Analysis of Growth Rates and Instability of Export of Tomato and its products from India.

Abstract

The study explores the analysis of the growth rates and instability of tomato area, production and export of tomato and its products from India during the study period 2001-2002 to 2019-2020 based on secondary data. The period of the study was 20 years, which was divided into three periods i.e., Period (2001-2002 to 2009-2010), Period (2011-2012 to 2019-2020) and overall period (2001-2002 to 2019-2020). The data collected from various publications including FAO, India stats, APEDA and APMC. The data was analysed with the help of analytical tool i.e., compound growth rate (CGR) and coefficient of variation (CV). In overall period, positive growth rate and significant was observed in area, production, export quantity of tomato, export value of tomato, export quantity of tomato paste, export quantity of tomato peeled and export value of tomato peeled, with CGR of 3.66, 6.58, 8.06, 3.60, 10.46, 4.34 and 1.06 per cent, respectively. The export of tomato juice and export of tomato paste was showed negative growth rate and non - significant. During overall period, the higher coefficient of variation was observed in export quantity of tomato juice, tomato peeled, tomato paste and fresh tomato with CV of 145.56, 91.35, 82.87 and 82.97 per cent respectively. The lower CV was observed in area, and production with a value of 23.53 and 36.56 per cent respectively. The result was concluded that the tomato and its products have better export potential in future.

Key words: compound growth rate, Instability, coefficient of variation, export.

Introduction

Tomato (Solanum lycopersicum) is most important vegetable crop in India and worldwide. It belongs to Solanaceae family, originated in South America.Tomato is widely used vegetable and consumed as both raw and cooked form, and also in the form of processed products. It is a short duration vegetable crop, botanically it is fruit for the purpose of trade.Tomato is protective supplementary food is called as poor man's orange. India ranks second in its area production of tomatoes after China. In India, tomato rank third after potato and onion. The majority of tomatoes are produced in India are consumed as fresh as well as processed products.Around 80% of the tomatoes are consumed fresh and 20% of tomatoes are used for processing. Processed products of tomatoes are tomato paste, tomato juice, tomato peeled, etc. The growing season of tomato in India is throughout the year because of the increasing demand for tomatoes within the market. The important tomato growing states in India are Andhra Pradesh, Madhya Pradesh, Karnataka, Gujarat, and Odisha. Andhra Pradesh is the major state in terms of area as well as production of tomatoes in India. During the year 2019-2020 area of tomato cultivation was 61 thousand hectare and production of tomato was 2810 thousand MT. Andhra Pradesh shares 20.2 per cent of tomato production of the country. India contributes to more than 11 per cent of the world 's total tomato production. The total cultivated area of tomato in India during 2019-2020 was 8,13, 000 ha and tomato production was 20, 57, 300 tonnes. India is one of the major exporters of tomatoes which exports tomatoes to more than 50 countries. During the year 2019-2020, India exported 93,621.53tonnes with an export value of Rs.22,259.85 Lakhs. (www. Apeda.org).Considering the importance of the tomato hepresent study was analysed the growth and instability of tomatoes and its products.**Objectives of the study**

1. To estimate the growth in area, production and export of tomatoes and tomato products, and 2. To work out the instability in area, production and export of tomatoes and tomato products.

Research Methodology

Nature and Source of data

The present study was based on secondary data. The secondary data was collected from Agricultural and Processed Food Products Export Development Authority (APEDA), Food and Agricultural Organization (FAO), Indian Agristat, Agricultural Produce Marketing Committee (APMC), various Government publications/ website.

Period of study

The data regarding area, production, export quantity and value of tomatoes, and export quantity and value of tomato products in India was collected from2001-2002 to 2019-2020. This includes 20 years of data. The period has been divided into three periods.

Period I (2001-2002 to 2009- 2010)

Period II (2011-2012 to 2019-2020)

Overall period (2001 – 2002 to 2019 – 2020)

Analytical tools and techniques.

The data was collected from secondary source subjected to appropriate analytical techniques in order to arrive at a meaningful conclusion.The different analytical technique used for the study were

Growth rate analysis and Instability analysis

1) Growth rate analysis

The growth rate of area, production, export of tomato and its products from India was studied by using compound growth rates. The growth rate was estimated using following model

$Y=a.b^t$…….... (1)

Y = Dependent variable for which growth rate was estimated i.e.

area, production and export.

a = Intercept

b = Regression Coefficient

t = Time Variable

This equation was estimated after transforming (1) as follows,

Log y = log a + t Log b……. (2)

Then the per cent annual compound growth rate was computed by using the relationship.

CGR= [Antilog (log b) – 1] × 100…… (3)
The significance of the regression coefficient was tested using the 't' test

2) Degree of instability

In order to study the instability in the export performance of tomatoes and its products coefficient of variation was used. Coefficient of variation (CV):

Coefficient of Variation (CV) = $(\sigma/ \bar{x}) *100$

σ = Standard deviation

$\bar{x}$= Arithmetic mean

Result And Discussion.

Keeping in the view of the objective of the study the necessary data collected from different sources were analysed and interpreted. The results obtained are presented and discussed below.

1.Compound growth rate in area, production, export of tomatoes, and tomato products.

The exponential growth function was used for estimation of compound growth rate of area,

production and export of tomatoes and tomato products. The study was divided into three periods namely, period (2001-2002 to2009-2010), period (2010-2011 to 2019-2020) and overall period (2001-2002 to 2011-2020).

The results from table 1 revealed the compound growth rate of area, production, export quantity and export value. In period , growth rate of area rate was 3.85 per cent per annum and in period , it was -1.47 per cent per annum and found to be statistically significant at five percent level of significance in the first period. Growth rate of production in period was 6.10 per cent per annum. In period , it was 1.68 per cent per annum. Growth rate in export quantity in period was 0.08 per cent per annum and period was 7.73 per cent per annum. Growth rate in export value in period showed negative growth rate of -1.88 per cent per annum and in period , it was

negative growth rate of -4.33 per cent per annum. The overall period area of tomatoes had shown a positive and significant growth rate of 3.66 per cent, production of 6.58 per cent, export quantity of 8.60 per cent and export value of 3.60 percent. It was found area, export of tomatoes, are significant at five percent level of significance.

The result presented in Table 2 revealed that, during the period , the compound growth rate of tomato juice export quantity was -12.96 per cent per annum, and export value was 3.99 per cent per annum. Tomato paste had export quantity of 8.37 per centper annum, and export value was -6.68 per cent per annum. The tomato peeled export quantity was 8.81 per cent per annum and export value was 9.12 per cent per annum.

In the period , the compound growth rate of tomato juice export quantity was 1.26 per cent per annum and export value was -1.35 per cent per annum. Tomato paste export quantity and export value were 2.42 and 5.74 per cent per annum, respectively. Tomato peeled export quantity was -19.81 per cent and export value was 13.61per cent per annum. The overall period of 20 years compound growth rate of tomato products, tomato juice export quantity and export value were showed negative andnon-significant with -1.28 and -17.06 per cent respectively. Tomato paste export quantity was 10.46 per cent per annum and export value was -1.10 percent per annum. Tomato peeled export quantity and export value were 4.34 and 1.06 per cent respectively. It was found that positive and significant growth.

2.**Degree of instability of area, production, export of tomatoes and tomato products.**

The coefficient of variation function was used for estimation of degree of instability in area, production, export of tomatoes and tomato products.

Results from Table 3 revealed that the area of tomato exhibited less variability with coefficient of variation at 11.7 per cent and 6.34 per cent in period and period , respectively. It was highest in overall period with coefficient of variation at 23.53 per cent. Production of tomato has showed less variability with coefficient of variation at 18.53 per cent and 7.06 per cent in period and period respectively and it was highest in overall period with coefficient of variation at 36.56 per cent. The export quantity of tomatoes exhibited highest variability with coefficient of variation at 97.60 per cent in period and less variation of 62.41 per cent in period and overall period with coefficient of variation at 82.97 per cent. The export value of tomatoes exhibited highest variability with coefficient of variation at 88.55 percent and less variation of 57.63 per cent in period and overall period with coefficient of variation at 71.77 per cent.

Table 4 revealed that the export quantity of tomato juice exhibited highest variation of 137.26 per cent in period and less variation of 107.52 per cent in period and overall period with co-efficient of variation at 145.56 per cent. Export value of tomato juice was showed highest variation in period i.e.,86.74 per cent, and less variation in period with 43.98 per cent and overall period with co-efficient of variation at 65.39 per cent.

The export quantity of tomato paste showed highest variation of 82.47 per cent in overall period as compared to period and period i.e., 38.45 per cent and 54. 22 per cent, respectively. Export value of tomato paste was exhibited highest variation of 59.21 per cent in period and less variation of 30.77 per cent in period and overall period with co-efficient of variation at 51. 82 per cent.

The export quantity of tomato peeled showed highest variation of 91.35 per cent in overall as period as compared to period and period i.e., 54.20 per cent and 77.22 per cent, respectively. Export value of tomato peeled showed highest variation of 66.54 per cent in period and less variation of 51.16 per cent in period and overall period with coefficient of variation at 57.39 per cent. It was concluded based on result showed in overall period of study that coefficient of variation was found less in area, production, and export value of tomato than the export quantity of tomatoes. The export quantity of tomato juice, tomato paste, tomato peeled were exhibited high variation with coefficient of variation than export value of tomato juice, tomato peeled, and tomato paste

Table 1. Compound growth rates of area,production, export of tomatoes.

S.No.	Particulars	Period □	Period □	Overall Period
1	Area	3.85	-1.47	3.66**
2	Production	6.10	1.68	6.58*
3	Export quantity	0.08	7.73	8.06**
4	Export value	-1.88	-4.33	3.60**

Note: ** denotes significant at 5% level, *denotes significant at 10%level.

Table 2. Compound growth rates of export of tomato products

S.No.	Particulars		Period □	Period □	Overall period
1	Tomato juice	Export quantity	-12.96	1.26	-1.28
		Export value	3.99	-1.35	-17.06**
2	Tomato Paste	Export quantity	8.37**	2.42	10.46*
		Export value	-6.68	5.74**	-1.10*
3	Tomato Peeled	Export quantity	8.81**	-19.81	4.34**
		Export value	9.12	13.61*	1.06**

Note: ** denotes significant at 5% level, * significant at 10% level

Table 3. Degree of instability in area, production, export quantity and export value of tomatoes

S.No.	Particulars	Parameters	Period □	Period □	Overall Period
1	Area	Mean	533710	825503	679606.5
		SD	62858.19	52412.77	159934.20
		CV%	11.77	6.34	23.53
2	Production	Mean	9242.36	18805.81	14024.08
		SD	1712.72	1327.72	5127.66
		CV%	18.53	7.06	36.56
3	Export quantity	Mean	20600.77	47502.26	34051.51
		SD	20106.82	29648.75	28254.90
		CV%	97.60	62.41	82.97
4	Export value	Mean	24683.31	39748.68	32216.00
		SD	21859.28	22910.35	23123.51
		CV%	88.55	57.63	71.77

Table 4. Degree of instability in export of tomato products

S.No.	Particulars		parameters	Period □	Period □	Overall period
1	Tomato juice	Export quantity	Mean	36.9	86.4	61.65
			SD	39.67	118.59	89.73
			CV%	107.52	137.26	145.56
		Export value	Mean	44457.08	23489.19	33973.13
			SD	19555.51	20376.51	22215.26
			CV%	43.98	86.74	65.39
2	Tomato Paste	Export quantity	Mean	109.9	392.7	251.3
			SD	42.25	212.95	208.26

			CV%	38.45	54.22	82.87
		Export value	Mean	42754.28	32373.04	37563.66
			SD	25318.2	9963.43	19468.43
			CV%	59.21	30.77	51.82
3	Tomato peeled	Export quantity	Mean	176.60	455.10	315.85
			SD	95.72	351.43	288.54
			CV%	54.20	77.22	91.35
		Export value	Mean	52475.58	48932.37	50703.97
			SD	268484.85	32562.52	29103.60
			CV%	51.16	66.54	57.39

Note: SD-Standard Deviation and CV- Coefficient of Variation.

(Source: www.faostat.fao.org), (Export Quantity in tonnes, export value in Rs lacs)

Conclusion

The present study was undertaken to analyse the compound growth rates, during the study periods have shown positive and significant. The study revealed that there is a scope to increase the export of tomatoes and its products. The high instability with coefficient of variation in tomato juice, paste, peeled and tomatoes than its area and production. Processing of tomatoes and export of tomato products in India is less than other countries. So that there is need to improve the technology and more facilities for processing. Most of the tomato varieties grown in India used for table purposes, less varieties of tomatoes were used for processing. So, there is need to improve more tomato varieties for processing purpose.

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