CHAPTER. III

IRRIGATION AND MAJOR INPUTS

<table>
<thead>
<tr>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Traditional and Mechanical inputs</td>
</tr>
<tr>
<td>3.2 Bio-Chemical inputs</td>
</tr>
<tr>
<td>3.3 Composite Index of Inputs</td>
</tr>
</tbody>
</table>

Findings

Reference
**Introduction**

In the previous chapter, an attempt is made to present the pattern of irrigation. The purpose of this chapter is to investigate how far irrigation facilities have been associated with inputs used in agricultural development. Examining their distribution per unit of irrigated area has assessed the association of these inputs with irrigation. Any goods or services, which are used to produce an output, are referred to as inputs and therefore, input studies may be ‘Resource Oriented’, they analyze the extent of utilization of productive factors (Dictionary of Social Sciences, 1987). There is a wide range of inputs whose function is to help sustain a system. Agricultural production and its efficiency depend upon the inputs used in the farming but most of the inputs depend on purchasing power of the farmers. However, no attempt is made to correlate the inputs and purchasing power of the farmers due to the lack of relevant data. These inputs can be grouped into two broad categories viz. a) Traditional & mechanical inputs and, b) Bio-chemical inputs.

### 3.1 TRADITIONAL AND MECHANICAL INPUTS

They include agricultural implements like wooden and iron plough, Tractors, Thrashers, Seed drillers, Harvesters. They also comprise sugarcane crushers, sprayers, dusters, Oil engines, Oil grannies and Electric motor pumps, etc. however, in the present study the major inputs in association with irrigated area are considered. The use of other inputs in the District is insignificant and so they are omitted in this investigation. (http://www.orientongman.com)
Table 3.1 Agricultural implements in Aurangabad District.

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Implement</th>
<th>1975</th>
<th>1985</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wooden plough</td>
<td>20,102</td>
<td>34,006</td>
<td>40,698</td>
</tr>
<tr>
<td>2</td>
<td>Iron plough</td>
<td>25,548</td>
<td>30,725</td>
<td>44,335</td>
</tr>
<tr>
<td>3</td>
<td>Sugarcane crusher</td>
<td>339</td>
<td>273</td>
<td>264</td>
</tr>
<tr>
<td>4</td>
<td>Electric pump</td>
<td>16,221</td>
<td>31,581</td>
<td>42,874</td>
</tr>
<tr>
<td>5</td>
<td>Oil engines</td>
<td>4700</td>
<td>1,403</td>
<td>542</td>
</tr>
<tr>
<td>6</td>
<td>Tractors</td>
<td>560</td>
<td>1277</td>
<td>1,616</td>
</tr>
<tr>
<td>7</td>
<td>Oil ghanies</td>
<td>72</td>
<td>61</td>
<td>93</td>
</tr>
</tbody>
</table>

Source: Socio-Economic Review and Statistical Abstracts of All Districts in Aurangabad Division, for the year 1975-76 to 1995-2000

Wooden plough is an implement for scratching the soil. More than 4 Thousand of wooden ploughs are in use in the District. The average per 1,000 hectares of irrigated area is 500 %. The density of wooden plough is high (above 500) in Gangapur taluka. The area irrigated is comparatively low and soils are soft. The low density is observed, in Aurangabad, Khuldabad, Kannad, Sillod & Paithan taluka. From 1980 to 2000 the number of wooden ploughs has increased. (Table 3.1). The increase in number is observed in Gangapur taluka. Fig. 3.1-A shows that there is a continuous change in the number of wooden ploughs in the District. Wooden ploughs are in use because most of the farmers still practice traditional farming on small and medium operational holdings.
Iron plough is an improvement upon the wooden plough and farmers can use it without much difficulty. The number of plough in use in the District is above twenty five thousand. The average density of iron plough per 1000 hectares of irrigated land is 400 in the district and a high concentration above 500 of iron plough is observed in Vaijapur and Paithan taluka of Aurangabad district. It has been recorded moderate concentration in Kannad, Soegaon, Sillod, Aurangabad taluka which is 300 to 500 per 1000 hectares of irrigated area, whereas low concentration is found in Gangapur Phulambri and Khuldabad talukas (Fig. 3.2-A). The Vaijapur taluka having deep soils needs conservation of moisture to get Rabi crops. The soil requires deep ploughing with the help of iron plough. There is a continuous increase in the use of iron plough with the increasing trend of irrigated area in the District (Fig. 3.1-A). Positive change, in the use of iron plough, is noticed in Vaijapur taluka, whereas, Kannad, Gangapur, Khuldabad, Soegaon taluka record a negative change.

**Tractors** are necessary where large farm tracts are to be sown more than once as a result of improved irrigation facilities. The no of tractors in district in 1980 was 560. There is a considerable increase in number of tractors. It is 1660 in 2000. The proportion of tractor per 1000 tractors of irrigated area is four.

In talukas of Paithan and Soegaon the use of tractor is below 3 where as in Kannad taluka it ranges 3 to 4 per 100 irrigated land. Vaijapur, Gangapur, Khuldabad, Phulambri, Aurangabad and Sillod Talukas have above 4 Tractor per 1000 hectares irrigated area.
Generally, the irrigated areas where Sugarcane and Cotton crops are cultivated the use of tractors comparatively high. In general there is an increase numbers of tractors in each talukas of district. The increases in use of tractor show because the large commercialization of Agricultural product is low. But tractors do not seem to be popular in the study area, which is observed by the very low proportion below 3.5 tractors per 1,000 hectares of irrigated area. It indicates that the area sown more than once is not high in the District. However, Aurangabad, Khuldabad Gangapur, Vaijapur, and Sillod talukas record eight tractors per 1000 hectare of irrigated area because here the area under sugarcane and cotton is comparatively high. In the remaining talukas of the District, density of tractors per 1,000 hectares of irrigated area is insignificant (Fig. 3.2 B). The are of tractor is very low in Paithan and Soegaon taluka It was found that there were only 560 tractors in the year 1975-76 and the number of tractors and increased by three times in 1999-2000. The increase in number of tractors in found almost in all talukas. The increase in use of tractor is slow because the degree of commercialization of agricultural produce is low. The ‘r’ value or ranking co-efficient also shows the similar trend.

The Oil engines and Electric pumps play very significant role in the development of agriculture as they are used to lift water from wells and canals for irrigation. The number of oil engines in the District in 1985 was only 4,700, which decreased to 1,430 in 1985. But in the next decade declined to 542 in 1999-2000 (Fig. 3.2-B). Oil engines are numerous in Soegaon and Sillod, where densities are over 160 to 240 per 1,000 hectares of
irrigated area. The moderate densities (80 to 160) are found in Gangapur. Total electric pump in the district is 42,874. The number of electric pumps is more in Aurangabad, Khuldabad, Vaijapur talukas and the density varies from 300 to 600 pumps per 1000 hectares of irrigated land. Seogaon and Gangapur, talukas record moderate above 400 density whereas in other part, it is below average. Sugarcane crushers and oil ghanies are other farm implements in the District. Sugarcane crushers are numerous in Paithan and Gangapur taluka and oil Ghanies are confines to Aurangabad taluka of the District, the decline is sugarcane crushers and oil Ghanies appear due to increase in the number of sugar factories and oil mills (Fig. 3.1-B). Thus the forgoing review shows that use of agricultural implements is subject to change on account of changing economic, agronomic and technical situation. However, the modern implements and irrigation development go hand in hand especially in irrigated tract.

3.2 BIO-CHEMICAL INPUTS

Bio-chemical inputs include chemical fertilizers; plant protecting insecticides, pesticides and high yielding varieties. The use of bio-chemical inputs, with assured water supply, augments agricultural productivity.

Chemical Fertilizers

The fertilizers are one of the most effective means of increasing crop productivity per unit area. Three types of chemical fertilizers are used viz. phosphates, nitrogenous and potassic. Nitrogen fertilizers are used in large quantities in
Soegaon, Sillod, Aurangabad and Paithan taluka of the District. Phosphates fertilizers are consumed more in Paithan, Sillod, Soegaon, taluka, whereas, potassic fertilizers in Kannad taluka. The spatial pattern of the consumption of fertilizers in relation to the irrigated area is depicted in Fig. 3.3-A. The consumption of chemical fertilizers per 1000 hectares of irrigated land in the District is 23402 metric tons. The consumption of fertilizers is higher in the Soegaon, Sillod, Aurangabad and Paithan taluka of the District and varies from 15000 to 25000 metric tones. The use of fertilizers is low in the taluka of Phulambri, Khuldabad Vaijapur & Gangapur taluka. The total consumption of chemical fertilizers in the years of 2000 is about 1,87,220 metric tones and it has been continuously increasing in the District. However, the rate of increase in the use if fertilizer is low because of some obstacles likes inadequate irrigation facilities, fluctuation in canal discharge and irregular electric supply.

**High Yielding Varieties (HYV)**

The real benefit of irrigation comes out when improved seeds are used and it is true that the water requirements of most of the improved varieties are much higher than local varieties. Therefore, without an assured supply of water, neither the HYV nor chemical fertilizers – the pivot of modern agricultural growth – can profitable be used (Harries, 1972). The introduction and expansion of irrigation in the District has enabled the farmer to cultivate HYV crops. Hybrid jowar, Cotton, gram, groundnut and high yielding varieties of wheat are the major irrigated crops in the District. Hybrid jowar is an important crop, which is sown in the District with an average of 30 quintal per 1000 hectares of
irrigated area. In Aurangabad taluka hybrid jowar seeds are sown with high (35 to 40 quintal) concentration, moderate (25 to 35 quintal) in Sillod taluka and below average (25 quintal) in remaining part of the District (Fig. 3.4-B). Seeds of jowar used in the District are CSH 1, CSH 5, CSH 8R and SPV 86. Hybrid Bajara is cultivated with an average of 3 quintal per 1000 hectares of irrigated land and high proportion is found in scarcity zones of the District. The use of hybrid bajara is negligible in the central and eastern parts of the District.

Wheat is most responsive crop to irrigation in the District. The important varieties used in irrigated area of the District are HD-4502, CC-464, HD-2276 and HD-2189. The average use of high yielding variety seeds of wheat is 45 quintal per 1000 hectares of irrigated area in the District. Adoption of high yielding variety of wheat is more in the Aurangabad and Paithan taluka. The positive (+0.4) correlation between irrigation and use of HYU wheat is observed. In case of cotton, important seeds in use are H-4, H-6, Varlaxmi, Godavari and Savitri. The average use of hybrid cottonseed is 10 quintal per 1000 hectares of irrigated area. However, the high proportion (20 to 30 quintals) is found in Aurangabad Khuldabad, Phulambri & Paithan taluka and moderate (10 to 20 quintal) in Kannad, Sillod, Gangapur, Vaijapur taluka, of the District. The adoption of high yielding varieties/hybrid seeds of rice, gram and sugarcane has been relatively low as compared to other crops.

**Pesticides and Insecticides**

Damage due to insects, pests and applying plant protection measures can reduce weeds of the crops. Along with better seeds,
fertilizers and irrigation, insecticides, pesticides are also considered as the supporting factor for increasing agricultural production. Among the liquid formulated pesticides, phosphamidon, Endosulphin, Quinolphos 25 E.C. and in other granular pesticides BHC, Carbaryl 10 percentage, Zinc phosphide are used. Endosulphin are used with high quantity i.e. 1,160 litre per 1000 hectare of irrigated area. The average consumption of BHC is 0.9 tone per 1000 hectares of irrigated land in the District.

Application of insecticides and pesticides is not possible on large of various difficulties like lack of finance, non-availability of sprayers and dusters, etc. However, efforts are being made by the Department of Agriculture, Maharashtra State, to popularize the use of pesticides and insecticides in the District.

3.3 COMPOSITE INDEX OF INPUTS

In the forgoing paragraphs, the association of individual inputs with irrigation was considered. In order to assess the combined effect of different inputs a composite index, representing the individual inputs, with weight age, is considered, for this, composite index is computed by considering the ratio of individual inputs to net irrigated area and the same is converted into index value. Fig. 3.4 shows the spatial pattern of composite picture of major inputs viz. electric pumps, tractors, chemical fertilizers and HYV/hybrid seeds. In Khuldabad, Phulambri, Kannad & Vaijapur taluka covering 15 percent of the total cultivated area of Aurangabad District. In Paithan, Gangapur taluka, which comprising 30 percent of the total
cultivated. Area has high association of inputs with irrigation. Whereas in Soegaon and Aurangabad taluka its is moderate. It indicated that more than 69.43 percent of the cultivated area is devoid of modern inputs thereby reflecting on the agricultural backwardness of the district.
(http://www.aicaurangabad.org/AbadJsinchnl.htm.)
**FINDINGS**

The traditional agricultural implements are still used in the District. The areas having low proportion of irrigation have high concentration of wooden ploughs. The Kannad, Khuldabad, Aurangabad taluka, which records low density of wooden plough. The number of iron plough has increased with the increase in irrigation facilities particularly in Aurangabad and Vaijapur taluka. The use of tractors also shows positive trend but the rate of increase in use of tractors is low. The average number of tractor per 1000 hectares of irrigated land is 4. It is because of subsistence nature of agriculture. However, the density of tractors in relation to irrigated area is high in sugarcane and cotton cultivated talukas like Gangapur, Kannad, Soegaon and Sillod, etc. The use of oil engines as water lifting device has declined due to increase in electric motor pumps. The application of fertilizers is high in Paithan and Gangapur taluka where irrigated tracts are devoted to each crops. But in Soegaon, Sillod taluka the consumption of fertilizers is low as major portion of irrigated land is used for cereal crops. The irrigation facilities enable the farmer to cultivate high yielding varieties as such hybrid jowar is sown with larger quantity in the Aurangabad and Paithan taluka, hybrid bajara is confined to Vaijapur Ganagapur and Paithan taluak high yielding variety of wheat and cotton in Aurangabad Khuldabad and Sillod taluka of the District. Application of insecticides, pesticides is insignificant both in irrigated and non-irrigated areas. The composite index of inputs reveals that the association of modern inputs and irrigation is high only in 15.69 percent of the cultivated area and 69 percent is devoid of modern inputs.
REFERENCES


- **Harris B.** (1972) : Innovation Adoption in Indian Agriculture High Yielding Programme. Modern Asian Studies, Vol. 6, p. 71-78.


  - http://www.orientlongman.com