International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

A Study of Trends in Wheat and Pulses Production in India: Post Millennium

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ABSTRACT

India holds the distinction of being the second-largest producer globally of essential food staples like wheat and rice. Furthermore, it ranks as the second-largest producer of various agricultural commodities, including dry fruits, textile raw materials, root and tuber crops, pulses, farmed fish, eggs, coconut, sugarcane, and an array of vegetables. This diverse agricultural output not only caters to domestic consumption but also contributes significantly to international markets, solidifying India's position as a key player in global agriculture.

Wheat stands as India's second most important cereal crop, predominantly cultivated in the northern and north-western regions, where it serves as the primary food crop. India's global standing as a major wheat producer ranks closely behind only China and the USA. This agricultural prominence not only underscores wheat's pivotal role in Indian agriculture but also highlights its crucial contribution to the nation's food security and economy. With its widespread cultivation and diverse applications, wheat plays a central role in sustaining livelihoods and meeting nutritional needs across India's vast and populous landscape.

Despite India's significant domestic production, there is also a substantial import market for pulses from countries like Canada, the USA, Myanmar, and Australia. This indicates both the importance of pulses in Indian cuisine and the need to supplement domestic production to meet the high demand. Pulses, the dried, edible seeds of leguminous plants, are a cornerstone of diets worldwide, providing indispensable dietary protein and energy.

This study is primarily dedicated to investigating the production of Wheat and Pulses yield in India. By scrutinizing these pivotal crops, we aim to gain insights into agricultural productivity dynamics, market trends, and their ramifications for both food security and economic development. Through a comprehensive examination of Wheat coupled with an evaluation of Pulses production, area and yield, this study endeavours to elucidate the agricultural output in terms of wheat and pulses in total along with suggestions to broaden the food supply chain.

KEYWORDS: Wheat, Pulses, Area, Yield, Production, Agriculture.

INTRODUCTION

Indian agriculture traces its roots back to around 9000 BCE in the north-west region, marked by the early cultivation of plants and the domestication of crops and animals. Over millennia, the Indian subcontinent emerged as a powerhouse in agricultural production, particularly in wheat and grain. This rich heritage underscores the deep-seated agricultural traditions that have shaped India's agrarian landscape, contributing significantly to its historical and contemporary agricultural prowess.

India, historically renowned for its agricultural heritage, sustains its populace through millennia-old farming practices. With two-thirds of its population reliant on agriculture for sustenance, accounting for 60-70% of its populace, the sector serves as a cornerstone of livelihoods. As a primary activity, agriculture remains pivotal in India's economy, providing the bulk of the food supply for its vast and diverse population. This enduring dependence underscores the profound significance of agriculture in shaping India's social and economic sector.

India holds the distinction of being the second-largest producer globally of essential food staples like wheat and rice. Furthermore, it ranks as the second-largest producer of various agricultural commodities, including dry fruits, textile raw materials, root and tuber crops, pulses, farmed fish, eggs, coconut, sugarcane, and an array of vegetables. This diverse agricultural output not only caters to domestic consumption but also contributes significantly to international markets, solidifying India's position as a key player in global agriculture.

Punjab is acclaimed as the "wheat granary of India" owing to its extensive wheat cultivation facilitated by favourable conditions. The region's fertility is attributed to the presence of five tributaries that enrich its soil. These tributaries, including the Sutlej, Beas, and Ravi rivers, deposit sediment, enhancing soil quality. Ample water supply from these rivers supports irrigation, crucial for crop growth. Punjab's climate, characterized by dry winters and hot summers, complements wheat cultivation. Furthermore, the meticulous farming practices of Punjabi farmers contribute to high yields. This synergy of natural advantages and agricultural expertise solidifies Punjab's status as a cornerstone of wheat production, vital for both local sustenance and national food security.

According to the Food and Agriculture Organization (FAO), pulses are simply defined as the dry, edible seeds harvested from crops within the Leguminosae family. In India, some of the most commonly grown varieties of pulses include chickpeas, mung beans, black gram, and pigeon peas.

Dal's appeal lies not only in its preparation but also in its diverse varieties, each offering a distinct taste, texture, and nutrient profile. Whether it's the velvety consistency of red lentils, the earthy richness of yellow split peas, or the hearty bite of chickpeas, dal adds versatility and nutrition to any meal. Yet, the significance of pulses transcends their culinary prowess. Praised for their nutritional density, pulses abound in protein, fibre, vitamins, and minerals, fostering satiety, stabilizing blood sugar levels, and nurturing digestive wellness.

OBJECTIVES OF THE STUDY

1. To Analyse the trend of agricultural production, yield and area under cultivation of Wheat in India from 2002-03 to 2022-23.
2. To Analyse the trend of agricultural production, yield and area under cultivation of Pulses in India from 2002-03 to 2022-23.

REVIEW OF LITERATURE

Sendhil Ramadas, T.M. Kiran Kumar and Gyanendra Pratap Singh observed in their paper “Wheat Production in India: Trends and Prospects” that the advancement of agriculture for regional development necessitates interdisciplinary research to develop high-yielding crop varieties. Increased public and private investment in research and development is essential despite its high cost. Enhancing productivity requires the active involvement of extension personnel to educate farmers. Reforms in price, seed, and credit policies are crucial to support farmers and improve production systems. Access to markets, rural

infrastructure, and skill development for rural labour are also vital for boosting crop productivity. Ultimately, achieving higher production levels and ensuring food security hinges on the synergy between research, extension, policy, and institutions, along with the development of resilient crop varieties.

Akram Ahmad Khan concluded in his research titled, "An Economic Analysis of Wheat Production in The Light of Climate Change In India" that expanding cultivation area is crucial for long-term increases in wheat production, with a positive association between wheat production and cultivation area. While temperature and precipitation showed insignificant coefficients, temperature negatively affected wheat production in the long run. In the short term, temperature had a negative correlation with wheat output, while cultivation area had a positive association. Overall, the research highlighted the critical dependence of wheat output on cultivation area in both short and long terms, suggesting that temperature changes may have a long-term impact on Indian wheat production.

Vaibhav Yashwant Mohare concluded in his study "Analysis of Production of Pulses in India", that from 1992-93 to 2019-20, there was a shift towards higher compound growth rates in wheat area, production, and yield from 2007-20 due to government interventions like the National Food Security Mission. Some states like Andhra Pradesh and Bihar showed negative growth in cultivated area, while others like Tamil Nadu and Rajasthan showed positive growth in production and productivity. Instability increased moderately from 1993-2006 to 2007-20 in pulses production. Johansen Co-integration test revealed a long-run relationship between cultivation area, seed distribution, and pulse production, with area and seed distribution positively impacting production.

Y Latika Devi states in her paper "Pulses Production in India: Trend and Decomposition Analysis" that there is a consistent increase in pulses area, production, and productivity over six decades. While yield growth was significant, area and production rates were not. Despite this, domestic demand outpaced supply. Pre-Green Revolution, area expansion drove production, while post-revolution, yield increase dominated. Post-Economic Liberalization, although area and yield improved, production growth declined. To meet rising demand, enhancing pulse productivity through advanced techniques like hybrid cultivation is crucial due to limited resources.

P. K. Joshi and Raka Saxena state in their research paper "A Profile of Pulses Production in India: Facts, Trends and Opportunities" that pulses are expanding into new regions, presenting promising opportunities despite overall lacklustre performance. It's crucial to identify and focus on these promising niches for each pulse type, introducing suitable technologies and supportive policies. Rapid dissemination of improved technologies through collaboration with seed sectors, research institutions, and NGOs is vital to prevent a decline in pulse cultivation, which could lead to increased imports and harm producers. To address this, region-specific constraints to pulse production should be identified, and R&D strategies tailored to boost pulse crop production, improve availability, reduce imports, and conserve natural resources. Overall, revitalizing pulse research and extension programs is essential to ignite a "yellow revolution" in the pulse sector.

DATA SOURCES AND RESEARCH METHODOLOGY

This study relies heavily on empirical data collected from various secondary sources. These sources include book chapters, journal articles, newspaper articles, published reports, official documents such as those from the Economic Survey of India, reports from the National Statistical Survey Organization, bulletins and annual reports from the Reserve Bank of India (RBI), speeches and publications by RBI governors, records from the Labor Bureau of the Government of India, Ministry of Agriculture, and the

World Bank. Additionally, information has been gathered from various informative websites. Specific data regarding area, yield, and production have been sourced from the official website of the Reserve Bank of India (RBI). With the help of data tables and graphs, the true picture of India's Wheat and Pulses in terms of their area, yield and production has been analysed.

WHEAT

Wheat, a vital grass, thrives globally for its nutritious seeds, a staple in diets worldwide. Belonging to the genus Triticum, it encompasses diverse varieties. Archaeological findings trace wheat cultivation back to approximately 9600 BCE in the Fertile Crescent, marking a pivotal moment in human agricultural history. Its versatility and adaptability have sustained civilizations and shaped culinary traditions across millennia, making it a cornerstone of human nutrition and culture.

Wheat, classified as a grain within the grass family, aligns with the botanical definition of grains as plants yielding dry, edible seeds, termed kernels or berries. Within this classification, wheat notably yields kernels, commonly recognized for their culinary significance. Additionally, corn, grain sorghum, rice, oats, and rye exemplify other members of the grain family, each contributing distinct characteristics and uses to agricultural and dietary landscapes. This classification facilitates understanding and categorization within the vast diversity of plant species essential to human sustenance and agricultural practices.

Table 1. Wheat: Area, Yield and Production from 2002-03 to 2022-23.

YEAR	AREA (LAKH HECTARES)	YEILD(KG/HECTARE)	PRODUCTION (LAKH TONNES)
2002-03	252	2610	657.6
2003-04	266	2713	721.6
2004-05	264	2602	686.4
2005-06	265	2619	693.5
2006-07	280	2708	758.1
2007-08	280	2802	785.7
2008-09	278	2907	806.8
2009-10	285	2839	808.0
2010-11	291	2988	868.7
2011-12	299	3177	948.8
2012-13	300	3117	935.1
2013-14	312	3075	958.5
2014-15	310	2872	865.3
2015-16	304	3034	922.9
2016-17	308	3200	985.1
2017-18	297	3368	998.7
2018-19	293	3533	1036.0
2019-20	314	3440	1078.6
2020-21	311	3521	1095.9
2021-22	305	3537	1077.4

2022-23	**318**	**3543**	**1127.4**

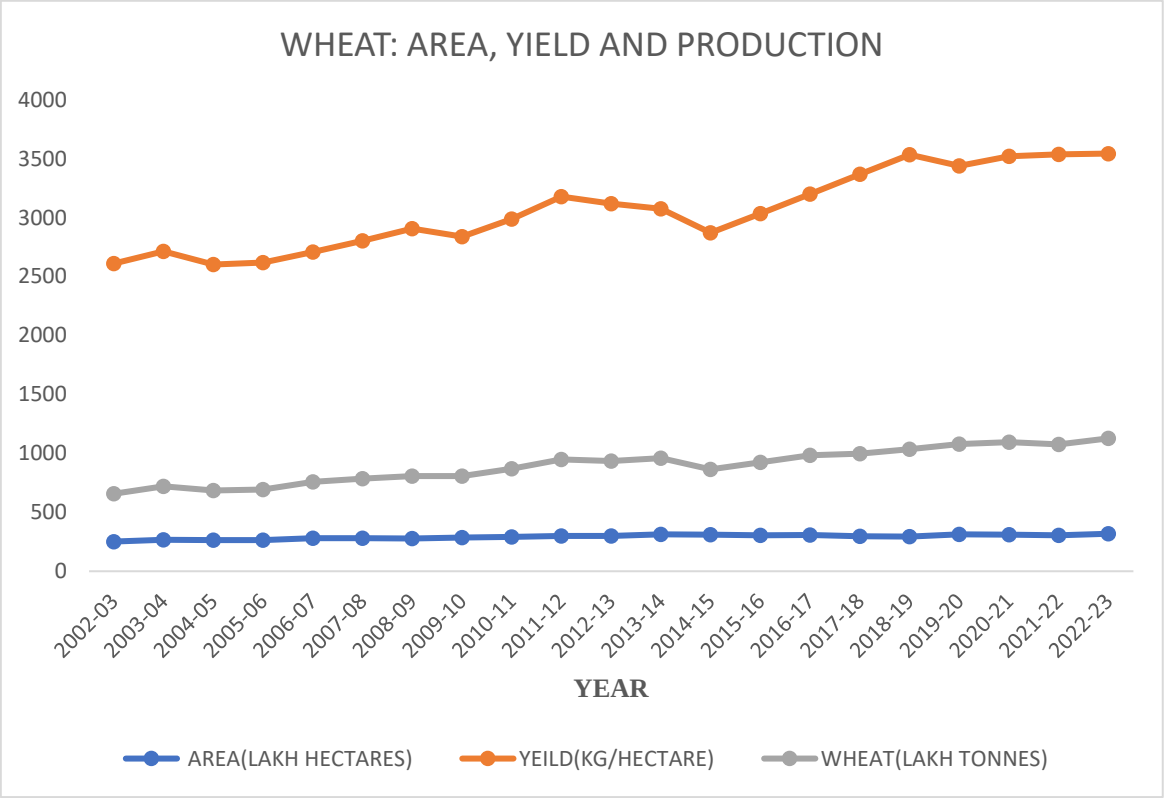
Source: Reserve Bank of India

The above Table 1. shows area of cultivation, yield and the production of Wheat. It is seen that the lowest area of cultivation of wheat was in the year 2002-03 at 252 lakh hectares as it is a Temperate crop. The highest area for cultivation of wheat was experienced in the year 2022-23 with 318 lakh Hectare. This happened because of the good weather conditions which prevailed over the wheat producing regions in the country.

It has been found that the yield of wheat crop was lowest in the year 2004-05 which was 2602 kg/ Hectare, because of lack of pollination and the insufficient moisture in soil. While the highest yield of wheat was found in the year 2022-23 which was 3543 kg/ Hectare due to the large area of cultivation and all the favourable weather and soil conditions prevailing.

The lowest production of the wheat was experienced in the year 2002-03 which was 657.6 lakh tonnes. The production was low because of the low area under cultivation and lack of proper facilities such as irrigation. The highest production of the wheat was in the year 2022-23 at 1127.4 lakh tonnes. The production was high because of the good productivity due to good irrigational facilities.

Figure 1.



Source: Author's own calculation.

The Figure 1 is the graphical representation of the area under wheat cultivation, its yield (kg/hectare) and the wheat production in India since 2002-03 to 2022-23. It is clearly visible from the graph that area under wheat cultivation has been almost constant (identical to parallel line). While the wheat production has

been increasing steadily since 2002-03 in India, Yield of wheat has been showing a fluctuating trend till 2022-23, as it being an agricultural commodity depends on the prevailing weather conditions and the allied facilities.

PULSES

Pulses are the nutritious seeds harvested from certain types of legume plants. When we talk about pulses, we're referring to a variety of seeds such as beans, lentils, and peas. While the legume plant itself, like a pea plant with its pods, might be familiar, it's the inner seed that we call the pulse. So, to clarify, while the pea pod is indeed a legume, it's the small, edible pea inside the pod that qualifies as the pulse. These pulses are not only tasty but also packed with essential nutrients, making them an excellent addition to a healthy diet.

Pulses are widely consumed globally due to their widespread availability and affordability, making them a staple crop. When we look at consumption trends, pulses rank closely behind cereals in terms of popularity. These nutrient-rich seeds belong to the Leguminosae family, as noted by Lal in 2007.

Table 2. Pulses: Area, Yield and Production from 2002-03 to 2022-23.

YEAR	AREA (LAKH HECTARE)	YEILD (KG/HRCTAREs	PRODUCTION (LAKH TONNES)
2002-03	205	543	111.3
2003-04	235	635	149.1
2004-05	228	577	131.3
2005-06	224	598	133.8
2006-07	232	612	142.0
2007-08	236	625	147.6
2008-09	221	659	145.7
2009-10	233	630	146.6
2010-11	264	691	182.4
2011-12	245	699	170.9
2012-13	233	789	183.4
2013-14	252	764	192.5
2014-15	231	744	171.5
2015-16	249	656	163.2
2016-17	294	786	231.3
2017-18	298	853	254.2
2018-19	292	757	220.8
2019-20	280	823	230.3
2020-21	288	885	254.6
2021-22	307	888	273.0
2022-23	291	944	275.0

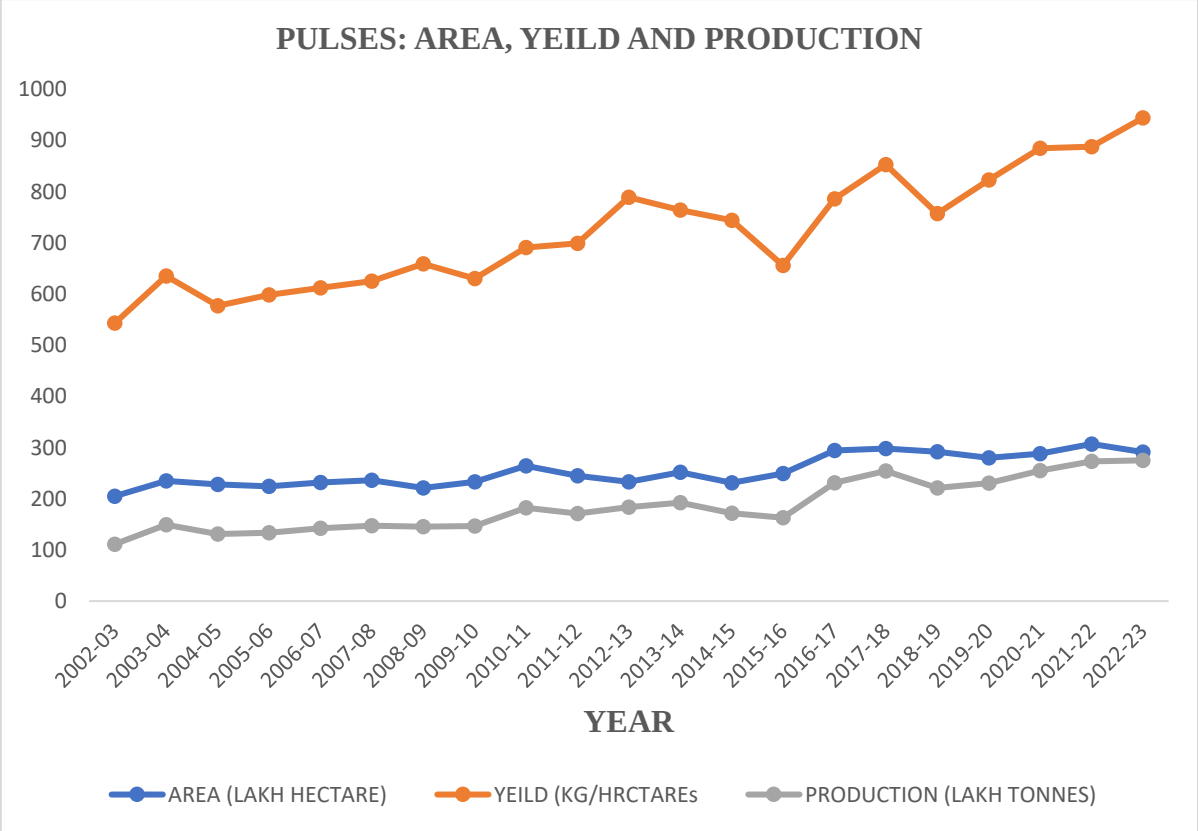
Source: Reserve Bank of India

The above table 2. shows the highest and the lowest area of cultivation, yield and the production of Pulses. The area of cultivation under pulses was lowest in the year 2002-03 which was 205 lakh hectares, the reason was the climatic condition as Indian farming is highly dependent on the rain. The highest area of cultivation was in the year 2021-22 at 307 lakh hectares. Rajasthan is the highest producer of the pulses in India.

The lowest yield of pulses was experienced in the year 2002-03 which was 543 kg/hectare, this was because pulses plants faced tough conditions like rough weather and heat stress as a result, they matured early but produced less. The highest yield of pulses was seen in the year 2022-23 which was 944 kg/ hectare due to good climatic condition.

The lowest production of pulses was seen in the year 2002-03 at 111.3 lakh tonnes. The reason of this low production of pulses was the low yield and area of cultivation. The highest production of the pulses was experienced in the year 2022-23 which was 275 lakh tonnes.

Figure 2.



Source: Author's own calculation.

The Figure 2. is the graphical representation of the area under pulses cultivation, its yield and the pulses production in India since 2002-03 to 2022-23. It is clearly visible from the graph that area under pulses cultivation and the production of the pulses has been increasing in almost the same pattern every year, due to land on which the pulses are grown can be used again for growing the pluses as a result production increases because it needs less water. Yield of pulses has been showing a fluctuating trend till 2022-23, as it being an agricultural commodity depends on the prevailing weather conditions and the allied facilities.

FINDINGS AND SUGGESTIONS

Wheat undergoes milling to produce flour, a versatile ingredient utilized in a myriad of culinary creations. This finely grounded flour serves as the foundation for a diverse array of foods, spanning from staple items like bread, crumpets, and muffins to globally enjoyed dishes such as noodles and pasta. Moreover, wheat flour contributes to the creation of baked goods like biscuits, cakes, and pastries, as well as snack items ranging from cereal bars to both sweet and Savory treats. Its application extends to the production of crackers, crisp-breads, sauces, and even confectionery, showcasing wheat's indispensable role in the culinary world.

Moreover, the fluctuating trend in wheat yield underscores the sensitivity of agricultural commodities to external factors like weather conditions and infrastructure support. While wheat cultivation is subject to similar influences as rice, its yield variability highlights the need for continued investment in agricultural research, infrastructure, and risk management strategies to ensure food security and sustainability in the face of changing environmental conditions.

Notably, the area under wheat cultivation has exhibited relative stability throughout the observed period, indicating a consistent commitment to wheat farming practices despite potential environmental and economic fluctuations. Conversely, the steady increase in wheat production over the years underscores India's success in enhancing agricultural productivity and efficiency. This upward trajectory suggests advancements in farming techniques, technological innovations, and infrastructural developments that have contributed to bolstering wheat output across the nation.

However, the fluctuating trend in wheat yield highlights the vulnerability of this crop to external factors such as weather variability and the availability of supporting facilities. Given its sensitivity to climatic conditions and other allied factors, the fluctuating yield underscores the need for proactive measures, including improved irrigation systems, resilient crop varieties, and risk management strategies, to mitigate the impact of environmental uncertainties on wheat production.

Notably, both the area under pulses cultivation and pulses production have demonstrated a consistent upward trajectory over the observed period. This parallel increase suggests a sustained commitment to pulses farming practices and indicates the potential for continued expansion in pulses production. One key factor contributing to this growth is the efficient use of land resources, as the land used for pulses cultivation can be readily utilized for subsequent pulses crops, facilitating a continuous cycle of production. Additionally, the relatively low water requirement for pulses compared to other crops has likely played a role in driving their increased cultivation, making them an attractive option for farmers, particularly in regions facing water scarcity.

However, despite the overall upward trend in pulses production, the fluctuating trend in yield highlights the inherent vulnerability of pulses cultivation to external factors such as weather variability and the availability of allied facilities. Addressing these challenges will be crucial for sustaining and further enhancing pulses productivity in the future. The data presented indicates a positive trend in the area under total production of pulses in India from 2002-03 to 2022-23. This growth can be attributed to the reusability of cultivated land for pulse cultivation and the favourable conditions for pulse crops, particularly their ability to thrive with less water. Notably, Rajasthan emerges as a significant contributor to India's pulse production.

However, the yield of pulses exhibits a fluctuating pattern over the same period. This variability can be attributed to the agricultural nature of pulses, which heavily relies on weather conditions and supporting infrastructure. Despite this fluctuation, the overall increase in total production suggests that efforts to

expand pulse cultivation have been successful. Below are some suggestions pertaining to wheat and pulses:

1. The consistent area under wheat cultivation and the steady rise in production signify India's agricultural resilience and capacity for growth, the fluctuating yield trend emphasizes the ongoing challenges faced by farmers in safeguarding wheat productivity. Addressing these challenges will require sustained efforts and investments in research, infrastructure, and policy initiatives to ensure the long-term sustainability and viability of wheat farming in India.
2. The area under pulse production has steadily increased, the yield has fluctuated due to external factors like weather conditions and infrastructure. Continued efforts to stabilize yields and enhance supporting facilities could further strengthen India's position as a leading producer of pulses.
3. The consistent growth in pulses cultivation and production reflects India's agricultural resilience and capacity for expansion, addressing yield fluctuations will require ongoing efforts to improve farming practices, infrastructure, and risk management strategies. By leveraging technological advancements and adopting sustainable agricultural practices, India can continue to bolster its pulses production and contribute to food security and economic development.
4. Optimizing wheat production in India requires a multifaceted approach. Firstly, efficient water management strategies must be prioritized, given rice's heavy reliance on water. Implementing techniques like drip irrigation and rainwater harvesting can ensure sustainable irrigation practices. Additionally, promoting the adoption of modern agricultural technologies and practices, such as precision farming and mechanization, can enhance productivity while reducing labour dependency.
5. Investments in research and development are crucial for developing drought-resistant resilient wheat strains. By mitigating the impact of climate change on crop yields, India can stabilize production levels despite fluctuating weather conditions. Moreover, improving rural infrastructure, including storage facilities and market access, facilitates efficient transportation of produce, reducing post-harvest losses.
6. Extension services play a vital role in disseminating information and training farmers on best practices in crop management and pest control. Government should support through subsidies, insurance schemes, and price support mechanisms incentivizes farmers to adopt sustainable practices and invest in productivity-enhancing technologies.

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