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Impact of micro irrigation on production and profitability of green chilli under drip method of irrigation in Madhya Pradesh

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Abstract

The Per Drop More Crop component of PMKSY mainly focuses on water use efficiency at farm level through Precision/ Micro Irrigation (Drip and Sprinkler Irrigation). Drip irrigation is an irrigation method saves to water and fertilizer. To evaluate impact of drip irrigation on chilli production a study was conducted in Dhar district was Madhya Pradesh. 60 chilli growers (48 adopted and 12 non- adopted) were selected for the study. The study reveal that the yield of green chilli was found to be increased 54.24 per cent on an average green chilli growers farm in drip irrigation (182q/ha) over the surface method of irrigation (118q/ha) with the result of that gross return was also increase 88.15 per cent, from cultivation of green chilli The net return, family labour income, farm investment income and farm business income was also found to be increased 105.14, 86.68, 103.84, and 93.41 per cent respectively due to drip as compared to surface method irrigation. On investment of Re. 1.00 an average green chilli grower was found to be obtained 3.65 per cent more in drip (Rs. 1.42) as compared to surface method (Rs. 1.37) of irrigation. The majority of respondents were found to the faced several constraints in adoption of drip method of irrigation of cultivation of green chilli viz. more fragmentation of land (64%), damage of tubes of drip irrigation by wild animals (62%), more expensive, despite the subsidy (58%), difficulty in obtaining government subsidy & support (56%) and poor quality of drip irrigation equipment (55%).

Keywords: micro irrigation, drip method of irrigation, Production and Profitability ability, green chilli

Introduction

The Ministry of Agriculture and Farmers Welfare, Government of India, has launched the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) in the year 2015. The Per Drop More Crop component of PMKSY mainly focuses on water use efficiency at farm level through Precision/ Micro Irrigation (MI) (Drip and Sprinkler Irrigation). PDMC-PMKSY has put great emphasis on micro-irrigation technologies (drip and sprinklers). Drip irrigation is an irrigation method saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters (Ram kumar *et al*, 2016).

Drip method of irrigation is highly suitable for vegetable crops can save about 43 per cent of water and increase productivity of vegetable by 39 per cent by adopting drip method of irrigation over conventional flood method of irrigation. The profitability of vegetables cultivating farmers under drip method of irrigation is increased more than 205 per cent over non-drip adopters. (Devika N, Narayanamoorthy A and Jothi P 2017).

Green chilli is considered as one of the most commercial vegetable crop and cultivated in tropical and subtropical region throughout in year with purpose of vegetable as well as spice. The average cost of cultivation per hectare for chilli under drip irrigation system to conventional irrigation method which is significantly higher. About 16% cost saving was observed, in irrigation under drip method of irrigation as compared to conventional irrigation method. The cost of growth regulator, estimated depreciation, planting material, manure and cakes, rental value of owned land and estimated interest on working capital was found to be higher 124%, 77%, 68%, 45%, 15% and 8% respectively in drip method of irrigation over conventional method of irrigation. The yield of chilli was also found significantly higher on drip as compared to conventional method of irrigation with the result that the productivity of chilli was higher (18.07%) under drip irrigation method over conventional method.

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The gross income per hectare was also found higher in drip chilli farm by 21.95 per cent against the conventional method of irrigation. In drip method of irrigation, the farm business income, family labour income and farm investment income was increased over the conventional method of irrigation chilli farm. The net profit per hectare in drip chilli farm was higher 48.12 per cent compared to conventional method. Looking to the input output ratio, there is no doubt to conclude that cultivation of green chilli in drip method of green chilli was more profitable than that of conventional method of irrigated chilli farms because the ratio was 3.58 and 3.15 for drip and conventional system (Patel Jisnu K, jadav KS and Parmar HC 2014).

Madhya Pradesh is one of the second largest green chilli producing state of India, produces 0.67 MT of green chilli in Indian basket of production 3.59 MT (13.38%). (13.38 and 18.63%).

Looking to the above facts mind the present study has been taken in Dhar district (18.43%) which has maximum irrigated area under drip in Madhya Pradesh to examine the cost incurred and return obtains by the farmer in cultivation of green chilli under drip method of irrigation and compared with surface method of irrigation.

Materials and Methods

The study has been purely based on primary data collected from the adopted and non-adopted of drip method of irrigation on various aspects viz. expenses seed cost, fertilizer cost, FYM/organic, pesticide, irrigation etc. A return obtained in cultivation of green chilli and constraint faced by adopter in adoption of drip method of irrigation. A multi stage stratified random sampling method was used for selection of districts, blocks, villages and respondents. 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. In the second stage from the selected districts, one blocks having maximum area under drip irrigation namely Badnawar block was selected for the study. In third stage 3 villages in selected block was selected randomly from the list of drip irrigated villages. Thus, Bakhatpura, Tilgara & Jabada villages was selected. In the fourth stage, a list of all the adopters and non- adopters in the selected villages prepared and 16 adopters and 4 non-adopters from each village were selected constituting 48 adopters and 12 non-adopters for the study. Thus, the total size of sample was 60 farmers. The selection of crops was also done on the basis of higher area under drip method of irrigation used by selected farmers. Hence, green chilli has

been selected under drip irrigation for the study.

Results

This result deals with the cost incurred in cultivation of green chilli, return obtained from production and constraints faced by farmers to adoption of drip method of irrigation in study area.

Cost incurred in cultivation

The cost of cultivation of green chilli under drip and surface method of irrigation in area under study are presented in figure 1&2. It is observed from these finger that an average farmer was found to be investment Rs. 194500 and Rs. 353760/ha in cultivation of green chilli respectively in surface irrigation and drip method of irrigation. In total cost of cultivation of green chilli the maximum cost was found to be incurred in rental value of own land (25%) followed by application of pesticide (16%), investment in family labour (14%), application of fertilizer (14%), investment of seed (9%), investment of stacking (6%), investment of hired human labour (5%), investment of machine labour (5%), application of irrigation (2%), interest on working capital(2%) and application of FYM (2%)(fig.1) while drip method of irrigation amongst various cost item the maximum was found to be incurred in rental value of own land (26%) followed by application of FYM (13%), application of pesticide (10%), investment in family labour (10%), application of fertilizer (9%), investment of seed (6%), investment of stacking (5%), investment of machine labour (5%), investment of hired human labour (4%), interest on fixed capital (3%), interest on working capital (2%) application of irrigation (1%) and depreciation of assets (1%) in study area. (fig. 2)

Therefore, in various items of cost of cultivation of green chilli under surface irrigation to drip irrigation the maximum was found to be increased observed in application of in FYM (4%) as compared to, interest on fixed capital & mulching from (2%) and rental value of own land (1%) while, the maximum decreased was observed in application of fertilizer (2%) followed by application of pesticide (1%), investment of family human labour (1%), and investment of hired human labour (1%). There was no change observed in investment of interest on working capital, application of irrigation, stacking, depreciation and investment of machine labour in drip as compared to surface method of irrigation.

The various cost items changed in cultivation of green chilli in drip method as compared to surface methods of irrigation in area under study are presented in table 1.

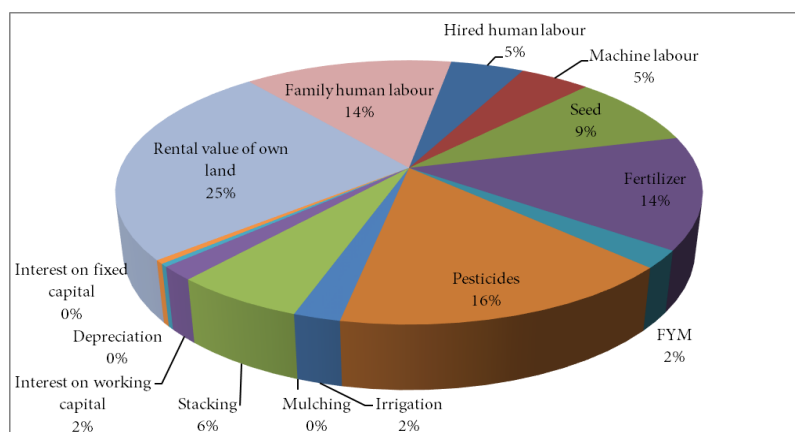


Fig 1: Share of various items of costs in cultivation of green chilli under surface irrigation

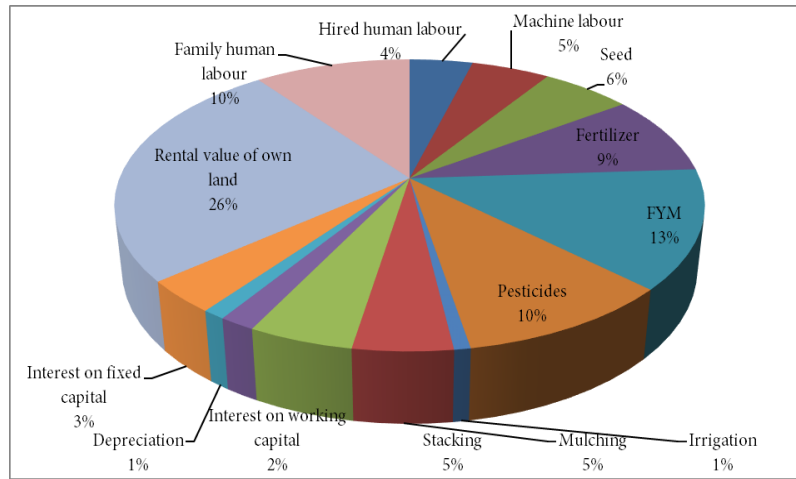


Fig 2: Share of various items of costs in cultivation of green chilli under drip irrigation

Amongst all the cost items maximum was found to be increased in case of interest on fixed capital (1317.65%) followed by application of FYM (999.92%) depreciation of assets (428.46%), investment of machine labour (102.28%), rental value of own land (88.15%), interest on working capital (78.25%), investment of hired human labour (56.16%), stacking materials (44.98%), investment of family human labour (35.56%), investment of seed (20.48%), application of

fertilizer (16.77%) and application of pesticides (14.19) in drip as compared to surface methods of irrigation. The cost incurred in mulching was found increased infinite as compared to drip irrigation as this practice only prevailed in drip method of irrigation. The irrigation cost was found to be decreased 37.03 per cent from Rs.3867 to 2435 9/ha in drip method as compared to surface methods of irrigation. (Table 1)

Table 1: Changes occurred in drip irrigation over surface irrigation in cultivation of green chilli (Rs/ha)

Particulars	Surface irrigation	Drip irrigation
Hired human labour	8517	13300 (56.16)
Machine labour	8158	16502 (102.28)
Seed	15659	18866 (20.48)
Fertilizer	24333	28414 (16.77)
FYM	3843	42270 (999.92)
Pesticides	28532	32581 (14.19)
Irrigation	3867	2435 (-37.03)
Mulching	0	14828 (0)
Stacking	10810	15672 (44.98)
Interest on working capital	3025	5392 (78.25)
Depreciation	650	3435 (428.46)
Cost A ₁ /A ₂	107394	193695 (80.36)
Interest on fixed capital	816	11568 (1317.65)
Cost B ₁	108210	205263 (89.69)
Rental value of own land	44368	83477 (88.15)
Cost B ₂	152578	288740 (89.24)
Family human labour	24240	32860 (35.56)
Cost C ₁	132450	238123 (79.78)
Cost C ₂	176818	321600 (81.88)

Cost C ₃	194500	353760 (81.88)
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Figure in parenthesis shows incremental percentage over surface irrigation

2. Return obtained from production of green chilli

The return obtained from production of green chilli under drip method and surface method of irrigation in area under study is presented in table 1. An average cultivator was found to be produced 118 q of green chilli from a hectare of land and received gross return Rs. 266208/ha from production of green chilli in surface method of irrigation. He was found to be obtained a net return of Rs 71708/ha from production of green chilli. His family labour income, farm investment income and farm business income was found to be Rs.113630, Rs. 134574 and Rs. 158814/ha, respectively. On an investment of Re. 1.00, he was found to be received Rs. 1.37 from cultivation of green chilli. To produce a quantal of green chilli an average farmer was found to be invested Rs. 1648 in surface method of irrigation. (Table2)

Table 2: Changes in yield, gross return and profitability aspect over surface irrigation in cultivation of green chilli

Particulars	Surface irrigation	Drip irrigation
Yield	118	182 (54.24)
Gross income	266208	500864 (88.15)
Net income	71708	147104 (105.14)
Family labour income	113630	212124 (86.68)
Farm invested income	134574	274309 (103.84)
Farm business income	158814	307169 (93.41)
Cost of production	1648	1944 (17.96)
Per rupee return	1.37	1.42 (3.65)

Figure in parenthesis shows incremental percentage over surface irrigation

An average cultivator was found to be produced 182 q of

green chilli from a hectare of land and received gross return Rs. 500864/ha from production of green chilli in surface method of irrigation. He was found to be obtained a net return of Rs 147104/ha from production of green chilli. His family labour income, farm investment income and farm business income was found to be Rs. 212124, Rs. 274309 and Rs. 307169 /ha, respectively. On an investment of Re. 1.00, he was found to be received Rs. 1.42 from cultivation of green chilli. To produce a quantal of green chilli an average farmer was found to be invested Rs. 1944 in surface method of irrigation. (Table2)

Therefore with the introduction of drip method of irrigation the yield of green chilli was found to be increased 54.24 per cent in drip method (182q/ha) an over the surface method of irrigation (118q/ha) with the result of that the gross return was also increased 88.15 per cent. The net return, family labour income, farm investment income and farm business income was also found to be increased 105.14, 86.68, 103.84, and 93.41 per cent respectively in drip on compared to surface method irrigation. On investment of Re. 1.00 an average green chilli grower was found to be obtained 3.65 per cent more in drip (Rs.1.42) as compared to surface method (Rs.1.37) of irrigation (Table 2).

3. Constraints faced by farmers

The constraints faced by farmers in adoption of drip method of irrigation in area under study are presented in table 3. The majority of respondents were found to be faced several constraints viz. the more fragmentation of land (64%), damage of micro tube in drip irrigation by wild animals (62%), more expensive, despite the subsidy (58%), difficulty in obtaining government subsidy & support (56%), poor quality of drip irrigation equipment (55%), high need/cost of maintenance in drip irrigation (53%), lack of credit (52%), lack of drip irrigation system dealers in area (44%), lack of knowledge/training for drip irrigation system (41%), poor marketing arrangements (38%), low output price/profitability (36%) and poor after sales service (32%). (Table3)

Table 3: Constraints faced by adopters in adoption drip method of irrigation

S. No.	Constraints	Per cent age
1	Poor quality of drip irrigation equipment	55
2	High need/cost of maintenance in drip irrigation	53
3	Difficulty in obtaining government subsidy & support	56
4	Lack of credit	52
5	Lack of knowledge/training for drip irrigation system	41
6	More expensive, despite the subsidy	58
7	Lack of drip irrigation system dealers in area	44
8	Poor after sales service	32
9	Low output price/profitability	36
10	Poor marketing arrangements	38
11	Fragmentation of land	64
12	Damage of micro tube in drip irrigation by wild animals	62

Therefore, the Per Drop More Crop component of PMKSY which mainly focuses on water use efficiency at farm level through Precision/Micro Irrigation (Drip and Sprinkler Irrigation). Under this component drip method of irrigation was found to be is highly suitable for vegetable i.e. green chilli. As by the introduction of drip method of irrigation in farmer field the yield of green chilli was found to be increased

(54.24%) an over the surface method of irrigation with the result of that the gross return was also increased (88.15%). The net return, family labour income, farm investment income and farm business income was also found to be increased 105.14, 86.68, 103.84, and 93.41 per cent respectively in drip on compared to surface method irrigation. On investment of Re. 1.00 an average green chilli grower was found to be

obtained 3.65 per cent more in drip as compared to surface method of irrigation. However the adopter faced various constraints (more fragmentation of land, damage of micro tube in drip irrigation by wild animals, more expensive, despite the subsidy, difficulty in obtaining government subsidy & support, poor quality of drip irrigation equipment, high need/cost of maintenance in drip irrigation, lack of credit, lack of drip irrigation system dealers in area, lack of knowledge/training for drip irrigation system, poor marketing arrangements, low output price/profitability and poor after sales service) in adoption of drip method of irrigation in the field. Hence, efforts should be made to promote the drip system of irrigation with proper awareness about the program to the farmers of all the districts of the state. Efforts should also be made to reduce the price drip irrigation equipment, more subsidy and Govt. assistance, provision/ support for farm fencing, easier process getting subsidy/ Govt. assistance latest and improved MI technology/ equipments and better training drip method of irrigation for the farmers/adopters is required for betterment of programme as majority of the adopters agreed to expanding the use of drip method of irrigation in future course of action.

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