STUDY THE CONSTRAINS IN OPERATION OF DRIP IRRIGATION

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ABSTRACT

The study was conducted with an objective to evaluate the constraint in operation of drip irrigation for Farmers of Junagadh Taluka of Gujarat State. The questionnaire was divided in three parts as: socio - economic profile of the farmers, information on irrigation and crop and constraints in operation of drip irrigation. Thirteen possible constraints were identified and ranking was given to each constraint based on response of farmers for a particular constraint as most important, important, less important and not important by assigning score as 3, 2, 1 and 0, respectively. Results revealed that 74 per cent of farmers have education level of secondary school or less. 84 per cent of farmers were having less than 4 ha land. 64 per cent of farmers had annual income from agriculture more than 2 lakh. Problem of clogging of system due to salty/impure water was ranked most important constraint in operation of drip irrigation with a score of 133 followed by more maintenance require as compare to surface irrigation and damage to system due to rats and other animals with rank ii and iii with a score of 118 and 114. respectively.

KEY WORDS: drip irrigation, micro irrigation, operation, ranking, socio - personal profile

INTRODUCTION

The water use efficiency under conventional flood method of irrigation which is predominantly practiced in Indian agriculture is very low due to substantial conveyance and distribution losses. Micro irrigation systems, comprised of drip and sprinkler technologies, have proved to be an efficient method in saving water and increasing water use efficiency as compared to the conventional surface method of irrigation. Micro irrigation is promoted in India, by central and state government agencies. In Gujarat, since the inception of Gujarat Green Revolution Company (GGRC) from May 2005, till 31.12.2014, a total area of 1.03 Mha has been covered under Micro Irrigation System. Out of which, 0.49 Mha area has been covered under drip irrigation and 0.54 Mha under sprinkler irrigation (www.ggrc.co.in)

Narayanamoorthy (2005) stated that inadequate information about the operation, maintenance and usefulness of drip irrigation is one of the main reasons for its uneven spread across regions in India. Thamban *et al*. (2004) reported that clogging of emitter was the most important problem faced by the cultivators which secured the 1st rank in the operation and maintenance of drip irrigation system. Vidal (2001), Timbadia and Patel (2007), Senarathna and Pathmarajah (2007) and Bahire

et al. (2015) observed that lack of availability of technical know-how, lack of after care service, low quality equipment and spares etc. are some other constraints reported for operation of drip irrigation.

Despite the significant economic advantages and the intensive support of the government and NGOs, the current area under micro irrigation in India is very low as compared to its potential. Keeping in view the points mentioned above, a study was undertaken with an objective to study the socio-economic characteristics and constraints in operating of drip irrigation for farmers of Junagadh *Taluka* of Gujarat state.

MATERIALS AND METHODS

The present investigation was conducted in Junagadh *Taluka* of Gujarat state situated in the South Saurashtra agro-climatic zone between $20^0.30$`- 24^0N latitude and 69^0 - 72^0E longitude. The Taluka falls under semi-arid region with an average annual rainfall of 900 mm. Groundnut, cotton, wheat, pearl millet, sesame, pulses, castor, sugarcane and sorghum are the major field crops grown in the *Taluka*. The major horticultural crops are mango, sapota, banana, guava, pomegranate, ber, etc.

A comprehensive interview schedule was prepared considering the specific objectives formulated under study. The questionnaire was prepared by reviewing available literature and incorporating local condition.

The questionnaire was divided in three parts as below.

1.Socio -personal profile of the farmers
2.Information on irrigation and maintenance of drip irrigation system
3.Constraints in operation of drip irrigation

The information was collected from 50 farmers, who are presently adopting drip irrigation. The socio-personal profile of the farmers includes name of farmer, name of village, age, education, occupation, number of family members, land size (ha), annual income from farming, etc. Information on irrigation and maintenance of drip irrigation system was also collected.

Following 13 possible constrains were identified which are affecting adoption of drip irrigation. Which are problem of clogging of system due to salty/impure water, non availability of technical knowledge and information about operating drip irrigation for different crops, irrigation quantity by drip seems to be insufficient for crop growth, difficulties about timely availability of electricity, non-availability of skilled persons for repairing the system, not satisfying after sales service, problems in farm operations, laying and remove drip system is difficult/problematic, damage to system due to rats and other animals, more maintenance require as compare to surface irrigation, difficult to maintain the pressure, less availability of spare parts at local level, repairing is to be done more frequently.

The farmers were requested to indicate their perception about importance of each of the constraint on a four point continuum *viz*., most important, important, less important and not important with scores of 3, 2, 1 and 0, respectively. The items were rank ordered based on the total score obtained by individual items for all the respondents.

RESULTS AND DISCUSSION

Socio - Personal profile of the farmers

The socio - personal profile of farmers is given in Table 1.

Table 1 showed that the age of 40 per cent of the farmers were >50 years. It was observed that 22 per cent of adopters are graduates. Only 26 per

cent of adopters were depending on farming alone as their source of livelihood the remaining was engaged in other sources besides farming for income generation. Majority of the farmers (42 %) were having 2 – 4 ha of farm land. No farmer amongst the respondent was found to have land > 10 ha. Forty per cent of the adopters were member of any society or organization, whereas 64 per cent of adopters had annual income more than Rs. 2 lakhs.

Information on irrigation and maintenance of drip irrigation system

The information on area under irrigation was given in Table 2 and maintenance of drip irrigation in Table 3.

As per the information given by farmers, the average net land of 50 farmers was found to be 3.2 ha. Average data from adopter farmers showed 32 per cent increase in gross area under irrigation after adopting drip. Saving of water by drip irrigation enabled framers to use that water for *rabi* and summer season, which resulted in higher cropping intensity. Only 16 per cent farmers got training of drip irrigation, so there is a need to increase the efforts towards training the farmers who are adopting drip irrigation. So there is a need to expedite the efforts towards imparting the training to the farmers on drip Irrigation. It can be seen from Table 3 that majority (65 %) of farmers were cleaning the drip system once in two months and only four per cent of farmers were cleaning twice or more in a month. Majority (84 %) of farmers were using acid treatment for cleaning the drip system and only 16 per cent of farmers were using flushing for cleaning drip system. Majority (94%) of the farmers were using drip for fertigation using liquid fertilizer.

Constraints in operation of drip irrigation

The scoring perception of farmers over thirteen (13) identified constraints in operation of drip irrigation was given in Table 4. The constraints were ranked based on the total score as per Farmers' Perception was given in Table 5. Percentage of farmers indicating a particular constraint as most important was given in Table 6. Clogging of the drip irrigation system was the most important problem faced by the farmers, which secured I rank among the constraints operation of drip irrigation with a total score of 133. Seventy four per cent of farmers have scored it as most important constraint. The drip irrigation line/emitters or system is considered to be partially or fully blocked/clogged due to mineral, organic matter or scale from pipes when the emission rate through the emitters is reduced/stopped or there is non-uniformity of water distribution.

Emitter clogging continues to be the major problem associated with the drip irrigation operation. The causes for clogging, which is directly related to the quality of irrigation water may be physical, chemical or biological factors. Even though standard recommendations are available to prevent clogging, farmers were found unaware of these practices. Timbadia and Patel (2007) studied the problems in adoption and operation of drip irrigation system among farmers of Gujarat state and stated that among the problems those related to system were frequent clogging of drippers and lack of availability of technical know-how. The system requires proper filtration so that dust and other particles do not block the small emitter holes. Adding fertilizers to source water (fertigation) can potentially cause clogging of drip emitters due to

chemical interactions and high mineral concentrations, exceeding their solubility limit. So care should be taken while applying liquid fertilizer with irrigation. Acid injection, to reduce irrigation water pH, can prevent chemical clogging of drip emitters. As give in Table 3, since 65 per cent of farmers were cleaning/treating the system after duration of more than twice a month, the clogging problem has secured higher rank, system should be treated/cleaned more frequently to reduce clogging problem. The irrigation water should be tasted for biological, chemical and particles content of the irrigation water which plays major role in choosing appropriate prevention measures.

More Maintenance require as compared to surface irrigation was ranked II as per the farmers' perception with a score of 118 and 46 per cent of farmers indicating it as most important The constraint of damage to system due to rats and other animals ranked III with a score of 114 and 54 per cent of farmers have scored it most important.

Non availability of technical knowledge and information about operating drip irrigation for different crops has ranked IV among the constraints in operation of drip irrigation with a score of 108. It requires a good technical and management skills for setting up and upkeep of drip irrigation system. The trainings given to the farmers needs to focus on not only the technical aspects, but also on the managerial aspects like marketing and value chain fundamentals and institution formation to enable the farmers the best economic deal possible. Cropping pattern of the region with socio-person profile of the farmers must be kept in mind while training/demonstrating the framers.

The adopters of drip irrigation ranked non- satisfying after sales service as V with a score of 104. Narayanamoorthy (2005) reported that drip sets manufacturers should be asked to involve intensively in promoting drip irrigation by introducing frequent demonstration at farmers' field, active role of drip manufacturers' is essential in promoting drip irrigation as well as developing confidence among the farmers about the usefulness of this new technology. Other constraints in operation of drip irrigation ranked VI to XIII with a score of less than 100 and with 30 per cent or less farmers scored as most important. Laying and remove drip system is difficult/problematic, dismantling, storing and reinstalling their systems at the start, during and end of every rainy season was too difficult or time-consuming for them to continue. It can be noticed that 18 per cent of non adopter farmers and 30 per cent adopter farmers scored difficulties in maintaining pressure as most important. Twenty two per cent of farmers indicated the constraint irrigation quantity by drip seems to be insufficient for crop growth as most important. Difficulties about timely availability of electricity were found not important for the study area.

CONCLUSION

Problem of clogging of system due to salty/impure water was ranked most important constraint in operation of drip irrigation with a score of 133 followed by more maintenance require as compare to surface irrigation and damage to system due to rats and other animals with rank II and III with a score of 118 and 114, respectively. Repairing is to be done more frequently and difficulties about timely availability of electricity were least important constraints with a score of

66 and 58. Farmers' own attributes such as level of education, size of land etc. may also augment or complement the public extension services, as educated farmers are active information seekers and experimenters. There is a need to develop and recommend package of practices for drip irrigation for various crops considering agronomical aspect such as maintaining soil health and fertility, controlling weeds and avoiding diseases etc. Generalization in designing drip irrigation should be avoided by considering soil properties and other important parameters to increase its techno-economical feasibility. There is a need to conduct research and make the policy based on constrains faced in operation of micro irrigation by involving all the stakeholders including farmers, dealers, manufactures, extension workers.

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Table 1:- Socio-personal profile of farmers

Age			**Size of Family**		
Category	**Frequency**	**Per cent**	**Category**	**Frequency**	**Per cent**
<30 years	2	4	<5	24	48
30-40 years	11	22	5-10	22	44
40-50 years	17	34	>10	4	8
>50 years	20	40	**Total**	**50**	**100**
Total	50	100			
Occupation			**Land Size**		
Farming	13	26	Marginal (<1 ha)	7	14
Farming + Animal Husbandry	13	26	Small (1-2 ha)	14	28
Farming + Job	8	16	Semi medium (2-4 ha)	21	42
Farming + Business	16	32	Medium (4-10 ha)	8	16
Total	**50**	**100**	Large(>10ha)	0	0
			Total	**50**	**100**
Education level			**Annual Income from Farming in Rs.**		
Illiterate	7	14	<1,00,000	4	8
Primary	13	26	1,00,000-2,00,000	14	28
Secondary	17	34	2,00,000-4,00,000	21	42
Graduate	11	22	>4,00,000	11	22
Post Graduate	02	04	**Total**	**50**	**100**
Total	**50**	**100**			

Table 2 : Area under irrigation (Average of 50 farmers)

Net Land	3.2 ha			
Gross Land Under irrigation(ha)				
Before using Drip Irrigation	**Kharif**	**Rabi**	**Summer**	**Total**
	3.2	2.2	0.8	6.2
After using Drip Irrigation	3.2	3.2	1.8	8.2
Increase in area under irrigation due to drip % (Average of 50 farmers)	32			

Table 3 : Maintenance of drip irrigation

(i) Frequency of Cleaning/Treatments				
Frequency	Twice or more a month	At each month	Every two month	More than two month
% of farmers	4	8	23	65
(ii) Methods of treatment				
Method of treatment	Acid treatment		Chlorination	Flushing
% of farmers	84		0	16

Table 4 : Scoring of constraints in operation of drip irrigation

Sr. No	**Constraint**	**No. of Respondents**				**Total Score**
		Most Important	**Important**	**Less Important**	**Not Important**	
1	Problem of clogging of system due to salty/impure water	37	9	4	0	133
2	Non availability of technical knowledge and information about operating drip irrigation for different crops	19	22	7	2	108
3	Irrigation quantity by drip seems to be insufficient for crop growth	11	14	13	12	74
4	Difficulties about timely availability of electricity	6	12	16	16	58
5	Non availability of skilled persons for repairing the system	7	15	19	9	70
6	Laying and remove drip system is difficult/problematic	13	25	9	3	98
7	Problems in Farm Operations	15	18	15	2	96
8	Not satisfying After Sales Service	16	25	6	3	104
9	Damage to system due to rats and other animals	27	12	8	3	114
10	More Maintenance require as compare to Surface Irrigation	23	23	3	1	118
11	Difficult to maintain the pressure	15	22	10	3	99
12	Less availability of spare parts at local level	10	26	10	4	92
13	Repairing is to be done more frequently	6	14	20	10	66

7 = (3x3) + (4x2) + (5x1)

Table 5: Ranking of constraints in operation of drip irrigation

Constraint No	Constraint	Total Score	Rank
1	Problem of clogging of system due to salty/impure water	133	I
10	More Maintenance require as compare to Surface Irrigation	118	II
9	Damage to system due to rats and other animals	114	III
2	Non availability of technical knowledge and information about operating drip irrigation for different crops	108	IV
8	Not satisfying After Sales Service	104	V
11	Difficult to maintain the pressure	99	VI
6	Laying and remove drip system is difficult/problematic	98	VII
7	Problems in Farm Operations	96	VIII
12	Less availability of spare parts at local level	92	IX
3	Irrigation quantity by drip seems to be insufficient for crop growth	74	X
5	Non availability of skilled persons for repairing the system	70	XI
13	Repairing is to be done more frequently	66	XII
4	Difficulties about timely availability of electricity	58	XIII

Table 6 : Scoring as most important constraint in operation

Rank	Constraint	Percentage of Farmers
I	Problem of clogging of system due to salty/impure water	74
II	Damage to system due to rats and other animals	54
III	More Maintenance require as compare to Surface Irrigation	46
IV	Non availability of technical knowledge and information about operating drip irrigation for different crops	38
V	Not satisfying After Sales Service	32
VI	Problems in Farm Operations	30
VII	Difficult to maintain the pressure	30
VIII	Laying and remove drip system is difficult/problematic	26
IX	Irrigation quantity by drip seems to be insufficient for crop growth	22
X	Less availability of spare parts at local level	20
XI	Non availability of skilled persons for repairing the system	14
XII	Difficulties about timely availability of electricity	12
XIII	Repairing is to be done more frequently	12

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