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Adoption of prevailing best practices and models to stabilize prices of pulse

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Abstract
Despite India being largest producer of pulses, it remains consistent importer of pulses every year. Import demand is a function of its prices in domestic and international markets. Demand being fixed, price is mostly determined by extent of supply in the market which includes domestic production, stock and imports. Pulse price inflation has been major concern for policy makers. To put a tab on food inflation, India has come up with various policies like inclusion of pulses in National Food Security Mission (NFSM), inclusion of pulses in The Essential Commodities Act 1955, Accelerated Pulse Production Programme (A3P), etc. There have been developments in strategies and policies by various countries. All national and international strategies and policies review suggest the need to design and develop the overall architecture of market in such a way that it could automatically suck the surplus in peak arrival season and release stock in market when prices start rising. Besides, a system of commodity outlook needs to be put in place to provide insight to policymaker to take decision about time and type of intervention to be done.

Keywords: Stabilize**,** NFSM, prevailing, commodities

Introduction
India is the world's largest producer of pulses but its domestic demand outstrips production. The shortfall is met through import of pulses from various countries like Canada, Australia, Myanmar, etc. The volume of domestic import has increased from 172.96 thousand tons in 1980 to 6609.49 thousand tons in 2016-17 that had gone more than 38 times. During 2016-17, India imported pulses worth Rs. 28523.18 Crore which is 15.6 per cent of value of total Agricultural imports. India has entered in legal agreement with Mozambique to import 6.90 thousand tonnes of pulses in time span of five years from 2016 to 2021 (DES, 2017). Owing to increased import demand, countries that traditionally did not grow pulses for their domestic markets have emerged as significant exporters due to their comparative advantage. India being an assured pulse market, these countries could develop pulse parks due to their well endowed resources. Australia and Canada emerged as important exporters of chickpea in the mid-1990s, whereas Myanmar dominates the pigeon pea export market (APEDA, GOI 2017). Government has resorted to adhocism for setting of pulse prices, import and distribution policies in the country. Besides, the pulse has been relegated to dry, harsh and marginal environment because of predominance of rice and wheat in irrigated belt in last more than three decades. This has led to stagnation in area and production, worsening the pulses trade deficit. Coupled with low productivity issue, most pulse crops have lost their competitive edge over other crops grown under similar agro-climatic conditions. Additionally, recent years have witnessed wide fluctuations in pulse prices owing mainly to speculative activities by traders /pre-emptive purchases by state agencies/boards in response to anticipated shortfalls in domestic demand. The average WPI inflation for pulses is highest among food grains (Chand, R., and Parappurathu, S., 2012) [7]. Lack of trade restrictions is compelling the Indian farmers to compete with cheaper imports from Australia, Canada and Myanmar. Policies to increase competitiveness of pulse crops by providing producer subsidies or by strengthening the price support structure would ensure pulses acreage increase. To improve production of pulses, there is a need to improve their profitability by promoting high yielding varieties and ensuring competitive prices for them. A coherent long-term import policy would enable the both domestic and international prices to be more stable while providing adequate imports to meet domestic demand. Majority of studies on import and export have marginalized pulses even though they have second highest share in total agricultural imports.

Hence it becomes necessary to study the models/systems/best practices and other government efforts to stabilize the pulse prices.

Best practices being followed in world

Several practices are followed all over the world to curb the price fluctuations. Among them few which are suitable to Indian condition with special reference from works of Poulton *et al*. 2006 has been described below.

1. An African ''BULOG'' model

In this model, an autonomous agency was given the task of maintaining the wholesale prices of food grains in identified major markets within a certain limit, both within and across seasons. The main responsibility entrusted to this agency was to avoid major price fluctuations, without interfering in private trade and storage activity and the functioning of commodity exchanges. This model did not replace the existing private trade and storage activity structure in market instead it has influenced the rules for smooth conduct of market activities.

2. Uganda Grain Traders Model

The essence of this model was to have a public–private partnership in which the Government of Uganda provided storage infrastructure to Uganda Grain Traders, a formation of private food grain traders. The private sector will procure, own and ultimately sell the food grain. The model was designed to deal with periodic gluts in the Ugandan market. The objective of model was to secure better trade opportunities. The Grain Traders in collaboration with government announced remunerative retail prices for food grains to encourage local producers and also to negotiate with the central authority when surpluses had to be exported at a loss in years when demand was very low in immediate neighbouring for food grains of Uganda.

Best practices being followed in India

Rising prices of pulses is a concern for both food as well as nutrition security. Surprisingly, the production of pulses is not responsive to increasing minimum support price (MSP). This might be due technological and market barriers. Therefore we need special policy efforts to increase the production and availability of pulses in India and make them more affordable to consumers.

1. Price Stabilization Fund

Prices of pulses are highly volatile. Steep fall in prices is observed during peak market arrival time. Produce are then stocked with expectation of price rise in near future. This high volatility in prices leads to speculation which then impact retail market's prices. Government to cushion this fluctuation has created "Price Stabilisation Fund" from which State/UT Government and Central agencies/Central PSUs/Cooperative organisations will procure produce for maintenance of buffer stocks and regulated release into the market to regulate the market prices.

2. Subsidised prices

Prices of pulses have shown high fluctuation for which government has been coming up with suitable policies like providing price subsidy. Recently, Government of India has recently subsidized Chickpea in addition to Pigeon Pea and Black gram which are already under subsidy.

3. Price Monitoring Cell

The Price Monitoring Cell (PMC) of Department of Consumer Affairs is sole organization which collects and disseminates daily retail and wholesale prices of 22 essential commodities for 49 markets spread across the country. The pulses currently monitored by this cell are Chickpea, Red gram, Lentil, Black gram and Green gram.

4. Market Intervention for Pulses

Government has made a market intervention by undertaking distribution of imported pulses through five designated agencies (*viz*., MMTC Ltd., STC Ltd., PEC Ltd., NAFED and NCCF), to the States/UTs for distribution in the Public Distribution System. The collated information were fed to different ministries for price monitoring for smooth running of the economy. These designated importing agencies will be vested with responsibility to bridge the gap between demand and supply of pulses in the domestic market.

5. Public distribution system

Public distribution system (PDS) has played significant role in achieving food security. There is increasing demand to diversify this existing large cereals-only PDS basket to make it more nutrition sensitive. States like Andhra Pradesh, Telangana, Himachal Pradesh, and Tamil Nadu that have added pulses to the PDS. They provide 1–2 kg of subsidized pulses per month per family. There is scope to increase the quantity of pulses to have any significant impact to achieve nutritional security.

6. Minimum Support Prices

Minimum Support Prices for pulses have always been less than market price. There is no procurement also at announced MSP. It has dual negative impact on pulse producers. First, it helps pulse traders to influence pulse price near less or equal to MSP. The stock procured from mandis at MSP is based on Fair Average Quality (FAQ). The private traders procure produce from mandis below FAQ. Second, the remaining pulses out of procurement system after lapse of 90 days of crop harvest goes to trader at lower than even MSP.

7. Promoting pulse production

The pulse consumer is very rigid in taste and preference of pulse consumption in his diet mainly due to prevailing varying agro-climatic and other socio-economic environment in the country. This rigidity in food habits have resulted is very low elasticity among pulses (cross elasticity). For instance, white lentil and pigeon pea are very predominant in south household consumption pattern. If chickpeas are available to Southern consumers even at substantially lower price than prevailing open market price/MSP, they would not substitute white lentil and pigeon pea to chickpea. Henceforth, increase in availability of region specific pulses is vital than mere total pulse production. As measures to boost pulse production in the country, government has recently included pulses under its Bringing Green Revolution to Eastern India (BGREI) programme. In National Food Security Mission (NFSM), pulses are included in Accelerated Pulses Production Programme (A3P) which has extended over 60000 Pulses and Oilseeds villages to enhance Breeder Seed Production through ICAR and its network. These good quality seeds when timely available will boost pulse production in the country.

8. Metals and Minerals Trading Corporation of India (MMTC)

As a price stabilization measure to control inflating prices of pulses in 2015, government of India decided to import pulses through Metals and Minerals Trading Corporation of India (MMTC) with assistance from the Price Stabilisation Fund (PSF). Metals and Minerals Trading Corporation of India has established its efficiency in importing of metal. MMTC is a specialised agency in field of metals trading. Therefore to harness its intellectual potential government of India has decided to import pulses through this body.

Table 1: Pulses imported by MMTC, 2016

Pulses	Imports (MT)
Tur	1,53,615.17
Urad	42,252.00
Masur	1,30,517.40
Chana	52,315.00
Total	3,78,699.57

***Source*:** Ministry of Consumer Affairs, Food and Public Distribution

Table 1 reveals that the quantity imported of Tur, Urad, Masur and Chana by Minerals and Metal Trading Corporation and State Trading Corporation. Tur as in procurement is also highest imported pulse which constitutes 40% of total pulse import. It is followed by Masur, Chana and urad with 30%, 14% and 11% of total imports respectively.

10. Electronic National Agricultural Marketing (e-NAM)

The Government of India launched Electronic National Agricultural Marketing **(**e-NAM) on 14th April, 2016 connecting major mandis is likely to help market access to farmers. Government plans to link 22,000 mandis with e-Nam platform by 2022. This will increase the size of the market and also reduce marketing and other transaction costs for farmer due to increase in competition. This in turn would help to enhance income level of farmers. Development of ICT based technology interface in marketing system would improve transparency, reliability and accountability to all stakeholders.

11. Agreement with Mozambique

India has entered in legal agreement with Mozambique for import of pulses. According to agreement, government of India will provide its technical and scientific man power to Mozambique which will in turn provide infrastructure facilities like land and machinery.

Table 2: Quantity to be imported from Mozambique under agreement

Year	Quantity to be imported
2016-17	100,000 tonnes
2017-18	125,000 tonnes
2018-19	150,000 tonnes
2019-20	175,000 *tonnes*
2020-21	200,000 tonnes

***Source*:** Ministry of Consumer Affairs, Food and Public Distribution

The main pulse imported from Mozambique is yellow pea. Since the agreement is legal in nature so it is mandatory on part of government of India to purchase yellow pea every year at the rate of 18 per cent per annum. The quantity of import would be doubled from Mozambique in five years Table 2). Prices of procurement will be existing minimum support prices in India. Evaluation will be done every January and if any amount of import is left then will be procured through Metals and Minerals Trading Corporation of India (MMTC).

12. Total Procurement and Imports for Buffer Stock

Table 3: Pulses procured and imported (MT) in 2016-17

Total Pulses Procured	15, 40, 616.19
Imported Pulses	3,78,699.57
Grand Total	19,19,315.76
Per cent of import	19.73

***Source*:** Ministry of Consumer Affairs, Food and Public Distribution

One of the primary reasons for government procurement is for maintaining buffer stock with objective of food security, cushioning price variability and minimizes ill effects of speculation on domestic market. Figures from table 3 imply that imports constitute 19.73 per cent of total pulse stock available with government agencies.

Table 4: State wise procurement of pulses for Buffer Stock

Sl. No	States	Green gram	Black gram	Red gram	Lentil	Chick pea	Total
1	Madhya Pradesh	9233.53	27566.52	102771.52	19780.69	14788.91	174141.17
2	Maharashtra	7275.36	15396.56	401329.08	0.00	0	424001
3	Andhra Pradesh	3665.6	702.28	584.15	0.00	0	4952.03
4	Telangana	3381.41	72.7	216480.69	0.00	0	219934.8
5	Karnataka	5050.65	2105.75	314409.76	0.00	0	321566.16
6	Gujarat	77.44	1422.45	127035.55	0.00	0	128535.44
7	Rajasthan	190161.7	18963.07	0	0.00	44098.42	253223.26
8	Uttar Pradesh	0	22322.59	370.79	7352.55	1144.8	31190.73
9	Tamil Nadu	0	118.54	0	0.00	0	118.54
10	Haryana	1069.35	0	0	0.00	308	1377.35
	Total	219915	88670	1162981	27133	60340.13	1559040

***Source*:** Ministry of Consumer Affairs, Food and Public Distribution

In state wise procurement (table 4), Chick pea and Green gram are highest in Rajasthan. Black gram and Lentil are procured most in Madhya Pradesh and Red gram in Maharashtra. Karnataka procurement of pulses is highest among all states. The concerted efforts of the government are to release maximum supply of the commodities in the market to cool down the price especially during inflation period. Madhya Pradesh, Maharashtra, Karnataka and Rajasthan constitute more than 96 per cent of total green gram production in country. In case of black gram 95 per cent of total production comes from Madhya Pradesh, Maharashtra, Uttar Pradesh and Rajasthan. Madhya Pradesh, Maharashtra, Karnataka and Gujarat contribute about 81 per cent of total Red gram production. Madhya Pradesh alone produces 72 per cent of Lentil in country. Almost 73 per cent of Chickpea production is from Rajasthan

In all it was observed that even though the government has taken best move to improve market efficiency in order to cushion the price volatility in the best interest of both producer and consumer, it still requires some improvement to achieve the goal of food as well as nutrition security. Some policies or practices have been suggested below after reviewing the best practices of the government in the country and in world.

Best practices suggested

1. The overall architecture of market is to be designed and created in such a way that it could automatically suck the surplus in peak arrival season and release stock in market when prices start rising.
2. Mapping the flow of commodities from market to another need to be done which would provide greater insight into the market channel of the respective pulses.
3. A system of commodity outlook need to be put in place which could project demand, supply, stock, trade and prices for future. The signals emitting from such system would provide insight to policymaker to take decision about time and type of intervention to be done.
4. The Market Intelligence system (MIS) needs to be put in place to forecast price for pre sowing and pre harvest of crops every season. Farm price advisory based on this MIS must be issued through various mass Medias among farmers so that they can take decision whether stock or release the produce for better price realisation based on well informed decision.
5. In general the shelf life of pulses is around 6 months and at the outset of rainfall the grains of pulses starts showing hydrophilic properties. The grains start absorbing the moisture from air during the rainy season leading to development of white blotches on skin surface of grains. At that time the quality of pulses goes down and hence their market prices will decline. So the government should construct/incentivise the private players to construct warehouse infrastructures in dry land areas like western Rajasthan where moisture in air during rainy season is very less. The general practice of stocking the imported pulses is very near to seaport godowns or warehouses where already contains moisture. For calculating shelf life of pulses our importers or policymakers have to take into account the agronomic details of pulses of production side of foreign countries *viz*. Date of sowing and harvesting, place and condition under which the produce was stored, etc. all these information needs to be built in strategy of procuring, storing and selling of produce in India.
6. In case of abnormal market sentiments there is general tendency by traders, stockists to create artificial scarcity with the intention to capture windfall gains. Government machinery has to react in the market to clear the rumours in market. So government prompt governance, policies, mechanisms needs to be built or some sort of early warning system needs to be placed. Government should immediately initiate actions to restore normalcy.
7. To cushion price shocks in pulses a financial reserve can be kept as fixed interest instruments. Interest and principal amount earned can be utilised to pay the difference between a standard CIF import price and the normal domestic cost of pulses. So higher import price will not be transferred to market. This will have beneficial effect in two ways. First it protects consumer from bearing burden of higher prices and hence making pulse available even to the economically weaker section of the society. This augments food security programme of the nation. Second, since markets prices are not fluctuating scope for domestic hoarder's declines sharply which is one of the major cause of existing high prices in pulses in market. Due to stabilised pulse price which will ensure farmers a guaranteed market, he will go for pulse production regularly. This will lead to expansion of area under pulse cultivation and thus boosts up the domestic production. Regular income generated by the farmer can also be invested as capital for use of modern technology which will augment yield. Hence over the years our dependency on imports will decline.
8. Linking the producers with processors (mostly millers) or traders by government. Warehouses in India are mostly under private ownership (more than 60%). The distribution is also skewed towards northern region where area under cultivation under pulse is low. Cereals occupy major share in storage. Hence from storage point of view pulse can be said to be neglected. Hence private players need to be encouraged by providing subsidies and other facilities to construction of warehouses.
9. Addition of moisture conservation chemical as one of the inputs provided under Accelerated Pulses Production Programme (A3P). Presently the Kit contains critical inputs such as Gypsum, Micro Nutrient (Zinc Sulphate, Borax, Ferrous Sulphate, Micronutrient Mixture), Rhizobium culture, Phosphorous Solubalising Bacteria (PSB) culture, Urea (for foliar spary), Fungicide for seed treatment namely Carbandzim, Insecticide which are need based chemicals Qoinolphose/Endosulphan/ Carbandezim / Monocrotophose, Pheromone traps and NPV/bio pesticides. One moisture retaining chemical which can be suggested is Hydrogel. Hydrogels are hydrophilic cross-linked polymer chains. They are formed through physical, ionic or covalent interactions. Due to hydrophilicity, hydrogels have the ability to absorb water and swell growing in weight and size. Depending on the hydrogel type they can absorb and hold up to even 1500 times their weight. Similarly, they can release this water. Its efficiency has been proved by various researchers. The low application rate (i.e. 2.5–5.0 kg/ha) of hydrogel is effective for almost all the crops in relation to soil type and climate of India (Kalhapure *et al*. 2016) [18]. Application of this hydrogel for pulses will enhance its yield.
10. Incentives for farmers who are selling their pulse produce in group must be given. There are very few Farmer Producer Organisations (FPOs) of pulses in the country. If pulse farmers can be motivated to form cooperatives then it has several benefits. Since farmers are small and marginal, through these cooperatives can avail inputs at subsidised prices. Since farmers are forming cooperative their size of produce for sale increases and so is there bargaining power for remunerative prices in market. Their harvesting, handling and transportation charges will also turn to be low for individual since it will be on share basis. It also benefits buyer since he his getting large produce at one sale point. Buyer can himself make arrangements to buy produce at farmer's field. A step further, cooperative tenant farming can be promoted since land is augmented they can be provided irrigation facilities by government on the agreement with farmers cooperative that they will grow pulse at least for a season as a sole crop. It will avoid the mobility of farmers

towards cash crops due to availability of irrigation facility. Since now government has started procuring pulses, they may procure from these organisations. Farmers could be supported by universal income support through direct benefit transfer on acre basis in order to purchase inputs before or at the time of sowing. This would help farmers not to borrow loan from private money lenders. This strategy will not only bring scattered small and marginal pulse farmers together but also reduces the rate of farmer's distress sales.

11. Pulses can be brought under Essential Commodities Act (ECA) with presently existing 22 commodities. ECA gives the central government the power for imposition of limits on retail prices of listed essential commodities. Since pulse price fluctuation is one of the major and common phenomenons in market. This policy may bring an end to it. This will stabilize the pulse demand and also the consumer especially poor households which form a major market base for pulse.
12. Government involves huge cost annually in storage of food grains. One alternative is government mediated linkage between farmer producers and buyers. If harvest failure occurs due to seasonal disturbances or insect pest or disease attack then government as a surety from farmers side will pay for buyers loss. If buyer turn out be under loss or shut down as a bankrupt then government will buy those food grains. Quantity to be bought and price will be fixed by farmer, buyer as well as a government agent based on prevailing prices in that area. This price should be in between farm harvest price and wholesale price. This develops a healthy and risk free relationship between farmer producer and buyer. It ensures market for the farmer as well as of raw material to the buyer. Huge amount of government in the form of expenditure on storage of pulses will reduce since government needs to pay only when buyer seller transaction fails. It also contributes in dampening of price fluctuation in pulse market.
13. Minimum support price need to be fed to e-NAM platform as first minimum bid from APMC side. Then all auctions through e-platform would take place at more than minimum bid price. The first bid at MSP level will assure farmer to get reasonable price.

References

1. Agricultural Prices in India, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, various issues.
2. Agricultural Statistics at a Glance, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, various issues.
3. Ali M, Gupta S. Carrying capacity of Indian agriculture: pulse crops. Current Science. 2012; 102(6):874-881.
4. Banik D. The Hungry Nation: Food Policy and Food Politics in India. Food Ethics. 2016; 1(1):29-45.
5. Chand R. Demand for food grains. Economic and Political Weekly, 2007, 10-13.
6. Chand R. International trade, regional Integration and food security in South Asia with special focus on LDCS. UNCTAD and Common Wealth Secretariat, 2012.
7. Chand R, Parappurathu S. Temporal and spatial variations in agricultural growth and its determinants. Economic and Political Weekly. 2012; 47(26):55-64.
8. Charnovitz S. World Trade and the Environment: A Review of the New WTO Report. Geo. Int'l Envtl. L. Rev. 1999; 12:523.
9. Dorosh PA. Food price stabilisation and food security: International experience. Bulletin of Indonesian Economic Studies. 2008; 44(1):93-114.
10. Elumalai K, Sundaram S. Analysis of trends in India's agricultural growth, 2001.
11. FAO R. FAOSTAT database. Food and Agriculture Organization of the United Nations, Rome, Italy, 2017.
12. http://consumeraffairs.nic.in/WriteReadData/userfiles/file/MoU%20Between%20GOI%20and%20Mozambique.pdf
13. http://consumeraffairs.nic.in/WriteReadData/userfiles/file/PSF%20Operational%20Guidellines%20DOCA.pdf
14. http://pib.nic.in/newsite/PrintRelease.aspx?relid=160050
15. Joshi PK, Rao PP. Global and regional pulse economies: Current trends and outlook. International Food Policy Research Institute, 2016, 144.
16. Joshi PK, Rao PP, Gowda CLL, Jones RB, Silim SN, Saxena KB *et al*. The World Chickpea and Pigeonpea Economies Facts, Trends, and Outlook. International Crops Research Institute for the Semi-Arid Tropics, 2001.
17. Kalamkar SS, Atkare VG, Shende NV. An Analysis of Growth Trends of Principal Crops in India. Agricultural Science Digest. 2002; 22(3):153-156.
18. Kalhapure A, Kumar R, Singh VP, Pandey DS. Hydrogels: a boon for increasing agricultural productivity in water-stressed environment. Current Science. 2016; 111(11):1773.
19. Kelley TG, Rao PP, Grisko-Kelley H. The pulse economy in the mid-1990s: A review of global and regional developments. In Linking research and marketing opportunities for pulses in the 21st century. Springer Netherlands, 2000, 1-29
20. Kumari DL, Kumari KS, Public Distribution System in India: an Overview. Indian Journal of Applied Research. 2016; 5(5).
21. Maxwell S. A food charter for the millennium. Appropriate Technology. 1996; 23(2):6-8.
22. McCorriston S, MacLaren D. Parastatals as instruments of government policy: The Food Corporation of India. Food Policy. 2016; 65:53-62.
23. Ministry of Consumer Affairs, Food and Public Distribution, Government of India
24. Poulton C, Kydd J, Wiggins S, Dorward A. State intervention for food price stabilisation in Africa: Can it work? Food Policy. 2006; 31(4):342-356.
25. Press Information Bureau, Government of India, Ministry of Consumer Affairs, Food & Public Distribution
26. Rao PP, Birthal PS, Bhagavatula S, Bantilan MCS. Chickpea and pigeonpea economies in Asia: facts, trends and outlook, 2010.
27. Reddy AA. Consumption pattern, trade and production potential of pulses. Economic and Political Weekly, 2004, 4854-4860.
28. Reddy AA. Pulses production technology: Status and way forward. Economic and Political weekly, 2009, 73-80.
29. Reddy AA, Reddy GP. Supply side constrains in production of pulses in India: Case study of lentils, 2009.
30. Rimal NS, Kumar S, Singh DR, Chahal VP. Sources of Growth in Pulses Production in India. Agricultural Economics Research Review, 2015, 28(1).

31. Sharma D, Jodha NS. Pulses production in semi-arid regions of India: constraints and opportunities. Economic and political weekly, 1982, A135-A148.
32. Singh P, Shahi B, Singh KM. Trends of pulses production, consumption and import in India: current scenario and strategies, 2016.
33. Swain M. Sources of growth and instability in agricultural production in Western Odisha, India. Asian Journal of Agriculture and Development. 2014; 11(2):51-70.