



TRENDS IN PADDY CULTIVATION WITH REFERENCE TO ANDHRA PRADESH

Balakrishna Ankalam

Dr.

Dept. of Economics, Acharya Nagarjuna University

Introduction:

More than half of the world's population relies on rice as a main food source, making it one of the most significant cereal grains in existence today (Briana L. Grossa et al., 2014). It is the seed of two types of grass, *Oryza glaberrima* (African rice) and *Oryza sativa* (Asian rice). Although there are only two species, more than 40,000 different variations have been discovered worldwide. Some of the most widely used varieties of rice include long grain, Basmati, wild, and jasmine. The top three nations in the world for rice production are China, India, and Indonesia. China produced more than 148 million metric tons of milled rice in 2018 and 2019. In 2018–19, India produced more than 116 million metric tons of rice overall. India's greatest producer of rice is the state of West Bengal. On a cultivable area of 5.46 million hectares, the state produced 15.75 million tons of rice in 2016. With 4.4 million tons exported in 2018–19, India was the world's top exporter of basmati rice. With an estimated 100 million metric tons of rice consumed annually, it is also the second-largest rice-consuming nation. The primary source of income and employment for more over 50 million people in India, where over 65% of the population eats rice, is the rice industry (Steph Wright, 2020). Currently, Asia, mainly China, Indonesia, Pakistan, India, Vietnam, Thailand, Myanmar, Bangladesh, Philippines, and Japan, accounts for 92% of the world's total rice population.

Paddy Production Countries in the World:

More than 100 countries currently farm rice, which results in an annual production of more than 715 million tons of paddy rice. 90% of the world's rice harvest is produced by fifteen nations. 50% of the rice produced is farmed only in China and India. 90% of the world's total rice output is produced by Asian nations, which also include Indonesia, Bangladesh, Vietnam, Myanmar, Thailand, the Philippines, Japan, Pakistan, Cambodia, the Republic of Korea, Nepal, and Sri Lanka. Brazil, the United States, Egypt, Madagascar, and Nigeria are other significant non-Asian producers of rice, and collectively they account for 5% of the world's total production. Rice is the dietary staple that is expanding the quickest in Africa (Sumithra Muthayya et al., 2014). According to figures from 2011–12, China produces close to 28% of the world's paddy production,

followed by India (21.78%), Indonesia (9.07%), Bangladesh (6.98%), Vietnam (5.85%), and Thailand (4.77%). Together, these six nations provide three-fourths of the world's paddy crop.

The main goal of this study is to compile and compare data on paddy production, area, and productivity for Andhra Pradesh, India, and the rest of the world. Because of this, secondary data from several "Statistical Abstracts" and "Agricultural Statistics At A Glance" have been gathered. To compare three time periods, log data were created, and the following linear regression equation was used to calculate linear growth rates.

$$\text{Log } Y = \log a + \log bx$$

The variations in Area, Production, and Productivity of Paddy in Andhra Pradesh, India, and the World over a 29-year period are shown from table 1 to table 3 as log linear growth rates. The entire period has been broken down into three decades, which are then examined in more detail and contrasted with the total period.

Growth Rates of Area, Production and Productivity of World:

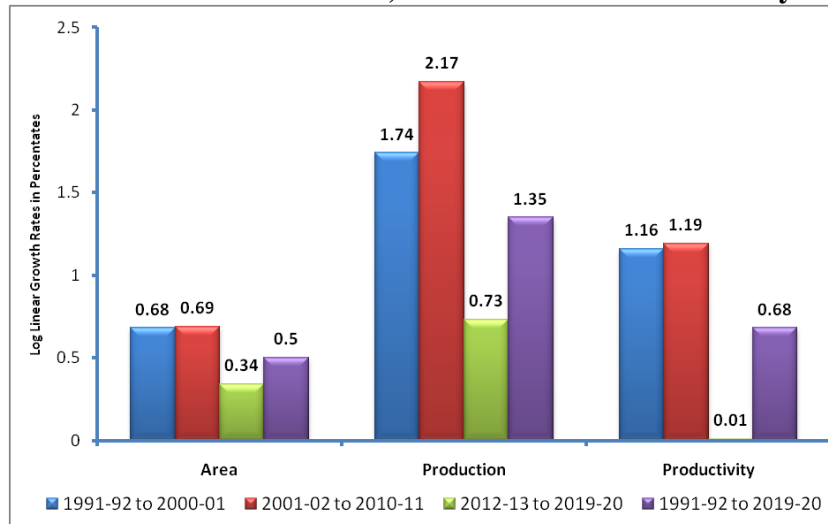
The information in table 1 relates to the log linear growth rates of paddy production, area, and productivity worldwide. Overall, the area under paddy cultivation worldwide has increased by 0.50 percent between 1991–1992 and 2019–20, a growth rate that is statistically significant at the one percent level. Overall, it is determined that the growth rates of paddy production in the world (0.68 percent) and productivity (1.35 percent) are positive throughout the same period and statistically significant at five percent. The statistics from the years 2001–2002 to 2010–11 show that the growth rates of paddy output (2.17 percent) and productivity (1.19 percent) are substantial at the one percent level. From the results of the log linear growth rates it is observed that productivity of paddy in the world is declining and stagnant. Overall, paddy cultivation area increased modestly from 1991 to 2019. Paddy production and productivity showed significant growth, particularly from 2001 to 2010. However, recent data points to a decline and stagnation in global paddy productivity.

Table-1
Log Linear Growth Rates of Area, Production and Productivity of World

	1991-92 to 2000-01	2001-02 to 2010-11	2012-13 to 2019-20	1991-92 to 2019-20
Area	0.68***	0.69***	0.34**	0.50**
Production	1.74***	2.17***	0.73***	1.35*
Productivity	1.16***	1.19***	0.01***	0.68*

Source: Calculated from the data of Various 'Statistical Abstracts' and 'Agricultural Statistics At A Glance'
*** 1 percent level, ** 5 percent level and * 10 percent level of significance

Chart:1
Log Linear Growth Rates of Area, Production and Productivity of World



Source: Prepared from table-1

Paddy Cultivation in India:

In India has witnessed a dramatic increase in paddy production India. India has abundant water and land resources with favorable agroclimatic conditions for the cultivation of paddy. A significant role in Indian agriculture is played by paddy. India's largest rice producer is Chhattisgarh. In both the northern Gangetic Plains and the southern Peninsular Plateaus, paddy fields are a typical sight. In the majority of India, paddy is grown at least twice a year during the seasons of Rabi and Kharif. While the latter depends on the monsoon, the former depends on irrigation. The cultivation of paddy is very important to rural India's sociocultural life. Between 2001 and 2011, paddy production in India increased from 86.30 million tons to 95.33 million tons. India's population is expected to reach 1546 million by the end of 2030, 1695 million by the end of 2040, and 1824 million by the end of 2050, according to forecasts published by the Population Foundation of India. The demand for rice is anticipated to reach 121.2 million tonnes by 2030, 129.6 million tonnes by 2040, and 137.3 million tonnes by 2050. The productivity of rice must be increased from its current level of 2.2 tonnes per ha to 3.3 tonnes in order to meet this goal. The current rate of output growth (2007-2008 to 2011-2012) of 0.36 percent is far lower than the population growth rate of 1.63%. Therefore, the current slowing trend in production and yield is a reason for concern and needs to be reversed in order to meet the expanding domestic market and export demand. On the other hand, one of the main causes of rice production is the erosion of the profit margin in rice agriculture. The main causes of the increased worldwide demand for food are the growing population and shifting dietary preferences. Forecasts indicate that the world's food output must rise by about 40% by 2030 and by 70% by 2050 (FAO, 2009). Globally, declining water and agricultural land supplies, as well as climatic whims, will make it more difficult to guarantee a sufficient supply of food. These factors will change weather patterns, and pests and illnesses will exert more pressure. In order to achieve the nation's declared aim of securing food for all, producers will need to produce more rice on less land while using less water, energy, and other inputs. Therefore, a two-pronged strategy of creating new technologies through increased research investments and beneficial government policies is the pressing need of the hour in order to fulfill the country's future rice demand (Anjani Kumar et al., 2014).

Andhra Pradesh, Tamil Nadu, Bihar, Chhattisgarh, Odisha, Assam, Karnataka, and Kerala are the primary paddy-producing states in India; combined, they produce the majority of the nation's paddy. These largest paddy producing states hold about 72 per cent of the total paddy-growing area in India and contribute more than 95 per cent to the total paddy production in the country (Kasula Sekhara and Deverajulu, 2019). India has seen a significant rise in paddy production due to favorable conditions and abundant resources. Paddy plays a crucial role in Indian agriculture, with states like Chhattisgarh leading in production. With a growing population, the demand for rice is projected to increase, necessitating higher productivity and innovative strategies. While various Indian states are key contributors to paddy production, the need for increased research and government support is vital to meet the nation's rising rice demand. India has witnessed a substantial increase in paddy production, driven by favorable conditions and abundant resources. Paddy is pivotal in Indian agriculture, with Chhattisgarh as the leading rice producer. The growing population forecasts a rising demand for rice, emphasizing the need for improved productivity and government support to address food security concerns. Key paddy-producing states like Andhra Pradesh, Tamil Nadu, Bihar, and others play a crucial role in meeting this demand.

Growth Rates of Area, Production and Productivity of India

The information in table 2 relates to the log linear growth rates of paddy production, area, and productivity in India. The overall Log Linear Growth Rate of Area in India is dropping, with a tendency of -1.43 percent. The highest portion of the declining trend was from 1991–1992 to 2000–2001, at -3.85 percent. While the growth in the area planted to paddy in India over the remaining two periods is negligible and stationary. However, the log linear growth rate is noteworthy when it comes to paddy productivity in India, where it was 1.85 percent from 1991–1992 to 2000–01 and 1.57 percent from 2012–2013 to 2019–20. With relation to productivity, India is showing a pattern that is almost same. Growth rate of productivity is found to be high and significant during 2012-13 to 2019-20 with 1.49 percent or growth rate. Overall, paddy area is declining, particularly from 1991–2000. In contrast, productivity shows notable growth, especially from 2012–2019, indicating a consistent pattern in India's agricultural landscape.

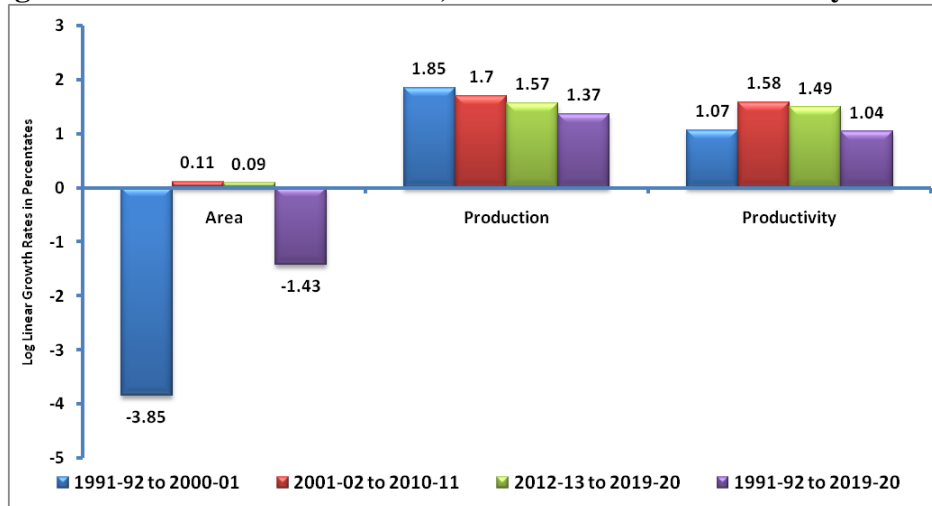
Table-2
Log Linear Growth Rates of Area, Production and Productivity of India

	1991-92 to 2000-01	2001-02 to 2010-11	2012-13 to 2019-20	1991-92 to 2019-20
Area	-3.85*	0.11*	0.09*	-1.43*
Production	1.85***	1.70*	1.57***	1.37*
Productivity	1.07***	1.58**	1.49***	1.04*

Source: Calculated from the data of Various 'Statistical Abstracts' and 'Agricultural Statistics At A Glance'

*** 1 percent level, ** 5 percent level and * 10 percent level of significance

Chart:2
Log Linear Growth Rates of Area, Production and Productivity of World



Source: Prepared from table-2

Paddy Cultivation in Andhra Pradesh:

About 43% of the population of Andhra Pradesh, the largest state in the Indian union in terms of both territory and population, lives in rural areas, with agriculture serving as the primary economic activity. Rice is the primary cuisine in Andhra Pradesh, one of the Indian states. Millions of farmers in Andhra Pradesh generate the majority of the paddy that is produced worldwide. Paddy production has increased dramatically since the High Yielding Varieties Programme was introduced in the middle of the 1960s. From 2001 to 2011, paddy production increased from 86.30 million tons to 95.33 million tons, and in the 2011–2012 crop year, it reached a record high of 104.32 million tons. Despite these successes, paddy agriculture has grown unprofitable over time and farmers in Andhra Pradesh are unable to receive a fair price for their crop. The researcher is interested in looking into the issue because it is so significant and impacts the livelihood of 65% of the State's people. Despite being the largest economic activity in our country, agriculture is fraught with danger and uncertainty. The farmers might not be able to maintain this occupation unless the federal and state governments offer them support. In all of the districts of the State, paddy, the main staple food grain crop, is farmed throughout both the Kharif and Rabi seasons and is primarily irrigated. During 2019–20, it made up 32.33% of the State's total cropped area.

The main crop, paddy, is widely grown in all of the state's districts both during the Kharif and Rabi seasons. Paddy crop produced 82.59 percent of the food grains produced in 2018–19, or 30.26 percent of the total planted area. As compared to 22.18 lakh hectares in 2017–18, the area planted to paddy in 2018–19 was 22.08 lakh hectares, a decrease of 0.45 percent. With an area of 3.97 lakh hectares, West Godavari district tops the list, followed by East Godavari (3.85 lakh hectare), Krishna (2.74 lakh hectare), and Guntur (2.46 lakh hectare). The amount of paddy produced in 2018–19 was 123.52 lakh tonnes, down 2.67 percent from 126.91 lakh tonnes in 2017–18.

Andhra Pradesh, India's largest state in both territory and population, has about 43% of its population residing in rural areas, primarily engaged in agriculture. Rice is a staple in the state, and Andhra Pradesh contributes significantly to global paddy production. Although production has grown

substantially, farmers struggle to receive fair prices, impacting the livelihoods of 65% of the state's population. To sustain this crucial occupation, government support is vital. Paddy cultivation is prevalent in all districts, accounting for a significant portion of the state's cropped area. In 2018-19, it constituted 82.59% of food grains produced, with a slight decrease in planted area and production compared to the previous year. West Godavari district leads in paddy cultivation.

Log Linear Growth Rates of Area, Production and Productivity of Andhra Pradesh:

The information in table 3 relates to the log linear growth rates of paddy production, area, and productivity in Andhra Pradesh. Data clearly demonstrate that Andhra Pradesh's paddy crop has experienced a strong positive growth rate of 2.26 percent overall. Additionally, Andhra Pradesh's growth rates for the area planted to paddy from 2012–13 to 2019–20 reflect a downward tendency.

Table-3

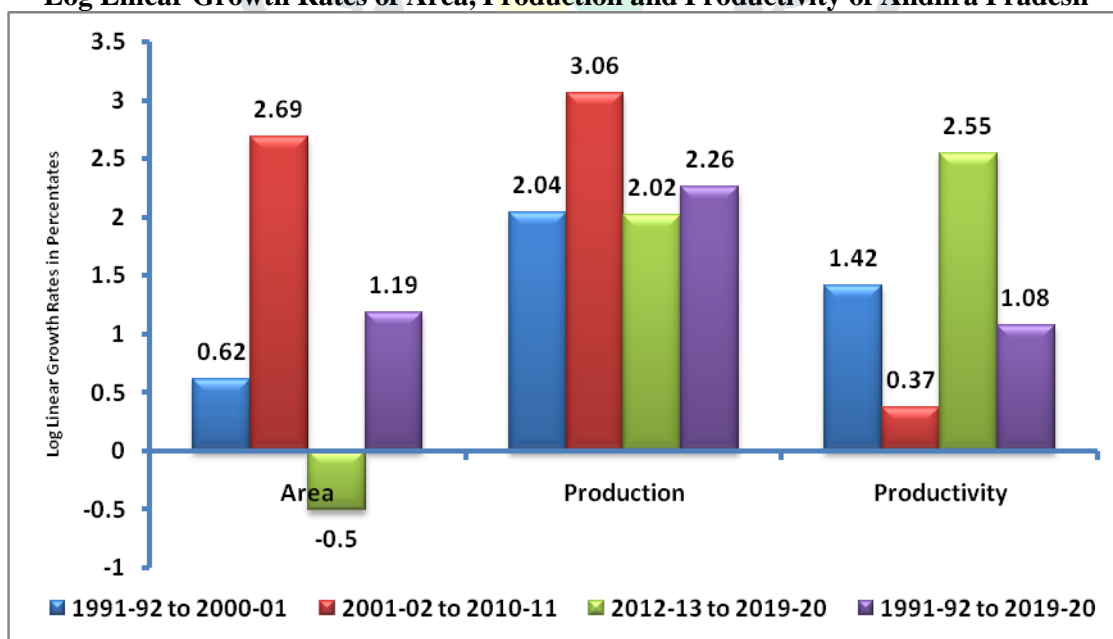
Log Linear Growth Rates of Area, Production and Productivity of Andhra Pradesh

	1991-92 to 2000-01	2001-02 to 2010-11	2012-13 to 2019-20	1991-92 to 2019-20
Area	0.62*	2.69*	-0.50*	1.19*
Production	2.04***	3.06*	2.02**	2.26***
Productivity	1.42**	0.37*	2.55***	1.08*

Source: Calculated from the data of Various 'Statistical Abstracts' and 'Agricultural Statistics At A Glance'
 *** 1 percent level, ** 5 percent level and * 10 percent level of significance

Chart:3

Log Linear Growth Rates of Area, Production and Productivity of Andhra Pradesh



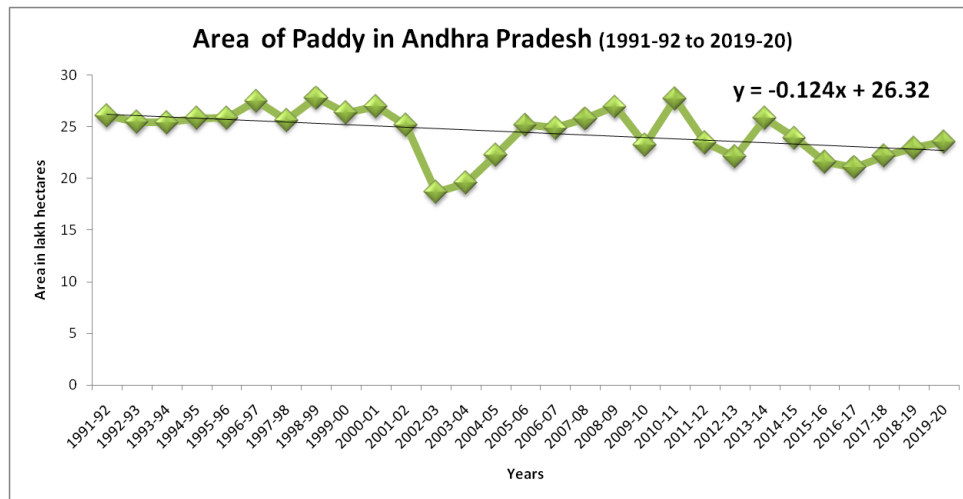
Source: Prepared from table-1

Trends in Area, Production and Productivity of Paddy in Andhra Pradesh (exponential values):

From the Chart-4 it can be noticed that Paddy acreage in Andhra Pradesh has been fluctuatingly declining at - 0.124 lakh hectares from 1991–1992 to 2019–20, as can be seen. In Andhra Pradesh, there has been a

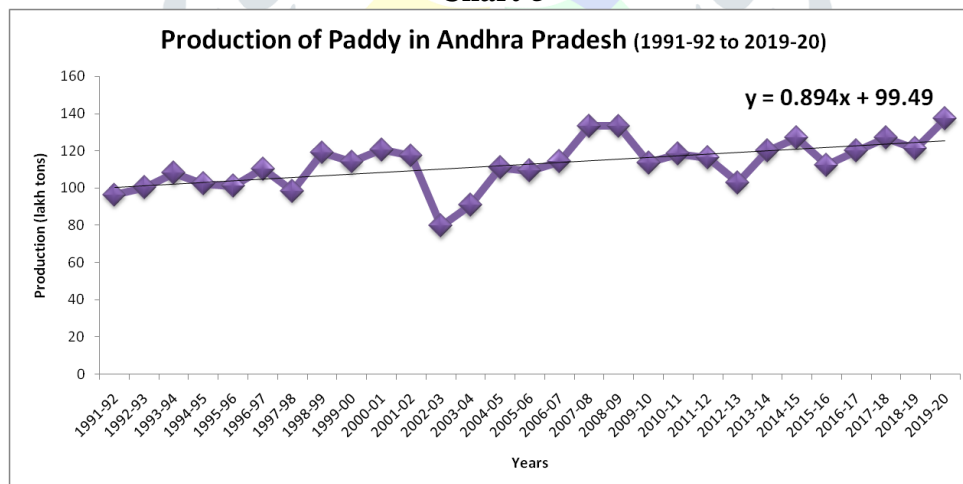
significant fall in paddy production and area between 1999-2000 and 2004-2005. Even though there has been a noticeable decrease in paddy area from 1991-1992 to 2019-2020, this has not been reflected in production, which has climbed by an average of 0.894 lack tone annually (Chart 5). The increase in productivity during the same era may be the cause of this denial result. The production of paddy in Andhra Pradesh has been steadily increasing at 61.12 metric KG per hectare from 1991-1992 to 2019-20, as shown in Chart 6. Overall, paddy production in Andhra Pradesh has shown a robust positive growth rate of 2.26%. However, the area dedicated to paddy from 2012 to 2019 exhibits a declining trend. While paddy acreage has seen fluctuations, production has steadily increased over the years, possibly due to rising productivity. Paddy production in Andhra Pradesh has consistently risen, reaching 61.12 metric KG per hectare from 1991 to 2019.

Chart-4



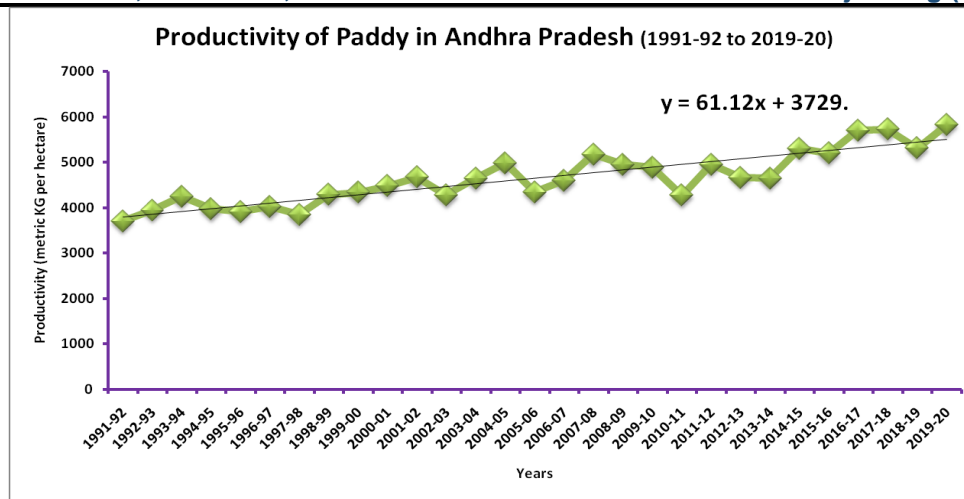
Source: Prepared from data of various Agricultural Statistics At A Glance

Chart-5



Source: Prepared from data of various Agricultural Statistics At A Glance

Chart-6



Source: Prepared from data of various Agricultural Statistics At A Glance

Summery and Conclusion:

India is the world's largest producer of paddy, constituting approximately one-third of global paddy fields, with China being the only nation ahead. It also ranks fourth in global rice exports and maintains the highest paddy production worldwide. However, paddy productivity in India has experienced fluctuations over the years. The primary objective of this study is to gather and compare paddy production, cultivation area, and productivity data for Andhra Pradesh, India, and the rest of the world. Between 1991-1992 and 2019-20, there has been a positive global growth rate in paddy cultivation area at 0.50 percent, statistically significant at the 1% level. In contrast, India's overall Log Linear Growth Rate for cultivation area has shown a decline, with a tendency of -1.43 percent. The steepest decrease occurred from 1991-1992 to 2000-2001 at -3.85 percent. Conversely, Andhra Pradesh has witnessed a substantial positive growth of 2.26 percent in paddy production from 1991-1992 to 2019-20. On the productivity front, global paddy productivity declined and remained stagnant over the years. In India, paddy productivity displayed positive trends, growing at a rate of 1.85 percent from 1991-1992 to 2000-01 and 1.57 percent from 2012-2013 to 2019-20. However, the area allocated to paddy cultivation in India has consistently decreased, with the most significant drop observed from 1991-1992 to 2000-2001 at -3.85 percent. Andhra Pradesh, despite a declining cultivation area, demonstrated robust positive growth in paddy production. Given the importance of rice as a staple grain in India, it is crucial for the Andhra Pradesh government to focus on enhancing paddy crop output by implementing innovative cultivation techniques. Because rice is a staple grain in India, the government of Andhra Pradesh should work to increase paddy crop output by implementing new growing techniques. India is the world's largest producer of paddy, constituting approximately one-third of global paddy fields, with China being the only nation ahead. It also ranks fourth in global rice exports and maintains the highest paddy production worldwide. However, paddy productivity in India has experienced fluctuations over the years. The primary objective of this study is to gather and compare paddy production, cultivation area, and productivity data for Andhra Pradesh, India, and the rest of the world. Between 1991-1992 and 2019-20, there has been a positive global growth rate in paddy cultivation area at 0.50 percent, statistically significant at the 1% level. In contrast, India's overall Log Linear Growth Rate for cultivation area has shown a decline, with a tendency of -1.43 percent. The steepest decrease occurred from 1991-1992 to 2000-2001 at -3.85 percent. Conversely,

Andhra Pradesh has witnessed a substantial positive growth of 2.26 percent in paddy production from 1991-1992 to 2019-20. On the productivity front, global paddy productivity declined and remained stagnant over the years. In India, paddy productivity displayed positive trends, growing at a rate of 1.85 percent from 1991-1992 to 2000-01 and 1.57 percent from 2012-2013 to 2019-20. However, the area allocated to paddy cultivation in India has consistently decreased, with the most significant drop observed from 1991-1992 to 2000-2001 at -3.85 percent. Andhra Pradesh, despite a declining cultivation area, demonstrated robust positive growth in paddy production. Given the importance of rice as a staple grain in India, it is crucial for the Andhra Pradesh government to focus on enhancing paddy crop output by implementing innovative cultivation techniques.

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