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CONSTRAINTS FACED BY THE VEGETABLE GROWERS IN ADOPTION OF DRIP SYSTEM OF IRRIGATION

Rakesh Natwadia[1], R. N. Sharma[2] and B. S. Badhala[3]

1 Ph.D. Research Scholar, Department of Extension Education SKNAU, Jobner - 303328
2 Professor, Department of Extension Education SKNAU, Jobner - 303328
3 Assit Professor, Department of Extension Education SKNAU, Jobner - 303328
E-mail: crakeshchoudhary1@gmail.com

ABSTRACT

Water is the most precious, crucial and limiting natural resource, mainly important for agricultural production and day-to-day living of human beings. The present study was conducted in four adopted villages and total of 120 farmer respondents were selected. The result of the study revealed that 61.67 per cent of vegetable growers were in the category of medium constraints level where as 18.33 per cent, and 20.00 per cent vegetable growers were into the categories of low and high constraints levels, respectively

Keywords: *vegetable growers, drip system of irrigation, constraints, adopted villages*

INTRODUCTION

Drip irrigation technique, the water is applied to the root area of plant drop by drop because of which large amount of water can be saved (Tupe *et al., 2015*). drip irrigation helps in growing agricultural crops under limited water availablility and maintains landscapes during periods of less than average rainfall (Mishra *et a,,* 2018). Drip irrigation is precise and regulated application of water and plant nutrients at frequent intervals and low pressure through emitters/drippers into the root zone of the plant with the help of close network of pipes. Drip system of irrigation is more profitable as it saves 50-70% water as compared to surface irrigation method and minimize labour cost, minimize plant diseases by reducing humidity in atmosphere.

Rajasthan is the biggest state of India in terms of area and it covers about 10.4 per cent of the total area of India but only 1.04 per cent of the water resources. There are 295 blocks in Rajasthan state, out of which 185 blocks were under dark zone. In Jaipur district out of 15 blocks, 14 blocks were under dark zone. Because of arid and semi-arid climate *i.e.* poor soil quality, negative moisture index and use of traditional agriculture practices the available water is depleting day by day. The source of irrigation water in the state are wells and tube wells.

Rajasthan state ranks 7th in terms of coverage of area under drip system of irrigation. Rajasthan covers an area of 245301 hectares under drip irrigation after Andhra Pradesh (1295658 ha), Maharashtra (1199963 ha), Gujarat (723222 ha), Karnataka (6581171 ha), Tamil Nadu (487511 ha) and Madhya Pradesh (313887 ha) (Annonymous, 2019).

OBJECTIVE

To identify the constraints faced by the vegetable growers in adoption of drip system of irrigation

METHODOLOGY

The present study was undertaken in the adopted villages of S.K.N. Agriculture University, Jobner. The University adopted four villages *viz*., Pachar, Idan ka Bas, Khejrawas and Dhani Boraj. The total of 120 farmer respondents were selected from 212 respondents in four selected villages by using of random sampling through proportional allocation method.

To identify the constraints in adoption of drip system of irrigation by the farmers, the constraint measuring procedure developed by Sharma (2002) was used after modification in light of the suggestions of the experts. The responses regarding different constraints like general, technical, infrastructural, financial, educational, climatic and geographical and miscellaneous were recorded on three-point continuum *viz*., 'most severe', 'severe' and 'least severe' which were assigned scores, 3, 2 and 1, respectively (PART-D). Total score obtained by farmers as well as for each statement was calculated. The farmers were divided into three categories *viz.*, most severe, severe and least severe on the basis of mean and standard deviation given as under :

1. Low level constraint = Less than (Mean - SD)

2. Medium level constraints = Between (Mean ± SD)

3. High level constraints = More than (Mean + SD)

Frequency and percentage of farmers in each category were calculated. Further, to determine the intensity of constraints, mean per cent score for each item was worked out and ranked accordingly. The significance of difference among the group of farmers with respect to constraints encountered by them was calculated and the conclusions were drawn accordingly.

Mean per cent score (MPS)

It was calculated by multiplying total obtained score of the respondents by 100 and divided by the maximum obtainable score.

$$\text{Mean Per cent Score} = \frac{\text{Total score obtained}}{\text{Maximum obtainable score}} \times 100$$

Rank

Ranks were accorded in the descending order according to the mean per cent score obtained. This was used to find out the knowledge, adoption and constraints severity in order of priority.

RESULTS AND DISCUSSION

To make an overview of the constraints faced by the vegetable grower in adoption of drip system of irrigation, they were divided into the strata i.e. high level, medium level and lower level. The data given in table 1 reveal that 61.67 per cent of vegetable growers were found in to the category of medium constraints level where as 18.33 per cent, and 20.00 per cent vegetable growers were found into the categories of low and high constraints levels, respectively.

Table 1 : Distribution of categories of constraints faced by the vegetable growers in adoption of drip system of irrigation (n=120)

Sr. No.	Category of constraints	Frequency	Per cent
1	Low level constraints (below 78.57 score)	22	18.33
2	Medium level constraints (from 78.57 to 100.57 score)	74	61.67
3	High level constraints (above 100.57 score)	24	20.00

Mean = 89.57, SD = 11.00

Aspect wise constraints encountered by vegetable growers General constraints

Table 2 : General constraints faced by the vegetable growers in adoption of drip system of irrigation (n=120)

Sr. No.	General constraints	Frequency			MPS	Rank
		Most Sever	Sever	Least Sever		
1	Spacing varies from crop to crop, so it becomes difficult to change the place of lateral pipes frequently	90	30	0	91.67	I
2	Difficulty in maintenance of drip system of irrigation regularly	37	70	13	73.30	II
3	Difficult to operate the drip system of irrigation by illiterate people	44	47	29	70.83	III
4	Problem of uprooting plants due to shallow root system	13	66	41	58.88	IV
5	Irregular supply of electricity in the area	08	46	66	50.55	V

* Mean Per cent Score

The data incorporated in table 2 reveal that the general constraints which could be responsible for adoption of drip system of irrigation. The data given in 2 table depict that the constraints like 'Spacing varies from crop to crop, so it becomes difficult to change the place of lateral pipes frequently' was most perceived general constraint by the vegetable growers as it was perceived by 91.67 per cent vegetable growers and had occupied first rank.

The present findings are in agreement with the findings of research conducted by Gourav *et al.* (2003), Jiterwal (2007), Bunkar (2011) and Yadav *et al.* (2017).

Technical constraints

Table 3 : Technical constraints faced by the vegetable growers in adoption of drip system of irrigation (n=120)

Sr. No.	Technical constraints	Frequency			MPS	Rank
		Most Sever	Sever	Least Sever		
1	Leakage of water from the pipes	93	27	0	92.50	I
2	Blocking the drippers due to salt or other impurities in the water	88	31	01	89.72	II
3	Lack of technical know-how about maintenance and repairing of drip irrigation sets	46	61	13	75.83	III
4	Lack of organizing regular trainings on operation and maintenance, of drip irrigation sets	37	67	16	72.50	IV
5	High technical skill is required in operation and maintenance of drip system of irrigation	36	57	27	69.16	V
6	Uneven distribution of water due to insufficient pressure of water	21	69	30	64.16	VI
7	Non-availability of spare parts at village level	19	62	39	61.11	VII

* Mean Per cent Score

A perusal of data incorporated in table 3 reveal that "Problem of leakage of water from the pipes", was most perceived technical constraints by the vegetable growers as it was perceived by 92.50 per cent vegetable growers and had occupied first rank.

The finding was in accordance with the findings of research conducted by Gawande and Shinde (2003), Meti (2013) and Dinakar and Singh (2020).

Financial constraints

Table 4 : Financial constraints faced by the vegetable growers in adoption of drip system of irrigation (n=120)

Sr. No.	Financial constraints	Frequency			MPS	Rank
		Most Sever	Sever	Least Sever		
1	High initial cost of installing drip system of irrigation	88	31	01	90.83	I
2	Lack of knowledge of banking facilities for loan	51	66	03	80.00	II
3	Lack of knowledge about government schemes for installing drip sets on subsidized rates	50	66	04	79.44	III
4	Maintenance cost of drip system of irrigation is high	37	68	15	72.78	IV
5	High rate of interest on sanctioned loan	25	61	34	64.17	V
6	Lack of timely availability of financial help from government through subsidies	22	63	35	63.05	VI
7	Procedure for getting loan from bank / societies is complicated	12	67	41	58.61	VII

* Mean Per cent Score

The data presented in table 4 reveal that the "High initial cost of installing drip set", was most serve problem which was placed at the first rank with 90.83 MPS. Second rank "Lack of knowledge of banking facilities for loan" with 80.00 MPS.

The findings are in accordance with the findings of research conducted by Meti (2013), Yadav *et al.* (2017) and Dinakar and Singh (2020).

Infrastructural constraints

Table 5 : Infrastructural constraints faced by the vegetable growers in adoption of drip system of irrigation

(n = 120)

Sr. No.	Infrastructural constraints	Frequency			MPS	Rank
		Most Sever	Sever	Least Sever		
1	Technical staff working in the field is not available	83	34	03	88.89	I
2	Lower quality of pipes and micro-tubes	52	64	04	80.00	II
3	Insufficient supply of electricity for irrigating fields	50	56	14	76.66	III
4	Service by the companies are poor after sale	38	72	10	74.44	IV
5	Generally spare parts are not available timely	24	55	41	61.94	V
6	Monopoly of few companies who supply the drip sets for irrigation	19	39	62	54.72	VI

* Mean Per cent Score

The findings of the perceived infrastructural constraints responsible for the adoption of drip system of irrigation have been presented in table 5 reveal that the constraint like "Technical staff working in the field is not available" was the most perceived infrastructural constraint with 88.89 MPS, occupied the first rank, followed by "Lower quality of pipes and micro-tubes" was the second most important problem with 80.00 MPS.

The findings are supported with the findings of research conducted by Jiterwal (2007) and Yadav *et al.* (2017).

Educational constraints

Table 6 : Educational constraints faced by the vegetable growers in adoption of drip system of irrigation

(n = 120)

Sr. No.	Educational constraints	Frequency			MPS	Rank
		Most Sever	Sever	Least Sever		
1	Inadequate awareness about the advantage of drip system of irrigation	90	28	2	91.11	I
2	Adequate number of demonstrations were not arranged to motivate and develop skills for its adoption	56	53	11	79.16	II
3	Vegetable growers training are not organized for its installation (adoption/use)	43	67	10	76.94	III
4	Lack of individual's contact with experts related to drip system for effective adoption	44	67	09	76.38	IV
5	Lack of systematic campaign for popularizing the drip system of irrigation	52	50	18	76.11	V
6	Untrained vegetable growers feel difficulty in using drip system of irrigation	51	55	14	75.83	VI
7	Lack of knowledge about operation of drip system of irrigation	30	51	39	64.16	VII

* Mean per cent score

It could be observed from the data given in table 6 show that most of vegetable growers constraint like 'Inadequate awareness about the advantage of drip system of irrigation' and 'Adequate number of demonstrations were not arranged to motivate and develop skills for its adoption' were the first and second most important constraints perceived by 91.11 and 79.16 per cent vegetable growers, respectively.

The findings were in corroboration with the findings of research conducted by Jitarwal (2007), Singh (2010) and Sugirtharan (2018).

Climatic and geographical constraints

Table 7 : Climatic and geographical constraints faced by the vegetable growers in adoption of drip system of irrigation

(n = 120)

Sr. No.	Climatic and geographical constraints	Frequency			MPS	Rank
		Most Sever	Sever	Least Sever		
1	Unsuitable in the area where water is highly saline which causes chocking of emitters	84	34	02	89.44	I
2	High temperature reduces the durability of drip irrigation technology	78	39	03	87.50	II
3	Less suitable for clay soil	56	51	13	78.61	III
4	Unprofitable where land is leveled and ground water available in sufficient quantity	28	72	20	68.88	IV

* Mean Per cent Score

The data given in table 7 explains that the majority of vegetable growers encountered constraint like 'Unsuitable in the area where water is highly saline which causes chocking of emitters' was ranked first in adoption of drip system of irrigation at 89.44 per cent vegetable growers. In order to sequence 'High temperature reduces the durability of drip irrigation technology.

The findings are in accordance with the findings of research conducted by Jiterwal (2007), Singh (2010) and Yadav *et al.* (2017).

Miscellaneous constraints

Table 8 : Miscellaneous constraints faced by the vegetable growers in adoption of drip system of irrigation

(n = 120)

Sr. No.	Miscellaneous constraints	Frequency			MPS	Rank
		Most Sever	Sever	Least Sever		
1	Lack of organizing trainings to improve skills about operation and repairing of parts of drip system of irrigation	81	35	04	88.05	I
2	Problem of motivation of vegetable growers towards installation of drip system of irrigation	68	41	11	82.50	II
3	Lack of measurement of water pressure in lateral distributors	34	60	26	68.88	III
4	Lack of extension efforts in popularizing the drip system of irrigation for getting maximum benefits	35	49	36	66.38	IV

* Mean Per cent Score

The data given in table 8 explains that the most important constraint like 'Lack of organizing trainings to improve skills about operation and repairing of parts of drip system of irrigation' was ranked first constraints in adoption of drip system of irrigation as it was perceived by 88.05 per cent vegetable growers.

The finding was supported with the findings of research conducted by Yadav *et al.* (2017), Sugirtharan (2018) and Dinakar and Singh (2020).

Overall constraints faced by the vegetable growers in adoption of drip system of irrigation

Table 9 : Overall constraints faced by the vegetable growers in adoption of drip irrigation system

(n = 120)

Sr. No.	Constraints	MPS	Rank
1	Climatic and geographical constraints	81.73	I
2	Educational constraints	77.69	II
3	Miscellaneous constraints	77.08	III
4	Technical constraints	05.35	IV
5	Infrastructural constraints	73.05	V
6	Financial constraints	69.95	VI
7	General constraints	69.27	VII

* Mean Per cent Score

A critical examination of data given in table 4.5.9 revealed that among overall constraints, most of the vegetable growers faced the climatic and geographical constraints and assigned ranks first with 81.73 MPS regarding adoption of drip system of irrigation of vegetable growers. The educational constraints were perceived by 77.69 per cent vegetable growers and second rank was assigned. The miscellaneous constraints were perceived by 77.08 MPS and third rank was assigned. followed by technical constraints (75.35 MPS), Infrastructural constraints (73.05 MPS) and financial constraints (69.95 MPS) and fourth, fifth and sixth ranks were assigned them, respectively. The General constraints were least perceived by the vegetable growers (69.27 MPS), hence last seventh rank was accorded.

Further the vegetable growers had highest constraints faced in aspect of 'Climatic and geographical constraints. This might be so occurred due to unsuitable in the area where irrigation water is highly saline which causes choking emitters and high temperature reduce the durability of drip system of irrigation. General constraints were observed as least important.

The present findings are supported with Bunker (2011), Jiterwal (2007), Gauttam et al. (2014), Yadav *et al.* (2017), Gulkari et al. (2019), Dinakar and Singh (2020), Pratik and Vinaya (2021), Gajera et al. (2022), Kapadiya et al. (2022), Natwadia et al. (2022)

CONCLUSION

It was found that majority of vegetable growers (61.67%) had medium constraints and (20.00%) were having high constraints in adoption of drip system of irrigation.

POLICY IMPLICATION

Best on the finding of the study it can be recommended that there is vast scope of improve knowledge of vegetable growers TO minimizing their level of constraints about drip system of irrigation. Government should focused on training program, demonstration, campus, redio, TV and using other ICT tools at grass root level.

CONFLICT OF INTEREST

No conflict of interest among researchers

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