

Impact of Per Drop More Crop Yojana on irrigated area and annual income of beneficiary farmers

Chhakuli Shelake¹, M. K. Rathod² and Pradnyesh Deore³

1. and 3. Ex-PG Students, 2. Professor and Head, Extension Education Section
College of Agriculture, Nagpur 440001(M.S.), India
Corresponding author's e-mail: shelakechhakuli1997@gmail.com

ABSTRACT

The research was conducted in Solapur district of western Maharashtra. 120 beneficiaries of PDMC Yojana were selected randomly from Barshi and Madha tahsils. Data were collected on the profile characteristics of the respondents and impact of PDMC Yojana on beneficiary farmers with the help of pre structured and pretested interview schedule. The results indicated that 23.28 per cent increase was observed in irrigated area while 47.23 per cent increase in irrigated area was observed during rabi season. Overall 21.46 per cent increase was observed in annual income obtained from different sources as agriculture, dairy, poultry, goat farming and service sector. While 28.24 per cent increase in income was observed in income obtained from agriculture due to adoption of micro irrigation system. 54.16 per cent of respondents had 2.24 to 4.60 ha. irrigated area before adoption of PDMC Yojana while after adoption, 57.50 per cent of respondents had 2.24 to 4.60 ha. irrigated area. Only 7.50 per cent of respondents had more than and equal to ₹ 4,58,139.88 annual income before adoption of PDMC Yojana while 30.84 per cent of respondents had more than and equal to ₹ 4,58,139.88 annual income after adoption of micro irrigation system. Great majority of respondents (89.16%) had observed 16.62 to 31.42 per cent increase in irrigated area. Majority of respondents (61.66%) had observed 14.73 to 29.19 per cent increase in annual income. The calculated 'Z' value of irrigated area (2.54) and annual income (5.45) revealed that positive and significant change observed in irrigated area and annual income of respondents after adoption of PDMC Yojana.

Keywords : Annual income, impact, irrigated area, PDMC Yojana.

INTRODUCTION

Water is the most important natural resource meeting the different demands of the people. But use of water in agriculture is very important for agricultural production and to decrease risk of drought. Global water use in agriculture is approximately 70.00 per cent not only in India but also in the world (Anonymous, 2020). The irrigation sector is under pressure to increase its efficiency since it is the major user of fresh water globally. This is exacerbated as water resources become scarcer due to climate change, increasing population and inappropriate irrigation applications and as the competition for water from other economic and environmental uses. In the future, improved efficiency in the use of water for food production will become even more important. In future, the amounts of water used for industries and municipalities will increase while it for the agriculture decreases. Hence, there is need to bring more area under irrigation with available source of water. This is possible only with efficient utilization of water. This can be achieved through adoption of

micro irrigation system. So, Government of India launched Per Drop More Crop (PDMC) Yojana as component of Pradhan Mantri Krishi Sinchayee Yojana in 2015 and selected 2015-16 as base year (Anonymous, 2017).

The GOI started PDMC Yojana with an objective to increase the area under micro irrigation technologies to enhance water use efficiency in the country, to increase productivity of crops and income of farmers through precision water management and to promote micro irrigation technologies in water intensive crops like sugarcane, banana, cotton etc. and give adequate focus to extend coverage of field crops under micro irrigation technologies (Anonymous, 2017). Hence, the study was planned to know impact of Per Drop More Crop Yojana on irrigated area and annual income of beneficiary farmers.

METHODOLOGY

The study was conducted in Solapur district of Western Maharashtra. Solapur was purposively selected as it belongs to rain shadow area. In Solapur

district, there are eleven tahsils out of these Barshi rank first, Karmala rank second and Madha rank third tahsils according to number of beneficiaries of PDMC Yojana. Hence, Barshi and Madha tahsils were selected randomly from these three tahsils. Ex post facto research design of social research was used for the study. From each selected tahsil, six villages were selected purposively having large number of beneficiaries of PDMC Yojana in all twelve villages were selected. From the selected villages, ten respondents were selected randomly from each village which comprise total sample size of 120 respondents. All the respondents were personally interviewed and data were collected regarding irrigated area and annual income of respondents as before and after adoption of PDMC Yojana.

The irrigated area refers to area equipped to provide water to the crops via artificial means of irrigation such as by diverting streams, flooding or spraying. The irrigated area of respondents was calculated by summing up irrigated area of beneficiary farmers during kharif, rabi and summer season. Per cent change in irrigated area was measured on the basis of difference between mean irrigated area of respondents before and after beneficiary of PDMC Yojana. The categorization of respondents according to change in irrigated area and according to per cent change in irrigated area was done by using mean and standard deviation.

$$? IA = \frac{IAA - IAB}{IAB} \times 100$$

Where,

? IA : Change in irrigated area.

IAB : Mean irrigated area before beneficiary

of PDMC Yojana.

IAA : Mean irrigated area after beneficiary of PDMC Yojana.

The annual income is the total income of respondents earned from different sources over one year. It is calculated by summing up earning from different sources like agriculture, poultry, dairy, goat farming and service sector. Per cent change in annual income was measured on the basis of difference between mean annual income of respondents before and after beneficiary of PDMC Yojana. The categorization of respondents according to change in annual income and according to per cent change in annual income was done by using mean and standard deviation.

$$? AI = \frac{AIA - AIB}{AIB} \times 100$$

Where,

? AI : Change in annual income.

AIB : Annual income before beneficiary of PDMC Yojana.

AIA : Annual income after beneficiary of PDMC Yojana.

RESULTS AND DISCUSSION

Impact on irrigated area and annual income

The impact of Per Drop More Crop Yojana on its beneficiary farmers were assessed as after adoption of PDMC Yojana in comparison to before adoption of PDMC Yojana. This was done by assessing indicators like change in irrigated area and change in annual income.

1. Change in irrigated area

Table 1
Season wise distribution of irrigated area (ha.) of respondents

Sl. No.	Season	Irrigated area (ha.)		Difference (ha.)	Per cent increase in irrigated area	'Z' value
		Before Adoption	After Adoption			
1	Kharif	171.20	190.19	18.99	11.09	2.54*
2	Rabi	121.20	178.45	57.25	47.23	
3	Summer	76.00	85.56	9.56	12.57	
	Total	368.40	454.20	85.80	23.28	

*Significant at 0.05 level of probability

It is depicted from Table 1. that during kharif season there is only 11.09 per cent increase in irrigated area because farmers grow crops fully depending on monsoon in kharif season. But in case of long spell of rain, farmers have to provide protective irrigation to crops. At that time, micro irrigation system is useful. During rabi season, rainfall is less so farmer have to grow crops by using available quantity of water. Due to utilization of micro irrigation system water is saved so that more area is brought under irrigation. So we observed nearly fifty per cent (47.23%) increase in irrigated area during rabi season. However, during summer

season, there is no rainfall so farmers have to depend on ground water source for irrigation. Due to 30 to 50 per cent water saving by drip irrigation system, irrigated area was increased.

The findings are in line with Veerendranath and Sailaja (2009), Global Agri System (2014), Planning Commission Report (2014), Harinathareddy and Chennareddy (2015), Mahesh (2018), Gorain *et al.* (2019), Kharde and Madhe (2019). The 'Z' value for irrigated area is 2.54 which revealed that positive and highly significant change observed in irrigated area after adoption of PDMC Yojana.

Table 2
Distribution of respondents according to their irrigated area (ha.)

Sl. No.	Irrigated area (ha.)	Before (n=120)		After (n=120)	
		Freq.	%	Freq.	%
1	Up to 2.23	43	35.84	28	23.33
2	2.24 to 4.60	65	54.16	69	57.50
3	4.61 and above	12	10.00	23	19.17
	Total	120	100.00	120	100.00
		Mean = 03.07		Mean = 03.78	

It is inferred from Table 2 that majority of respondents (54.16%) had observed 2.24 to 4.60 ha. irrigated area while 35.84 per cent and 10.00 per cent of respondents had observed up to 2.23 ha. and more than and equal to 4.61 ha. irrigated area before adoption of PDMC Yojana, respectively. But, after adoption of PDMC Yojana, only 23.33 per cent of respondents had up to 2.23 ha. irrigated area while majority of respondents (57.50%) had 2.24 to 4.60 ha.

irrigated area and 19.17 per cent of respondents had 4.61 ha. and above irrigated area. The reason is that due to adoption of micro irrigation system 30 to 50 per cent water saved (Qureshi *et al.* 2001; Sivanappan 2002; Namara *et al.* 2005; Kooji *et al.* 2013) due to reduction in seepage loss, leaching losses, evaporation losses etc. This saved water is utilized to irrigate another crop and hence, increase in irrigated area of respondents.

Table 3
Distribution of respondents according to their per cent increase in irrigated area

Sl. No.	Per cent increase in irrigated area (%)	Respondents (n=120)	
		Frequency	Percentage
1	Up to 16.61	9	07.50
2	16.62 to 31.42	107	89.16
3	31.43 and above	04	03.34
	Total	120	100.00
		Mean = 24.02	

It is revealed from Table 3 that great majority of respondents (89.16%) had found 16.62 to 31.42 per cent increase in irrigated area after adoption of PDMC Yojana. 24.02 per cent increase was observed as mean per cent increase in irrigated area of respondents after adoption of micro irrigation system. The reason is that due to micro irrigation system different losses of water which

occur in flood irrigation was reduced after adoption of PDMC Yojana so that water gets saved hence, with the help of saved water more area is brought under irrigation with the same source of irrigation. The findings are in similarity with Radhika (2007).

2. Change in annual income

Table 4
Change in annual income (`) of respondents from different sources before and after adoption of PDMC Yojana

Sl. No.	Income source	Change in annual income (`)			Difference (`)	Per cent increase in annual income	'Z' value
		Freq	Before	After			
A	Agriculture	120	23371800 (194765)	29972400 (249770)	6600600 (55005)	28.24	5.45**
B	Other						
1	Dairy farming	65	8683200 (133587.69)	9753200 (150049.23)	1070000 (16461.53)	11.97	
2	Poultry	120	290000 (2416.67)	388000 (3233.33)	98000 (816.66)	33.01	
3	Goat farming	43	2868000 (66697.67)	3300000 (76744.18)	432000 (10046.51)	14.75	
4	Service	17	3700000 (217647.05)	3900000 (229411.76)	200000 (11764.70)	5.21	
	Total (A+B)	120	38953000 (324608.33)	47313600 (394280)	8360600 (69671.66)	21.46	

(Figures in parentheses indicate mean)

From above Table 4, it is observed that 28.24 per cent increase in income from agriculture after adoption of PDMC Yojana has been observed while 11.97 per cent, 33.01 per cent and 14.75 per cent increase in income has been observed indirectly in income obtained from dairy farming, poultry and goat farming, respectively after adoption of micro irrigation system. The by products as straw obtained from threshing of crops like pigeon pea, wheat etc. has been utilized as input in dairy farming and goat farming. The broken grains of wheat and pigeon pea are utilized as concentrate for goats and as feed for poultry birds. Hence, it indirectly helps to reduce input cost of dairy farming, poultry and goat farming. PDMC Yojana has indirect impact on income obtained from service sector. As money earned from farming helps farmers to educate their son and daughter and also helps to get jobs in private

schools, private colleges and private companies. Hence, PDMC Yojana contributes indirectly to dairy farming, poultry, goat farming and service sector. The overall 21.46 per cent increase observed in annual income of respondents from different sectors after adoption of PDMC Yojana.

It is concluded that micro irrigation system helped farmers to bring more area under irrigation due to saving in water which ultimately provides incentives to farmers to grow more crop which results in increment in cropping intensity. Micro irrigation system results in efficient utilization of inputs incurred by farmers so results in increment in crop productivity which ultimately results in increase in water use efficiency. All together these things contribute to increase in income of respondents from agriculture. As income of farmers got increased, they invest that money in allied sectors

like dairy farming, goat farming etc which contribute to increase in annual income of respondents. As income obtained from agriculture, farmers purchase cows (Jersey Breed) or Buffaloes (Murraha, Pandharpuri breed) from market and expand dairy farming sometimes they purchase good quality breeds of goats and expand goat farming. They also purchase layer or broiler breed of hen and expand poultry. Hence, from these expansion of poultry farm, goat farm and dairy farm ultimately results in

increase in income of farmers from that sectors. Micro irrigation system indirectly helps to increase in income from service sector as income obtained from agriculture sector helps their sons to get private sector jobs. Above findings were supported by Global Agri System (2014), Kharde and Madhe (2019). The calculated 'Z' value for annual income is 5.45 which revealed that positive and highly significant change observed in annual income of respondents after adoption of PDMC Yojana.

Table 5
Distribution of respondents according to their annual income (`)

Sl. No.	Annual income (`)	Before (n=120)		After (n=120)	
		Freq.	%	Freq.	%
1	Up to 2,60,748.44	30	25.00	15	12.50
2	2,60,748.45 to 4,58,139.87	81	67.50	68	56.66
3	4,58,139.88 and above	09	07.50	37	30.84
	Total	120	100.00	120	100.00
		Mean = 324608.33		Mean = 394280.00	

It is evident from Table 5. that, 67.50 per cent of beneficiary farmers had ? 2,60,748.45 to ? 4,58,139.87 annual income before adoption of PDMC Yojana, where one fourth of respondents (25.00%) have up to ? 2,60,748.44 annual income followed by only 07.50 per cent of beneficiary farmers have more than and equal to 4,58,139.88 ? annual income. From Table 5 it could be seen that, more than fifty per cent of beneficiary farmers (56.66%) have ? 2,60,748.45 to ? 4,58,139.88 annual income after adoption of PDMC Yojana followed by 12.50 per cent of respondents who were having income up to ? 2,60,748.44 annual income after adoption of PDMC Yojana and 30.84 per cent of respondents had more than and equal to ? 4,58,139.88 annual income after adoption of PDMC Yojana.

Farmers income from agriculture was increased by 28.24 per cent after adoption of PDMC

Yojana because of increase in water saving increase in irrigated area, increase in cropping intensity, increase in water use efficiency and increase in crop productivity. Increase in water saving ultimately results in increase in irrigated area while increase in water saving and increase in water use efficiency results in increase in crop productivity. Increase in water saving results in increase in cropping intensity. All indicators ultimately result in increase in income from agriculture. While by-products like straw obtained from agriculture was utilized for rearing goat and cows for dairy purpose. As income from agriculture increases farmers invest that money in another allied activities like goat rearing, dairy purpose etc. Increase in both sector as agriculture and allied sector increase an overall annual income of beneficiary farmers. The findings are in line with Radhika (2007).

Table 6
Distribution of respondents according to their per cent increase in annual income

Sl. No.	Per cent increase in annual income (%)	Respondents (n=120)	
		Frequency	Percentage
1	Up to 14.72	22	18.34
2	14.73 to 29.19	74	61.66
3	29.20 and above	21	17.50
	Total	120	100.00
		Mean = 21.96	

It is revealed from above Table 6 that 61.66 per cent beneficiary farmers have 14.73 to 29.19 per cent increase in annual income while 18.34 per cent of beneficiary farmers have upto 14.72 per cent increase in annual income however 17.50 per cent of beneficiary farmers have more than and equal to 29.20 per cent increase in annual income. Average per cent change in annual income was 21.46 per cent. The findings are in line with Rathakrishnan and Padma (2012); Tagar *et al.* (2012); Chandran and Surendran (2015); Qureshi *et al.* (2015); Rehman *et al.* (2016); T. Mahesh (2018).

Table 7
Correlation coefficient of selected profile characteristics of respondents with impact related to change in irrigated area and change in annual income

Sl. No.	Independent variables	Change in irrigated area	Change in annual income
1	Age	-0.0826	-0.7083**
2	Education	0.0429	0.7122**
3	Size of land holding	0.9490**	0.1044
4	Farming experience	-0.0870	-0.3986**
5	Extension contact	0.1483	0.7509**
6	Sources of information	0.0849	0.7339**
7	Social participation	0.1609	0.8010**
8	Innovativeness	0.1921*	0.8498**
9	Economic motivation	0.1430	0.8180**
10	Knowledge of micro irrigation system	0.1269	0.0000
11	Attitude towards micro irrigation	0.1915*	0.6904**

**Significant at 0.01 level of probability *Significant at 0.05 level of probability

It is observed from Table 7 that among selected profile characteristics of beneficiary farmers, size of land holding was positively and highly significant at 0.01 level of probability while innovativeness and attitude towards micro irrigation were positively significant at 0.05 level of probability.

The reason behind this that innovativeness of farmers intend them to develop different techniques of water saving which results in significant increase in irrigated area however attitude of farmers towards irrigation also matter, as positive attitude of farmers towards micro irrigation lead them to adopt different micro irrigation techniques and ultimately results in significant increase in irrigated area. Though the farmer has innovativeness and positive attitude towards micro irrigation, size of land holding affect on irrigated area. Hence size of land holding had significant and

positive relationship with change in irrigated area.

The selected profile characteristics of respondents like Education, Extension contact, Sources of information, Social participation, Economic motivation and Knowledge of micro irrigation system had positive and non significant relationship with change in irrigated area. While age and farming experience had negative and non significant relation with change in irrigated area. The reason that old farmers have more farming experience and they not intended to adopt new techniques and technology.

It is depicted from Table 7 that selected profile characteristics of respondents like education, extension contact, sources of information, social participation, innovativeness, economic motivation, knowledge of micro irrigation system and attitude towards micro irrigation had positive significant

relationship with change in annual income at 0.01 level of probability.

The reason behind this that educated farmers have regular and occasional contact with extension personnel, have information seeking attitude, involved in social activities, always seeking new farming techniques, have knowledge of micro irrigation system and positive attitude towards micro irrigation this ultimately results in adoption of different micro irrigation techniques which results in increase in annual income of farmer.

However, age and farming experience were negative and significant at 0.05 level of probability with annual income. The reason that old age farmers are not interested in sophisticated life and they are only interested in their subsistence so they never think about increase in their annual income.

CONCLUSION

The present study revealed that 23.28 per cent increase in irrigated area was observed. As increase in irrigated area results in increase in number of crops grown by farmers i.e. increase in cropping intensity. As increase in cropping intensity and yield of crop ultimately contribute to increase in income of the farmers from agriculture and indirectly contribute to increase in income obtained from other sectors as dairy farming, poultry, goat farming. Government of India has targeted to double the farmers income by 2022. Increase in yield of crop due to micro irrigation system means PDMC Yojana is helpful to achieve the target of doubling farmers income. As increase in farmers income will also contribute to achieve target of five trillion economy by 2030.

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