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# Dynamics of Production and Trade Scenario of Pulses in India

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**Abstract**

*India holds a prominent position in the global production of pulses, being the leading producer and consumer. The study aims to analyze the dynamics of the production and trade balance of pulses in India using the trade specification coefficient index. A comprehensive analysis of growth rates and stability in pulses production reveals an increasing trend in area, production, and productivity. There has been a consistent increasing in yield of pulses as compared to area under cultivation, indicating improved productivity over time. Instability in pulses production was found higher than area and yield during the study period. Despite fluctuations in pulses trade, with exports showing an upward trend and imports on the rise, India's Trade Specialization Coefficient (TSC) remains negative, signifying a relative trade disadvantage due to higher imports than exports.*

**Keywords:** Pulses, Growth rate, Instability, Trade specialization coefficient index

**JEL Codes** Q1, Q13, Q17

## Introduction

Pulses are often referred to as the "poor man's meat" and the "rich man's vegetable" in discussions concerning food and nutritional security, especially for individuals with lower incomes. In India, pulses are cultivated throughout the year, thanks to the country's diverse agro-climatic conditions. India is the world's largest producer and consumer of pulses, accounting for about 26 per cent of global production, 28 per cent of global consumption, and 35 per cent of the total area dedicated to pulses cultivation worldwide (Anonymous, 2018). The influence of various factors, including technologies, high-yielding crop varieties, and irrigation, has had a notable impact on the cultivation area of pulses. According to the Expert Committee on Pulses in 2012, these factors have played a significant role in shaping the pulses cultivation landscape. It's worth noting that while cereal production, particularly of rice and wheat, has shown an increase, there has been a decrease in the proportion of coarse grains and pulses in the overall food grain production since the 1960s. This shift in the composition of food grain production reflects changing agricultural practices and priorities in India (Hasan and Khan, 2018).

The demand for pulses has been on the rise year after year, reflecting their importance in the diet and nutrition of people. However, the challenge lies in the fact that pulses production has either remained stagnant or, in some cases, has shown negative growth. This has led to a situation where per capita availability of pulses is either decreasing or has remained stable, which is a matter of concern (Sachdeva, 2008). In India, the majority of pulses production is carried out by small and marginal farmers as a means of subsistence farming. A major challenge in pulses cultivation is the limited growth in the area under cultivation over the years. This stagnation in pulses cultivation can be attributed to several factors, including limited available land for cultivation, lack of irrigation facilities leading to stagnation in cropping intensity, and the diminishing availability of water resources. Addressing these supply constraints is essential for boosting pulses production and ensuring food security (Singh et al., 2022). The continuous upward pressure on trade and prices of various pulses varieties worldwide is primarily attributed to the strong demand in India and the relatively consistent supply. These dynamics have arisen due to a mismatch between domestic supply and demand in countries with higher consumption. This situation has led to increased international trade and price fluctuations in the pulses market, reflecting the challenges in balancing production and consumption on a global scale (Tuteja, 2009).

India occupies a significant position in the global pulses industry as the largest processor and re-exporter of pulses. This prominence is because many major pulses-exporting countries, such as Myanmar, Canada, and Australia, often lack sufficient pulses processing facilities and have limited domestic consumption of pulses (Kumar et al, 2018). The stagnation in pulses production in India, especially in the

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context of global price fluctuations and trade dynamics, reflects broader agricultural challenges, including the disproportionate focus on cereal crops like rice and wheat. Moreover, India's pivotal role in the global pulses trade, as a major processor and re-exporter, necessitates an understanding of how domestic production and demand interact with international markets. Hence, this study aims to address these gaps and contribute to policies that can improve pulses production, enhance food security, and balance global trade dynamics.

## Data Sources and Methodology

The entire study relies on secondary data sourced from various government-published reports and databases. The data about the area, production, and productivity of pulses were collected from the *Directorate of Economics and Statistics (DES)*, Ministry of Agriculture and Farmers Welfare, Government of India (GoI), covering the period from 1970-71 to 2021-22. The data on exports and imports was obtained from the *International Trade Centre (ITC)* for the period 2001 to 2022.

### Growth rate and instability indices

The growth in area, production and yield of pulses was studied through compound growth rates (CGR), which was calculated by the formula:

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

Where

Y- Variable whose CAGR is to be calculated.

a- Constant term.

t- Time variable.

b- Regression coefficient of limits.

To assess instability in the study, "Cuddy and Della's instability index" was used.

$$\text{Cuddy and Della Index} = C.V * 100 * \sqrt{1 - adjR^2}$$

where,

Adj R2= Adjusted R2 of the trend equation, CV= Coefficient of Variation

### Trade Specification Coefficient Index (TSC Index)

The Trade Specification Coefficient Index (TSC Index), also known as Lafay's Index (1992), is utilized to assess the export competitiveness of pulses over the study periods. This index quantifies the relationship between the trade balance (the difference between exports and imports) of a specific commodity in a country and the total trade value (the cumulative value of exports and imports) for that particular commodity.

$$TSC = (X_{ij} - M_{ij}) / (X_{ij} + M_{ij})$$

Where:

$X_{ij}$ = Total exports of the commodity.

$M_{ij}$ = The total imports of the commodity.

The value of this index equals 'zero' when a commodity's exports are equal to its imports. A positive index indicates that the country's exports of a particular commodity are higher than the imports of the commodity. Hence this measure indicates the degree of equilibrium between exports and imports of a particular commodity and is a suitable method for comparing the trends over a longer period

## Results and Discussion

India holds the top position globally in both the area and production of pulses, making it the largest contributor and consumer of pulses worldwide. Various varieties of pulses are extensively cultivated in India, playing a crucial role in promoting sustainable farming practices and ensuring the nutritional security of households. Among the Indian states, Madhya Pradesh leads in pulses production, accounting for 21 per cent of India's production, followed by Rajasthan (17%), Maharashtra (15%), Uttar Pradesh (10%), and Karnataka (9%). In India, chickpea accounted for 47 per cent of the overall pulses production, followed by arhar (16%), moong (11%), urad (10.6%) and lentil (5%) during the period TE 2021-22. Results found align with the studies conducted by Sharma et al (2020) and Singh et al (2020). As shown in Table 1 between the TE 1972-73 and TE 2021-22 both the area under cultivation and the total production of pulses in India increased from 21.87 million hectares and 10.94 million tonnes to 29.17 million hectares and 25.26 million tonnes, respectively. The overall productivity of pulses also showed an increasing trend, from 5 quintals per hectare in TE 1972-73 to 8.65 quintals per hectare in TE 2021-22. While the production of pulses experienced fluctuations in response to changes in cultivation area, productivity exhibited consistent growth over the study period. The rise in productivity was highest in chickpeas and lentils compared to other major pulse crops. Productivity of chickpea increased from 6.52 quintals per hectare to 11.98 quintals per hectare, and of lentil rose from 4.75 quintals per hectare to 9.21 quintals per hectare between TE 1972-73 and TE 2021-22. Area under chickpea increased from 7.57 million hectares in TE 1972-73 to 10.15 million hectares in TE 2021-22, with steady production growth. Similarly, area under urad bean has also increased, from 1.97 million hectares in TE 1972-73 to 4.44 million hectares in TE 2021-22. Mung bean cultivation has also grown, from 1.96 million hectares in TE 1972-73 to 5.09 million hectares in TE 2021-22. Arhar cultivation has remained relatively stable, with slightly increased production and productivity. Lentil cultivation in India has increased from 0.35 million tons in TE 1972-73 to 1.39 million tons in TE 2021-22, accompanied by significant improvements in productivity.

Analysis of the growth rate and stability of major pulses production was conducted over the period from 1971-72 to

**Table. 1 Area, production and productivity of major pulses in India, TE 1972-73 to TE 2021-22**

| | | TE 1972-73 | TE 1982-83 | TE 1992-93 | TE 2002-03 | TE 2012-13 | TE 2021-22 |
|---|---|---|---|---|---|---|---|
| Chickpea | Area | 7.57 | 7.28 | 6.52 | 5.84 | 8.68 | 10.15 |
| | Production | 4.94 | 4.75 | 4.63 | 4.52 | 8.25 | 12.18 |
| | Productivity | 6.52 | 6.54 | 7.12 | 7.71 | 9.48 | 11.98 |
| Urad | Area | 1.97 | 2.77 | 3.31 | 3.29 | 3.25 | 4.44 |
| | Production | 0.60 | 0.98 | 1.56 | 1.42 | 1.81 | 2.36 |
| | Productivity | 3.06 | 3.53 | 4.72 | 4.33 | 5.62 | 5.32 |
| Moong | Area | 1.96 | 2.77 | 3.28 | 3.04 | 3.24 | 5.09 |
| | Production | 0.59 | 1.03 | 1.36 | 1.00 | 1.54 | 2.92 |
| | Productivity | 3.04 | 3.73 | 4.17 | 3.29 | 4.82 | 5.73 |
| Arhar | Area | 2.48 | 2.47 | 2.53 | 2.62 | 2.59 | 4.72 |
| | Production | 1.83 | 1.67 | 1.72 | 1.78 | 1.89 | 4.14 |
| | Productivity | 7.41 | 6.82 | 6.84 | 6.81 | 7.28 | 8.78 |
| Lentil | Area | 0.74 | 0.96 | 1.19 | 1.44 | 1.53 | 1.39 |
| | Production | 0.35 | 0.49 | 0.81 | 0.92 | 1.04 | 1.29 |
| | Productivity | 4.75 | 5.05 | 6.83 | 6.39 | 6.89 | 9.21 |
| Total Pulses | Area | 21.87 | 23.04 | 23.19 | 20.95 | 24.84 | 29.17 |
| | Production | 10.94 | 11.33 | 13.03 | 11.86 | 17.93 | 25.26 |
| | Productivity | 5.00 | 4.92 | 5.61 | 5.65 | 7.24 | 8.65 |

*Note: Area (mha), Production (mt) and Productivity (q/ha), Source: DES, GOI, various issues*

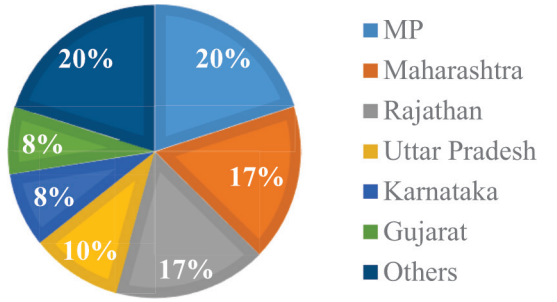



**Figure 1. Major pulses producing states of India (TE2021-22)**

2021-22 and is shown in Table 2. The area under cultivation has shown a modest but consistent increase over time, with the most significant growth observed in the recent period (2011-12 to 2021-22). Crop production has seen substantial growth in more recent years, with a high growth rate of 4.78 per cent per annum from 2011-12 to 2021-22. Growth rate of pulses production (1.44%) was found higher than yield of pulses growth (1.13%), whereas growth in the area under cultivation was the least (0.33%). This suggests that productivity-led growth is higher than area-led growth in pulses production. The results were found align with the studies conducted by Vembu (2014) and Naresha et al. (2024). The instability analysis indicated that instability in total pulses production and yield was 15.08 per cent and 8.31 per cent respectively and area instability was relatively less i.e. 7.57 per cent.

Lentil exhibited the highest growth in the area (1.27%), production (2.61%) and productivity (1.32). Whereas arhar experienced the lowest growth (1.4 %) in production due to less growth in area (1.1%) and yield (0.28%). Among the major pulses, chickpea showed the highest instability in area at 15.35 per cent, while arhar had the lowest at 7.5 per cent. Production instability was highest in moong (31.29 %) and least in lentil (13.53 %). The highest yield instability was observed in moong (18.29%), while chickpea displayed the lowest at 10.11 per cent. The production of pulses was found more unstable when compared to the area across all the pulses. In general, yield instability was less across all the pulses (Table 3). A study undertaken by Jadhav et al. (2018) reported that the Indian pulses sector was facing sluggish growth in yields and stagnant growth in acreage over the last six decades. Similarly, Vembu (2014) also noted that the pulses sector was primarily affected by technological stagnation from 1970-71 to 2011-12.

Both pulses exports and imports show fluctuations in quantity and value over the years. For instance, pulses exports were highest in 2013 and 2022, while imports were higher in 2017. These fluctuations could be attributed to various factors such as changes in demand, production levels, global market conditions, and government policies. Despite fluctuations, there is an overall increasing trend in both exports and imports

**Table. 2 Period-wise growth rate and instability in the area, production and yield of pulses in India, 1971-72 to 2021-22 (% per annum)**

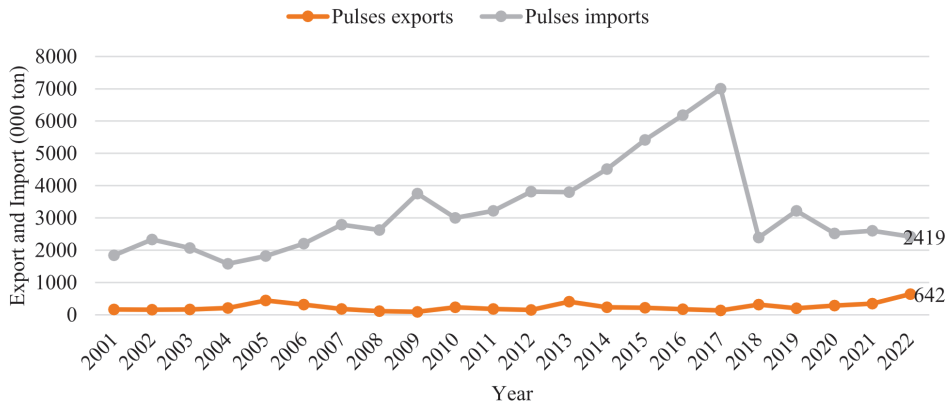
| | Area | | Production | | Yield | |
|---|---|---|---|---|---|---|
| | CAGR | Instability | CAGR | Instability | CAGR | Instability |
| Period I | 0.45 NS | 4.26 | -0.01 NS | 12.12 | -0.47 NS | 9.28 |
| Period II | 0.09 NS | 4.08 | 1.5 NS | 7.39 | 1.41 ** | 4.76 |
| Period III | -0.64 NS | 3.65 | 0.04 NS | 8.64 | 0.68 NS | 6.4 |
| Period IV | 1.42 ** | 4.81 | 3.09 ** | 8.59 | 1.65 ** | 4.67 |
| Period V | 2.43 *** | 5.33 | 4.78 *** | 9.84 | 2.22 ** | 6.9 |
| Overall | 0.31 *** | 7.57 | 1.44 *** | 15.08 | 1.13 *** | 8.31 |

*Period I-1971-72 to 1980-81, Period II-1981-82 to 1990-91, Period III-1991-92 to 2000-01, Period IV-2001-02 to 2010-11, Period V-2011-12 to 2021-22, Period VI- 1971-72 to 2021-22.*
*Note: **, * Significant at 1 per cent, and 5 per cent level of significance; NS: non-significant.*

**Table 3. Growth rate and instability in area, production and productivity of major pulses in India (1971-72 to 2021-22) (% per annum)**

| | Area | | Production | | Yield | |
|---|---|---|---|---|---|---|
| | CAGR | Instability | CAGR | Instability | CAGR | Instability |
| Chickpea | 0.57*** | 14.68 | 1.81*** | 23.92 | 1.23*** | 10.11 |
| Arhar | 1.11*** | 7.5 | 1.4*** | 16.56 | 0.28*** | 11.69 |
| Moong | 1.21*** | 13.41 | 2.13*** | 31.29 | 0.91*** | 18.29 |
| Urad | 1.22*** | 13.44 | 2.55*** | 20.87 | 1.27*** | 10.76 |
| Lentil | 1.27*** | 9.21 | 2.61*** | 13.53 | 1.32*** | 10.92 |

*Note: **, * Significant at 1 per cent, and 5 per cent level of significance; NS: non-significant.*




*Data Source: International Trade Centre*

**Figure 2. Export and import of pulses in India**

of pulses over the years. This indicates a growing global demand for pulses as a food commodity (Fig. 2)

The major export destinations and import sources of Indian pulses are shown in Fig. 3 and Fig. 4. The major export destinations for Indian pulses include the United Arab Emirates, China, the United States of America, Bangladesh, Sri Lanka and Nepal accounting for nearly 66 per cent of the pulses export during TE 2022. Myanmar is the largest exporter of pulses to India followed by Canada, Mozambique, Tanzania, Australia and Brazil during TE 2022. These countries accounted for nearly 86 per cent of the total import of pulses during TE 2022. The result was found to conform with the findings reported by Singh et al. (2022).

Table 4 presents the trade specification coefficient index

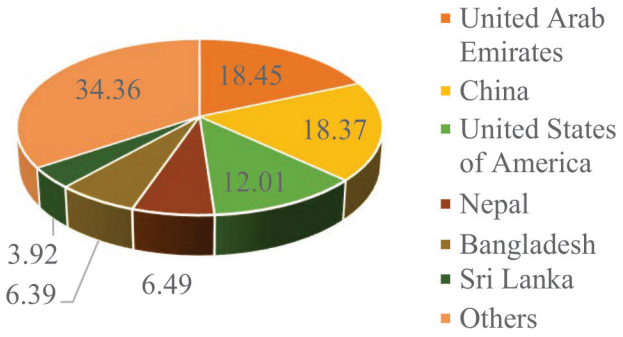
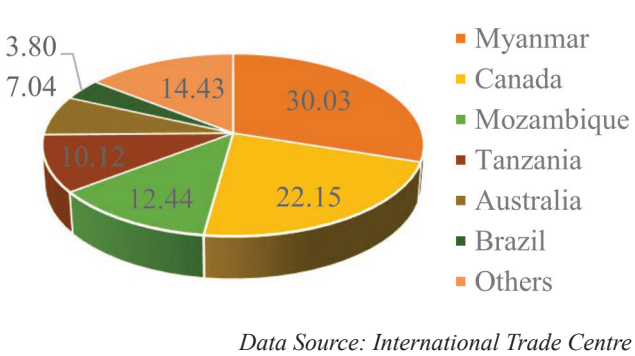



**Figure 3. Major export destination of Indian pulses during TE 2022**




*Data Source: International Trade Centre*

**Figure 4. Major import sources of pulses for India during TE 2022**

**Table 4 Trade Specification Coefficient (TSC) Index of pulses**

| | TSC | |
|---|---|---|
| Year | Quantity | Value |
| 2001 | -0.83 | -0.75 |
| 2002 | -0.87 | -0.79 |
| 2003 | -0.85 | -0.77 |
| 2004 | -0.77 | -0.64 |
| 2005 | -0.61 | -0.41 |
| 2006 | -0.75 | -0.62 |
| 2007 | -0.88 | -0.80 |
| 2008 | -0.92 | -0.87 |
| 2009 | -0.95 | -0.93 |
| 2010 | -0.86 | -0.81 |
| 2011 | -0.89 | -0.78 |
| 2012 | -0.92 | -0.85 |
| 2013 | -0.81 | -0.73 |
| 2014 | -0.90 | -0.86 |
| 2015 | -0.92 | -0.89 |
| 2016 | -0.94 | -0.90 |
| 2017 | -0.96 | -0.90 |
| 2018 | -0.77 | -0.57 |
| 2019 | -0.88 | -0.78 |
| 2020 | -0.80 | -0.71 |
| 2021 | -0.77 | -0.73 |
| 2022 | -0.58 | -0.55 |

*Data Source: International Trade Centre*

(TSC) for the years 2001 to 2022. The trade specification coefficient measures the trade specialization in pulses for India, indicating the country's relative advantage or disadvantage in the trade. The trade specification coefficient (TSC) values are consistently less than zero. This indicates that India faces a relative disadvantage in pulses trade with a negative trade balance, primarily due to imports being higher than exports during the study period. The result was found to conform with the findings reported by Singh et al. (2020) and Naresha et al. (2024).

## Conclusion and Policy Implications

India is a global leader in both the cultivation and production of pulses, with Madhya Pradesh being the top producer, followed by Rajasthan, Maharashtra, Uttar Pradesh, and Karnataka. The growth in pulses production was higher than the increase in yield, whereas growth in the area under cultivation was the least. This indicates that growth in pulses production has been primarily driven by improved productivity rather than the expansion of cultivated area. Chickpea and lentil productivity has significantly increased compared to other pulses, thanks to advancements in farming techniques. Chickpea cultivation is expanding, along with urad and moong bean crops. Arhar has seen moderate growth, while lentil cultivation has grown substantially with notable productivity improvements. However, the instability in production of pulses was higher than area and productivity. Despite fluctuations, both pulses exports and imports have risen, with India facing a negative trade balance, as imports exceed exports.

India should prioritize investment in research to develop high-yield, drought-resistant pulses and enhance agricultural infrastructure. And supporting small farmers with access to better resources, technology, and financial support will boost productivity of pulses. Promoting exports and strengthening the value chain for pulses will not only improve domestic production but also enhance India's position in global trade, ensuring food security and economic growth.

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