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Impact of drip irrigation system on profitability of Chilli in Madhya Pradesh

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Abstract

The chilli is considered as one of the most commercial vegetable crop and he cultivated in subtropical and also tropical region with purpose of vegetable. This study was purely based on primary data and this was conducted in Dhar district of Madhya Pradesh on 180 drip irrigated farmer and 60 conventional irrigated farmer. Hence, 240 samples were collected from vegetable growing farmers. The expenditure incurred in total cost of cultivation was compared with drip irrigated farm as compared to conventional irrigated farm and found that an average drip irrigated farmer was found to be invested 0.34 per cent ($\text{₹}1141.92 \text{ ha}^{-1}$) less in total cost as compared to conventional irrigated farmer in cultivation of chilli. An average drip irrigated farmer (284.62 qha^{-1}) was found to harvest significantly 16.98 per cent more yield as compared to conventional irrigated farmer with the result of this his gross return was found to be significantly 20.01 per cent increased as compared to conventional irrigated farmer from cultivation of vegetable chilli.

Keywords: Drip irrigation system, conventional irrigation system, cost of cultivation of chilli and profitability of chilli

Introduction

Vegetables are most commercial cultivated and consumed across the world. The chilli is considered as one of the most commercial vegetable crop and he cultivated in tropical and subtropical region throughout in year as purpose of vegetable in the India. The chilli cultivation through drip irrigation method, as an efficient water-saving irrigation technology, has been widely used in crop production, but its effects on crop yield, irrigation water productivity (IWP) and water productivity (WP) vary with field managements, climatic conditions and soil properties.

Keeping this in view the above facts, the study have been undertaken with the objective with the objective to analyze cost incurred and return obtained in production of chilli under drip and conventional irrigation system in the study area.

Materials and Methods

In present study a district have maximum area under drip irrigation have been selected for the study. Hence, Dhar district of Madhya Pradesh was selected for study. A multistage sampling method was adopted to selection of block, village and farmers. In the first stage from the selected districts, two blocks having maximum area under drip irrigation namely Badnawar and Dhar blocks were selected for the study. In second stage 2 villages in each selected block was selected randomly from the list of drip irrigated villages. Thus, Bakhatpura & Tilgara villages from Badnawar block, and Berchha & Pachlana villages from Dhar block was selected. In the 3rd stage, a list of all the drip irrigated farmer and conventional irrigated farmer in the selected villages prepared and 45 drip irrigated farmer and 15 conventional irrigated farmer from each village were selected constituting 180 drip irrigated farmer and 60 conventional irrigated farmer for the study. Thus, the total size of sample was 240 farmers. The selection of crops was also done on the basis of higher area under drip method of irrigation used by selected farmers.

Cost of cultivation

Cost of Cultivation refers to the total cost incurred by the farmer for cultivation of a crop in a hectare of area.

Total Cost: Total cost is a sum of the total fixed cost and total variable cost.

$$\text{Total cost} = \text{Total variable cost} + \text{Total fixed cost}$$

Change

Change was estimated as absolute and relative change

$$\text{Per cent change} = \frac{\text{Value of the drip irrigated farm} - \text{Value of the conventional irrigated farm}}{\text{Value of the conventional irrigated farm}} \times 100$$

Mean difference

= Value of the drip irrigated farm

– Value of the conventional irrigated farm

Results and discussion

This result deals with the change of cost incurred and profitability in cultivation of vegetable chilli in drip irrigation system as compared to conventional irrigation system in study area.

Cost of Cultivation

The expenditure incurred in human labour, machine power, seeds/plants, chemical fertilizer, FYM/organic manures, plant protection chemical, irrigation, mulching films, miscellaneous charges, interest on working capital, depreciation, interest on fixed capital, rental value of land and managerial cost in

cultivation of vegetable chilli was considered total cost.

An average conventional irrigated farmer was found to invested ₹ 362336.72 ha⁻¹ in cultivation of vegetable chilli. Amongst the various items the maximum expenditure was found to be incurred in rental value of land (29.29%), human labour (28.59%), chemical fertilizer (10.10%), managerial cost (9.48%), plant protection chemical (9.11%), machine power (3.81%), seeds/plants (3.79%), FYM/organic manures (2.05%), miscellaneous charges (1.65%), interest on working capital (1.10%), irrigation (0.70%), depreciation (0.20%) and interest on fixed capital (0.14%) in cultivation of vegetable chilli. (Fig. 1)

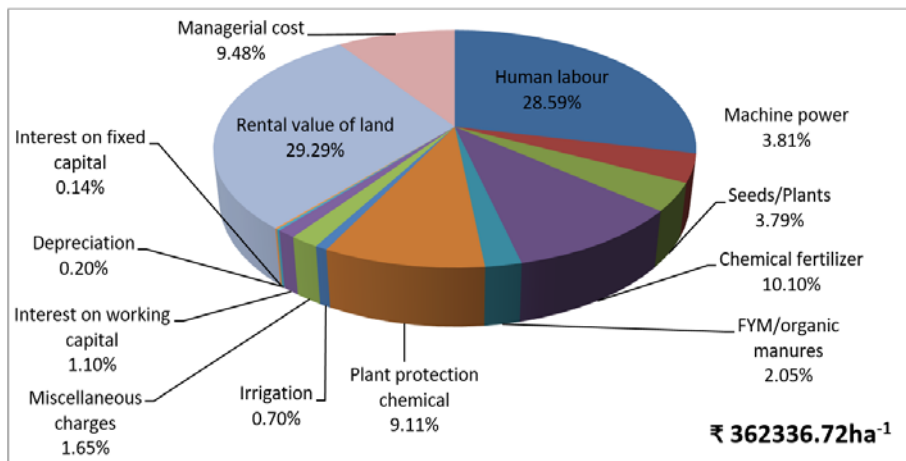


Fig 1: Percentage share of different items in cultivation of chilli under drip irrigation system

An average drip irrigated farmer was found to invested ₹ 361094.80ha⁻¹ in cultivation of vegetable chilli. Amongst the various items the maximum expenditure was found to be incurred in rental value of land (35.20%), human labour (24.95%), managerial cost (9.46%), chemical fertilizer (8.24%), plant protection chemical (7.84%), machine power

(3.67%),seeds/plants (3.63%), FYM/organic manures (1.81%), mulching films (1.62%), miscellaneous charges (1.55%), interest on working capital (1.00%), irrigation (0.44%), interest on fixed capital (0.41%) and depreciation (0.17%) in cultivation of vegetable chilli. (Fig. 5.2)

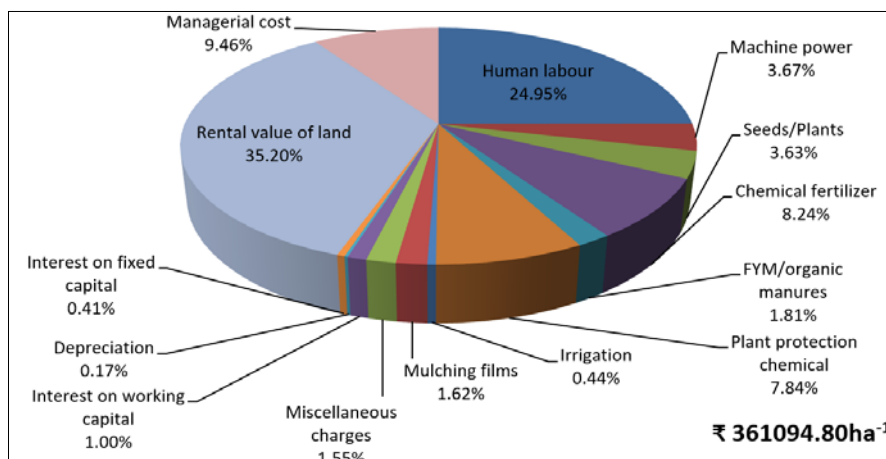


Fig 2: Percentage share of different items in cultivation of chilli under drip irrigation system

Therefore, the expenditure incurred in total cost of cultivation was compared with the drip irrigation system and conventional irrigation system in cultivation of vegetable chilli was analyzed and presented in table 1. The expenditure incurred in total cost of cultivation was compared with drip irrigated farm as compared to conventional irrigated farm and found that an average drip irrigated farmer was found to be invested 0.34 per cent ($\text{₹}1141.92 \text{ ha}^{-1}$) less in total cost as compared to conventional irrigated farmer in cultivation of vegetable chilli. Amongst different cost in cultivation of vegetable chilli, an average drip irrigated farmer compared with conventional irrigated farmer and it was found to be invested significantly -36.66, -18.58, -14.15, -12.85, -11.58, -8.85, -3.97 less in irrigation, chemical fertilizer, plant

protection chemical, human labour, FYM/organic manures, interest on working capital and machine power cost respectively, while the expenditure incurred in interest on fixed capital and rental value of owned land cost were found to be significantly 197.21 and 20.01 per cent, respectively more in cultivation of vegetable chilli.

The expenditure incurred in seeds/plants (-4.54%), FYM/organic manures (-11.58%), miscellaneous charges (-6.16%), depreciation (-14.27%), managerial cost (-0.34%) was found to be invested less in drip irrigation system as compared to conventional irrigation system in cultivation of vegetable chilli, but not significant. These finding was such as Patel *et al.* (2014) [9]. These finding are also confined by such as Navyasri, *et al.* (2021) [10] and Jadav, *et al.* (2014) [11].

Table 1: Change in expenditure incurred on various items in drip irrigation system as compared to conventional irrigation system in cultivation of chilli

(₹ha^{-1})

Particulars	DIS	CIS	Mean difference	Per cent change	't' cal. value
Variable cost					
Human labour	99350.16	86587.58	-12762.58**	-12.85	8.02
Machine power	13249.07	12723.08	-525.99*	-3.97	2.42
Seeds/Plants	13183.56	12584.43	-599.13 ^{NS}	-4.54	1.24
Chemical fertilizer	35102.37	28579.32	-6523.05**	-18.58	11.72
FYM/organic manures	7110.7	6287.08	-823.62 ^{NS}	-11.58	1.89
Plant protection chemical	31669.86	27188.85	-4481.01**	-14.15	6.77
Irrigation	2421.16	1533.54	-887.62**	-36.66	11.5
Mulching films	0	5630.47	5630.47	0	-
Miscellaneous charges	5731.28	5378.3	-352.98 ^{NS}	-6.16	1.03
Interest on working capital	3820.12	3481.98	-338.14**	-8.85	12.68
Depreciation	701.26	601.18	-100.08 ^{NS}	-14.27	0.22
Total variable cost	227133.35	204694.94	-22438.41**	-9.88	10.09
Fixed Cost					
Interest on fixed capital	478.99	1423.63	944.64**	197.21	12.82
Rental value of land	101784.68	122149.42	20364.74**	20.01	19.49
Managerial cost	32939.7	32826.81	-112.89 ^{NS}	-0.34	0.41
Total fixed cost	135203.37	156399.86	21196.49**	15.67	20.39
Total cost					
Total cost	362336.72	361094.8	-1141.92 ^{NS}	-0.34	0.41

Hence, it can be concluded above results and found that the total cost of cultivation was found to be more or less same in drip irrigation system as compared to conventional irrigation system in cultivation of vegetable chilli. Although, the expenditure on irrigation, chemical fertilizer, plant protection chemical, human labour, FYM/organic manures, interest on working capital and machine power cost was found to be significantly less, while the expenditure incurred in interest on fixed capital and rental value of land cost was found to be significantly more in drip irrigation system as compared to conventional irrigation system in cultivation of vegetable chilli. The expenditure incurred in seeds/plants, FYM/organic manures, miscellaneous charges, depreciation, managerial cost was found to be less or more same in drip and conventional irrigation system in cultivation of vegetable chilli.

Profitability

Profitability of vegetable chilli was calculated on yield of the crop and gross, net farm, family labour, farm business and farm investment income have been analyzed. The cost of production and return on investment of $\text{₹} 1.00$ was also

analyzed for vegetable chilli cultivation. It is observed from data that an average drip irrigated farmer (284.62qha^{-1}) was found to harvest significantly 16.98 per cent (41.31qha^{-1}) more yield as compared to conventional irrigated farmer (243.31 qha^{-1}), with the result of this his gross return was found to be significantly 20.01 per cent ($\text{₹} 122188.40\text{ha}^{-1}$) increased as compared to conventional irrigated farmer ($\text{₹} 610708.10 \text{ ha}^{-1}$) from cultivation of vegetable chilli. An average drip irrigated farmer also received significantly more net farm (49.70%), family labour (34.04%), farm business (30.99%), and farm investment (36.77%) income as compared to conventional irrigated farmer from cultivation of vegetable chilli.

An average drip irrigated farmer was found to invested $\text{₹} 1268.69$ to harvest a quintal of vegetable chilli from his farm, which was significantly 14.81 per cent less than conventional irrigated farmer ($\text{₹} 1489.20 \text{ q}^{-1}$). On investment of $\text{₹} 1.00$ an average drip irrigated farmer ($\text{₹} 2.03$) was found to obtained significantly 20.12 per cent more as compared to conventional irrigated farmer ($\text{₹} 1.69$) in cultivation of vegetable chilli. These finding are such as Navyasri, *et al.* (2021) [10] and Jadav, *et al.* (2014) [11].

Table 2: Change in yield and return obtain in drip irrigation system as compared to conventional irrigation system in cultivation of irrigation vegetable chilli(₹ha⁻¹)

Particulars	DIS	CIS	Mean difference	“t” cal. value
Yield (q)	243.31	284.62	41.31** (16.98)	18.05
Gross income	610708.10	732896.50	122188.40** (20.01)	16.49
Net farm income	248371.38	371801.70	123430.32** (49.70)	21.83
Family labour income	340203.83	456012.74	115808.91** (34.04)	24.53
Farm business income	442467.50	579585.79	137118.29** (30.99)	23.90
Farm investment income	383574.76	528457.12	144882.36** (36.77)	22.03
Cost of Production	1489.20	1268.69	-220.51** (-14.81)	16.69
B:C Ratio	1.69	2.03	0.34** (20.12)	21.84

Figure in the parenthesis shows per cent change in drip irrigated farmer to conventional irrigated farmer

** Significant at 1 % level, * Significant at 5 % level ('t' table value 1.98)

Conclusion

It can be concluded above results and found that the total cost of cultivation was found to be more or less same in drip irrigation system as compared to conventional irrigation system in cultivation of vegetable chilli. Although, the expenditure on irrigation, chemical fertilizer, plant protection chemical, human labour, FYM/organic manures, interest on working capital and machine power cost was found to significantly less, while the expenditure incurred in interest on fixed capital and rental value of land cost was found to significantly more in drip irrigation system as compared to conventional irrigation system in cultivation of vegetable chilli. The expenditure incurred in seeds/plants, FYM/organic manures, miscellaneous charges, depreciation, managerial cost was found to be less or more same in drip and conventional irrigation system in cultivation of vegetable chilli. The farmer was harvested significantly more yield and gross, net, family labour, farm business and farm investment income and per rupee return from investment was also significantly more in drip irrigation system as compared to conventional irrigation system, while cost of production was found to be significantly decrease in drip irrigation system as compared to conventional irrigation system in cultivation of vegetable chilli.

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