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Dynamics of Pulse Production in India: From farmer's perspective!

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Abstract

India is the largest producer and consumer of pulses in the world, accounting for about one fourth of global production, 27 per cent of global consumption and about one third of the world's area under pulses. The growth rate of area and production of pulses are unable to match that of cereals, such as wheat and paddy, due to wide variability in their yield. Over the last decade the price of pulse crops has demonstrated a rising trend but the area under such crops has not increased in accordance. The objective of the present study is to explore the growth and dynamics of area, production and yields of major pulses in India and analyze their responsiveness to selected variables using pooled regression analysis. Special focus is placed on the recipients of gains from price increase over the past decade and the causal factors for reluctance of farmers to increase the area under pulses cultivation. The results of the study establish that there is a large discrepancy between the market price of pulse crops and the returns that accrue to farmers. Moreover, factors such as high dependence on rain, lack of improved inputs and capital further exacerbate the situation and compromise the growth of pulse crops leading to low returns and lack of incentive for cultivation.

Keywords: Agriculture, FHP, Retail Prices, Pulses, Yield

Background

Pulses are important food crops and nutritional security for a country and particularly for India due to major vegetarian dominant of population. it plays a vital role in farming in all over the world, as moreover have a positive effect on soil, and climate, its natural qualities such as nitrogen fixing and are cited as not only the main source of protein but its residue is said to be a very important source of high quality livestock feed in India.

India accounts for over one fourth of the total world area and occupies the foremost position in global pulse production and accounts for 25.5 percent of the world output (DES, 2016). The production level of the country is matched by high consumption levels which stand at 27 percent of world consumption causing the country to engage in high levels of import at 14 percent. Gram is the main pulse which accounts for 40 percent of the total production and after that it is tur/arhar at around 15 to 20 per cent followed by urad/ black gram and moong/ green gram at about 8-10 per cent. Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh and Karnataka are the top five pulses producing states in India.

Despite its importance and role, in the Indian agricultural sector, the country was unable to increase production and productivity of pulses many folds. It has been very rightly shown by the Santa Kumar committee report that although the MSPs have been announced for around twenty three crops but still the effective price support benefits mostly wheat and paddy. Whilst the country has shortage of pulses, but its price was frequently goes below the MSP (minimum support price), so it has not possible, increase in production and productivity, without effective price relies. Over the past few decades the area under the cultivation of pulses was around 0.08 percent which is lower than paddy (0.58 percent), wheat (1.7 percent) oilseeds (1.4 percent) etc.it is pertinent to mention that the yield of pulses was noticed very voltaic in last four decades(Singh and Renu, 2009).Growth rate of production is less than one percent during the last four decades (1970 to 2010), which compared to the population growth of the country is negligible leading to a major fall in the per capita availability for production from around 60 grams per day in the 1950s to 40 grams in the 1980s and around 35 grams per day in 2000s. This decline has not been seen in consumption mostly due to the import of pulses 50 grams per day in 2012-13 compared to less than 40 grams prior to 2012-13.This discrepancy has led to increased imports of pulses which stood at India imported about 4 million tonnes of pulses during 2012-13. Despite being the world's largest producer of pulses nonetheless only small exports of pulses are taking place from India, because of restrictions on exports and the high domestic demand.

Table 1: Demand and Supply Balance Sheet (or outlook)for Pulses (000 tonnes)

Total pulses	2010-11	2011-12	2012-13	2013-14
Production	18,240	17,090	18,340	19,770
Imports	2,780	3,500	4,010	3,500
Total supply	21,020	20,590	22,350	23,270
Total Export	209	175	200	200
Domestic Consumption	20,811	20,415	22,150	23,070
Total consumption	21,011	20,590	22,350	23,270
per cent imports to Production	15.2	20.5	21.7	17.8

Source: Agricultural Outlook and Situation Analysis Reports for different Years

The Demand-supply balance sheet (outlook) for pulses is provided in Table 1. Generally, prices is known as area pulling factor, which helps in diversifying the crops, nevertheless in table has observed in recent years have seen a constant and persistent increase in prices which has not been supported to Production. of pulses. Stagnant production (I think you are taking about production) is declining availability has generated a large discrepancy between the demand and supply of pulses. This situation has important implications for the country's foreign policy and nutritional security. Rising prices and scarce availability has adverse effect on the nutritional security of a large section of the population all over the world as it is not only cheap but it is also cited as one of the most important source of protein.

It cannot be denied from fact that pulses are very important crops in terms of nutritional and protein security of the nation. Domestic production of pulses is not matched the demand of India although efforts have done through price policy in last decade (Producer consumer gap need to minimize). Present study mainly focused on growth rate of production, yield and area in last decade and decomposing the growth of production. Farther study determines the responsiveness of inputs to yield and analyses why farmers not increase area und pulses when high prices was fixed spired in last decade.

Data and Methodology

The plot wise data used in the study, it has been collected from the "Comprehensive Scheme for Studying the Cost of Cultivation (CoC) of Principal Crops", Directorate of Economics and Statistics, Ministry of Agriculture, Government of India. Directorate of Economics and Statistics also publish monthly retail price data of different commodities by market. In the study, we were compiled monthly market wise data and estimate year wise national average. The compound growth rate of area, production and yield of pulses were estimated for selected periods of time. Compound growth rate was estimated with the following exponential model.

$$Y = ab^t$$

$$\text{Log } Y = \log a + t \log b$$

$$\text{CGR} = (\text{Antilog } b-1) \times 100$$

Where,

t = time period in year

Y = area/ production / productivity

a & b = Regression parameters and

CGR = Compound growth rate,

To measure the relative contribution of area and yield in the total output change for pulses, (Minhas, 1964; Minhas 1965) component analysis model has been used as given below. (Sharma, 1977; Shende et. al., 2011) redeveloped the model and several research workers Kalamkar et.al (2002)[5] used this model and studied growth performance of crops on state. The method states that if A_0, P_0 and Y_0 are respectively area, production and productivity in base year and A_n, P_n and Y_n are values of the respective variables in nth year then

$$P = A_0 \quad \Delta Y + Y_0 \Delta A + \quad \Delta A \Delta Y$$

Change in Production =Yield effect + Area effect+ Interaction effect.

The 1st, 2nd and 3rd terms of the above equation represent productivity, area and interaction effect respectively. Hence is usual difference operator showing change i.e.

$\Delta A = A_n - A_0$; $\Delta Y = Y_n - Y_0$ and $\Delta P = P_n - P_0$

Thus, the total change in production can be decomposed into three effects *viz*. yield effect, area effect and the interaction effect due to change in yield and area.

The net return has been computed as the gross return (value of main product and byproduct) less variable costs (Labour cost + Machine cost +Fertilizer Cost + Seed cost + Manure cost + insecticides cost + Miscelaneous cost + Leased in Land value + Deprecation + Irrigation Charges + Interest on working Capital) actually paid and received by the farmer or imputed in some cases.

To identify the responsiveness of inputs to yield of pulses, multiple regression model to fit as below:

$$\text{Yield}_t = \alpha + \beta_1 \text{ Labourhrs}_t + \beta_2 \text{ machinehrs}_t + \beta_3 \text{ seedqty}_t + \beta_4 \text{ fertqty}_t + \beta_5 \text{ irrihrs}_t + \beta_5 \text{ Insecticidecost}_t + e$$

Where

Labourhrs_t =Labourhrs per hector at t time

machinehrs_t= Machine hrs per hector at t time

seedqty_t= Seed use qty kg per hector at t time

fertqty_t= Fertilizer use kg qty per hector at t time

irrihrs_t= Irrigationhrs per hector at t time

Insecticidecost_t= Insecticide cost Rs. per hector at t time

α, β_1 to β_6 and e are intercept, estimated coefficients and residual term.

Results and discussion

Due to important source of nutrition of population pulses has an important place in cultivation in India. As observed that area under pulses was increased with the growth rate of 1.28 per cent during 2001-01 to 2012-13, table (2) portraits that the area under pulse cultivation was fluctuated which has increased from 20333 thousand hectare to 26402 thousand hectare during

2001-01 to 2010-11 afterwards the declining trend has been recorded.

Production of Pulse was increased from 11061 thousand tones to 18342 with3.64 percent growth rate. Yield is one of the important factor which leads to overall production as well growth of the particular crop, as noticed that the yield which stands 544 kg/ha in 2000-01 has increased 45 times in 2012-13. Therefore, this productivity was pushed to Production as able to production to achieve a growth up to 3.64 per cent because area only increased 1.28per cent. Moreover is has estimated that he CAGR for area, production and yield is significant at 5, 1 and 1 percent of level respectively.

Table 2: Area, Production and Yield with CAGR of Pulses crops in India

Year	Area pulses (000 ha)	Production (000 tonnes)	Yield (kg/ha)
2000-01	20333	11061	544
2001-02	21989	13351	607
2002-03	20478	11108	542
2003-04	23441	14892	635
2004-05	22746	13116	577
2005-06	22371	13354	597
2006-07	23170	14172	612
2007-08	23614	14739	624
2008-09	22073	14540	659
2009-10	23282	14662	630
2010-11	26402	18241	691
2011-12	24462	17089	699
2012-13	23257	18342	789
CAGR	**1.28****	**3.64*****	**2.32*****

Source: Authors' estimations based on DES data.

*****, **, * significant at 1, 5 and 10per cent level of significance, respectively**

Consequently, examined the contribution of area and yield in production In table 3 during the 2000-01 to 201-13area a director factor which leads to production, we calculated the almost fifty per cent effect of area while the yield effected was 44.42 per cent during 2001-01 to 2006, nevertheless, after 2006-07, the surprised yield effect (98.35) has been recorded. Area reach of pulses is limited because the competitive crops are more benefited and secure for famers. Therefore, yield is an important indicator which can push the return turned to pull the area under pulses.

Table 3: Contribution of area and yield in change in production

(Per cent)

Time Periods	Area effect	yield effect	interaction effect
2000-01 to 2006-07	49.61	44.22	6.17
2006-07 to 2012-13	1.28	98.35	0.37
2000-01 to 2012-13	21.85	68.33	9.83

Source: Authors' estimations.

The return drove from the high yield and minimum support price. The Economics of pulses presented in table 4, the output cost ratio are stable around 1.5 times point at various point of time. In the year 2009-10, output cost ratio recorded its highest point. Afterwards although the output value increased but the cost of cultivation also hiked which turn to reduce the return per acre.

Table 4: Value of Output, Cost of cultivation and Returns from pulses in India (Rs/Ha)

Year	Value of output	Cost of cultivation	Return	Output Cost Ratio
2000-01	11502	7588	3914	1.5
2001-02	10975	7269	3707	1.5
2002-03	11020	8306	2715	1.3
2003-04	11683	8809	2875	1.3
2004-05	12182	9401	2781	1.3
2005-06	15511	11270	4241	1.4
2006-07	17658	12131	5527	1.5
2007-08	18700	12366	6333	1.5
2008-09	20314	14094	6221	1.4
2009-10	29104	16201	12902	1.8
2010-11	29175	19832	9343	1.5
2011-12	30823	22373	8450	1.4
2012-13	35142	24214	10929	1.5

***Source*: Authors' estimations based on unit level cost of cultivation data of DES.**

Both the value of output and return to farmers displayed a rising trend from 2002 to 2004. This trend intensified for the year 2008 to 2009 but fell from 2009 to 2010 but resumed its rising trajectory. The cost of cultivation rose from Rs. 7588 to 24214 while the output return of Rs. 11502 to Rs.35142 per hectare during 200-01 to 2012-13 which is less percentage comparatively. .

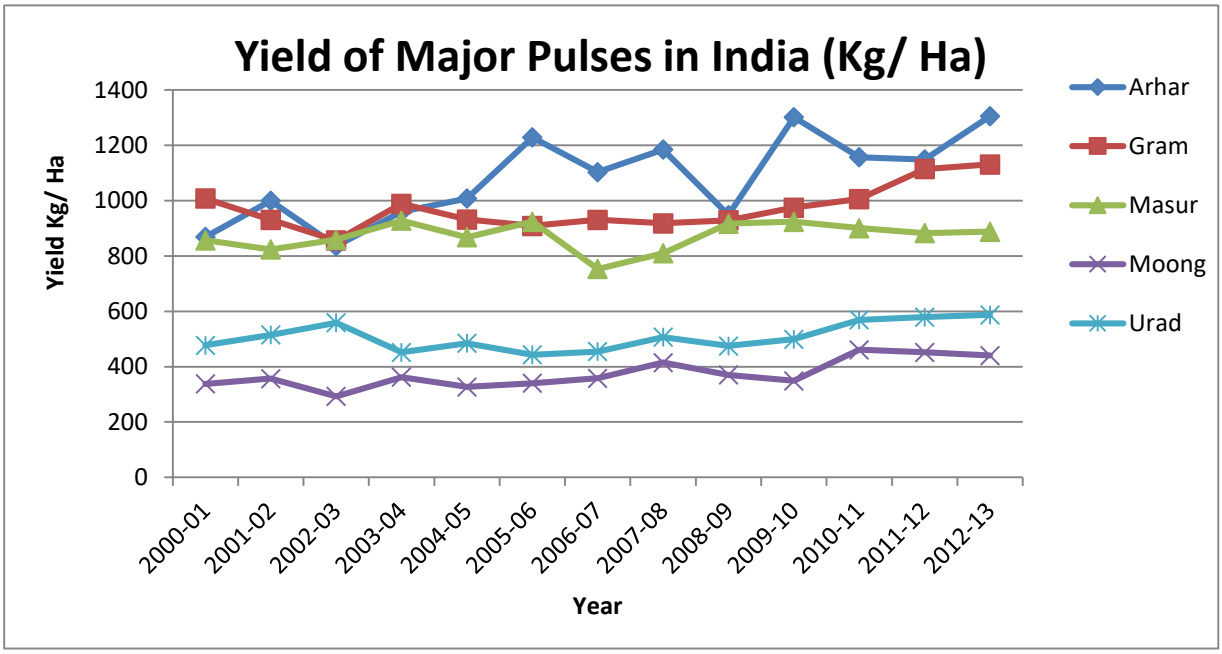

Figure: 1 Trend yield of pulses in India.

Figure 1 shows the yield of various major pulses from 2000 to 2012. the trends for all pulses are rising but with major inter-year fluctuations. In the year 2000-01 Arhar is on top in yield/ha in 2012-13 which was less than compared to Gram in 2000-01. Gram yield/ ha was increase at stagnant rate while the highly fluctuation trend has been examined in Arhar crop remaining three pulses namely Masur, moong and urad yield/ha was stagnant, it is need to research in new seeds to increase the yield of these pulses

Pulses cultivation is a risky among crops due to more dependency on nature. High volatility in yield and price also play an important role to area allocation under pulses cultivation. But over the time, new innovations and technological improvement would be in favor of pulses cultivation. pooled regression analysis has been castoff to know the impact of new technological inputs on yield of pulses.

Table 4: Estimated parameters of pooled regression analysis

Variable	Pulses
Dependent variable Yield of pulses	
Constant	2.585*** (0.747)
Labourhrs/Ha	0.00358* (0.00213)
Machine hrs/Ha	0.257*** (0.0720)
Seed quantity Kg/Ha	0.0493* (0.0260)
Fertilizer quantity Kg/Ha	-0.00257 (0.03093)
Irrigation hrs/Ha	0.004 (0.0154)
Insecticides cost	0.000001 (0.00057)
Adjusted R^2	**.96**
Durbin-Watson	**2.04**
F – Value	184.07***

Figures within parentheses are standard error of estimated parameters

*****, **, * significant at 1, 5 and 10per cent level of significance, respectively**

Table 4 shows the parameters of the pooled regression analysis. The variable labors and seed quantity are significant at 10 percent level while the variable machine is significant at 1 percent level. Future growth in pulses is highly depending upon labour, quality seeds and modern technological practices. The R^2 value is 0.96 and Durbin Watson value is 2.04 indicating that the good fit of model

Table 5: Differences of Farm Harvest prices and Retail Prices of Pulses.

Year	Prices (Rs.per/qtl)	Arhar	Gram	Masur	Moong	Urad
2000-01	FHP	1397	1550	1406	1799	1826
	Retail Price	2944	2611	2882	3400	3515
2006-07	FHP	1986	2180	1993	2739	2896
	Retail Price	3876	3496	3539	4600	4806
2012-13	FHP	3791	3393	3426	4688	3517
	Retail Price	7199	5521	6167	8000	6568

***Source*: Author estimate FHP based on unit level cost of cultivation data of DES.**

Retail price is based on monthly retail price information collected from DES.

Earlier we have discussed about that price policy is pulling factor which can fetch the area under particular crop. But he same the price of completive crops does matter. The next issue is

displayed in table 5 which is dealing with farm harvest price and retail prices. there is huge gap, farmers were getting less price nevertheless consumer were paying high price. As observed that retail price is almost double of all pulses. There is need to minimize the huge gap, it can be shift in favour of farmers which helps to increase the yield/ha turned to fetch area under pulses.

Conclusion

The production and prices of pulse crops have demonstrated persistent fluctuations over the past decade. Although the minimum support price has been fixed by government of pulses, but in practically farmers are getting less harvest price compared to minimum support price because have not proper market facilities like wheat and paddy. Farmers have not certainty about prices, therefore farmer only prefer the area for pulses there is not irrigation facilities. The varying trends in production and prices has negatively impacted its cultivation and increased reluctance of farers to cultivate them and resulted in a drastic fall in the per capita availability of pulses. It is found that during the 2000-01 to 2006-07, area and yield almost equal contribution in growth of production.. The present study uses pooled regression technique to estimate the factors which impact the growth rate of pulses. The results shows the labor, capital and seeds are positively related with the growth rate of pulses. New technological improvement, use of quality seed and labour put positive impact on pulses yield. The study also established that the gap between retail prices and farm harvest prices. There is needed to improve the seed technology which help to increase the yield/ ha of pulses as well as should provide ensure market with remunerative market price which force to farmer to diversify the area under pulses. More over to needed to establish storage government storage facilities which can escape to black hording of pulse turned to provide to consumer at accurate prices. It is required to establish the whole process through government interference.

Reference

Govt. of India (2016), "Agriculture statistics at a glance", Directorate of Economics and Statistics, Ministry of Agriculture & Farmers WelfareDepartment of Agriculture, Cooperation & Farmers Welfare.

Kalamkar, S.S, Atkare, V.G. and Shende, N.V. (2002),"An analysis of growth trends of Principal crops in India",*Agricultural Science Digest*, Vol. 22, PP:- 153-156.

Minhas B. S. (1964),"Analysis of Crop Output Growth by Component Analysis (Mimeo.)"

Minhas, B.S. and Vidhyanathan A. (1965),"Growth of crop output in India",*Journal of Indian Society of Agricultural Statistics,*Vol. 28, PP:- 230-252.

R. P. Singh and Rupam Renu (2009), "Growth of production and productivity of different pulses in Jharkhand", *Journal of Economic and Social Development*, Vol. V, No. 1 & 2, PP: 35-43.

Sharma, K.L. (1977),"Measurement of the effects to Area, yield and prices in the increase of value of crop output in India",*Agricultural Situation in India*,Vol. 32, PP:- 348-350.

Shende, N.V., Thakare, S.S. and Roundhal, P. S. (2011),"Acreage response and decomposition analysis of soybean in Western Vidarbha",*Journal of Food Legumes*,Vol. 24, PP:- 133-137.