Review Article

A Review on Long-Term Vision of Pulses Economy in India

ABSTRACT

This study is a review on status of pulses economy in India comprising of import, export and consumption status as well as a long-term vision for promotion of pulses in the country. Pulses form one of the most important group of crops in India, which is also responsible for yielding large financial gains by amounting to a large part of the exports. Of all categories of people, pulses form an integral part of the Indian diet, providing much-needed protein to the carbohydrate-rich diet. For farmers, pulses are an important crop because they can both sell them and consume them, which helps farmers maintain household food security and creates economic stability.Being leguminous crops, they help in restoring soil fertility by utilising nitrogen from the air (nitrogen fixation). Therefore, pulses are mostly grown in rotation with other crops. They need less moisture and survive even in dry conditions.

India is the largest producer as well as consumer of pulses in the world. The top pulse-producing states in India are Rajasthan, Madhya Pradesh, Maharashtra, Uttar Pradesh, and Karnataka, collectively contribute significantly to the country's pulse output, yet current production fails to meet domestic demand, leading to imports. The common pulses across globe are black gram, green gram, horse gram, peas, cow peas, pigeon peas, lentils and chick peas. A long-term vision is required for pulses in India because of various aspects like lower yield compared to global average, wide gap between demand and supply, rapid population growth and nutritional as well as environmental value. In this article the challenges and constraints in achieving projected demand of pulses and government policy support for achieving this projected demand have been discussed.

Keywords: *Pulses, import, export, demand, supply, long-term vision*

INTRODUCTION

As the global population is growing and farms are shrinking, the world is increasingly adopting sustainable production systems. India's position in the Global Hunger Index worsened after the COVID-19 pandemic, with nearly 14 per cent of the population undernourished due to pandemic-induced poverty and food insecurity. A significant portion of the population lacks adequate protein, fruits and vegetables; 73 per cent of urban residents surveyed were found to be protein deficient. Pulses, which contain 20-25 per cent protein by dry weight, double that of wheat and triple that of rice,

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are a vital protein source for vegetarians and vegans.India produces 25 per cent of the world's pulses. To meet the expected demand of 38 million ~~tonnes~~ tons by 2030, pulse production must increases by 2.2 per centannually. Despite the nutritional benefits of pulses, their production is hindered by competition with wheat, ~~and~~ rice, and other rabi crops resulting in decreased per capita availability.Pulses also play a crucial role in improving soil biodiversity and can contribute to sustainable agricultural practices. As dietary preferences shift towards vegetarianism and veganism, pulses are recognized as a low-carbon food option for the future.Challenges remain in improving the agricultural workforce, especially in resource-poor and rainfed regions. Issues such as inadequate skills in scientific crop cultivation, poor infrastructure, and lack of organized markets for pulses are being addressed by government strategies aimed at boosting production[11-13]. The nutritional status of the population is a pressing concern, particularly among low-income households, which has long-term implications for economic development.To combat these issues, the government is promoting nutrition-sensitive agricultural interventions that emphasize pulse cultivation, which is rich in essential vitamins and micronutrients [14-17]. This approach aims to enhance dietary diversity and addresses hunger and malnutrition at a national level. As dietary patterns evolve, policymakers, researchers, and health advocates are shifting focus from merely calorie intake to nutrition, recognizing pulses as key players in addressing the three types of hunger: calorie inadequacy, protein deficiency, and micronutrient deficiency.

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(Source: DPD (2024))

NUTRITIONAL AND FOOD COMPOSITION OF MAJOR PULSES

Table 1.Nutritive value of Pulses (Values per 100g)

Pulses	Energy (Kcals)	Protein (g)	Fat (g)	Carbohydrates (g)	Calcium (mg)	Phosphorus (mg)	Iron (mg)
Field bean	347	**25**	1	1	60	**433**	3
Lentil	343	**25**	1	59	69	293	7
Cow pea	323	24	1	3	77	414	**9**
Green gram	334	24	1	4	124	326	4
Moth beans	330	24	1	56	202	230	9
Rajmah	346	23	1	**61**	260	410	5
Horse gram	321	22	0	5	**287**	311	7
Pigeon pea	335	22	2	58	73	304	3
Chick pea	**360**	17	**5**	4	202	312	5
Peas	93	7	0	16	20	139	1

Langyan*et al.* (2022) in a review, highlighted the potential role of pulses in global food systems and diets, their nutritional value, health benefits, and prospects for biofortification of major pulses (Table 1).

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PULSES CLASSIFICATION & PER-CENT SHARE TO THE TOTAL PRODUCTION (INDIA)

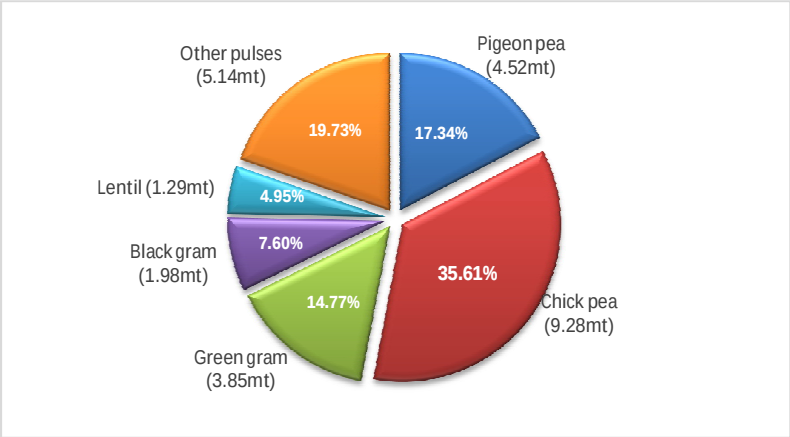

Fig. 1: Percent share of different pulses in total pulses production

(Source: https://indiastat.com)

Fig. 1depicts that the maximum production among all the pulses is of chick pea (9.28 mt) with 35.61 per cent of total production followed by pigeon pea (4.52 mt) and green gram (3.85 mt).

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PULSES STATUS IN INDIA

Table 2: Area, Production and Productivity of Pulses in India

Year	Area (mha)	Production (mt)	Productivity (kg/ha)
2010-11	26.407	18.241	691
2011-12	24.462	17.089	691
2012-13	23.257	18.343	789
2013-14	25.220	19.257	764
2014-15	23.553	17.152	728
2015-16	24.911	16.348	656
2016-17	29.445	23.130	786
2017-18	29.813	25.416	853
2018-19	29.156	22.076	757
2019-20	27.987	23.025	823
2020-21	28.783	25.463	885
2021-22	30.731	27.302	888
2022-23	28.901	26.058	902
CAGR	1.92^{NS}	4.08**	2.15*

CV%	9.16	17.41	9.93
CDVI	5.79	11.01	6.28

Note: ** and * , Indicates 1 and 5 per cent level of significance respectively

(Source: https://indiastat.com)

Table 3: State wise Area and Production of total pulses in India (2022-23)

Sr. No.	States/UT	Area (in Lakhs ha)	Production (In lakhs tonnes)	%Area covered	% Contribution to total production
1	Andhra Pradesh	10.32	10.76	3.57	4.13
2	Assam	1.44	1.11	0.50	0.43
3	Bihar	4.34	4.14	1.50	1.59
4	Chhattisgarh	6.26	4.75	2.17	1.82
5	Gujarat	13.10	17.93	4.53	6.88
6	Haryana	1.09	0.80	0.38	0.31
7	Jharkhand	7.28	7.61	2.52	2.92
8	Karnataka	28.26	17.57	9.78	6.74
9	**Madhya Pradesh**	**56.22**	**62.67**	**19.45**	**24.05**
10	Maharashtra	49.94	46.35	17.28	17.79
11	**Punjab**	**0.32**	**0.33**	**0.11**	**0.13**
12	**Rajasthan**	**54.98**	**36.17**	**19.02**	**13.88**
13	Tamil Nadu	7.91	5.03	2.74	1.93
14	Uttar Pradesh	27.56	28.43	9.54	10.91
15	Uttarakhand	0.62	0.62	0.21	0.24
16	West Bengal	4.57	4.51	1.58	1.73
17	Others	14.33	11.22	4.96	4.31
	India	289.01	260.58	100.00	100.00

(Source: https://indiastat.com)

Table 2 shows area, production and productivity of pulses in India which reveals that the area is increasing from 26.407 mha in 2010-11 to 28.901 mha in 2022-23 while production increases with annual growth rate of 4.08 per cent from year 2010-11 with 18.241 mt to 26.058 mt in year 2022-23 and in case of productivity, it increases with growth rate of 2.15 per cent from 691 kg/ha (2010-11) to 902 kg/ha (2022-23).

Table 3 reveals that Madhya Pradesh has maximum area (56.22 La. Ha)and production (62.67 La. Tonnes), which contribute 19.45 per cent to total area and 24.05 per cent to total production of pulses in India, followed by Rajasthan and Uttar Pradesh.

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Table 4: Compound Annual Growth rates (CAGR) of Pulses (1956-57 to 2015-16, in per cent)

Periods	Gram (Chickpea)			Tur (Pigeon pea)			Total Pulses		
	Area	Prod	Yield	Area	Prod	Yield	Area	Prod	Yield
1956-57 to 1965-66	-1.55	-2.89	-1.35	1.04***	-0.72	-1.75	0.06	-0.61	-0.66
1966-67 to 1975-76	-0.38	0.43	0.81	-0.02	2.84*	2.87*	0.26	1.17	0.94
1976-77 to 1985-86	-0.74	0.07	0.67	2.72***	4.30**	1.67	0.62	2.05	1.43
1986-87 to 1995-96	1	2.78*	1.79*	0.55	-1.17	-1.05	-0.19	1.06	1.25
1996-97 to 2005-06	-0.94	-1.11	-0.18	0.28	0.38	0.1	0.05	1	-0.48
2006-07 to 2015-16	1.71**	2.79*	1.08*	1.18*	1.51	0.18	0.92	2.62***	1.88*
Karnataka									

Jadhav *et al.*, (2018)

Note: ***, ** and * Indicates1, 5 and 10 per cent level of significance respectively

Jadhav *et al.* (2018) carried out a study on supply-demand gap analysis and projection for major pulses in India and their result is presented in Table 4. Results revealed that the annual growth rate of chick pea area and production significant in period 2006-07 to 2015-16 with 1.71 per cent (at 5 per cent level of significance) and 2.79 per cent (at 10 per cent level of significance), respectively, while for yield it is found to be significant with 1.79 per cent (at 10 level of significance) in period 1986-87 to 1995-96. For pigeon pea area and production found to be significant in period 1976-77 to 1985-86 with 2.72 per cent (at 1 per cent level of significance) and 4.30 per cent (at 5 per cent level of significance), respectively. Yield of pigeon pea is found to be significant at 10 per cent level of significance with 2.87 per cent in period 1966-67 to 1975-76. For all pulses yield and production is found to be significant with 1.88 per cent (at 10 per cent level of significance) and 2.66 per cent (at 1 per cent level of significance) in period 2006-07 to 2015-16.

IMPORT, EXPORT AND CONSUMPTION STATUS IN INDIA

- List 1 :India regularly imports following Pulses:

Pulse	Countries Exporting to India
Chick peas (Desi)	Australia and Canada
Chick peas (Kabuli)	Turkey, Canada and Australia
Lentils	Turkey and Syria
Black gram, Pigeon peas	Myanmar
Dun peas and yellow peas	Australia, Canada, China and Ukraine

Table 5: Production, Import, Export and availability of Pulses in India

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Year	Production (mt)	Import (mt)	Availability (mt)	Share of import in total availability (%)	Export (mt)
2009-10	14.66	3.51	18.17	19.42	0.10
2010-11	18.24	2.69	20.93	13.02	0.21
2011-12	17.09	3.37	20.46	16.59	0.17
2012-13	18.34	3.84	22.18	17.47	0.20
2013-14	19.25	3.05	22.30	13.88	0.34
2014-15	17.15	4.59	21.74	21.31	0.22
2015-16	16.32	5.79	22.11	26.52	0.26
2016-17	23.12	6.61	29.73	22.33	0.14
2017-18	25.41	5.61	31.02	18.19	0.18
2018-19	22.07	2.53	24.60	10.40	0.29
2019-20	23.02	2.89	25.91	11.28	0.23
2020-21	25.46	2.47	27.93	8.92	0.28
CAGR (%)	**4.32****	**-0.28^{NS}**	**3.73****		**4.46****

Tamil Nadu Murugananthi *et al.*, (2024)

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Murugananthi*et al.* (2024) carried out a study on demand and supply projections for pulses in India. They found that total availability of pulses in India has increased with 3.73 per cent annual growth rate from 18.17 mt in 2009-10 to 27.93 mt in 2020-21,while export of pulses from India has increased with 4.46 per cent annual growth rate from 2009-10 (0.10 mt) to 2020-21 (0.28 mt) (Table 5).

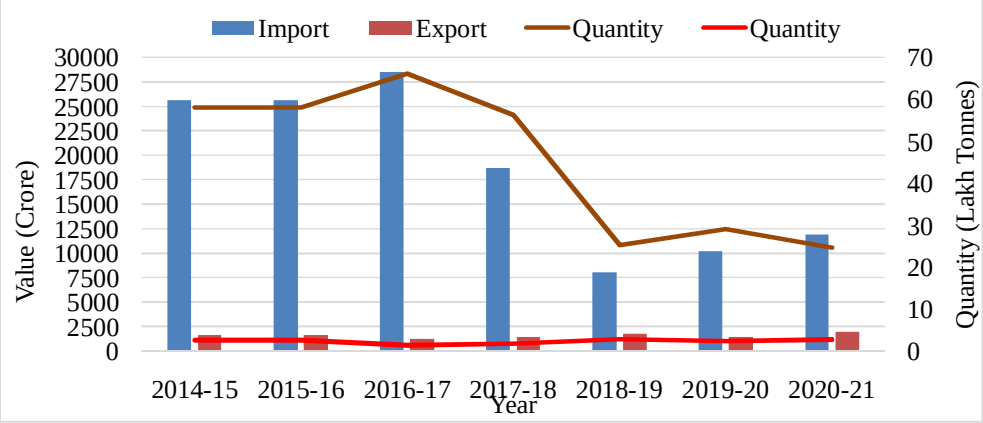

Fig. 2: Trade Gap in Pulses in India

Singh (2021) overviewed export and import of pulses in India at Uttar Pradesh and revealed that the maximum quantity imports in year 2016-17 (6.61 mt) and export in year 2018-19 (0.28 mt). While in terms of value it is maximum for imports in 2016-17 (28523.90 crores) and for export in 2020-21 (1977.88 crores).

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REASONS OF INDIA IMPORTING PULSES DESPITE BEING THE LARGEST PRODUCER:

- 45% of the children below the age of 3 years are undernourished in India. A large number suffer from protein deficiency. The yield isn't enough to keep up with demand.
- Pulses and pulse products are main source of protein and minerals.
- Domestic demand for pulses goes higher.
- No perfect substitution to pulses for vegetarians.
- Prices of pulses are rising with falling production and growing demand. Imports fills this gap.
- India has one of the lowest per unit area productivity of agricultural pulses in Asia. Though India has maximum area and production of pulses in the world yet pulses productivity is very less (globally 7th rank).
- More attention was given to cereal production. Most of land was under cereal productions leading to less production of pulses.

WITH SO MUCH IMPORT, IS THERE ANY IMPROVEMENT IN CONSUMPTION STATUS?

- Percapita availability of pulses: 43.67g/ person/ day
- ICMR Recommendation: 55g/ person/ day
- Deficit: 11.33g/ person/ day

(Source: IIPR, Kanpur (2023))

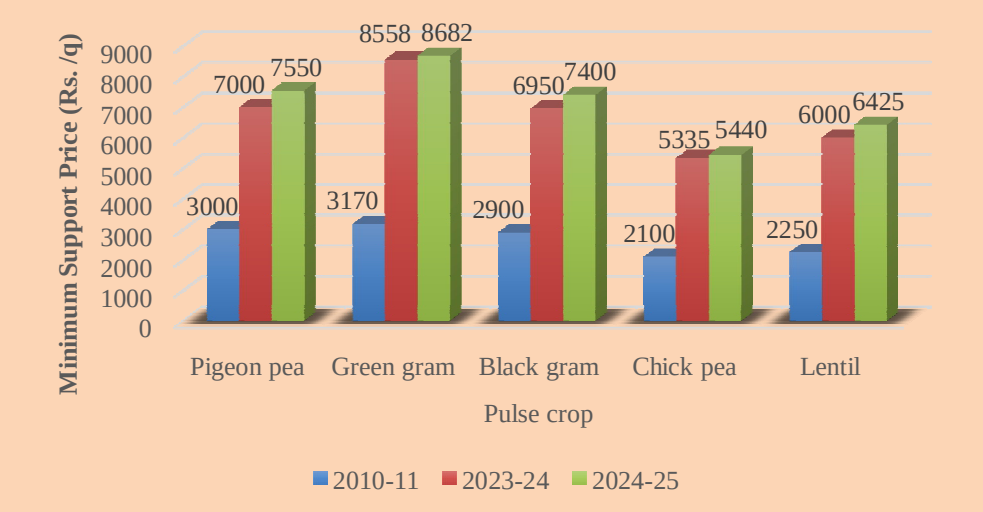


Fig. 3: Difference between the MSP of pulses in 2010-11, 2023-24 and 2024-25

(Source: CACP (Commission for Agricultural Cost and Price))

LONG TERM VISION FOR PROMOTION OF PULSES

Why long-term vision is required in Pulses?

- Production and Productivity Vision
- Nutrition Importance

- Widening gap between demand and supply
- Pulses yield of India is lower than global average
- Rapidly growing Indian population
- Pulses important in environmental point of view

Data pertaining tolong-term vision for promotion of pulses

- Current population of India: 1.42 billion
- Expected population by 2030: 1.52 billion
- Current percapita availability: 43.67g/ person/ day
- ICMR recommendation: 55g/ person/ day
- Present Demand (@ 55g/ person/ day): 29.74 mt
- Projected Demand in 2030: 38.20 mt
- Projected demand @ 55 g for 1.52 billion people
- (29.74*1.52)/1.42 = 31.83 mt by 2030 + 20% PHL, seed = 38.20 mt

(Source: IIPR, Kanpur (2023))

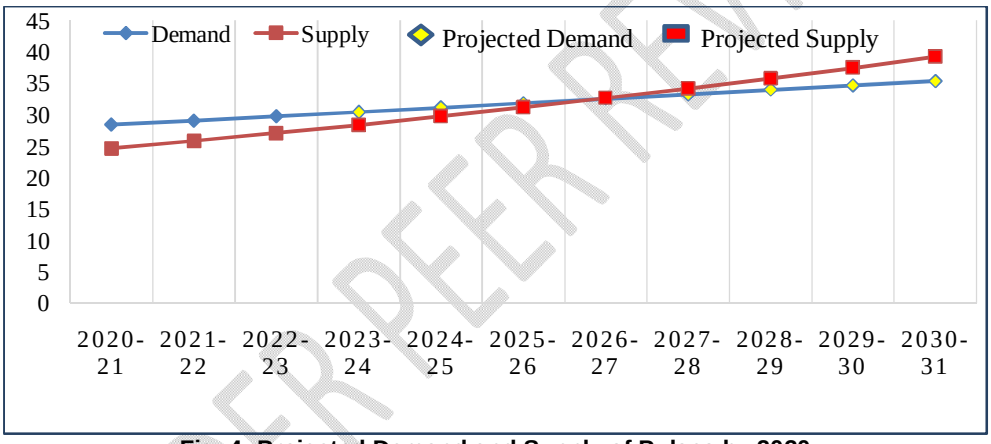


Fig. 4: Projected Demand and Supply of Pulses by 2030

(Source: Niti Ayog Report (2018))

Challenges in achieving the projected demand

- India has high population pressure on land and other resources to meet its food and development needs.
- Natural resources base of land, water and bio-diversity is under severe pressure.
- Factor productivity in major cropping systems and rapidly shrinking resource base.
- There is need to produce more without depleting our natural resources any further.
- Water, which is going to be probably the scarcest factor in the twenty-first century.
- Resource conservation technologies that improve input use efficiency, and conserve and protect our natural resources need to be promoted aggressively.
- Climate change has emerged as a major challenge to our agriculture. The immediate problems relate to intra-seasonal variability of rainfall, extreme events and unseasonal rains. These aberrations cause heavy crop losses every year.

- Reduction in the soil fertility and loss of essential soil nutrients on account of exhaustive cropping systems being followed after green revolution.
- Shortfall in pulse availability in the nation is mainly due to less seed replacement rate of improved varieties, poor adoption of improved technologies by the farmers, abrupt climatic changes, complex disease-pest syndrome and emergence of new biotypes and races of key pests and pathogens and declining total factor productivity.
- Pests, diseases and extreme weather events are likely to affect substantially the potential of pulse production.

(Source: IIPR, Kanpur (2023))

Constraints in achieving the projected demand

1. Decline in Area of Pulses in Indo-Gangetic plains (IGP)

The Indo-Gangetic plains which used to be the major areas for pulses cultivation are now witnessing reduced area under pulse cultivation due to following reasons:

• Creation of extensive irrigation network, leading to cultivation of cereals and cash crops
• Epidemics of Ascochyta blight in chickpea
• Incentive for rice-wheat production
• Less economic viability of pulses than cereals

2. Low Genetic Yield Potential

The harvest index in pulses is relatively low due to following reasons:

• Narrow genetic base, inefficient plant types, little scope of heterosis breeding due to self- pollinating nature, genetic erosion and linkage drag.

3. Low Realized Yield

Pulses are consistently being grown in harsher environments and resource limited conditions on account of comparatively low farmer's preference and less remuneration than the cereals. The major points explaining low realized yield are as follows:

• Relegation of pulses from high productivity zone to low productivity zone
• Largely grown in rainfed areas (87%)
• Poor crop management

4. Instability in Production

Variation in pulses production and productivity over the years indicated the large instability of the production system and the major reasons are outlined below:

• Highly sensitive to environmental fluctuations
• Being rainfed crop, pulses experience drought at critical growth stages
• Highly sensitive to abiotic stresses (temperature extremities, excessive moisture & salinity)
• Vulnerable to a large number of diseases and emergence of new races of pathogens
• Prone to attack by insect-pests.
• Unpredictable nature of host-pest relationship due to dynamic changes in the pest behavior under changing climates

5. Climate Change Risk

Manifestations of climate change affecting production of pulses are:

• High night temperature adversely affects productivity of winter pulses
• Drought appears in more intense form as a result of high temperature interaction
• Unpredictable weather condition coupled with temperature extremities (both high and low) adversely affects reproductive physiology and grain filling in pods
• Expected changes in the native flora of rhizobium and other useful microbes due to ecological imbalances

6. Poor seed replacement

Availability of good quality seeds and high seed replacement rate form the basis of higher productivity. Unfortunately, poor seed replacement rate in pulses is one of the major issues related to low yield. The factors influencing seed replacement rate are mentioned below:

• Non-conversion of breeder seed to certified seeds
• Less preference to pulse seed production by central and state seed corporations
• Lesser participation of private seed companies
• High volume of some pulse crops (chickpea, fieldpea and rajma)
• High storage losses

7. Post Harvest Loss

About 20 to 30% post-harvest losses has been estimated in pulses which remains an issue to be resolved by improving post-harvest machineries. The most important reasons for high amount of post-harvest losses in pulses are:

• Lack of efficient and good quality harvesting and threshing equipment
• Traditional dal mills with low dal recovery
• High infestation with stored grain pests (bruchids)

Table 6: Post Harvest Loss of Pulses

Stages	Losses (%)
Harvesting	1.0-3.0
Handling	1.0-7.0
Threshing	0.5-5.0
Drying	1.0-5.0
Transport	0.5
Primary Processing	1.0
Storage	5-10
Milling	15-20
Total	25-30

8. Wide fluctuation in Prices

The issues related to wide fluctuation in prices of pulses need to be addressed on priority basis and factors influencing price fluctuation are required to be critically analysed

• Unorganized market
• No policy on assured procurement
• Poor holding capacity of produce by farmers

9. Poor availability of critical inputs in Productivity Zone

Presently, poor availability of critical inputs largely influences the productivity of pulses. Among all major critical inputs, seeds are the most demanding input.

• Seeds, Biofertilizers, Biopesticides (NPV, Trichoderma, NSKE) and Secondary and micro-nutrients

10. Poor transfer of technology

Pulse growers generally belong to poor or marginal farming community and most of the times they do not have access to technologies that are developed in Agricultural Institutes/state Agricultural Universities. Lack of awareness to latest pulse-production technologies is a critical gap leading to low productivity of pulses. The underlying points indicated the reasons behind poor transfer of technology [18-20].

• Lack of trained extension personnel and Lack of exposure of farmers to improved technologies

• Poor interface among state departments of agriculture, research organizations and private agencies

(Source: IIPR, Kanpur (2023))

Road map to attain the challenges and constraints

1. Bringing additional Area under Pulses
2. Improving Productivity
3. Improving Yield Stability
4. Extensive Irrigation
5. Expanding Pigeon pea hybrid Production
6. Increasing mechanization
7. Development of resilient Pulse crops to climate adversities
8. Production and Supply of quality seeds
9. Reducing Post Harvest Losses
10. Ensuring attractive price to producers
11. Ensuring timely availability of critical inputs
12. Efficient transfer of technology

(Source: IIPR, Kanpur (2023))

POLICY SUPPORT AND CURRENT POLICIES

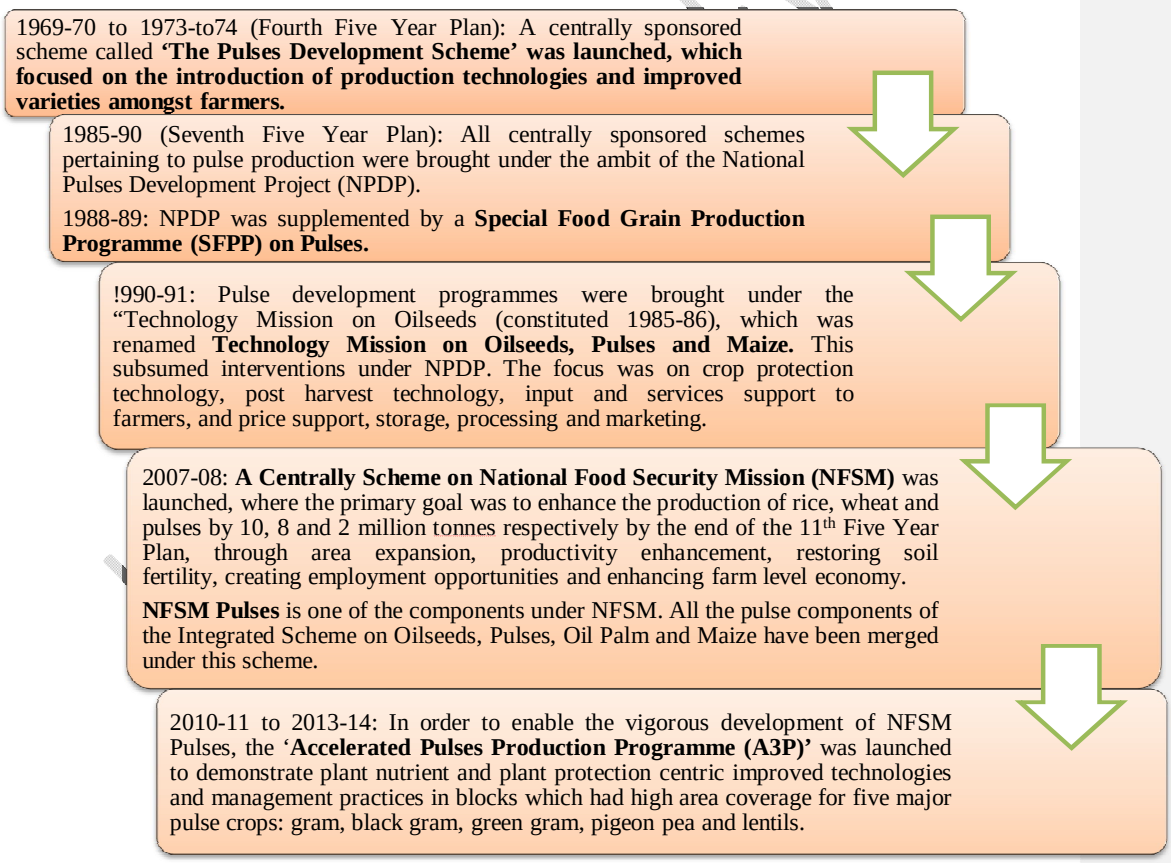
➢ Policy Support / Reforms

- Technology Transfer (Farmers trainings and exposure visits)
- Establishment of National Pulses Development Board
- Value addition
- Creation of infrastructure for storage
- Procurement assurance
- Establishment of secure water rights to user
- Decentralization and privatization of water resources
- Introduction of appropriate water saving micro irrigation technologies
- Formulation and integration of water use policy and its judicious implementation.

(Source: IIPR, Kanpur (2023))

➢ **Current Policies**

- Promotional Schemes:
- National Food Security Mission (NFSM): 10 lakh ha area in 1000 blocks to be covered under village level demonstrations for 5 major crops: pigeon pea, chick pea, green gram, black gram & lentil.
- Rashtriya Krishi Vikas Yojna (RKVY): Rs. 300 crores earmarked for organizing 60000 pulses and oilseeds villages in the rainfed areas.
- Accelerated Pulses Production Programme (A3P)
- Minimum Support Price (MSP)
- Incentives to pulses growers
- Pradhan Mantri Fasal Bima Yojna (PMFBY)
- Pradhan Mantri Krishi Sinchai Yojna (PMKSY)



(Source: IIPR, Kanpur (2023))

Fig. 5: Centrally Sponsored Schemes Pertaining to Pulses since the Fourth Five Year Plan

(Source: IIM, Ahmedabad (2023))

CONCLUSION

Pulses are crucial for human nutrition, and India, being the largest producer and consumer, must enhance domestic production to reduce reliance on imports. Currently, India produces around 27 million ~~tonnes~~ tons and imports 2-3 million tonnes annually to meet a demand of 29-31 million tonnes. Recent efforts have led to a record production of 26.06 million ~~tonnes~~tons, an increase in cultivation area from 24.91 million hectares in 2015-16 to 28.90 million hectares in 2022-23, and improved yields from 656 kg/ha to 902 kg/ha. Import dependency has dropped from 19 per cent in 2013-14 to approximately 9 per cent in 2021-22, with further reductions expected to 3 per cent by 2030-31. As increase in the cultivated area and improved yield, it surpasses the supply and demand gap from -2.1 (2023-24) to 3.9 (2030-31) as per projection. Provision of life-saving irrigation with water-harvesting structures may help increase pulse production in India significantly. Increase in Minimum Support Prices (MSP) and NFSM has provided a crucial boost to farmers, encouraging higher production and ensuring their economic well-being.

Comment [AUZ14]: Rewrite the sentence.

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