

Research Paper

Economics of Growth Performance, Instability and Decomposition Analysis of Tobacco in India

Sumit B. Wasnik^{1*}, Sunita N. Suryawanshi² and Sneha Pandey¹

¹Department of Agricultural Economics, CoA, IGKV, Raipur, Chhattisgarh, India

²Department of Agril. Economics, College of Agriculture, Nagpur, Maharashtra, India

*Corresponding author: sumitwasnik123@gmail.com (ORCID ID: 0000-0001-5613-5164)

Received: 17-01-2022

Revised: 25-02-2022

Accepted: 02-03-2022

ABSTRACT

This paper studied the state wise growth and instability in area, production, productivity and decomposition analysis of major tobacco producing states in India. The nature of data used for the study is entirely based on secondary from 1987-88 to 2016-17. India's share in world production of tobacco was doubled from 468 th tonnes during TE 1989-90 to 822 th tonnes during TE 2016-17. It was found that Gujarat and Andhra Pradesh ranked first in area and production while, Uttar Pradesh has found high productivity among major tobacco producing states of India. Uttar Pradesh found to be high instability for area and production during period I and overall period respectively. Gujrat, Uttar Pradesh and Tamil Nadu found to be high instability for area, production and productivity of tobacco, respectively. For growth rate performance, Gujarat found highly positive and significant growth rate in area and production with 9.31 per cent and 7.99 per cent per annum during period II while, Uttar Pradesh found highly positive growth rate with 6.30 per cent per annum, all together with 10 per cent level of significance. The percentage contribution of relative period wise and state wise effect in production of tobacco in area, productivity and their interaction were found highest and in similar way for Karnataka, Tamil Nadu and Uttar Pradesh during period I, period II and overall period respectively. But the contribution of area, productivity and their interaction were found highest during period II i.e., 126.26 per cent 1998.80 per cent and 30.61 per cent, respectively.

HIGHLIGHTS

- India is the world's second largest producer of tobacco after China and Brazil in the global market.
- Worldwide on an average more than 6 million tonnes of tobacco produced per year.
- China and India produce together more than 50 per cent of World's tobacco.

Keywords: Tobacco, CGR, CV, Cuddy and Della Valle, decomposition analysis.

Agriculture is the keystone for the Indian economy. Since pioneer study of N. Patted (2012) have assessed the compound annual growth rate of tobacco in area, production and productivity as observed 0.79, 1.67 and 1.04 percent respectively for a period of 1994-95 to 2010-11. Insignificant growth in area and production signifies less importance to the crop because the crop is neither a food crop nor a crop of high commercial importance. It may be noted that the growth rate of productivity of tobacco for the same period was slightly higher than growth rate of area and production as farmers used high

yielding variety along with adoption of improved cultivation practices.

Tobacco production in the world increasing since the demand for tobacco products continually growing. It cultivated in both tropical and sub-tropical climatic parts of the world. The area under tobacco in the world during 2016-17 was 3.57 million

How to cite this article: Wasnik, S.B., Suryawanshi, S.N. and Pandey, S. (2022). Economics of Growth Performance, Instability and Decomposition Analysis of Tobacco in India. *Economic Affairs*, 67(02): 87-94.

Source of Support: None; **Conflict of Interest:** None



ha with a production of 6.39 million tonnes and productivity of 1791.30 Kg/ha. (FAOSTAT, 2021).

Tobacco “Golden Leaf” is one of the important commercial crops grown in India and being so it is vital to the economy. It provides employment directly and indirectly to 45.70 million people and contributed as much as ₹ 22,737.07 crore as excise duty and ₹ 5,975.08 crore in terms of foreign exchange to the National exchequer, during 2016-17. India has a prominent place in the production of more than 0.80 million tonnes with average productivity of about 1470.17 Kg/ha and is being cultivated in an area of more than 0.40 million Ha (0.24% of country’s total arable land) of tobacco in the world. India stands second in production and export of tobacco in the world. It produces different styles of FCV tobacco viz., cigarette tobacco, *bidi* tobacco, chewing tobacco, hookah tobacco, cheroot tobacco, cigar wrapper tobacco, cigarfiller tobacco, oriental tobacco, dark fire cured tobacco, etc., which vary in their physical and chemical characteristics under diverse climatic conditions (Tobacco Board, Annual Report, 2016-17). Even though, the cultivation of tobacco is spread all over the country, the commercial cultivation of tobacco is concentrated in states like Andhra Pradesh, Karnataka, Gujarat, Maharashtra, Bihar, Tamil Nadu and West Bengal. The present study was depicted to find out growth performance, instability and decomposition analysis of major tobacco producing states in India.

DATA AND METHODOLOGY

This study is based on the secondary data collected for the period of 1987-88 to 2016-17 from the various official sources. The period of study was divided into three periods i.e., period I (from 1987-88 to 2001-02), period II (from 2002-03 to 2016-17) and overall period (1987-88 to 2016-17). The state wise growth, instability and contribution of area and productivity in production of tobacco was analyze by following statistical techniques.

(a) Growth rate analysis

By taking time as the independent variables and the area, production, productivity and export volume and their respective values of the tobacco as the dependent variables, the compound growth rates were estimated by using following exponential growth function.

$$Y = a b^t$$

Where, Y = Area/Production/Productivity of tobacco in India, t = Time variable, b = Regression coefficient and a = Intercept.

The above equation can be written as, $\log Y = \log a + t \log b$. The average annual compound growth rates ‘ r ’ will be computed by using the following formula.

$$CGR (r) = [\text{Antilog} (\log b) - 1] \times 100$$

(b) Instability analysis

The present study applies the Cuddy Della Valle Index and coefficient of variation (CV) for measuring the instability. Instability in tobacco is expected to hamper the process of economic development.

$$CV (\%) = \frac{SD}{\bar{X}}$$

Where, SD = Standard deviation, \bar{X} = Arithmetic mean and CV = Coefficient of variation.

Cuddy Della Valle index (CIDV) de-trends the given series by using coefficient of determination (R^2) which is a better measure to capture instability in agricultural production. A low value of this index indicates the low instability in farm production and vice-versa (Cuddy and Della Valle, 1978).

$$CDVI (\%) = CV \times \sqrt{1 - R^2}$$

Where, CV is the coefficient of variation in percent, and \bar{R}^2 is the coefficient of determination from time trend regression adjusted by the number of degrees of freedom.

(c) Decomposition analysis

To measure the effect of area, productivity and their interaction towards increasing production of the crop concern, the relative contribution to the total output change measured by the decomposition analysis model as given below. Sharma and Subramanyam (1984) redeveloped the model and several research workers Kalamkar, (2003) and Jagannath *et al.* (2013) used this model and studied growth performance of crops on state. The method state that if A_{0t} , P_0 and Y_{0t} respectively area,

production and productivity in base year and A_n , P_n and Y_n are values of the respective variable in n^{th} year item.

$$\text{Production} = \frac{A_0 \Delta Y}{\Delta P} \times 100 + \frac{Y_0 \Delta A}{\Delta P} \times 100 + \frac{\Delta Y \Delta A}{\Delta P} \times 100$$

Production = Productivity effect + Area effect + Interaction effect

Thus, the total change in production can be decomposed into three components viz., yield effect, area effect and the interaction effect due to change in yield and area.

RESULTS AND DISCUSSION

Growth trends of Indian tobacco

In India, during 30 years (1987-88 to 2016-17) of study period it was observed the average of area, production and productivity of tobacco i.e., 402.62 th Ha, 595.02 th tonnes and 1470.17 Kg/ha, respectively. While, the area, production and

productivity of tobacco in India were increase from 324 th ha, 359 th tonnes and 1108 Kg/ha during 1987-88 to 399.63 th Ha, 805.51 th tonnes and 2016 Kg/ha during 2016-17. Fig. 1 is the time series representation of indices in area, production and productivity of Indian tobacco to determine growth trend during year 1987-88 to 2016-17. The indices constructed using base year 1987-88. It is evident from the table 1 that highly fluctuating trend was observed in production latter it shows increasing trend from 2007-08. It was depicted that maximum change observed during 2016-17 in production and productivity while minimum change was observed during 2000-01 in both area and production.

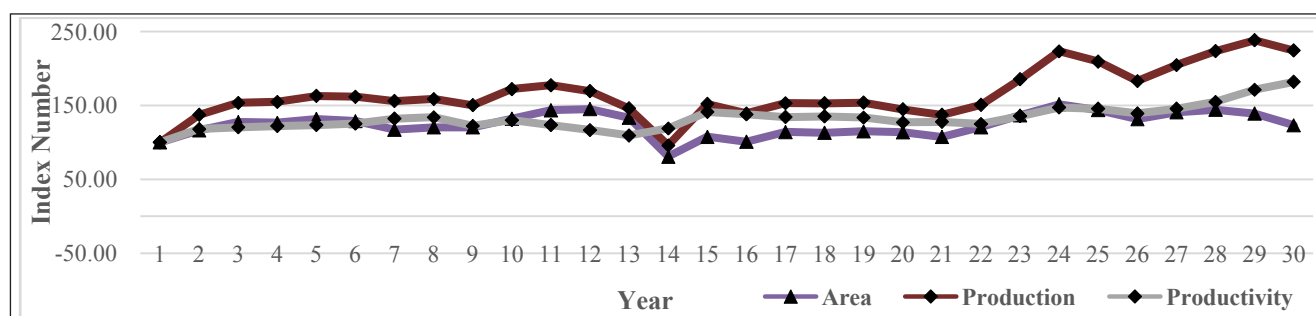
Production performance which was calculated on triennium ending bases depicted from table 1 that the tobacco production of China was highest among other major contributing countries in the world. India's share of tobacco production in the world was increase from 468 Th tonnes during TE 1989-90 to 822 Th tonnes during TE 2016-17. The percentage share of India was 12.01 per cent of which worlds

Table 1: Production performance of major tobacco producing countries in the world

Year	China	India	Brazil	USA	Indonesia	Other countries	World tobacco	Asia
Rank	1	2	3	4	5			
TE 1989-90	2523.35 (37.69)	467.80 (6.99)	422.47 (6.31)	593.54 (8.87)	103.53 (1.55)	2583.67 (38.59)	6694.35 (100.00)	3963.59 (59.21)
TE 1996-97	2609.48 (38.92)	575.93 (8.59)	484.06 (7.22)	660.96 (9.86)	140.44 (2.09)	2233.81 (33.32)	6704.68 (100.00)	4218.60 (62.92)
TE 2006-07	2614.48 (39.57)	540.16 (8.18)	903.70 (13.68)	340.92 (5.16)	154.95 (2.35)	2053.08 (31.07)	6607.27 (100.00)	4093.62 (61.96)
TE 2016-17	2750.34 (40.23)	821.22 (12.01)	802.41 (11.74)	336.31 (4.92)	172.27 (2.52)	1954.02 (28.58)	6836.56 (100.00)	4443.71 (65.00)

Note: All figures in Thousand Tonnes except Figures in parentheses indicating percentage share to the world.

Source: Author's calculation (TE-Triennium Ending) using FAOSTAT Official Data accessed on 1/11/2021.



Source: Author's calculation by using data from Agricultural Statistics at a Glance 2019 (Directorate of Economics & Statistics, DAC&FW) Govt. of India.

Fig. 1: Growth trend in area, production, productivity of tobacco in India

production was 6836.56 th tonnes. It was also found that China and India share more than 50 per cent of tobacco production in the world. Similarly, Asia was highest contributor of world tobacco production which accounts share of 65 per cent during TE 2016-17. It was due to China followed by India as their major share in the world. Hence, Asia found to be largest contributor of tobacco in the world.

Growth and percentage share in area, production, productivity of tobacco

From table 2, the growth share of tobacco in India as a whole was found increased from 371 Th Ha (TE 1989-90) to 439 Th Ha (TE 2016-17) in area, 467 Th tonnes (TE 1989-90) to 821 Th tonnes (TE 2016-17)

in production and 1250 Kg/Ha (TE 1989-90) to 1876 Kg/Ha (TE 2016-17) in productivity. The percentage share of India's tobacco in area and production was found highest i.e., 11.62 per cent and 12.01 per cent respectively, while productivity of India and the world was 1876.67 Kg/Ha and 1808.13 Kg/Ha respectively, during TE 2016-17.

It was observed from the Table 3 that during 1987-88 to 2016-17 Gujarat ranked first among the major Indian states in area with share of 40.45 per cent during TE 2016-17 while, Andhra Pradesh ranked first in production with share of 39.25 per cent during TE 2016-17, respectively. It was evident that Uttar Pradesh was observed high productivity state with 5821.66 Kg/Ha during TE 1996-97 among the

Table 2: Growth and share in area, production, productivity of tobacco in India and world

Year	India	World	India	World	India	World
	Area (000' Ha)		Production (000' Tonnes)		Productivity (Kg/Ha)	
TE 1989-90	371.37 (8.20)	4527.01 (100.00)	467.80 (6.99)	6694.35 (100.00)	1250.00	1478.37
TE 1996-97	402.67 (9.28)	4340.31 (100.00)	575.93 (8.59)	6704.68 (100.00)	1428.33	1543.07
TE 2006-07	369.27 (9.47)	3897.87 (100.00)	540.16 (8.18)	6607.27 (100.00)	1462.67	1695.23
TE 2016-17	439.28 (11.62)	3779.96 (100.00)	821.22 (12.01)	6836.56 (100.00)	1876.67	1808.13

Note: Figures in parentheses indicating percentage share to the World production.

Source: Author's calculation by using data from Agricultural Statistics at a Glance 2019, Directorate of Economics & Statistics (DAC&FW) Govt. of India and FAOSTAT accessed on 1/11/2021.

Table 3: Growth and share of major states in area, production, productivity of tobacco in India

Year/States	Andhra Pradesh	Gujarat	Karnataka	Tamil Nadu	Uttar Pradesh	Other States	India
	Area ('000' Ha)						
TE 1989-90	145.00 (39.04)	94.57 (25.46)	46.57 (12.54)	6.70 (1.80)	14.60 (3.93)	63.93 (17.22)	371.37 (100.00)
TE 1996-97	159.17 (39.53)	101.37 (25.17)	58.43 (14.51)	8.77 (2.18)	14.93 (3.71)	60.00 (14.90)	402.67 (100.00)
TE 2006-07	131.17 (35.52)	71.30 (19.31)	98.33 (26.63)	4.90 (1.33)	21.73 (5.89)	41.84 (11.33)	369.27 (100.00)
TE 2016-17	105.00 (23.95)	177.00 (40.45)	89.33 (20.45)	1.80 (0.50)	29.00 (6.75)	34.52 (7.90)	439.28 (100.00)
Production (000' Tonnes)							
TE 1989-90	169.57 (36.25)	151.97 (32.49)	34.23 (7.32)	8.50 (1.82)	44.07 (9.42)	59.47 (12.71)	467.80 (100.00)
TE 1996-97	187.07 (32.48)	188.00 (32.64)	56.50 (9.81)	16.37 (2.84)	87.33 (15.16)	40.67 (7.06)	575.93 (100.00)
TE 2006-07	191.83 (35.51)	113.90 (21.09)	56.67 (10.49)	7.47 (1.38)	121.83 (22.56)	48.46 (8.97)	540.16 (100.00)
TE 2016-17	322.33 (39.25)	241.00 (29.35)	68.17 (8.30)	8.33 (1.01)	123.67 (15.06)	57.72 (7.03)	821.22 (100.00)
Productivity (Kg/Ha)							
TE 1989-90	1156.67	1396.33	735.00	1300.33	2997.33	930.40	1250.00
TE 1996-97	1176.04	1853.23	984.47	1946.54	5821.66	724.12	1428.33
TE 2006-07	1462.00	1597.00	580.67	1523.00	5619.67	1158.23	1462.67
TE 2016-17	3286.67	1372.33	763.33	2974.67	4165.67	4921.94	1876.67

Note: Figures in parentheses indicating percentage share to the India.

Source: Author's calculation by using official data from Agricultural Statistics at a Glance 2019, Directorate of Economics & Statistics (DAC&FW) Govt. of India.

other major states of India. It was also found that in case of Tamil Nadu where its growth in area as well as in production was least.

Compound growth rates and instability analysis

The data in table 4 represents growth and instability in area of major tobacco producing states in India during year 1987-88 to 2016-17. Regarding instability analysis table below was found similar results for co-efficient of variation and Cuddy Della Valle index to the respective states for all three periods. It was evident that Uttar Pradesh shown highest instability for both CV and CDVI with variation i.e., 30.91 per cent and 31.31 per cent respectively, during period I among other states. Similarly, Gujarat found to be high instability during period II and overall period i.e., 48.02 per cent and 35.67 per cent respectively, however it was highest of all other major states in India. Instability for India as a whole represents high variation with 13.64 per cent and 14.13 per cent for CV and CDVI respectively.

It was enunciated from the table that Karnataka has positive and highest growth rate of 4.39 per cent and 3.38 per cent per annum with statistically significant at 10 per cent level of significance during period I and overall period respectively, while Gujarat has found to be positive and statistically significant with highest growth rate of 9.31 per cent per annum during period II at 10 per cent level of significance. It was evident that for period I except Karnataka all other major states were found to be statistically non-significant. Similarly, in period II only Karnataka and Gujarat found to be statistically non-significant. Again, during overall period, only Gujarat found to be statistically non-significant. Also, India as a whole only during period II it was found positive and statistically significant growth rate with 2.11 per cent per annum at 10 per cent level of significance while period I and overall period found statistically non-significant.

It was evident from the table 5 that production in Uttar Pradesh found highly instable state in terms of both CV and CDVI during period I with 50.79

Table 4: State-wise growth and instability in area of major tobacco producing states in India during year 1987-88 to 2016-17

Periods	Particulars	Andhra Pradesh	Gujarat	Karnataka	Tamil Nadu	Uttar Pradesh	Other States	India
Period I (1987-88 to 2001-02)	Mean	157.34	99.25	59.82	7.58	15.06	56.63	395.68
	SD	37.34	11.57	12.96	1.63	4.66	8.33	53.96
	CV	23.73	11.65	21.66	21.53	30.91	14.71	13.64
	CDVI	23.78	11.96	10.68	22.11	31.31	7.89	14.13
	CGR	-1.89 ^{NS} (0.01)	0.39 ^{NS} (0.00)	4.39 ^{***} (0.00)	0.64 ^{NS} (0.01)	-3.38 ^{NS} (0.02)	-3.04 ^{***} (0.00)	-0.21 ^{NS} (0.00)
Period II (2002-03 to 2016-17)	Mean	134.25	106.91	102.50	4.78	24.31	36.36	409.56
	SD	28.30	51.34	12.61	1.38	2.88	4.16	50.66
	CV	21.08	48.02	12.30	28.92	11.84	11.44	12.37
	CDVI	20.98	29.82	12.75	23.73	6.48	9.66	8.47
	CGR	-1.37 ^{NS} (0.01)	9.31 ^{***} (0.01)	0.15 ^{NS} (0.00)	-4.63 ^{**} (0.01)	2.56 ^{***} (0.00)	-1.45 ^{**} (0.00)	2.11 ^{***} (0.00)
Overall Period (1987-88 to 2016-17)	Mean	145.80	103.08	81.16	6.28	19.53	46.49	402.62
	SD	34.61	36.77	25.08	2.06	6.07	12.17	51.91
	CV	23.74	35.67	30.90	32.81	31.08	26.18	12.89
	CDVI	22.66	35.18	14.73	23.64	28.34	9.82	12.63
	CGR	-1.11 ^{**} (0.00)	1.00 ^{NS} (0.00)	3.38 ^{***} (0.00)	-2.97 ^{***} (0.00)	3.02 ^{**} (0.00)	-2.72 ^{***} (0.00)	0.42 ^{NS} (0.00)

Note: 1. *, ** and *** represents significance at 0.01, 0.05 and 0.1 level respectively and NS- Non-Significant.

2. Figures in parentheses indicate respective standard error.

Source: Estimated by the author using official data from Agricultural Statistics at a Glance 2019, Directorate of Economics & Statistics (DAC&FW) Govt. of India.

Table 5: State-wise growth and instability in production of major tobacco producing states in India during year 1987-88 to 2016-17

Periods	Particulars	Andhra Pradesh	Gujarat	Karnataka	Tamil Nadu	Uttar Pradesh	Other States	India
Period I (1987-88 to 2001-02)	Mean	189.81	159.66	48.73	11.90	82.07	45.90	538.07
	SD	42.78	31.49	10.99	3.09	41.69	8.66	83.96
	CV	22.54	19.72	22.54	25.98	50.79	18.87	15.60
	CDVI	23.12	19.86	15.76	25.56	52.15	8.42	16.09
	CGR	-0.90 ^{NS} (0.01)	-1.15 ^{NS} (0.01)	4.30 ^{***} (0.00)	1.85 ^{NS} (0.01)	2.94 ^{NS} (0.02)	-3.64 ^{***} (0.00)	0.44 ^{NS} (0.00)
Period II (2002-03 to 2016-17)	Mean	255.91	171.09	71.65	7.81	96.12	49.38	651.97
	SD	66.38	77.39	24.27	1.54	36.19	8.87	129.90
	CV	25.94	45.23	33.87	19.73	37.65	17.96	19.92
	CDVI	16.19	32.96	32.14	20.13	37.71	13.25	9.82
	CGR	4.86 ^{***} (0.00)	7.99 ^{***} (0.01)	2.79 ^{NS} (0.01)	-0.89 ^{NS} (0.01)	-2.45 ^{NS} (0.01)	2.73 ^{***} (0.00)	4.00 ^{***} (0.00)
Overall Period (1987-88 to 2016-17)	Mean	222.86	165.38	60.19	9.85	89.09	47.64	595.02
	SD	64.35	58.34	21.87	3.18	39.01	8.79	122.08
	CV	28.87	35.28	36.34	32.24	43.79	18.45	20.52
	CDVI	24.15	35.34	25.86	27.53	43.66	18.64	16.33
	CGR	1.98 ^{***} (0.00)	0.74 ^{NS} (0.00)	2.74 ^{***} (0.00)	-1.92 ^{**} (0.00)	1.61 ^{NS} (0.01)	0.25 ^{NS} (0.00)	1.49 ^{***} (0.00)

Note: 1. *, ** and *** represents significance at 0.01, 0.05 and 0.1 level respectively and NS- Non-Significant.

2. Figures in parentheses indicate respective standard error.

Source: Estimated by the author using official data from Agricultural Statistics at a Glance 2019, Directorate of Economics & Statistics (DAC&FW) Govt. of India.

per cent and 52.15 and overall period with 43.79 per cent and 43.66 per cent respectively, while during period II Gujarat found to be highly instable for CV with 45.23 per cent and Uttar Pradesh for CDVI with 37.71 per cent. As for India as a whole, it was reported highly instable during overall period for both CV and CDVI with 20.52 per cent and 16.33 per cent respectively.

It was revealed from table 5 that Karnataka has highly positive and statistically significant growth rate for period I i.e., 4.30 per cent per annum and overall period i.e., 2.74 per cent with 10 per cent level of significance while Gujarat found highly positive and statistically significant growth rate of 7.99 per cent per annum with 10 per cent level of significance. During period I, except Karnataka, all other major states were found to be statistically non-significant. Similarly, during period II, Karnataka, Tamil Nadu and Uttar Pradesh found statistically non-significant growth rate. Also, during overall period, Gujarat and Uttar Pradesh found statistically non-significant growth rates. India's tobacco production found to be highly positive and

statistically significant growth rate of 4 per cent per annum with 10 per cent level of significance.

The results presented in table 6 was the state wise growth and instability in productivity of major tobacco producing states in India. It was observed that Tamil Nadu found highly instable in both CV and CDVI with 51.40 per cent and 45.52 per cent respectively during period II. Instability i.e., CV and CDVI was found different for different states both in period I and overall period. Compared to period I and period II, India found highly instable during overall period in both CV and CDVI with 12.59 per cent and 8.16 per cent respectively.

Table 6 enunciate the highest compound growth rate in productivity for Uttar Pradesh during period I with positively statistically significant growth of 6.40 per cent per annum at 10 per cent level of significance. Similarly, Andhra Pradesh found positive and highly significant growth rate in both the periods i.e., period II and overall period with 6.32 per cent and 3.12 per cent respectively at 10 per cent level of significance. During period I, except for Uttar Pradesh the growth rate of all other major

Table 6: State-wise growth and instability in productivity of major tobacco producing states in India during year 1987-88 to 2016-17

Periods	Particulars	Andhra Pradesh	Gujarat	Karnataka	Tamil Nadu	Uttar Pradesh	Other States	India
Period I (1987-88 to 2001- 02)	Mean	1228.95	1515.83	822.59	1577.84	5224.64	822.23	1357.80
	SD	168.19	379.75	148.55	269.68	1519.48	102.74	110.75
	CV	13.69	25.05	18.06	17.09	29.08	12.50	8.16
	CDVI	13.34	25.95	18.73	16.99	21.35	12.67	7.95
	CGR	1.01 ^{NS} (0.00)	0.38 ^{NS} (0.01)	-0.11 ^{NS} (0.00)	1.02 ^{NS} (0.00)	6.40 ^{***} (0.01)	-0.62 ^{NS} (0.00)	0.65 ^{NS} (0.00)
Period II (2002-03 to 2016- 17)	Mean	1996.13	1624.27	694.87	1815.13	3950.00	2025.43	1582.53
	SD	813.66	184.00	180.89	933.05	1616.99	1783.74	177.97
	CV	40.76	11.33	26.03	51.40	40.94	88.07	11.25
	CDVI	22.66	10.50	24.36	45.52	36.82	51.08	7.49
	CGR	6.32 ^{***} (0.00)	-1.20 ^{**} (0.00)	2.64 ^{NS} (0.01)	3.93 ^{***} (0.01)	-4.88 [*] (0.01)	11.54 ^{***} (0.01)	1.84 ^{***} (0.00)
Overall Period (1987-88 to 2016- 17)	Mean	1612.54	1570.05	758.73	1696.49	4587.32	1423.83	1470.17
	SD	696.76	298.33	175.12	685.53	1672.43	1384.02	185.13
	CV	43.21	19.00	23.08	40.41	36.46	97.20	12.59
	CDVI	25.07	19.11	22.89	38.52	35.62	63.74	8.16
	CGR	3.12 ^{***} (0.00)	0.39 ^{NS} (0.00)	-0.62 ^{NS} (0.00)	1.03 [*] (0.00)	-1.40 ^{NS} (0.00)	4.88 ^{***} (0.00)	1.07 ^{***} (0.00)

Note: 1. *, ** and *** represents significance at 0.01, 0.05 and 0.1 level respectively and NS- Non-Significant.

2. Figures in parentheses indicate respective standard error.

Source: Estimated by the authors using official data from Agricultural Statistics at a Glance 2019, Directorate of Economics & Statistics (DAC&FW) Govt. of India.

Table 7: State wise decomposition analysis (%) of tobacco in India (1987-2016)

Periods	Particulars	Andhra Pradesh	Gujarat	Karnataka	Tamil Nadu	Uttar Pradesh	Other States	India
Period I (1987- 88 to 2001-02)	Area effect	66.70	8.02	79.34	18.89	11.52	19.26	77.49
	Productivity effect	12.76	72.61	14.17	82.89	61.97	84.11	6.32
	Interaction effect	20.54	20.54	6.49	-1.78	26.51	-3.37	16.19
Period II (2002- 03 to 2016-17)	Area effect	9.11	78.55	126.26	-445.04	27.12	119.85	30.51
	Productivity effect	88.39	23.59	-9.46	1998.80	42.27	-34.30	56.60
	Interaction effect	2.50	-2.14	-16.80	-1453.76	30.61	14.44	12.89
Overall Period (1987-88 to 2016-17)	Area effect	36.91	44.50	103.61	-213.07	19.59	71.29	53.19
	Productivity effect	51.87	47.26	1.95	1040.84	51.78	22.87	32.33
	Interaction effect	11.21	8.24	-5.56	-727.77	28.63	5.85	14.48

states found statistically non-significant. While, during period II, only for Karnataka found non-significant growth rate. However, India's growth rate for period II and overall period was found positive and statistically significant with 1.84 per cent and 1.07 per cent per annum respectively at 10 per cent level of significance.

Decomposition analysis of tobacco in India

Table 7 represents the percentage contribution of relative period wise and state wise effect in production of tobacco in India. It was evident from the table that during period I, period II and overall period the highest contributors of area, productivity and their interaction was Karnataka, Tamil Nadu

and Uttar Pradesh. During period II the contribution of area, productivity and their interaction effect was found highest i.e., Karnataka (126.26%), Tamil Nadu (1998.80%) and Uttar Pradesh (30.61%) respectively. Similarly, India's contribution in area and their interaction effects were found to be highest during period I i.e., 77.49 per cent and 16.19 per cent respectively while period II i.e., 56.60 per cent for productivity effect. It was also found that interaction effect was negative during all three periods i.e., -1.78 per cent, -1453.76 per cent and -727.77 per cent respectively.

CONCLUSION

The study evident of increasing growth trend as well as their percentage share in area, production and productivity of tobacco in India as state wise and overall. There were little changes found in the area of tobacco in India while production and productivity observed doubled during the study period. Gujarat, Uttar Pradesh and Tamil Nadu found to be high instability in area, production and productivity of tobacco, respectively of which Uttar Pradesh found to be highly instable for area and production. There was increasing trend in growth rates of tobacco in the major producing states. The state wise as well as India's growth rates of tobacco in area, production and productivity in India were found to be positive and highly significant. The study was enunciating that Karnataka, Tamil Nadu and Uttar Pradesh has highest contributors of area, productivity and their interaction effect. The productivity effect was high and more concerned in tobacco production during all three periods. Though there are negative impact of tobacco consumption to the human being but it having some medicinal values too, however it has major contribution in the India's export in terms of value that's why country need to encourage production to cover major share of foreign earning from the export of tobacco.

REFERENCES

- Cuddy, J.D.A. and Valle, P.A.D. 1978. Measuring the instability of time series data. *Oxford J. Econ. Stat.*, **40**(1): 53-78.
- DACNET. 2019. Agricultural Statistics at a Glance, Directorate of Economics and Statistics, Department of Agriculture and Farmers welfare, Ministry of Agriculture, Government of India, New Delhi. Available at: https://eands.dacnet.nic.in/latest_2006.htm. (Last Accessed on: 1st November, 2021)
- FAO. 2021. Food and Agriculture Organization. Food and Agriculture Data, Crop and Livestock Products. Available at: <https://www.fao.org/faostat/en/#data/QCL>. (Last Accessed on: 1st November, 2021)
- Jagannath, Tayade, Nandeshwar, P. M., Shende, N. S., Mallesh, N.V. and Vinodakumar, S.N. 2013. Decomposition analysis of agricultural growth. *Ecology, Environment and Conservation*, **19**(4): 1-6.
- Kamalkar, S.S. 2003. Agricultural development and source of output growth in Maharashtra state. *Artha Vijnana Journal of the Gokhale Institute of Politics and Economics*, **XLV**(3&4): 297-324.
- Patted, N. 2012. Export performance and competitiveness of tobacco and its products from India. Unpublished Thesis submitted to the University of Agricultural Sciences, Dharwad, in partial fulfillment of the requirements for the Degree of Master of Science.
- Sharma, P.V. and Subramanyam, S. 1984. A note on the decomposition of the growth rate of aggregate crop output. *Agricultural Situation in India*, **39**(9): 691-694.
- TB. 2016. Tobacco Board Annual Report, Ministry of Commerce & Industry, Government of India. Available at: <https://tobaccoboard.com/tbdata/publicationsfiles/AR16-17ENG.pdf>. (Last Accessed on: 1st November, 2021)
- TII. 2016. The Tobacco Institute of India. Available at: <http://www.tiionline.org/publications/tii-booklets>. (Last Accessed on: 1st November, 2021)
- Vasavada, K.M. and Shiyani, R.L. 2021. Growth and Instability of Exports of Vegetable Products from India. *Economic Affairs*, **66**(3): 363-369.