ABSTRACT

ROLE OF TECHNOLOGY IN AGRICULTURAL AND RURAL DEVELOPMENT
OF ALIGARH DISTRICT SINCE 1960
The task of feeding the rapidly growing population, maintaining the socio-economic stability, generating employment opportunities and improving the standard of living of the rural masses are some of the challenges India is facing today. India is predominantly an agricultural country where about 77 per cent of its population lives in rural areas and directly or indirectly depends on agriculture for its livelihood. India has taken big strides in agricultural production but the increase in production has been washed out by rapid growth in population. The major problem of the Indian agriculture is that it is predominantly of subsistence type. Food is perennial problem and the rural masses are backward and poverty stricken. All attention should be diverted to increase the food production and ameliorate the lot of rural masses.

Hence, it is now realised that the development of Indian agriculture depends on its adaptability to technological change— a change in the parameter of production-function resulting directly from the use of new knowledge. The technological change in agriculture consists of adoption of farming techniques developed through research and calculated to bring out diversification, increase in production and greater economic returns to the farmers. The proper combination of various improved technological factors, i.e., ensured agricultural innovations, use of fertilizers, high-yielding variety of seeds, modern agricultural implements, pesticides, irrigation and various other farming techniques should certainly result
in better yield and higher production. One of the objectives of the development of agriculture is to improve the living standard of the people in the rural areas. During the first quarter of the present century, it was realised that if the poverty of India's teeming millions is to be reduced, more attention has to be given to rural areas.

The primary objective of agricultural development is usually the increased growth of agricultural output, the main aim of rural development is the improvement of the material and social welfare of the rural population. The first provides the basis for the second since agriculture largely generates the income required for sustaining rural improvement. Keeping this in mind, the micro level study taking blocks as units, was undertaken to assess, "Role of Technology in Agricultural and Rural Development of Aligarh District since 1960".

Aligarh, one of the rich districts of Uttar Pradesh, lies in the central part of the Ganga-Yamuna doab. It spreads from 27°29' to 28°19' latitudes and 77°29' to 78°38'E longitudes. The district has been divided into seventeen blocks spread over 1,769 villages. The total area of the district is 502,580 hectares of which 77.66 per cent is net sown area, the total cultivated area is 127.89 per cent and the area sown more than once is 50.24 per cent. Agriculture is the main occupation of the people in the district. About 77 per cent
of the total population lives in rural area. Nearly 47.83 per cent of the total workers are classified as cultivators. Of the total cultivators, 50.52 per cent are marginal farmers, whereas 21.71 per cent are small farmers. Only 0.7 per cent are large farmers. The land holding in different categories varies from 0.42 hectare to 13.17 hectares.

The salient features of the present study are:

i) To assess the growth of crop output and to analyse the contribution of different component elements, i.e., area growth, yield effect, changes in cropping pattern and interaction between yield cum cropping pattern, to this growth in the different blocks.

ii) To identify the inter-block variations in agricultural development seven technological indicators were considered.

iii) To attempt to identify the factors, including specific technological inputs - irrigation, fertilizers, high-yielding variety seeds and use of implements, causing variations in yield in the different blocks.

iv) To identify the inter-block variations in rural development twelve indicators representing socio-economic infra-structural facilities were considered.

v) To attempt to identify the factors, including specific socio-economic infra-structural facilities causing
variations in rural development in the different blocks.

vi) To identify the block-wise level of overall development nineteen indicators representing seven technological factors in agriculture and twelve socio-economic infrastructural facilities in rural development were considered.

vii) To assess the possible inter-relationship between agricultural and rural development, agriculture and overall development, rural and overall development on block-wise basis.

viii) Based on this study planning regions for overall development of the district has been delineated.

The work has been divided into two parts spread over six chapters.

Part one comprises of chapter I and chapter II. In this part an evaluation of the study area has been done. Chapter I makes an attempt to analyse the physical features, drainage and climate of the district and how these factors have helped in the development of agriculture in Aligarh district. Chapter II is devoted to the examination of the agricultural background of the district. Here an assessment is made of the agricultural conditions in the Pre and Post-Green Revolution Period and the nature of change that took place.
Part two presents the crux of the problem investigated. This section comprises of Chapter III, IV, V and VI. Chapter III is devoted to the block-wise assessment of growth of crop output and analysis of the contribution of the different component elements to this growth. Chapter IV deals with the inter-block variations in agricultural development. An attempt is also made to study the factors affecting variations in yield in the different blocks. Chapter V elucidates the components of rural development. It also deals with the inter-block variations in rural development and tries to assess the factors affecting variations in rural development. In Chapter VI, an attempt has been made to identify the levels of overall development in the various blocks of the district. Inter-relationship between the block-wise levels of agriculture and rural, agriculture and overall and rural and overall development is sought to be made. Based on the results obtained regions were delineated for planning purpose for overall development of the district.

This study is the outcome of field work done by the writer during the years 1984 to 1986. The data were collected both from primary and secondary sources. Data from the secondary sources have been collected principally from various bulletins like Uttar Pradesh Statistical Bulletins, Sankhiyaki Patrika, Agricultural Prices in India and crop and season Reports. Data were collected from Project office of Aligarh
district. Data from primary sources have been collected through field surveys, discussions with farmers, patwaris (village accountants) and Government officials. District level published data were available from 1960 to 1985, whereas block level data was available from 1974 to 1985. Therefore, all the analysis has been done for the district as a whole from 1960 onwards and for the 17 blocks from 1974 onwards.

Results have shown that Aligarh district recorded high rates of growth in agricultural output and productivity particularly since the mid-sixties due to the application of technology in the fields. However, the pattern of growth has not been uniform in the different blocks. Differentials in resource endowments, degree of adoption of various ingredients of available technology and socio-cultural factors have been primarily responsible for this disparity. Technological changes have led to self-sufficiency in food production and have changed the face of villages.

The analysis of the growth performance of agriculture has indicated that Aligarh specializes in foodcrops. Wheat has got ascendency over other crops followed by bajra and barley. High-yielding varieties of wheat and bajra, increased market value, better irrigational facilities have pushed them ahead of other crops. The analysis also reveals that a pronounced shift has been taking place in favour of wheat thereby exposing
the economy to the hazards of over specialization. **Kharif**
crops (maize, rice and **jowar**) showed marked instability in
production. This was mainly due to the natural constraints
such as heavy rains, water-logging and weed infestations.
Commercial crops like sugarcane and oilseeds are claiming
wider attention. Stagnancy in the yields of pulses and oil-
seeds was also observed. The imbalances in the cropping pattern
could be checked through greater emphasis on research efforts
to evolve high-yielding varieties of pulses and oilseeds. It
was also observed that prior to the launching of **IADP Progra-
mm** (1961-62), cotton-pea, **bajra**-barley, wheat, maize-gram
etc. rotations were followed. But these were replaced by other
improved crop rotations such as **arhar**-wheat, soyabean-wheat,
**moong**-paddy, wheat-maize etc. This change in crop rotations
helped in increasing production.

The four factor model—area effect, effect of yield
changes, effect of changes in cropping pattern and the inter-
action between yield cum cropping pattern (Minhas and
Vaidyanathan, 1972) was adopted to estimate the contribution
of different components. An examination of the different
factors brought into light that in the district during the
period 1962-64 to 1972-74, of the overall growth rate of 1.92
per cent, approximately 99.82 per cent was attributable to
yield increases and 78 per cent to area growth. There was
marginal difference between the effects of both the components.
While during the latter period (1972-74 to 1982-84), of the overall growth rate of 2.39 per cent, approximately 110.25 per cent was attributable to yield increases and 4.93 per cent to area growth. While the contribution of rest of the two factors was negative during both the periods. Even in the seventeen blocks, during the latter period, the contribution of yield was predominant. In about fourteen blocks namely, Hathras, Dhanipur, Sasni, Mursan, Iglas, Akrabad, Jawan, Hasayan, Lodha, Atrauli, Khair, Chandaus, Sikandra Rao and Gonda the contribution of yield was substantially higher than the district's average (2.64 percentage points). Earlier researches carried over different regions in the country had established that in sixties, area contributed more to increases while thereafter increases in yields was the major contributing factor.

It was observed that the extent of utilization of technology varied from block to block which resulted in variations in the levels of agricultural development. With the help of seven indicators, agricultural development were measured at two points of time, i.e., 1974-75 and 1984-85 to see the changes in the span of ten years. Standard score technique was applied and the composite scores were further divided into three classes—high, medium and low, signifying levels of agricultural development. This classification may help in suggesting suitable
measures for balanced development (Fig. 4.1 and 4.2), In 1974-75 five blocks namely, Sasni, Hathras, Dhanipur, Jawan and Sikandra Rao and in 1984-85 four blocks namely, Jawan, Akrabad, Sikandra Rao and Dhanipur came under high level category. In 1974-75 nine blocks namely, Atrauli, Tappal, Mursan, Akrabad, Lodha, Iglas, Chandaus, Hasayan and Khair in 1984-85 eleven blocks namely, Hasayan, Hathras, Sasni, Lodha, Atrauli, Khair, Chandaus, Gonda, Tappal, Iglas and Mursan came under medium level category. In 1974-75 three blocks namely, Gonda, Bijauli and Gangiri and in 1984-85 two blocks namely, Gangiri and Bijauli came under low level category.

Factors affecting variations in yield in the seventeen blocks were studied with the help of step-wise regression analysis. This would help to determine the direction in which further investments in agriculture could be made or whether existing surpluses of any particular factor could be diverted from one block to another or from one use to another for increasing crop output. An examination of the factors affecting variations in yields revealed that in Aligarh district during the period 1966 to 1984 (a period after the introduction of new technology) consumption of fertilizer alone accounted for 42.38 per cent of the variation in yield. During the period 1974 to 1984 yield showed high correlation with the consumption of fertilizer and use of implements. Block-wise analysis (1974 to 1984) revealed that in six blocks, i.e., Gangiri (59.53 per cent)
Sasni (48.47 per cent), Atrauli (46.42 per cent), Dhanipur (36.64 per cent), Iglas (33.14 per cent) and in Bijauli (26.48 per cent) the effect of high-yielding variety of seeds was quite prominent. In four blocks, i.e., Hathras (33.30 per cent), Gonda (43.30 per cent), Jawan (23.8) per cent) and in Gangiri (17.31 per cent) fertilizer affected yield, significantly. In three blocks, i.e., Jawan (24.01 per cent), Khair (32.68 per cent) and in Hasayan (29.23 per cent) yield was affected by the use of implements. While in one block, i.e., Lodha, Irrigation (28.16 per cent) caused variations in yield.

For rural development to be economically sound, it is essential to provide a self-supporting agriculture which can generate enough surplus to finance social facilities and services on a continuing basis. Block-wise analysis of levels of rural development was measured at two points of time 1974-75 and 1984-85 with the help of twelve indicators. Standard score technique was applied. The composite standard scores were further divided into three classes-high, medium, low, signifying levels of rural development (Fig. 5.23 and 5.24). In 1974-75, four blocks namely, Chandaus, Sikandra Rao, Lodha and Sasni in 1984-85 four blocks namely, Akrabad, Sikandra Rao, Lodha and Khair came under high level category. In 1974-75 nine blocks namely, Khair, Atrauli, Akrabad, Bijauli, Iglas, Jawan, Gonda, Mursan and Gangiri and in 1984-85
ten blocks namely, Dhanipur, Chandaus, Atrauli, Hathras, Sasni, Iglas, Bijauli, Jawan, Gangiri and Gonda came under medium level. In 1974-75 four blocks namely, Hathras, Dhanipur, Tappal and Hasayan and in 1984-85 three blocks namely Tappal, Mursan and Hasayan came under low level category. It was observed that in the categorisation of blocks on the basis of rural development, a clear spatial distribution pattern emerged which almost coincided with that obtained on the basis of agricultural development.

The overall level of development obtained on the basis of composite standard scores of 7+12 indicators in the seventeen blocks was measured at two points of time, i.e., 1974-75 and 1984-85. The composite standard scores were divided into three distinct classes (Fig. 6.1 and 6.2). In 1974-75, two blocks namely, Sasni and Sikandra Rao and in 1984-85 two blocks namely, Akrabad and Sikandra Rao came under high level category. In 1974-75 thirteen blocks namely, Atrauli, Chandaus, Lodha, Jawan, Khair, Akrabad, Hathras, Mursan, Iglas, Bijauli, Dhanipur, Gonda and Tappal and in 1984-85 twelve blocks namely, Dhanipur, Lodha, Khair, Jawan, Hathras, Atrauli, Chandaus, Sasni, Iglas, Gonda, Bijauli and Hasayan came under medium level category. In 1974-75 only two blocks namely, Gangiri and Hasayan and in 1984-85 three blocks namely, Tappal, Mursan and Gangiri came under low level category.

Since a thriving agriculture is the key to self-sustaining rural development, the writer has tried to study the relationship
existing between these two components. In 1974-75, six blocks had similar levels of development in both agriculture and rural sectors. The blocks of Sasni and Sikandra Rao had high levels, while the blocks of Atrauli, Akrabad, Iglas and Mursan had medium levels of both agriculture and rural development. In 1984-85, eight blocks had similar scores on both counts. The blocks of Akrabad and Sikandra Rao had high levels while the blocks of Chandaus, Atrauli, Hathras, Sasni, Iglas and Gonda had medium levels of development of both agriculture and rural.

Significant correlation was also found to exist between the levels of (i) agriculture and overall development and between (ii) rural and overall development. This analysis indicates that there were only three blocks in the district which were having similar levels of agriculture, rural and overall development from 1974-75 to 1984-85. Sikandra Rao block was having a high level while Atrauli and Iglas were having medium levels.

The foregoing analysis has helped in the delineation of regions for planning for overall development of Aligarh district. On the basis of temporal variations of category or rank, the seventeen blocks have been grouped under four regions for the purpose of planning and development. These four regions are named as dynamic, prospective, less developed and problematic (Fig. 6.3).

The dynamic region consists of those blocks which have steadily maintained a higher rank and high level, e.g., SikandraRao
or have been promoted from a lower to higher level, e.g., Akrabad and Hasayan or have been drastically promoted to a higher rank though maintaining their level, e.g., Dhanipur. For the block coming under this category, the present level of plan efforts are adequate to maintain the rate of growth in future, no special efforts are needed. Thus, the present efforts should continue. The prospective region consists of blocks which have maintained their medium level but have marginally improved their ranks, e.g., Gonda, Lodha, Khair and Hathras. For these blocks, the present plan strategies need to be slightly modified and more concentrated efforts are required to promote the agriculture and rural sector. Less developed region comprises of blocks which have maintained their medium level but have recorded a marginal fall in their ranks, e.g., Chandaus, Atrauli, Jawan and Iglas. For the blocks belonging to this category the present plan strategy are not only inadequate but they need total reorientation. Intensive surveys of the blocks should be made to assess the existing potentials. Problematic region comprises of blocks which have steadily maintained a low level, e.g., Tappal and Gangiri or have fallen from a higher to lower category e.g., Sasni, Mursan and Bijauli. Such blocks also requires reassessment of their potentials and then plan could be formulated on those lines. For allocation of funds priority should be given to these blocks.
Block level studies are lacking in the country. But now, importance should be given to such studies because it is only with the help of block level planning that over planners could reduce disparities at grass-root levels. After identification of the blocks according to their levels of development, different strategies of development could be pursued. The major thrust of planning should be on the development of all types of blocks in the district. Thus a proper balanced development strategy should aim at increasing the levels of development of all the blocks so that the district keeps on moving towards higher and higher level of development.