

## Comparative Study on Intensity of irrigation in the districts of state Haryana (India)

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**Abstract:** Intensity of irrigation matter and particularly influences the intensity of cropping, the cropping pattern and the agricultural productivity. The intensity of irrigation is an indicator of irrigation efficiency. It is the ratio of gross area irrigated to net irrigated area in terms of percentage. The higher the index of intensity of irrigation, the higher the irrigation efficiency and lower the index, lower the irrigation efficiency. The intensity of irrigation is not uniform in any agricultural region. In fact, it is controlled by various factors such as source of irrigation, quantity and quality of water supply, density of network of water channels, cropping seasons, types of crops grown and likewise. It also varies from place to place and time to time. Sometimes and several parts of agricultural world, these variation are very important such as India, where unreliability of rainfall continuous to be a feature. The benefits of intense irrigation are reflected in the cropping pattern, land use efficiency, methods of cultivation and yield. In an agricultural region, other things being equal, the intensity of irrigation tend to increase with decreasing rainfall and vice-versa. However, the intensity of irrigation will always remain low and negligible in rain fed areas where there is restricted surface water, limited fresh quality of ground water and hilly or undulating topography.

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### Introduction:

In traditional agriculture, irrigation was recognized only for its protective role of insurance against the vagaries of rainfall and drought. But with the adoption of high-yielding varieties, chemical fertilization and multiple cropping, the controlled irrigation has become the chief factor in increasing productivity. In developing countries like India, agriculture owes an important role in the economic status between world's economy, as economy of India is based on mainly agriculture, India is a agricultural country. Food resources and raw materials for industries and common use depend upon agriculture in terms of employment. Agriculture and its allied activities are important for the progress of our country because it is the base of industrial and commercial activities which provides a source of livelihood to over 77 crore people of this country & providing food grains to feed same. Besides, it provides fodder for an equally large cattle population, is a main source of employment in rural population (Tyagi, 2000). Though, economic and industrial liberalization results the decline in agricultural based employment and a trend towards other economic and industrial activities is seen through 20 years back but the importance of agriculture can be seen from its contribution to the national income. The share of agriculture in National income was placed at 49 percent in 1948-49. In 1950-51 its share in the net domestic product was about 56% and during the following 10 yrs, it remained over

50 percent (Om Parkash, 2000). The share of agriculture declined to all times low of 25.50 percent in 2001, it is all due to rapid increase in industrial goods production and service. Beside this trend, the economy of India still is depends on agriculture.

The size of the national output is still substantially dependent upon the performance of agriculture. The agriculture sector has been the major contributor to the net domestic product, but its growth rate over the years has been very low. However, the growth rate of agriculture has improved during 5th and 6th five-year plan. It was about 4.3 percent in 1988-89. After 1947, independence, India faced food deficit problem. So preference was to increase food grain production in the first five year. In very this sequence agricultural production team sponsored by food foundation in the year 1959. On various recommendations of the team, the Agricultural Food Production Board launched a new program was named as Green Revolution as a New Agricultural Strategy. It included regular and adequate irrigation facilities, use of fertilizers, H.Y.V. seeds, pesticides and insecticides, new instruments of agriculture, the main emphasize was on two food grains crops wheat and rice to solve the problem of food deficit. The result was quick and substantial. India is a unique country from agricultural point of view. Its enormous expanse of level plain, rich soils, high percentage of culturable land, wide climate variety with adequate aggregate rainfall combined with sufficient temperature, ample

sunshine and long growing season provide solid base to agriculture. Agriculture has double relation with industry. It acts as a supplier of raw material to the industries and as consumer of industrial products. It goes without saying that the prosperity of industrial sector largely depends upon the agricultural prosperity. In fact prosperity of the entire nation depends upon the prosperity of agriculture.

India is a country, where primary occupation is agriculture and comprises more than 20 percent of the world's irrigated land. The country receives over 80 percent of its rainfall, during the period of the monsoon. the rainfall is too meager for successful agriculture. Therefore, storage is essential for an assured supply of water for irrigation. India is one of the foremost countries in the world in the exploitation of her water resources for irrigation, generation of hydroelectric power and supply of drinking water during the test about sixty years of planned development. Since the early day's of 'Green Revolution' there are signs of imbalance in cropping pattern. Technological changes of mid-sixties caused significant shifts, in land utilisation, in favour of crops like wheat and rice at the cost of area under coarse cereals, pulses and oil seeds. This shift was the combined effect of differential rates of technological change among crops, irrigation bias of new technology causing shift, of land away from dry crops in favour of irrigated crops and the associated policy of price support system as well as market intervention by the Government for certain crops. Distortions in cropping pattern were reflected in relatively abundant supply of the same crops (like wheat of which the Government had surplus stocks) and acute shortage of others (like pulses and edible oils which had to be imported at huge cost in terms of foreign exchange). Changes in cropping pattern is determined by factors like agro-climatic conditions, technological, infrastructural and institutional environment and profitability signals. The single most important element in crop production strategy in the post-green revolution period is improved agricultural technology. This technology is in the form of high yielding plant varieties, intensive cultivation, greater use of fertilizers.

#### Materials and Methods:

Intensity of irrigation matter and particularly influences the intensity of cropping, the cropping pattern and the agricultural productivity. The intensity of irrigation is an indicator of irrigation efficiency. It is the ratio of gross area irrigated to net irrigated area in terms of percentage. The higher the index of intensity of irrigation, the higher the irrigation efficiency and lower the index, lower the irrigation efficiency.

The intensity of irrigation is not uniform in any

agricultural region. In fact, it is controlled by various factors such as source of irrigation, quantity and quality of water supply, density of network of water channels, cropping seasons, types of crops grown and likewise. It also varies from place to place and time to time. Sometimes and several parts of agricultural world, these variation are very important such as India, where unreliability of rainfall continuous to be a feature. The benefits of intense irrigation are reflected in the cropping pattern, land use efficiency, methods of cultivation and yield. In an agricultural region, other things being equal, the intensity of irrigation tend to increase with decreasing rainfall and vice-versa. However, the intensity of irrigation will always remain low and negligible in rain fed areas where there is restricted surface water, limited fresh quality of ground water and hilly or undulating topography. Also the relative information like Intensity of irrigation in the districts of state Haryana from the ten year span of the time from 1966-67 and 2017-18 were observed from primary data of the irrigation department of Haryana.



**Fig. 1. Location of state of Haryana and of district Kurukshetra, Haryana (India).**

#### Results and Discussion:

Intensity of irrigation matter and particularly influences the intensity of cropping, the cropping pattern and the agricultural productivity. The intensity of irrigation is an indicator of irrigation efficiency. It is the ratio of gross area irrigated to net irrigated area in terms of percentage. The higher the index of intensity of irrigation, the higher the irrigation efficiency and lower the index, lower the irrigation efficiency.

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The intensity of irrigation in Haryana has increased from 153.3 percent in the year 1969-70 to 199.18 percent in 2017-18. This increase of 30.65 percent in intensity of irrigation is very significant in state. Table 1 to 5 depicts the changing trends in the intensity of irrigation in the districts of Haryana. Table 1 to 5, from 1969-70 to 2017-18, depicts the spatial variations in the level of intensity of irrigation. The

districts have been classified into 4 categories of irrigation intensity as the areas of low intensity (less than 125), areas of high intensity (150-175) and the areas of very high irrigation intensity (175 and above).

In the year 1969-70, described by table 1 low intensity of irrigation was recorded in southern parts of state i.e. Mahendergarh, Gurgaon districts. The moderate intensity was recorded in Rohtak district. High & very high irrigation intensity was found in Hisar, Karnal, Ambala and Jind districts. As shown by table 2, low irrigation intensity existed in Bhiwani, Rohtak, Mahendergarh and Sirsa districts. The moderate intensity was found in Hisar, Karnal and Sonapat districts. High intensity was noted in Jind and Faridabad districts, very high intensity of irrigation was noted in Ambala, Kurukshetra and Gurgaon districts in 1979-80. During 1989-90, table 3 shows, the intensity of irrigation was low in Gurgaon, Rewari and Mahendergarh districts. The moderate Irrigation intensity was found in Rohtak and Bhiwani districts. High Irrigation-Intensity areas were Yamunanagar, Kurukshetra, Kaithal, Hisar, Panipat, Sonapat and Faridabad districts whereas very high intensity of irrigation found in Ambala, Karnal, Jind and Sirsa districts.

**Table 1: During the year 1969-70, intensity of irrigation in the districts of state Haryana.**

Sr. No.	Districts	Gross A.I.	Net A.I.	Irrigation Intensity
1	Hisar	770	494	155.9
2.	Rohtak	289	226	127.0
3.	Gurgaon	160	146	109.6
4.	Karnal	614	371	165.5
5.	Amabala	73	39	127.2
6.	Jind	214	99	216.2
7.	Mahendergarh	40	33	121.2
	Haryana	2158	1408	153.3

**Table 2: During the year 1979-80, intensity of irrigation in the districts of state Haryana.**

Sr. No.	Districts	Gross A.I.	Net A.I.	Irrigation Intensity
1	Hisar	562	397	141.6
2.	Sirsa	302	287	105.2
3.	Bhiwani	124	108	114.8
4.	Gurgaon	108	61	177.0
5.	Faridabad	135	89	151.7
6.	Jind	311	178	174.7
7.	Mahendergarh	120	117	102.6
8.	Ambala	165	79	208.9
9.	Karnal	418	270	154.8
10.	Kurukshetra	469	260	180.4
11.	Rohtak	228	199	114.6
12.	Sonapat	189	129	146.5
	Haryana	3131	2174	144.0

There was very low intensity of irrigation in Mahendergarh district in 1999-2000 as shown by table 4. In Panchkula the irrigation intensity was moderate and rest of Haryana had high and very high intensity of irrigation. As shown by table 5, in 2005-06, low intensity exists in Mahendergarh district. The moderate intensity is found in Bhiwani, Rohtak and Rewari districts, high intensity is noted in Ambala and Yamunanagar districts whereas rest of Haryana having

very high intensity of Haryana. During the present study in the year 2017-18, low intensity exists in the Nuh, Mewat, Palwal and Mahendergarh districts of the state Haryana. Like year 2005-06, the moderate intensity is found in Bhiwani, Rohtak and Rewari districts, high intensity is noted in Ambala and Yamunanagar districts whereas rest of Haryana having very high intensity of Haryana.

**Table 3: During the year 1989-90, intensity of irrigation in the districts of state Haryana.**

Sr. No.	Districts	Gross A.I.	Net A.I.	Irrigation Intensity
1	Ambala	157	79	198.7
2.	Yamunanagar	149	93	160.2
3.	Kurukshetra	238	147	161.9
4.	Kaithal	356	211	168.7
5.	Karnal	297	152	195.4
6.	Panipat	235	150	156.7
7.	Sonepat	154	99	155.5
8.	Rohtak	364	286	127.3
9.	Faridabad	185	109	169.7
10.	Gurgaon	155	126	123.0
11.	Rewari	109	97	112.4
12.	Mahendergarh	89	83	107.2
13.	Bhiwani	239	160	149.4
14.	Jind	344	185	185.9
15.	Hisar	751	441	170.3
16.	Sirsa	431	239	180.3
	Haryana	4253	2657	160.1

**Table 4: During the year 1999-2000, intensity of irrigation in the districts of state Haryana.**

Sr. No.	Districts	Gross A.I.	Net A.I.	Irrigation Intensity
1	Ambala	175	95	184.2
2.	Panchkula	19	13	146.1
3.	Yamunanagar	170	103	165.0
4.	Kurukshetra	271	147	184.3
5.	Kaithal	380	196	193.9
6.	Karnal	379	207	183.1
7.	Panipat	181	97	186.6
8.	Sonepat	269	174	154.6
9.	Rohtak	183	110	166.4
10.	Jhajjar	167	111	150.4
11.	Faridabad	220	116	189.6
12.	Gurgaon	176	76	231.6
13.	Rewari	132	84	157.1
14.	Mahendergarh	143	119	120.2
15.	Bhiwani	363	208	174.5
16.	Jind	429	220	195
17.	Hisar	502	271	185.2
18.	Fatehabad	387	208	186.0
19.	Sirsa	578	333	173.6
	Haryana	5124	2888	177.4

**Table 5: During the year 2005-06, intensity of irrigation in the districts of state Haryana.**

Sr. No.	Districts	Gross A.I.	Net A.I.	Irrigation Intensity
1	Ambala	184	116	158.6
2.	Panchkula	22	4	550.0
3.	Yamunanagar	186	113	164.6
4.	Kurukshetra	277	150	184.7
5.	Kaithal	376	196	191.8
6.	Karnal	387	195	198.5
7.	Panipat	186	93	200.0
8.	Sonepat	271	141	192.2
9.	Rohtak	183	132	138.6
10.	Jhajjar	179	99	180.8
11.	Faridabad	240	117	205.1
12.	Gurgaon	197	90	218.9
13.	Rewari	156	110	141.8
14.	Mahendergarh	150	121	124.0
15.	Bhiwani	430	287	149.8
16.	Jind	431	223	193.3
17.	Hisar	530	227	233.5
18.	Fatehabad	411	205	200.5
19.	Sirsa	638	335	190.4
	Haryana	5434	2954	183.9

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