SUPPLY RESPONSE OF ARHAR AND GRAM IN VARANASI DISTRICT OF UTTAR PRADESH

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ABSTRACT

The study attempted to undertake the task of investigating the relative impacts of various factors on acreage response of different pulse crops by analyzing time series data from 1970–2012. Supply response model was used in the study. It is well known that the area under the pulse crops is decreasing at an alarming rate. Its price is also increasing but farmers are not getting fair remuneration. This indicates that farmers do not have proper incentives to adjust to desired pulse area. This scenario is further illustrated by farmers’ inelastic response to government supports (incentives).

Key words : Supply response, elasticity, arhar, gram coefficients.

Agriculture the backbone of Indian economy contributes the highest share in employment generation and creation of livelihood. There was spectacular advances in agriculture during 1960s in terms of production and productivity. But the advances were seen only for cereals that too mainly in rice and wheat.

Pulses are the main ingredient in the protein basket of a vegetarian food. These are leguminous annual crops which are not only consumed for its protein content but is also used as a fodder crop and it also contributes to healthy soils. Pulses are mainly grown in unirrigated conditions as this group of crops can utilize limited soil moisture efficiently and for this reason farmers have chosen this crop to grow under highly adverse conditions. Important pulse crops grown in India are Chickpea, Pigeonpea, Gram, Lentil, Red kidney beans, Peas etc. India is the largest producer (25% of global production), consumer (27% of world consumption) and importer (14%) of pulses in the world. Pulses account for around 20 per cent of the area under food grains and contribute around 7-10 per cent of the total food grains production in the country. Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh and Karnataka are the top five pulses producing states (1).

According to the e book of IIPR in Uttar Pradesh the area under pulse crops is 2.304 million ha production and productivity are 1.697 million tones and 736 kg/ha respectively. Eastern Uttar Pradesh occupies very important place in pulse production in the state. The pulse crops grown are pigeonpea, chickpea, lentil, fieldpea, urdbean and mungbean. Among these chickpea and pigeon pea occupy highest area than other pulse crops. Chickpea was grown on 0.57 lakh ha and production was 0.59 lakh tonnes in the year 2010-11 while the total area and production of chickpea in whole Uttar Pradesh was 6.05 lakh ha. The growth rate of production of pulses in India, the major pulse growing country in the world is low compared to that of cereals. With the advent of Green Revolution the growth in the production of pulses is rather disappointing and has given way to the problem like rise in the prices of pulses and has serious impact on the state of food security because pulses are generally consumed by majority of population as staple food. It was recently in the news for its continuous upswing in prices.

RESEARCH METHODOLOGY

The study was conducted to examine the response behavior of arhar and gram growers to the changes in price and selected non price variables in Varanasi district of Uttar Pradesh. The objectives of the study were to estimate the supply response of Arhar and Gram and to estimate the short run and long run price elasticities of acreage in Varanasi district of Uttar Pradesh. Purposively Varanasi was selected as the study area.

The secondary data was collected from Directorate of Agricultural Statistics and Crop Insurance Lucknow Uttar Pradesh and from various publications like economic survey, Uttar Pradesh Bulletin of Agriculture Statistics. Apart from books and journals, Govt. of India, Dept of Agriculture and Cooperation, Ministry of Agriculture, India’s Comprehensive Statistical Analysis are some sites.

The study was undertaken on a micro framework in Varanasi district of Uttar Pradesh using secondary data for the period of 42 years :

(1) Pre liberalization period- 1970–90
(2) Post liberalization period-1991–12,
season rainfall, percentage irrigated area of crop, competing crop and wages. Arhar and Gram were selected for study as the area shift under these crops was maximum as compared to other crops. Competing crop of Arhar is Lentil and Gram is Rapeseed and Mustard which is based on scoring the highest negative correlation coefficient.

Analytical Framework

To attain the first objective i.e. to estimate the supply response of Arhar and Gram, Nerlovian Adjustment Model was used.

\[ A^*_t = a + bP_{t-1} + u_t \quad \ldots (1) \]

\[ A_t - A^*_t = \beta (A^*_t - A_{t-1}); \quad 0 \leq \beta < 1 \quad \ldots (2) \]

\[ A_t = a_0 + b_0 P_{t-1} + c_0 A_{t-1} + u_t \quad \ldots (3) \]

Where,

\[ a_0 = \alpha / \beta \]
\[ b_0 = b / \beta \]
\[ c_0 = 1 - \beta \]
\[ u_t = \beta u_{t-1} \]

\( A^*_t \) is the acreage farmers would plant in period \( t \) if there were no difficulties of adjustment. As \( A^*_t \) is unobservable, equation (1) cannot be estimated. Therefore assuming that acreage actually planted in period \( t \) equals acreage actually planted in period \( t-1 \) plus a term that is proportional to the difference between the acreage farmers would like to plant now and the acreage actually planted in the preceding period, hypothesis (2) is made. Technological or institutional factors prevent the intended acreage from being realised during the period and the parameter \( (C) \) is called the acreage adjustment coefficient. Expressing \( A^*_t \) in terms of directly observable variables estimating equation is (3).

The specified model is given below:

\[ A^*_t = b_0 + b_1 P_{t-1} + b_2 P^2_{t-1} + b_3 Y_{t-1} + b_4 Y^2_{t-1} + b_5 RP_t + b_6 RY_t + b_7 MR_t + b_8 IR_t + b_9 IG_t + b_{10} D + U_t \quad \ldots (1) \]

\[ A_t - A_{t-1} = \beta (A^*_t - A_{t-1}); \quad 0 \leq \beta < 1 \quad \ldots (2) \]

The final equation of the model can be obtained as follows:

\[ A_t = \beta (A^*_t - A_{t-1}) + A_{t-1} \]
\[ A_t = \beta A^*_t - \beta A_{t-1} + A_{t-1} \]
\[ A_t = \beta A^*_t A_{t-1}(1-\beta) \quad \ldots (3) \]

By substituting the value of \( A^*_t \) from equation (1) in equation (3),

\[ A_t = \beta (b_0 + b_1 P_{t-1} + b_2 P^2_{t-1} + b_3 Y_{t-1} + b_4 Y^2_{t-1} + b_5 RP_t + b_6 RY_t + b_7 MR_t + b_8 IR_t + b_9 IG_t + b_{10} D + U_t) + A_{t-1}(1-\beta) \]

Where;

\[ A_t = \text{area of pulse crop in the current year (hectare)} \]
\[ A_{t-1} = \text{area of concerned pulse crop lagged by one year (hectare)} \]
\[ P_t = \text{farm harvest price of pulse crop lagged by one year (Rs/qtl)} \]
\[ P^2_{t-1} = \text{farm harvest price of competing crop lagged by one year (Rs/qtl)} \]
\[ Y_{t-1} = \text{yield of pulse crop lagged by one year (kg/ha)} \]
\[ Y^2_{t-1} = \text{yield of the competing crop lagged by one year (kg/ha)} \]
\[ RP_t = \text{price risk variable} \]
\[ RY_t = \text{yield risk variable} \]
\[ MR_t = \text{rainfall during monsoon period in current year (mm)} \]
\[ IR_t = \text{irrigated area of pulse crop in current year (hectare)} \]
\[ IG_t = \text{irrigated area of competing crop in current year (hectare)} \]
\[ D = \text{Dummy variable 'liberalisation'} \]
\[ U_t = \text{a disturbance term} \]

To attain second objective i.e. to estimate the short run and long run price elasticities of acreage in Varanasi district of Uttar Pradesh following formula was used from the study of (2):

**Short run elasticity** = Coefficient of lagged price \times \frac{(Mean\ price)}{(Mean\ Acreage)}

**Long run elasticity of acreage** = Short run price elasticity/1-C

where,

\[ 1 - C = (\beta) \text{ Coefficient of adjustment} \]

RESULTS AND DISCUSSION

It may be observed from table-1 that the regression coefficient of lagged area under Arhar 0.454 is found to be significant at 1 percent level which implies that if there was an increase in last year’s area by one percent there will be increase in current year area allocation by 0.454 percent. The area under the crop is increasing but at a decreasing rate than the last year. The regression coefficient of lagged price is 0.065 significant at 5 percent level. So the lagged price has a positive influence on the
CONCLUSION

The analysis of supply response revealed that lagged area under arhar is an important determinant of supply response in Varanasi district of Uttar Pradesh. It has a positive influence on the farmer's decision related to current year's acreage allocation under arhar whereas in case of gram it has a negative impact.

The next important determinant was last year's price of pulse crop. It has a positive and significant response. So, the last year's price of main crop was one of the important influencing factors for farmers's decision regarding the current year's area allocation under the crop. It could be noted that the price elasticities of area of arhar and gram were less in magnitude and inelastic in nature. The relatively lower values of coefficients of area adjustment in both the cases suggested that the farmers in this district of Uttar Pradesh in general were confronted with rigid technological and institutional constraints in the production of pulses and thus relatively longer period was needed for the adjustment of the area.

The competing crop's price lagged by one year, showed no significance impact in the acreage allocation decision of the farmers. The yield of arhar and gram lagged by one year showed no significant response. The lagged yield of competing crop was found to be significant. The price risk of arhar and gram crop was found positive but not significant. The yield risk was found negative and significant which suggests that farmers were taking into account yield risk while allocating current year area under the crop.

The rainfall factor indicated the negative and significant impact. This implied that as the rainfall amount increases farmers change their decision to allocate area under arhar and gram. They reduce the area under the arhar and gram and allocate more area under other crops. This variable is an important determinant in determining the acreage under pulse crops as these crops have less water requirement. So when there is plenty of rainfall farmer tries to grow those crops which he is unable to grow in dry conditions.

The irrigated area under pulse crop showed negative response. This implies that when there is irrigation facilities available with farmers, farmers reduce the area under pulse crop and grow other crops. So their decision of area allocation under pulse crop is inversely related to the availability of irrigated area.

The dummy variable representing presence or absence of liberalization was not significant. This implies that farmers do not significantly differ between pre and
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post liberalization and globalization. It is true that mere these reforms do not contribute to the strengthening of response unless the pulse crops are made more attractive by providing farmers some price incentives.

The results of supply response implies that only last year’s area, monsoonal rainfall and last year’s price are important variables that farmers keep in mind while allocating area under pulse crops in Varanasi district of Uttar Pradesh.

**Short run and long run elasticity**: The lower value of short and long run elasticity was indicative of the fact that farmers of Varanasi are less price responsive or their nature was inelastic to price. The comparative closeness of long run elasticity to short run elasticity reveals a greater degree of adjustment in this region. This implies that pulses are not grown for profit purpose. It was mainly grown by the farmers for their own consumption. Due to price and yield risk farmers do not find pulse crop profitable that is why they allocate less and less area under the crop.

**REFERENCES**