A., and 1.44 % of others.

As is evident from the Table 10, the probability matrix indicated that rice exports to Malaysia could not be retained by Tamil Nadu. Sri Lanka and USA gained Malaysia's share. Sri Lanka retained 26.31 % of its share. The UAE retained 35 % of the share, but it lost 65% of its share to other countries. Other countries, which included U.K., Australia, Bahrain, etc., could retain 80.82% share of exports from Tamil Nadu ports. These new destinations are gaining importance in recent years. It could be concluded that the despite the negative compound

**Table 10. Transitional Probability Matrix of Non-Basmati Rice Exports from Tamil Nadu**

| Countries | Malaysia | Singapore | Sri Lanka | U A E | U S A | Others |
|---|---|---|---|---|---|---|
| Malaysia | **0.0000** | 0.0000 | 0.8559 | 0.0000 | 0.1441 | 0.0000 |
| Singapore | 0.0936 | **0.8267** | 0.0000 | 0.0246 | 0.0069 | 0.0483 |
| Sri Lanka | 0.1126 | 0.2967 | **0.2631** | 0.0675 | 0.1174 | 0.1428 |
| U A E | 0.0000 | 0.0000 | 0.0000 | **0.3500** | 0.0000 | 0.6500 |
| U S A | 0.3885 | 0.2518 | 0.0144 | 0.0334 | **0.0714** | 0.2405 |
| Others | 0.0142 | 0.0144 | 0.0347 | 0.1045 | 0.0240 | **0.8082** |

growth, the probability of retaining Singapore's share was high for Tamil Nadu. Further, probability of retaining export share of UAE and Sri Lanka could be high with positive compound growth rates.

## Research Implications

The results of the study would be useful to the rice exporters to understand the growth and instability of different variety and milling type of non basmati rice in terms of quantity and value. The results of the study would also be helpful to understand the direction of exports of non basmati rice from the state ports. Further, the results of the study are useful to frame appropriate policies to promote export of non basmati rice from the state.

## Conclusion

The annual growth rates of Matta, Sonamasuri, Ponni, and Idly rice showed an increasing trend. Export of full boiled and raw rice had grown over the years. However, Ponni and Sonamasuri, parboiled and raw rice had high probability of retention of export share. The instability of non basmati rice was more after the export ban period. The growth rate of export of non basmati rice was more to UAE. Singapore, UAE, and Sri Lanka had more probability of retention of export of non basmati rice. Hence, producer and exporters can concentrate upon Ponni, Sonamasuri, and Idly rice in the form of parboiled and raw type to export rice from the state. The non-basmati rice could be exported to the major importing countries - Singapore, UAE, and Sri Lanka. The retention probability of other countries was also high. Hence, the exporter can also concentrate upon the emerging markets like UK, Australia, and Bahrain.

## Limitations of the Study and Scope for Further Research

Lack of access to data on origin of rice that was exported from the state and the major share of rice exports as "unspecified rice" greatly hindered the reporting of export performance with location and variety specific details. Further research may be conducted by accessing data from all the Southern ports of the region and it could be useful to understand the research problem well.

## References


Adhikari, A., Sekhon, M.K., & Kaur, M. (2016). Export of rice from India: Performance and determinants. *Agricultural Economics Research Review, 29* (1), 135-150. DOI: 10.5958/0974-0279.2016.00026.4

Coppock, J.D. (1962). *International economic instability : The experience after World War II.* New York : McGraw Hill.

Davar, S.C., & Singh, B. (2013). Competitiveness of major rice exporting nations. *The Indian Journal of Industrial Relations, 48* (3), 513- 533.

Government of India. (2015). *Agricultural statistics at a glance 2015.* New Delhi : Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture.

Lee, T.C., Judge G. G., & Takayama, T. (1965). On estimating the transitional probabilities of a Markov process. *Journal of Farm Economics, 47* (2), 742-762.

Sekhar, C.S.C. (2003). Agricultural trade liberalization - Likely implication for rice sector in India. *Indian Journal of Agricultural Economics, 58* (1), 42-63.

Shinoj, P., & Mathur V.C. (2008). Comparative advantage of Indian in agricultural exports vis-à-vis Asia: A past reforms analysis. *Agricultural Economics Research Review, 21*(1), 60-66.

Slayton, T. (2009). *Rice crisis forensics: How Asian Governments carelessly set the world rice market on fire* (Working Paper No. 163). Washington DC : Center for Global Development.

Veena, U.M., Suryaprakash, S., & Achoth, L. (1994). Changing direction of Indian coffee exports. *Indian Journal of Agricultural Economics, 49* (3), 425-431.

Yeledhalli, R.A., & Kulkarni, V. (2009). Direction of trade and export competitiveness of onion. *Agriculture Update, 4* (3&4), 237-243.