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A REVIEW

Pulses: In need of more attention

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Pulses are an integral part of many diets across the globe. Pulses have great potential to improve human health, conserve our soils, protect the environment and contribute to global food security. The diversified agro-climatic condition in India positively supports variety of pulses in various regions. Pulses are grown in on area of 22-23 million hectares which has an annual production of 13-18 million tonnes. There is always a gap between actual yield and potential yield. This gap bridging would substantially increase country's pulses production. The potential areas of pulses may be identified and if provided with technological support then the area under pulses will be showing an upward trend.The total pulses production in the country is almost static although substantial productivity improvement in many of the pulse crops has been made. The static production of pulses is mainly due to poor adoption of improved varieties and production technologies by farmers. Even though pulses have high export value, we are importing pulses in order to meet the internal demands, as India is the largest producer as well as consumer of pulses. The instability in production has to be improved upon to meet the growing demands by using the emerging technologies.

Key words : Demand, Supply, Growth, Productivity, Pulses scenario, Yield gap

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Pulses are an important component of foodgrain crops. Because of the high nutritive value of pulses, they form an important part in the balanced diet. Pulses are considered as principal source of protein in India. In fact India is the largest producer as well as consumer of pulses. So far they have been a foremost source of protein for people, as meat is too costly for most of the population. India grows such a wide variety of pulses, which none of the other countires in the world grows. Pulses include grams (Chana), Arhar or Moong, black gram (Wad), lentil (Masur), peas (Matar) etc. They are grown all over the country, excluding areas with profuse rainfall. These are predominantly rain-fed crops. But the average productivity in India is lower than other pulse growing countries. Being leguminous, these plants help in reestablishing the fertility of the soil and are hence, grown in alternation with other crops. Pulses also play an important role in dairy farming, as cattle feed of straws and hay of cereals are deficient in lysine, whereas legume hay is rich in aminoacids (Singh, 1998)

In India,'gram' is the major pulse and occupies around two-fifth of the total area under all the pulses. The two rich nutritious legumes of Indian diet, the Bengal gram or Kabuli Channa in Hindi (botanically called as *Cicer arietinum*) called as chickpea and red gram or arhar in Hindi (botanically, *Cajanus cajan*) called as pigeonpea. The name itself keeps us puzzled. Pulses never were an essential part of the European diet, as they considered it as an inferior grain. They used to feed arhar to pigeons and chana to chickens, which reveals the curious reason for the molding of these names.Gram is basically raised as a *Rabi* crop particularly in those

areas that receive rainfall less than 10 cm during the winter season. At times, gram is sown mixed with wheat and it is basically the crop of central and northern India. Other pulses like tur, Urd and Moong are grown as *Kharif* crops almost in every part of the country. In northern India, Khesari and Masur are raised as *Rabi* crops. These crops are leguminous and they fix atmospheric nitrogen in soil. Thus, they are usually rotated with other crops to maintain fertility of soil. The support prices should also be evenly captivating. Even so, the only optimistic change is the introduction of a short duration third crop of Moong and Urd, which can be grown as post-*Rabi* crop. Situation can be bettered if new varieties are developed with higher yields.

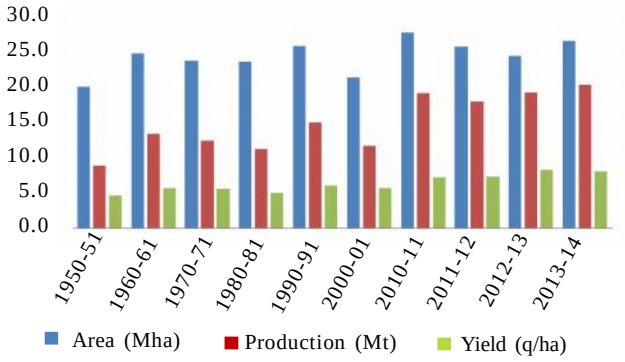
Importance of pulses :

After independence, we did not accord the importance to pulses which it deserved to be given among the basket of crops. Pulses production and consumption are important in maintaining food security. The emphasis of increasing pulses production on lines with rice and wheat was always missing. The concept of food security was confined only to boosting wheat and rice production. It is because of this negligence, the country is facing shortage of pulses now. A balanced diet is one which has emphasis on carbohydrates as well as pulses. Pulses occupy an important place in human diet. So production of pulses should be emphasized more so as to bring it at par with the production of rice and wheat (Joshi and Saxena, 2002). Pulses contain more protein than any other grains and vegetables.

India‘s pulse production :

For several decades India‘s pulses production remained almost static. The main reason for which is the failure of policy makers to bring out plans and strategies to boost domestic production of pulses. Agricultural research programmes were more confined to wheat and rice, as not much money came in for the research of pulses. There were no major breakthrough in pulses production for a simple reason that pulses research were not accorded the equal importance to wheat and rice. From the farmer’s point of view, the long duration of crops, susceptibility to pest and diseases, lack of certified seeds were the reasons which lead them to avoid cultivation of pulses, or finding it difficult to fit pulses in the usual cropping pattern (Byerlee and White, 1997; Joshi *et al*., 2000 and Chand, 2000).

Increasing productivity of pulses does not only depend upon improved varieties. It has also a lot to do with the enabling environment the government provides by way of assured markets and assured prices. Once the cultivation of pulses become attractive, farmers will also show interest in pulse cultivation. India‘s pulse production during the last five years varied in the range of 11 to 15 million metric tones. Normal area under pulse cultivation has been growing rapidly partly to improve soil condition and for better earnings prospects. The area under pulse cultivation is 12.85 million hectares and yield range anywhere between 600 to 1200 kg per hectare. Pulse production is estimated to cross 15 million tones which will account for 62 – 67 per cent of world pulse production.Given its strong production pattern and consumption profile, the country plays a major role in the world pulses market. Madhya Pradesh is the largest producing state of pulses in India, followed by Uttar Pradesh, Rajasthan, Karnataka, Andhra Pradesh and Bihar.



Source: Department of Agriculture and Co-operation, Ministry of Agriculture, Govt. of India

Fig. 1: Decadal growth of pulses on all India basis for area, production and productivity

Major bottle necks in pulses production :

Pulses cultivation in India is adhered with extremely low productivity mainly because of factors related to inputs and their efficient management. The increase in gross productivity can be achieved by fine tuning of management aspects and thereby increasing total system productivity and sustainability. The unfavourable weather conditions leads to late sowing of legumes. It causes reduced length of growing period. Reduction in growing period makes the crops to sustain cold injuries at early

vegetative period, which freezes all biological activities for a prolonged period. A sudden rise in temperature after that induces forced maturity but also invites several biotic stresses like pests and diseases (Ali and Gupra, 2012 and Reddy, 2009). Pulses crop prefer neutral soil reactions and are very sensitive to acidic, saline and alkaline soil conditions. Abnormal soil conditions of Indian soils leads to deficiency of micronutrients to an acute shortage level. Acute deficiency with respect to zinc, iron, boron and molybdenum and that of secondary nutrients like sulphur particularly in traditional pulse growing (Singh *et al*., 2013) tract. Improper sowing time, low seed rate, defective sowing method, insufficient irrigation, inadequate intercultural operations without proper management are major agronomic constraints (Ramakrishna *et al.*, 2000 and Reddy, 2009). Consequent upon delayed planting, early encounter with severe cold, growth and development of crop gets hampered for a considerable period. Subsequently plants get comparatively less time to complete their lifecycle leading to forced maturity (Ramakrishna *et al*., 2000). Timely availability of quality chemical fertilizers continues to be a major problem in many pulses growing area. Lack of high yielding varieties, low harvest index, high susceptibility to diseases and insect pests, flower drops, lack of short duration varieties, intermediate growth habits, poor response to inputs and instabilities in performances are the few of the varietal constraints which needs immediate attention. Due to the lack of viable strategy to control the potential menace of blue bulls attack on the pulse crop, the farmers of Indo Gangetic plains are leaving the potential area of pulse cultivation, uncultivated. Farmers engaged in pulses cultivation are mainly with poor resource base, having low risk bearing capacity and are, therefore, have less access to credit. Delivery of improved technology, inputs, credits need to be stream lined through appropriate policy interventions. Benefit of crop insurance need to be extended to pulses farmers.

Approaches for improving production of pulses :

Pulses are invariably subjected to abiotic stresses leading to sub-optimal nutrient uptake; farmers tend to use low doses of fertilizer nutrients. Further, nutrient use is unbalanced and seldom based on soil-test values. However, wide spectrum of agro-climatic conditions, favorable thermal regime for almost year round cropping and availability of generally adequate rainfall point to the fact that there is a vast untapped potential for improving productivity of pulses and bringing additional area under pulses. The approaches which can be potentially used for improving production of pulses include, (1) Promotion of sequential cropping and intercropping, (2) Promotion of quality seeds of promising varieties to farmers in adequate quantity and at the right time, (3) Opportunities to increase crop productivity by adopting better crop management practices makes pulse cultivation more efficient, (4) A balanced nutrient management to overcome the deficiency of micronutrient status in the potential pulses growing tracts of India, (5) Innovative ways to aggregate the scattered pulse growers and linking them up for improving the quality of inputs and finding better marketing of the produce, (6) Adoption of deep ploughing, ridge planting, line sowing, inter-culture operations etc besides, mechanization contributes to timeliness of operations, reduces cost of production and improves resource use efficiency (Patel *et al.*, 2014). (7) Pulses crops are invariably grown under moisture stress which leads to sub-optimal productivity levels. Scientific scheduling of irrigation, an estimate of quantity of water to be applied and deployment of water saving irrigation methods can lead to enhanced yield, higher water and nutrient use efficiency and larger area coverage under irrigation, (8) Efficient utilization of rice fallow lands with suitable short duration varieties of pulses which brings 3 to 4 million ha additional area under *Rabi* pulse cultivation, (9) Policy intervention is needed to make pulse cultivation a lucrative one.

Export import scenario :

The production of pulses has lagged far behind consumption since 1995. In 2014-15 crop year (July-June), the pulses prices rose sharply in October because of around two million tonne fall in domestic output due to deficient monsoon. Due to stagnant annual domestic output at 17-18 million tonne, the country had been importing 3-4 million tonne. The retail prices of arhar or tur rose to Rs. 200 per kg in October which has moderated to an extent after the government's intervention through imports and actions against hoarders. In the current scenario, a three-pronged strategy focusing on yield, insurance and price can augment domestic production of pulses and India can attain self-sufficiency in pulses production. Supporting weather-based price insurance for pulses, the relevant insurance policy needs

to be 'more effective' since the climate risks faced by farmers are very high with erratic rainfall that adversely impacts pulse cultivation.

Depending on the domestic shortfall in pulses production, India's imports of pulses have ranged from 1 mt to 3 mt while exports are one-tenth of the volume of imports. Imports of pulses increased from 0.58 mt to 3.1 mt between1994-96 and 2007-09 and are projected to increase to 4 mt by 2020. The share of peas, chickpeas, pigeonpea and Moong was higher in total imports. Peas, chickpeas, pigeonpea and beans showed increase in imports during 2007-09 to 2014-15. India also has a comparative advantage in the export of lentils, as it has been the largest export item among pulses during the last 10 years. Pulses shortfall may increase to 6.8 mt by 2020-21 and the anticipated increase in per capita consumption of pulses is from 9 kg per year 2007-08 to 10.9 kg by 2020-21 overall, India needs to increase domestic production of peas, chickpeas,beans and pigeonpea as substitutes for surging imports and lentils for export promotion.

The growth rate of pulses production is just 1.52 per cent in the 1980s and 0.59 per cent in the 1990s. It has significantly increased to 3.42 per cent during 2001-08. Growth rate in the total area under pulses was negative both in 1980s and 1990s, while it was positive during 2001-08 growth in yield of pigeonpea has been significantly higher 2.74 per cent during recent years, due to wider adoption of long duration varieties. While rapid growth in the production of chickpea has mainly been through wider growth area in south India with the expansion of area under rice fallows, the growth rate in yield and area in case of other pulse crops is still quite low.

Conclusion :

In short, to increase the area and production of pulse crops, we need crop specific and region specific approaches, which should be adopted in the overall framework of systems approach. The major thrust areas to be addressed are as follows: (1) Replacement of cereal crops in the prevailing rice-wheat cropping systems with high yield varieties of pulses. (2) Inclusion of short duration varieties of pulses as catch crop. (3) Development of multiple diseases and pest resistant varieties. (4) Reducing storage losses and improving market information and infrastructure. (5) Developing high nitrogen fixing varieties, which will play a crucial role in sustainable agriculture and (6) Co-ordination of research, extension and farmers to encourage farmer's participatory research. Totally 3.2 million tonnes of additional pulses can be produced by extending pulses area to rainfed rice fallow lands, replacing low productive crops and summer fallows. Hence, the respective state governments may take necessary action to increase pulses production by providing technological and institutional support.

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