

Agricultural Sector in Jharkhand: An Overview of the Performance and Adoption of Climate Smart Agriculture to Improve the Productivity

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ABSTRACT

Agriculture involves the cultivation of land, the growing of crops, and the raising of animals for food, fiber, and other products that are essential for sustaining and improving human life. Agriculture is a fundamental component of the Indian economy. It acts as the foundation of the nation and offers livelihoods to almost half of its population. It makes a substantial contribution to the GDP and is essential for guaranteeing food security, supporting rural communities, and aiding the agro-based industries that rely on agricultural products. The agricultural sector in Jharkhand is characterized by low productivity, resulting in a notably high rate of rural poverty. It is unfortunate that there has been no substantial improvement in the economic circumstances of the population, rural infrastructure, which encompasses irrigation, water harvesting, rural connectivity, communication, storage, and marketing, among other aspects. Agriculture in Jharkhand is heavily dependent on the monsoon, and the state possesses limited irrigation facilities. In this article, we will examine an overview of the production scenario in Jharkhand, the challenges faced in agriculture within the state, the adoption of climate-smart agricultural practices to enhance productivity, and propose production techniques aimed at increasing agricultural output. This paper aims to demonstrate that with systematic development, agriculture has the potential to become one of the primary profit-generating sectors for Jharkhand.

Keywords: Area, Production, Yield and Growth of Agriculture, Climate, Smart Agriculture.

Introduction

Agriculture in India represents a vital sector that supports the nation's economy and sustains the livelihoods of countless individuals. The agricultural sector not only supplies food and fiber but also plays an essential role in employment, cultural traditions, and socio-economic advancement.¹

Jharkhand is recognized as an agrarian state due to a significant portion of its rural population depending on agriculture for their livelihoods and income, with rice, maize, and pulses being the primary crops. Jharkhand stands out as one of India's key vegetable producers. The most significant vegetable crops cultivated in the state, ranked by the area they occupy, include potato, tomato, lady finger, peas, cauliflower, brinjal, and cabbage. Nevertheless, agricultural productivity frequently suffers from natural limitations such as uneven terrain, inadequate soil fertility, and insufficient irrigation infrastructure, with more than 90% of the cultivated land relying on rainfall. Agriculture in Jharkhand is largely dependent on the monsoon season, and the state's irrigation facilities are quite limited.²

Objective of Study

- To gain an understanding of the production scenario in Jharkhand.
- To examine the issues related to agriculture in Jharkhand.
- The adoption of climate-smart agriculture aims to enhance productivity.
- To propose methods of production aimed at enhancing productivity in agriculture.

Literature Review

Singh, U. (2020) discovered that agriculture plays a crucial role for the rural populace of Jharkhand, which constitutes approximately 80% of the state's total population. The average productivity of rice, wheat, maize, and pulses in Jharkhand falls short of both national and global averages, with the

exception of pulses. To address the existing challenges, it is vital to diversify the agricultural sector and promote sustainable agricultural practices.³

Kumar, D., (2019), Paddy is a fundamental staple food grain and serves as a lucrative venture for numerous farmers in Jharkhand. This crop plays a significant role in enhancing the economic status of farmers. The success of paddy cultivation largely relies on soil fertility, climatic factors, high-yield seed varieties, and irrigation capabilities. Consequently, rice production differs across various regions and even among districts. The climatic conditions in Jharkhand are conducive to rice cultivation.⁴

Research Methodology

The study is based on the analysis of the secondary. The secondary data has been collected mainly from Ministry of agriculture and farmers welfare- Government of India, state government of Jharkhand and journals and online database. We have kept the research study easy to understand.

About Jharkhand

Jharkhand is a state located in eastern India. It was carved out of the southern part of Bihar on 15th November 2000. Jharkhand shares its border with the states of Bihar to the north, Uttar Pradesh and Chhattisgarh to the west, Odisha to the south, and West Bengal to the east. The city of Ranchi is the state capital and Dumka is the subcapital, whilst Jamshedpur is the largest and the biggest industrial city of the state. The state has an area of about 79,000 km², one of the smaller states in India in terms of area, and consists of several administrative units.

Brief Profile of Agriculture in Jharkhand

Agriculture serves as the primary support for 80% of the rural population in Jharkhand. It plays a significant role as a major source of employment and the main avenue for income-generating activities.⁵ Despite a significant number of farmers continuing to rely on traditional food crops for their livelihoods, it is noteworthy that 51% of the agricultural Gross State Domestic Product is derived from horticulture and livestock products.⁶ Total geographical area of the state encompasses 79.71 lakh hectares. Of this area, 47.67% is utilized for cultivation, while 29.20% is covered by forests. The average landholding is 1.58 hectares. The state experiences an average annual rainfall of 130 cm, which is nearly double the national average for India.

Major crops cultivated in Jharkhand include paddy, coarse grains, maize, wheat, pulses, and oilseeds. The state also produces a variety of fruits such as mangoes, bananas, guavas, papayas, tomatoes, chilies, and other spices. Additionally, minor forest products contribute to the state's economy. Over the years, the agriculture and allied sectors have reported a growth rate of approximately 13%.⁷

Overview of the Production Scenario in Jharkhand

Gross State Value Added (GSVA) is an economic indicator that quantifies the value of goods and services generated within a state. It is determined by deducting the expenses of inputs and raw materials from the overall output. Numerous agricultural variations concerning the production of various crops have been documented multiple times in Jharkhand, making it a prevalent occurrence in the region. In the 2023-24 period, paddy production has risen to 1342.95 thousand hectares and 3201.05 thousand tonnes, compared to 855.08 thousand hectares and 1909.63 thousand tonnes in the 2022-23 period, in terms of total cropped area and production. Likewise, wheat production has increased to 227.92 thousand hectares and 480.96 thousand tonnes in 2023-24, up from 204.4 thousand hectares and 438.54 thousand tonnes in 2022-23, also regarding total cropped area and production. The Gross State Value Added by Agriculture and Allied Activities at Constant (Base Year 2011-12) and Current Prices is presented below:

Table 1: Gross State Value Added by Agriculture and Allied Activities at Constant (Base Year 2011-12) and Current Prices

Financial Year	GSVA (At Current Prices)	GSVA (At Constant Price) Base Year 2011-12	Growth Rate	Growth Rate (%)
2019-20	25043	13830	0	0
2020-21	27807	14747	917	6.63
2021-22	32047	15585	838	5.68
2022-23	26185	12860	-2725	-17.48
2023-24	29425	13441	581	4.517

Source: Directorate of Economics and Statistics, Government of Jharkhand

The Gross State Value Added (GSVA) at current prices has demonstrated a more stable upward trajectory, albeit with some variations. The widening gap between the two lines suggests that inflation has played a pivotal role in elevating the nominal value of agricultural output. These trends are also essential for efficient land use planning. By examining the GSVA data and pinpointing growth trends and challenges within the agricultural sector, it becomes possible to make informed decisions regarding land use strategies. Consequently, there is a pressing need for this industry to explore methods to enhance the profitability and reliability of its operations.⁸

Kharif Crops

Kharif crops refer to those that are planted at the onset of the monsoon season (typically June – July) and harvested at the conclusion of the monsoon season (generally September – October). These crops are also referred to as monsoon crops. The primary kharif crops include Paddy, Jowar, Bajra, Maize, and Ragi. Kharif crops are reliant on monsoon water and are characterized as short-duration crops. Below is an overview of the area, production, and yield of Kharif crops in Jharkhand:

Table 2: Area, Production and Yield of Kharif Crops in Jharkhand

Year	2022-23			2023-24			Increased/Decreased		
Crop	Area in 000-hec.	Production - 000 Tonnes	Yield - Kg/hec.	Area in 000-hec.	Production - 000 Tonnes	Yield - Kg/hec.	Area in 000-hec.	Production - 000 Tonnes	Yield - Kg/hec.
Paddy	855.08	1909.63	2233.26	1342.95	3201.05	2383.6	487.87	1291.42	150.34
Maize	209.23	408.37	1951.83	259.5	544.73	2099.15	50.27	136.36	147.32
Ragi	16.42	12.72	774.84	31.51	34.06	1080.92	15.09	21.34	306.08
Bajra	0.24	0.14	580.01	0.36	0.28	775.3	0.12	0.14	195.29
Jowar	0.79	0.76	967.15	1.05	1.07	1017.67	0.26	0.31	50.52

Source: jharkhand-economic-survey-2024-25/

- The largest area under cultivation among Kharif crops is paddy with 1342.95 thousand hectare, 3201.05 thousand tonnes and 2383.60 kg/hec, reflecting an increase of 487.87 thousand hectare, 1291.42 thousand tonnes and 150.34 kg/hec over 855.08 thousand hectare, 1909.63 thousand tonnes and 2233.26 kg/hec in the previous year. The paddy covers more than 82 % of the area cultivated under Kharif crop in the state of the Jharkhand.
- The second largest area is covered by maize crop with 259.5 thousand hectare, 544.73 thousand tonnes and 2099.15 kg/hec, reflecting an increase of 50.27 thousand hectare, 136.36 thousand tonnes and 147.32 kg/hec over 209.23 thousand hectare, 408.37 thousand tonnes and 1951.83 kg/hec in the previous year. The maize covers more than 15 % of the area cultivated under Kharif crop.
- Among the crops in the Kharif season, Ragi, Bajra and Jowar are the most important crops in terms of area, production and yield. Reflecting an increase of 15.09 thousand hectare, 21.34 thousand tonnes and 306.08 kg/hec, 0.12 thousand hectare, 0.14 thousand tonnes and 195.29 kg/hec and 0.26 thousand hectare, 0.31 thousand tonnes and 50.52 kg/hec in the previous year.

Rabi Crops

Rabi crops refer to a specific group of crops that are planted during the winter months (generally October and November) and harvested in the spring months (usually March and April). This category includes significant crops such as Wheat, Maize, Pulses, and oilseeds. Below is an overview of the area, production, and yield of Rabi crops in Jharkhand:

Table 3: Area, Production and Yield of Rabi Crops in Jharkhand

Year	2022-23			2023-24			Increased/Decreased		
Crop	Area in 000-hec.	Production - 000 Tonnes	Yield - Kg/hec.	Area in 000-hec.	Production - 000 Tonnes	Yield - Kg/hec.	Area in 000-hec.	Production - 000 Tonnes	Yield - Kg/hec.
Wheat	204.4	438.54	2145.52	227.92	480.96	2110.22	23.52	42.42	-35.3
Pulse	348.86	348.32	998.45	364	385.69	1059.6	15.14	37.37	61.15
Oilseeds	29.55	29.52	998.89	29.28	31.78	1085.41	-0.27	2.26	86.52
Maize	30.83	50	1621.96	9.94	20.55	2067.12	-20.89	-29.45	445.16

Source: jharkhand-economic-survey-2024-25

- The largest area under cultivation among Rabi crops is wheat with 227.92 thousand hectare, 480.96 thousand tonnes and 2110.22 kg/hect, reflecting an increase of 23.52 thousand hectare, 42.42 thousand tonnes and decrease of (35.30) kg/hect over 204.4 thousand hectare, 438.54 thousand tonnes and 2145.52 kg/hect in the previous year. The wheat covers more than 36 % of the area cultivated under Rabi crop in the state of the Jharkhand.
- The second largest area is covered by pulses crop with 364 thousand hectare, 385.69 thousand tonnes and 1059.60 kg/hect, reflecting an increase of 15.14 thousand hectare, 37.37 thousand tonnes and 61.15 kg/hect over 348.86 thousand hectare, 348.32 thousand tonnes and 998.45 kg/hect in the previous year. The pulse covers more than 57 % of the area cultivated under Rabi crop.
- Among the crops in the Rabi season, Oilseeds and Maize are the most important crops in terms of area, production and yield. The area of pulses has declined over the year but production and yield has increased by 2.26 thousand tonnes and 86.52 Kg/hect., the area and production of oilseeds has decreased but the yield has slightly declined.⁹

Problems of agriculture in Jharkhand

Indian agriculture is a multifaceted and evolving sector influenced by a range of physical, socio-economic, and technological elements. In spite of the difficulties presented by climate fluctuations, small land sizes, and scarce resources, this sector continues to be a fundamental component of the Indian economy. Indian agriculture faces numerous issues; some are natural, while others are man-made. They are:

- Size of Holdings
- Seeds
- Manure, Fertilizer and Biocides
- Irrigation
- Absence of Proper Agriculture Management
- Soil Erosion
- Agricultural Marketing System
- Inadequate Storage Facilities and Transport
- Scarcity of Capital/Finance

Embracing sustainable agricultural practices is essential for achieving a long-term increase in yield while preserving and protecting the natural resources of the ecosystem. In recent years, the State has experienced intermittent water shortages, which have affected all sectors reliant on water. The State Government is dedicated to implementing new technologies and practices to enhance resource efficiency and bolster the sustainability of the agricultural sector.¹⁰ (www.ijfmr.com)

Adoption of Climate Smart Agriculture

Enhancing agricultural productivity can lead to significant improvements, while simultaneously achieving co-benefits in emission reduction through increased efficiency in agricultural operations, which will also lower input costs. The effective utilization of agricultural land, careful selection of fertilizers, appropriate application methods, and efficient water usage can contribute to the reduction of both methane and NOx emissions.

- **Crop Selection:** Transitioning to rice varieties that necessitate a comparatively lower quantity of water.
- **Multi Cropping:** Implementing multi cropping techniques to mitigate the risks associated with crop failure.
- **Intelligent Irrigation:** Employing water conservation methods, utilizing energy-efficient water pumps, and implementing sprinkler or drip irrigation systems. Strategically positioning percolation tanks that assist in preserving soil moisture, thereby decreasing the need for irrigation.
- **Minimizing Energy Consumption Associated with Irrigation:** Discouraging the utilization of energy-inefficient water pumps through intelligent energy pricing and managing the leakage of kerosene from the Public Distribution System (PDS). Advocacy for renewable energy irrigation systems: The promotion of solar water pumps will assist farmers in decreasing their reliance on rainfall while also aiding in the reduction of greenhouse gas emissions.

- Enhancing resource availability by transforming wasteland and barren areas into productive land through technical measures.
- Deterring the sale of contaminated fuel in rural regions can enhance the efficiency of agricultural machinery while simultaneously decreasing emissions associated with fuel in the agricultural sector.
- **Fertilizer Use Management:** A reduction in fertilizer usage can be accomplished by implementing more intelligent soil testing, precise application methods, and practices such as crop rotation or mixed cropping.
- Utilizing the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) to cultivate underused and unused land for agricultural purposes, as well as to preserve water harvesting systems.¹¹

Conclusion

Based on the assessment of the Agricultural sector's performance in Jharkhand, it is evident that this sector significantly contributes to the development of Jharkhand's economy, playing a crucial role in macroeconomic indicators. The primary challenges that have hindered the growth of both the agricultural sector and the economy in Jharkhand are the persistent fluctuations among the key contributors and sub-sectors of agriculture. To enhance the sector's performance, the government must rigorously implement various input and output-oriented programs and schemes introduced by both the central and state governments of Jharkhand. It is necessary to diversify the agricultural sector and promote sustainable agriculture to tackle the ongoing challenges. Ongoing efforts to improve infrastructure, embrace modern technologies, and execute effective land reforms are vital for increasing productivity and sustainability in agriculture. The entire economic growth process in Jharkhand is contingent upon the dynamics of agriculture.

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