Chapter IV

REVIEW OF LITERATURE

It may be useful and necessary to pursue the review of the related studies. So in this chapter an attempt is made to take the review of previous studies on price variations, behaviour of market arrivals and prices, and change in area under crop due to a change in price. This chapter is divided into three parts, the first part dealing with the review of studies on price trend and seasonal price variations of agricultural products, second part dealing with the review of studies on behaviour of market arrivals and agricultural price, and the third part dealing with the review of studies on area response to change in price. Some of the most important and noted studies concerning the above aspects are considered.
Review of the Studies on Price Trend and Seasonal Price Variations:

There is a study held by K.G. Adur on price trend and price variations of agricultural products, at all-India level. This study covered the period from 1950-51 to 1982-83. The whole period was divided into three sub-periods having three different base years i.e. 1952-53, 1961-62 and 1970-71 for the sub-periods 1950-51 to 1961-62, 1962-63 to 1970-71 and 1971-72 to 1982-83 respectively. He found that except few years in the beginning of planning in 1950-51, there has been almost a continuous upward trend in agricultural prices. The same upward trend may be seen in each sub-period and also for individual commodity groups viz., cereals, pulses, oilseeds, etc. The extent of price rise is different in different sub-periods. In the first sub-period (1950-51 to 1961-62) price index increased from 110 to 127.8. In the second sub-period (1962-63 to 1970-71) it increased from 102.3 to 201.4, and in the third sub-period (1971-72 to 1982-83) from 100.4 to 248.1. Over the entire period covered under this study, the price index of agricultural commodities has increased
from 100 to 525.7. It means prices have increased by more than five times in the period of three decades. During the first decade (1950-51 to 1959-60) price index increased by 6 per cent, by 82.2 per cent during second decade (1960-61 to 1969-70), and by 148 per cent during the third decade (1970-71 to 1982-83).

The author discussed the point that the prices of particular agricultural commodities have been fluctuated widely from year to year also e.g., price index of wheat rose steeply from 120 in 1973-74 to 189 in 1974-75 i.e. by 57.5 per cent but fell by 19 per cent in the subsequent year. The prices of pulses also fluctuated arbitrarily. The price index of pulses fell steeply from 194 in 1974-75 to 148 in 1975-76 (by 24.5 per cent). It went up steeply from 240 in 1979-80 to 341 in 1980-81 (by 42.1 per cent). Similar behaviour was noticed in case of raw cotton, raw jute and groundnut also.

The author pointed out that the main reason for fluctuations in agricultural prices is the seasonal and uncertain supply of agricultural products and mainly
of foodgrain products. Further, the author drove attention towards the adverse effect of price variations on small and marginal farmers e.g., price variations reduce the income of small farmers due to fall in prices and dampen the spirit of farmers to enhance production. Fluctuating prices have spelt misery to the poorer sections of the population whose purchasing power is low.

2 H.S. Singh's study examined the nature of groundnut and jowar prices for the period from 1953-54 to 1962-63 for selected markets in India. Groundnut and jowar are the kharif crops. The author found that during the study period the range of variations between minimum and maximum yearly price indexes for groundnut has been 71 as against 56 for rice, 56 for jowar and gur, and 37 for cotton. It implies that the prices of rice and cotton are subject to low variations than that of groundnut, jowar, and gur. The author pointed out that it is the effect of price regulation. Due to absence of price regulation, price variation was greater for jowar, gur and groundnut. The co-efficient of variation for the groundnut prices was very high (20.3 per cent ) as
compared to that for other agricultural commodities viz. rice 12.5 per cent, gur 17.1 per cent and cotton 11.6 per cent. The author also found the variability in groundnut prices to be high within a period of one year. The percentages of difference between maximum and minimum harvest price indexes ranged between 13 per cent to 46 per cent for groundnut, which was higher than for other agricultural commodities viz., for rice from 12 per cent to 23 per cent, jowar from 7 per cent to 29 per cent, for gur from 8 per cent to 50 per cent and for cotton from 3 per cent to 20 per cent. The author also studied spatial price variations between different selected markets for groundnut and jowar. It was found that the prices in different markets moved in a dissimilar manner both in regard to degree of variations and also directional movements. Between the selected markets the movements of groundnut prices did not follow an identical course during a period of one year. The difference in the prices between selected markets varied at different points of time. There was lack of sympathy in price movement of groundnut in selected markets. It means that the market of groundnut is not integrated
such as the market of jowar. Comparatively, the price movement of jowar in selected markets had similarity and the difference in the prices between selected markets was also quite low. The author calculated the deviations of the prices of selected commodities from their means and converted them into percentage form. It also indicated that the jowar prices reflect a high degree of market integration than the groundnut prices. The price behaviour of groundnut was fairly irregular and varied in an individual market as well as from market to market.

Jailas Chandra made a comparative study of fluctuations in wholesale prices of different food articles and non-food articles. He covered the period from 1950 to 1961. He found that the wholesale prices of industrial goods are more stable than the prices of food articles. Further, he concluded that different agricultural goods, which have been included in food articles, have different degrees of price variation during the study period. The coefficient of variation of prices of cereals was found to be 4.02 per cent, for pulses 7.48 per cent, for fruits and vegetables 10.5
per cent, etc. These co-efficients showed that prices of fruits and vegetables and pulses were more unstable. In the group of cereals, the co-efficients of variation of prices were: for rice it was 5.61 per cent, wheat 5.26 per cent, maize 8.78 per cent, barley 10.94 per cent and jowar 6.4 per cent. It showed that the prices of barely, maize and jowar were more fluctuating and therefore unstable. In the group of pulses, the co-efficient of variation for gram prices was found to be 11.96 per cent. It was 8.73 per cent in case of arhar, 8.16 per cent for masur and 6.87 per cent for green gram. These co-efficients also showed that the prices of gram, arhar and masur were more unstable.

M.V. Nadkarni attempted to examine the nature of agricultural prices and production in India. This study is a doctoral thesis of the author submitted to Karnataka University, Dharwar. The study was based on secondary data and covered the period from 1951-52 to 1965-66. The selected agricultural commodities were rice, wheat, jowar, pulses, gur, groundnut, raw cotton and raw jute. From the observation of data on prices and production, it was found that there is not any
regularity in fluctuation of prices and production. The degree of fluctuations in prices differed from market to market, and from plan to plan during the study period.

To precise the nature of fluctuations in prices and production of the selected commodities, author calculated co-efficients of variation. The co-efficients showed that the fluctuations in agricultural prices are irregular and larger than that in the production. Further, it was seen that the fluctuations in prices and production are lower (co-efficient of variation being 11.29 per cent), 7.22 per cent for production, for cereal group than that for the group of pulses. In the group of cereals, greater fluctuations were found in both price (16.88 per cent) and production (10.49 per cent) of jowar. On the other hand, the least variations in both prices (8.91 per cent) and production (8.83 per cent) were found for rice. Variations in prices of gur (19.33 per cent) and groundnut (17.26 per cent) were higher than the variations in prices of cereals but lower than the variations in prices of pulses.
The author pointed out that different commodities have different price elasticities of demand which result into the fact that variations in prices does not respond equally to variations in production. The considerable degree of fluctuations found in prices of jowar, pulses, gur and groundnut is a serious problem. So the author suggested that the price stabilisation policy must pay sufficient attention towards the prices of these crops.

Mohanan N. and Purushothan P. held one study on production trend and price behaviour of dry chillies between the different markets in Andhra Pradesh. They examined the relation between wholesale and retail prices and compared fluctuations in these two types of prices. This study was based on the secondary data for the period from 1969-70 to 1975-76. The author found that the area under chillies and its production have increased but productivity has fallen down. Because the increased area is larger than increased production. It indicates that productivity of chillies depends on agro-climatic conditions rather than area and/or prices.
The variations in the retail prices of chillies were found to be consistent with the wholesale prices. It means that the movements in these prices were in the same direction, that is, either increasing or decreasing. The co-efficient of correlation between the wholesale and retail prices was highly significant (0.99) and revealed a close relation between these prices. It was found that retail prices are higher than wholesale prices by 14 per cent to 21 per cent. Average retail prices were found to be higher by 17.37 per cent than the average wholesale prices. The authors found that there was a considerable difference between wholesale and retail prices, between various marketing centres which have spread all over the state. In 1969-70 the wholesale and retail prices were closely related with each other as the co-efficient of correlation was significant (0.50). But in 1975-76 these prices were not closely related to each other as the co-efficient of correlation (0.20) was not significant. It indicates improportionate variations in the wholesale and retail prices in various marketing centers at different points of time.
Further by scrutinizing the data in the view of seasonal price fluctuation it was found that wholesale prices are higher (Rs. 535 per quintal) in peak harvesting period in 1970, and declined by 2.6 per cent in off season upto Rs. 521 per quintal. It means that the prices are lower in off season and higher in peak season which is in contrast to general market trend. The same trend was observed in retail prices also. The reason behind this was that a record production of chillies was recorded in 1970 and there were high accumulated stocks. Due to this and comparatively lower demand for chillies price of this commodity, in off season, declined from what it was in peak season. On the contrary, wholesale and retail prices of chillies attained the highest level in lean season (Rs. 1285 and Rs. 1425 per quintal respectively) and the lowest level in peak season (Rs. 765 and Rs. 900 per quintal respectively) in the year 1975. It means that the wholesale and retail prices had declined in peak period by 67.9 per cent and 58.3 per cent respectively. This clearly indicates that the structure of seasonality of

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wholesale and retail prices was different in 1975 from that in 1970.

Geogre, M.V. and Ranju, S. attempted to study the price structure of rubber as a cash crop in Kerala state for the period from 1961 to 1978. Price trend was studied by fitting a linear regression equation to the price data of rubber crop. They found that price of rubber increased over the period from 1961 to 1978. The trend value showed that the rate of increase in price during the study period was Rs. 24.89 per year. But there was no continuous steady rising trend in price for the whole study period. The data revealed a violent fluctuations in price of this crop. From January 1967, rubber prices had come down than previous prices till May 1968, but then upward price trend was observed from June 1968 to March 1969. During April 1969 to August 1971 prices showed a gradually decreasing trend. Again from September 1971 prices had steadily increased till September 1974. Further, prices had shown again downward trend till September 1976. From January 1977 to September 1978 rubber prices attained a higher level. It
indicated that over a long-period rubber prices show an upward trend but in a short-period there are very high variations. Seasonal variations in rubber prices were also discussed in this study. In this connection it was found that the seasonal index of rubber prices was lowest in the month of October (95.7) and highest in the month of August (102.5). However, the difference between these maximum and minimum seasonal price indexes was not very high.

F. Kamala Devi also attempted to study the seasonality in prices of jowar for certain selected markets in the southern zone (Madras, Mysore and Andhra Pradesh states) and for the period from 1950 to 1960. In this study it was found that the price of jowar fluctuated in different extents in different markets. The price variation between different markets was the highest in 1956 and the lowest in 1959 which indicated the different integrity of markets in different periods. Another important finding of this study was the seasonal fluctuations in the prices which occur within a period of one year. The author calculated the co-efficients of variation within a year and for each selected market. It
was found that the seasonal fluctuations in prices attained a maximum level in 1956 but they were more stable in 1957. The half-yearly price averages were worked out for each year. The price difference was found between the first half and second half of a year in all the marketing centres.

It was seen that the price of jowar declines from November with the harvesting arrivals of kharif jowar and begins to rise at the end of its harvest period. But due to harvesting period of rabi jowar, kharif jowar price remains lower in the months of March and April. Thereafter off seasonal rises in price take place, and touch to a maximum level in the months of October and November. Further, the study also found that the degree of seasonal variations in price of jowar was different at different marketing centres.

Rath N. and Satyapriya V.S. undertook a study to examine the seasonal pattern of price movement of jowar in Maharashtra and Mysore states mainly for post-war II period. The main objectives of this study were to note the seasonality in wholesale prices of jowar in
selected markets and compare the rising prices with the estimated cost of storage. The marketing centres selected were Akola, Amravati, Nagpur, Barsi, (from Maharashtra state), Hubli, Hospet and Gulberga (from Mysore state). The data were collected from both published and unpublished sources.

It was found that the seasonal movements in price of jowar in selected markets have a distinguishable nature from market to market and from year to year. In Akola market price reached at a lower level in October and at a higher level in the month of July. The difference between the maximum and minimum price was 10 percent. But the degree of seasonal price variations differed from year to year. As well as the month of highest price and the month of lowest price also differed from year to year. In three years out of six years harvest prices were found to be higher than the pre-harvest prices. In case of Amravati market also in two years out of three years harvest price was higher than pre-harvest price. In case of Hospet market there was not any consistency in seasonal movement of jowar prices. In case of Nagpur and Hubli markets, higher
price level was found to have attained in the month of October and the lowest during the months of December and January. Seasonal rise in prices ranged from 18 per cent to 50 percent. Barshi and Gulbarga markets are surrounded by predominantly rabi jowar growing tracts. The marketing season of rabi jowar begins in the month of March. In these markets prices reached at a lower level in the months of March-April and later on move upward till the month of October. The seasonal variations in these markets ranged between 10 per cent to 34 per cent.

In short, it was found that the seasonal variation in jowar price was irregular and differed from market to market, from year to year, and between kharif tract and rabi tract markets also. Particularly in three markets, namely, Akola, Amravati and Hospet that the seasonality in jowar prices was most irregular.

A study held by National Council of Applied Economic Research dealt with structure of agricultural prices and their role in regard to production and marketed surplus. The study was confined to some
selected crops e.g., wheat, gram, jowar and paddy, which are the main foodgrain crops in India. The indexes of price trend and of seasonal prices for the four selected foodgrains were worked out for the period from 1950 to 1965. The variations in the prices of these commodities were, more or less, similar during the study period.

In this study the price trend and seasonal price variations were explained by using graphical methods also. The price trend of these commodities was declining during 1950-56. During the period 1957-62 prices had increased at a low rate, but after 1962 prices rose at a relatively high rate.

The seasonal price variation is a common phenomenon in India agriculture. The author worked out the co-efficient of seasonal variation in prices of each crop and for each year. The range of co-efficients of variation during the study period was for rice 3.1 per cent to 10.4 per cent, wheat 7.8 per cent to 12.1 per cent, jowar 2.8 per cent to 20.1 per cent and for gram 4.3 per cent to 23.8 per cent. It means that the prices of different commodities have varied in different degrees.
The price of rice begins to decline as harvest takes place. The lowest price was reached in the month of January when there is peak marketing period and it attained a maximum level in the month of August when market arrival is the minimum. In case of wheat, price begins to decline about in the month of June. Off seasonal maximum price level of wheat was found to have reached generally around the months December-January. In case of jowar, which is a kharif crop, off seasonal price rises generally take place during the months from May to October. The price of jowar begins to decline from about November. It hardly rises at the end of kharif marketing season, but the harvest of rabi jowar again brings the kharif jowar prices down. In case of gram, the seasonal low price is reached about in the month of May and reached at the top level in off season, that is, about in the month of February. The range in seasonal indexes of wholesale prices for selected crops was 11.6 for rice, 11.1 for wheat, 7.8 for jowar and 13.2 for gram. It shows that the seasonal variations were higher in case of gram and lower in case of jowar.
There is a contribution made by Kainth and Singh. They undertook a study for selected markets and for two main food crops viz; paddy and wheat. The study covered the period from 1964-65 to 1977-78. In the temporal analysis of agricultural prices, authors found the seasonality in prices of wheat and paddy. The price of wheat begins to decline as harvest crop approached to the minimum price index level (95.38) and move upward to the maximum price index (108.74) in lean period. It means the price increased by 14 per cent in lean period. The price of paddy was somewhat more unstable than that of wheat, where price index of paddy increased by 20.75 per cent in lean period as compared to harvest period price index, which increased from 89 to 107.47. The study revealed that the seasonal variations in wheat and paddy prices are not very high. It means foodgrain market in Punjab is operating efficiently.

Singh L.S. conducted one study on the price variations of agricultural and non-agricultural commodities, at all-India level for the period from 1951-52 to 1977-78. In the analysis of agricultural
prices the study concentrated mainly on the foodgrain prices. The foodgrains were considered into two groups: cereals and pulses. The author found that the agricultural prices are more unstable than the prices of manufactured articles. The standard deviation of manufactured prices was 6.3 as against 10 for primary goods. In this study it was found that prices of agricultural products are most dominating in the economy than the prices of any other products. In the detailed analysis it was found that prices of primary products are most dominant than prices of manufactured articles. Further, prices of food articles are most dominant than that of non-food articles in the group of primary products itself. In the group of food articles, the foodgrain prices are most effective than that of non-foodgrain prices. Only rice prices are effective than price of any other commodity in the group of foodgrains.

One of the most important findings of this study was regarding seasonal variations in agricultural prices. He presented the seasonal nature of prices of some selected agricultural commodities viz; foodgrains, cereals, rice, wheat, etc. The extent of seasonality in
prices was measured in terms of standard deviation. In case of foodgrains and cereals, the standard deviations were comparatively lower (1.19 and 1.35 respectively) than that for rice and wheat for which standard deviation was 3.44 for rice and 1.67 for wheat. In case of rice, during the peak harvest period i.e., October-November, price index was found to have gone down to 95.4 and then it reached at a maximum point (i.e. 104.8) in the lean period (May-June). In case of wheat, which is a rabi crop, the price index was found to have touched to a minimum level in the month of March (98.2) and to a maximum level in the month of November (102.7). Further, he found that the extent of seasonality in wholesale prices of wheat was somewhat less than that for rice. It means that wheat prices were more stable than the rice prices. Because wheat is grown by comparatively big farmers, who need not rush to sale their produce in the market immediately after the harvest.
Review of the Studies on Behaviour of Market Arrivals and Prices:

According to laws of supply and demand, changes in supply and demand of a commodity take place due to change in its price. In this view price is an independent factor which affects the supply and demand. An increase in price has a positive effect on supply and inverse effect on demand and vice-versa. On this background a hypothesis is established, 'that there is positive relation between price and marketable surplus'.

This is supported by Raj Krishna. But there is another hypothesis developed by Mathur and Ezekiel. According to them, there is an inverse relation between price and marketable surplus. It means any change in market arrival of a commodity affects its price. Market arrival is an independent factor which has influence on price. Generally, it is found that in the harvest season when arrivals of agricultural products are at a peak level, prices decline to a minimum level, and in off season when arrivals are at a lower level, the prices move to upwards at a peak level. It reveals the
inverse relation between arrivals and prices. Having special characteristic in agricultural sector and agricultural products, it is true that market arrivals (i.e., supply of agricultural products) play a dominant role in determination of prices particularly in short period. Therefore the hypothesis developed by Mathur and Ezekiel seems to be correct. This hypothesis is also verified through various empirical studies. Ramulu and Reddy conducted a study of marketing of jaggery in Anakpalli regulated marketing centre in Andhra Pradesh. He found that the index of arrivals and prices have changed from month to month. The arrivals of jaggery increased during the period from September to May in the market because of entrance of new production in the market and then after the month of May arrivals of jaggery decline. From the collected data the author found that the average prices and arrivals are negatively related, as explained by linear regression line. Prices are relatively low during September to June due to larger arrivals in the market. During the period from June to September, when arrivals are low, prices are comparatively high. The study concluded that
for each unit increase in prices the arrivals of jaggery decrease by 2633.87 units. The co-efficient of determination ($R^2$) indicated that 37 per cent variations in arrivals are explained by the variations in average price alone.

Jaith and Kansal in their study entitled "Price Behaviour of Himachal and Kashmir Apples in Delhi Market" found the negative value of regression co-efficient which indicates inverse relation between price and arrivals. The value of $R^2$ (i.e., the co-efficient of multiple determination) indicated that 51 per cent variations in case of Himachal Pradesh apple prices are caused by arrivals. However, in case of Kashmir apples the supply of apples played a significant role. In case of Himachal Pradesh apples the prices of apples were higher when arrivals were poor and prices declined due to larger arrivals. Seasonal variations are higher in arrivals of apples, which ultimately affect its wholesale price.
Balakrishna V., Swaminathan L.P. and Puhazendhi V. held a study for Nilgiri district in Tamilnadu to examine the nature of arrivals and prices of potato for the period from 1962 to 1977. They found that there is a positive growth in arrivals and prices over the period under consideration. But the important finding was that the price and arrivals have varied to a greater extent even within the period of one year. Out of total quantity marketed in a year, 62 to 63 per cent quantity is marketed during June to September, which is a peak period for this crop, at lower prices. The quantity marketed in the lean period (from January to May) was remained in between 17 per cent to 20 per cent only, when prices are higher.

The study held by K.S. Gill and S.S. Johl for Punjab also found the same result. During the study period (from 1952 to 1966) the index of arrivals was highest in May (270.05) followed by June, April and July. The prices corresponding to these months were found to be in lowest range i.e. between 92.59 to 96.46. It indicates inverse relation between arrivals and
prices. The price index for the period from September to March ranged from 100.69 to 107.89 at the higher level while arrival index ranged from 46.48 to 67.5 at the lower level. The major portion of cultivators' product (i.e. 70 per cent) was received in the market at lower price level. So in peak period (from April to July) major part of product shifts into the hands of trader at low prices. It implies inverse relation between arrivals and prices.

The National Council for Applied Economic Research also found the same result in its study. It was found that in case of rice the co-efficient of variation of arrivals is larger, when co-efficient of variation in wholesale prices is smaller. This indicates that the variation in arrivals was larger than variation in price. In case of wheat, jowar, and gram also the same result was found, that is, the variation in arrivals was greater than variation in its price. The co-efficients of variation in arrivals and price differed from state to state and also from commodity to commodity.
Seasonal pattern of market arrivals of rice showed that 50 to 70 per cent of the total market arrivals take place during the period from October to March, that is, within six months from beginning of the harvest season a larger share of surplus grain is sold in the market. During the lean season, when generally prices are high, the quantity of rice marketed is a small portion of the total marketed quantity. The elasticity of market arrivals turned out to be negative.

The estimated value of $R$ was very small meaning that the variations in price explain very little of the variations in market arrivals, during the study period.

In case of wheat 50 to 70 per cent of total market arrivals take place during only three months of harvest period. The market arrivals of wheat during the six months i.e. from October to March were found to be 30 to 40 per cent of total marketed wheat in a crop year. The value of $R$ for the relationship between price and market arrivals of wheat turned out to be very low. It means the variations in the price of wheat explain very little of the variations in the market arrivals. In this study price elasticity of market
arrivals had a negative sign.

Jowar is a kharif as well as a rabi crop. So the structure of arrivals of jowar is somewhat different in the kharif jowar producing area from the rabi jowar producing area. In Uttar Pradesh, and Madhya Pradesh where mostly kharif jowar is produced, the arrivals in the market have a greater variation as compared to other states where both kharif and rabi jowar are produced and marketed. The study found that when co-efficient of variation of prices of jowar increases, there is general tendency of increase in co-efficient of variation of market arrivals also.

The seasonal pattern of market arrivals of jowar showed that 60 to 80 per cent of the total marketed quantity of jowar is marketed during the period from January to June, when generally prices are low. In the statistical form the relationship between change in prices and change in arrivals turned out to be very weak. The value of $R^2$ was very low. It indicates that the variations in the price of jowar have explained very little of the variations in its market arrivals.
Gram is produced mainly in rabi season. In this study it was found that since major portion of total marketed quantity is sold during the months from April to June, that is, immediately after the harvest. The co-efficient of variation in the prices of arrivals differed in different states. The value of R was low, which indicates that the variations in price of gram explained very little of the variations in its market arrivals. The statistical relationship was found to be very weak.

Kamat G.S. and Purushottan P. also attempted to study the price behaviour of chillies in Andhra Pradesh. This study covered the period of 16 years from 1961 to 1976. This study was conducted to study the seasonality in chillies price and to examine the benefit from storage of chillies. Chillies is a labour intensive and seasonal crop sown in November and harvested in February to March. The study found that the harvesting period of chillies is confined only to two to three months and mainly to February and March as 60 per cent. of crop is harvested in the month of February and
34 per cent in the month of March. This percentage may slightly change due to change in monsoon. Near about 3/4ths of the total marketed surplus is sold in the harvest period. Due to heavy arrivals in harvest season prices fall down and vice versa. It indicates inverse relation between arrivals and price. The difference between harvest and post-harvest prices was as low as Rs. 14 in 1961 and as high as Rs. 699 in 1975. During the study period, the harvest prices were found to be higher than the post-harvest prices in the years 1964 and 1972.

Further, the study found that the seasonal price fluctuations of chillies in harvest and post-harvest periods are excessive than the required storage costs.

Review of the Studies on Influence of Change in Prices on Area under Crops:

Crop pattern depends on various factors. Prices of agricultural commodities is one of those important factors. Price and area under a crop have a close relation with each other. There is a hypothesis that there is a positive relationship between change in price and change in area. There are various sides to this relation. The relation between change in price with change in area may differ for subsistence crops and for cash crops. Area under a crop may be affected by price
of that crop as well as prices of competing crops also. These different aspects of relationship between price and area under a crop are verified through various empirical studies.

There is a study held by Sinha S.P. and Verma B.N. to examine the variation in prices of foodgrains and specially in cereal prices and its effects on acreages under the crops in Bihar state for the period from 1956 to 1998. During the study period, prices and area under cereal crops showed an increasing trend. But the co-efficient of correlation between these variables was negative (-0.13). This indicated that the expansion of area under cereal crops is not influenced by rise in their prices. Because in case of cereals climate and rainfall are dominant factors which determine the area under them. Many of the cereal crops are produced for home consumption and for barter exchanges. So the authors point out that, though the price incentive is given to cereal crops the area under them on the whole is inelastic. Further, it was found that the co-efficient of variation is the highest in case of prices of cereals (23.68 per cent) and the
lowest for the acreage (4.2 per cent) under them. This also indicates that the acreage under cereals is almost inelastic when effect of price on area is limited.

The study conducted by K.S. Gill and S.S. Johl for gram has proved the hypothesis that the higher prices of the products should, in long run, increase acreages under the crops. In this study he used one year lagged prices viz: prices for the years from 1949 through 1964 were put corresponding to acreages for the years from 1950 through 1965. The coefficient of co-relation was worked out for these lagged prices and acreages. It was found to be 0.001487, which is not significant. It means the relationship between price and area is very weak. The crop gram is mostly sown on unirrigated lands where sowing is mostly dependent on rainfall at the time of sowing.

In this regard Dharam Narayan's study is a well authenticated and thought provoking contribution. In this study the author dealt with almost all the important aspects of the hypothesis concerning producers
behaviour in response to price changes in the context of peasant agriculture. The theoretical issues involved in assessing the role of profit, a basic economic principle in decision making process of Indian farmers have been thoroughly examined and this is the most important contribution of this study. The study covered the period from 1900 to 1939.

In the second part of his study the author explained the graphical composition of year-to-year variations in acreage under selected crops viz; cotton, jute, groundnut, sugarcane, rice, and wheat with those of the variations in their prices and also with variations in income per acre. Dharam Narayan concluded that Indian farmers are significantly responsive to prices. However, he has pointed out a striking difference of behaviour between cash crop and food crop areas. He found in major cases that the prices emerge as a decisive consideration with the farmer in the area where he sows for profit motive. He concluded that in case of foodgrain crops rainfall plays a significant role, but for the cash crops prices are most effective to bring a change in area under the crop.
Dharam Narayan's study also demonstrated the role of prices in areas where foodgrains are grown. In Indian economy, the role of prices in foodgrain areas is firmer when food crops compete with cash crops rather than with rival foodgrains in given area. On the basis of his selective findings, relating to rice area in jute region of Bengal and cotton growing tracts in Madras, to wheat area in a part of sugarcane growing region of United Province, to jowar area in relation to area under groundnut in Madras, the author has proved that specific region at least exerts a significant influence on the variations of foodgrain area.

Responsiveness of area to price change is also discussed in the study held by National Council for Applied Economic Research. In case of rice growing states the co-efficient of price variable in regression equation has turned out to be positive. The short-term price elasticity of area was found to be relatively high in some states as compared to other selected states. In case of wheat also co-efficient of price variable was found to be positive in all the seven states. It indicated that changes in wheat area were positively
related to changes in price. But both in long-run and short-run periods, price elasticity appears to be low.

This aspect was studied in 6 states for jowar and found positive sign of the co-efficient of price variable. In both short-run and long run, price elasticity of area was found to be low. In case of gram the co-efficient of price variable turned out into negative in three states, namely, Gujrat, Maharashtra and Rajasthan out of seven states. In the remaining states this co-efficient was positive, that is, the area under gram had positively changed with the changes in its price. But the price elasticity of area under gram was found not to be relatively high.

In short, the study reached to the conclusion that in India the degree of responsiveness of area of individual crops to changes in their prices is low and in some cases insignificant. It means that farmers are responsive to change in price but the response is weak.

Lalita Sud and A.S. Kahlon held one study in the Punjab state to examine the responsiveness of acreage to change in price. They selected two crops.
namely, wheat and gram. In all, six districts were selected. Of which Jalander, Ludhiana, Ferozpur and Amritsar were the irrigated districts, where more than 50 per cent area cropped is under irrigation, and Gurudaspur and Hoshiarpur were the rainfed districts.

The study found that the response of acreage to change in wheat prices is significant at 5 per cent level with an elasticity of 0.098 at the state level. Although rainfall prior to sowing is significant factor at 5 per cent level with elasticity of 0.06. It clearly indicates that with favourable weather conditions and given incentive prices farmers would allocate more land to wheat.

The district-wise analysis revealed that in Ludhiana, Jalander, Gurdaspur and Ferozpur districts acreage response to wheat prices was significant. It means acreage under wheat increases with the increase in its price. But in Hoshiarpur district price co-efficient is negative. It means area under wheat decreases with increase in its price in this district. The reason is that the total area under crops had declined due to agricultural land appropriated for non-agricultural purposes.
Wheat and gram are competing crops as they are grown in the same season. But allocation of land under wheat was found to have affected considerably by its own price. Upto some extent irrigation facilities and rainfall were also responsible. But the price of gram as a competing crop had no effect on area under wheat.

Gram is a multi-purpose crop mostly grown on unirrigated lands. So the rainfall just prior to sowing season is an important factor affecting acreage under gram.

In this study it was found that in Hoshiarpur, Ludhiana and Jalander districts price elasticity is positive. It means acreage under gram was affected by its price. But in Amritser, Ferozpur, and Gurudaspur districts price elasticity was found to be negative. It means acreage under gram had a tendency to decrease with the increase in its price. But it could be attributed to the factors other than the price. In Amritser and Gurudaspur districts cultivated area was affected by water logging where hundreds of acres of land was unfit for gram cultivation. In Ferozpur district excessive
Irrigation facilities are developed and gram is cultivated on marginal lands only. Due to these reasons area under gram had declined in these districts where price elasticity was negative.

Due to competitiveness of these crops, it was found that acreage under gram was significantly affected by wheat prices and the effect of gram prices was insignificant. It means a relatively higher price of wheat would increase the acreage under wheat and decrease the acreage under gram.

Kainth G.S. attempted to examine the response of individual crops to their relative prices, in Punjab state. This study covered the period from 1961-62 to 1976-77. Ratio of prices and ratio of areas of two competing crops were worked out to study the responsiveness of area to relative price.

The study found that out of 15 years in 11 years the movement in price ratio and area ratio was positive and only in four years it was negative. It indicates a significant and positive response of area to change in relative price. However, the degree of
responsiveness depends on the magnitude of the positive and opposite movements. In order to know the degree of responsiveness correlation co-efficient is worked out between price ratios and area ratios of non-foodgrains and foodgrains. The value of co-relation co-efficient (i.e. 0.68) also showed the same result, that is, responsiveness of area to relative price is positive.

In case of American cotton and desi cotton, which are perfectly competitive varieties, it was found that in 4 years movement of price and area ratios was positive and in 11 years it was negative. The co-efficient of co-relation was -0.58 which is negative. It indicates that responsiveness of area is inversely related to relative price in case of both American and desi cotton.

Rice and maize are competitive crops. In case of these crops out of 15 years in 7 years there were positive movements and in 8 years negative movements in price ratios and area ratios. Co-efficient of correlation also had a negative value (-0.26). It indicates that change in relative price of rice in terms
of maize did not lead to change in the allocation of acreage between rice and maize.

Wheat and gram are purely competitive crops as they are grown in rabi season on the same quality of land and require moderate rainfall. The study also found that in 6 cases movement was positive and in 9 cases it was negative. The co-efficient of correlation between these ratios was found to be -0.46 and statistically significant. It reveals that movement of relative prices of wheat and gram led to perverse movement of relative area of these crops.

An attempt was made by D. Naik and S.C. Patnaik to study the impact of change in prices on area, output and productivity of potato crop in Orissa state for the period from 1971 to 1981. The data was collected from Directorate of Agriculture and Department of Civil Supplies, Government of Orissa. Data was
analysed by using least-squares method. Co-efficients of correlation and multiple determination were also calculated. It was found that the area under potato in a particular year is more dependent on post-harvest price lagged by one year. The co-efficient of correlation (0.5162) indicated that there was a close association between acreage and lagged harvest price of potato in Orissa. From this analysis it could be said that the cultivators of Orissa grow potato mainly for market and they are much aware of the lagged prices.

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