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Economic Performance of Jute in Assam: Analyzing Area, Production and Productivity

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Abstract

India is the largest producer of raw jute in the world with a 49.7 percent share in global production in 2021 closely followed by Bangladesh with 48.6 percent share. In 2024, Bangladesh overtook India as the largest producer of Jute in the world based on a report from the Food and Agriculture Organization of the United Nations (FAO). According to the Economics, Statistics & Evaluation Division, Ministry of Agriculture and Farmers Welfare Assam, West Bengal and Bihar together contribute 98.8 percent of total raw jute production during 2023. Assam is a home to more than 4 million small and marginal farmers who contributes 9percent of India's jute production share. Based on data compiled from Indiastat, Indiastat district, Directorate of Economics and Statistics, Government of Assam and various price policy jute report this study aims at examining the growth in area, production and productivity of jute in Assam. An overall and segregated detailed analysis is carried out for 3 sub-periods, i.e., period-I (1997-98 to 2004-05), period-II (2005-06 to 2013-14) and period-III (2014-15 to 2022-23). The overall compound annual growth rates of area under jute in Assam is negative whereas production and productivity under jute in Assam is positive and statistically significant. The periodic compound annual growth rates of area, production and productivity for

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period-1 is negative, and for period-II and III it encompasses both positive negative growth rates.

Keywords: *Jute, India, Assam, Compound Annual Growth Rate (CAGR).*

Introduction

The "golden fiber," jute (Corchorus spp.) is a dicotyledonous natural fiber crop. Two types of jute are farmed in India since prehistoric times: white jute (Corchorus capsularis), which is primarily self-pollinated, and tossa jute (Corchorus olitorius), which is slightly cross-pollinated. These plants are grown for their fiber. Nonetheless, jute needs to become a part of our economy and has the potential to produce foreign exchange for us. More over 4 million agricultural households are estimated to engage in jute cultivation, with the bulk of them falling into the small and marginal categories. Additionally, 0.5 million people work in related industries, including trading completed goods and raw jute. Among the different textile fiber production in the world, Jute stands second after cotton. Jute occupies nearly 0.4 per cent of the total area under agricultural land in the country (Baviskar et al., 2022; Price-Policy-Raw-Jute-2020-21, 2021). Raw jute production in India is expected to touch 0.2 million bales (1 bale = 180 kg) this year with 25-30percent increase in sowing area of fibre crops The Future of Food and Agriculture and Challenges (2017). About 5.0 million people in eastern and northeastern India depend on jute as their primary commercial crop for their livelihood Sinha et al. (2009). According to the office of Jute Commissioner, Ministry of Textiles the top 5 states of raw jute production in 2023-24 (kharif) in terms of yield (in kg/hectare) is Bihar, West Bengal, Andhra Pradesh, Nagaland, Meghalaya with 2636, 2448, 2151, 1150, 1050 respectively.

According to Price Policy for Jute 2024-25 season Paul Sharma et al. (2023) India is the largest producer of raw jute in the world with a 49.7 percent share in global production in 2021 closely followed by Bangladesh with 48.6 percent share. However, Bangladesh has the largest area under jute cultivation (50percent) in the world, followed by India (48.4percent). Jute is also cultivated in China,

Nepal, Uzbekistan, Thailand, Myanmar and Bhutan but their share is very meagre. India has higher yield (26.1 qtl/ha) than the global average (25.4 qtl/ha) and Bangladesh (24.7 qtl/ha) but is significantly lower than Uzbekistan (107.4 qtl/ha) and China (40.1 qtl/ha). Among the top five jute producers, Bangladesh has experienced the highest surge in production with a compound annual growth rate of 1.92 percent during 20112021, attributed to a substantial increase in yield (1.93percent).

Jute thrives in tropical climates with high rainfall, moderate temperatures, and fertile soil. It requires about 150–200 cm of annual rainfall, and the optimal temperature for its growth ranges from 25°C to 35°C (Ray, 2003). The plant grows best in regions with rich alluvial soils, typically in river deltas, which is why the Ganges Delta and surrounding areas are ideal for its cultivation. Jute is a Kharif (March to April) season crop. It is grown in a wide range of temperature. It can thrive well with a minimum temperature of 15 °C to maximum temperature of 38 °C and may increase up to 46 °C M. S. Islam & Alauddin (2012).

The jute industry plays a vital role in the economies of both India and Bangladesh, contributing to employment, rural development, and environmental sustainability. As one of the largest producers of jute globally, India has faced fluctuating growth due to various challenges, including land constraints, productivity issues, and the growing competition from synthetic fibers. According to Bag et al. (2016), India remains a major player in the global jute market but faces stiff competition from Bangladesh, which has become a dominant force in jute production and trade. While the sector continues to hold significant potential, its growth is often volatile, particularly in regions like Assam, an important jute-producing area in India Khatun & Deka (2013). These fluctuations are primarily driven by climatic and market conditions, which impact yields and the overall stability of the industry.

Furthermore, the dynamics of international jute trade are complex, with significant growth observed in India's exports, yet challenges remain in maintaining competitiveness on the global stage Kumari et al. (2020). Climate change is emerging as another critical factor that threatens the sustainability of jute farming. Studies by (M. M. Islam et al., 2009; M. S. Islam & Alauddin, 2012) reveal that jute crops are highly vulnerable to changing weather

patterns, such as rising temperatures and irregular rainfall, which can reduce yields. These climatic shifts are of growing concern for both India and Bangladesh, as they impact the long-term viability of jute production in South Asia. Assam is known for producing some of the finest quality raw jute in India, with the crop being cultivated in nearly all of the state's districts. This paper focuses on the current status of jute production in Assam, highlighting the compound annual growth rate.

Table-1: - District-wise Jute Area (in hectare), Production (in bales of 180 kg), Productivity (in bales/hectare) and share in total area and total production (in percent) in Assam during 2022-23.

Districts	Area	Share in total area	Production	Share in total production	Productivity
Baksa	416	0.74	4939	0.74	11.87
Barpeta	4761	8.42	62096	9.25	13.04
Bongaigaon	1685	2.98	17375	2.59	10.31
Cachar	33	0.06	392	0.06	11.88
Chirang	1455	2.57	14509	2.16	9.97
Darrang	3295	5.83	39503	5.88	11.99
Dhemaji	71	0.13	843	0.13	11.87
Dhubri	8997	15.91	109775	16.35	12.20
Dibrugarh	9	0.02	107	0.02	11.89
Dima Hasao	10	0.02	119	0.02	11.90
Goalpara	3144	5.56	30479	4.54	9.69
Golaghat	113	0.20	1342	0.20	11.88
Hailakandi	12	0.02	142	0.02	11.83
Jorhat	30	0.05	356	0.05	11.87
Kamrup	5317	9.40	51179	7.62	9.63
Kamrup Metropolitan	42	0.07	499	0.07	11.88
Karbi Anglong	1076	1.90	12774	1.90	11.87
Karimganj	48	0.08	570	0.08	11.88
Kokrajhar	1443	2.55	16833	2.51	11.67

Lakhimpur	73	0.13	866	0.13	11.86
Morigaon	5469	9.67	75499	11.25	13.80
Nagaon	10207	18.05	141060	21.01	13.82
Nalbari	3530	6.24	35712	5.32	10.12
Sivasagar	13	0.02	214	0.03	16.46
Sonitpur	3414	6.04	33047	4.92	9.68
Tinsukia	4	0.01	48	0.01	12.00
Udalguri	1890	3.34	21042	3.13	11.13
Assam	56557		671320		11.87

Source: Indiastat districts

Table-1 shows the area, production and productivity of jute among 27 districts of Assam. It can be seen that among the 27 districts of Assam, five districts—Nagaon, Dhubri, Morigaon, Kamrup, and Barpeta are performing at the top in terms of area, production and productivity during the year 2022-23.

Materials and Method

This study uses secondary data from 1997-98 to 2022-23 from sources like Indiastat, Ministry of Agriculture & Farmers Welfare, Government of India and various other secondary sources. Trend of growth in area, production and productivity of jute were analysed using time series data from 1997-98 to 2022-23 in Assam. The 27 districts of Assam are considered by merging the districts announced after 2015 with their original districts before they were separated. For better comparison of growth rate of area, production and productivity of jute in the study area over time, the overall time period (1997-98 to 2022-23) was divided into three sub-periods viz. Period-I (1997-98 to 2004-05), Period-II (2005-06 to 2013-14) and Period-III (2014-15 to 2022-23).

Growth in area, production & productivity was calculated using the following formula –

Y =abt ……. (1)

Where Y = Refers to area/ production/ productivity in 1st year a = Refers to intercept

t = Refers to year (time period) (say t = 1,2,3,…,n) b = 1 + r/100, where 'r' refers to the percentage rate of compound growth rate of area, production, productivity per annum.

By taking logarithms both side of the equation, it have been reduced to following linear form with log 'Y' as dependent variable and 't' as independent variable:

$\log Yt = \log a + t \log b$

For convenience, if we put 'log a' = A and 'log b' = B, then this can be written as –

$\log Yt = A + B\ t$…….(2)

Electronic copy available at: https://ssrn.com/abstract=3728002

This is semi log function with time 't' as independent variable. Then by using OLS technique, we have normal equations of the type.

$\sum \log Yt = nA + B \sum t$

$\sum \log Yt\ t = A \sum t + B \sum t2$.....(3)

Where 'n' is the number of observations (years)

By solving equation (3), the values of 'A' and 'B' have been computed. For deriving compound growth rate from the computed regression coefficients, the following procedure has been adopted.

When 'B' has positive value, anti-log of 'B' has been obtained and then one was subtracted from anti log value of 'B'. Thereafter the B-1 value has been multiplied by hundred. Thus, it gave the compound growth rate (CGR) of increasing type, when 'B' had negative value, the procedure of calculating CGR is the same, but the value of growth rate will be negative. This negative CGR indicates the decreasing growth rate over time. Percentage rate of compound growth per annum has been calculated as –

$r = (b-1) \times 100$

$r = (\text{Antilog 'B'} - 1) \times 100$

This represented a uniform rate of change from observation to observation Das & Mishra (2020).

Results

The compound annual growth rate (CAGR) of jute area, production and productivity for overall and three periods is shown below in Table-2.

Table 2: - CAGR of jute area, production and productivity.

Growth Rate	Period-I (1997-98 to 2004-05)	Period-II (2005-06 to 2013-14)	Period-III (2014-15 to 2022-23)	Overall (1997-98 to 2022-23)
Area	-2.38***	1.02***	-1.28***	-0.23*
Production	-2.78**	0.47	-0.81**	0.29*
Productivity	-0.47	-0.49	0.57*	0.52***

Source: Author's own compilation

*** Significant at 1percent level of probability

** Significant at 5percent level of probability

* Significant at 10percent level of probability

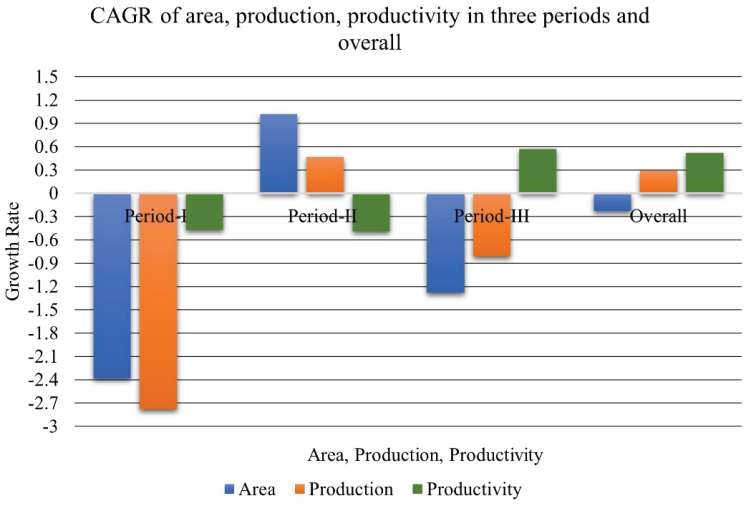
It is seen from table 2 that for Assam as a whole, the overall growth rate of area under jute cultivation was negative at 0.23 percent and is statistically significant at 10 percent level of significance. Period wise analysis indicated that growth rate of area during period-I and period-III is negative both being statistically significant at 1 percent level of significance. The reason for declining trend in area under cultivation might be due to shift of land for non-agricultural purposes such as construction of buildings, growing urbanisation etc. However, period-I shows the lowest level of growth this may be due to lesser cultivation across the districts of Assam. Period-II shows an increasing growth rate of 1.02 significant at 1 percent level of significance.

The state witnessed a positive growth rate of production at marginal rate of 0.29 statistically significant at 1 percent level of significance. The growth rate of production in period-I and period-III shows negative growth both significant at 5 percent level of significance. The negative growth in production may be due to labour issues, possibilities of natural disaster like flood or drought.

It is evident that the state's overall productivity has a positive growth rate of 0.52 statistically significant at 1 percent level of

significance. Period-III also shows positive growth in productivity at the rate of 0.57 being statistically significant at 10 percent level of significance which is higher than the state's overall productivity. This may be due to yield per unit of area is higher or efficiency in farming practices. However, period-I and period-II shows negative growth rate. The compound annual growth rate in the three periods and overall is shown in figure1.

Figure-1: - Graphical representation of CAGR of jute area, production and productivity.



In terms of jute area in Assam, a linear negative growth rate of -389.69 units can be seen during the period 1997-98 to 2022-23 with less variations. This negative growth can be due to urbanization, construction of buildings, shift from agriculture to non-agricultural aspects etc. The production of jute has increased by 4409.2 units over time, although there are noticeable variations over the year. The productivity of jute over the period 1997-98 to 2022-23 has increased by 0.124 units. In 2004-05, productivity and production of jute has fallen by almost 60percent compared to 2003-04, this can be due to occurrence of devastating flood throughout the State of Assam and catchments areas of Arunachal Pradesh, Meghalaya, Nagaland and Bhutan, the river Brahmaputra and its tributaries started swelling up which has caused widespread damage to human life and property, standing crops, flood control

embankments and other basic infrastructure. Similar is the case with 2012-13 production and productivity which has decreased during the 2012 flood due to heavy monsoon rains in Assam. The production and productivity increased during 2012-13 which can be due to an increase in the Minimum Support Price (MSP) to 2200 per quintal of jute set by the government for raw jute, encouraging farmers to cultivate more jute in the region of Assam. The graphical representation of jute area and production in Assam is shown in Figure-2 and jute productivity in Assam in figure-3 for the period 1997-98 to 2022-23.

Figure-2: - Graphical representation of Jute Area and Production in Assam, 1997-98 to 2022-23.

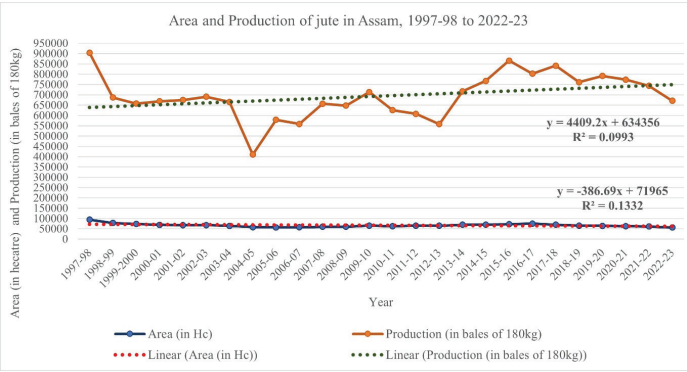
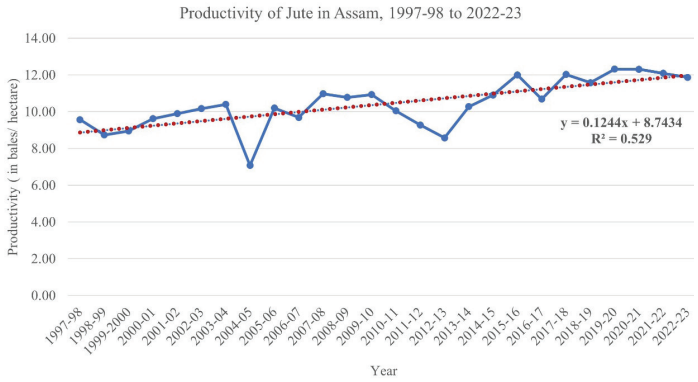


Figure-3: - Graphical representation of Jute Productivity in Assam, 1997-98 to 2022-23.



Discussion

Several factors, including environmental conditions, market dynamics, technological advancements, and policy-related aspects, influence jute production in India, especially in regions like Assam. Some of the key factors affecting jute production include:

1. **Climatic Conditions:** Jute is highly sensitive to weather conditions, and any adverse changes in temperature or rainfall patterns can significantly impact yields. According to M. M. Islam et al. (2009), climatic changes such as rising temperatures and irregular rainfall are major concerns for jute production, particularly in regions like Bangladesh and India, which rely heavily on stable climatic conditions for optimal crop growth.
2. **Soil and Land Availability:** The quality of soil and the availability of suitable agricultural land are crucial for jute production. Baviskar et al. (2022) highlight that jute requires fertile, well-drained soil for best results. However, with increasing urbanization and land-use changes, access to such land is becoming increasingly constrained, which may pose challenges for sustaining jute cultivation.
3. **Technological Advancements and Productivity:** Jute farming in India is still largely dependent on traditional practices, with limited technological advancements. Sinha et al. (2009) emphasize the potential of crop diversification and the adoption of new agricultural practices to improve productivity. Introducing modern techniques and high-quality seeds could help mitigate challenges such as low productivity and environmental stressors, enhancing the overall yield.
4. **Government Policies and Price Support:** Government policies are crucial in shaping the future of jute production. Price support mechanisms, subsidies, and crop insurance schemes can help stabilize the incomes of farmers. The Price Policy for Raw Jute (2020-21) by the government has been a step in this direction, aiming to protect farmers from price fluctuations. However, consistent policy support is needed to ensure long-term stability in the sector.

5. **Seed Availability:** Jute-producing states must focus on ensuring the timely availability of good-quality jute seeds. The production of high-quality seeds for mesta is particularly limited, necessitating organized seed production initiatives to meet demand.
6. **Variety and Technology Adoption:** While the popular jute variety JRO-524 has been in use for over 40 years, newer varieties like JRO-204 are gaining traction. The potential yield for jute varieties is 35-40 q/ha, but actual yields are only about 65percent of this potential. Similarly, mesta varieties show a potential yield of 25-30 q/ha, but actual yields remain lower due to factors like weather and poor technology adoption. Improved implements for sowing and weed control are still limited.
7. **Post-Harvest Operations:** Retting is essential for fiber quality but is hindered by inadequate facilities. While ribbon retting and microbial consortium technologies have been developed to improve quality and speed, they have not been widely adopted due to labor intensity and other limitations. More efficient retting methods need to be developed and popularized.
8. **Marketing:** Jute marketing is largely controlled by private traders, leaving farmers vulnerable to monopolistic pricing. With institutional marketing covering only a small portion of the total produce, developing better marketing infrastructure is crucial to protect farmers' interests and improve the efficiency of the jute sector.

Conclusion

In conclusion, a number of factors, including soil quality, climate, market dynamics, government regulations, and technological adoption, present both possibilities and problems for Assamese jute production. Along with varying production and productivity, the shrinking area used for jute farming emphasizes the necessity of focused actions to solve these problems. The effect of unfavourable weather conditions, including floods, on output highlights how susceptible the industry is to more erratic climate change. Simultaneously, improvements in seed availability,

technological acceptance, and jute variety developments may contribute to higher yields and increased productivity. The market is stabilized in large part by government assistance in the form of price controls and subsidies, but more investment in post-harvest operations, marketing systems, and infrastructure is necessary to protect farmers' interests. A complex strategy comprising enhanced technology, stronger legislative frameworks, and better resource management is required to guarantee the long-term viability and expansion of the Assamese jute sector.

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