

Original Article

Irrigation Development in Vaijapur Tehsil of Aurangabad District

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Abstract: To increase agricultural production in India irrigation plays vital role. The success of agriculture depends on the development of irrigation. India is not only facing the problem of development in water resources, but also their management in a sustainable manner. The need of the present day is to increase water efficiency in agriculture and to bring more land under irrigation, reduce the per acre cost of irrigation, and increase the output per acre inch of water. It can be achieved by modern irrigation methods like micro irrigation such as drip and sprinkler. The study has found that, the coverage area under drip irrigation method was highest as compared to sprinkler irrigation in Marathwada region as well as Aurangabad district. The study also found that the cropped area under cotton crop was highest and is followed by ginger, onion, maize, sweet lime (Mosambi), orange in Aurangabad district. In Marathwada region, the coverage area under micro irrigation is highest in Jalna district out of it coverage area under drip irrigation is highest as compared to the sprinkler irrigation in 2018-19.

Keywords: Irrigation, Coverage Area, Rainfall.

I. INTRODUCTION

To increase agricultural production in India irrigation plays vital role. The success of agriculture depends on the development of irrigation. The rainfall is limited only for four months of the year, it affects on the irrigation facility. So it is necessary to use available water resources properly because water resources become limited by the use of conventional irrigation system. Today, adoption of improved water management practice is the need of the time.

The demand of water by the agriculture sector for irrigation has been reduced by various options such as supply-side and demand side management practices. In supply side, various options are available for increasing in irrigation potential i.e. watershed and water resources development through major, medium & minor irrigation projects. The demand side management practices include water management technologies. The micro-irrigation (MI) technologies such as drip and sprinkler are the key method in water saving. Generally, irrigation defined as- "The application of water to soil for the purpose of supplying moisture is essential for plant growth especially during stress periods".

India is not only facing the problem of development in water resources, but also their management in a sustainable manner. The need of the present day is to increase water efficiency in agriculture and to bring more land under irrigation, reduce the per acre cost of irrigation, and increase the output per acre inch of water. It can be achieved by modern irrigation methods like micro irrigation such as drip and sprinkler. The micro irrigation method improves the water productivity, so modern methods of irrigation have a number of advantages as compared to the conventional irrigation methods.

The Micro Irrigation Scheme (MI) was launched by the Government of India, Ministry of Agriculture during under VIII Five Year Plan (1992-1997). The aim of Micro Irrigation Scheme is to increase the area under efficient methods of irrigation like drip and sprinkler. Government of India has formulated the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) with the vision of extending the coverage area of irrigation '**Har Khet ko pani**' and improving water use efficiency '**More crop per drop**' on 1st July, 2015.

The objective of the present study is to study the coverage and potential of the micro irrigation in Marathwada region under different crops. For the purpose of this study, the secondary data is used to work out the potential of micro irrigation techniques in Marathwada.

A) Review of Literature:

Dhawan B. D. (1994), study titled 'Agricultural Transformation through Irrigation', found that the irrigated yield is highest on farms watered by private tube wells, and lowest on those dependent on tanks. But although groundwater irrigated leads yield more than canal or tank irrigated lands in many states. Groundwater is not likely to be more productive than canal

irrigation if it is supplied by either shallow dug wells or badly managed public/community tube well. He also notes that, the extent groundwater irrigation enhances output by promoting intensity of cropping much more than surface irrigation.

Koli P. A. & Bodhale A. C., (2006) has carried out a study entitled, ‘Irrigation Development in India,’ which found that the impact of irrigation was depend on the level of education of irrigated and non-irrigated farmers. It was found irrigated farmers facing the shortage of labour problem, particularly in season period. There is no adequate and timely supply of electricity, voltage always fluctuating, which affects the irrigation schedule.

Kale C. N. (2014), has carried out a study on Irrigation and Agricultural Development in Solapur district, which shows that there is direct relationship between the facilities of irrigation and per hectare yield/production of different crops. The yield of sugarcane, grapevine wheat and groundnut has increased with the increase in irrigation facilities. The relationship between yields and irrigated area under these crops stands positive throughout the region.

II. RESULTS AND DISCUSSION:

A) Districtwise Rain Fall In Marathwada Region:

The potential of water resources with surface and ground water depends on rain fall. All the weather elements, but rainfall is a dominat weather parameter and climate hazard which affects plant growth and crop production.

The study shows that, the district wise annual rainfall in Marathwada region had decreased in 2018 as compared to 2010. Day by day the water table has declined in Maratathwada region. Due to the descrling of water table in Marathwada region the micro irrigation techniques are needed for water management.

Table 1: District wise Rainfall and Rainfall Intensity of Marathwada Region (Rainfall in Millimeters)

Year	Aurangabad		Jalna		Beed		Latur	
	Actual Rain	Rainy Days	Actual Rain	Rainy Days	Actual Rain	Rainy Days	Actual Rain	Rainy Days
2010	887.6	75	894.2	65	962.4	76	1052.3	77
2011	589.2	48	560.7	46	740.2	50	710.4	48
2012	375.5	42	324.8	35	461.1	43	760.5	61
2013	736.4	64	844.1	65	729.9	70	966.2	79
2014	527.3	51	426.7	36	423.4	34	496	39
2015	595.3	47	545.1	44	459.6	51	490.7	49
2016	612.2	50	793.9	52	824.7	59	1142.3	65
2017	576.3	50	679.7	52	706.1	58	780.2	52
2018	358.9	25	430.4	29	344.1	31	546.9	48
Total	5258.7	452	5499.6	424	5651.5	472	6945.5	518
Average	584	50	611	47	628	52	772	58
Intensity of Rainfall	11.63		12.97		11.97		13.41	

Year	Osmanabad		Nanded		Parbhani		Hingoli	
	Actual Rain	Rainy Days	Actual Rain	Rainy Days	Actual Rain	Rainy Days	Actual Rain	Rainy Days
2010	1035.7	86	1025.8	73	1013.3	67	1246.9	67
2011	540.2	44	708.1	62	667.5	51	764.1	54
2012	400.7	39	662.7	61	637.2	48	711.1	52
2013	726.2	64	1111.9	71	968	78	1174.8	66
2014	505.2	46	436.5	38	448.3	34	549.1	42
2015	477	49	599	61	417.8	48	718.9	57
2016	688	58	1124.8	66	836.4	55	954.4	60
2017	880.5	56	641.8	56	550.9	45	640	51
2018	505.1	42	799.5	52	509	36	710.6	49
Total	5758.6	484	7110.1	540	6048.4	462	7469.9	498
Average	640	54	790	60	672	51	830	55
Intensity of Rainfall	11.9		13.17		13.09		15	

Source: Access through, <http://maharain.gov.in/RainPastMonthDistrictList.php>

B) Irrigation In Maharashtra State:

The irrigated command area in Maharashtra state is under the jurisdiction of water resources department is 43.38 lakh ha in 2021-22. Table 2 indicates the number of irrigation projects, created irrigation potential & utilized area.

Table 2: Number of Irrigation Projects, Created and Utilized Irrigation Potential in Maharashtra (Area in Lakh Hectares)

	Water Resources Department Projects		
	Major & Medium	Minor	Total
Completed and Ongoing Projects (30 th June, 2022)	406 (10.98)	3,291*\$ (89.02)	3,697 (100)
(i) Created Irrigation Potential (June, 2021)	41.18 (74.55)	14.06 (24.45)	55.24 (100)
(ii) Irrigated Area under Canal (2021-22)**	21.62 (73.24)	7.90 (26.76)	29.52 (100)
(iii) Irrigated Area under wells (2021-22)**	11.57 (83.48)	2.29 (16.52)	13.86 (100)
(iv) Total Utilized Irrigation Potential (2021-22)**	33.99 (76.51)	10.19 (23.49)	43.38 (100)

* Includes lift irrigation schemes of Irrigation Development Corporation of Maharashtra (IDCOM)

\$ 83 minor project handover to land and irrigation department

** inconstant

Note: Figures in bracket indicate the percentage to total.

Source: Economic survey of Maharashtra, Mumbai, 2022-23.

The total number of projects completed and on ongoing as on 30 June, 2022 are 3697 out of which 406 (10.98%) lakh ha are major and medium projects and 3291 (89.02%) lakh ha are minor projects (table 2).

C) Irrigation Potential created up to June, 2021:

The major and medium irrigation project created irrigation potential up to June, 2021 is 41.18 (74.55%) lakh ha, and minor irrigation projects created irrigation potential up to June, 2021 is 14.06 (24.45%) lakh ha, the total irrigation potential created up to June, 2021 is 55.24 lakh ha (table 2).

D) Total Irrigation Potential Utilized during 2021-22:

The major and medium irrigation projects total irrigation potential utilized during 2021-22 is 33.99 (76.51%) lakh ha and minor irrigation projects total irrigation potential utilized during 2021-22 is 10.19 (23.49%) lakh ha. The total number of irrigation projects completed on 30 June, 2022 is 3697 lakh ha, this project irrigation potential created up to 55.24 lakh ha during 2021, but total irrigation potential utilized is 43.38 lakh ha; during 2021-22, out of which 13.86 lakh ha area irrigated under well irrigation and 29.52 lakh ha area irrigated under canal irrigation. The study finds that the irrigation potential created up to June, 2021 is 55.24 lakh ha and utilized total irrigation potential is 43.38 lakh ha in Maharashtra during the year of 2021-22 (table 2).

E) District Wise Irrigated Area In Marathwada Region:

The surface water and ground water are the major important sources in Marathwada region. These water sources are highly depended on rain. The major, medium, minor irrigation projects, diversion weir, village tank and percolation tanks etc, are the sources of water storage for the surface water. The surface water means water over the earth and ground water means water within the earth. The well and bore well are the major sources for water storage of the ground water.

a. Aurangabad:

In Aurangabad district, the Net irrigated area was 177441 ha out of which 58090 ha covers surface irrigation and 119351 ha under well irrigation. The gross cropped area was 831522 ha out of it gross irrigated area was 111515 ha (13.41%) in 2015-16.

Table 3: District-wise Irrigated Area in Marathwada Region (Area in Hectares)

District	Year	Source of Irrigation		Net irrigated area	Gross irrigated area	Gross Cropped Area
		Surface	Well			
Aurangabad	2015-16	58090	119351	177441	111515 (13.41)	831522
Beed	2011-12	92849	40519	133368	153488 (38.84)	395200
Hingoli	2016-17	13367	30502	43869	100641 (19.76)	509313
Jalna	2011-12	1113	42657	43770	44327 (8.92)	496885
Latur	2016-17	22602	41976	64578	137990 (14.61)	944527
Osmanabad	2016-17	114547	5736	120283	110903 (11.62)	954202
Parbhani	2016-17	107498	38494	145992	253258 (32.05)	790238
Nanded	2016-17	102576	27193	129769	102576 (9.87)	959012

Note: Figures in brackets indicate the percentage to gross cropped area.

Source: *Socio-Economic Review & District Statistical Abstracts of Aurangabad, Beed, Hingoli, Jalna, Latur, Osmanabad, Parbhani & Nanded district.*

b. Beed:

The Beed district gross cropped area was 395200 ha out of it gross irrigated area was 153488 ha (38.84%) in 2011-12. The Net irrigated area was 133368 ha, out of it 92849 ha under surface irrigation, and 40519 ha under well irrigation in 2011-12.

c. Hingoli:

The Hingoli district gross cropped area was 509313 ha out of it gross irrigated area was 100641(19.76%) in 2016-17. The net irrigated area was 43869 ha, out of it 13367 ha under surface irrigation, and 30502 ha under well irrigation in 2016-17.

d. Jalna:

In Jalna district, net irrigated area was 43770 ha out of it 1113 ha covers surface irrigation and 42657 ha under well irrigation. The gross cropped area was 496885 ha out of it gross irrigated area was 44327 ha (8.92%) in 2011-12.

e. Latur:

The Latur district gross cropped area was 944527 ha out of it gross irrigated area was 137990 ha (14.61%) in 2016-17. The net irrigated area was 64578 ha, out of it 22602 ha under surface irrigation and 41976 ha under well irrigation in 2016-17.

f. Osmanabad:

In Osmanabad district, net irrigated area was 120283 ha out of which 114547 ha under surface irrigation and 5736 ha under well irrigation. The gross cropped area was 954202 ha out of it gross irrigated area was 110903 ha (11.62%) in 2016-17.

g. Parbhani:

The Parbhani district gross cropped area was 790238 ha out of it gross irrigated area was 253258 ha (32.02%) in 2016-17. The Net irrigated area was 145992 ha, out of it 107498 ha under surface irrigation and 38494 ha under well irrigation in 2016-17.

h. Nanded:

In Nanded district, net irrigated area was 129769 ha out of which 102576 ha under surface irrigation and 27193 ha under well irrigation. The gross cropped area was 959012 ha out of them gross irrigated area was 102576 ha (9.87%) in 2016-17.

The present study finds, the highest gross cropped area was 959012 ha in Nanded district, but gross irrigated area was highest in Parbhani district 253258 ha (32.02%) during 2016-17.

F) Coverage Of Micro Irrigation In Marathwada Region:

Table No 4 related to Area under Micro Irrigation, it shows that, in 2018-19 the all India physical achievement under MIS has been increased by 10.44 percent. In 2018-19 1158332.74 hectares , out of which 582850 hectares under sprinkler irrigation and 575482.74 hectares under drip irrigation method. The Maharashtra state total physical achievement with MIS system is 176410.7 hectares, out of them 55218.16 hectares under sprinkler irrigation and 121192.6 hectares under Drip irrigation method. The total physical achievement of MIS in the Marathwada region was 56998.02 hectares out of it 22561.26 hectares under sprinkler irrigation method and 34436.76 hectares under drip irrigation method in 2018-19.

In Marathwada region, the highest physical achievement of MIS is 11670.06 ha. (20.47%) in Jalna district, out of them 3595.96 ha is sprinkler, and 8074.1 ha is drip in the year 2018-19, which has been increased as compared to previous year. The physical achievement of Aurangabad district is 10474.49 ha (18.38%) out of them 9156.5 drip & 1317.99 sprinkler. The physical achievement of Beed district was 8327.2 ha (14.61%), Hingoli 3164.93 ha (5.55%), Parbhani 4551.29 ha (7.98%), Nanded 5143.55 ha (9.02%), Osmanabad 6783.3 ha (11.90%) and Latur 6883.2 ha (12.08%) during 2018-19.

Table 4: Districtwise Area under Micro Irrigation in Marathwada Region (2017-18) (Area in Ha)

District	Drip		Sprinkler		Total	
	2017-18	2018-19	2017-18	2018-19	2017-18	2018-19
Aurangabad	5567.24	9156.5	777.62	1317.99	6344.86 (16.00)	10474.49 (18.38)
Beed	4501.64	5506.59	1638.73	2820.61	6140.37 (15.49)	8327.2 (14.61)
Hingoli	1269.19	1056.76	3656.13	2108.17	4925.32 (12.42)	3164.93 (5.55)
Jalna	7602.53	8074.1	2221.09	3595.96	9823.62 (24.78)	11670.06 (20.47)
Latur	660.55	2415.95	1585.84	4467.25	2246.39 (5.67)	6883.2 (12.08)
Nanded	2192.4	2518.65	1270.9	2624.9	3463.3 (8.74)	5143.55 (9.02)
Osmanabad	1097.17	3432.78	1350.78	3350.52	2447.95 (6.17)	6783.3 (11.90)
Parbhani	2467.84	2275.43	1786.75	2275.86	4254.59 (10.73)	4551.29 (7.98)
Marathwada	25358.56	34436.76	14287.84	22561.26	39646.4 (100.00)	56998.02 (100.00)
Maharashtra	85425.08	121192.6	47404.41	55218.16	132829.5	176410.7
All India	541466.39	575482.74 (6.28)*	507408.24	582850.00 (14.87)*	1048874.63	1158332.74 (10.44)*

Note: Figures in the brackets indicate the percentage to total area under MIS in Marathwada.

* Figures in the brackets indicate the percentage to previous year.

Source: Access through, http://pmksy.gov.in/microirrigation/Physical_Report.aspx;

G) Crop Wise Coverage Area Of Micro Irrigation In Aurangabad District:

According to the MIS Physical achievement Report 2019-20, Marathwada region as well as Maharashtra state, cotton, sugarcane and turmeric are produced by using the drip irrigation method. The fruit crops like banana, grapes, mango, pomegranate, orange, sweet lime (mosambi) are produced under drip irrigation method. The groundnut, jowar, bajra, gram, soybean, and maize are produced under sprinkler irrigation method.

The crop wise coverage area under micro irrigation in Aurangabad is given in table 5. In Aurangabad district, gross coverage area of micro irrigation was 12216.4 ha, out of them 11050.6 ha under drip irrigation and 1165.84 ha under sprinkler irrigation method in 2019-20.

a. Cotton:

The coverage area of cotton crop is highest under micro irrigation method in Marathwada region. In 2019-20, it was 6701.55 ha, out of which 6378.58 ha under drip & 322.97 ha under sprinkler irrigation method. \

b. Ginger:

The coverage area of Ginger crop under micro irrigation in 2019-20 was 1075.17 ha, out of which 1073.7 ha under drip & 1.47 ha under sprinkler irrigation method.

c. Sugarcane:

In 2019-20, the coverage area of sugarcane crop under micro irrigation was 271.52 ha, out of which 271.12 ha was under drip irrigation and 0.4 ha under sprinkler irrigation in Aurangabad district.

Table 5: Crop wise Area under Micro Irrigation in Aurangabad District (2019-20) (Area in ha)

Crop Name	Physical Achievement		
	Drip	Sprinkler	Total
Other Crops	6	0	6
Bajra (Pearl millet)	46.36	2.3	48.66
Cotton	6378.58	322.97	6701.55
Gram (Chickpea)	46.38	128.64	175.02
Jowar (Sorghum)	2.74	5.14	7.88
Maize	546.61	92.69	639.3
Soybean	0	25.7	25.7
Sugarcane	271.12	0.4	271.52
Tur/Arhar (Pigeon Pea)	7.27	0	7.27
Wheat	5.1	19.94	25.04
Banana	89.45	0	89.45
Ber	0.82	0	0.82
Custard Apple	94.51	0	94.51
Grapes	14.98	1.66	16.64
Guava	74.79	0	74.79
Lime/Lemon/Citrus	13.2	0	13.2
Mango	29.9	0	29.9
Orange	543.74	0	543.74
Papaya	13.71	0	13.71
Pomegranate	235.24	0	235.24
Sapota	3.17	0	3.17
Water Melon	33.68	0	33.68
Brinjal	8.31	4.06	12.37
Capsicum	25.75	1.2	26.95
Cucumber	4.48	0	4.48
Ginger	1073.7	1.47	1075.17
Green Chillies	160.09	7.92	168.01
Leafy Vegetables	470.77	63	533.77
Onion	181.29	488.42	669.71
Potato	0.58	0	0.58
Tomato	41.9	0	41.9
Turmeric	8.56	0	8.56
Sweet lime (Mosambi)	609.84	0	609.84
Marigold	0.36	0	0.36
Coriander Seeds	0	0.33	0.33
Tamarind	0.55	0	0.55
Drumstick	7.06	0	7.06
Total of Aurangabad	11050.6	1165.84	12216.4

Source: Access through https://pmksy.gov.in/microirrigation/Report_Crop.aspx ;

III. CONCLUSION

The study has found that, the coverage area under drip irrigation method was highest as compared to sprinkler irrigation in Marathwada region as well as Aurangabad district. The study also found that the cropped area under cotton crop was highest and is followed by ginger, onion, maize, sweet lime (Mosambi), orange. The irrigated area was highest in Parbhani district but highest cropped area is in Nanded district during 2016-17. The coverage area under micro irrigation is highest in Jalna district out of it coverage area under drip irrigation is highest as compared to the sprinkler irrigation in 2018-19.

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IV. REFERENCES:

- [1] Dhawan B. D., (1994), "Irrigation in India's Agricultural Development", (Second Edition), Commonwealth Publishers, New Delhi.
- [2] Bansil. P. C., 2004, Water management India, concept publishing company, New Delhi-110059.
- [3] Koli P. A. & Bodhale A. C., 2006, Irrigation Development in India, Serials Publications, New Delhi.
- [4] Narayanamoorthy A., 2008, "Drip Irrigation and Rainfed Crop Cultivation", Indian journal of Agricultural Economics, Vol.63, No. 3, July -September.
- [5] Kale C. N., (2014), "Irrigation and Agricultural Development", Serials Publications, New Delhi.
- [6] Maharashtra Water Resources Department-Vision 2020 Report (Draft Report), Government of Maharashtra.
- [7] Government of India, 2017-18, Economic Survey, Volume 2, Ministry of Finance, New Delhi.
- [8] Government of Maharashtra, 2022-23 Economic Survey of Maharashtra, Directorate of Economics and Statistics, Mumbai.
- [9] eThibak website, <http://mahaethibak.gov.in>
- [10] PMKSY website : <http://pmksy.gov.in/Documents.aspx>
- [11] <https://en.m.wikipedia.org/wiki/Micro-irrigation>