Orphan Food? Nay, Future of Food !
Understanding the Pulse of the Indian Market

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Abstract

Pulses have been an important traditional food crop of India. India is the largest producer and consumer of pulses. However, pulse acreage and yield has not kept pace with the growing demand in India. As a result, India is also the single largest importer of pulses today. While Green Revolution in India focused on cereal crops, pulses remained an orphaned and neglected crop. However, from the triple perspective of economy, environmental sustainability, and provision of balanced nutrition; pulses have now been recognized as the future of food. India can substantially increase her production and yield in pulses with a strategic emphasis on research in public and private sector, expanding irrigation infrastructure, provision of MSP to pulses, assured procurement by government for PDS/MDMS, facilitation of mini *dal* mills and storage at village level, and allowing futures markets to function. Price stability for consumers can also be attained by reduction in middlemen margins through modern warehousing, FDI in wholesale and retail trade, introducing competition to APMC markets, and substantial reduction in import tariffs on substitute products such as chicken.

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1. Motivation

It is being said that this century will belong to India. As one may know, India has been the fastest growing economy in the world in the recent past and continues to do so. This phenomenon contrasts in bold relief, especially in the backdrop of quite a few world economies witnessing negative growth and some others reeling under recession. And, it is not just about the economy alone. On the cultural front, United Nations (UN) has acknowledged India's contribution in promoting healthy lifestyle by instituting 21 June as the International Yoga Day. Moreover, UN General Assembly has also declared year 2016 as the International Year of Pulses, marking every day of this year a celebration of the humble Indian crop. Furthermore, Food and Agricultural Organization (FAO) has been nominated to facilitate implementation of the year in collaboration with governments, non-governmental organizations, and other stakeholders. This acknowledgement of pulses perhaps gets underscored by the fact that a year-long equivalent celebration of yoga will take 365 years! In fact, simultaneously, Global Pulse Confederation (GPC) has also taken the lead to christen pulses as the Future of Food. As is being brought out in this paper, it is significant to note that pulses are important from a triple perspective of economy, environmental sustainability, and provision of balanced nutrition.

In Section 2 that follows, I bring out the historical importance of pulses to India and her premier position in the global production, consumption, and imports. Thereafter, in Section 3, I discuss why pulses have often been termed as orphan food and why they show a big promise to be termed as the future of our food. Having described the importance of pulses, Section 4 presents the economic policies that the country may want to pursue to bring price stability and substantial increase in the production and consumption of pulses. Finally, I close with the concluding observations in Section 5.

2. Historical Perspective and India's Global Position

Historical Perspective

We live in an interconnected world. Over the millennia, international trade in agricultural products has led to exchange of many fruits, vegetables, and grains across the world. For example, potatoes, tomatoes, and maize that were native to the Americas were introduced in India when Portuguese arrived in the 15th century. Similarly, while olive (oil), dates, grapes, arrived in India from the West Asian countries; cabbage, spinach, and beetroot arrived from Europe, Iran and Iraq; respectively. Among many agricultural commodities that are native to India, except perhaps chickpea (chana) most pulses such as pigeonpea (*tur dal*), black gram (*urad*), green gram (*mung*), field beans (*waal*), moth beans (*matki*), horse gram (*kulith*) belong to the Indian subcontinent (Nene, 2006). These pulses are the dried seeds that are found encapsulated in the pods of leguminous plants. The name '*tur dal*', for example, is derived from two Sanskrit words *Tuvar* which means astringent in taste and '*dwidal*' which means dicotyledon. One also finds references to pulses in the ancient Indian treatise *Kashyapiya Krishi Sukti* written in circa 800 C.E., where the agronomist of those times, Kashyapa, mentions two kinds of pulses, the ones with larger seeds that are sown in one line and the ones with smaller seeds that are moistened and sown by broadcasting (Ayachit, 2002).

India's Global Position

Given that many pulse varieties are native to India for centuries, it is not surprising that India is the largest producer of pulses in the world. Out of about 74 million tonnes of pulses produced in the world (FAO, 2016), India produces 18 million tonnes accounting for 24 per cent of the world production. The second largest producer, Canada does not even come closer to double digits with a production of 5 million tonnes accounting for 7 per cent market share. Clearly India stands out in terms of absolute levels of pulse production in the world. However, the current level of India's pulse production has been achieved at a very slow average growth rate of 1.5 per cent per year since 1960s. The domestic demand, on the other hand, has grown manifolds over the same period due to rapid increase in per capita income and population.

If India is the largest producer of pulses, she is also the largest consumer of it. In fact, as a result, India is also the single largest importer of pulses in terms of quantity and market share. For example, while India imported hardly any pulses in the 1960s; in the fiscal year 2015-16, her total consumption of pulses was 23 million tonnes and it had to import more than 5 million tonnes over and above her domestic production. This accounted for a lion's share of about 32 per cent of total imports worldwide. In the previous fiscal year 2014-15, the value of imports was a staggering $ 4 billion (ET, 2016). The shortage of pulses in India has now prompted India to secure pulses from African countries such as Mozambique on a 3-year contract till 2018-19. A similar arrangement may be on cards with Myanmar in the near future. In contrast to India, however, countries such as Australia, Niger, Canada, and Myanmar which had had a meagre production of pulses in the 1960s have achieved average annual production growth rates of 18.5 per cent, 17.6 per cent, 12 per cent, and 7 per cent, respectively. As a result of these sustained high production growth rates, today these four countries account for about 15 million tonnes of production, which is only a tad less than India's production of about 18 million tonnes.

3. The Orphaned Food is the Future of Food

The Orphan Food

Orphan food is defined as the food crop that is largely grown and used locally by communities, is an important crop in some regions, but not traded in large quantities around the world. Importantly, it receives little attention from research networks which traditionally have focused on extensive and intensive growth of main staple foods such as wheat, rice, and maize (GPC, 2016a). Many indigenous food crops from the developing countries that remain unrecognized for its sustainable growing practices and nutritional values fall under this classification. In the post-independence era, particularly in the decade of 1960s and 1970s agronomists focused their attention on development of high yielding varieties (HYV) of wheat and rice through technology transfer and extension services. Their efforts and the outcome, popularly known as the Green Revolution, was characterized by introduction of HYV seeds, extensive use of fertilizers, herbicides, pesticides, and the spread of irrigation. This integrated approach led to substantive increase in food grain production and yield. It is illustrative to know that during the period 1960 and 2013, while wheat production in India increased from about 10 million tonnes to 95 million tonnes, pulses production increased only

from about 12 million to 18 million tonnes. In percentage terms, these changes in wheat and pulses production amount to a contrasting 850 per cent and a 50 per cent increase; respectively.

It is also no surprise that yield levels of pulses have remained almost stagnant. For example, while the average yield for *tur dal* during the years 1960-1965 was 667 kg/ha, it only marginally increased to 695 kg/ha during the years 2010-2014 (IIPR, 2016). Since 1990s, however, developed countries such as Canada, US, and Australia have invested heavily in world-class breeding programmes to bolster pulse yields. The newer varieties have been created to adapt to their respective agro-ecology. As a result, for example, the yield levels for lentils in Canada, Australia, and US are as high as 1633 kg/ha, 1559 kg/ha, and 1457 kg/ha; respectively (FAOSTAT). Clearly, pulses have turned out to be the classic case of an orphan food in India even while developed countries have surged ahead both in terms of production and yield.

The Future of Food

From the decade of 1960s onwards, with the mounting pressure to feed millions of people, India had no choice but to go ahead with Green Revolution, the side effects of which surfaced about a few decades later. Constant use of NPK fertilizers, generous applications of pesticides and herbicides, and excessive use of water led to problems such as increase in salinity of fertile lands, appearance of chemical residues in foods, and ground water contamination and depletion. Moreover, rapid industrialization made matters worse with problems of environmental degradation reaching alarming proportions. Therefore, environmentally damaging agricultural practices also started getting increasingly challenged. Furthermore, too much dependence on cereal consumption at the cost of traditional coarse grains and pulses had caused nutritional imbalance in consumption in developing countries.

Many of the concerns expressed above can best be addressed by promoting orphan foods such as pulses. In fact, the leguminous plants that produce pulses seem to be the future of food crops for quite a many reasons. Currently, a significant proportion of the greenhouse gas emissions are caused by nitrogenous fertilizers that are required to be produced as inputs for food crops. In comparison, leguminous plants require much less nitrogenous fertilizers as they create their own fertilization by pulling nitrogen from the air and fixing it into the soil.

Thus, pulses leave a very low carbon footprint (GPC, 2016b). Moreover, leguminous crops can be effectively grown in poor soils, their nitrogen fixing property increases soil fertility, beneficial microbes left behind by the legumes help increasing productivity of the subsequent crops (crop rotation), and intercropping with other crops helps maintain biodiversity as well. The forage of the pulse crops is also a very effective animal feed. Leguminous plants conserve water. They extract water from shallower depths, leaving more water deep in the soil for other crops. This makes them well-adapted for drought prone, semi-arid regions. Importantly, these plants show a remarkably efficient use of water. As an important source of protein, 1 kg of *dal* requires only 50 litres of water, whereas 1 kg of chicken, mutton, and beef requires 4325 litre, 5520 litre, and 13,000 litre of water; respectively. Besides, unlike fruits and vegetables, pulses can be stored for long periods of time with minimal wastage (FAO, 2016).

Researches over the last few decades confirm that pulses are an extremely healthy food. Food scientists vouch for high nutritionally balanced content of pulses. Pulses are high in protein, fibre, various vitamins, minerals, antioxidants, and provide essential amino acids as well. They are also becoming a healthy substitute to animal protein, for meat products contain high levels of cholesterol, saturated fats, and are deficient in fibre. While soluble fibres in pulses prevent absorption of cholesterol and other toxins by binding them in the gut, non-soluble fibres contribute to roughage for effective bowel moment. Presence of antioxidants in pulses contributes to prevention of degenerative diseases. Moreover, unlike cereals, pulses are not only gluten-free but when consumed in combination with cereals, they also improve the protein quality and its absorption. Similarly, when pulses are consumed with vitamin C (read lemon juice or tamarind), they facilitate better absorption of iron and folic acids. Many traditional Indian preparations such as *pithala-bhakri*, *idli-sambar*, *dal-chawal*, *rajma-rice*, *waran-bhat* , *bhel-puri*, *dal-dhokli* are particularly suited for efficient use and absorption of nutrients, for the recipes include a combination of pulses and cereals. It is no wonder that GPC calls pulses the Future of Food and UN General Assembly has declared 2016 as the International Year of Pulses.

4. Economic Policy for Pulses

Shortage, Prise Rise and Need for Increased Production

The shortage of pulses in India has caused its domestic prices to rise much faster than the average inflation rate. Retail price of *tur dal* reaching a high of Rs. 200 a kg in the recent past is a clear signal of strong mismatch between domestic demand and domestic supply. The excess demand is being met by huge quantities of imports. Global market for pulses is thin. Although volume of pulses traded globally is small, India is the largest importer accounting for more than 30 per cent of import share. As a result, whenever India tries to import, international prices rise. Therefore, value of India's yearly imports has been worth more than INR 250 billion causing a big drain on the foreign exchange. Looking into the future, it is estimated that there will be a requirement of at least 70 per cent increase in food production the world over by the middle of the century. A disproportionately large share of this increase in demand will be from India. Importantly, this rise in production must happen by ensuring both environmental sustainability and provision of nutritionally balanced foods. Therefore, there is an urgent need to proactively promote pulses production in India in the foreseeable future. The imbalance caused due to government support to cereal crops over the past many decades may have to be corrected.

Focus on Research, MSP, Irrigation, and Cropping Pattern

Research focus may now have to be concentrated on pulses crops. While economist agree that a country must produce and export goods in which she has comparative advantage, no one disputes the fact that comparative advantage itself can be improved upon by research in academic institutions. Substantive yield increase in pulses must now be the priority for the agricultural research institutions in India. From 2009 onwards, attempts have been made through programmes such as the National Food Security Mission (NFSM) and the accelerated pulses production programme (APPP or A3P). However, yield gains have been marginal. Perhaps India needs newer iconic substitutes to Dr. Swaminathan or Dr. Norman Borlaug who revolutionized production yields for wheat and rice in India. Government support in terms of funding for research and agricultural extension services will be very crucial for this purpose. Fortunately, advances in the genetically modified (GM) foods have allowed scientists to come up with crops that can have specific features requiring fewer pesticides,

fertilizers, and which can have higher yield even in arid regions. While government may encourage research in public institutions, it must also be complemented by protection of intellectual property rights (IPRs) of private biotech firms. After all, many successful GM crops in cotton, soybean, tobacco and a few others have been brought to the market by private firms. Strict protection of IPRs ensures that private firms will have sufficient incentive to invest in research on newer GM varieties of pulses. Of course, India has not allowed GM foods so far; however, it is not going to be long before necessity has to bear invention in pulse crops.

While economist do not generally suggest any government intervention in market prices, minimum support price (MSP) for pulses may have to be implemented for a substantial number of years to incentivise farmers to produce pulses. In the tell-tale presence of strong positive externalities in terms of environmental sustainability, nutritional security, and food security, offering MSP to pulses for a substantial number of years is very much justified. MSP, however, by itself will not be sufficient to increase acreage under pulses production. As reported by CRISIL (2015), only 16 per cent of the total acreage in India under pulses in irrigated. This number is as low as 8.7 per cent in states like Maharashtra. In contrast, 58 per cent of land under food grains cultivation is irrigated. Clearly, MSP must be complemented by spread of canals and check dams that will increase both acreage and productivity of pulses. Fortunately, there is a shift in government thinking away from giving subsidies on agricultural inputs. These subsidies should, instead, be spent on irrigation infrastructure for the pulse crops, especially in the arid regions. Moreover, while it is understood that intercropping, crop rotation, and relay cropping in pulses results in maintaining bio-diversity, efficient use of inputs, increased yields; there is substantial scope for planting of pulses during the fallowing period after rice harvesting. This is particularly relevant in the Eastern region of India including but not limited to states such as Bihar, West Bengal, and Assam. Information extension of this nature to the farmers through agro-economic research centres will increase acreage as well as yields, especially in Eastern India.

Government Procurement, storage & processing, and Futures Market

A sustained procurement of pulses at MSP by Food Corporation of India (FCI) for distribution through public distribution system (PDS) or targeted PDS will also ensure that farmers are incentivised to produce pulses. Traditionally, only wheat, rice, and perhaps sugar have been sold through PDS. Currently, state and central government schemes such as *Anganwadi* and Mid Day Meal Scheme (MDMS) are expected to provide nutritious cooked food to children in government pre-primary and primary schools. For the provision of *chana-chikkis* and prepared *dal*, state and central governments may want to procure pulses on a sustained basis through Food Corporation of India (FCI) for MDMS purpose. Support by government for procurement of pulses for Anganwadi, MDMS, and PDS at MSP will ensure that there is enough incentive for farmers to grow pulses. This would help increase acreage and production of pulses in the country.

Another reason why farmers are wary of growing pulses is that there are no good processing and storage facilities at the village level. If farmers have the option to processing and storing dried pulses at village level, their bargaining power would be much better vis-à-vis traders and bulk processors. For example, in 2013, International Crop Research Institute for Semi-Arid Tropics (ICRISAT, 2016) developed a mini *dal* mill for 20 women of the Garima self help group (SHG) from Padasoli vollage near Jaipur in Rajasthan. The mini mill converts harvested whole *tur dal* into market-ready dried split *tur dal*. The husk of the crop separated during the processing gets used by the women as fodder for the livestock, and, the dry stalk of the legumes gets sold as fuel wood. As a result of this development, the women's income has doubled. Thus, facilitating mini *dal* mills and storage facilities locally may provide the just needed incentive for farmers to grow pulses.

Concurrently with its own efforts, government must allow farmers and traders to buy and sell pulses in the futures market on commodity exchanges such as National Commodity and Derivatives Exchange (NCDEX). For decades, whenever pulse prices have soured high, the populist and immediate response of the governments has been to ban exports, ban trading of pulses on futures markets, limit stockholdings by traders, and raid alleged 'hoarders' who store pulses. These populist practices do not help solve the problem of supply shortages in the long run. Unlike fruits and vegetables, pulses can be stored. Therefore, stockpiling by traders offers time utility to pulses. On the one hand, sufficient demand by traders during

harvest season prevents prices from dipping too low, and, on the other, release of stocks in a staggered manner ensures that pulse prices do not skyrocket prior to the following harvest. Similarly, banning futures market for pulses like *chana* or *tur dal* also does not help. In fact, futures markets provide price discovery mechanism to farmers and traders. High futures prices offer a message to farmers to produce more pulses for the next season. Banning futures market tantamounts to the proverbial shooting of a messenger who faithfully delivers a message of an impending situation.

Reduce Margins and Tariff on Substitutes

While the farmers can be encouraged to produce more pulses through improved technology, higher wholesale prices through MSP, public procurements for PDS/MDMS programmes, access to mini *dal* mills, and allowing a vibrant futures market; it does not mean that this will happen at the cost of higher retail prices for the final consumers. For example, if the current retail price of *tur dal* is about Rs. 200 per kg, the farm-gate price or the unit wholesale import price would be about Rs.50 per kg. It is always possible to shrink the gap between the retail and farm-gate price. As reported by Deodhar, Landes, and Krissoff (2006), marketing costs and marketing margins of middlemen account for about 50 per cent of the price paid by consumers at the retail level. These costs and margins of the middlemen can be compressed by efficient distribution channels and modern warehousing by allowing foreign direct investment (FDI) in wholesale and retail markets, and, by introducing competition to Agricultural Produce Marketing Committee (APMC) *mandis* through private markets.

Finally, retail prices for consumers can also be brought down by yet another policy. As reported in the recent survey conducted by the Registrar General of India (IE, 2016), at least 30 per cent of Indians are vegetarians. For this population, pulses are an important and staple source of protein. But this also means that remaining 70 per cent of the Indian population has the luxury of being non-vegetarian. This population can choose chicken and/or pulses as close substitutes for its protein intake. Unfortunately, however, one has to pay a relatively high price for chicken, for tariff on imports of chicken products in prohibitively high. For example, India has imposed 100 per cent tariff on imports of fresh, chilled, and/or frozen cut chicken products (MF, 2016). Further, after accounting for countervailing duty, additional countervailing duty, and educational cess, the total tariff amounts to 125 per cent. Under the auspices of the World Trade Organization (WTO) almost all countries including India have

lowered their tariffs significantly. Today, standard tariff rates on imports in India are about 5, 10 and 15 per cent with an occasional high duty of about 30 per cent. In contrast, a 125 per cent tariff on chicken products is prohibitively high which seems to keep chicken out of bounds of an average Indian. And, this puts pressure on prices of pulses. Therefore, it is suggested that tariff on chicken products be substantially brought down.

5. Concluding Observations

Pulses have been an important traditional food crop of India and she continues to dominate the world market in terms of total production, consumption, as well as imports. With rapid economic growth, while production and consumption of food products in general will rise, it ought to rise significantly for pulses. First, the economic importance is obvious as India cannot afford to continue to import large quantities of its staple consumption item which amounts to billions of US dollars. Second, India must focus on increase in production of pulses in comparison to cereals such as rice, wheat, and maize, for leguminous plants which produce pulses are environmentally sustainable. They require less water, leave much lower carbon footprint, and increase soil productivity for other crops. Third, as compared to any other food crop, pulses also offer the much needed balanced nutrition in terms of protein, fibre, amino acids, minerals, antioxidants, and other micronutrients.

To increase production and consumption of pulses, governments may have to take a strategic view on emphasizing research funding to agricultural research institutions for increasing pulse yields, both for arid and irrigated lands. The new GM technology may have to be catapulted to lead the next Green Revolution in pulse crops. In this effort, private biotech firms will have to be allowed to play a significant complementary role. And this will boil down to strict protection of IPRs of the private firms. Of course, development of irrigation infrastructure, sustained offering of MSP to farmers, assured procurement from government for PDS and MDMS, and allowing commodity futures markets for pulses may help farmers to increase acreage and production of pulses. Facilitation of mini *dal* mills at local levels will also enhance farmers bargaining power and income paving the way for higher pulses production. From the consumer perspective, improvement in supply chain logistics in terms of modern warehousing, eliminating margins of middlemen through better competition to APMC markets and allowing FDI in wholesale and retail may help shrink the gap between

farm-gate price and the retail price. Finally, substantive reduction in prohibitive tariffs on imports of chicken products may reduce the pressure on retail prices of pulses.

Pulse crops are important from the triple perspective of economy, environmental sustainability, and provision of balanced nutrition. If the techo-economic policies referred above are implemented on a sustained basis, the orphaned food crop of today will certainly become the future of food. Let us hope the International Year of Pulses motivates all stakeholders; farmers, scientists, traders, consumers, economist, and the government administrator understand the pulse of the Indian market.

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