**Research Article**

# GROWTH RATE ANALYSIS OF INDIAN VALUE ADDED COFFEE

**Varun Gangadhar, Pramit Pandit*and Pooja, B.S.**

*Department of Agricultural Statistics, Applied Mathematics and Computer Science,*
*University of Agricultural Sciences, Bengaluru, Karnataka 560065, INDIA*
**Corresponding author's E-mail: pramitpandit@gmail.com*

**KEYWORDS:**
Growth rate, coffee, value addition

**ARTICLE INFO**
**Received on:**
01.10.2018
**Revised on:**
22.11.2018
**Accepted on:**
24.11.2018

**ABSTRACT**

**Coffee is considered as one of the vital non-alcoholic beverages in the world. Data of ten years period from 2007-08 to 2016-17 were collected from Coffee Board of India, Bengaluru for the purpose of analyzing the growth rate of value added coffee export. The linear and compound growth rate was found to be significant for instant and pooled value added coffee. Whereas for ground and roasted coffee, the linear and compound growth rate were found to be non-significant which may be due to less preference in international export markets compared to instant coffee. For instant coffee growth rate was found to be highest and positively significant for Turkey, Indonesia and Poland because of increased demand from these countries. The growth rate was found to be negative for Finland due to shifting of consumer preference to other coffee products. For Russian federation and Ukraine growth rate was found to be non-significant because export to these had reached the plateau. The compound and linear growth rate of ground coffee was found to be highest for Australia because of more preference is given to Indian ground coffee from last four years. USA, Italy, Ukraine, Finland, Kuwait and other countries were found non-significant growth rate. For roasted coffee all the countries except Singapore was found to be non-significant. In case of pooled value added coffee, the growth rate was found to be highest for Turkey and negative growth rate was found for Finland. For Russian federation and Ukraine the growth rate was found to be non-significant.**

## INTRODUCTION

Coffee is one of the vital non-alcoholic beverages in the world (Kumar, 2017). Among the world's most popular beverages, coffee has placed in the second position after Tea. In recent years, coffee has become one of the most-profitable global commodities. The main reason for its popularity is its refreshing effect, which is due to the presence of 'Caffeine,' an alkaloid present in coffee.

Value addition to coffee is a process of development of the product from the raw coffee or green coffee so that the resulted product is entirely different from the original. The product may be new to the market or improvement of the existing one by changing the ingredients (fortification enrichment) or by processing technologies. Before pre-liberalization period, the importance for value added coffee products was less for both export and domestic consumption. The growth rate of value added coffee was negative in this period (Shiferaw, 2015). Over the years various value-added products of coffee have been invented. Some of the value-added coffee products have been developed to target market segments. For this purpose, various new products of coffee have been developed by different innovative ways of processing to explore the beneficial properties of the specific chemical components of coffee, and by mixing of compatible ingredients keeping the coffee as a base material. Because of this coffee beverage becoming the more popular than ever (Farah, 2014). This present study is mainly concentrated on three types of value added coffee, viz. instant coffee, ground coffee and roasted coffee.

Ashoka (2013) studied the compound growth rate of Indian coffee with an object to know the dynamics of coffee market and export from India. He collected the secondary data from Coffee Board of India, Bangalore and primary data from 30 coffee curing units of Chikmagalur, Kodagu

and Hassan districts. As a result he found a significant growth for instant coffee, ground coffee and roasted coffee for the study period 2000-01 to 2011-12. Mahadevaiah (2014) studied the production and export performance of cashew nut from India. Their study revealed that, during period (1992-2009) the national level compound growth rate was positive. Kaur and Bhullar (2012) with the help of growth rate came to conclusion that milk production had increased from 3.22 million tonnes (1980-81) to 9.38 million tonnes (2009-10) in Punjab state. Kathiravan and Sevam (2011) gave interpretation about livestock productivity with the help of compound growth rate. With these contexts, an effort has been made in the current investigation to analyse the growth rate of Indian value added coffee.

## MATERIALS AND METHODS

Ten years period from 2007-08 to 2016-17 was considered for the purpose of analyzing the growth rate of value added coffee export. Data were collected from Coffee Board of India, Bengaluru.

### Statistical Tools Used

### Linear Growth Rate

Linear growth rate was computed by fitting simple regression equation. Linear Growth Rate equation is given by

$$Y_t = \beta_0 + \beta_1 t + \varepsilon_t$$

Where,

$Y_t$ is the variable for which growth rate was estimated

$t$ is the time in years, independent variable, 1,2,3, … . , $n$

$\beta_0$ is an intercept

$\beta_1$ is linear regression coefficient

$\varepsilon_t$ is error term

The above equation is fitted by using the least squares method of estimation. The linear growth rate is calculated as follows

$$linear growth\ rate\ (LGR\ \%) = \frac{\beta_1}{\bar{Y}} \times 100$$

### Compound growth rate

In the present study, compound growth rates in export of coffee were obtained by fitting the following exponential model. The adequacy of the model is indicated by the coefficient of multiple determination ($R^2$).

$$Y_t = \beta_0 \beta_1^t \varepsilon$$

Where,

$Y_t$ = Variable for which growth is estimated

$t$ = Time in month, independent variable

$\beta_0$ = An intercept

$\beta_1$ = Regression coefficient

$\varepsilon_t$ = Error term

The compound growth rate percentage (CGR %) is compound from the relationship,

$$CGR = [Antil(\ln \beta_1) - 1] \times 100$$

## RESULTS AND DISCUSSION

The fluctuation of actual export of instant coffee, roasted coffee, ground coffee and pooled value added coffee over a period of time presented in Table 1. The result emanated from the study indicates that among all the value added coffee, Instant coffee holds highest export shares and it is in upward trend. The graphical representation of Instant coffee export is represented in Fig. 1. This export of Instant coffee ['00 MT] had increased from 648.5 (2007-08) to 1048.2 (2016-17). The other two types of value added coffee i.e. roasted coffee and ground coffee is showing up and down fluctuation and it is represented in Fig. 2 and Fig. 3 respectively. For roasted coffee the export had varied from ('00 MT) 0.52 (2013-14) to 1.61 (2015-16) and ground coffee had varied from 1.52 (2010-11) to 3.87 (2016-17).For pooled value added coffee, the actual export shares had varied (100 MT) from 564.51 (2009-10) to 1052.69 (2016-17) and the same is represented in graphical form in the Fig. 4 and it is showing upward trend for the study period. The per cent growth for Instant coffee was found to be highest among three types of value added coffee with value 61.62 per cent. Even though there is no much export of roasted coffee for the study period, the per cent growth was found to be second highest with value 15.60 per cent. For pooled value added coffee, the per cent growth was found to be 61.28 per cent.

**Table 1. Annual Export of value added coffee (’00 MT)**

| Year | Instant coffee | Roasted coffee | Ground coffee | Pooled value added coffee |
|---|---|---|---|---|
| 2007-08 | 648.57 | 0.54 | 3.61 | 652.72 |
| 2008-09 | 565.48 | 0.82 | 1.75 | 568.05 |
| 2009-10 | 561.88 | 0.96 | 1.68 | 564.51 |
| 2010-11 | 753.89 | 1.00 | 1.52 | 756.41 |
| 2011-12 | 833.83 | 0.70 | 1.97 | 836.50 |
| 2012-13 | 892.36 | 0.36 | 1.69 | 894.41 |
| 2013-14 | 849.73 | 0.52 | 1.84 | 852.09 |
| 2014-15 | 945.14 | 0.53 | 2.69 | 948.36 |
| 2015-16 | 938.88 | 1.61 | 5.69 | 946.18 |
| 2016-17 | 1048.20 | 0.63 | 3.87 | 1052.69 |
| Per cent Increase (Annual) | 61.62 | 15.60 | 7.15 | 61.28 |

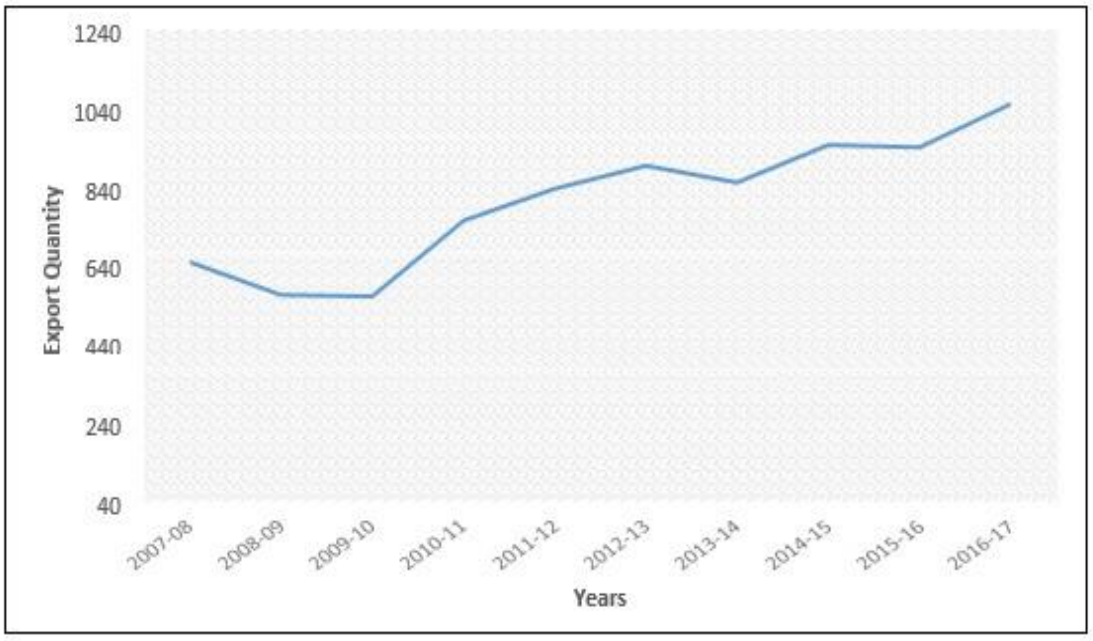


**Fig. 1. Export performance of instant coffee from India**

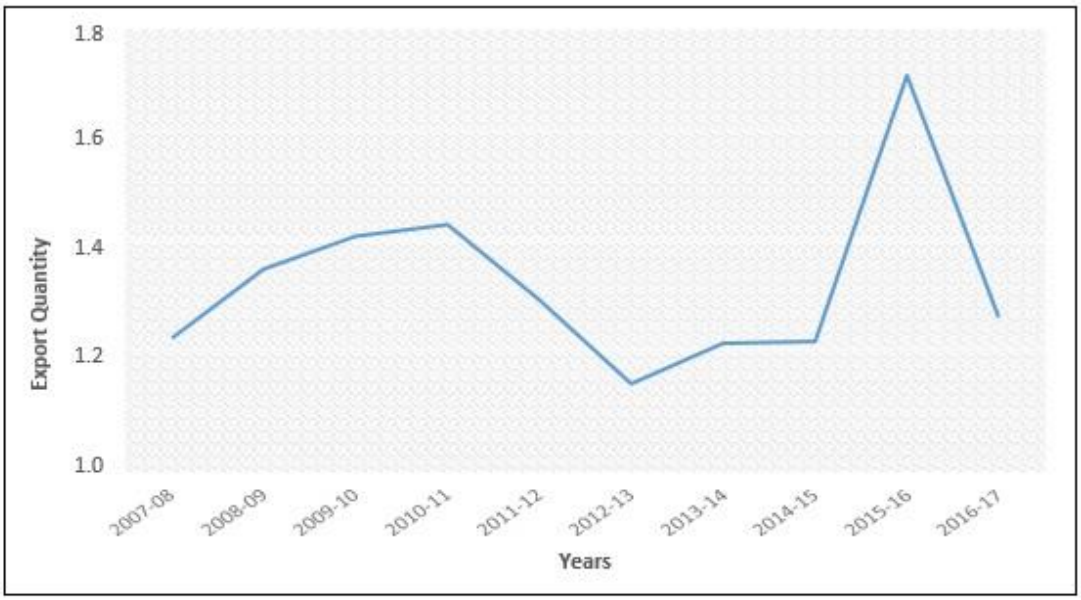


**Fig. 2. Export performance of roasted coffee from India**

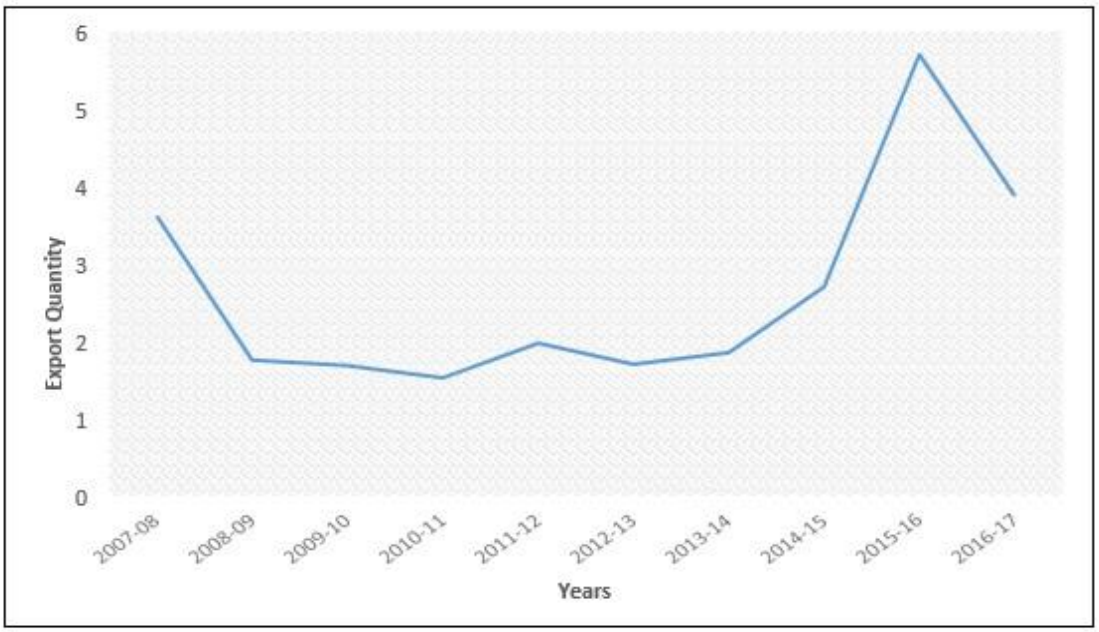


**Fig. 3. Export performance of ground coffee from India**

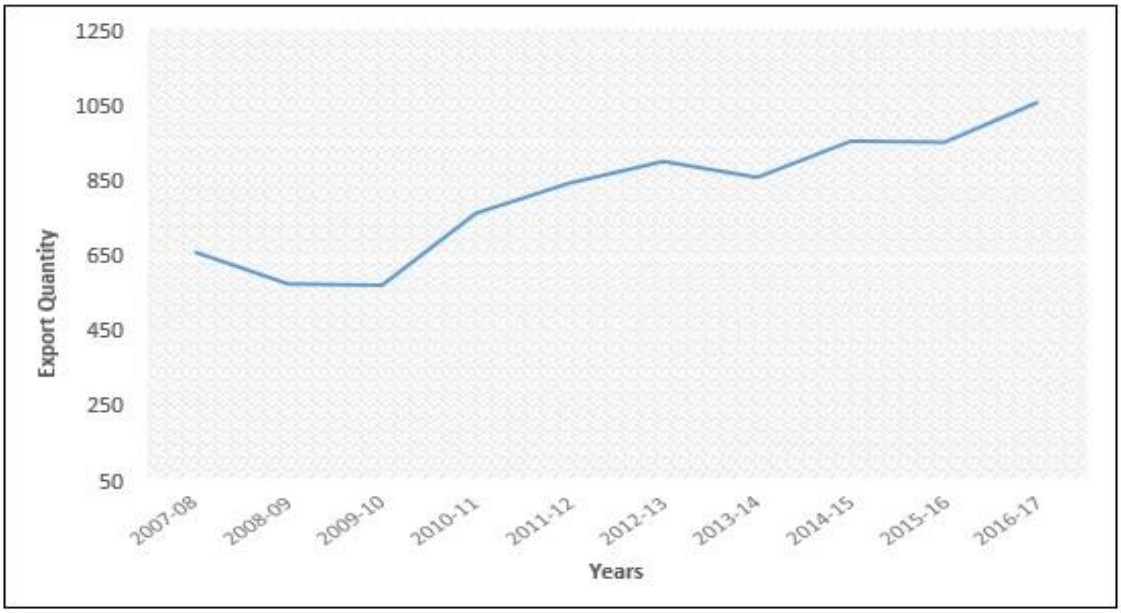


**Fig. 4. Export performance of value added coffee from India**

Further in order to get better idea about the export performance, an attempt has made to analyze the growth in export of value added coffee in terms of quantity under the period 2007-08 to 2016-17. In order to obtain a comparative performance, separate growth rates were calculated for three types of value added coffee i.e. instant coffee, roasted coffee and ground coffee and pooled growth rate is also calculated for better interpretation. Growth rate for major importing countries was also obtained to know the global movement of Indian value added coffee. The top eight markets which had considered for analysis are Russian Federation, Turkey, Malaysia, Ukraine, Finland, USA, Poland and Indonesia which accounts for more than 65 per cent of export from India. The rest of the countries had grouped under 'others.'

The linear and compound growth rate of instant coffee for different importing countries are represented in Table 2. From the table it was clear that, for countries Turkey, Malaysia, U.S.A, Poland and Indonesia have positive linear growth rate for instant coffee accounts 28.55, 9.29, 11.43,21.49 and 28.27 per cent, respectively, which may be due to increase in demand for instant coffee in recent years. Indian instant coffee is one of the premium coffee product in the international market because of its good quality and high caffeine content. Due to this reason, Turkey and Indonesia had become a new market and imported more amount of instant coffee from India. For Finland it was found to be negatively significant with -8.097 per cent due to the competition from other instant coffee exporting countries and also shifting of consumer preference from the instant coffee to other value added coffee products. The linear growth rate for Russian Federation and Ukraine was found non-significant for instant coffee. The other countries had positive linear growth rate with 5.02 per cent and found to be significant. The compound growth rate of instant coffee for countries like Turkey, Malaysia, U.S.A, Poland and Indonesia had positive growth rate with values 44.89, 11.53, 14.70,22.81 and 49.23 per cent, respectively. For Finland, the compound rate was found to be negatively significant with -7.983 per cent. The compound growth rate for Russian Federation and Ukraine was found non-significant for instant coffee because they are the stable importer of Indian instant coffee and they have reached the saturation point for the study interval. The positive significant compound growth rate had been found in case of other countries with 5.40 per cent.

The linear and compound growth rate of ground coffee for different importing countries had represented in Table 3. From the table, it was observed that for countries United Arab Emirates, Singapore, and Australia have positive significant linear growth rate with 13.08, 14.76 and22.81 per cent, respectively. The linear growth rate for U.S.A, Italy, Ukraine, Finland, and Kuwait was found to be non-significant. The other countries had negative non-significant linear growth. The compound growth rate of ground coffee for countries like Italy, Singapore and Australia had positive significant growth rate with values 62.23, 16.37 and 23.46 per cent respectively. The other countries had shown negative non-significant growth rate over a period. For U.S.A, United Arab Emirates, Ukraine, Finland and Kuwait shows non-significant linear growth rate for ground coffee.

**Table 2. Linear and Compound growth rate of instant coffee for different importing countries**

| Countries | Instant coffee | |
|---|---|---|
| | LGR | CGR |
| Russian Fed. | 00.356$^{NS}$ | 00.748$^{NS}$ |
| Turkey | 28.551** | 44.890** |
| Malaysia | 09.293** | 11.536** |
| Ukraine | 02.616$^{NS}$ | 02.653$^{NS}$ |
| Finland | -08.097* | -07.983* |
| U.S.A | 11.438** | 14.708** |
| Poland | 21.497** | 22.817** |
| Indonesia | 28.275** | 49.236** |
| Others | 05.023** | 05.408** |

** - Significant at 1%, * - Significant at 5%, NS–Non-significant

**Table 3. Linear and compound growth rate of ground coffee for different importing countries**

| Countries | Ground coffee | |
|---|---|---|
| | LGR | CGR |
| U.S.A. | -02.908$^{NS}$ | -05.401$^{NS}$ |
| Italy | 44.628$^{NS}$ | 62.221* |
| U.A.E | 13.108* | 12.422$^{NS}$ |
| Singapore | 14.763** | 16.440** |
| Ukraine | -20.532$^{NS}$ | -12.436$^{NS}$ |
| Finland | -11.000$^{NS}$ | -07.254$^{NS}$ |
| Australia | 22.816** | 23.552** |
| Kuwait | 08.632$^{NS}$ | 08.201$^{NS}$ |
| Others | 00.527$^{NS}$ | -01.900$^{NS}$ |

** - Significant at 1%, * - Significant at5%, NS–Non-significant

The linear and compound growth rates of roasted coffee for different importing countries had been represented in the Table 4. It can be noticed from the table that the roasted coffee showed a positive significant linear growth rate for only one country i.e. Singapore with the value of 36.40 per cent. For rest of the countries such as are South Africa, Italy, Ukraine, U.S.A., Russian Federation, Saudi Arabia, United Arab Emirates and Turkey had non-significant linear growth rate. Similarly, the compound growth rate follows the same pattern as the linear growth rate. For Singapore, the compound growth rate was found to be positively significant with value 18.4 per cent whereas the rest of the countries like South Africa, Italy, Ukraine, U.S.A., Russian Federation, Saudi Arabia, United Arab Emirates and Turkey had non- significant compound growth rate.

The linear and compound growth rate of pooled value added coffee for different importing countries are represented in the Table 5. It can be seen that value added coffee shows a positive significant linear growth rate for Turkey, Malaysia, U.A.S, Poland, Indonesia and others with 28.55, 9.29, 10.96, 21.50,28.27 and 5.07 per cent respectively, whereas Finland showed a negative significant growth rate (-8.1 %) and Russian Federation and Ukraine showed non-significant linear growth rate. The positive significant compound growth rate was observed from Turkey, Malaysia, U.S.A, Poland and Indonesia with 44.89, 11.53, 13.72, 22.82 and 49.23 per cent respectively whereas negative significant growth rate was observed for Finland (-7.987 %). Russian Federation and Ukraine was found to be non-significant. The similar work was on par with Vinod and Nethrayini (2018) for Indian coffee export. As a result, they found positive significant growth for Italy and other countries. The negative growth rate was found for the countries like Germany, Russian Federation, Canada and U.S.A.

**Table 4. Linear and compound growth rate of roasted coffee for different importing countries**

| Countries | Roasted coffee | |
|---|---|---|
| | LGR | CGR |
| South Africa | $-20.2^{NS}$ | $-25.5^{NS}$ |
| Italy | $42.2^{NS}$ | $25.9^{NS}$ |
| Ukraine | $08.5^{NS}$ | $06.0^{NS}$ |
| U.S.A. | $36.7^{NS}$ | $08.6^{NS}$ |
| Russian Fed | $40.6^{NS}$ | $14.9^{NS}$ |
| Saudi Arabia | $-41.4^{NS}$ | $-12.6^{NS}$ |
| U.A.E | $0.001^{NS}$ | $02.7^{NS}$ |
| Singapore | 36.4* | 18.4* |
| Turkey | $30.3^{NS}$ | $06.1^{NS}$ |
| Others | $-09.3^{NS}$ | $-03.1^{NS}$ |

** - Significant at 1%, * - Significant at5%, NS–Non-significant

**Table 5. Linear and compound growth rate of value added coffee for different importing countries**

| Countries | Value Added Coffee | |
|---|---|---|
| | LGR | CGR |
| Russian Fed. | 00.358$^{NS}$ | 00.751$^{NS}$ |
| Turkey | 28.551** | 44.892** |
| Malaysia | 09.296** | 11.539** |
| Ukraine | 02.570$^{NS}$ | 02.601$^{NS}$ |
| Finland | -08.100* | -07.987* |
| U.S.A | 10.965** | 13.729** |
| Poland | 21.509** | 22.827** |
| Indonesia | 28.275** | 49.236** |
| Others | 05.077** | 05.458** |

** - Significant at 1%, * - Significant at5%, NS–Non-significant

**ACKNOWLEDGEMENTS**

This research article is a part of Thesis work submitted for M.Sc. (Ag.) in Agricultural Statistics by Mr. Varun Gangadhar to University of Agricultural Sciences, Bengaluru in the year 2018. All co-operations received from Dr. D. M. Gowda, Mr. V. Manjunath, from the co-authors and all the supports provided by University of Agricultural Sciences, Bengaluru is duly acknowledged.

**REFERENCES**

**Ashoka, N. 2013.** Dynamics of Coffee Marketing and Export–An Agribusiness Approach, Ph.D. (Mktg) Thesis (Unpub.), University of Agricultural Sciences, Dharwad, Karnataka, India.

**Farah, A. 2014.** Coffee: Emerging Health Effects and Disease Prevention. John Wiley & Sons, Inc., New York, USA, pp. 21-29.

**Kathiravan, G. and S. Sevam. 2011.** Productivity dynamics of livestock in southern peninsular India- a compound growth rate analysis. *Veterinary world*, **4**(2): 68-74.

**Kaur, P. and A. S. Bhullar. 2012.** Structure of milk production in Punjab. An analysis of treads and sources of growth. *Indian Journal of Dairy Science*, **65**(6): 24-28.

**Kumar, P. 2017.** Shade management in beverage crops. *Innovative farming*, **2**(1): 26-31.

**Mahadevaiah, G. S. 2014.** Export performance of cashew from India. *Agricultural Economics Research Review*, **18**(2): 253-259.

**Shiferaw, M. T. 2015.** Export Marketing Strategies of Coffee in India and Ethiopia. Ph.D. (Mktg) Thesis (Unpub.), Kerala Agricultural University, Thrissur, India.

**Vinod, N. R. and Nethrayini K. R. 2018.** Changing Direction and Magnitude of India's Coffee Export in the Post-Liberalization Era. *International Journal of Horticulture*, **2**(1): 1-7.

**How to cite this article?**
Varun Gangadhar, Pramit Pandit and Pooja, B.S. 2018. Growth rate analysis of Indian value added coffee. *Innovative Farming*, **3**(4): 150-157.