



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.03

TPI 2018; 7(12): 58-62

© 2018 TPI

www.thepharmajournal.com

Received: 14-10-2018

Accepted: 18-11-2018

Kalpna Kumari

Ph.D., Research Scholar,
Department of Agricultural
Economics, Dr. Rajendra Prasad
Central Agricultural University,
Pusa, Samastipur, Bihar, India

Devegowda SR

Ph.D., Research Scholar,
Department of Agricultural
Economics, Banaras Hindu
University, Varanasi, Uttar
Pradesh, India

Saket Kushwaha

Vice-chancellor, Rajiv Gandhi
University, Papum Pare,
Itanagar, Arunachal Pradesh,
India

Correspondence

Kalpna Kumari

Ph.D., Research Scholar,
Department of Agricultural
Economics, Dr. Rajendra Prasad
Central Agricultural University,
Pusa, Samastipur, Bihar, India

Trend analysis of area, production and productivity of jute in India

Kalpna Kumari, Devegowda SR and Saket Kushwaha

Abstract

The study accompanied with time series data (1990-1991 to 2015-2016) on dynamics of Area, Production and Productivity of jute in India. Overall period divided into three sub periods as period 1(1990-00), Period 2(2000-10), Period 3(2010-16) based on decade. Negative growth of area 0.2, 0.9 and 1.6 per cent observed for the overall period, second period and third period respectively whereas first period showed positive growth of 1.5 per cent for area. Production showed growth rate of 2.3, 1.4 and 1.3 for first, second and overall period respectively while third period showed negligible growth for production. Variability calculated for area, production and productivity where variation for yield noticed significantly. Productivity effect of higher area effect and both effect observed in all the three periods and overall period. Decomposition calculated area effect and both effect for Period 2 and Period 3 and overall period but area effect, productivity effect and both effect are positive in the first period.

Keywords: area, production, growth rate and decomposition

Introduction

Jute (*Corchorus* spp.) is a dicotyledonous fiber crop that belongs to family *Tiliaceae* and genus *Corchorus*. Jute fibre is a natural fiber that is also mark named as 'golden fiber'. Jute is cheapest and most important of all textile fibers next to cotton (*Gossypium* spp.) and is used widely in manufacturing different types of packaging materials for various agricultural and industrial products. Jute fiber is obtained from two commercially important species namely, White jute (*Corchorus capsularis*) and Tossa Jute (*Corchorus olitorius*). Jute is however, our potential foreign exchange earner and must finds its place in our economy. It is estimated that more than 4 million farm families are engaged in jute farming and majority of them belongs to small and marginal categories. Besides, 0.5 million people are involved in raw jute and finished good trading and ancillary activities. Raw jute production in India is expected to touch 10.2 million bales (1 bale = 180 kg) this year with 25-30% increase in sowing area of fibre crops (Source: FAO 2017).

Jute Cultivation is dependent on climate, season and soil. Almost 85% of world's Jute cultivation is concentrated in the Ganges delta. This fertile geographic region is shared by both Bangladesh and India. China also has a dominating place in cultivation of jute. Several other countries like, Thailand, Myanmar, Pakistan, Nepal and Bhutan also cultivate jute and allied fibres on a smaller scale. Jute and allied fibers are group of natural fibers which have inconceivable economic and trade importance particularly in West Bengal, India. The area under jute in India is around 7.9 lakh ha with a production of about 102.85 lakh bales. West Bengal contributes the maximum towards Jute cultivation and it shares about 74.7% and 81.6% of national acreage and production, respectively (five years average of 2006-07 to 2010-2011). Jute is the cash crop for the poor and the marginal farmers in India and it continues to be an important commodity for employment and source of income for them. To meet the demands of the industry, production of jute and allied fibers have to be increased. Two important means to achieve this is to increase the output and to increase the area covered under jute cultivation. With the continuous efforts of the scientists as well as the special programs for jute production implemented by the Government, the area and productivity of jute had improved tremendously. Even then the jute sector could not be revived to the fullest extent. The industry faced stiff competition from its cheaper substitutes. The farmers on the other hand are not receiving remunerative price for the fiber they produce. It is therefore imperative to sort out the problems to the extent possible and bring back the past glory of jute production in India.

Research Methodology

The study was purely based on secondary data. The data was collected from www.Indiastat.com, central statistical organization of year 1990-91 to 2015-16, Directorate of Economics and Statistics, Food and Agriculture Organisation and National Jute Board. The data regarding area, production and yield of jute in India were collected for last 26 years i.e. from 1990 to 2016. The whole period of study has been divided into three sub-periods i.e. Period 1 (1990 to 2000), Period 2 (2000 to 2010), Period 3 (2010-2016) and overall period (1990 to 2016). On the basis of the data collected for period, analysed using Compound growth rates, instability and decomposition in area, production and productivity of jute estimated to examine the fluctuation.

Estimation of growth rate

Growth rate are worked out to examine the tendency of variable to increase, decrease or stagnant over a period of time. It also indicates the magnitude of the rate of change in the variable under consideration per unit of time. The rate of change of “Yt” per unit of time to express as a function of the magnitude of “Yt” itself is usually termed as the compound growth rate (CGR) which can be expressed mathematically as:

$$CGR = \left[\left(\frac{1}{Y_t} \right) \left(\frac{dY_t}{dt} \right) \right] = \left[\left(\frac{Y_{t+1} - Y_t}{Y_t} \right) \right] \dots\dots(1)$$

The above expression if multiplied by 100 gives the compound growth rate of Yt in percentage term. There are many alternative forms of growth function viz., linear exponential, modified exponential, Cobb-Douglas etc. which have been developed and used by the researcher.

The mathematical form of log-linear function (also known as exponential function) is as follows:

$$Y_t = A e^{bt} \dots\dots\dots(2)$$

Measurement of Instability

Instability is the deviation from the trend. It can be measured by using co-efficient of variation. The standard deviation as percentage of means called as co-efficient of variation.

$$CV = \frac{\sigma}{\mu} \times 100$$

Where,

- CV = Co-efficient of variation
- σ = Standard deviation of the variable
- μ = Mean of the variable.

Decomposition of Analysis

To estimate the contribution of area, productivity and interaction of the two in total production, the following additive scheme of decomposition can be used:

$$P = A_0 (Y_n - Y_0) + Y_0 (A_n - A_0) + \Delta A \Delta Y$$

$$1 = [(Y \Delta A)/P][(\Delta Y)/P][(\Delta A \Delta Y)/P]$$

Where,

- P = Change in production
- A0 = Area in base year
- An = Area in current year
- Y0 = Yield in base year
- Yn = Yield in current year
- ΔA = Change in area (An – A0)
- ΔY = Change in yield (Yn – Y0).

Result and Discussion

The compound growth trend equations were fitted to assess growth trend in area, production and productivity of Jute. To assess the trends in area, production and productivity, data over the period from 1990 to 2016 considered. It found that area of the commodity showed decreasing trend and productivity showed an increasing trend but production having fluctuations in overall period. A perusal of Table 1 indicates compound growth rate of area, production and productivity of jute in India. Total area under jute in India was 7.78 lakh hectares in 1990 and it decreased to a level of 7.28 lakh hectare in 2016 with fluctuating trends in between these years. The growth trend analysis suggests that area under jute was decreasing with the compound growth rate of 0.2 per cent per annum. The growth trend analysis for the first period of study suggested that it was 1.5 per cent per annum but in second period it decreased with 0.9 per cent per annum and then in third period, it decreased with 1.6 per cent per annum. The highest decrease of area under Jute was observed during third period that is (2010-2016) with 1.6 per cent per annum compound growth rate. Total jute production in India was 79.17 lakh bales in 1990-91 and it increased to 99.40 lakh bale in 2015-16 but with fluctuating trend in between the years. The growth trend analysis suggests that jute production in the country was growing with a compound growth rate of 1.3 per cent per annum. The sub period wise growth trend analysis of jute production suggests that highest growth was observed during first period (1990-2000) and lowest during third period (2010-2016). During the first period, jute production was growing with 2.3 per cent per annum, whereas it was growing with a compound growth rate of 0.00047 per cent in third period but it was growing with a compound growth rate of 1.4 per cent per annum in second period (2000-2010). Per hectare jute productivity was observed 1833 kg per hectare in 1990 and it was increased to the level of 2457 kg per hectare in 2016. The growth trend analysis suggests that it was growing with a compound growth rate of 1.4 per cent per annum in overall period of jute yield. Per hectare jute productivity during first period (1990-2000) of study was estimated to be 0.8 per cent per annum in second period (2000-2010) of study it was 2.0 per cent per annum and in third period (2010-16) of study it was 1.6 per cent per annum. It reveals that in second period of study, the compound growth rate in productivity was highest (Table 1).

Table 1: Compound growth trend in area, production and productivity of jute in India

Items	Particulars	Period 1 (1990-00)	Period 2 (2000-10)	Period 3 (2010-16)	Over all period
Area	F value	2.05	3.73	8.98	0.67
	R ²	0.20	0.31	0.69	0.02
	CGR	1.5	-0.9*	-1.6**	-0.2
Production	F value	4.47	5.32	0.00	37.28
	R ²	0.35	0.400	0.00	0.60
	CGR	2.3*	1.4**	0.00047	1.3***

Productivity	F value	8.98	25.82	2.83	229.73
	R ²	0.52	0.76	0.41	0.90
	CGR	0.8**	2.0***	1.6	1.4***
	R ²	0.17	0.74	0.46	0.54
	CGR	1.5	20.1***	-22.5	6.9***

CGR- Compound growth rate per cent per annum.

***- Significant at 1% level of significance;

** -Significant at 5% level of significance;

*- Significant at 10% level of significance.

Instability analysis of jute

In order to study the instability in the area, production and productivity of jute in India during the study period, coefficient of variation was worked out, The total period (1990-2016) was split into three sub periods viz; period 1(1990-2000), period 2 (2000-2010) and period 3 (2010) The instability refers to the deviation from a particular trend. It indicates the extent of variability.

Table 2 reveals that there was less variability in area is observed during the third period (2010-16) that is 3.61 per cent and the highest variability 9.71 per cent was observed during first period under study. In second period it was 4.72 Per cent coefficient of variation and the overall variability was 7.15 per cent. When we talk about production, the overall variability was 12.37 per cent. Decreasing trend in variability

under production during different periods under study as during first period it was 11.67 per cent, in second period it was 6.88 per cent and 4.22 per cent in third period. As regard with yield of jute, much variability was observed during different periods. The overall coefficient of variation was 11.63 per cent. During first, second and third period under study, the variability was observed 3.46 per cent 7.14 per cent and 4.68 per cent respectively. The highest variability was observed during second period under study. Among all the parameters like area, production and productivity much variability observed under second period of study (2000-2010) because there was a decreasing trend in area of jute for cultivation. Although productivity showed an increasing trend but production was not increasing with sustainable rate it was fluctuating year by year during overall period.

Table 2: Instability analysis of area, production and productivity of jute in India

Items	Particulars	Period 1 (1990-00)	Period 2 (2000-10)	Period 3 (2010-16)	Overall
Area	SD	78.22	38.51	27.68	57.22
	Mean	804.9	815.2	765.66	799.80
	CV	9.71%	4.72%	3.61%	7.15%
Production	SD	999.00	716.61	442.10	1201.06
	Mean	8556.6	10406.8	10454.33	9706.15
	CV	11.67%	6.88%	4.22%	12.37%
Productivity	SD	66.18	161.49	115.12	252.70
	Mean	1911.4	2261.4	2459.83	2172.57
	CV	3.46%	7.14%	4.68%	11.63%
	Mean	7526.2	22853.8	27177.66	17956.38
	CV	10.89%	63.94%	51.00%	76.57%

SD: Standard deviation; CV: Co-efficient of variation

Decomposition of production variability of jute

Examine the contribution of area, productivity and their interaction between both effects on the variability of total production we use decomposition schemes, decomposition of production variability into its different components is done for the two sub-periods for jute production and the results are shown in the Table 3. During the first sub period, variability in yield under jute cultivation was observed to be 88.97 per cent which was the lowest among all the periods but it showed an increasing trend during subsequent periods. The overall yield effect on decomposition of production variability was 128.43 per cent. During second and third sub periods, productivity effect was 203.15 per cent and 432.28 per cent respectively which reveals the highest yield effect in third period. Similarly, in case of area effect observed that negative effect on overall period under study on production variability of jute in India. Area effect was 2.76 per cent, positive only during first period under study. During second and third period of study observed that area effect was negative and it was -90.88 and -309.20 per cent respectively Both area and yield effect on production variability of jute is again observed to be negative in overall period and it was -7.87 per cent. Both effects were positive and highest during first period that showed 8.26 per cent. During second and third period under

study, both effect observed negative and was -12.27 and -23.07 per cent respectively (Tale 3).

Table 3: The Decomposition of production, area, and productivity of Jute in India

Items	Period 1 (1990-00)	Period 2 (2000-10)	Period 3 (2010-16)	Overall
Productivity effect	88.97%	203.15%	432.28%	128.43%
Area effect	2.76%	-90.88%	-309.20%	-20.56%
Both effect	8.26%	-12.27%	-23.07%	-7.87%

Summary

Data collected for the period of 1990-2016 divided into three sub periods Period 1(1990-2000), Period 2(2000-2010) and Period 3(2010-2016). Compound growth rate, instability and decomposition calculated for area, production and productivity of jute as combined. The growth trend analysis suggested that area under jute decreasing with the compound growth rate of 0.2 per cent per annum. The growth trend analysis study indicated growth of 1.5, 0.9, 1.6 per cent per annum for first, second and third period respectively. The highest decrease of area under Jute observed during third period with 1.6 per cent per annum. The growth trend analysis suggested that jute production in the country was growing

with a compound growth rate of 1.3 per cent per annum. Whereas in sub periods growth trend analysis of jute production suggests that highest growth was observed during first period and lowest during third period. During the first period jute production was growing with 2.3 per cent per annum, however it was growing with a compound growth rate of 0.00047 per cent in third period but it was growing with a compound growth rate of 1.4 per cent per annum in second period. The growth trend analysis for productivity indicated compound growth rate of 1.4 per cent per annum for overall period. Per hectare jute productivity during first period of study was estimated 0.8 per cent per annum, in second period of study it was 2.0 per cent per annum and in third period it was 1.6 per cent per annum. It revealed that in second period of study, the compound growth rate in productivity was highest.

The instability refers to deviation from a particular trend; it indicates the extent of variability. There was less variability in area observed during the third period that was 3.61 per cent and the highest variability 9.71 per cent observed during first period under study. In second period it was 4.72 per cent coefficient of variation and the overall variability was 7.15 per cent for area. During overall period variability observed for production was 12.37 per cent. During sub periods first period it was 11.67 per cent, in second period it was 6.88 per cent and 4.22 per cent in third period. As regard with productivity of jute, much variability was observed during different periods. The overall coefficient of variation observed 11.63 per cent during first, second and third period under study, the variability was observed 3.46 per cent, 7.14 per cent and 4.68 per cent respectively. The highest variability was observed during second period under study.

Both area and productivity effect on production variability of jute is again observed negative in overall period and it was -7.87 per cent. Both effects were positive and highest during first period that is 8.26 per cent.

Conclusion

India is the second largest producer of jute in the world. Indian jute was slowly covering the international market. In order to maintain the comparative advantages; Indian jute industry needs improvement in research facility and modern technology. Both growth and instability for productivity showed highest over area and production. Area effect showed maximum effect on productivity effect and interaction effect. Even though productivity showed increasing trend there is a need to increase the productivity levels which ultimately help in increase in domestic production and gain good foreign exchange through export. All the parameters under study (Area and production of jute from India) have significantly shown a fluctuating trend but the productivity showed an increasing trend over the years. Agricultural pricing policy plays a key role in increasing both farm production and incomes. Findings from this research paper are not only an initial effort from this perspective but also provide future issue for research and suggest necessary policy guidelines for future production and marketing strategies of the country.

References

1. Chakrabarti S. Trend of Production and productivity in jute: A Critical Study. *Indian Economic Journal*, 1982, 24-26.
2. Chapke R. Constraints Analysis and impact of improved Jute Cultivation Process, International conference on

- Innovative approaches for agricultural knowledge management. Vigyan Bhawan, New Delhi, 2011, 236-242.
3. Chinnappa B, Keshava Reddy TR. An Empirical Analysis of Growth and Instability in Sugar Industry. *Agricultural Banker*. 1999; 2:27-33.
4. Das M, Chanu LA. Farmers' share in consumers' price in jute marketing with reference to jute farmers of Barpeta District of Assam. *Indian Journal of Applied Research*. 2016; 6(4):235-238.
5. Das BB, Goswamy KK. Jute and Mesta statistics a critical analysis. All India Coordinated Research Project on Jute and Allied Fibres. Barrackpore, 2001, 114-119.
6. Dayal R. Agricultural Growth Rates and Their Components. *Indian Journal of Agricultural Economics*. 1966; 21(4):227 - 237.
7. Food and Agricultural Organisation. Demand outlook for jute to 1995 and Policy implication in FAQ Publication. Rome, 1990, 123-128.
8. Ghimire TB, Thakur NS. Constraint and opportunity of raw jute production: A case study of Eastern Terai. Nepal. *Agronomy Journal of Nepal*. 2013; 3:117-122.
9. Goyal HD. *Indian Jute Industry, problems and Prospects*. Delhi: Commonwealth Publishers, 1990, 6-7
10. Islam MS, Alauddin M. World Production of Jute: A Comparative Analysis of Bangladesh. *International Journal of Management and Business Studies*. 2012; 2(1):014-022.
11. Jamal H, Zaman A. Decomposition of Growth Trend in Agriculture: Another Approach. *Indian Journal of Agricultural Economics*. 1992; 47(4):644-652.
12. Kakoty G, Bora D. Impact of emerging channels in agriculture. Report by Agro Economic Research Centre, Assam Agricultural University, 2013, 102-108.
13. Karthik G, Ramya N. Swot Analysis of Indian Jute industry. *Indian Streams Research Journal*. 2012; 2:10-14.
14. Khan, Azizur, Rahman. Problems of Jute Marketing in East Pakistan. *The Pakistan Development Review*, Dhaka. 1961; 1:2-78.
15. Khondake GM, Rahman T, Sahan A. Jute Manufacturing sector in Bangladesh, Opportunities, Challenges and Policy options. Dhaka, 2009, 201-213.
16. Minhas BS. Rapportuer's Report on Measurement of Agricultural Growth. *Indian Journal of Agricultural Economics*. 1966; 21(4):165-182.
17. Minhas BS, Vaidyanathan A. An analysis by component elements. *Journal of Indian Society of Agricultural Statistics*. 1966; 17(2):230-252.
18. Mishra VN. Growth of Crop Output in Gujarat: A Component Analysis. *Indian Journal of Agricultural Economics*. 1966; 12(5):264-269.
19. National Jute policy. Report on jute 2016-17 Government of India. Newdelhi. 2017; 12:217-22.
20. Narain, Dharm. Growth of Productivity in Indian Agriculture. *Indian Journal of Agricultural Economics*. 1977; 32(2):20-32.
21. Pal, Anusri, Chakraborti, Pinaki. Indian Jute Industry in the Globalisation Era: Structure and Performance. *Economic & Political Weekly EPW*, 2011, 93-100.
22. Patel GN, Agarwal NL. Growth and Instability in Production of Groundnut in Sourashtra Region of Gujarat. *Agricultural Situation in India*. 1994; 3(2):56-61.
23. Rabbani AK. The Economic Determinants of Jute

- Production in India and Pakistan. *Pakistan Development Review*. 1965; 2(2):10-15.
24. Rahman, Rezaur AK. Proceedings of the Symposium on Natural Fibres. *Jute in South Asia*, 2008, 19-23.
 25. Rao NK, Muralidhara, Ramaswamy P. Raw Jute Marketing: Problems and Solutions *Economic and Political Weekly*. 1974; 2(3):497-488.
 26. Ray Kamal. Economics of Summer Paddy - Jute substitution: A profile of Environmental Cost. *Asian Journal of Research in Social Science & Humanities*. 2012; 2:4-8.
 27. Sabaratnam VE. Manual on field experience training for ARA scientists. National Academy of Agricultural Research Management. Hyderabad, 1988, 98-145.
 28. Sadat, Abdul, Chakraborty, Kaushik. Insect pest constrains of Jute and its control by biological agents under modern Eco-Friendly sustainable production system. *International Journal of Multidisciplinary Research and Development*. 2015; 2(3):316-321.
 29. Sagar, Vidya. A Component Analysis of Growth of Agricultural Productivity in Rajasthan: 1956-61 to 1969-74. *Indian Journal of Agricultural Economics*. 1977; 3(1):108-119.
 30. Sagar, Vidya. Decomposition of Growth Trends and Certain Related Issues. *Indian Journal of Agricultural Economics*. 1980; 35(2):42-59.
 31. Singh BNP. *Indian economy today: Changing contours*. Deep and Deep Publications PVT Ltd, New Delhi, 2004; 682-692.
 32. Singh M. Status paper: Status of raw jute (Jute and Mesta) in India. Directorate of Jute Development, Ministry of Agriculture, Department of Agriculture and cooperation, Government of India. 2014; 22(3):22-26.
 33. Sinha MK, Mitra, Ramasubramanian T, Mahapatra BS. Crop diversification for profitability in jute and allied fibre crops. *Indian Journal of Agronomy*. New Delhi. 2009; 54(2):221-225.
 34. Sondhi R, Singh K. Component of Food grain Economy of India. *Journal of Social and Economy*. 1975; 3(4):66-7.
 35. Shaik Haffis, Rama Roa CA, Reddy YVR, Katyal JC. Growth, Instability and Drought Sensitivity of Sorghum and Pearl millet Production. *Agricultural Situation in India*. 1994; 14(4):725-728.