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Situational Analysis of Pulse Production and Consumption in India

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Abstract

This paper discusses the importance of encouraging the production and consumption of pulses, given their nutritional benefits, to achieve the Sustainable Development Goal of reducing hunger and poverty as well as promoting health and nutrition. It gives a situational analysis of the production, consumption and prices of pulses. Further, it describes the various government programmes that have been initiated in India since 2000-01 to increase the production of pulses. This paper undertakes a situational analysis of area, production and yield — state-wise and crop-wise — for 5 major pulses (Bengal gram, red gram, green gram, black gram and lentils), along with that of total pulses, with reference to the time periods in which the various government schemes were launched. It also examines the state-wise growth performance in area, production and yield for these pulses along with an analysis of the share of these pulses in the statistics of total pulses. On the consumption side, the paper analyses the patterns in consumption using the 61st and 68th rounds of the National Sample Survey corresponding to the years 2004-05 and 2011-12. The area and production under pulses has been almost stagnant in the time period starting early 2000. The per capita availability of pulses was less than the recommended dietary allowance (RDA) of 40 g per day even till 2009-10, in spite of imports. Only after 2009-10 is the RDA being met. Though the availability has just reached the minimum level of RDA, the volatility in pulse prices is a major issue that needs to be taken care of. This volatility, which alternates between adversely impacting consumers and producers, creates dilemmas for public policy. The paper concludes with a few policy recommendations.

I Introduction

India is home to the highest number of malnourished children under 5 years of age. Thirty-eight per cent of the children were stunted and 21 per cent wasted in 2014-15 according to the fourth round of the National Health and Family Survey (NFHS-4). Protein-energy malnutrition as well as micronutrient deficiencies can be reduced by increasing the consumption of pulses which are rich sources of proteins, minerals, iron and fibre (Table 1). Thirty-one per cent of Indians are vegetarian, according to the 2006 The Hindu-CNN-IBN State of the Nation Survey (Yadav and Kumar 2006). Thus, a large part of their protein requirement could be met by pulses. The daily protein requirement of an average person is 56 g, and 100 g of pulses contain around 25 g of protein. At least half of the daily requirement of protein can be met by including two servings of pulses in the daily diet. Food security stands on the three pillars of availability, access and absorption (nutrition) (UNICEF 2016). Recently, there has been a paradigmatic shift from food availability to household food insecurity, and from energy intake (input measures) to anthropometric measures (output measures), thereby shifting the focus to proper nutrition (Dev and Sharma 2010).

There has also been a change in consumption patterns which directly affects nutritional outcomes. The results of changing consumption patterns are important for policy makers because they are concerned with food and nutrition security. Consumption patterns are affected by rising incomes, changing prices, urbanisation, globalisation, demographic shifts, improved transportation and changing consumer tastes and preferences. Apart from this, there are regional differences. The

staple diet in one state is very different from that in another. Given different diets, food expenditure responses to income and price changes vary between different states (Meenakshi 1996). Low-income households spend a greater portion of their budget on staple food products and are generally more responsive to food prices and income changes. The magnitude of a household's response to income and price change also differs across food items. For example, in poorer households, greater budget adjustments are made to higher value food items such as dairy and meat, while staple food budgets undergo little change. Rural and urban spending patterns are extremely different. Urbanisation has played a significant role in changing food consumption patterns. Given the different lifestyles of urban and rural residents, as also increased food availability and higher purchasing power in urban areas, urban and rural diets tend to differ significantly. With higher disposable incomes among urban residents, the demand for meat, horticultural, and processed products is expected to increase within developing countries (Kumar and Mathur 1996, Kumar and Mittal 2003). In India, per capita net pulse availability has declined from around 60 g per day in the 1950s to 40 g in the 1980s and further to around 35 g per day in the 2000s. On examining data from the consumer expenditure surveys of the National Sample Survey (NSS), it is found that the average consumption of pulses increased in rural India between 2004-05 and 2011-12 from 22 g to 26 g. This is less than 70 per cent of the norm of 40 g per day. In terms of protein consumption, data show daily protein consumption at the national level dipped from 60.2 g for a person in 1993-94 to 56.5 g in 2011-12 in rural areas and from 57.2 g to 55.7 g in urban areas. The shortfall in consumption of pulses can be attributed to changing tastes and preferences, greater diversification in diets as well as a demand-supply mismatch in pulses. However, the decline in consumption of proteins brings to light the fact that diet diversification cannot essentially be associated with more nutrition.

Pulses are climate resilient and can be sown in rain-fed areas. They can fix nitrogen in the soil and reduce dependence on nitrogenous fertilizers. They enrich the soil in nitrogenous compounds and are beneficial for crop rotation and mixed cropping. Hence increasing area under pulses or planting pulses as an inter-season crop promotes sustainable agriculture; the requirement of nitrogenous chemical fertilizers is reduced for the succeeding crops and periodical crop disease cycles are disrupted by the decreased use of chemical pesticides and weedicides (Venkateswarlu et al. 2008; FAO 2016a). Encouraging the production and consumption of pulses is in line with the second Sustainable Development Goal's three-fold objective to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture (FAO 2016 (2), United Nations 2016). The major producers of pulses in the world are India (23.1 per cent), Canada (6.7 per cent), China (12.08 per cent), Myanmar (7.57 per cent) and Brazil (4.03 per cent), together accounting for almost half of the global output. India ranks first in terms of area and total production of pulses; yet, it is still not self-sufficient and remains a net importer of pulses because of high consumption needs. In 2013-14, total area under pulses was 25 million ha and production was about 19 mt while the demand was about 24 mt (Directorate of Economics & Statistics 2015). Also, compared to India, pulse output has been much higher in other major pulse-producing countries. The pulse yield in Canada improved from 1141 kg/ha in 1961 to 1893 kg/ha in 2012. However, the yield in India has not improved much, and has been less than 800 kg/ha even till 2011-12.

On the price front, the government significantly increased the minimum support price (MSP) of pulses and strengthened the pulses procurement mechanism by designating additional central

agencies to support farmers (IIPR 2015). However, till 2014-15, the announcement of MSP had been coming too late. By then the farmers had already decided on the crops to be planted. Meanwhile, price volatility has also been affecting the poor. In 2015-16, the supply of pulses was hit as it was a drought year and prices escalated to almost double of what they were in 2014 (Bera 2015). State governments have taken proactive steps to make pulses available at reasonable prices, including distribution through the public distribution system (PDS) by some states following the National Food Security Act (NFSA). Ensuring a smooth supply of pulses at affordable prices remains a major challenge. Also, as mentioned earlier, diet diversification is not essentially associated with nutritional improvements. Given this and the fact that cash transfers are now being considered in lieu of take-home rations, it will be difficult to ensure that the cash transfers are spent on nutrition improvement (Editorial, Hindustan Times 19 September, 2017). An efficient institutional framework is a prerequisite for cash transfers.

This paper undertakes an analysis of the current scenario in India of pulse production, area under pulses and productivity, along with per capita availability and consumption. It further examines the state-wise growth performance of major pulses in India, concentrating on the years 2000-01, 2005-06, 2007-08, 2010-11, and 2013-14 in terms of area, production, and yield. These particular periods have been selected in conjunction with the government programmes that aimed at improving pulse production and productivity. In 2004, the Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) was implemented. In 2007, the National Food Security Mission was launched with the view of enhancing the production of rice, wheat and pulses. The Rashtriya Krishi Vikas Yojna (RKVY) encouraged states to draw up their own comprehensive production plans. In 2012, the Twelfth Five Year Plan started.¹ The paper also does a comparison of consumption of pulses between two rounds of the National Sample Survey (2004-05 and 2011-12). It seeks to analyse the reasons for stagnancy in area, production, yield and use of technology in pulses and examines what needs to be done for this major nutrient-dense crop to impact on nutrition outcomes. The data for the situational analysis has been taken from the Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India. The latest data for area, production and yield of pulses is available readily in the E-Pulses Data Book of the Indian Institute of Pulse Research (IIPR 2015). The consumption data has been collected from the National Sample Survey, 61st and 68th rounds in 2004-05 and 2011-12.

The paper is organised as follows. The next section gives the current scenario with respect to production, imports, prices (in terms of minimum support prices and wholesale price index) and per capita availability of total pulses. Section 3 describes the various government programmes aimed at increasing the area, production and productivity of pulses. Section 4 examines the state-wise area, production, yield and growth performances of major pulses in India along with consumption patterns. The last section makes recommendations for addressing the demand-supply gap.

The Tables and Figures referred to are found in the Annexures.

¹ Details of government schemes are provided in Section 3.

2 Current Scenario

Pulses are grown and consumed all over India. The major pulse crops in India include Bengal gram (chana), red gram (arhar/tur), green gram (moong), black gram (urad) and lentils (massar). Moth bean, Lathyrus, horsegram, peas and red kidney beans are the other pulse crops produced and consumed in India (Figures 1 and 2). Important pulse-growing states are Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, Karnataka, Andhra Pradesh, Gujarat, Tamil Nadu, Jharkhand and Bihar.

In 2013-14, India produced about 19 mt of pulses. However, after accounting for seed, feed and wastage, the per capita availability of pulses has been around 38 g per day which is less than the recommended daily requirement of 40 g per day (Table 2, Figure 3).² Only with imports could the daily requirement of pulses be met. Starting year 2000, the net imports have shown an increase. This has been important to meet the demand for pulses. Prior to 2010-11, even after imports, the daily requirement could not be met. Given the malnutrition situation in the country, this is especially problematic. The consumption of pulses also varied among states. Till 2011-12, the majority of the states consumed less than the recommended dietary norm for pulses. In 2014-15, the domestic production of pulses fell to about 17 mt due to erratic rainfall and in 2015-16; it was estimated to be in the range of 17 to 19.5 mt with the demand being 24.61 mt (Economic Times 19 July, 2016). As imports of 5.8 mt had been projected for 2016, this probably just about helped meet the demand for pulses. The major countries from where pulses are imported are Canada, Australia and Myanmar and now, Mozambique.

On looking at the fractile-wise analysis of consumption of pulses in rural and urban sectors across India in 2011-12, it is observed that only for the highest monthly per capita expenditure (MPCE) class, the per capita consumption has been above the 40 g per day requirement and that too only in the urban sector. For all other fractiles and on the overall, the actual consumption of pulses is much less than the norm (Table 3).

The demand-supply gap is reflected in the higher prices in recent years. High volatility in prices for long periods, low productivity, and stagnation in production technology have all acted as disincentives for pulses production (Reddy 2006; 2009). Figure 4 displays the wholesale price index (WPI) of pulses across India between the financial years 2005-06 and 2016-17. In the fiscal year of 2014-15, the WPI for pulses was 228, which means it increased by about 128 per cent from the base year of 2005 and in 2016-17, it increased by almost 300 per cent. In 2014-15, there was a fall in production, leading to a rise in prices. Pulses were a major contributor of food inflation in India due to this fall in production. The prices of pulses, in particular tur and urad, remained persistently high from mid-2015 to mid-2016 due to shortfall in domestic and global supply (Economic Survey 2016-17). The volatility in pulse prices is a major issue and needs to be taken care of. This volatility, which alternates between adversely impacting consumers and farmers, creates dilemmas for public policy. Pulses are grown by small and marginal farmers in dry land areas. Since there are different kinds of

² Low cost Indian vegetarian diet Page 112 in NIN's Nutrient Requirements And Recommended Dietary Allowances For Indians accessed at <http://icmr.nic.in/final/RDA-2010.pdf>

pulses, coalitions among farmers are difficult to build. High MSPs that raise the incomes of pulse-growing farmers can help increase pulse production. There could be a virtuous circle whereby prices and incomes rise, creating a demand pull that further increases yields, productivity and income that further strengthens the production of pulses. Joshi et al. (2016) claim that the production of pulses in India has not been very responsive to increases in minimum support prices or even in farm harvest prices. Farmers increase the area under pulses and intensify production only when they expect a big rise in prices. Small price increases get ignored because of high relative risks in production. Singh and Gupta (2016) quote NITI Aayog's Ramesh Chand as contending that synergy between technology and MSP is extremely important to provide incentives to farmers to increase area under pulses. The 2016 Report on Incentivising Pulses Production through MSP and Other Policies recommended announcing MSP of Rs. 40/kg for Bengal gram for *rabi* 2016 and MSP of Rs. 60/kg for both urad and tur for *kharif* 2017 (adjusted for inflation between 2016-17) (Subramanian 2016). Minimum Support Prices for other pulses should be increased by the same percentage as calculated for tur, urad, and Bengal gram. However, a proper procurement mechanism should also be in place to provide further incentives to farmers.

Consideration could be given to bringing pulses into the fold of PDS (as some states are already doing). There would be fiscal costs and implementation challenges but also benefits to nutrition and increased consumption of pulses. Distribution in PDS can only be feasible when substantial amounts are available. This is an important way to cushion poor consumers from inflationary effects of reduced consumption in times of high prices. This is an advantage of PDS over direct cash transfers which are not immune to the inflationary effects.

Since the launch of the National Food Security Mission (NFSM) in 2007, the MSP of pulses has been increased. The prices have more than doubled for all pulses between 2007-08 and 2016-17 as seen in Box I. However, timely announcement of the MSP is a major concern; it has to be announced before planting decisions have been taken by the farmers. Assured procurement and a lucrative MSP can incentivise farmers to increase the area under pulses. The guaranteed market for rice and wheat is a major reason why farmers do not grow pulses and shift to producing wheat and rice.

Box I Minimum Support Prices for Pulses (in Rs. per quintal)

Year	Tur	Moong	Urad	Bengal Gram	Lentil
2007-08	1550	1700	1700	1600	1700
2008-09	2000	2520	2520	1730	1870
2009-10	2300	2760	2520	1760	1870
2010-11	3000	3170	2900	2100	2250
2011-12	3200	3500	3300	2800	2800
2012-13	3850	4400	4300	3000	2900
2013-14	4300	4500	4300	3100	2950
2014-15	4350	4600	4350	3175	3075
2015-16	4625	4850	4625	3425	3325
2016-17	5050	5225	5000		

Source: Commission of Agriculture Costs and Price accessed at <http://cacp.dacnet.nic.in/ViewContents.aspx?Input=1&PageId=36&KeyId=0> in September 2016

3 Government Programmes

During the Tenth Five Year Plan, a centrally sponsored Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) (Directorate of Pulses Development- 2016) was implemented with effect from 1 April, 2004 in 14 major states growing pulses. It gave the states the flexibility to utilise the allocated funds for the scheme/crop of their choice and introduce innovative measures along with formulation of annual action plans. The pulses production in the country increased from 11.08 mt in 2005-06 to 15.16 mt in 2007-08.

The National Food Security Mission (NFSM), launched in the Eleventh Five Year Plan period (2007-08), aimed to enhance the *rabi* production of rice, wheat and pulses by 10, 8 and 2 mt, respectively, through measures such as area expansion and productivity enhancement; restoring soil fertility and productivity; creating employment opportunities; and enhancing farm level economy to restore the confidence of farmers of targeted districts (GoI 2007). The implementation of the NFSM scheme was continued during the Twelfth Five Year Plan. The basic strategies were meting out interventions which included promotion and extension of improved technologies such as seed, integrated nutrient management (micro-nutrient, soil amendments), integrated pest management and resource conservation technologies (RCTs) along with capacity building of farmers.

The National Development Council (NDC), in its meeting held on 29 May 2007, resolved that a special additional central assistance scheme called Rashtriya Krishi Vikas Yojana (RKVY) be launched (GoI 2014). NDC determined that agricultural development methods must be reoriented to meet the needs of farmers and called upon the central and state governments to evolve a strategy to rejuvenate agriculture; it also reaffirmed its commitment to achieve 4 per cent annual growth in the agricultural sector during the Eleventh Plan. RKVY aimed to incentivise states to draw up plans for their agriculture sector more comprehensively, taking agro-climatic conditions, natural resource issues and technology into account, and integrating livestock, poultry and fisheries more fully.

To further supplement the efforts to accelerate the production of pulses, a centrally-sponsored accelerated pulses production programme (A3P) as cluster demonstration approach was started during the Eleventh Plan (2010-11 to 2013-14). Special initiatives for pulses and oilseeds in dry land areas were given (2010-11); and integrated development of 60,000 Pulses Villages in rain-fed areas (2011-12) was undertaken both under RKVY and Special plan to achieve 19+ mt of pulses production during *kharif* (2012-13), in addition to pulses under NFSM (GoI 2010).

During the Twelfth Five Year Plan (2012-13 to 2016-17), the pulses development scheme under NFSM is under implementation in 27 states — Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, the Punjab, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttrakhand and West Bengal — with additional production target of 4 mt by the end of the Plan (2016-17) (GoI 2012).

Box 2 gives a summary of the different government schemes that addressed pulses.

Box 2 Summary of Government Schemes

S. no.	Programme	Year	Purpose
1	Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM)	2004	To give states the flexibility to utilise the funds for the scheme/crop of their choice
2	National Food Security Mission (NFSM)	2007	To enhance the production of rice, wheat and pulses by 10, 8 and 2 mt, respectively, through area expansion and productivity enhancement
3	Rashtriya Krishi Vikas Yojana (RKVY)	2007	To incentivise states to draw up plans for their agriculture sector more comprehensively, taking agro-climatic conditions, natural resource issues and technology into account, and integrating livestock, poultry and fisheries more fully
4	Accelerated Pulses Production Programme (A3P)	2010	Special plan to achieve 19+ mt of pulses production
5.	Pulse Development Scheme under NFSM	2012	Additional production target of 4 mt by 2016-17

4 Trends in Area, Production, Yield and Consumption across States

Trends in area, production, consumption and yield post-2000 (breaking the time period at 2005 when ISOPOM was launched, 2007 when RKVY and NFSM were launched, and 2010-11 when the Twelfth Five Year Plan started) for all pulses and individually for Bengal gram, red gram, green gram, black gram and lentils are discussed below.

4.1 All Pulses

Pulses were grown on around 25 million ha and production was nearly 19 mt in 2013-14. The six states of Madhya Pradesh, Rajasthan, Maharashtra, Karnataka, Uttar Pradesh and Andhra Pradesh together account for more than 80 per cent of the total area under pulses. Only 16 per cent of the total area under pulses was irrigated in 2008-09.³ The states with higher percentage of irrigated area under pulses were Madhya Pradesh, Uttar Pradesh and Karnataka. Coincidentally, these three states have the highest share of area and production under pulses in spite of the fact that pulses are largely rain-fed. They also show higher productivity than other states (Tables 4 and 5).

Growth rate has been positive for all the pulses till 2010-11. In fact, between 2007-08 and 2010-11, which is the time period when NFSM was launched, growth in area was 3.7 per cent and production 6.2 per cent. It appears that NFSM did induce the farmers to grow more pulse crops. Only Uttar Pradesh showed a decline where the farmers shifted to cereals due to improvements in irrigation.

³ Since the irrigation data is available only for 2008-09, an analysis of irrigated area under pulses has been done for that particular year.

This was compensated by positive growth rates of 9 per cent in Andhra Pradesh and 9.7 per cent in Karnataka, per annum (Table 6).

The yield performance varied in the states. Yield is dependent on soil, irrigation and agricultural practices. The yields were as high as 1044 kg/ha in Bihar while only 537 kg/ha in Odisha, compared to the all-India average of 762 kg/ha. The negative growth rate in area between 2010-11 and 2013-14 can be explained due to droughts in 2009 and 2014.

In comparing the consumption of pulses between 2004-05 and 2011-12, it is observed that the highest consumers of pulse and pulse products are Andhra Pradesh, Gujarat, Karnataka, the Punjab, Maharashtra, Madhya Pradesh, Tamil Nadu and Uttar Pradesh. The consumption of pulses is higher in the urban sector than in the rural areas. Even though Rajasthan is among the highest producers of pulses, it does not feature among the highest consumers (Table 7). Thus, there is need to promote the consumption of pulses in all the states.

For the pulses-and-pulse-products group as a whole, per capita consumption rose by 77-78 g between 2004-05 and 2011-12: from 705 g to 783 g per month in the rural sector and from 824 g to 901 g per month in the urban sector. However, in 2011-12, the minimum requirement of 40 g per day was not met in any of the states.

4.2 Bengal Gram (Chana)

The most important pulse crop in India is Bengal gram. It comprised almost 40 per cent of total area under pulse production and almost 50 per cent of total production, as well as almost a third of the per capita availability of pulses in 2012-13. It is cultivated mainly in the states of Madhya Pradesh, Rajasthan, Maharashtra and Uttar Pradesh. Together, these states account for 80 per cent of the total area under Bengal gram and are also the highest producers. Madhya Pradesh and Andhra Pradesh show high yields of 1044 kg/ha and 1439 kg/ha as compared to the country average of 958 kg/ha. Production of Bengal gram in Uttar Pradesh crossed that of Maharashtra and Rajasthan in 2001-02. Area-wise, Madhya Pradesh is the largest producer accounting for around a third of both area and production (Tables 8, 9 and 10).

Between 2000-01 and 2004-05, India showed a growth rate of 6 per cent in the area under Bengal gram while the growth rate in production was 8 per cent. Major drivers of growth in area were Andhra Pradesh, Maharashtra and Odisha, while Gujarat added almost 40 per cent to the area under Bengal gram in the same time period. Between 2005-06 and 2007-08, Andhra Pradesh, Jharkhand and Chhattisgarh showed very high growth rates in area under Bengal gram. Jharkhand and Chhattisgarh also showed high growth rates in production. Uttar Pradesh and Haryana showed negative growth rates as they shifted to cereal production. India showed a growth rate of 7 per cent in area and 13 per cent in production between 2007-08 to 2010-11, when NFSM was implemented. Between 2010-11 and 2013-14, Maharashtra showed a growth rate of 9 per cent in area and 7 per cent in production, per annum (Table 11).

State-wise preferences in pulses come out clearly on examining specific pulses and their consumption. The consumption of Bengal gram is highest in the Punjab, Haryana, Bihar and

Maharashtra. The consumption is higher in the urban sector than in the rural sector and it has increased between the time periods of the two rounds of the NSS (Table 12).

4.3 Red Gram (Arhar/Tur)

The most important pulse crop after Bengal gram, red gram is a long duration crop. In 2008-09, only 4.5 per cent of the total area under red gram was irrigated. In 2012-13, India had around 4 million ha under red gram production, and the yield was around 3.2 mt. About 75 per cent of area and 60 per cent of production was from the states of Maharashtra, Karnataka, Uttar Pradesh and Andhra Pradesh, with Maharashtra accounting for almost a third of total red gram production. Bihar, Jharkhand, Tamil Nadu and Uttar Pradesh showed higher yields than the rest of India, which was 813 kg/ha (Tables 13, 14 and 15).

Between 2000-01 and 2005-06, there was no growth in area under red gram in the country. However, a 4 per cent per annum increase in production was recorded. In the time period when ISOPOM was implemented, 4 per cent increase in area and 2 per cent increase in production of red gram were recorded. The major drivers of growth in area, production and yield were Jharkhand, Karnataka, Madhya Pradesh and Maharashtra. Between 2007-08 and 2010-11, even though a positive growth rate was observed in area under red gram, production showed negative growth rates. Tamil Nadu, Karnataka and Madhya Pradesh showed positive growth between 2007-08 and 2010-11 for area. Short duration varieties of red gram can be introduced after the long crop cycle (Table 16).

In terms of consumption, urban India consumes more than rural India. Between 2004-05 and 2011-12, a few states such as Maharashtra, Gujarat, Uttar Pradesh and West Bengal showed a decrease in per capita consumption. The highest consumers of arhar have been Andhra Pradesh, Chhattisgarh, Gujarat, Karnataka, Maharashtra, Tamil Nadu and Madhya Pradesh, which is actually not surprising given that these are also the states which have a good public distribution system in place (Table 17).

4.4 Green Gram (Moong)

In 2012-13, India produced 1.19 mt of green gram and had an area of 2.75 million ha under it. More than 50 per cent of the area and production of green gram was from the states of Rajasthan, Maharashtra and Andhra Pradesh. West Bengal, Uttar Pradesh and Andhra Pradesh showed the highest yields of green gram in India (Tables 19 and 20).

Between 2000-01 and 2005-06, there was very slow growth in the area under green gram in the country, while production and yield both displayed negative growth. Only Odisha and Rajasthan showed a positive growth in area and production of green gram. Between 2005-06 and 2007-08, there was an increase in 9.5 per cent per annum in area, 25.5 per cent per annum in production and 15.5 per cent in yield. The major drivers of growth were Karnataka, Maharashtra and Rajasthan in terms of area and production. In terms of yield, West Bengal, Rajasthan and Gujarat were the better performers. The growth slowed between 2007-08 and 2010-11 in terms of area. However, production and yield still showed positive growth (Table 21).

The highest consumers of green gram are the states of Odisha, Haryana, Gujarat, the Punjab and Rajasthan. As opposed to Bengal gram and red gram, in some areas the consumption of green gram is higher in the rural sector as compared to the urban sector. Also, between the two rounds of NSS, there has been a decrease in the consumption of green gram (Table 22).

4.5 Black Gram (Urad)

In 2013-14, India produced 1.70 mt of black gram on an area of 3.06 million ha. About 75 per cent of the area and production of black gram was in the five states of Andhra Pradesh, Madhya Pradesh, Maharashtra, Tamil Nadu and Uttar Pradesh. Bihar and Jharkhand showed the highest yield despite having low shares in both area and production (Tables 23 and 24).

Between 2000-01 and 2005-06, India showed negative growth in area, production and yield. However, in the time period after ISOPOM was launched, growth rate in area increased to 4.2 per cent per annum, production to 9 per cent per annum and yield to 4.7 per cent per annum. The key drivers in growth were Karnataka, Rajasthan, Gujarat and Maharashtra. After NFSM was implemented, growth in area was low but positive, while growth in production and yield was 6.43 per cent and 5.7 per cent, respectively (Table 25).

In 2011-12, black gram consumption was higher in the rural sector than in the urban sector. The highest consumers of black gram in India are the states of Tamil Nadu, Andhra Pradesh, Chhattisgarh, Karnataka, Kerala and Uttar Pradesh. The southern states and Chhattisgarh supply urad as part of PDS which is reflected in the higher consumption of pulses in these states. Short duration pulses like urad and moong as catch crops in rice fallows should be promoted (Table 26).

4.6 Lentil (Massar)

In 2013-14, India produced 1.13 mt of lentil on 1.42 million ha of area. Eighty-five per cent of the area and production of massar was in the states of Madhya Pradesh, Uttar Pradesh and Bihar. The productivity in Bihar and Uttar Pradesh has been almost double that of Madhya Pradesh. It is therefore important to increase the productivity in Madhya Pradesh as this is the state with the largest area under lentil (Tables 27 and 28).

Between 2000-01 and 2013-14, while the share of area under lentil increased in Madhya Pradesh, it decreased in Uttar Pradesh. It is probable that farmers in Uttar Pradesh shifted to other crops as irrigation improved. Lentil has shown a negative growth in area in the period between 2000-01 and 2012-13. Only in the period between 2007-08 and 2010-11, when NFSM was implemented, a 5 per cent improvement in production was observed which increased to 10 per cent between 2007-08 and 2012-13, possibly due to better use of inputs. In the previous period (till the early 2000s), massar had shown a favourable increase in area, production and productivity (Table 29).

Lentil has shown a decrease in consumption over the time period in the urban sector, and an increase in the rural areas. The states that reported the highest consumption of lentils are Assam, Bihar and West Bengal (Table 30).

5 Summing Up and Suggestions for Policy

This paper has examined the current scenario of pulse availability and consumption in the country. Based on the analysis, certain suggestions are made here for policy consideration.

5.1 Production

Given that India has a demand-supply gap in pulses and needs to import to make up for the 4 mt deficit, it becomes prudent to increase domestic production. The per capita availability just about meets the norm of 40 g per day after imports. In order to attain self-sufficiency, it is important to focus on research and development for pulses in terms of yield potential, fortification, growing days, etc.

5.2 Consumption

On the consumption side, different pulses are consumed in different states. For instance, urad is more popular in the southern states and Bengal gram in the northern states. It is vital that awareness about the benefits and nutritive value of pulses be made known to the masses. The consumption of less popular pulses such as moth bean and cow pea should be promoted and encouraged.

Pulses are often referred to as “poor man’s meat” and, together with millets, as “orphan crops”. This mind set needs to be changed. Pulses are an extremely important food group in tackling protein-energy malnutrition and their importance in forming a balanced diet is crucial. A few states have started distributing pulses through the public distribution system, such as Tamil Nadu, Andhra Pradesh, Telangana, Chhattisgarh and Himachal Pradesh. Therefore, it is imperative to encourage other states to distribute pulses through PDS. Of late, there is a view that cash transfers are better than take-home rations. However, the efficacy of cash transfers in improving nutrition is questionable as women do not have a strong voice in household expenditure. Therefore, the role of PDS remains important even if cash transfers are introduced.

5.3 Pulse Prices

Announcement of MSP should be made well in advance before the monsoon’s onset so as to send the right signal to growers and they can plan accordingly. Assured procurement and creation of procurement centres in production zones can act as added incentives. The lack of an assured market forces farmers to choose lucrative crops such as rice, wheat and cotton. Efficient procurement of pulses and millets including timely payment by the government procurement agencies is crucial.

Most pulses are climate resilient and rain-fed. However, drought years do have an impact on their production (for instance, 2014-15). Hence development of organised markets for pulses is important. The decision on imports needs to be timely. Otherwise, by the time the imports arrive, the domestic supply is also in the market, leading to fall in prices and lower returns for the farmers.

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Annexure I

Table I Nutritive value of different pulses

Food Items	Protein (gm)	Fat (gm)	Energy (Kcal)	Calcium (mg)	Iron (mg)	Folic acid (mg)	Vitamin (mg)
Bengal Gram Whole	17.1	5.3	360	202	4.60	186.0	3.0
Bengal Gram Dhal	20.8	5.6	372	56	5.30	147.5	1.0
Bengal gram roasted	22.5	5.2	369	58	9.50	139.0	0.0
Black gram dhal	24.0	1.4	347	154	3.80	132.0	0.0
Cow pea	24.1	1.0	323	77	8.60	133.0	0.0
Green gram whole	24.0	1.3	334	124	4.40	0.0	1.0
Green gram dhal	24.5	1.2	348	75	3.90	140.0	0.0
Horse gram whole	22.0	0.5	321	287	6.77	0.0	1.0
Khesari dhal	28.2	0.6	345	90	6.30	0.0	0.0
Lentil	25.1	0.7	343	69	7.58	36.0	0.0
Moth beans	23.6	1.1	330	202	9.50	0.0	2.0
Peas green	7.2	0.1	93	20	1.50	0.0	9.0
Peas dry	19.7	1.1	315	75	7.05	7.5	0.0
Peas roasted	22.9	1.4	340	81	6.40	0.0	0.0
Rajmah	22.9	1.3	346	260	5.10	0.0	0.0
Red gram dhal	22.3	1.7	335	73	2.70	103.0	0.0
Red gram tender	9.8	1.0	116	57	1.10	0.0	25.0
All pulses	22.44	2.78	320.50	122.22	5.81	62.44	2.33

Source: "Nutritive Value of Indian Foods", Indian Council for Medical Research, 2012

Table 2 Per capita availability of pulses, with and without imports

Year	Area (million hectares)	Production (million tonnes)	Yield (kg/ha)	Net imports (million tonnes)	Net production (million tonnes)	Total availability (with imports) (million tonnes)	Per capita availability per day with imports (grams)	Per capita availability per day without imports (grams)
1980-81	22.46	10.63	473	0.17	9.35	9.52	37.33	36.66
1981-82	23.84	11.51	483	0.13	10.13	10.26	39.30	38.81
1982-83	22.83	11.86	519	0.1	10.44	10.54	39.47	39.09
1983-84	23.54	12.89	548	0.22	11.34	11.56	42.35	41.55
1984-85	22.74	11.96	526	0.23	10.52	10.75	38.53	37.71
1985-86	24.42	13.36	547	0.43	11.76	12.19	42.71	41.21
1986-87	23.16	11.71	506	0.62	10.30	10.92	37.47	35.34
1987-88	21.27	10.96	515	0.6	9.64	10.24	34.38	32.37
1988-89	23.15	13.85	598	0.75	12.19	12.94	42.51	40.05
1989-90	23.41	12.86	549	0.46	11.32	11.78	37.90	36.42
1990-91	24.66	14.26	578	1.26	12.55	13.81	43.54	39.57
1991-92	22.54	12.02	533	0.29	10.58	10.87	33.59	32.70
1992-93	22.36	12.82	573	0.35	11.28	11.63	35.26	34.20
1993-94	22.25	13.30	598	0.58	11.70	12.28	36.54	34.81
1994-95	23.03	14.04	610	0.50	12.36	12.86	37.53	36.07
1995-96	22.28	12.31	552	0.42	10.83	11.25	32.26	31.05
1996-97	22.45	14.24	635	0.60	12.53	13.13	36.97	35.28
1997-98	22.87	12.98	567	0.84	11.42	12.26	33.92	31.59
1998-99	23.5	14.91	634	0.46	13.12	13.58	36.91	35.66
1999-2K	21.12	13.42	635	0.06	11.81	11.87	31.73	31.57
2000-01	20.35	11.08	544	0.11	9.75	9.86	25.93	25.64
2001-02	22.01	13.37	607	2.07	11.77	13.84	35.76	30.41
2002-03	20.5	11.13	543	1.85	9.79	11.64	29.62	24.92
2003-04	23.46	14.91	635	1.57	13.12	14.69	36.79	32.86
2004-05	22.76	13.13	577	1.06	11.55	12.61	31.11	28.49
2005-06	22.39	13.38	597	1.25	11.77	13.02	31.66	28.62
2006-07	23.19	14.2	612	2.02	12.50	14.52	34.79	29.95
2007-08	23.63	14.76	625	2.67	12.99	15.66	37.02	30.70
2008-09	22.09	14.57	659	2.34	12.82	15.16	35.35	29.90
2009-10	23.28	14.66	630	3.41	12.90	16.31	37.55	29.70
2010-11	26.28	18.24	694	2.49	16.05	18.54	42.12	36.46
2011-12	24.78	17.21	694	3.19	15.14	18.33	41.14	33.98
2012-13	23.26	18.34	789	3.64	16.14	19.78	43.81	35.75
2013-14	25.21	19.78	785	2.71	17.41	20.12	44.02	38.09
2014-15		17.38*		4.58*				

Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry Of Agriculture and Farmers Welfare, Government of India

Table 3 Fractile-wise consumption of pulse and pulse products per day per capita in grams, India

MPCE class	Rural	Urban	Deficit in rural	Deficit in urban
MPCE 1	17.23	19.4	-22.77	-20.6
MPCE 2	19.13	21.5	-20.87	-18.5
MPCE 3	20.73	23.93	-19.27	-16.07
MPCE 4	22.03	25.2	-17.97	-14.8
MPCE 5	23.3	27.43	-16.7	-12.57
MPCE 6	24.17	29.17	-15.83	-10.83
MPCE 7	26	31.07	-14	-8.93
MPCE 8	27.1	31.87	-12.9	-8.13
MPCE 9	28.5	35.17	-11.5	-4.83
MPCE 10	31.4	36.87	-8.6	-3.13
MPCE 11	34.3	39.93	-5.7	-0.07
MPCE 12	44.77	38.77	4.77	-1.23
MPCE all	26.1	30.03	-13.9	-9.97

Source: 68th Round of NSS-2011-12. MPCE stands for Monthly Per Capita Expenditure

Table 4 Area, production, yield, irrigation and state-wise percentage share of total pulses in India

2012-13						2008-09
State	Area		Production		Yield (kg/ha)	Area under irrigation (%) 2008-09
	(million hectares)	% share in area	(million tonnes)	% share in production		
Andhra Pradesh	1.67	6.66	1.55	8.11	928	1.6
Bihar	0.50	1.99	0.52	2.73	1044	2.4
Chhattisgarh	0.84	3.34	0.48	2.52	574	9.1
Gujarat	0.81	3.24	0.73	3.81	897	11.3
Haryana	0.15	0.61	0.13	0.65	819	30.4
Jharkhand	0.57	2.26	0.58	3.02	1021	2.4
Karnataka	2.50	9.95	1.60	8.37	641	8.5
Maharashtra	3.95	15.75	3.17	16.57	802	9.1
Madhya Pradesh	5.40	21.50	4.64	24.28	861	37.1
Odisha	0.78	3.11	0.42	2.19	537	7.7
Rajasthan	4.20	16.72	2.49	13.02	593	15.3
Tamil Nadu	0.82	3.25	0.61	3.21	752	5.7
Uttar Pradesh	2.31	9.18	1.70	8.87	736	21
West Bengal	0.29	1.14	0.24	1.26	843	13.7
Others	0.30	1.20	0.27	1.41		
All-India	25.10	100.00	19.13	100.00	762	16

Notes to Table 4: Area reported in million hectares, production in million tonnes and yield in kg/hectare. See also detailed Table 5

Table 5 Area, production and yield of all pulses

State	2000-01			2005-06			2007-08			2010-11			2013-14		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Andhra Pradesh	1.90	1.05	554	1.78	1.38	772	2.11	1.70	803	2.13	1.44	676	1.67	1.55	928
Assam	0.11	0.06	559	0.10	0.05	537	0.11	0.06	558	0.13	0.07	555	0.15	0.10	695
Bihar	0.72	0.62	865	0.60	0.45	749	0.61	0.50	818	0.61	0.56	918	0.50	0.52	1044
Chhattisgarh	0.67	0.27	400	0.95	0.45	479	0.92	0.54	586	0.86	0.54	626	0.84	0.48	574
Gujarat	0.64	0.19	300	0.78	0.55	704	0.88	0.74	843	0.85	0.72	845	0.81	0.73	897
Haryana	0.16	0.10	622	0.19	0.12	621	0.17	0.10	602	0.20	0.18	925	0.15	0.13	819
Himachal Pradesh	0.03	0.02	629	0.03	0.02	713	0.03	0.04	1062	0.03	0.01	487	0.03	0.05	1764
Jharkhand	0.12	0.10	825	0.29	0.17	567	0.41	0.30	736	0.41	0.27	656	0.57	0.58	1021
Karnataka	2.05	0.96	467	1.98	0.96	487	2.38	1.27	531	2.70	1.50	555	2.50	1.60	641
Madhya Pradesh	3.55	2.28	640	4.28	3.23	754	4.03	2.45	609	5.18	3.39	655	5.40	4.64	861
Maharashtra	3.56	1.64	460	3.43	2.01	584	4.06	3.02	746	4.07	3.15	773	3.95	3.17	802
Odisha	0.60	0.21	352	0.81	0.34	416	0.86	0.38	446	0.85	0.41	486	0.78	0.42	537
Punjab	0.06	0.04	740	0.03	0.03	804	0.03	0.02	804	0.03	0.02	923	0.05	0.04	872
Rajasthan	2.37	0.73	308	3.44	0.90	261	3.87	1.55	401	4.71	3.22	683	4.20	2.49	593
Tamil Nadu	0.69	0.31	455	0.53	0.18	337	0.61	0.19	303	0.73	0.30	407	0.82	0.61	752
Uttar Pradesh	2.69	2.16	803	2.75	2.23	811	2.16	1.98	917	2.43	2.01	829	2.31	1.70	736
Uttarakhand	0.03	0.02	765	0.06	0.04	590	0.06	0.05	794	0.08	0.07	870	0.07	0.06	869
West Bengal	0.27	0.22	800	0.22	0.17	785	0.19	0.15	793	0.19	0.16	839	0.29	0.24	843
All India	20.35	11.08	544	22.39	13.38	597	23.63	15.16	642	26.33	18.16	689	25.09	19.13	762

Source: Area reported in million hectares, production in million tonnes and yield in kg/hectare. Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry Of Agriculture and Farmers Welfare, Government of India accessed from the IIPR site at <http://www.iipr.res.in/e-pulse-data-book.html>

Table 6 Growth performance of all pulses

State	2000-01 to 2005-06			2005-06 to 2007-08			2007-08 to 2010-11			2010-11 to 2013-14		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Andhra Pradesh	-1.3	5.5	6.9	8.9	11.1	2	0.3	-5.3	-5.6	-7.8	2.5	11.1
Assam	-2.1	-2.8	-0.8	6	8	1.9	3.8	3.6	-0.2	5.9	14.2	7.8
Bihar	-3.6	-6.4	-2.8	0.9	5.5	4.5	-0.1	3.8	3.9	-6.2	-2.1	4.4
Chhattisgarh	7.3	11.1	3.7	-1.8	8.8	10.6	-2.2	0	2.2	-0.7	-3.5	-2.8
Gujarat	4.1	23.5	18.6	6.5	16.5	9.4	-1.1	-1	0.1	-1.5	0.4	2
Haryana	3.5	3.5	0	-5.6	-7.2	-1.5	5.6	21.8	15.4	-8.5	-12.1	-4
Himachal Pradesh	-2.6	-0.1	2.5	11	35.5	22	-4	-26	-22.9	-1.2	51.7	53.6
Jharkhand	20.1	12.4	-7.2	18.7	32.3	13.9	-0.2	-4	-3.8	11.7	29.4	15.9
Karnataka	-0.7	0.2	0.8	9.7	14.6	4.4	4.2	5.8	1.5	-2.5	2.3	4.9
Madhya Pradesh	3.8	7.3	3.3	-3.1	-12.9	-10.1	8.7	11.4	2.5	1.4	11.1	9.5
Maharashtra	-0.7	4.1	4.9	8.7	22.8	13	0.1	1.3	1.2	-1	0.2	1.2
Odisha	6	9.6	3.4	3	6.8	3.5	-0.3	2.6	2.9	-2.9	0.4	3.4
Punjab	-11.5	-10	1.7	-6.3	-6.3	0	-3.1	1.4	4.7	20.4	18.2	-1.9
Rajasthan	7.7	4.2	-3.3	6	31.5	24	6.8	27.5	19.4	-3.8	-8.2	-4.6
Tamil Nadu	-5.3	-10.8	-5.8	7.7	2.2	-5.2	6.1	17	10.3	3.9	27.5	22.7
Uttar Pradesh	0.4	0.7	0.2	-11.5	-5.9	6.3	4	0.6	-3.3	-1.7	-5.5	-3.9
Uttrakhand	16.4	10.6	-5.1	1.6	17.9	16	6.9	10.2	3.1	-5.5	-5.5	0
West Bengal	-4.1	-4.5	-0.4	-8.4	-8	0.5	1	2.9	1.9	14.3	14.5	0.2
All India	1.9	3.8	1.9	2.7	6.5	3.7	3.7	6.2	2.4	-1.6	1.8	3.4

Notes to Table 6: Based on author's calculations of growth rates from Table 5 using the formula, growth rate, $r = \left[\left(\frac{A_t}{A} \right)^{\frac{1}{n}} - 1 \right] * 100$ where $A_t = \text{Area/Production/Yield}$ in the year t , $A = \text{Area/Production/Yield}$ in the initial year and n is the number of years. For instance, for growth rates between 2000-01 and 2005-06, A_t is the area in 2005-06 and A in 2000-01 and $n=5$.

Table 7 Consumption of pulse and pulse products in rural and urban India in 2004-05 and 2011-12

State	2011-12		2004-05	
	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)
Andhra Pradesh	28.57	31.67	23.40	26.73
Assam	21.57	26.10	20.73	25.80
Bihar	24.80	27.40	23.60	29.47
Chhattisgarh	26.47	32.10	24.70	32.23
Gujarat	28.10	31.77	25.90	31.17
Haryana	25.03	29.87	19.63	23.40
Jharkhand	19.23	27.93	18.20	29.10
Karnataka	30.47	33.93	25.43	29.50
Kerala	23.23	26.17	19.53	21.37
Madhya Pradesh	28.47	30.97	25.53	28.77
Maharashtra	32.50	33.63	29.30	30.43
Odisha	20.33	24.30	16.57	23.43
Punjab	29.93	31.87	27.93	30.07
Rajasthan	18.97	19.77	16.90	16.90
Tamil Nadu	33.10	35.63	25.83	31.73
Uttar Pradesh	28.83	29.60	28.27	27.90
West Bengal	16.27	19.17	13.57	18.33

Source: 61st and 68th Rounds of the National Sample Survey

Table 8 Production, imports and per capita availability of Bengal gram (chana)

Year	Production (million tonnes)	Net Imports (million tonnes)	Total availability (million tonnes)	Net availability* (million tonnes)	Per capita availability per day with imports (grams)	Per capita availability per day without imports (grams)
2005-06	5.6	0.094	5.69	5.17	12.57	11.99
2006-07	6.33	0.07	6.42	5.64	13.52	13.35
2007-08	5.75	0.04	5.79	5.05	11.94	11.96
2008-09	7.06	0.19	7.27	6.28	14.65	14.48
2009-10	7.48	0.005	7.485	6.83	15.72	15.16
2010-11	8.22	-0.101	8.1	7.13	16.20	16.43
2011-12	7.58	0.036	7.616	6.71	15.06	14.97
2012-13	7.96	0.028	7.988	7.03	15.58	15.51

Notes to Table 8: * After accounting for 12% seed, feed and wastage.

Data source: Directorate of Economics and Statistics.

Table 9 Area, production, yield, irrigation and state-wise percentage share of Bengal gram in India

State	2012-13		2008-09			
	Area (million hectares)	% share in area	Production (million tonnes)	% share in production	Yield (kg/ha)	Area under irrigation (%) 2008-09
Andhra Pradesh	0.59	5.90	0.84	8.85	1439	2.1
Bihar	0.06	0.62	0.07	0.74	1147	5.9
Chhattisgarh	0.25	2.54	0.24	2.54	959	31.4
Gujarat	0.25	2.49	0.31	3.24	1251	28.8
Haryana	0.08	0.84	0.08	0.79	904	15.7
Karnataka	0.95	9.53	0.72	7.51	757	17.2
Madhya Pradesh	3.16	31.82	3.30	34.62	1044	51.4
Maharashtra	1.82	18.33	1.62	17.02	891	25.7
Odisha	0.05	0.48	0.04	0.38	768	-
Rajasthan	1.92	19.37	1.64	17.21	853	38.7
Uttar Pradesh	0.58	5.81	0.48	4.99	824	14.7
West Bengal	0.02	0.25	0.03	0.31	1175	32.7
Others	0.20	2.03	0.17	1.81		-
All India	9.93	100	9.53	100	958	33.6

Notes: Area reported in million hectares, production in million tonnes and yield in kg/hectare. For details, refer to Table 10.

Table 10 Area, production and yield of Bengal gram

State	2000-01			2005-06			2007-08			2010-11			2013-14		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Andhra Pradesh	0.29	0.36	1274	0.39	0.63	1591	0.63	0.91	1448	0.59	0.72	1235	0.59	0.84	1439
Bihar	0.08	0.08	1033	0.06	0.06	902	0.07	0.07	972	0.07	0.08	1182	0.06	0.07	1147
Jharkhand	0.00	0.00		0.03	0.02	811	0.07	0.07	925	0.07	0.05	800	0.16	0.18	1166
Gujarat	0.05	0.03	554	0.17	0.14	850	0.22	0.21	977	0.20	0.23	1172	0.25	0.31	1251
Haryana	0.13	0.08	640	0.13	0.07	555	0.11	0.05	505	0.11	0.11	982	0.08	0.08	904
Karnataka	0.37	2.39	648	0.42	0.23	548	0.61	0.37	607	0.96	0.60	626	0.95	0.72	757
Madhya Pradesh	1.98	1.62	819	2.57	2.37	926	2.44	1.74	711	3.11	2.69	863	3.16	3.30	1044
Chhattisgarh	0.00	0.00		0.14	0.07	515	0.23	0.16	706	0.24	0.21	874	0.25	0.24	959
Maharashtra	0.68	0.35	519	1.02	0.71	691	1.35	1.12	825	1.42	1.32	930	1.82	1.62	891
Odisha	0.02	0.01	476	0.04	0.02	646	0.04	0.03	659	0.04	0.03	749	0.05	0.04	768
Rajasthan	0.67	0.40	590	1.08	0.48	443	1.23	0.57	466	1.78	1.60	898	1.92	16.40	853
Uttar Pradesh	0.83	0.70	844	0.74	0.66	893	0.51	0.38	745	0.57	0.53	930	0.58	4.75	824
All India	5.19	3.86	743.7	6.93	5.60	808.1	7.54	5.75	762.6	9.21	8.22	892.51	9.93	9.53	959.72

Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry Of Agriculture and Farmers Welfare, Government of India accessed from the IIPR site at <http://www.iipr.res.in/e-pulse-data-book.html>

Table II Growth performance of Bengal gram

State	2000-01 to 2005-06			2005-06 to 2007-08			2007-08 to 2010-2011			2010-11 to 2013-14		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Andhra Pradesh	6.69	11.55	4.54	26.45	20.60	-4.60	-2.38	-7.41	-5.17	0.00	5.20	5.23
Bihar	-3.98	-6.55	-2.68	5.17	9.20	3.81	-1.88	4.80	6.74	-1.93	-2.99	-1.00
Jharkhand	0.00	0.00	0.00	57.27	67.94	6.80	-4.53	-9.04	-4.72	33.83	51.75	13.38
Gujarat	27.74	39.17	8.94	13.46	21.61	7.21	-2.71	3.38	6.25	7.65	10.02	2.20
Haryana	0.79	-2.09	-2.81	-9.28	-13.40	-4.61	1.53	26.77	24.82	-9.51	-11.99	-2.72
Karnataka	2.50	-0.88	-3.30	20.31	26.59	5.25	16.64	17.87	1.03	-0.49	6.01	6.54
Madhya Pradesh	5.35	7.91	2.49	-2.53	-14.46	-12.37	8.47	15.68	6.67	0.51	7.09	6.55
Chhattisgarh	0.00	0.00	0.00	28.55	50.54	17.08	0.57	7.99	7.37	2.28	5.55	3.14
Maharashtra	8.58	14.97	5.89	15.17	25.82	9.27	1.70	5.84	4.07	8.55	7.03	-1.42
Odisha	10.95	17.92	6.30	5.11	6.17	1.00	2.50	6.45	4.36	3.97	5.30	0.84
Rajasthan	9.97	3.84	-5.57	6.68	9.50	2.56	13.13	40.75	24.44	2.56	0.81	-1.70
Uttar Pradesh	-2.35	-1.23	1.14	-17.37	-24.56	-8.66	4.12	12.12	7.67	0.41	-3.56	-3.95
All India	5.95	7.73	1.67	4.31	1.33	-2.85	6.90	12.65	5.38	2.54	5.05	2.45

Notes to Table II: Based on author's calculations of growth rates from Table I0 using the formula, growth rate, $r = \left[\left(\frac{A_t}{A} \right)^{\frac{1}{n}} - 1 \right] * 100$ where A_t = Area/Production/Yield in the year t, A = Area/Production/Yield in the initial year and n is the number of years. For instance, for growth rates between 2000-01 and 2005-06, A_t is the area in 2005-06 and A in 2000-01 and $n=5$.

Table 12 Consumption of Bengal gram in rural and urban India in 2004-05 and 2011-12

State	2011-2012		2004-05	
	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)
Andhra Pradesh	2.30	2.70	1.70	1.87
Assam	2.13	3.10	0.63	1.43
Bihar	6.13	7.57	3.97	6.17
Chhattisgarh	2.03	2.57	0.77	2.00
Gujarat	4.07	4.43	2.10	3.03
Haryana	8.13	8.77	5.33	5.67
Jharkhand	3.27	6.33	2.03	5.70
Karnataka	5.03	5.47	3.80	3.83
Kerala	4.70	5.53	3.60	3.90
Madhya Pradesh	4.70	3.47	4.03	2.70
Maharashtra	5.60	4.53	5.47	4.73
Odisha	1.57	1.57	0.80	1.07
Punjab	11.40	10.90	7.83	7.97
Rajasthan	4.37	4.00	2.93	2.80
Tamil Nadu	2.73	3.93	2.33	3.17
Uttar Pradesh	2.77	3.37	1.90	2.77
West Bengal	0.90	1.10	0.53	1.00

Source: 61st and 68th Rounds of the National Sample Survey

Table 13 Production, imports and per capita availability of red gram

Year	Production (million tonnes)	Net imports (million tonnes)	Total availability (million tonnes)	Net availability* (million tonnes)	Per capita availability per day with imports (grams)	Per capita availability per day without imports (grams)
2005-06	2.74	0.20	2.96	2.61	6.35	5.87
2006-07	2.31	0.23	2.6	2.26	5.42	4.87
2007-08	3.08	0.31	3.39	3.02	7.14	6.41
2008-09	2.27	0.5	2.77	2.50	5.82	4.66
2009-10	2.46	0.39	2.85	2.55	5.88	4.99
2010-11	2.86	0.35	3.21	2.87	6.51	5.72
2011-12	2.65	0.47	3.119	2.80	6.29	5.24
2012-13	2.78	0.28	3.059	2.73	6.04	5.42

Notes to Table 13: * After accounting for 12% seed, feed and wastage.

Data source: Directorate of Economics and Statistics

Table 14 Area, production and yield of red gram in India

State	2012-13		2008-09			
	Area (million hectares)	% share in area	Production (million tonnes)	% share in production	Yield (kg/ha)	Area under irrigation (%) 2008-09
Andhra Pradesh	0.45	11.49	0.243	7.67	542	0.2
Bihar	0.02	0.56	0.0365	1.15	1667	1.3
Gujarat	0.21	5.38	0.209	6.59	995	8.2
Jharkhand	0.20	5.05	0.2052	6.47	1042	-
Karnataka	0.82	21.13	0.5875	18.53	713	5
Maharashtra	1.14	29.26	1.034	32.62	906	1.7
Madhya Pradesh	0.46	11.90	0.332	10.47	716	1.4
Odisha	0.14	3.56	0.1244	3.92	896	-
Tamil Nadu	0.06	1.53	0.0577	1.82	967	4.8
Uttar Pradesh	0.30	7.72	0.271	8.55	900	12.7
Others	0.05	1.28	0.07	2.21		-
All-India	3.90	100.00	3.17	100.00	813	4.5

Notes: Area reported in million hectares, production in million tonnes and yield in kg/hectare. For details, refer to Table 15.

Table 15 Area, production and yield of red gram (arhar)

State	2000-01			2005-06			2007-08			2010-11			2013-14		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Andhra Pradesh	0.513	0.219	427	0.494	0.301	609	0.463	0.302	652	0.638	0.265	415	0.448	0.243	542
Bihar	0.044	0.059	1348	0.033	0.043	1291	0.034	0.035	1012	0.036	0.055	1515	0.022	0.037	1667
Chhattisgarh	0.049	0.021	429	0.058	0.026	445	0.054	0.028	522	0.055	0.024	440	0.051	0.031	613
Gujarat	0.318	0.107	337	0.254	0.280	1102	0.265	0.294	1109	0.277	0.273	986	0.210	0.209	995
Jharkhand	0.024	0.029	1238	0.085	0.054	633	0.117	0.094	800	0.104	0.730	700	0.197	0.205	1042
Karnataka	0.583	0.264	452	0.601	0.433	727	0.681	0.485	712	0.891	0.509	571	0.824	0.588	713
Madhya Pradesh	0.331	0.272	824	.	.	.	0.320	0.260	812	0.360	0.310	861	0.464	0.332	716
Maharashtra	1.096	0.660	602	1.100	0.792	720	1.175	1.083	922	1.320	0.998	756	1.141	1.034	906
Odisha	0.149	0.075	503	0.133	0.099	742	0.137	0.113	825	0.135	0.123	909	0.139	0.124	896
Tamil Nadu	0.063	0.045	712	0.038	0.020	540	0.030	0.021	701	0.060	0.038	629	0.060	0.058	967
Uttar Pradesh	0.407	0.510	1254	0.383	0.378	987	0.368	0.328	891	0.344	0.308	895	0.301	0.271	900
Uttrakhand				0.001	0.001	1000	0.003	0.002	667	0.002	0.012	706	0.003	0.003	810
All-India	3.630	2.250	620	3.580	2.740	765	3.730	3.080	826	4.420	2.860	647	3.900	3.170	813

Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India accessed from the IIPR site at <http://www.iipr.res.in/e-pulse-data-book.html>

Table 16 Growth rate of red gram

State	2000-01 to 2005-06			2005-06 to 2007-08			2007-08 to 2010-2011			2010-11 to 2013-14		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Andhra Pradesh	-0.75	6.57	7.36	-3.19	0.17	3.47	11.28	-4.26	-13.98	-11.12	-2.85	9.31
Bihar	-5.29	-6.10	-0.86	1.49	-10.17	-11.46	1.63	16.59	14.40	-15.27	-12.77	3.24
Chhattisgarh	3.08	3.84	0.74	-3.27	4.77	8.31	0.74	-5.12	-5.54	-2.55	9.14	11.69
Gujarat	-4.39	21.17	26.74	2.14	2.47	0.32	1.49	-2.44	-3.84	-8.82	-8.52	0.30
Jharkhand	29.38	13.12	-12.55	17.19	31.78	12.42	-3.85	98.31	-4.35	23.69	-34.49	14.18
Karnataka	0.62	10.44	9.97	6.45	5.83	-1.04	9.37	1.62	-7.09	-2.57	4.90	7.68
Madhya Pradesh	0.62	10.44	9.97	6.45	5.83	-1.04	9.37	1.62	-7.09	-19.55	-13.28	7.83
Maharashtra	0.07	3.70	3.64	3.35	16.94	13.16	3.95	-2.69	-6.40	-4.74	1.19	6.22
Odisha	-2.28	5.60	8.09	1.72	7.25	5.44	-0.59	2.78	3.28	0.95	0.38	-0.48
Tamil Nadu	-9.80	-14.67	-5.38	-10.76	1.70	13.94	25.85	21.67	-3.55	-0.22	14.94	15.41
Uttar Pradesh	-1.21	-5.83	-4.68	-1.91	-6.81	-4.99	-2.22	-2.07	0.15	-4.35	-4.18	0.19
Uttrakhand	0.00	0.00	0.00	73.21	41.42	-18.33	-17.25	81.71	1.91	25.99	-39.18	4.69
All-India	-0.28	4.02	4.29	2.07	6.02	3.91	5.82	-2.44	-7.82	-4.09	3.49	7.91

Notes to Table 16: Based on author's calculations of growth rates from Table 15 using the formula, growth rate, $r = \left[\left(\frac{A_t}{A} \right)^{\frac{1}{n}} - 1 \right] * 100$ where A_t = Area/Production/Yield in the year t, A = Area/Production/Yield in the initial year and n is the number of years. For instance for growth rates between 2000-01 and 2005-06, A_t is the area in 2005-06 and A in 2000-01 and $n=5$.

Table 17 Consumption of red gram in rural and urban India in 2004-05 and 2011-12

State	2011-2012		2004-05	
	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)
Andhra Pradesh	15.43	15.30	14.13	14.93
Assam	0.60	1.43	1.13	2.37
Bihar	2.60	4.90	2.30	5.50
Chhattisgarh	10.17	19.47	6.80	19.83
Gujarat	10.87	12.00	11.57	14.03
Haryana	0.67	2.53	0.43	1.63
Jharkhand	5.50	9.37	5.30	10.20
Karnataka	12.20	12.90	10.87	12.97
Kerala	4.23	5.07	3.50	4.30
Madhya Pradesh	11.17	15.20	10.77	15.30
Maharashtra	12.23	13.73	12.93	13.60
Odisha	5.43	12.20	3.90	11.07
Punjab	0.27	1.90	0.33	1.37
Rajasthan	0.83	1.93	0.37	0.90
Tamil Nadu	13.00	13.00	10.97	12.77
Uttar Pradesh	8.70	10.47	9.83	10.73
West Bengal	0.10	1.37	0.20	1.20
Total	114.00	152.77	105.33	152.70

Source: 61st and 68th Rounds of the National Sample Survey

Table 18 Production, imports and per capita availability of green gram and black gram (moong and urad)

Year	Production (million tonnes)	Net import (million tonnes)	Total availability (million tonnes)	Net availability (million tonnes)	Per capita availability per day with imports (grams)	Per capita availability per day without imports (grams)
2005-06	2.2	0.08	2.28	2.02	4.90	4.71
2006-07	2.56	0.33	2.89	2.58	6.19	5.40
2007-08	2.98	0.33	3.31	2.95	6.98	6.20
2008-09	2.21	0.44	2.65	2.38	5.56	4.53
2009-10	1.92	0.71	2.63	2.40	5.53	3.89
2010-11	3.56	0.43	3.99	3.56	8.09	7.12
2011-12	3.54	0.43	3.969	3.54	7.96	6.99
2012-13	3.16	0.30	3.457	3.08	6.82	6.16

Notes to Table 18:* After accounting for 12% seed, feed and wastage.

Data source: Directorate of Economics and Statistics

Table 19 Area, production, yield, irrigation and state-wise percentage share of green gram in India

2012-13					
State	Area (million hectares)	% share in area	Production (million tonnes)	% share in production	Yield (kg/ha)
Andhra Pradesh	0.28	10.11	0.19	15.80	676
Bihar	0.15	5.60	0.09	7.71	596
Chhattisgarh	0.02	0.64	0.00	0.41	278
Gujarat	0.13	4.55	0.06	4.79	456
Jharkhand	0.03	0.92	0.02	1.34	632
Karnataka	0.18	6.51	0.05	4.54	302
Madhya Pradesh	0.09	3.18	0.04	3.47	473
Maharashtra	0.41	14.98	0.20	16.55	478
Odisha	0.28	10.17	0.09	7.27	309
Rajasthan	0.80	28.98	0.24	20.27	303
Tamil Nadu	0.13	4.55	0.04	2.97	283
Uttar Pradesh	0.08	2.73	0.05	4.20	667
West Bengal	0.02	0.85	0.02	1.42	719
All-India	2.75	100.00	1.19	100.00	433

Notes: Area reported in million hectares, production in million tonnes and yield in kg/hectare. For details, refer to Table 20.

Table 20 Area, production and yield of green gram (moong)

State	2000-01			2005-06			2007-08			2010-11			2013-14		
	Area	Production	Yield	Area	Production	State	Area	Production	Yield	Area	Production	State	Area	Production	Yield
Andhra Pradesh	0.52	0.18	354	0.39	0.17	433	0.44	0.19	438	0.38	0.17	439	0.28	0.19	676
Bihar	0.19	0.11	581	0.18	0.10	556	0.17	0.12	680	0.18	0.12	669	0.15	0.09	596
Chhattisgarh	0.01	0.00	248	0.02	0.00	256	0.02	0.00	267	0.02	0.01	259	0.02	0.00	278
Gujarat	0.15	0.04	256	0.17	0.05	309	0.21	0.11	545	0.21	0.11	505	0.13	0.06	456
Jharkhand	0.00	0.00	538	0.01	0.01	467	0.02	0.01	573	0.03	0.02	500	0.03	0.02	632
Karnataka	0.45	0.18	184	0.40	0.09	228	0.53	0.11	209	0.40	0.11	275	0.18	0.05	302
Madhya Pradesh	0.09	0.02	253	0.08	0.03	323	0.08	0.03	335	0.10	0.04	353	0.09	0.04	473
Maharashtra	0.71	0.24	341	0.55	0.19	355	0.67	0.37	552	0.58	0.38	655	0.41	0.20	478
Odisha	0.15	0.03	199	0.26	0.07	257	0.27	0.06	236	0.27	0.08	293	0.28	0.09	309
Rajasthan	0.46	0.08	173	0.80	0.13	163	1.06	0.42	393	1.05	0.65	621	0.80	0.24	303
Tamil Nadu	0.13	0.06	476	0.14	0.05	336	0.16	0.05	302	0.20	0.07	368	0.13	0.04	283
Uttar Pradesh	0.08	0.03	400	0.07	0.04	523	0.06	0.03	413	0.08	0.05	577	0.08	0.05	667
West Bengal	0.01	0.01	580	0.01	0.00	304	0.00	0.00	636	0.02	0.01	632	0.02	0.02	719
All-India	3.01	1.03	343	3.11	0.95	305	3.73	1.52	408	3.55	1.80	507	2.75	1.19	433

Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry Of Agriculture and Farmers Welfare, Government of India accessed from the IIPR site at <http://www.iipr.res.in/e-pulse-data-book.html>

Table 21 Growth rate of green gram (moong)

State	2000-01 to 2005-06			2005-06 to 2007-08			2007-08 to 2010-2011			2010-11 to 2012-13		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Andhra Pradesh	-5.85	-1.96	4.11	6.66	7.32	0.58	-4.79	-4.73	0.08	-14.24	6.42	24.09
Bihar	-0.50	-1.36	-0.88	-2.95	7.37	10.59	0.62	0.03	-0.54	-6.22	-11.47	-5.61
Chhattisgarh	4.05	4.68	0.64	-3.25	-1.14	2.13	-0.21	5.16	-1.01	4.88	-1.01	3.60
Gujarat	2.95	6.97	3.83	9.95	45.97	32.81	-0.16	-2.70	-2.51	-22.48	-26.32	-4.98
Jharkhand	57.25	52.11	-2.79	9.54	22.83	10.77	30.06	25.50	-4.44	-12.44	-2.99	12.43
Karnataka	-2.37	-13.21	4.38	15.11	10.44	-4.26	-8.65	0.00	9.58	-33.44	-30.25	4.79
Madhya Pradesh	-2.47	2.42	5.01	0.06	1.93	1.84	7.54	9.44	1.76	-6.04	8.63	15.76
Maharashtra	-5.23	-4.48	0.81	11.11	38.51	24.70	-4.88	0.71	5.87	-15.72	-28.00	-14.57
Odisha	11.79	17.71	5.25	1.85	-2.37	-4.17	0.14	7.78	7.48	2.16	4.64	2.69
Rajasthan	11.79	10.39	-1.18	15.12	78.89	55.28	-0.30	16.16	16.48	-12.88	-39.18	-30.15
Tamil Nadu	1.42	-5.41	-6.73	7.75	2.16	-5.19	7.47	14.55	6.81	-20.31	-29.88	-12.31
Uttar Pradesh	-3.33	2.00	5.51	-4.31	-15.02	-11.14	7.38	20.06	11.79	-1.94	5.41	7.52
West Bengal	0.53	-6.68	-12.12	-56.26	-44.83	44.64	97.70	98.80	-0.21	17.57	23.95	6.66
All-India	0.66	-1.60	-2.25	9.52	26.49	15.50	-1.64	5.80	7.56	-11.99	-18.69	-7.62

Notes to Table 21: Based on author's calculations of growth rates from Table 20 using the formula, growth rate, $r = \left[\left(\frac{A_t}{A} \right)^{\frac{1}{n}} - 1 \right] * 100$ where A_t = Area/Production/Yield in the year t, A = Area/Production/Yield in the initial year and n is the number of years. For instance for growth rates between 2000-01 and 2005-06, A_t is the area in 2005-06 and A in 2000-01 and $n=5$.

Table 22 Consumption of green gram in rural and urban India in 2004-05 and 2011-12

State	2011-2012		2004-05	
	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)
Andhra Pradesh	3.47	3.33	2.97	2.50
Assam	2.07	5.43	4.00	5.00
Bihar	2.57	2.33	2.40	2.40
Chhattisgarh	0.40	0.87	0.67	1.47
Gujarat	6.60	6.30	7.27	6.73
Haryana	5.20	5.60	4.20	4.53
Jharkhand	0.80	1.63	1.00	2.30
Karnataka	3.27	3.63	2.77	2.60
Kerala	4.23	4.77	3.80	4.13
Madhya Pradesh	3.50	4.63	2.90	4.27
Maharashtra	4.97	5.03	4.23	4.67
Odisha	5.83	4.47	5.97	4.73
Punjab	5.03	5.13	6.27	6.10
Rajasthan	6.10	5.40	6.77	5.97
Tamil Nadu	2.27	2.97	2.27	3.17
Uttar Pradesh	1.00	2.00	1.03	1.80
West Bengal	1.27	3.33	1.80	3.60

Source: 61st and 68th Rounds of the National Sample Survey

Table 23 Area, production, yield, irrigation and state-wise share of black gram in India

2012-13

State	Area (million hectares)	% share in area	Production (million tonnes)	% share in production	Yield (kg/ha)
Andhra Pradesh	0.31	10.13	0.25	14.53	797
Bihar	0.02	0.51	0.01	0.83	912
Chhattisgarh	0.11	3.54	0.03	1.89	297
Gujarat	0.09	2.97	0.06	3.24	604
Jharkhand	0.09	3.08	0.09	5.19	937
Karnataka	0.10	3.33	0.05	2.94	490
Madhya Pradesh	0.60	19.66	0.23	13.29	376
Maharashtra	0.33	10.92	0.21	12.12	617
Odisha	0.08	2.77	0.03	1.55	310
Rajasthan	0.20	6.41	0.07	4.15	360
Tamil Nadu	0.37	11.93	0.31	18.28	851
Uttar Pradesh	0.54	17.71	0.25	14.59	458
Uttarakhand	0.01	0.48	0.01	0.68	791
West Bengal	0.11	3.72	0.06	3.72	556
Others	0.09	2.84	0.05	3.00	
All-India	3.06	100.00	1.70	100.00	555

Notes: Area reported in million hectares, production in million tonnes and yield in kg/hectare. For details, refer to Table 24.

Table 24 Area, production and yield of black gram (urad)

State	2000-01			2005-06			2007-08			2010-11			2013-14		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Andhra Pradesh	0.55	0.39	703	0.42	0.25	595	0.50	0.25	497	0.46	0.25	547	0.31	0.25	797
Bihar	0.03	0.02	634	0.03	0.02	770	0.02	0.02	798	0.02	0.02	852	0.02	0.01	912
Chhattisgarh	0.12	0.03	280	0.12	0.03	288	0.11	0.03	303	0.11	0.03	286	0.11	0.03	297
Gujarat	0.08	0.02	294	0.10	0.04	379	0.10	0.07	683	0.10	0.07	676	0.09	0.06	604
Jharkhand	0.04	0.03	698	0.07	0.04	529	0.10	0.06	625	0.09	0.06	600	0.09	0.09	937
Karnataka	0.15	0.06	384	0.11	0.02	214	0.16	0.07	407	0.13	0.05	352	0.10	0.05	490
Madhya Pradesh	0.42	0.11	252	0.45	0.16	354	0.47	0.17	351	0.59	0.23	390	0.60	0.23	376
Maharashtra	0.57	0.21	357	0.48	0.21	430	0.58	0.33	567	0.49	0.33	672	0.33	0.21	617
Odisha	0.11	0.03	250	0.13	0.03	253	0.15	0.05	311	0.13	0.04	297	0.08	0.03	310
Rajasthan	0.11	0.03	288	0.14	0.04	253	0.14	0.08	529	0.13	0.09	737	0.20	0.07	360
Tamil Nadu	0.28	0.13	462	0.22	0.07	329	0.31	0.07	240	0.32	0.13	398	0.37	0.31	851
Uttar Pradesh	0.39	0.16	423	0.54	0.24	444	0.39	0.18	455	0.55	0.37	668	0.54	0.25	458
Uttrakhand	0.01	0.00	414	0.03	0.02	606	0.04	0.03	868	0.01	0.01	769	0.01	0.01	791
West Bengal	0.07	0.04	522	0.06	0.04	716	0.05	0.04	764	0.05	0.04	659	0.11	0.06	556
All-India	3.01	1.29	429	2.94	1.23	418	3.19	1.46	458	3.26	1.76	540	3.06	1.70	556

Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry Of Agriculture and Farmers Welfare, Government of India accessed from the IIPR site at <http://www.iipr.res.in/e-pulse-data-book.html>

Table 25 Growth rate of black gram

State	2000-01 to 2005-06			2005-06 to 2007-08			2007-08 to 2010-2011			2010-11 to 2013-14		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Andhra Pradesh	-5.36	-8.47	-3.28	9.28	-0.16	-8.61	-2.86	0.27	3.25	-12.39	-0.67	13.37
Bihar	-4.67	-0.90	3.96	-1.80	0.00	1.80	-4.75	-2.47	2.21	-9.63	-7.82	2.29
Chhattisgarh	-0.38	0.18	0.57	-2.58	0.00	2.57	-2.25	-4.46	-1.91	0.72	2.39	1.27
Gujarat	2.69	8.00	5.21	4.14	39.85	34.24	-0.65	-0.95	-0.34	-3.73	-7.28	-3.68
Jharkhand	12.54	6.49	-5.39	16.21	26.26	8.70	-1.92	-3.34	-1.35	0.79	17.09	16.02
Karnataka	-5.11	-15.56	-11.04	20.27	65.83	37.91	-7.55	-11.99	-4.72	-7.29	3.57	11.66
Madhya Pradesh	1.37	8.52	7.03	2.53	2.02	-0.42	7.79	11.71	3.57	0.54	-0.73	-1.21
Maharashtra	-3.51	0.13	3.79	9.92	26.25	14.83	-5.79	-0.30	5.83	-11.69	-14.19	-2.81
Odisha	4.09	4.30	0.24	5.73	17.34	10.87	-3.48	-4.83	-1.52	-14.15	-13.04	1.44
Rajasthan	4.21	1.55	-2.56	2.18	47.73	44.60	-4.01	7.06	11.69	15.26	-9.10	-21.24
Tamil Nadu	-4.80	-11.06	-6.56	19.49	2.10	-14.59	1.21	19.83	18.37	4.60	34.74	28.83
Uttar Pradesh	6.93	7.97	0.97	-14.58	-13.46	1.23	11.58	26.81	13.65	-0.24	-12.09	-11.82
Uttarakhand	30.56	40.91	7.92	7.31	28.45	19.68	-30.06	-32.83	-3.96	3.94	4.77	0.94
West Bengal	-4.02	2.25	6.52	-4.11	-0.98	3.30	0.32	-4.43	-4.81	28.97	21.84	-5.51
All India	-0.47	-0.95	-0.52	4.16	8.95	4.68	0.73	6.43	5.64	-2.09	-1.15	0.98

Notes to Table 25: Based on author's calculations of growth rates from Table 24 using the formula, growth rate, $r = \left[\left(\frac{A_t}{A} \right)^{\frac{1}{n}} - 1 \right] * 100$ where A_t = Area/Production/Yield in the year t, A = Area/Production/Yield in the initial year and n is the number of years. For instance for growth rates between 2000-01 and 2005-06, A_t is the area in 2005-06 and A in 2000-01 and $n=5$.

Table 26 Consumption of black gram in rural and urban India in 2004-05 and 2011-12

State	2011-2012		2004-05	
	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)
Andhra Pradesh	4.87	6.40	3.47	5.93
Assam	2.87	1.17	1.83	0.63
Bihar	0.20	0.13	0.10	0.07
Chhattisgarh	3.70	2.07	5.73	2.90
Gujarat	1.73	1.77	1.40	1.13
Haryana	2.07	2.50	1.97	2.87
Jharkhand	1.23	0.33	1.93	0.40
Karnataka	2.50	4.30	1.87	4.13
Kerala	5.37	6.00	4.33	5.07
Madhya Pradesh	2.60	1.43	1.93	1.10
Maharashtra	2.37	1.53	1.50	1.10
Odisha	1.63	1.30	1.77	1.73
Punjab	2.77	2.50	3.53	3.63
Rajasthan	1.80	1.50	2.03	1.43
Tamil Nadu	10.13	10.67	6.67	8.77
Uttar Pradesh	3.30	2.83	4.37	4.07
West Bengal	0.63	0.47	0.50	0.40

Source: 61st and 68th Rounds of the National Sample Survey

Table 27 Area, production, yield and state-wise percentage share of lentil in India

State	Area		Production (million tonnes)	% share in production	Yield (kg/ha)
	(million hectares)	% share in area			
Bihar	0.160	11.246	0.183	16.212	1147
Chhattisgarh	0.013	0.908	0.004	0.372	326
Jharkhand	0.041	2.873	0.046	4.044	1121
Madhya Pradesh	0.571	40.176	0.333	29.504	584
Maharashtra	0.004	0.246	0.001	0.124	400
Rajasthan	0.028	1.944	0.030	2.690	1100
Uttar Pradesh	0.495	34.859	0.441	39.027	891
West Bengal	0.064	4.507	0.062	5.442	960
Others	0.046	3.239	0.029	2.584	
All-India	1.420	100.000	1.130	100.000	796

Notes: Area reported in million hectares, production in million tonnes and yield in kg/hectare. For details, refer to Table 28.

Table 28 Area, production and yield of lentil (massar)

State	2000-01			2005-06			2007-08			2010-11			2012-13		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Bihar	0.172	0.169	981	0.163	0.115	705	0.163	0.129	793	0.239	0.215	900	0.16	0.183	1147
Chhattisgarh	0.013	0.003	270	0.019	0.006	324	0.017	0.006	335	0.014	0.004	302	0.013	0.004	326
Jharkhand	0.006	0.004	641	0.017	0.011	671	0.023	0.017	744	0.021	0.017	822	0.041	0.046	1121
Madhya Pradesh	0.489	0.206	422	0.564	0.288	510	0.468	0.206	440	0.591	0.178	301	0.571	0.333	584
Maharashtra	0.006	0.002	333	0.009	0.004	414	0.01	0.005	500	0.004	0.002	500	0.004	0.001	400
Rajasthan	0.022	0.026	1189	0.019	0.017	908	0.015	0.011	709	0.044	0.038	872	0.028	0.03	1100
Uttar Pradesh	0.652	0.408	626	0.608	0.435	715	0.507	0.368	726	0.586	0.411	701	0.495	0.441	891
Uttarakhand	0.015	0.013	828	0.021	0.009	449	0.016	0.009	571	0.012	0.009	740	0	0	0
West Bengal	0.076	0.068	901	0.062	0.047	764	0.059	0.045	763	0.057	0.053	929	0.064	0.062	960
Others	0.029	0.021	724	0.031	0.019	621	0.033	0.015	451	0.032	0.012	377	0.046	0.029	635
All-India	1.48	0.92	622	1.51	0.95	629	1.31	0.81	618	1.6	0.94	588	1.42	1.13	796

Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry Of Agriculture and Farmers Welfare, Government of India accessed from the IIPR site at <http://www.iipr.res.in/e-pulse-data-book.html>

Table 29 Growth rate of lentil

State	2000-01 to 2005-06			2005-06 to 2007-08			2007-08 to 2010-2011			2010-11 to 2012-13		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Bihar	-1.15	-7.49	-6.39	0.03	6.14	6.06	13.64	18.51	4.31	-18.19	-7.63	12.89
Chhattisgarh	7.98	12.03	3.71	-3.30	-1.68	1.68	-7.03	-10.20	-3.40	-3.66	0.00	3.90
Jharkhand	21.15	22.26	0.92	16.59	22.84	5.30	-2.72	0.59	3.38	39.72	63.00	16.78
Madhya Pradesh	2.89	6.84	3.86	-8.93	-15.37	-7.12	8.07	-4.76	-11.89	-1.71	36.90	39.29
Maharashtra	7.71	12.47	4.45	7.21	17.85	9.90	-26.32	-26.32	0.00	-6.46	-16.33	-10.56
Rajasthan	-3.14	-8.22	-5.25	-10.56	-20.94	-11.64	43.90	54.07	7.14	-20.89	-11.02	12.32
Uttar Pradesh	-1.38	1.28	2.69	-8.68	-8.01	0.77	4.95	3.75	-1.16	-8.09	3.59	12.74
Uttarakhand	5.48	-6.68	-11.52	-10.83	0.54	12.77	-9.21	-1.09	9.03	0.00	0.00	0.00
West Bengal	-4.15	-7.26	-3.24	-2.30	-2.37	-0.07	-0.74	6.03	6.78	5.59	7.32	1.65
All-India	0.40	0.64	0.22	-6.86	-7.66	-0.88	6.89	5.09	-1.67	-5.79	9.64	16.40

Notes to Table 29: Based on author's calculations of growth rates from Table 28 using the formula, growth rate, $r = \left[\left(\frac{A_t}{A} \right)^{\frac{1}{n}} - 1 \right] * 100$ where $A_t = \text{Area/Production/Yield}$ in the year t , $A = \text{Area/Production/Yield}$ in the initial year and n is the number of years. For instance for growth rates between 2000-01 and 2005-06, A_t is the area in 2005-06 and A in 2000-01 and $n=5$.

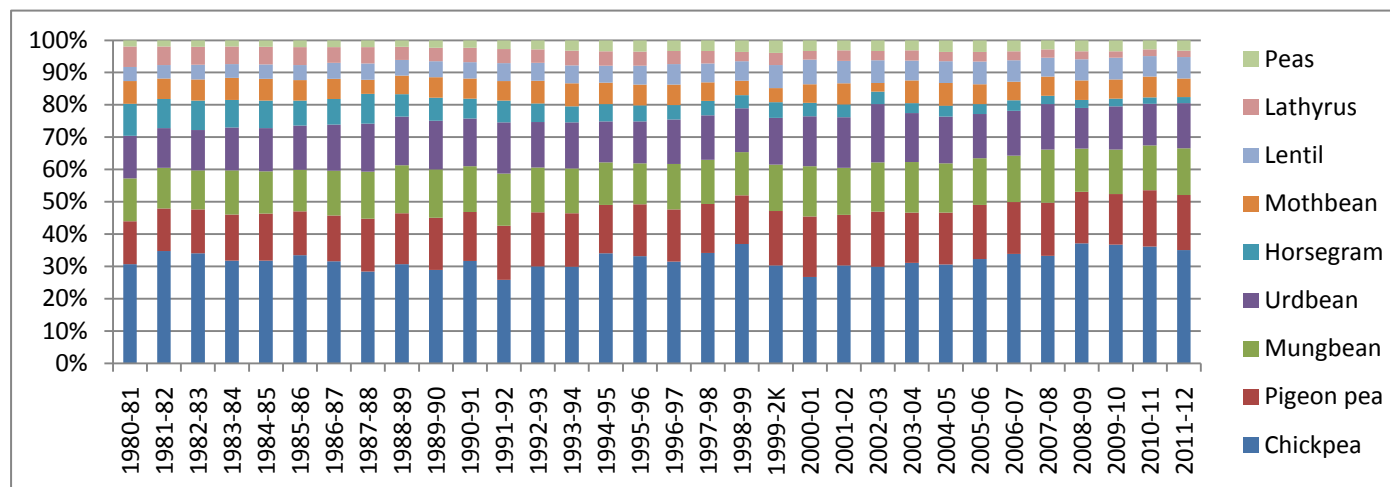
Table 30 Consumption of lentil in rural and urban India in 2004-05 and 2011-12

State	2011-2012		2004-05	
	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)	Rural consumption per capita per day (grams)	Urban consumption per capita per day (grams)
Andhra Pradesh	0.53	0.80	0.27	0.53
Assam	12.00	12.97	10.93	14.13
Bihar	9.67	9.47	9.57	12.17
Chhattisgarh	1.57	1.60	0.80	1.47
Gujarat	0.27	0.77	0.13	0.40
Haryana	2.97	3.67	3.53	3.73
Jharkhand	5.87	7.07	5.93	6.90
Karnataka	0.57	0.67	0.17	0.60
Kerala	0.17	0.17	0.10	0.07
Madhya Pradesh	2.37	1.50	3.33	2.13
Maharashtra	1.87	2.70	1.10	2.00
Odisha	2.13	1.30	1.20	1.60
Punjab	3.50	3.80	4.50	4.50
Rajasthan	1.27	2.23	1.10	1.67
Tamil Nadu	0.07	0.10	0.03	0.07
Uttar Pradesh	2.93	3.67	3.43	3.50
West Bengal	9.90	10.10	8.17	10.17

Source: 61st and 68th Rounds of the National Sample Survey

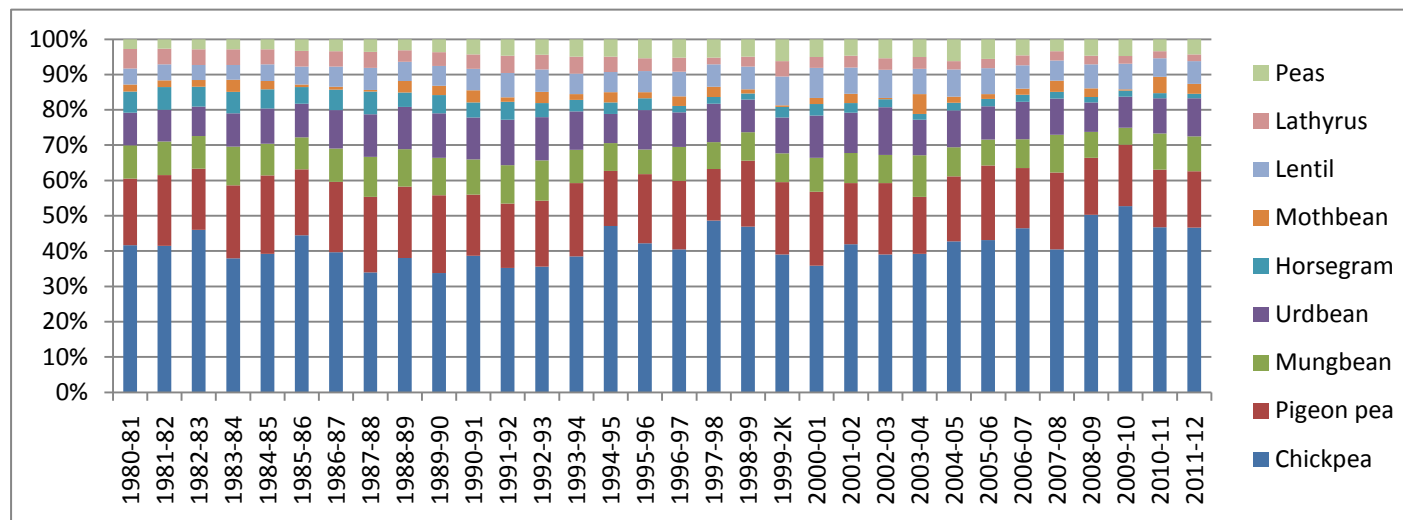
Annexure II

Figure I Area under different pulses (1980-81 to 2011-12)



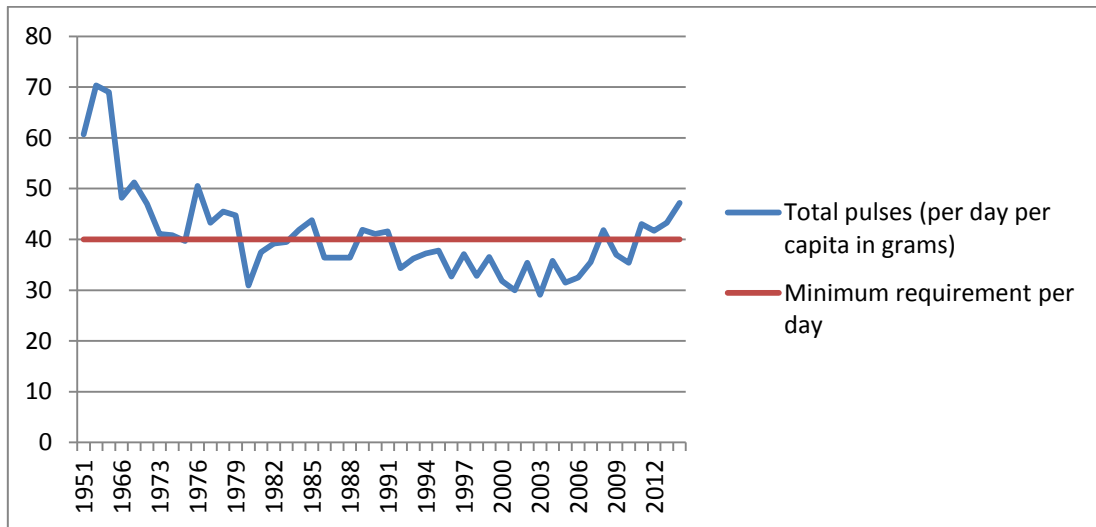
Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry Of Agriculture and Farmers Welfare, Government of India accessed from the IIPR site at <http://www.iipr.res.in/e-pulse-data-book.html>

Figure 2 Production of different pulses (1980-81 to 2011-12)



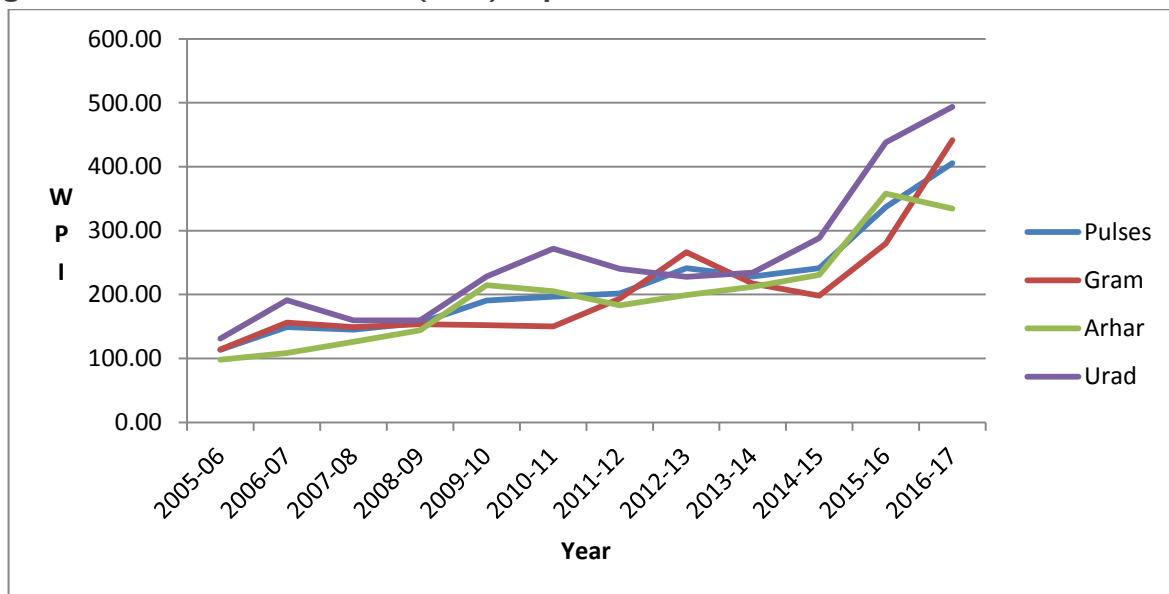
Source: Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry Of Agriculture and Farmers Welfare, Government of India accessed from the IIPR site at <http://www.iipr.res.in/e-pulse-data-book.html>

Figure 3 Comparison of minimum requirement with per capita availability of pulses with imports



Source: Directorate of Economics and Statistics

Figure 4 Wholesale Price Index (WPI) of pulses across India



Source: Office of the Economic Adviser, Govt. of India, Ministry of Commerce & Industry Department of Industrial Policy & Promotion (DIPP) accessed at http://www.eaindustry.nic.in/download_data_0405.asp