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RESEARCH PAPER

Growth and Instability of Pulses in Uttar Pradesh and Uttarakhand

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ABSTRACT

In India the Pulses are not only the major protein source but, it also helps in sustainable agriculture by fixing atmospheric nitrogen. The green revolution was highly skewed in favor of mainly major staple crops wheat and rice and pushed pulses to small and marginal lands, this led to poor growth of pulses. Low productivity led to shortage of pulses that accelerated the nutritional deficiency in Indians specially children. Government always tried to fill the gap between demand and supply by importing pulses from other countries and initiated various schemes to promote production of leguminous crops in India to control the foreign currency and meet the demand of pulses. In this article an attempt has been made to study the growth and instability of pulses in Uttar Pradesh and Uttarakhand. Uttar Pradesh identified as the major contributor of pulse production and Uttarakhand being a part of Uttar Pradesh, the analysis was carried for these two states.

HIGHLIGHTS

- This study is about to the growth and instability of pulses in Uttar Pradesh and Uttarakhand. The analysis reveals the importance of MSP and consider it as primary reason for decreasing import of pulses and increasing self-reliance.

Keywords: Instability, Growth, pulses, Uttar Pradesh, Uttarakhand

In India pulses are the primary staple food for majority of the population and primary source of protein for the vegetarian community of the country. They also have lower fat and higher fibre content which added to their nutritional value and a reason to be preferred over non-vegetarian food (MoA&FW). At the advent of green revolution technologies were skewed in favour of major staple foodgrains wheat and rice (Chand *et al.* 1999) and pulses are pushed to small and marginal lands. During 1966-67, the area under pulses was 22 million hectare and production was 8.35 million tons with productivity 377 kg/hectare. The per capita consumption of pulses which was 60 gm/day in 1951-51 has reduced to 26 gm/day in 2000-01 below than the recommended doses of 43 gm/day by Indian Council of Medical Research (Joshi *et al.* 2002). The target of pulse production remained under achievement during 2001-02 to 2009-10 and it is minimum 69.56 per cent in 2002-03 (Kumari *et al.* 2022). Import of pulses registered a sudden jump in 2001-02 and imported 2.23-million-ton pulses which was just 0.35 million ton in 2000-01 (MoA&FW). Due to important dietary component pulses received considerable attention both from consumers and producers and also suitable programmatic support from the government. Due to acute short fall of pulses, the gap between supply and demand was widen. Government of India was compelled to import pulses from other countries. To control the

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flow of foreign currency, improve production of pulses and fight against malnutrition persisting in the country, government announces various schemes for pulse production. The concerted efforts of research and development institutions, support of government policies, improved technologies and drought tolerant varieties stroked increase in pulse production in recent decade (Chauhan *et al.* 2011). By implementing policy decisions and utilizing technological interventions, the transition from cereal-based cropping systems to pulses-based cropping systems has a potential to convert rice-fallow areas into rice-gram or rice-lentil systems, thus promoting diversification (Singh *et al.* 2017). The Per Capita Net Availability of pulses (Per Annum) which was about 11 Kg/annum has increased to 16 kg/annum (GoI, 2021). The import of the pulses has also been decreased in recent years. India imported 3001 thousand tonnes pulses in TE 2010-11 which fell down to 2630 thousand tonnes in TE 2020-21. India imported around 2.46 MMT pulses in 2020-21, which is the lowest in the last ten years (PTI, 2022).

MATERIALS AND METHODS

This paper makes an effort to explore the question of instability in pulse production in Uttar Pradesh and Uttarakhand. Pulses are cultivated in all most all states of India. Pulses are grown in both *rabi* and *kharif* season but major share is contributed by *rabi* pulses. The paper attempts to comprehend the growth rates of area, production and yield of all major pulses and to measure the instability in aforementioned variables across Uttar Pradesh and Uttarakhand. The time period used under the study is 2000-01 to 2020-21 divided into two periods. Period I cover 2000-01 to 2010-11 and period II starts from 2010-11 to 2020-21. The time period has been chosen to study the impact of formation of new state Uttarakhand from Uttar Pradesh in year 2000.

Data on variables for the selected period were compiled from Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, New Delhi. The compound annual growth rate of area, production and yield of pulses has been computed using semi log model.

Annual growth rate was used to measure trends in; area, production and productivity of pulses by applying exponential growth function by using following equation (Avinash *et al.* 2018):

$$Y = ab^t e$$

Where, Y = area/ production/ productivity of pulses, a = intercept, b = regression coefficient, t = time variable and e = error term

The compound growth rate was obtained from logarithmic form of the equation as follows:

$$Ln\ y = ln\ a + t\ ln\ b$$

The per cent compound growth rate (G) was derived as follows:

$$G = (Antilog \text{ of } b - 1) * 100$$

For calculating instability index the methodology used by Chand and Raju (2009) has been used. The instability index is given by:

$$Instability\ Index = Standard\ deviation\ of\ the\ natural\ logarithm\ (X_{t+1}/X_t)$$

Here X_t refers to Area (A), Production (P), Yield (Y) in the year "t"; and X_{t+1} denote the same for subsequent year. The index doesn't contain the measurement units and considered as the robust and measures to map deviations from fundamental trend (log linear in this case). In case of absence of deviations from the trend, the ratio of X_{t+1} and X_t remains the same and their standard deviation is zero.

RESULTS AND DISCUSSION

Pulses in Uttar Pradesh

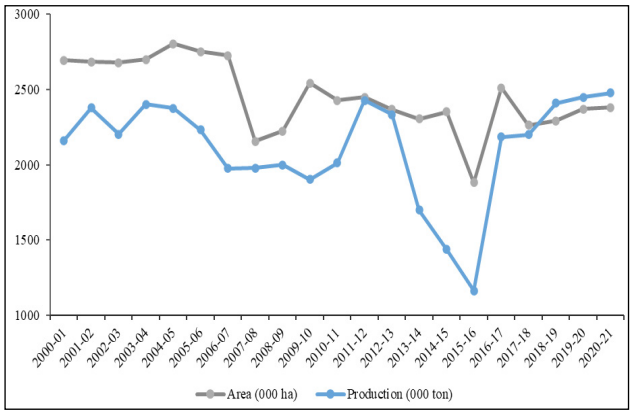
Uttar Pradesh ranks fourth in major pulse producing state in India. It contributes ten per cent to all India pulse production with 2.38 million hectares. The share of Uttar Pradesh in All India pulse area is 8.24 per cent. The biggest drop in area and production of pulses was recorded in year 2015-16. After that the area and production of pulses took momentum and showing increasing trend. Table 1 indicates the compound growth rates of pulses in Uttar Pradesh. It is reported that area under pulses has negative growth of magnitude of 1.8 per cent in the period from 2001-02 to 2010-11. The high level of fluctuation

in production and prices may be diverting farmers from pulse production to other cash crops such as cotton and sugarcane. It also indicates that in recent years, improvement in yields has contributed to higher pulse production in the state.

Table 1: Growth in area, production and yield of total pulses in Uttar Pradesh (per cent)

Period	Area	Production	Yield
2001-02 to 2010-11	-1.82	-2.46	-0.65
2011-12 to 2020-21	-0.06	2.56	2.62
2001-02 to 2020-21	-1.00	-0.42	0.58

***Source**: Ministry of Agriculture & Farmers Welfare.*



***Source**: Ministry of Agriculture & Farmers Welfare.*

Fig. 1: Area and production of Total pulses in Uttar Pradesh

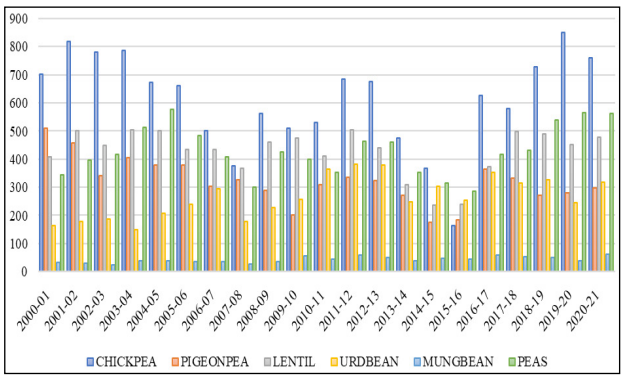
The instability in area, production and productivity are presented in Table 2 that reflects that production is highly instable as high as twenty-five per cent. The cultivated area and productivity is also instable of magnitude more than ten per cent.

Table 2: Instability in area, production and yield of total pulses in Uttar Pradesh (per cent)

Period	Area	Production	Yield
2000-01 to 2010-11	9.22	7.19	12.38
2010-11 to 2020-21	12.17	24.71	16.93
2000-01 to 2020-21	10.84	18.63	14.88

***Source**: Ministry of Agriculture & Farmers Welfare.*

Chickpea, Pigeonpea, lentil, uradbean, and peas are the major pulses grown in Uttar Pradesh and constitute ninety-nine per cent in total pulse production. Chickpea constitute the major share (32%) followed by pea (23 %) and lentil (19%). Both uradbean and pigeon pea contributing twelves percent. Chickpea has shown positive growth in recent years in area and production in Uttar Pradesh and its yield is higher than average national yield. Area, production and productivity is becoming more instable in recent decade (2010-11 to 2020-21).



***Source**: Ministry of Agriculture & Farmers Welfare.*

Fig. 2: Trend in production of pulses in Uttar Pradesh (000 Tonnes)

Table 3: Instability in different pulses of Uttar Pradesh (per cent)

Crop	2000-01 to 2010-11			2010-11 to 2020-21			2000-01 to 2020-21		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Chickpea	11.85	20.39	16.76	33.71	52.77	24.40	25.81	40.91	21.05
Pigeon pea	8.42	23.11	20.26	12.38	30.44	22.71	10.27	25.66	20.73
Peas	12.61	20.28	14.13	19.20	19.23	21.99	16.44	19.50	18.49
Lentil	8.96	14.36	14.22	15.62	24.03	19.29	12.91	19.74	16.71
Urad bean	17.92	25.93	28.06	5.94	25.36	26.16	12.96	24.83	25.23
Mung bean	28.75	28.91	12.90	13.68	24.78	22.72	21.04	26.18	18.71

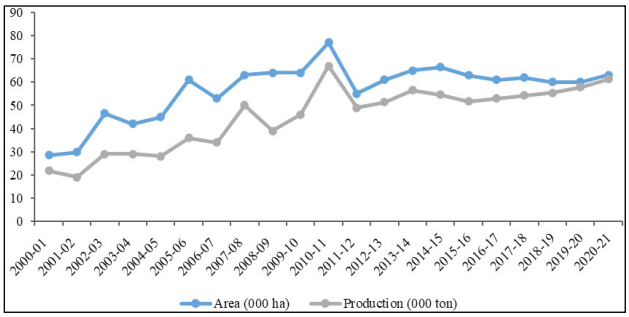
***Source**: Ministry of Agriculture & Farmers Welfare.*

Peas reported positive growth in area, production and output in recent decade in Uttar Pradesh. The yield contributing more in high production of peas. Though the area, production and yield area instable as high as approximately 20 per cent in recent decade.

The growth in area, production and productivity is positive in the recent decade for lentil also in Uttar Pradesh. It seems mainly yield factors are contributing in high production of lentil in Uttar Pradesh. Area, production and yield has become more instable in recent decade as compared to last decade. The productivity of lentil is higher than the country average. Mungbean and uradbean recorded negative growth in recent decade as compared to last decade. The yield has become less than national average in Uttar Pradesh.

Pulses in Uttarakhand

Uttarakhand is not playing major role in the production of pulses as its share is less than one per cent in total area under pulses of the country. Year 2010-11 marked the highest area and production which is followed by a drop. The period from 2000-01 to 2010-11 recorded growth of nearly 9 per cent in area and eleven per cent in the production. The state could not have sustained this growth and the next decade reported 0.28 per cent growth in area as scope of adding more area under pulses is limited.



Source: *Ministry of Agriculture & Farmers Welfare.*

Fig. 3: Trend in area and production of total pulses in Uttarakhand

Table 4: Growth rates in area, production and yield of total pulses in Uttarakhand (per cent)

Period	Area	Production	Yield
2001-02 to 2010-11	8.66	11.33	2.46
2011-12 to 2020-21	0.28	1.68	1.40
2001-02 to 2020-21	2.24	4.83	2.53

Source*: Ministry of Agriculture & Farmers Welfare.*

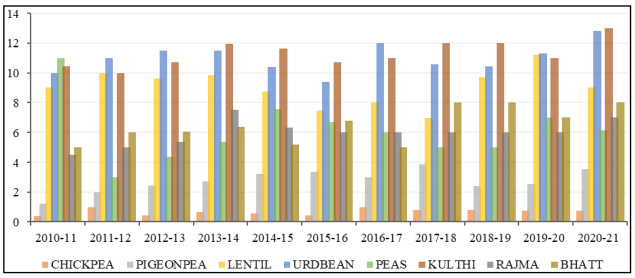
The growth of total pulses in Uttarakhand is high in the first period i.e. 2000-01 to 2010-11. This period recorded high instability also.

Table 5: Instability in area, production and yield of total pulses in Uttarakhand (per cent)

Period	Area	Production	Yield
2000-01 to 2010-11	18.03	24.07	16.42
2010-11 to 2020-21	13.05	15.95	6.68
2000-01 to 2020-21	16.16	19.39	11.65

Source*: Ministry of Agriculture & Farmers Welfare.*

Kulthi, Rajma, bhatt, lentil, uradbean and peas are the major crops in Uttarakhand. Kulthi occupies the largest share in total production of pulses with 12 thousand hectares. Uradbean is next to Kulthi in production and share of chickpea has been declining over time.



Source*: Ministry of Agriculture & Farmers Welfare.*

Fig. 4: Trend in production of pulses in Uttarakhand (000 tonnes)

Instability of different pulses grown in Uttarakhand are presented in Table 6. It depicted that most of

Table 6: Instability in different pulses of Uttarakhand (per cent)

Crop	2000-01 to 2010-11			2010-11 to 2020-21			2000-01 to 2020-21		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Chickpea	56.50	43.67	21.55	46.03	57.71	14.97	49.06	47.54	17.76
Pigeon pea	36.41	35.04	37.23	23.76	31.35	23.32	28.70	29.57	28.20
Peas	25.03	50.07	37.71	50.65	61.80	23.65	39.33	48.78	26.35
Lentil	23.84	39.60	32.46	15.72	18.17	17.17	17.54	29.67	25.37
Urad bean	44.87	49.27	16.96	20.96	22.97	12.08	31.49	35.08	14.66

Source*: Ministry of Agriculture & Farmers Welfare.*

the pulses are instable in their area and production. Chickpea is found to be highest instable pulse for Uttarakhand.

CONCLUSION

Uttar Pradesh is one of the leading pulse production states and by enhancing availability of better-quality seeds of high yielding varieties, state of art production technology, favourable climatic conditions and increase in minimum support prices along with effective government programmes for enhancing pulses production may significantly contribute in increasing pulses production in the state and country as a whole. The increase in MSP of pulses in the recent decade may be one of the factors for accelerating the production of pulses. The government may also incorporate the supply and demand of pulses while setting the MSPs of pulses along with procurement system. Area under pulses in Uttarakhand is very small and produce very small amount of pulses but traditional pulses like *kulti*, *bhatt* and *rajma* are in demand in rest of the country. Therefore, more emphasis may be given to enhance their production in Uttarakhand. The import of the pulses has been decreased in recent years. India imported 3001 thousand tonnes pulses in TE 2010-11 which reduced to 2630 thousand tonnes in TE 2020-21. Increased production and declining in imports clearly indicate that country is moving towards achieving self- sufficiency in pulses with appropriate technological support, favourable Govt. policies and remunerative prices to farmers.

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