Impact Of Prices On Acreage And Income From Gram In Haryana

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Abstract:
Agriculture sector plays a vital role in the life of the people of India due to being an agriculture based economy. It contributes significantly to the country's income and employment status and the sector has been growing rapidly. To get a breakthrough in the production of different crops, the government of India set up a Commission for Agriculture Costs and Price (1965) to make recommendations for the safety of the interest of farmers and to motivate them to use modern technology in the agriculture sector. How far, this incentive given as monetary term has succeeded in motivating farmers and getting positive response from them is the major examination of the present study. To conduct the study, Haryana state (India) has been selected. The data related to Area, Production, Yield and prices have been obtained from various issues of the Statistical Abstract of Haryana from 1979-80 to 2008-09. The data have been compiled for the whole study period. For comprehensive study, the period from 1979-80 to 2008-09 has also been split up into three decades. The important findings emerged from the present study indicates that the growth rates of area and production during all the reference periods have been negatively highly significant. The results obtained in the present study depicted the worse situation of the price policy as far as concerned with the area allocation under gram crop because the area has been decreasing in spite of providing more prices for the crop. It may be concluded on the bases of the above discussion that for bringing about the technological revolution, the price policy is a necessary condition but not a sufficient one.

1.Introduction
The role of agriculture has been of great importance in the economy like India. The agriculture sector is the main source of livelihood for the majority of its population. So, due to its huge importance in the economy, the government of India always tries to make Indian farmers to adopt modern technology to boost up the growth of the agriculture sector of the Indian economy. The government has raised the procurement price and along with this, many inputs-incentives have also been used to motivate the farmers. Food Corporation of India, commission for agricultural costs and price has been set up to provide a safety-guard to the farmers as well as the interest of the consumers of India. But there has always been a burning debate regarding the fruitfulness of the CACP. There has always been a stressed of the farmer's side on this institution as well as on the government. The main objectives of the government ,s price policy for agricultural produce aims at ensuring remunerative prices to the growers for their produce with a view to encourage high investment and production. Towards these ends, minimum support prices for the major agricultural products are announced the recommendation of the commission for agricultural prices (CACP). A number of researches have been conducted to study the farmers' response to prices changes as far as concerned to the growth performance of different crops by adopting the new technology. Gram crop has been selected for our study to examine the impact of Farm Harvest Prices on the growth of area, yield and Income. At the same time, suitable suggestions are given at the end of the paper.

2.Specific Objectives Of The Study
- To examine the growth rates of farm harvest prices, area, production, and yield of Gram crop in Haryana.
- To examine the Correlation between Farm Harvest Prices with area, production and yield of Gram in Haryana.
- To study the impact of lagged farm harvest prices on acreage allocation, production and yield of Gram in Haryana
- To find out the contribution of the area, prices, yield and their interaction in the incremental income of the grain crop in Haryana.

3.Methodology

The study is pertained to the whole of the Haryana state and covers the period from 1979-80 to 2008-09. The data related to Area, Production, Yield and prices have been obtained from various issues of the Statistical Abstract of Haryana from 1979-80 to 2008-09. The data have been compiled for the whole study period. For comprehensive study, the period from 1979-80 to 2008-09 has also been split up into three decades.

Compound growth rates (C.G.R.) of the Area, Production, Yield and prices of the Gram crop have been worked out by fitting exponential function. Using the least square method, the following form of exponential function has been used to calculate compound growth rates.

$$Y = AB^t$$

Where, Y= Area/ Production/ yields/Farm harvest price of the crop

A= Constant
B = 1+r
a = Compound growth rate
t = time variable in years (1, 2 ------ 30)

The compound growth rate (r) is equal to (B-1) x 100. In log form B has been calculated by the following formula:

$$\text{Log } B = \frac{\Sigma T \log Y - \Sigma t \,\Sigma \log Y / N}{\Sigma t^2 - (\Sigma t)^2 / N}$$

The growth rates has been tested for significance by calculating 't' value where t = r/s, 's' is the standard error. The value of standard error has been calculated by following formula:

$$\text{S.E. } (r) = \frac{100B}{\text{Log}_{10} e} \sqrt{\frac{\Sigma (\log Y)^2 - (\Sigma \log Y)^2 / N - (\log 10^b)^2\, \Sigma T^2}{(N-2)\, \Sigma T^2}}$$

Where; $T = t - \bar{t}$

To examine the correlation between area, production, yield and farm harvest prices of Gram, correlation coefficient (r) has been worked out as follows.

$$r = \sqrt{\frac{\Sigma XY - (\Sigma X)\,\Sigma Y)}{\Sigma X^2 - (\Sigma X)^2 / N \quad \Sigma Y^2 - (\Sigma Y)^2 / N}}$$

Where X: Harvest prices in RS. per Ouintal
Y: Area, Production, yield and farm harvest prices.

The significance of the correlations has also been tested by comparing the calculated and table values of (t). The 't' value of coefficient correlation has been calculated by using the following formula

$$t\ cal, = \frac{r}{\sqrt{1-r^2}\ \sqrt{n-^2}}$$

To study the impact of lagged farm harvest prices on the acreage allocation, production and yield, linear and logarithmic form of equations have fitted. As logarithmic type of function has found a better fit than linear function, the former has been presented here. The previous year harvest prices are being used here since these prices generally influence the farmers' decision on acreage allocation for the current year.

In equation form, the following type of equation has been used as:

$\text{Log } A_t = \log a + b\, P_{t-1}$
$\text{Log } P_t = \log a + b\, P_{t-1}$
$\text{Log } Y_t = \log a + b\, P_{t-1}$

A_t = Area under Gram at (t)th period
P_t = Production of Gram at (t)th period.
Y_t = Yield of Gram at (t)th period.
P_{t-1} = Farm harvest prices of Gram taken in per quintal at (t-1)th period.

In order to decompose total change in the value of Gram production (X), the price effect has also been studied in addition to the area and yield effects. Thus, to analyse price effect, the model formulated by Sharma, (1977) has been used. Further, the interaction effects between area, yield and price have also studied by using the model given below:

$$\Delta X = (P_0\ A_0\Delta Y) + (P_0\ Y_0\Delta A) + (Y_0\ A_0\Delta P) + (P_0\Delta A\Delta Y) + (A_0\Delta P\Delta Y) + (Y_0\Delta P\Delta A) + (\Delta A\Delta Y\Delta P)$$

Where, $P_0 A_0\Delta Y$ shows the yield effect, $P_0\ Y_0\Delta A$ give the area effect and $Y_0\ A_0\Delta P$ give the price effect and these are divided by 100 for getting per centage contribution. Likewise $P_0\Delta A\Delta Y$, $A_0\Delta P\Delta Y$, $Y0\Delta P\Delta A$, $\Delta A\Delta Y\Delta P$ show the different interaction effects.

ΔX was calculated by substracting X_0 from X_n

Where,

$X_0 = A_0 Y_0 P_0$ and $X_n = A_n Y_n P_n$

$A_0 Y_0 P_0$ = Area, yield and price of Gram in the base year (1979-80)

$A_n Y_n P_n$ = Area, yield and price of Gram in the current year (2008-09)

4. Results And Discussion
The period-wise analysis is presented here as given under:

4.1. Compound Growth Rates Of Area, Production, Yield And Prices
The period-wise results on compound growth rates of Area, production, yield and prices of Gram crop are presented in Table 1

Particulars	1st Period	2nd Period	3rd Period	Study Period
Area	-8.86*	-6.01*	-5.96*	-7.73*
Production	-11.94**	-3.74*	-7.40*	-6.81*
Yield	-3.43*	2.40*	-1.45*	1.00*
Prices	9.94*	6.79*	7.94*	8.48*

Table1: Compound Growth Rates Of Area, Production, Yield And Prices Of Gram Crop
(1979-80 To 2008-09)
*   Significant At 0.01 Per Cent Level Of Significance

The estimated exponential growth rates of area, yield, production and prices of Gram for reference period are presented in table 1. Period-wise analysis has shown significant deceleration in area, yield and production during first period while during second period, significant deceleration has observed in case of area and production. It could be inferred that the dominant role played by negative growth rate of area over the positive yield trends resulted in negative production trend. The trends during the third and overall study periods have been very much similar to first period as negative trends have been shown by most of the concerning variables. Positive and significant trend has been observed in case of prices of Gram. So, the results can be induced from the above table that there has been significant increase in case of price and yield but this has not helped much to increase the area under this crop. Prices have not found itself sufficient to motivate farmers to intensify modern technology on their farms and increase the area under the targeted crop.

Particulars	1st Period	2nd Period	3rd Period	Study Period
Area	-50.09	-30.03*	-13.36	-27.34*
Production	-43.53	-17.42	-12.18	-16.66*
Yield	-21.59	19.50	-8.49	5.56
Prices	32.17*	55.99*	132.62*	70.21*

Table 2: Linear Growth Rates Of Area, Production, Yield And Prices Of Gram Crop
(1979-80 To 2008-09)
*   Significant At 0.01 Per Cent Level Of Significance

4.2. Linear Growth Rates Of Area, Production, Yield And Prices
The linear growth rates for acreage, production, yield and prices for the time period from 1979-80 to 2008-09 have calculated and results obtained are presented in table 2. During first period, the growth rate has been declined for all the variables except for price of gram. In case of prices, the linear growth rate has been found significant at 1 per cent level of probability. It shows that price of gram has been of linear nature during the period under study. The above analyses on the performance of gram in Haryana revealed that the area under gram has shown declining trend with positive trend in yield. But these positive growth rates of yield have surpassed by the significant negative growth trends in area for the state as a whole resulting in decline in production. During third period, growth trends have been negatively significant except for price. During overall study period, the results are almost same as observed during second period. It is the indication of less impact of the government price policy as it could not motivate the farmers to grow gram crop and simultaneously used the new technique.

Particulars	1st Period	2nd Period	3rd Period	Study Period
Area	-.71**	-.60	-.47	-.81*
Yield	-.46	-25	-.54	-.09
Production	-.60	-.39	-.56	-.66*

Table 3: Correlation Of Farm Harvest Prices With Area, Production, Yield Of Gram Crop
(1979-80 To 2008-09)
* Significant At 0.01 Per Cent Level Of Significance

The results related to correlation of farm harvest prices with area, production and yield of gram crop presents an alarming picture as the area, yield and production of gram in state has not found to be affected by the increasing trends of its prices. There has been found negative value of calculated (r) in case of all the variables during all the reference periods and it has also been found significant in case of area and production during overall study period at 1 per cent level of probability. Area during first period has also been recorded negatively significant at 5 per cent level of probability.

4.3.Impact Of Lagged Harvest Prices On Area, Production And Yield Of Gram
The impact of lagged farm harvest prices on area, production and yield of gram is given in Table 4.

1) $\text{Log } A_t = \text{Log } a + b\, P_{t-1}$
   $2.949124 + 0.9989^* p_{t-1}$
   Standard error of regression coefficient = (0.19584)
   $R^2 = 0.70155$
   Calculated' value = -8.113

2) $\text{Log } P_t = \text{Log } a + b\, P_{t-1}$
   $2.731883 + 1.0019^* P_{t-1}$
   Standard error of regression coefficient = (.26987)
   $R^2 = .48767$
   Calculated 't' value = -5.163

3) $\text{Log } Y_t = \text{Log } a + b\, P_{t-1}$
   $2.781233 + 1.0001^* P_{t-1}$
   Standard error of regression coefficient = (.07592)
   $R^2 = .07592$
   Calculated 't' value = 1.517

Table 4: Impact Of Lagged Harvest Prices On Area, Production And Yield Of Gram
Significant At 1 Per Cent Level Of Probability

The numerical values of the linear lag function for gram indicates that R^2 is significant at 1 per cent level and supports the results that 70 per cent variation in area and 48 per cent variation in production and 7 per cent change in yield is explained by the explanatory variable, i.e., previous year's price of the gram. The elasticity for these variables is significant at 1 per cent level in case of area and yield. The value of elasticity has found as 0.9989, 1.0019 and 1.0001 per cent indicating thereby that previous year price influences current year's area, production and yield to some extent.

4.4.Contribution Of Area, Yield And Price In Production Of Gram
Effects of area, yield, prices and their interactions in the incremental Income of gram crop are depicted in table 5. It is clear from the table that the total increase in value of production of gram crop during the first period has accounted for -2098398.72 rupees of which 94.09 per cent has been due to decrease in price, 29.37 per cent has been due to area effect. The change in production in value term has been observed negative during all the study periods. Negative effect of price has also observed more powerful. Same results have also observed during third and overall study periods.

Time	Change in Production (ΔX)	Yield Effect ($P_0\Delta Y$)	Area $P_0 Y_0\Delta A$	Price Effect ($Y_0\Delta P$)	Area and Yield ($P_0\Delta A\Delta Y$)	Price and Yield ($A_0\Delta P\Delta Y$)	Price and Area ($Y_0\Delta P\Delta A$)	Area, Yield price ($\Delta A\Delta Y\Delta P$)
1st Period	-2098398.72	389835.59 (-18.57)	-616453.05 (29.37)	-1974582.99 (94.09)	176000.50 (-8.38)	563753.56 (-26.86)	-891472.22 (42.48)	-1254519.88 (-12.12)
2nd Period	-6454916.34	-680327.44 (10.53)	-1248052.16 (19.37)	-2411844.67 (37.36)	-289667.27 (4.48)	-559778.27 (8.67)	-1026906 (15.90)	-238340.30 (3.69)
3rd Period	-3528147.1	193317.8 (-5.47)	-1041369.9 (29.51)	-2008941.6 (56.94)	104549.69 (-2.96)	201690.30 (-5.71)	-1086471.18 (30.79)	109077.68 (-3.09)
Overall Study period	-26637844.5	48434.45 (-0.18)	174652.39 (-0.65)	-11212306.8 (42.09)	44281.94 (-0.16)	-2842805.35 (10.67)	-10251022.9 (38.48)	-2599078.25 (9.75)

Table 5: Contribution Of Area, Yield And Price In Production Of Gram
(1979-80 to 2008-09)

So, it is found that there has been abrupt decrease in the income from Gram during all the study period.

5.Summary And Suggestions
The results obtained in the present study depicted the worse situation of the price policy as far as concerned to the area allocation under gram crop as area has been decreasing in spite of providing more prices for the crop. It may be concluded on the bases of above discussion that for bringing about the technological revolution, the price policy is a necessary condition but not a sufficient one. The price policy will have to be supplemented by appropriate institutional changes as well as by research and extension in this connection, the role of promotional subsidy in reducing the farmer to adopt better technology. New technological mission on Gram should be started to promote the growth of Gram. Although gram is the most important food grains in the country, but in Haryana state, its area as well as productivity is continuously declining. In this context, concerned research efforts are needed to find out the main reasons for the devastation of these crops and also suggest appropriate remedial measures for correcting this undesired trend. The demand for Gram can be increased by putting in more efforts to boost up the horse-business in India. The government should make adequate arrangement for timely supply of quality seeds and other inputs at reasonable prices to the growers so as to increase per acre productivity of Gram and to minimize the cost of cultivation.

6.References
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