



## Research Article

# PRESSURIZED IRRIGATION IN CANAL COMMAND AREA

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**Abstract-** Gravity irrigation through surface methods like borders, furrows, basins etc is a common practice in the command areas of major projects. By and large the efficiency of these methods ranges for 40 to 50% and similar amount of water goes waste from the precious, costly water collected in the reservoir. On the other hand, tail end receives less water and remains un-irrigated. The study was carried out in command area of Jhansi minor of the Bargi Command. It presents the situation of the command and status of method of irrigation in the command area where the water is available and where the water is not reaching. As a solution, farmers use their tube-wells which are recharged by canal water. This ground water is applied through pressurized irrigation. Thus, a good water use efficiency is obtained and at the same time, use of ground water keeps the water table within limit in the area. This gives an idea of using canal water through pressurized irrigation.

**Keywords-** Gravity irrigation, Pressurized irrigation, Jhansi minor, Canal water, Ground water, Tube well

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## INTRODUCTION

Jhansi minor has irrigated command of 210 ha and irrigates only 105 ha. The water table depths are ranging from 2m to 4m from ground surface. The canal irrigation may be supplemented by ground water utilization in tail end. This increases the irrigated area by 90 ha through tube wells adopting sprinkler irrigation. It has raised efficiency of irrigation and water productivity as compared to head reach of the command. The left bank canal of Rani Avanti Bai Sagar Project was started in year 1989. The reduced level of sill at the left bank canal is 399.50 m. The left bank canal covers Jabalpur and Narsinghpur district. The command area of L.B.C. lies between the North latitudes  $22^{\circ}52'0''$  to  $23^{\circ}26'30''$  and East longitude  $78^{\circ}45'0''$  to  $79^{\circ}54'0''$ . The design capacity of LBC is 124.65 m<sup>3</sup>/sec. Total command area of the L.B.C. is 1.57 lakh hectare which comprises 62,000 ha in Jabalpur and 95,000 ha in Narsinghpur district. The study area is command of Jhansi minor which is a part of LBC command of RABS Project and lies between latitude  $23^{\circ}03' 21''$  N to  $23^{\circ}04' 53''$  N and longitude  $79^{\circ} 41' 14''$  E to  $79^{\circ} 42' 51''$  E. The topography of the command area is mostly flat and plain, the slope ranges from 0 to 3 percent. The soil of the study area is clay-loam. Land use classification of Jhansi Minor command shows that out of total command of 279ha, 208 ha is actual command area out of which Early Sown Wheat covered 68.9 ha, Gram spreads into 11.3ha, Bare soil 48ha, Water spread 1.4 ha and road, settlements, grass land occupied 12.5ha, 13.3ha, 24.3ha respectively [1,2].

## Conclusion

1. Use of tube wells/open should not be stopped after commencement of canal irrigation in area. This provides proper irrigation to the tail end and even after supply cut-off.
2. Canal water should be used through pressurized irrigation to enhance water productivity.

**Application of research:** This study recommends application of water through pressurized irrigation in command areas and emphasizes use of wells conjunctively which generally farmers stop after commencement of canal.

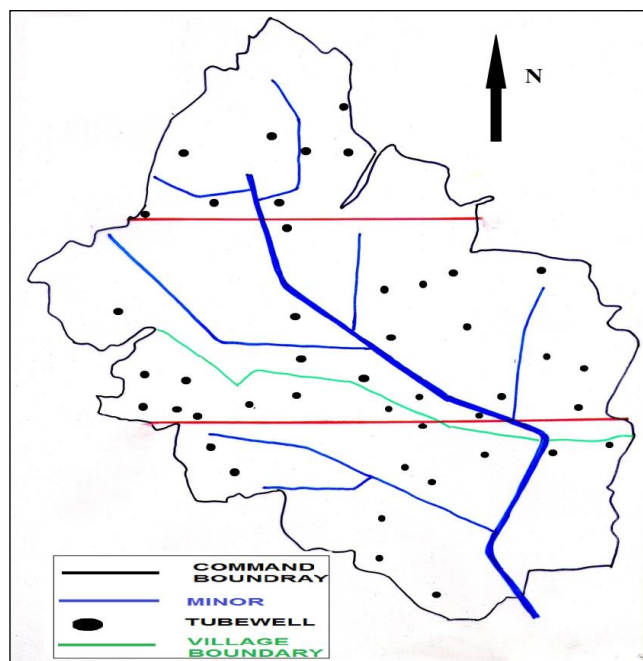


Fig-1 Command area of Jhansi minor with location of tube well

Table-1 Generalized characteristics of the study area

S No	Name of village	Land capability class	Land irrigability class	Available water holding capacity, cm /m depth
1	Jamuniya	II	B	16.2
2	Jhansi	II	B	15.6
3	Pipariya	II	B	16.2
4	Dhulakheda	II	B	16

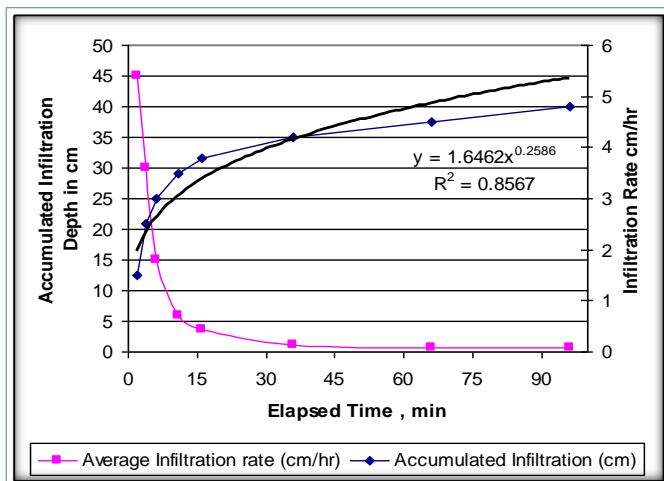


Fig-2 Accumulated Infiltration for Jhansi Minor

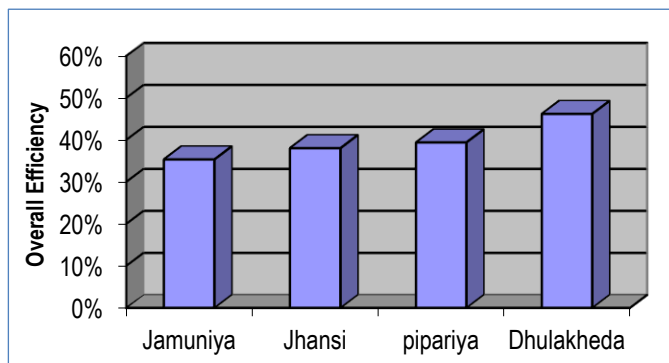


Fig-3 Overall efficiency in the commands of different minors

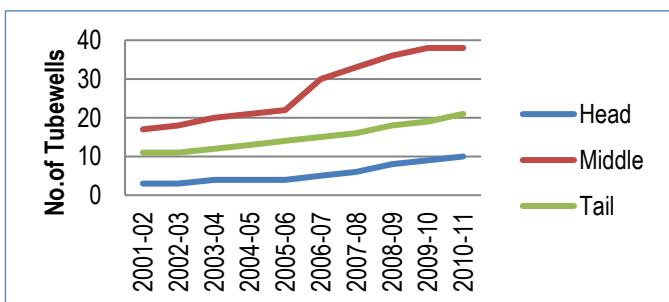


Fig-4 Number of tube wells in last 10 years at Khulri minor

**Table-2** Village-wise command area details and tube well population

S. No.	Description	Name of the Village			
		Dhulakheda	Pipariya	Jhansi	Jamuniya
1	Gross command area(ha)	275	360	208	215
2	Canal irrigated area(ha)	120	150	61	70
3	Tube well irrigated area(ha)	135	210	122	145
4	Seepage affected area(ha)	20	Nil	25	Nil
5	Tube well population	55	60	48	50

**Table-5** Area under different crops in ha from 2003-04 to 2009-10 in command area of Jhansi minor

Year	Wheat		Gram		Pea		Lentil	
	irrigated	Un- irrigated	Irrigate	Un-irrigated	irrigated	Un- irrigated	irrigated	Un- irrigated
2003-04	59.4	0	104.7	12.8	0	5	0	4.1
2004-05	19.5	33.6	19.1	91.3	3.4	0	0	8.6
2005-06	56.8	0	95.2	13	14.6	5.4	0	15.3
2008-09	127.4	0	69.9	0	7.6	0	11.7	0
2009-10	138.85	0	59.9	0	14.2	0	8.1	0

**Table-3** Classification of Soils of Command Area

S. No	Location	Clay %	Silt %	Sand %	Soil classification
1	Jamuniya minor	39.52	27.82	32.65	Clay loam
2	Jhansi minor	42.3	26.25	31.45	Clay loam
3	Pipariya minor	56.5	26.05	17.47	Clay
4	Dhulakheda minor	46.21	25.48	28.31	Clay loam
Average		46.13	26.4	27.47	Clay loam

**Water availability in the study area****Table-4** Water Availability in Different Reaches through Different Sources

S.N	Particulars	Head	Middle	Tail
1	Canal Discharge (lps)	99	60	45
2	Tubewell Discharge (lps)	09-Oct	11	10
3	Water Supply Through Canal (m³)	769824	466560	349920
4	Water Supply Through Tubewell (m³)	13100	15200	26980
5	Total Volume of Water Supply Through Tubewell and Canal (m³)	782924	481760	376900

**Research Category:** Soil and Water Engineering

**Abbreviations:** CW: Area irrigated from minor through gravity irrigation; LI: Area irrigated through pumping or lift irrigation from canal & nala; TW: Area irrigated from tube well; Ha: Hectare; M: Metre

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**Ethical approval:** This article does not contain any studies with human participants or animals performed by any of the authors.

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- [2] Anonymous (2011) *Annual Progress Report of AICRP on GWU College of Agril.Engg.JNKVV Jabalpur*

Table-6 Water resource utilization in command of Jhansi minor

Year	Area irrigated, ha									Total
	Head			Middle			Tail			
Source of irrigation	CW	LI	TW	CW	LI	TW	CW	LI	TW	
2001	35.65	3.9	4	54.33	5	10.4	16	0	0	129.28
2002	34.81	3.9	4	56.93	5	10.4	6	0	0	121.04
2003	36.79	7.8	8	54.66	5	15.6	3	0	0	130.85
2004	0	7.8	8	0	10	26	0	0	4.4	56.2
2005	21.13	11.7	8	33.95	10	36.4	0	0	4.4	125.58
2006	25.33	11.7	20	35.68	15	52	3	4.18	13.2	180.09
2007	28.77	15.6	20	38.83	13.17	59	6	4.18	22	207.55
2008	24.47	14.53	28	25.64	10	75.36	0	8.36	26.4	212.76
2009	8.81	15.6	36	9.22	10	91.78	4	6	31	30-Jul
2010	14.87	13	39.13	6.68	10	94.32	1	5	35	219

CW – Area irrigated from minor through gravity irrigation. LI – Area irrigated through pumping or lift irrigation from canal & nala. TW – Area irrigated from tube well.

- It was interesting to note that farmer who was taking water from personal tub-wells were using sprinklers and found present in the field while the farmers taking canal water were making wild flooding to the field and not present in the field.
- No direct effect of seepage or percolation was found in open well as they were already dried in March except two locations.