Chapter 8

Pulses Value Chain- Pigeon Pea and Gram

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8.1 Introduction

8.1.1 *Significance of Pulses in India*

Pulses form an important part of Indian agriculture given that the country is the largest producer, consumer and importer of pulses. Owing to their natural resilience to extreme weather conditions, low water requirements and being environmentally benign, pulses have been traditionally a smallholder's crop. However, with poor price realization, farmers have been switching towards other remunerative crops such as sugarcane, soybean, among others. Unlike rice and wheat, pulses are not covered by the regular public procurement system which makes marketing of pulses at fair and remunerative prices, a challenge for the farmers. Pulses are no longer a poor man's diet given the escalating consumer prices. Nonetheless, it is considered as an important source of protein (given the large vegetarian diet base in India), consumption of which is being promoted to address the protein gap in the diets. Over time, per capita availability of pulses has declined like other traditional cereals. With changing consumption patterns and emerging dietary deficiencies, there is scope for enhancing consumption of pulses through traditional and value-added products.

Pulses account for only 4% of the value of crop agriculture and cover about 11.7% of the gross-cropped area. Since 1950s, area under pulses as a per cent of total area under food grain remained almost unchanged at 20% with some minor annual deviations. The share of pulses as a per cent of total food grain production declined over a period of time and is about 7% average for the five-year period ending 2016–17. About 17% of the area under pulses is irrigated for the five-year period average ending 2013–14. In addition to being less water intensive compared to other crops, pulses can withstand extreme temperatures and also enable natural

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fixation of nitrogen in the soil due to its leguminous properties. Gram and pigeon pea together account for 52% of pulses area and 61% of production (as estimated for TE 2015–16). Agricultural imports in India largely comprise of pulses, after edible oils. Yellow peas accounted for 49% of pulses import for the period 2010–11 to 2016–17. Factors related to lack of expansion of area under pulses through persistent low yields due to lack of any major technological breakthrough have restricted production expansion. Coupled with this, a weak procurement regime has resulted in inadequate domestic availability of pulses. Owing to these gaps, Government of India (GoI) adopted a focussed policy thrust to augment pulses production and programs such as the National Food Security Mission (NFSM); Integrated Development of Pulses Villages, among others. While these are more supply side policy efforts, enough emphasis on marketing infrastructure and practices has been missing, resulting in poor price realization for the farmers. Responding to situations when market prices fell below minimum support price (MSP), government procured pulses through the public procurement agencies such as National Agricultural Cooperative Marketing Federation of India Limited (NAFED) and Small Farmers Agribusiness Consortium (SFAC) through the Price Stabilization Fund (PSF) and Price Support Scheme (PSS). In 2016–17 and 2017–18, farmers had been under severe distress owing to market prices crashing below MSP resulting in state-wide agitation and demonstration by the farmers. The crisis situation forced several state governments to ease off the pressure by announcing loan waivers and introducing price deficiency payments and direct benefit transfer programs. Notably, Madhya Pradesh introduced the Bhavantar Bhugtan Yojana (BBY) in September 2017, to compensate the farmers, the difference between MSP and average sale price without getting into physical procurement. In the case of loan waivers, there are concerns about the extent to which farmers under distress actually benefit. Loan waivers have been widely debated and are perceived to be more populist in nature and lacked economic rationale.

8.1.2 Major trends in Consumption and Production of Pulses

Pulses are an integral part of the staple vegetarian diet of Indians. Per capita availability of pulses reduced by 38%, to 43.8 g per day in 2015 from a peak of 70.3 g per day in 1956. Pulses contributed to 10.6% of protein intake in rural areas and 12.4% in urban areas in 2011–12 (Government of India 2014a). The increase in protein intake from pulses over the years has been the slowest among all other foods. As per the NSSO estimates for 2011–12, an average Indian consumes 739 g per month or 8.9 kg per annum of pulses in rural areas while 857 g per month or 10.3 kgs per annum of pulses in urban areas. The share of pulses in per capita consumption expenditure on food has been fluctuating. It decreased from 5.9% in 1993–94 to 5.4% in 2004–05, then increased to 6.8% in 2009–10 and declined to 6.1% in 2011–12 (Government of India 2014a). Prices of pulses have increased significantly, notably in urad, tur and chana. Since April 2006, the highest peak in wholesale price index of pulses was observed in November 2015. Although retail prices of pulses escalated sharply, the same has not resulted in higher prices for farmers.

With 32% of the area and 25% of global production, India cultivates the largest pulses varieties. Pulses production in India increased from about 8.4 million tonnes in 1950–51 to a record level of 25.2 million tonnes in 2017–18 (according to fourth advanced estimates). Between 2015–16 and 2017–18, production increased from 16.4 million tonnes to 24.5 million tonnes, registering a growth of 49.4%. With two consecutive years, 2014–15 and 2015–16, when production fell to 17.2 and 16.4 million tonnes, respectively, farmers were incentivized through increase in MSP to grow more pulses. This together with soaring market prices in 2014–15 and 2015–16, resulted in unprecedented production levels in 2016–17 and 2017–18, with market prices crashing below MSP. The highest yield in pulses was registered at 789 kg per hectare in 2012–13 from a lowest of 377 kg per hectare in 1966–67 (Fig. 8.1). This indicates that pulses are yet to undergo a major technological breakthrough that has a positive impact on yield performance.

Assessing the overall food grain sector, it is observed that cereals and particularly rice, wheat, and more recently, maize have done well in terms of production, in comparison with pulses. While the green revolution and maize revolution propelled production of these crops, similar breakthrough in pulses has not been achieved till date. While the share of pulses in area under food grain remained unchanged at 20% during 1950–51 to 1959–60 and 2010–11 to 2015–16, the share in overall food grain production declined dramatically from 16% to 7% during the above period.

Under these prevailing circumstances, it is important to ensure that goals pertaining to productivity gains should be dovetailed with profitability for farmers, thereby creating a sustainable ecosystem. With increasing importance of technology be it high yielding, climate-resilient seeds or advanced mechanization, cost of production is bound to increase for the farmers. However, the quantity and quality of produce should allow farmers to recover their cost of production and make reasonable profits to be able to sustain pulses farming. Just as millers, wholesalers and retailers are

Fig. 8.1 Trends in pulses production, area and yield in India since 1950–51. *Source* Agricultural statistics at a glance 2016, 4th advance estimates, MoA&FW, GoI (2017). *Note* Area and yield data up to 2015–16

able to play the markets, farmers should be given similar options. Hence, marketing opportunities need to be widened for the farmers to benefit from higher price realization either by streamlining the physical value chain and reducing the margins or providing farmers the option of holding their produce in warehouses and participating in futures market.

8.1.3 Study Objective

The objective of the study is to map the current pulses value chain in the context of competitiveness, inclusiveness, sustainability and scalability and access to finance (CISS-F). This study focusses on gram/*chana* and pigeon pea/*tur/arhar*, which together account for nearly half of the pulses production basket.

- **Competitiveness** is assessed in terms of domestic price formation in the pigeon pea and *chana* value chains. Wholesale and retail prices are analyzed to assess the spread of prices in the respective value chain. Since the study is not based on primary representative surveys, obtaining the actual costs and margins in the chain was not feasible. Competitiveness also includes the international import and export trends and tariff regulations.
- **Inclusiveness** is assessed in terms of the irrigated and non-irrigated area under pulses. Majority of the farmers are marginal and small and operate less than 2 hectares of land, and pulses are largely rainfed. Access to irrigation results in higher productivity of pulses and hence higher marketable surplus. Inclusiveness in terms of access to markets, storage and processing is also captured through secondary research.
- **Sustainability** is assessed at three levels for pigeon pea and *chana* value chains
 - sustainability of production growth through increased productivity
 - environmental sustainability in terms of the impact of increasing production on water and soil
 - financial sustainability in terms of cost of cultivating pigeon pea and *chana* and the price received (MSP or wholesale market price)
- **Scalability** is assessed in terms of the potential to diversify to other pulses in addition to *chana* and pigeon pea; diversify production of pulses to states other than Maharashtra and Madhya Pradesh that are agro climatically suitable for growing pulses and have the scope for improving yield levels.
- **Access to finance** is assessed in terms of farmers availing loans or subsidies in general and those targeted to the pulses growing farmers. Also, financing of the value chain particularly, milling in the case of pulses, is also studied.

8.1.4 Study Approach and Methodology

The study includes pigeon pea/*tur* and bengal gram/*chana* value chains given that these account for more than half of pulses production in India. To study these two value chains, Maharashtra and Madhya Pradesh were chosen as these are the largest producers of pigeon pea and *chana*, respectively. Given the scope of the study, primary research was conducted in these two states. For certain aspects of the study, where information or data specific to these two value chains were not available to the author, the findings have been reported at the aggregate pulses value chain level.

The study methodology includes analysis of secondary data and information to assess the pigeon pea and *chana* value chains on the CISS-F framework. It also includes interaction with key stakeholders such as farmers, wholesalers, millers, commission agents and farmer producer organizations. These interactions were carried out in Latur and Mumbai in Maharashtra and Indore, Dewas and Ujjain in Madhya Pradesh. In addition to the value chain players, meetings with millers' association and marketing committee officials were held. The objective was to understand their perspective of the price and trade policies changing dynamics of the pulses sector in general with improvements in technology, restructuring of marketing operations and increased awareness amongst farmers.

8.2 Competitiveness of Pulses Value Chain

8.2.1 Domestic Competitiveness of Pulses Value Chain

In ascertaining domestic competitiveness of pulses value chain, the analysis includes farmer's share in end consumer price as well as the extent to which actual price received by the farmer covers his cost of production. Increasing the share of the farmer's price in the end consumer rupee indicates the efficiency of the value chain. In addition to the real costs incurred in terms of processing, transportation, marketing charges and legitimate fees for intermediation, if supernormal margins do not accrue to the other players in the value chain, then the value chain is more competitive. It is also important to ensure that farmers earn a remunerative price covering their cost of production such that pulses farming is profitable for them. To further assess the domestic competitiveness of the pulses value chain, the spread between wholesale and retail prices has been analyzed.

As observed in pulses marketing season of 2017–18, market price fell below minimum support price (MSP) of pulses, and hence, farmers could not recover their production costs. Under such circumstances, a farmer receiving higher share of the consumer rupee does not make much difference because anyway he is unable to cover the production cost. In pulses value chain, processing and value addition and

storage requirements for longer time periods add to the costs and margins in the chain. Since farmers interface the chain only during arrival months, in situations of glut, they suffer from lower prices and so do other stakeholders. However, most often, everyone except the farmer is able to recover their losses or enhance their margins once the arrivals have ended, and the value chain moves on stored pulses. From millers to wholesalers and retailers, everyone is able to sell at a much higher price compared to what the farmer received. Hence, comparing farmer's price to a prevailing wholesale or retail price months after arrival further brings down his share in the end retail price, significantly.

Domestic Price Formation in Pigeon Peas/Tur Value Chain

In assessing farmer's share in consumer price, a pigeon pea value chain starting from a wholesale market in Latur to Vashi (wholesale market in Mumbai) and further retail outlets in Mumbai, Maharashtra has been mapped. The analysis illustrates the different stages of the pigeon pea value chain specific to Maharashtra under which price formation takes place right from the price paid by the miller to the farmer; price of milled dal sold to wholesale traders in Vashi, Mumbai; price at which wholesale traders in Vashi sell to other bulk buyers (including other wholesale traders, retailers, and individuals); followed by price at which retailers sell in retail market close to the Vashi wholesale market. It should be noted that the price formation from miller onto wholesalers and retailers is weighted average of the various products derived from raw pigeon pea sold by the farmer. In other words, the price received by the farmer for 1 quintal of pigeon pea is not compared to the price of a single variety of processed dal but to weighted price of the different varieties of processed dal, broken and cattle feed, excluding wastage (3%). As observed from Fig. 8.2, a farmer earns

Fig. 8.2 Price formation in a domestic value chain of pigeon peas/tur from Latur to Vashi and Mumbai city. *Source* Authors' calculation based on field visit

about 68% of the consumer price and remaining accrues to the miller, wholesaler and retailer. This is higher than the data often reported about farmer's share in consumer price which hovers around (50–57)%, which perhaps typically takes into account the consumer end price of one variety of processed dal. RBI (2019), reported farmers' average share in retail price of pigeon pea to be 60%.

Figure 8.3 shows the wholesale price in Maharashtra as a percentage of the retail price in selected cities. This is an approximately close indicator of the price received by the farmers selling whole pigeon pea as a percentage of the split pigeon pea or tur dal purchased by the retail consumer. Between (Jan–Apr) 2014 and 2018, the wholesale price was about (44–67)% of the retail price, in the selected cities. The average for the above period varied between (53–59)%. On ground, the farmers receive less than this amount given a range of marketing charges that are recovered from the farmers, officially or unofficially. Of course, the wholesale price received by the farmers, as observed in 2016–17 fell short of MSP by 16% and did not cover the cost of cultivation of pigeon pea for the farmers.

Fig. 8.3 Wholesale price as a percentage of retail prices of pigeon pea/tur in selected cities. *Source* Agmarket for wholesale price data, Government of India (2018a) and retail price information system, Government of India (2018b)

Fig. 8.4 Wholesale price as a percentage of retail prices of Bengal gram/chana in selected cities. *Source* Agmarket for wholesale price data, Government of India (2018a) and retail price information system, Government of India (2018b)

Domestic Price Formation in Bengal Gram/Chana Value Chain

Figure 8.4 shows the wholesale price as a percentage of the retail price in selected cities. This is an approximately close indicator of the price received by the farmers selling whole bengal gram/chana as a percentage of the whole bengal gram/chana purchased by the retail consumer. Between (Jan–Apr) 2014 and 2018, the wholesale price of chana in Madhya Pradesh was about (46–93)% of the retail price, in the selected cities. The average for the above period varied between (57–81)%. On ground, the farmers receive less than this amount given a range of marketing charges that are recovered from the farmers, officially or unofficially. The share of wholesale price as a percentage of retail price in the selected cities has higher compared to that of pigeon pea.

Trends in Wholesale and Consumer Price Indices

Analyzing the trends in the price indices, it was observed that both wholesale price index (WPI) and consumer price index (CPI) fell from the peaks of October–December 2015 to negative percentage change since September 2016 until April 2018 (the period studied), touching the lowest in July 2017, followed by some recovery but in the negative zone. During the peak inflation period of pigeon pea, consumer

Fig. 8.5 Per cent change in wholesale price index and retail price index of pigeon pea/tur and gram. *Source* Office of Economic Advisor, Government of India (2018c) (for wholesale price index) and Labour Bureau, Government of India (2018d) (for retail price index)

price inflation shot up more than wholesale price inflation. During peaking inflation, the supernormal gains are restricted to the wholesalers and retailers without anything significant passing on to the farmers because of their limited window of participation in markets. In the absence of access to negotiable warehouse receipt system and/or future trading, farmers lose out on the gains from price recovery during the year. In contrast to pigeon pea, WPI and CPI inflation in gram/chana was somewhat lower (Fig. 8.5).

Price Support and Procurement of Pulses

Although there has been an year-on-year increase in MSP for pulses, the same has not been very effective in delivering higher incomes to the farmers due to lack of assured procurement unlike rice and wheat. In the case of pigeon pea/tur in particular, wholesale prices crashed below MSP in 2016–17 and 2017–18 and several APMC regulated markets reported selling below MSP. Chana wholesale prices crashed below MSP in 2017–18.

Recurrent price volatility in horticulture crops like potato and onion resulted in setting up of a price stabilization fund (PSF) in 2014–15. Subsequently, pulses were added to this scheme. PSF was designed with the objective of maintaining strategic buffer stock (2 million tonnes of pulses) through direct procurement from the farmers through NAFED and SFAC; farmer groups at the farm gate or *mandi*; as well as pigeon pea import of 50,000 tonnes. The same would be then released to meet domestic demand and moderate fluctuations in retail prices.

The government also set up a price stabilization scheme (PSS) under which it would procure directly from the farmers at MSP, when the ruling market price fell below MSP. The number of procurement agencies under PSS is decided by the central agencies in consultation with state-level agencies and government, depending upon what is economically viable. Under PSS, any losses occurring to the central agencies are fully reimbursed by the government, and profits earned are credited to the government. Working capital to central agencies in the form of bank guarantees for

procurement is provided by DAC&FW under which a standing government guarantee of INR 2500 crores is available with NAFED and INR 150 crores with SFAC. Also, DAC&FW issues letters of comfort to financial institutions for providing short-term loans to central agencies to provide the adequate financial bandwidth to undertake large-scale procurement, storage and processing (GoI 2016).

During Kharif 2016–17, NAFED undertook about 75% of the domestic procurement of pulses under PSF and PSS compared to other agencies like FCI and SFAC. Such bulk procurement needs to be backed by adequate storage and processing capacity. Pulses procured by NAFED are stored in central warehousing and state warehousing corporation warehouses. NAFED is in a position to hire such godowns by negotiating the warehouse rent at par with the rent offered by the private warehousing service provider or can hire private warehouses accredited by warehousing development and regulatory authority (WDRA) through a competitive bidding process. NAFED has over 200 empanelled millers to undertake milling and supply milled pulses according to specified quality and packaging as well as destination, provided by any particular state or central government agency. Milling and supply of milled pulses are assigned to millers through e-auction portal on the basis of highest out-turn ratio of milled pulses offered by the empanelled millers. This portal includes all services in the supply chain right from assaying of raw pulses in the godowns to delivery of milled pulses at the given destination. The same portal is being used for e-auction of raw/whole pulses. Pulses procured under PSF or PSS are being disposed through the e-auction portal of NCDEX e-Market Limited (NeML) who have a large base of empanelled buyers. It is further possible to include more buyers onto the NAFED portal to absorb the increased supply (NAFED, Annual Report 2016–17).

Given a bumper production of pulses and declining market prices, the Department of Food and Public Distribution removed all restrictions on stocks with effect from 17th May 2017 following which nearly 10 states removed stocking limits (CACF, March 2017). Considering the demand-supply situation, stocking limits have been subject to change over time. Ironically, farmers have not been able to benefit as much due to lower price realization at the wholesale markets, except for the procurement undertaken by the government through agencies like NAFED and SFAC.

8.2.2 Global Competitiveness of Pulses Value Chain

Trends in Imports of Pulses

In TE 2015–16, share of pulses in total agricultural imports was 15%. As aggregated from the pulses categories (based on HS codes) provided by DGCIS, Government of India, import of pulses increased from 0.8 million tonnes valued at USD 0.3 billion in TE 1998–99 to 6.1 million tonnes valued at USD 3.7 billion in TE 2017–18 (Fig. 8.6). Increasing domestic demand for pulses resulted in rising imports of pulses in India.

Fig. 8.6 Import of pulses by quantity and value, 1996–97 to 2017–18. *Source* Export Import data, Ministry of Commerce, Government of India (2018e)

Peas and chickpeas are the major import items. These together accounted for half of pulses import during TE 1998–99 and about 48% in TE 2017–18. Pigeon peas accounted for 15% of pulses import in TE 1998–99 and declined to 12% in TE 2017–18. During this period, import of lentils (*masur*) and *moong* took off, accounting for 19% and 15%, respectively, in TE 2017–18. India has been a consistent importer of peas and chickpeas. Imports of pigeon peas resurged in 2013–14 and increased by 47% in 2014–15, when domestic production of pulses took a hit and imports had to be increased. Import of lentils (*masur*) started from 2003–04 and was the third-largest pulse imported in TE 2017–18 (Fig. 8.7).

Fig. 8.7 Import of pulses by types, 1996–97 to 2017–18. *Source* Export Import data, Ministry of Commerce, Government of India (2018e)

Major Import Origin Countries for Pulses

India is dependent on very few countries for import of pulses and nearly on single country for a particular pulse. This leaves India quite vulnerable to thin global markets and fluctuations in prices. For instance, Canada is the major source of importing peas with nearly 53% of the imports sourced from Canada during TE 2017–18 followed by Russia and Ukraine (replaced US as the third-largest country for sourcing peas in 2017–18). For chickpeas, Australia is the leading source of imports for India accounting for 81% during TE 2017–18. Myanmar is the leading source of import of moong/urad bean and accounted for 76% of the imports in TE 2017–18. Again, Canada is the largest destination for sourcing lentils (masur) accounting for 76% in TE 2017–18. During TE 2017–18, India imported 47% of pigeon peas from Myanmar and remaining 53% from six African countries, viz, Mozambique, Tanzania, Malawi, Kenya, Sudan and Uganda. Earlier during 1996–97 to 2002–03, Myanmar was the sole country supplying pigeon pea to India.

The widening demand-supply gap in pulses before 2016–17, led to government to government (G2G) dialogues and private sector collaboration for producing pulses in the African continent for imports to India. Indian companies like Mahindra and Mahindra, Tata, among others invested in Africa to grow pulses leveraging their existing presence in agribusiness sector and/or through greenfield investment given the abundance of land and favourable climatic conditions. The government of India also pursued dialogues to develop a roadmap to ensure that India is able to source enough pulses for meeting domestic demand. These efforts resulted in stepping up import of pulses from different African countries, particularly, Kenya, Tanzania, Mozambique, among others and most notably, pigeon peas since 2013–14. Considering a perpetual deficit situation around pulses, India has been importing pulses consistently to meet the domestic demand and tame inflation. This has resulted in lowering of tariffs to incentivize import of pulses over several years. With the bumper production of pulses recorded in 2016–17 and 2017–18, tariffs have been raised to control import of pulses and exports freed up. Like in the past, the decision to control or stop imports of pulses or its implementation came in too late when the harvest was already in the market and farmers could not fetch the minimum support price for their produce.

Trends in Export of Pulses from India

India is not a major exporter of pulses. In TE 2017–18, India exported USD 224 million worth of pulses of which USD 167 million was chickpeas (*kabuli chana*) accounting for 74% of the export value (Fig. 8.8). Between 2007–08 to 2013–14, more than 95% of pulses export was chickpeas. In later years, India exported pigeon peas, lentil and moong/urad with increasing domestic production.

Fig. 8.8 Rising sharing of chickpeas in export of pulses: TE 2017–18. *Source* Export Import data, Ministry of Commerce, Government of India (2018e)

Trade Competitiveness of Chickpea/Kabuli Chana

Saini and Gulati (2017) estimate that India's kabuli chana has been a net exportable commodity since 2006–07, except 2004–05 and 2005–06. Since 2005–06, nominal protection coefficients (NPCs) have been consistently below 1, except in 2012–13, when NPC exportable was 0.96 due to rising domestic prices following a bad crop in 2011–12. In 2006–07, despite higher world prices, exports declined, due to ban on pulses exports. However, the ban was removed later in 2006–07, and exports revived. Increasing trade liberalization, favourable export policy and domestic incentives to improve yields and production contributed to increase in export of gram.

Tariff Regulations in Pulses Trade¹

India has been consistently dependent on imports to meet the domestic consumption of pulses and hence, time and again, incentivized imports by keeping import duty at (0–10)%, although there exists bound duty rate of 100%. In June 2006, import duty on pulses was brought down to zero to ease out supply. The glut starting 2016–17 resulted in bringing back import restrictions by gradually raising import duty and quantity ceilings.

- In December 2017, government increased the import duty on chana and masur by 30% and yellow peas by 50% while that on pigeon pea/tur continued to be 10%.
- Further in February 2018, import duty on chana was hiked to 40% and 60% in March 2018, to curb cheap imports.
- Import of yellow peas has been restricted with effect from 01st April to 30th June 2018.
- During this period, 1,00,000 tonnes of peas import less the amount already imported until 01 April 2018, was allowed against licence, as per procedure required by DGFT.
- Import quota restrictions were announced in the case of import of green gram (moong) and black matpe (urad) at 300,000 tonnes and pigeon peas (arhar) at 200,000 tonnes. However, this restriction would not impact any previous bilateral

¹Tariff notifications obtained from www.dgft.gov.in and www.cbec.gov.in.

or regional agreement or MoU between India and trading country. This raised concerns amongst key countries like Canada, Australia, US and other WTO members, as well as countries like Myanmar, Tanzania, Ethiopia, among others, jeopardizing trade relations and putting at risk the livelihood of farmers in these countries.

- Further in May 2018, import of urad and moong in split form in addition to moong/urad listed under HS 07133100 were all restricted to an annual fiscal year quota of 300,000 tonnes in total. This restriction is not applicable for existing government commitments under bilateral/regional agreement/MoU.
- In 2011, export of up to 10,000 tonnes of organic pulses per annum, including lentils was also allowed, which was raised to 50,000 tonnes per annum. As per government notification on 22 November 2017, export of all varieties of pulses including organic pulses was freed up without any quantitative ceilings.

India is the largest consumer of both pulses and edible oils, and hence shortfall in domestic production has resulted in massive imports. High import dependency together with a short-sighted trade policy have not worked in the interest of the farmers in the long run. Cheaper imports in the wake of shortfall in domestic production and spiralling prices have helped contain consumer prices on several occasions, but with a definite lag and resulted in glut situation in the next crop cycle, leaving the farmers further distressed. Inability of trade policies to signal when imports should be allowed or restricted, has time and again resulted in severe losses for the farmers and drained the central and state exchequer of serious financial resources without any commensurate gains. Typically, entry of cheap imports at the time of market arrivals has resulted in crashing of domestic prices followed by a bigger mess of mounting heaps of pulses and government stepping in to bail out farmers through public procurement. How much the farmers gain from such crisis management in the absence of a long-term strategy is not clear. Hence, there is need to focus on aggregate supply chain management including trade to ensure that total availability is adequate to meet increasing demand for pulses.

8.3 Inclusiveness of Pulses Value Chain

8.3.1 *Irrigated Area under Pulses*

The fact that 86.1% of farmers are smallholders, i.e. operating on less than 2 hectares of land; by default, farmers cultivating pulses are marginal and small in size. About 65% of gram and 68.8% tur farmers are small and marginal (Agri Census 2015–16, Government of India 2020). Pulses are less water intensive, more climate resilient, require less crop care, making it easier for a resource poor smallholders to cultivate the crop. About 18.1% of the area under pulses was irrigated in TE 2013–14 and about 4% and 35.1% of area under pigeon peas and gram were irrigated, respectively, (Fig. 8.9). Between TE 1952–53 to TE 2013–14, irrigated area under pulses nearly

Fig. 8.9 Percentage irrigated area under pulses, gram/chana and pigeon pea/arhar. *Source* Agricultural statistics at a glance 2016, GoI (2017)

doubled from 9.6% to 18.1%. Irrigated area under pigeon pea increased from 0.5% to 4% and that of gram from 14.1% to 35.1% between the period 1950–51 to 2013–14. Madhya Pradesh has more than 43% of area irrigated under pulses and 60% of the area irrigated under gram. In Maharashtra, 11.9% area under pulses is irrigated, and only 1.6% of pigeon pea and 24.3% of gram areas are irrigated. Pigeon pea is largely unirrigated, making it more amenable for cultivation by small and marginal farmers.

Enhancing irrigation and water use efficiency can increase yield of pulses. Irrigation technologies such as micro irrigation, better access to farm machineries, and crop management practices can enable farmers to improve crop yields. Since majority of pulses growers are small and marginal farmers, ensuring affordable access to such technologies and practices will be important. Farming of pulses can be made inclusive by making technology and resources accessible to the farmers. However, this does not automatically ensure that the small and marginal farmers will benefit from higher incomes, particularly, in the absence of assured pricing and market linkages. Participating in production is the first step of the value chain, and as one goes up the pulses value chain, it is observed that it is not as inclusive and smallholders do not benefit from the way it is structured.

Given that pulses undergo processing, require storage facilities, are extremely price sensitive, and much of the trade happens through traditional channels, all stakeholders (millers, wholesalers and retailers), but farmers are able to play the markets and at times make significant gains. Also, their ability to undertake risks is much higher than the farmers. Over a period of time, they are able to recover losses incurred when prices crash due to huge arrivals as observed during the study period (2016–17 and 2017–18). In pulses value chain, there is no provision for farmers to sell directly to the millers or the traders, and they are caught in the web of intermediation. Pulses value chain operates on bulk milling and trading, and has been thriving on huge investments and trading relations, which for a farmer to break into is extremely difficult, without institutional reforms. Unless there is a farmer aggregation model like

the farmer producer companies, whereby they are able to undertake value addition and marketing at their end or transact directly with the miller, ensuring farmers reap a modest return on their produce, is difficult.

8.3.2 Inclusiveness in Marketing

In India, sizeable share of food crops is retained for self consumption. Crops which are backed by assured procurement and remunerative price support are largely marketed through regulated markets. In this context, public procurement for pulses is weak compared to that of sugarcane, groundnut, soyabean, among others. Also, in typical marketing channels, it is observed that small and marginal farmers with low marketable surplus are less likely to have direct interface with the wholesale markets, and usually trade through village-level aggregators, transporters and other intermediaries. Hence, economic gains to farmers are limited where marketable surplus is low, and farmers have limited direct interface with the market channels. At an aggregate level, (32–53)% of different types of pulses produced are marketed (Fig. 8.10).

For most of the food crops including pulses, the most popular agency is local private trader except for sugarcane, where co-operative and government agency are most active. In pulses, about 79% of *moong*; 63% of *urad*; 50% of lentils (*masur*); and 44% of *tur* are marketed through the local private trader which restricts farmers' direct

Fig. 8.10 Per cent share of production marketed through different agencies. *Source* NSS KI (70/33): Key Indicators of Situation of Agricultural Households in India, Government of India (2014b)

interface with the wholesale market and hence, chances for higher price realization (Government of India 2014b). It is observed that general awareness about MSP and procurement agency is quite low among households reporting sale of crops—about 40% in the case of sugarcane, more than 30% in paddy; and only (5–18)% in pulses.

Unlike wheat and paddy, public procurement system is not functional in the case of pulses, except during crisis, when due to price crash, farmers are unable to sell their produce at MSP or high retail price inflation, when the procuring agencies buy directly from farmers and sell at affordable prices to the consumers. Time and again, both central and state governments have tried to bail out farmers by adding bonus on MSP, stepping up public procurement, but it is not clear whether such crisis management has really benefitted the farmers. Often, in such government initiatives, the monetary benefits accrue to the farmers after a significant lag of time, or they are unable to fulfil the paperwork and prove their entitlement, causing a lot of resentment among the farmers. Needless to say, marginal and small farmers are the worse off, because in most cases, they are either unaware of the such initiatives or even if they know, getting across various hurdles is difficult for them.

8.3.3 Inclusiveness in Access to Risk Mitigation and Financing

Majority of the farmers lack any access to formal risk mitigation tools and are unable to hedge against the risks of either crop failure or price crash, and the situation is worse for tenant and sharecropper who do not have any land title. The flagship agricultural insurance program, Pradhan Mantri Fasal Bima Yojana (PMFBY), launched in 2016 replaced the National Agricultural Insurance Scheme (NAIS) and the Modified National Agricultural Insurance Scheme (MNAIS). The Weather-Based Crop Insurance Scheme (WBCIS) continues to exist with premium rates made at par with those of PMFBY, and a particular state can decide whether it wants PMFBY or WBCIS or both. In the design of the program, it is inclusive to some extent as the premium rates are lower compared to erstwhile schemes—2% for kharif crops and 1.5% for rabi crops that include pulses and 5% for horticulture and other commercial crops. However, given that the scheme is compulsory for loanee farmers and voluntary for non-loanee farmers to a large extent, excludes the latter from benefitting from the scheme. CSE (2017) reports that less than 5% of non-loanee farmers availed the scheme in 2015 and 2016 kharif season. There have been reports about the reluctance of farmers to avail the insurance scheme because of the automatic linking of their loan account with insurance. Issues related to delays in settling claims due to red tapism, slack attitude of states in providing data from crop cutting experiments on time, determining the threshold yield, low indemnity, etc., have not resulted in PMFBY to work in the interest of farmers and more so, the marginal and small farmers. Gulati and Hussain (2018) point out that the target of bringing 50% of the gross cropped area under insurance coverage by 2018–19 remained a distant dream considering significant inter-state variations and existing coverage of 30%. Other estimates show

that gross cropped area covered under insurance declined from 30% in 2016–17 to 24% in 2017–18 against a target of 40% for 2017–18 (Business Standard 2018).

8.3.4 *Inclusiveness in Access to Storage and Warehouse Facilities*

Despite the negotiable warehouse receipt system being available, it has not reached the farmers who could make better use of it to avoid distress sale by availing pledge finance and marketing credit. Also, this gives farmers the freedom to hold onto legitimate stocks in the event of bumper market arrivals. The integrated scheme for agricultural marketing includes warehousing as an integral component, and efforts have been made to augment warehouse capacity as well as upgrade and modernize existing facilities. Further, under the Agricultural Produce and Livestock (Promote and Facilitate) Marketing Act, 2017, warehouses by notification can be declared as a market sub-yard. With e-NAM being the future of agricultural marketing in India, electronic negotiable warehouse receipt system has immense scope. It is aimed at avoiding high cost of intermediation by facilitating electronic transactions and delivery of products at the final destination of the purchaser. In addition to strengthening marketing infrastructure for greater value realization, policy efforts must be made to ensure that the provisions are accessible to the farmers for their benefit. In pulses, most of the storage and warehousing is operational at the millers' and wholesalers' end. Hence, they are able to benefit from appropriate stocking and offloading during the course of time.

8.4 Sustainability of Pulses Value Chain

8.4.1 *Environmental Sustainability*

Pulses are environmentally more benign, less water intensive and more climate resilient, compared to many other crops. Hence, increasing production of pulses in an environmentally sustainable manner is feasible. Considering the low yield levels, it is possible to push the production frontier in pulses through technology breakthrough. Pulses accounted for 15.3% of the gross cropped area in 1950s which declined to 12% in 2000–01 to 2010–11 and 12.3% during 2011–12 to 2013–14. Area irrigated under pulses increased from 8.9% in 1950s to 14.7% during 2000–01 to 2010–11 and 18.1% during 2011–12 to 2013–14 (Fig. 8.11).

In Madhya Pradesh, about 44% of the area under pulses is irrigated followed by Uttar Pradesh (27%) and Haryana (23%), according to 2013–14 data. Rajasthan and Maharashtra being the second and third largest producer of pulses have 18% and 12% of the area irrigated, respectively (Fig. 8.12).

Fig. 8.11 Area under pulses—per cent irrigated and per cent of gross cropped area: 1950–51 to 2013–14. *Source* Agricultural statistics at a glance 2016, MoA&FW, Government of India (2017)

Fig. 8.12 Statewise per cent area irrigated under pulses: 2013–14. *Source* Agricultural statistics at a glance 2016, MoA&FW, Government of India (2017)

Irrigated area under gram increased from 14.1% in TE 1952–53 to 35.1% in TE 2014–15. Tur being a largely rainfed crop suited for semi-arid climatic conditions, per cent irrigated area increased from a meagre 0.5% to 4% during the same period. There is enough potential to increase the irrigated area under tur to augment production through productivity breakthrough. ICRISAT has been successful in developing climate smart cultivars that are high yielding, drought tolerant, disease resistant, short duration (75–80 days) lines and hybrids. These cultivars are customized to suit the needs and preferences for farmers and consumers across the world. Various on-farm practices like intercropping of pulses with cereals, crop rotation, ridge planting, among others are being tested on farmers' fields to improve water and soil health as well as enhance yield levels. In pigeon pea cultivation, ratooning to support zero tillage has been developed in order to minimize soil erosion particularly in cases of intense rainfall (ICRISAT, no date). There are proven successes of adopting innovative methods of pulses cultivation both in India and beyond. For instance, 80%

expansion of area under chickpeas in rice fallows of Prakasam district in Andhra Pradesh benefited smallholder farmers. Pigeon pea used as land cover to manage soil and water in China helped reverse soil erosion, land degradation as well as provided quality fodder for cattle. Pulses intercropping with other crops have helped farmers diversify their production basket as well as income opportunities (ibid).

Seeds play an important role in realizing the productivity potential of the crops. The organized sector comprising of private sector players and public sector agencies accounts for (30–35)% of the total seeds distributed in the country, while the remaining comprises of farm-saved seeds which comes under the unorganized sector. The Sub-Mission on Seeds and Planting Material (SMSPM) under the National Mission on Agricultural Extension and Technology (NMAET) was launched during the 12th five-year plan with an objective to strengthen the seed supply chain in India. Focus was put on increasing seed replacement ratio from 25% to 33% in self-pollinated crops, 33% to 50% in cross-pollinated crops and 100% in hybrids. Between 2007–08 and 2014–15, distribution of certified and quality seeds grew substantially for pulses, followed by cereals and fibres at 97%, 64% and 47%, respectively. In the case of open-pollinated crops, improvement in seed quality can be attributed to a larger participation of the public sector. Hence, there is a scope and need to enhance the participation of the private sector in further strengthening the seed supply for this crop sector. Also, it is important to develop varieties that are high yielding, drought and pest-tolerant.

8.4.2 Financial Sustainability of Pulses

Wholesale Price Inflation

Pulses have undergone massive price fluctuations measured in terms of per cent change in wholesale price index (WPI) since April 2016 until December 2017. The volatility in prices has been sharper compared to cereals and food articles in general. Inflation in pulses soared in 2015–16 when production of pulses took a hit owing to severe drought, and touched the lowest in 2017. In 2017–18, inflation in pulses was at an unprecedented low of (–) 26.7% compared to 34.6% in 2015–16 and 18.3% in 2016–17.

In 2017–18, tur suffered the steepest decline in prices by 40% followed by urad by 36%. Wholesale price index of masur fell by 23% and moong by 20%, respectively. These price trends are in sharp contrast to the situation in 2015–16 when production shortage resulted in steep escalation of prices of tur by nearly 50%, urad by 45% and gram by 35%. WPI of tur and urad has been on a negative trend since September and November 2016, respectively, and reached the lowest levels in July 2017 (Fig. 8.13).

Fig. 8.13 Percent change in wholesale price index of pulses by types, April 2013 to November 2018. *Source* Office of Economic Advisor, Government of India (2018c)

Minimum Support Price for Pulses

In order to incentivize pulses production, government announced an increase in minimum support price (MSP) for kharif pulses, i.e. tur, moong and urad, adding a bonus of INR 425 each and INR 200 for rabi pulses, i.e. gram and lentil (masur) each in 2016–17. The effective increase in MSP in 2016–17 over 2015–16 for tur was 13.5%; moong was 12%; urad was 12.4%; gram was 22.6%; and lentil was 23.3%, respectively (Fig. 8.14).

The increase in MSP in 2016–17 was particularly aimed at reviving production of pulses, which suffered a setback due to two consecutive bad monsoon years of 2014–15 and 2015–16. Area under pulses increased by 23% from 11.3 million hectares to 13.9 million hectares (CACP, Kharif 2017–18 report, Government of India 2018f). Also, production increased as a result of the price incentive at the rate of 73% for kharif pulses, 25% for rabi pulses and at 41.5% for all pulses (as per second advance estimates released by DES on 27 February 2018).

Fig. 8.14 MSP for pigeon pea/tur and chana: 2012–13 to 2017–18. *Source* MSP data, CACP, GoI (2018f)

Comparing Minimum Support Price, Domestic Price and International Price

Domestic prices of pulses falling below the MSP have been a concern given that farmers are unable to cover their cost of production. Domestic price of gram fell below its MSP of INR 3000 per quintal during Q3 of 2013 to Q4 of 2014 due to bumper production. After which prices recovered and reached a peak in Q4 of 2016; prices fell thereafter. During Q1 and Q2 of 2018, domestic prices were less than the MSP of INR 4000 and INR 4400, respectively. Between Q4 of 2014 and 2016, both domestic wholesale price and international prices have remained well above MSP for pigeon pea. Since Q1 of 2017, both these prices have fallen below MSP (Fig. 8.15).

Financial sustainability of producing pulses needs to be assessed in terms of the net returns accruing to the farmers. Cost of cultivation of agricultural crops has been increasing over a period of time. Market prices of pulses ruling below MSP, resulted in net income losses for the farmers.

Figure 8.16 shows the increasing cost of cultivation in selected states in terms of costs A2 and C2. While both A2 and C2 increased over the years, the increase in C2 cost is steeper than A2 cost in case of both pigeon pea and gram. For farming of pulses to be sustainable for the farmers, it is important that they are able to at least recover the cost of production from the MSP or market price at which they sell their produce. In the absence of such conditions, as observed in the study period, it is not sustainable for the farmers to continue with pulses farming.

With the increasing need to optimize water usage, improve the quality of crop care including pest management and nutrient applications and enhance productivity at the same time, farming has become an expensive activity for the farmers. This is observed in the increasing trends in cost of cultivation. Hence, it is even more important that farmers' have adequate access to markets in order to be able to market their products and earn their livelihoods. Increasing production without the appropriate market linkages will dampen the objective of sustainable farming of pulses.

Fig. 8.15 Mapping domestic wholesale prices, international prices and MSP of pigeon pea and bengal gram: 2013–2018 (quarterly). *Source* CACP, Government of India (2018f)

Fig. 8.16 Trends in cost of cultivation (A2 and C2) in INR per quintal for pigeon pea and gram. *Source* Cost of Cultivation data, MoA&FW, GoI (2018g)

8.5 Scalability of Pulses Value Chains

8.5.1 Scope for Diversification in Pulses Production

Common types of pulses grown in India are pigeon pea (tur); bengal gram (chana); lentil (masoor); black gram (urad); green gram (moong), among others. In TE 2015–16, gram accounted for 36% of the area and 45% of the production of pulses. While tur (pigeon pea) accounted for 16% of the area and production, respectively. Moong and urad accounted for 14% of the area each and 11% of the production each (Fig. 8.17).

While the all India average yield of pulses for TE 2015–16 was 713 kg per hectare, that of Madhya Pradesh was 875 kg per hectare, Rajasthan was 559 kg per hectare, and Maharashtra was 608 kg per hectare. Three of the top five states producing pulses had yield levels lower than the all India average (Fig. 8.18).

Fig. 8.17 Per cent share of major pulses in total area and production: TE 2015–16. *Source* Agricultural statistics at a glance (2016), MoA&FW, Government of India (2017a)

Fig. 8.18 Statewise yield of pulses: TE 2015–16. *Source* Agricultural statistics at a glance (2016), MoA&FW, Government of India (2018c)

8.5.2 Scope for Scaling up Production across States

In TE 2015–16, the top five pulses growing states were Madhya Pradesh, Maharashtra, Rajasthan, Karnataka and Uttar Pradesh accounting for nearly 69% of production (17 million tonnes) and 72% of total area (27.4 million hectares) (Fig. 8.19).

Pulses account for 23% of the gross cropped area in Madhya Pradesh, followed by Karnataka and Odisha at 21% and 19%, respectively. Maharashtra, Rajasthan and Uttar Pradesh being among the top five states producing pulses account for 15% each and 8% of the gross cropped area in the respective states (Fig. 8.20).

Among the top five states producing pulses, gram is the major pulse. It accounts for 65% of the total pulses grown in Madhya Pradesh; 52% in Rajasthan, Maharashtra and Karnataka and 24% in Andhra Pradesh. The next big pulse crop is tur (pigeon pea) which accounts for 34% of the pulses grown in Maharashtra, 30% of pulses

Fig. 8.19 Top five pulses producing states in India, TE 2015–16. *Source* Agriculture—Statistical Year Book India (2017b), Government of India (2017a) and Agricultural statistics at a glance (2016), MoA&FW, Government of India (2017a)

Fig. 8.20 State-wise area under pulses as a per cent of gross cropped area: TE 2015–16. *Source* Agricultural statistics at a glance (2016), MoA&FW, Government of India (2017a)

grown in Karnataka and 14% in Uttar Pradesh. Of the pulses grown in Uttar Pradesh, urad accounts for 18% of the total production. Moong is an important pulse crop for Rajasthan which accounts for 23% of the total pulses grown in the state.

Nearly 60% of tur is produced by Maharashtra, Madhya Pradesh and Karnataka. Maharashtra is the largest tur producing state accounting for 26% of the total production in India followed by Madhya Pradesh at 17% and Karnataka at 16%. Gram is predominantly produced in Madhya Pradesh, with 40% of the all India production. Maharashtra and Rajasthan produce 14% each. Madhya Pradesh is a leading producer of urad as well, contributing to 21% of the total production. Andhra Pradesh and Tamil Nadu produce 16% each, followed by Uttar Pradesh at 14%. Moong which accounts for less than 10% of the total pulses production in India is largely grown in Rajasthan which accounts for 31% of the production. Tamil Nadu and Andhra Pradesh account for 10% each and Maharashtra and Madhya Pradesh at 8% each (Fig. 8.21). While bulk of the production of tur and urad is spread over three states of Maharashtra, Madhya Pradesh and Karnataka; and Madhya Pradesh, Andhra Pradesh, Tamil Nadu and Uttar Pradesh, respectively, production of gram is

Fig. 8.21 Top five states producing tur, gram, urad and moong pulses, TE 2015–16. *Source* Agriculture—Statistical Year Book (2017b), MoSPI, Government of India (2017c)

Fig. 8.22 Comparison of yields of types of pulses by leading states, average of 2014–15 and 2015–16. *Source* Agriculture—Statistical Year Book (2017b), MoSPI, Government of India (2017c)

more concentrated in Madhya Pradesh and moong in Rajasthan. Such geographical spread of pulses could be used for developing pulse-specific storage, marketing and milling infrastructure to reduce the cost of transaction. The same can be used to plan any crop diversification interventions as well.

Considering the top six states in order of their contribution to the production of the major pulses types, a wide disparity in yields is observed (Fig. 8.22). Maharashtra with only 12% of the pulses area under irrigation has the lowest yields of nearly all the major pulses such as tur, urad, gram and moong. Maharashtra which is the leading producer of tur has the lowest yield of 600 kg per hectare compared to other states. Gujarat has the highest yield of 1098 kg per hectare. In the case of bengal gram, Madhya Pradesh which is a leading producer has a yield of 1039 kg per hectare compared to 1143 kg per hectare in Andhra Pradesh, which is the fifth-largest producer of gram. In the case of urad, yield levels in Madhya Pradesh (499 kg per hectare) are nearly half of that in Andhra Pradesh (946 kg per hectare) and Tamil Nadu (960 kg per hectare), the second and third largest producer of urad. Rajasthan, the leading producer of moong recorded a yield of 515 kg per hectare, lower than Tamil Nadu, Andhra Pradesh and Bihar, the second, third and sixth-largest producer of moong.

There is considerable scope for improving existing yield levels of the major pulses grown in India, particularly in states which account for a significant share of all India production. This will improve the per unit land productivity as well as allow multiple cropping, where feasible. Also, for states where the yield levels are already high but account for a smaller share of the all India production, efforts can be made to bring more area under pulses in those states. However, incentivising production through

increase in yields should be linked with efficient marketing of the same, failing which the farmers will not be able to benefit from increased production.

Agriculture policies have largely focussed on enhancing production with the objective to sustain food security. Among other flagship programs, National Food Security Mission (NFSM) was launched with a focus on augmenting production of paddy, wheat and pulses. Considering the increasing demand supply mismatch, pulses have been a focus crop with nearly 50% of the funds being allocated towards promoting pulses cultivation. In 2014–15, NFSM was extended to include 623 districts in 27 states as well as all the districts in north-eastern and hilly states. In 2015–16, pulses were brought under the initiative of *Bringing Green Revolution in Eastern India* for demonstrations under the cropping systems-based approach to target rice fallow areas (GoI 2016). Emphasis was also placed on area expansion through intercropping of pulses with commercial crops, oilseeds, cereals, etc., and productivity enhancement through frontline demonstrations, integrated nutrient and pest management, popularization and promotion of high yielding varieties or hybrids.

In 2010–11, under Rashtriya Krishi Vikas Yojana with an outlay of INR 300 crore, government initiated a special program for Pulses and Oilseeds in Dryland Areas by organizing 60,000 pulses and oilseeds villages in rainfed areas. The sub-scheme was under implementation in seven major oilseeds and pulses growing states including Karnataka. The states were focusing on developing farm mechanization hubs to extend the services through custom hiring centres to pulses and oil seeds growers. Inputs available under NFSM—pulses program were being used to supplement the efforts for enhancing productivity in identified villages and fields (GoI 2010).

8.6 Access to Finance and Risk Mitigation

Access to finance is critical for ensuring that agricultural value chains are competitive, sustainable, and scalable, and it also reflects the inclusiveness of the chains. With respect to agricultural finance, the challenge has been to bring increasing number of farmers under the formal channel and thereby reduce their dependence on informal sources. One of the key factors driving strong market intermediation (heavily criticized in all policy discourses) has been the role of intermediaries in extending informal credit and undertaking risks. Of course, these services are not free and farmers bear the burden in terms of unofficial commission fees; not so transparent monetary transactions despite the shift towards digital payments.

Although access to agricultural finance has improved over a period of time, a large number of small and marginal farmers and landless cultivators face challenges accessing institutional finance. Innovative ways of maximizing outreach and delivering benefits to the farmers such as Kisan Credit Cards (KCC), access to digital banking, etc, have improved availability of agricultural credit. Negotiable warehouse receipt systems can be leveraged to improve creditworthiness of the farmers, which has not picked up adequate momentum. Institutional credit accounts for 64% of the outstanding debt of cultivator household and 36% flow from non-institutional

sources. Within institutional sources, commercial banks account for the largest share of the credit advanced (Hoda and Terway 2015). In order to boost food processing which includes pulses processing, government has been providing particular incentives in terms of subsidized capital support, incentives for technology upgradation and modernization of infrastructure; creation of mega food parks, developing agro-processing clusters, integrated farm-firm linkages, etc. Food processing got a major boost under the Make in India initiative. In 2017, Pradhan Mantri Kisan SAMPADA Yojana (Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters) with an allocation of INR 60 billion for 2016–20 was launched by Government of India.

Agricultural or farming insurance indeed needs to be a compulsory part of the value chain operations of pulses considering the extent of volatility observed. There is considerable lack of awareness amongst farmers regarding crop insurance and given the experience of delays in payments; low compensation; and the paperwork required, farmers tend to shy away from the same. Linking agriculture finance with insurance under PMFBY is perhaps a good move to eventually improve the health of agricultural credit in India but this has been one of the often quoted reason for farmers not choosing insurance. With periodical loan waivers, the general attitude is not to pay upfront and later lose out on the waiver.

In general, crop insurance is availed by a very small section of the agrarian households, and most of them are not aware about the scope of the program. According to a NSSO (2012–13) survey, 58% of urad cultivators and 49% of moong cultivators were not aware of and were not insuring their pulses crops during the specified period (GoI 2014b). Pulses account for 15% of the total area insured across crops. 29% of the area under pulses is insured as against 38% under oilseeds and 30% under vegetables (Fig. 8.23).

So far, insurance schemes address crop losses but do not insure farmers against price fall. In the context of pulses, this has hit the pulses farmers as observed in the 2017–18 marketing season owing to market prices ruling below minimum support price.

Fig. 8.23 Per cent distribution of insured area under crops and per cent of crops insured. *Source* Agricultural statistics at a glance (2016), Government of India (2017c)

Price deficiency payment scheme such as Bhavantar Bhugtan Yojana (BBY) in Madhya Pradesh was aimed at bridging the gap between MSP and market price through the difference payable by the state government to the farmers. BBY covered eight crops, viz: soybean, maize, urad, tur, moong, groundnut, til and ramtil. Farmers were required to register on the government portal and get their sown area verified by the government in order to be eligible for the benefits of the scheme. The volume of each crop to be covered by BBY was determined based on the average productivity of the particular crop in a district and the area sown by the farmer. The difference between the average sale price (simple weighted average *mandi* prices in the state and adjoining two states) and MSP are paid directly to the farmer in their bank accounts. Gulati et. al. (2018) reported that 32% of urad production in MP was compensated. In moong, as little as 1.3% of the production was compensated under the scheme. Actual compensation for tur was not known.

There have been reports of several other issues related to BBY in terms of delays in processing of payments, issues with registration and verification of area sown to be eligible for the benefits. Also, with the introduction of BBY, it is observed that traders have colluded to keep the market prices deliberately low which has a distorting effect on market functioning. Gulati and Hussain (2018) also analyze the financial viability of continuing with BBY given that if the total production eligible for the scheme was actually covered, it would have cost the government INR 8434 crores and not just INR 1900 crores, which the government claims to have spent, thereby making a huge dent into the state exchequer. Extending such price deficiency payment scheme may not be financially viable. Instead a supply chain mechanism adequately backed by storage, processing and marketing opportunities including exports that are able to clear out excess supply will work better in terms of upward correction of prices.

8.7 Key Policy Suggestions and Way Forward

Policy advocacy for strengthening pulses value chains like many other agricultural commodities cannot be limited to boosting productivity, and thereby production only. Focus should be on strengthening market access for farmers in terms of higher price realization and improved risk mitigation. Even if farmers harvest a bumper crop, there is no guarantee that they will be able to sell the produce at support prices, let alone remunerative prices. This has been the situation with respect to several agricultural commodities in India with bumper harvests leaving the farmers helpless. Also, procurement without means to dispose raw or value-added products, either in the domestic market or export market means losses at the end of the procuring entity. This is observed in the case of public procurement, when market prices crash below support price. It is ironical that neither in the case of higher demand and consumer price inflation nor in the case of bumper production, farmers benefit in terms of higher returns.

Some of the important policy measures pertaining to pulses value chain that need to be undertaken are as follows:

Step up market access for farmers: Indian agriculture has passed the phase when increasing production was a key concern for the policymakers. In recent times, the crisis has been around bumper production without adequate market access. Hence, it is utmost important to step up market access for the farmers be it through direct sale to the millers, bypassing the *mandis* or through e-NAM, futures market, etc. A technology-enabled platform like e-NAM has the potential to aggregate market demand through inter *mandi* or inter-state trading systems which can help signal prices upwards. However, several *mandis* which are enrolled under e-NAM have not been able to take off in e-trading of pulses due to issues related to assaying which is critical for milling of pulses. Also, certain markets are in the process of setting up the infrastructure and services related to e-NAM. Futures market for tur and urad has been banned since 2007 and that of chana which was suspended in 2016 was again revived around June 2017. Given that the prices of major pulses recurrently crash below the MSP, futures market can be beneficial for the farmers in terms of higher price realization and hedging against price risk. However, there are certain constraints with the functioning of the futures market for agricultural commodities as cited by NCDEX that there are not enough delivery centres, and resource constraints make it expensive to reach out to large farmer base (The Indian Express 2017). The real benefits of higher price discovery can accrue to the farmers if they are able to directly trade on the futures platform through FPOs. In the absence of markets, assured procurement of pulses by the government either through central or state-level agencies should be in place for commodities covered under support price. Higher MSP without assured procurement has no meaning for the farmers who are unable to cover the cost of production or earn remunerative prices for their produce. The government procurement options under PSS and PSF should be made available to the farmers in a timely manner so that they do not bear the brunt of selling at market prices lower than MSP.

Strengthen storage and warehouse facilities: The Warehousing Development and Regulatory Authority (WDRA) was established in 2007 under the Warehousing (Development and Regulation) Act, 2007. The primary objective of WDRA was to develop and regulate warehousing, including registration and accreditation of warehousing that intend to issue negotiable warehouse receipts (NWRs) and electronic NWRs (eNWRs). There are 123 agricultural commodities and 26 horticulture commodities notified for negotiable warehouse receipts including cereals, pulses, oil seeds, spices, among others. Strengthening the access to NWRs particularly to the farmers can be extremely beneficial in terms of avoiding distress sale and holding onto stocks for better marketing opportunities. The margins in the pulses value chain accumulate at the miller, wholesaler and retailer levels where each are able to hold on to stocks (within permissible limits) and play the market fluctuations to their benefit. This can be shifted to the farmers by improving access to storage and warehouse facilities at the farm gate level. Access to warehousing will also improve farmer's access to institutional credit through e-NWRs.

Create infrastructure and services for standardised commodity assaying: During excess supply situations, it is easier for the traders to bargain for lower prices on the

pretext of poor quality of pulses brought into the *mandi* by the farmers. In the absence of standardization of assaying parameters related to moisture, foreign particles, etc., and lack of infrastructure for proper sorting and grading at the farmer level, fetching higher prices for quality produce becomes extremely difficult for the farmers. The introduction of e-NAM has brought about standardization of commodity assaying and related infrastructure and services at the *mandi* level. However, the pace of implementation is varied across *mandis*. Also, under e-NAM, assaying plays an important role in enabling e-trading, wherein eventually the traders undertaking inter state trading, will have no scope to physically inspect the produce but have to rely on standardized assaying measures. Hence, it is important to create the right infrastructure and services at the farmer or village level for sorting, grading and packaging, which will also help avoid losses due to physical inspection and unpacking and packaging, at the *mandi* level. This will also involve training and capacity building of the farmers or service providers at the village level to undertake sorting, grading, and packaging and ensure that the quality claims by the farmers in the *mandi* are true, and there is no manipulation. In some cases, it is observed that farmers mix different quality of the same products which often goes against their interest in terms of rejection or lower price realization.

Promote FPOs in pulses value chain: States and within them districts which have natural advantages of growing certain types of pulses should be incentivized. Also, states with higher yields but relatively lower area under pulses could be incentivized to increase area under pulses. Considering farmer aggregation model like FPO to bring about scale in farming as well as post-harvest activities like assaying, storage, value addition, and marketing can be beneficial to the farmers. Also, FPO can interface e-NAM to overcome the challenges faced by the farmers in terms of small marketable surplus and resource constraints in undertaking post-harvest activities. Direct linkage with the millers, particularly in case where pulses variety determines milling efficiency can be achieved through FPO and cluster-based model. FPOs can also undertake dal milling and marketing to enable assured markets and higher returns to the farmers.

Institute dynamic pricing policy that links domestic prices with import tariffs and decisions related to trade of pulses: Advanced production estimates and thereby likely market arrivals should be used to calibrate both import and export of pulses. In the event of bumper production, imports can be discouraged by raising the tariff levels. This will help revert situations of massive price crash, which hurt the interest of the farmers. Prudent decisions related to opening up of exports can help tide over domestic supply shortages and at the same time ease out the inflationary pressures on consumers.

Strengthen risk mitigation and access to finance: While improving market access is key to ensuring that farmers are able to earn the right price for their produce, it is also important to ensure that the risks associated with production and marketing are

covered. In the case of pulses, the measures that are available have been either ineffective like the price support system; or not functional at a scale that has any demonstrated impact like the negotiable warehouse receipt system; or populist measures like loan waivers which do not offer long term sustainable solution for the farmers. The outcomes of the price deficiency payment scheme—Bhavantar Bhugtan Yojana in Madhya Pradesh are not studied enough beyond the pilot. While futures offer options for price risk hedging, the market has been subjected to bans and suspensions, thereby limiting its scope.

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