INTRODUCTION
In a predominantly agricultural economy the overall rate of economic growth depends to a very large extent on the rate of growth in agriculture. In India, achievements in the agricultural sector will continue to be a determining factor in the achievements of plan targets for many years to come. The success or failure of programmes of agricultural development, in turn, depends decisively on the way farmers react to such programmes, since it is ultimately the farmers who make the final decision concerning the allocation of land and other resources for a particular enterprise. Highest priority must be given to the farmers, to farming, to food and agriculture as it is the cornerstone of the country’s economy.

Agricultural production is largely a private business, carried on in millions of farms, efforts to accelerate agricultural progress must be persuasive and must work through the market forces. Therefore, price policy is an important instrument for change and it should subserve the objective of economic development.

Price indicates how resources should be utilized in an economy, governed by price mechanism under competitive conditions and they determine not only what shall be produced but also how much should be produced. The price system is a powerful tool to elicit and transmit essential economic information and to stimulate appropriate decision by producers and consumers. Agricultural prices are the signals which conveys the producers demand for agricultural products. Agricultural prices are quickly responsive to demand and supply conditions. Since agricultural output constitute half of the national product, the general prices level is mostly determined by the behaviour of agricultural prices. That’s why agricultural price policy is of very vital importance. The result of it form bases for huge economic programmes.
However, agricultural price policy, in our country has been severely criticized on the ground that it has been deliberately forging the farm prices down. The aim of the agricultural price policy is to achieve price stability without destabilising the total revenue of the farmers and provide a price support which would be economic to the farmers as well as to agro-based industries and at the same time safeguard the interests of the consumers.

India has a long and proud tradition of agriculture, starting with the end of nomadic life and leading to a highly developed self-contained village economy based on the principle of the static division of labour. The cropping patterns followed were based on traditional system of subsistence farming, where the farmer tries to produce every thing he needs like cereals, pulses, vegetables etc. and this practice continued until the launch of 'Green Revolution' and the introduction of technology in agriculture. Our ever increasing population (total population was 844,324,222 and the decennial growth rate of population (1981-1991) was 23.56 percent, Census Report, 1991) is compelling us to give up the old time-tested way of maintaining soil fertility. Manures are being replaced by chemical fertilizers. Even marginal lands are being ploughed. Irrigation is being extended even to the most arid areas, changing the age-old eco-system. The production possibilities have increased with the use of costly inputs. The farmers have started producing surpius with the result that they think of maximising the returns from their lands. The price which the farmer gets for his produce became of vital importance. The Indian agriculture has now been shedding its subsistence character and is poised to enter into an entirely different phase of commercial agriculture.
It is true that the Indian farmer devotes a significant proportion of his land to fulfill his own requirements, but it is natural to expect that in sowing the surplus lands, farmer would look to the market. In the case of cash crops at least, profit motivation should be effective and prices ought to influence the variations in area. Even in case of foodgrains, which are largely grown for self-consumption and partly for market, we cannot deny the role of prices. With the development of money economy and technological changes, the traditional concept of subsistence farming has undergone radical changes. The subsistence producers also has to sell a certain portion of his produce to get cash for his domestic requirements and he also has to spend a substantial amount of money on inputs. Now after the ‘Green Revolution’, the output has increased substantially and the psychology of scarcity, which regulated the farmers attitude in the past is now changing. Though the farmers at near subsistence level grow primarily for the family, the variations in the prices of the crops may still be important for them, because if the price of their basic food crop rises, it would be costlier for them to meet their subsistence requirements.

All production takes time, in agriculture particularly because of its biological nature of the production process, which causes a considerable lag between production inputs and outputs. The lag between the time of decision in respect of utilization of land, the most important input factor and the fruition of that decision into output is also long. In principle the prices which motivates production is neither the price at the beginning of the production process nor the price at the end of it. It forces the producers to form expectations at the time of decision making, in respect of the prices which is most likely to prevail at the time of sale. Farmers in advanced countries respond to actual prices, but the channels
through which price information is transmitted are not so well developed in developing countries. So we take the prices realized at the time of the preceding harvest or harvests.

Area under any crop is governed largely by physical, cultural, social, technological and economic factors. Physical factors specify the range of crops that can be grown in a region, it describes the production possibilities of the crops but they don't determine which crop is the most profitable. Economic factors determines the particular kind of combination of crops that are most profitable to produce on the farm.

The economic background of the farmer contributes significantly in the decision making processes. A farmer can take risk in changing his cropping pattern if his economic position is sound. Farmer can use inputs like seeds, fertilizers, labour etc. if their cost is within his reach. Otherwise he prefer to grow those crops which require less investment. Some crops are easy to bring to the market, while other crops are not. For example, it is easy to bring non-perishable crops like grains, oilseeds etc. to the market than perishable goods like vegetables etc. If the market is located far away farmers will prefer to grow non-perishable items but if a processing industry comes up near like the oil processing, sugar etc. farmers may start producing those items. If a co-operative is formed or some government agencies takes the responsibility of marketing perishable goods at a reasonable price, farmers may shift from non-perishable to perishable crops.

A farmer will choose to grow those crops which give him higher market price, but at the same time he considers transportation costs also. Which ever crop gives him more net
profit, he prefers to grow that crop only. For example, sugarcane fetches higher prices than wheat, but at the same time transportation cost of sugarcane is higher than that of wheat so farmer will prefer to grow wheat. Many times, surrounding agro-based industries encourage farmers to grow crops of their interest, for which they are provided credit also. In this case farmers grow those crops also which they are not producing traditionally. Many times, government also encourages farmers to grow certain crops for which it provide seeds, fertilizers and even marketing facilities.

If a farmer owns land, then crops are sown, according to his choice, but in the case of share cropping or tenancy, the crops are grown according to the person who is more powerful - either the owner or the tenant. On the small holding it is difficult to use machinery, such as tractor, threshers, harvesters etc. But on large holdings these implements are profitable and can be operated easily. Farmers cultivate crops according to their tastes and preferences. They will cultivate those crops which they have been eating traditionally, till some drastic changes come. Their customs and cultural background also play an important role in their selection of crops. By-product of some crops can be utilized for other purposes, which prove more profitable to the farmers.

OBJECTIVES

In the present work an attempt has been made to study the influence of changing prices on cropping pattern in the districts of Upper Ganga-Yamuna doab. Upper Ganga-Yamuna doab has been selected as the study area because this region is the seat of 'Green Revolution' It is one of the agriculturally most prosperous, fertile, highly irrigated and thickly populated
part of Uttar Pradesh. It also enjoys the highest level of agricultural efficiency in the state. This region provides many choices to farmers to grow their desired crops. This region consists of five districts namely, Saharanpur, Muzaffarnagar, Meerut, Ghaziabad and Bulandshahar. District has been chosen as the basic unit of study. Sample survey has also been made of 277 farms in the study region.

The present study has certain specific research objectives.

1. To assess the physical environment - Physical features, drainage, climate and soils and how these factors have helped in making the study region a prosperous agricultural region.

2. To assess the changes in the land use pattern - net sown area, gross cropped area, net irrigated area, gross irrigated area, fallow lands and cultivable wastes etc. in the study region (from 1966-67 to 1990-91).

3. To assess the changes in cropping pattern - changes in area under important foodgrains and non-foodgrains in the study region (1966-67 to 1990-91).

4. To study the trends in production of selected food grains and non-foodgrains (from 1966-67 to 1990-91)

5. To study the trends in the prices of selected foodgrains and non-foodgrains (from 1965-66 to 1989-90)

6. To assess the relationship existing between price - area and price-production of the twelve selected crops (taking yearly data from 1965-66 to 1990-91).
7. To examine the influence of other important factors like, preceding year's price, production, irrigated area and acreage under the selected crops.

8. To study farmers response to price changes and its effect on the cropping pattern of the sample farms socio-economic profile of the sample farmers, farm practices adopted by them, cropping pattern adopted by them and various factors influencing the cropping pattern of these farmers were examined.

The study region has made rapid strides in agriculture and is now poised to enter into a phase of commercial agriculture. With the introduction of modern technology and better irrigation facilities, the production has increased manifold and farmers have started producing surplus and they think of maximising the return from their lands. We assume that it was the variation in prices which had brought changes in the cropping pattern in upper Ganga-Yamuna doab region. Better cropping patterns and intensification of agriculture have resulted in an appreciable increase in crop yields. This has opened new economic possibilities for the farmers of the study region. These assumptions have been tested in the present work and found to be substantiated.

DATA BASE

The data were collected both from the primary and secondary sources. Data from primary sources have been collected through (i) field surveys, (ii) interviews with farmers and (iii) discussions with the government officials. For getting accurate information the farms were visited frequently. The field work was done by the writer during the years, 1990 and 1991.
Data from secondary sources have been collected principally from various bulletins:


(ii) Statistical abstracts of various districts (from 1965-66 to 1970-71), Published by Directorate of Economics and Statistics, Lucknow, Uttar Pradesh.

(iii) Farm Harvest prices of principal crops in India (from 1965-66 to 1989-90), Published by Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, New Delhi


Since our study is from 1965, district level published data were available for the four districts from 1965 onwards to 1990 only. The fifth district of Ghaziabad was formed in 1976, so the data for this district has been taken from 1976 onwards. All the analysis has been done for the five districts of the study region till 1990-91 only, since data is available till this year only.

METHODOLOGY

The following statistical methods have been used in the present study:
The original data of area, production and prices were converted into index number form. The data of a particular year has been divided by the data of base year and then it was multiplied by hundred to get the index number.

Correlation Co-efficient were calculated between price-area and price-production for all the selected crops, with the help of following formula:

\[ r = \frac{x \cdot y}{N \cdot \sigma_x \cdot \sigma_y} \]

where \( x = x - \bar{x} \)
\( y = y - \bar{y} \)

\( x \) = independent variable

\( y \) = dependent variable

\( x = x/N \)
\( y = y/N \)

\( \sigma_x \) = Standard deviation of x series

\( \sigma_y \) = Standard deviation of y series

\( N \) = number of observations.
(iii) Regression equations were calculated for area - price and area - production for all the selected crops with the help of 'Cobb-Douglas' formula, which is expressed as:

\[ Y = a \times x^b \]

Which when expressed in logarithm form would be:

\[ \log Y = a + b \log x \]

where \( x \) = Price of a crop

\( Y \) = Area or production of that crop

\( a \) = Value of the constant

\( b \) = Gradient between \( \log Y \) and \( \log x \)

(iv) Multiple linear regression equations were set up to examine the response of acreage of the selected crops to the variations in preceding years price, production, irrigated area and total area with the help of 'Nerlove's Partial Adjustment Model', which is expressed as:

\[ \hat{A}_t = b_0 + b_1 \bar{P}_{t-1} + b_2 \bar{U}_{t-1} + b_3 \bar{I}_{t-1} + b_4 \hat{A}_{t-1} + \nu_t \]

where \( \hat{A}_t \) = Area under any crop (in hectares) in year \( t \)

\( \bar{P}_{t-1} \) = Farm harvest price (Rs. per quintal) of that particular crop in year \( t-1 \).

\( \bar{U}_{t-1} \) = Production of that particular crop (in metric ton) in year \( t-1 \).
\( I_{t-1} \) = Irrigated area under that particular crop (in hectares) in year \( t-1 \).

\( A_{t-1} \) = Area under that particular crop (in hectares) in year \( t-1 \).

\( b_0, b_1, b_2, b_3 \) and \( b_4 \) = Regression Co-efficients.

\( e_t \) = Error term

(v) The data for studying the socio-economic conditions of the farmers, farm practices adopted by them, cropping pattern adopted by them and various factors influencing their cropping pattern and were drawn from the survey of 237 farms in the study region during 1990 and 1991.

The sample design adopted was a purposeful one having two stages. The first stage consisted of selecting villages from the five districts of the study region. About 45 villages were selected. The second stage of our survey consisted of selecting farmers and 237 farmers were selected. The data pertaining to the 237 farmers were selected on 'Stratified Random' basis. These farmers were categorised on the basis of their farm sizes.

The present work is divided into three parts, spread over six chapters.

Part one is devoted to the general description of the study area - Upper Ganga - Yamuna doab. This part comprises of chapter one. In this chapter an attempt has been made to assess how the physical environment - physical features, drainage, climate and soils have helped in making the study
region a prosperous agriculture region, in this part, attempt was also made to assess the changes in land use pattern and changes in cropping pattern of the study region.

Part two is devoted to study the trends in area, production and prices of the twelve selected crops of the study region. This part comprises of two chapters—second and third. Second chapter deals with the trends in area and production of selected foodgrains and non-food grains in the study region. Third chapter deals with the trends in prices of the selected foodgrains and non-foodgrains in the study region.

Part three presents the crux of the problem investigated. This part spreads over the last three chapters. Chapter four makes an attempt to assess the influence of prices on cropping pattern and production pattern of selected crops in the study region. Fifth chapter investigates the influence of preceding year’s price, production, irrigated area and the total area of a particular crop on the acreage in the current year for all the selected crops in the study region. Sixth chapter analyses the farmer’s response to price and its effect on the cropping pattern in the sample farms. In this chapter social and economic profile of the sample farmers, farm practices adopted by them, cropping pattern adopted by them and various factors influencing their cropping pattern were studied.

Finally a brief conclusion based on the results obtained, has been presented.