Conference Name: 7th ASAE Conference, Hanoi

Year: 2011

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Do pulses growing farmers in India respond to prices and what is the price mechanism for improving pulses production?

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1. Introduction

The cause for concern in pulses cultivation in the State of Tamil Nadu is almost near stagnation in production and divergent output trends in different districts as green revolution technologies such as high yielding varieties, fertilizers and pesticides largely bypassed those farmers who have been cultivating pulses and these crops did not have much to offer them. Studies found that an increase in cost of production coupled with low and fluctuating prices is the main reason which discourages the farmers to take up pulses cultivation (Chatha and Singh, 1986; Shivaraya,et.,al ; 1999). Further, evidences show that adoption of high yielding varieties is minimal and there is lowest use of fertilizers due to rainfed cultivation resulting in low yield (Rangaswami, 1990; Kelly and Rao, 1994; Kerr, 1996). This reflects technological stagnation and relative profitability of modern inputs. The problem is further accentuated by the less developed agricultural markets, which are characterized by high trade margins, commodity speculations and inadequate storage facilities. An improvement in pulses production technology can reduce the cost of production and hence prices, and create scope for further increase in demand for pulse crops by replacing some portion of the disproportionately high level of cereals in the consumption basket for a balanced diet (Reddy, 2009).

2. Elasticity of Response

Despite the fact that there is a widening gap between the demand and supply of pulses both at the nation and state, which results in soaring price of pulses, there has been stagnant yield and stagnant acreage. In the state of Tamil Nadu area under pulses decline at the rate 1.89 exponentially for the period between 1990-91 and 2006-07 with a variability of 14 per cent. During this period maximum area attained was 8.47 lakh hectares, which was in the year 1990-91 and minimum was 5.25 lakh hectares, which was in the year 2005-06 revealing that State has

lost more than 3 lakh hectares during last 18 years losing by 0.17 lakh hectares annually (Table 1). Regaining the area lost is a daunting task as the net cropped area in the state is declining due to many associated factors. Pulses productivity during this period has not shown any improvement rather it declined at the rate of 1.20 percent challenging the availability. With the assumption that if the State is able to increase the area under pulses to 8.47 lakh hectares in the span of five years and with already achieved yield of 0.54 tonnes per hectare, production would likely to increase to 4.57 lakh tonnes which is also lower than demand estimates of 2010, which is 9.8 lakh tonnes (estimated based on growth rate of consumption of pulses in the state namely 2.03 per cent for rural and 1.27 per cent for urban) 10.1 lakh tonnes (estimated based on growth rate of consumption of pulses in the state namely 2.03 per cent for rural and 1.27 per cent for urban with four per cent income variant).

Then the question is whether increasing the prices of pulses can act as an incentive for the farmers to increase their area under cultivation and what is formula to fix the price as long as there is an area response. Estimated area response elasticity indicates that none of the pulses has shown positive response to prices rather red gram and bengal gram have shown significant negative response to both MSP and farm gate price (Table 2). It may be inferred that production response to price in pulses is rather weak and non-price factors such as high-yielding technology /modern varieties, better infra-structures including adequate procurement system are more important for accelerating pulse production. Appropriate technology, particularly under the changing compulsions for double cropping was a necessary adjunct for prices to play their expected role more effectively. Under such response increasing MSP would result in area increase is highly debatable as near stagnation in pulses production is attributed to inadequate attention in every respect such as cultivation in marginal and dry lands not as pure crop but as inter and mixed crop. As irrigated land has expanded, more profitable high yielding cereal crops have displaced pulses production to marginal lands consequently potentials for growth of pulse area or yield are limited.

Table 1. Growth and variability in area and productivity of major pulses in Tamil Nadu (1990 -91 to 2006-07)

Details	Area in Lakh ha			CV (%)	Growth (%)
	Max	Min	Triennium ending 2006-07		
Total Pulses	8.47 (0.54)	5.25 (0.30)	5.51 (0.42)	14.50 (15.35)	-1.89 (-1.20)
Bengal Gram	0.10 (0.71)	0.05 (0.57)	0.06 (0.65)	24.04 (5.43)	-2.08 (0.26)
Green Gram	3.19 (0.57)	1.86 (0.33)	2.31 (0.42)	12.42 (13.94)	-1.21 (-0.48)
Red gram	1.11 (0.73)	0.29 (0.45)	0.37 (0.65)	38.44 (15.31)	-7.92 (0.77)
Black Gram	3.19 (0.57)	1.86 (0.33)	2.31 (0.42)	17.44 (17.36)	-1.21 (-0.48)
Horse Gram	1.45 (0.51)	0.56 (0.25)	0.61 (0.42)	27.16 (23.41)	-4.94 (-1.35)

(Figures in parentheses are related to productivity of major pulses in Tamil Nadu)

Table 2 Area response of major pulses

Pulses	Area response elasticity with respect to Minimum Support Price (MSP_t)	Area response elasticity with respect to Farm Gate Price (FGP_{t-1})
Redgram	-1.11* (-0.96)	-0.91* (-0.71)
Green gram	-0.18 (-0.38)	-0.07 (-0.18)
Black gram	-0.18 (-0.38)	-0.10 (-0.31)
Bengal gram	-0.29** (-0.50)	- 0.21 (-0.28)

(Figures in parentheses are Pearson Correlation Values)
* Significant at 1% level of probability
** Significant at 5 % level of probability

3. Trend in the cost of cultivation and prices

Minimum support for pulses increased over the period as fixation of support prices is based on many factors such as change in cost of production of pulses, input prices, and demand/ consumption, etc. MSP for redgram has been increased from Rs. 480 per quintal in 1990-91 to Rs.2000 per quintal during 2008-09, while the cost of production increased from Rs.535 per

quintal in 1990-91 to Rs. 2844 per quintal during same period. During the year 1990-91 MSP formed 90 per cent of cost of production, while it shared 70 per cent during 2008-09. Maintaining the same share in later years then the MSP during 2008-09 might have been Rs. 2560 per quintal, which is higher by 28 per cent. Slope coefficient of trend analysis show that marginal increase in cost of production is higher by Rs. 55.15 per quintal than MSP during the period between 1990-91 and 2008-09. Therefore at the increase of 86.39 per cent, MSP might have been Rs. 2457 per quintal, which again higher by 23 per cent (Table 3). This implies that higher MSP might have been fixed so that other market prices might have ruled higher and generated higher income for the farmers. Similarly in the case of black gram, the results show that MSP might have been higher than the actual.

Table 3. Estimated slope coefficient

Crop	Slope Coefficient	
	MSP	Cost of Production
Redgram	63.84	118.99 (86.39)
Blackgram	68.33	135.21 (97.88)

(Figures in parentheses denote percentage change in cost of production over Minimum Support Price)

4. Market Risk – product and input

It is evident from the many studies that an increase in cost of production coupled with low and fluctuating prices are the main reasons which discouraging the farmers from taking up pulses cultivation. Instability in prices and productivity is the major cause for variation in profitability of pulses which resulted in the phenomenon of aggregate demand exceeding the aggregate supply adversely affecting the crop husbandry and processing sector. The high annual fluctuations in price of pulses indicating a higher risk might have turned the farmers away from pulses and in favour of other competing crops like oilseeds and cereals which did not exhibit price fluctuations as high as that observed in pulses. The variability measured in terms of coefficient of variation shows that both product and input prices showed high variation both in nominal and real terms, while input price variability in nominal term is higher than product price. In fixation of MSP, if input price variability is higher than the product price variability, then

MSP needs to be adjusted for input price risk. In present case input variability is higher by 4- 8 per cent (Table 4-7). Therefore MSP for 2008-09 might have been Rs. 2160 per quintal, which is adjusted by 8 per cent for input price risk. The minimum support price announced by the Government does not benefit farmers in absence of procurement mechanism as such mechanism can minimize product price variability. Moreover, all pulse crops are not covered under the minimum support price. Therefore, procurement policy for pulses needs to be strengthened and reasonable buffer stock needs to be built up to meet the contingencies. Supply of pulses through public distribution system is sure to bring some relief to consumers. To make the state pulse sufficient there is a need to increase the area under pulse cultivation and improve productivity. A proactive strategy from researchers, planners, policy makers, extension workers, market forces and farmers aiming not only at boosting the per unit productivity of land but also at reduction in the production costs, is needed to improve availability and affordability of pulses.

Table 4. Variability in prices

Pulses	Nominal Terms				Real Terms			
	MSP	RP	WP	FGP	MSP	RP	WP	FGPP
Redgram	36.65	36.92	29.55	38.46	53.45	57.99	47.95	44.34
Green gram	43.50	28.94	30.72	39.99	55.45	48.48	51.56	53.58
Black gram	43.50	33.75	35.94	41.58	55.45	50.48	54.87	57.55
Bengal gram	42.29	30.98	33.22	29.71	61.34	52.61	53.60	51.63

MSP – Minimum Support Price, RP – Retail Price, WP – Wholesale Price, FGP – Farm gate Price. Nominal prices were converted in to real prices using wholesale price indices.

Table 5. Variability in Cost of Cultivation of pulses (CV per cent)

Pulses	Nominal terms			Real terms		
	Variable cost	Fixed Cost	Total Cost	Variable cost	Fixed Cost	Total Cost
Redgram	44.33	50.46	39.91	24.19	36.92	20.54
Green gram	51.60	59.92	46.24	32.86	43.30	27.52
Black gram	47.87	54.26	42.23	25.87	41.72	23.44
Bengal gram	32.33	36.62	34.68	13.88	15.55	12.77

Table 6. Difference in variability between Minimum Support Price, Retail Price and Cost of Cultivation

Pulses	Nominal terms			Real terms		
	Variable cost	Fixed Cost	Total Cost	Variable cost	Fixed Cost	Total Cost
Redgram	-7.68 (-7.41)	-13.81 (-13.54)	-3.26 (-2.99)	29.26 (28.73)	16.53 (41.46)	32.91 (25.08)
Green gram	-8.1 (-22.66)	-16.42 (-30.98)	-2.74 (-17.3)	22.59 (25.89)	12.15 (36.33)	27.93 (20.55)
Black gram	-4.37 (-14.12)	-10.76 (-20.51)	1.27 (-8.48)	29.58 (20.9)	13.73 (36.75)	32.01 (18.47)
Bengal gram	9.96 (-1.35)	5.67 (-5.64)	7.61 (-3.7)	47.46 (52.61)	45.79 (6.82)	48.57 (4.04)

(Figures in parentheses indicate the difference in variability between Retail Price and cost of cultivation)

Table 7. Difference in variability between Wholesale Price, Farm Gate Price and Cost of Cultivation

Pulses	Nominal terms			Real terms		
	Variable cost	Fixed Cost	Total Cost	Variable cost	Fixed Cost	Total Cost
Red gram	-14.78 (-5.87)	-20.91 (-12)	-10.36 (-1.45)	23.76 (20.15)	11.03 (7.42)	27.41 (23.8)
Green gram	-20.88 (-11.61)	-29.2 (-19.93)	-15.52 (-6.25)	18.7 (20.72)	8.26 (10.28)	24.04 (26.06)
Black gram	-11.93 (-6.29)	-18.32 (-12.68)	-6.29 (-0.65)	29 (31.68)	13.15 (15.83)	31.43 (34.11)
Bengal gram	0.89 (-2.62)	-3.4 (-6.91)	-1.46 (-4.97)	39.72 (37.75)	38.05 (36.08)	40.83 (38.86)

(Figures in parentheses indicate the difference in variability between Farm Gate Price and Cost of Cultivation)

5. Movement in market prices

The rising support price ratios for pulses with respect to competing crops reflect the policy intention to promote pulse cultivation. But in the absence of vigorous procurement operations there were reports of fall in market prices below support levels, particularly in the initial years. But it is not true in the later years because all the market prices - farm gate, whole sale and retails prices of major pulses were higher than MSP during the period between 1990-91 and 2008-09. There is a wide difference between farm gate and retail prices of pulses as evident from the data presented in the Table 8. The marketing channel between producers and consumers comprises several different levels. These levels show little evidence of vertical integration. Importers, millers, and wholesalers operate on small margins, with earnings being made with high inventory turnover. In contrast, retail margins are significant, ranging from 30-50 percent. Share of MSP in farm gate price of red gram is ranging from 44 per cent to 96 per cent, while its share in retail price is ranging between 36 and 77 per cent and in the later years the share of MSP in retail price was less than 50 per cent implying that there is no vertical integration and there is huge margin in retail marketing. Similar the case with major pulses. Therefore, strengthening the supply chain is crucial for higher realization of remunerative prices of pulses by farmers.

Table 8. Share of MSP in various market prices

Year	% Share in Retail Price				% Share in Wholesale Price				% Share in Farm Gate Price			
	Red gram	Black gram	Bengal gram	Green gram	Red gram	Black gram	Bengal gram	Green gram	Red gram	Black gram	Bengal gram	Green gram
1990-91	51.99	57.01	42.15	58.11	57.01	58.11	42.15	51.99	78.84	77.81	59.53	74.77
1994-95	36.91	38.97	43.62	49.84	61.82	77.47	29.66	65.74	59.31	52.07	54.66	68.52
1999-00	77.18	44.33	50.02	54.97	62.99	50.52	50.02	54.97	91.19	57.54	62.64	68.60
2000-01	71.09	55.20	45.56	56.76	77.18	48.14	45.56	56.76	93.95	90.35	69.46	69.55
2001-02	47.45	57.78	43.95	54.18	78.19	60.72	43.95	54.18	84.65	78.51	76.76	76.38
2002-03	45.67	57.40	49.16	60.82	76.44	73.49	55.85	58.45	91.34	49.70	60.13	71.97
2003-04	44.18	60.66	58.33	61.01	70.73	82.08	66.72	70.03	95.29	72.30	70.07	69.92
2004-05	45.86	61.66	57.45	61.58	67.36	68.77	64.63	66.71	94.09	67.66	73.59	88.50
2005-06	46.67	66.45	53.83	67.84	66.67	51.62	57.57	52.76	96.56	68.52	68.48	62.38
2006-07	46.44	66.74	57.78	67.30	63.23	68.43	64.15	65.60	97.14	73.58	72.30	76.14
2007-08	52.61	76.18	63.12	76.89	65.43	67.37	69.45	66.95	73.95	69.68	80.05	80.37
2008-09	66.24	81.29	67.39	90.65	88.76	94.28	75.94	96.96	68.97	86.90	85.18	76.60

6. Product subsidy to growers

In the last two years international prices are lower than the domestic market prices (farm gate and regulated market prices). Further MSP is lower than the market prices and as long as there is no government procurement mechanism to procure pulses at the market rate and take the burden of subsidy cost of price difference between MSP and procurement price then provision of product subsidy (the difference between import price and market price) is an another option to improve pulses production in the state (Table 9). Under such situation, as per the international trade theory provision of producer subsidy (product) would enhance supply and there is no consumption distortion loss but there would be production distortion loss as many inefficient producers who may grow pulses. But the government has to take the burden of cost of subsidy. Estimated total subsidy for the State for major pulses is provided in the Table 10.

Table 9. Provision of product subsidy

Pulses	Import Price (Rs/qtl)		MSP (Rs/qtl)		Product subsidy per qtl	
	2007-08	2008-09	2007-08	2008-09	2007-08	2008-09
Redgram	2187	2786	1590	2000	597	786
Blackgram	2589	2809	1740	2520	849	289
Greengram	2901	3200	1740	2520	1161	680

Table 10. Estimated total product subsidies

Pulses	Production in tones		Total product subsidy Rs in Crores	
	2007-08*	2008-09**	2007-08	2008-09
Redgram	25618	23571	15.29	18.53
Blackgram	76559	98936	65.00	28.59
Greengram	53652	61682	62.29	41.94

* Triennium ending 2005-06. ** Triennium ending 2006-07

Finally, all the policy options suggest for higher MSP or provision of subsidies to improve supply position to meet the domestic demand and pulses could be a import substitute (Table 11).

Table 11. Policy Options and Level of MSP

Policy Option	Suggested MSP	Other measures
Elasticity of Response	As per the present procedures adopted	Technological intervention for yield improvement as there is no area response
Trend in the cost of cultivation and prices	23-28 per cent higher than the present MSP	-
Market Risk – product and input	4-8 per cent even up to 20 per cent higher than MSP	-
Movement in market prices	As per the present procedures adopted	Strengthening the supply chain for higher realization of remunerative prices of pulses by farmers.
Product subsidy to growers	Rs 289 to 1161 per qtl as product subsidy	-

7. Does improving pulses production need combination of policies?

Among the various policy options suggested, implementing single policy in isolation with other policies may not improve pulses production in the State. As observed it may not possible to increase area under pulses by announcing higher MSP year after year. In the State of Tamil Nadu, the area under pulses has declined sharply despite the fact that market prices have been ruling higher (weak area response to prices). This clearly indicates that to improve pulses production in the State there would be technological intervention with combination of all packages for enhancing productivity. Tamil Nadu Agricultural University has released many high yielding varieties for adoption but productivity of pulses has not improved substantially due to poor adoption of packages as claimed by many studies. A proactive strategy from researchers, planners, policy makers, extension workers, market forces and farmers aiming not only at boosting the per unit productivity of land but also at reduction in the production costs, is needed to improve availability and affordability of pulses.

Expanding area under pulses is a challenging as irrigated land has expanded, more profitable high yielding cereal crops have displaced pulses production to marginal lands consequently potentials for growth of pulse area limited. Identification of potential area for pulses production is paramount important at this juncture. Share of MSP in farm gate and retail prices implies that there is no vertical integration and there is huge margin in retail marketing. Therefore, strengthening the supply chain is crucial for higher realization of remunerative prices of pulses by farmers. Procurement policy for pulses needs to be strengthened and reasonable buffer stock needs to be built up to meet the contingencies. Supply of pulses through public distribution system is sure to bring some relief to consumers. Whenever international prices are lower than the domestic market prices (farm gate and regulated market prices) and MSP is lower than the market prices and as long as there is no government procurement mechanism to procure pulses at the market rate then provision of product subsidy (the difference between import price and market price) is an another option to improve pulses production in the state. This subsidy policy can be again adopted in combination with other suggested policy options.

References

Chata, B.K. and Singh, L.R. 1986. An Analysis of Growth in Area, Production and Productivity of Pulses and Oil seeds in Punjab. ***Economic Affairs***,31(2).pp.109-114

Kelley, T.G and P.Parthasarathy Rao 1994. Chickpea Competitiveness in India. ***Economic and Political Weekly***, January 25th.

Kerr M. John 1996. Sustainable Development of Rainfed Agriculture in India. ***Environmental Protection and Trade Division (EPTD) Discussion paper No.20.*** Environment and Production Technology Division, International Food Policy research Institute, Washington DC, USA.

Rangaswamy P. 1990. ***Dry Land Farming technologies in India***. New Delhi : Agricole Publishers

Reddy A. Amarender (2009). Pulses Production Technology: Status and Way Forward. **Economic and Political Weekly**, 6452, PP. 73-80.

Shivaraya Balappa, Hugar, L.B. and Olekar, J.N.1999.Growth Performance of Red Gram in Karnataka State. ***Agricultural Banker***, October – December. pp. 20-23.