Asian Journal of Advances in Agricultural Research

Volume 24, Issue 10, Page 53-59, 2024; Article no.AJAAR.125048
ISSN: 2456-8864

Assessment of Farmer's Attitude towards Drip and Traditional Irrigation System in Junagadh District, Gujarat

A. B. Parmar [a++*], C. R. Bharodia [a#], H. Y. Maheta [a#] and Kalpesh Kumar [a#]

[a] P. G. Institute of Agri-Business Management, Junagadh Agricultural University, Junagadh, Gujarat, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/ajaar/2024/v24i10556

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/125048

Original Research Article

Received: 15/08/2024
Accepted: 17/10/2024
Published: 23/10/2024

ABSTRACT

Cotton (*Gossypium herbaceum*) is a leading natural fiber crop that is cultivated for its soft, fluffy staple fiber. Drip irrigation is a method of irrigation wherein water is carried to the plant under low pressure, through small diameter plastic pipes and delivered at the root zone drop by drop through an emitting device. The research was conducted in Junagadh district, utilizing a multistage sampling technique. A total of 160 farmers comprising 80 drip irrigation user and 80 conventional irrigation system users were surveyed. Likert's scale with three point scale was used to analyse attitude towards the drip and traditional irrigation system by using 10 statements for each respondents. The farmers in the research area having positive attitudes toward the drip

---

[++] *Research Scholar;*
[#] *Assistant Professor;*
**Corresponding author: Email: abparmar1912@gmail.com;*

Cite as: *Parmar, A. B., C. R. Bharodia, H. Y. Maheta, and Kalpesh Kumar. 2024. "Assessment of Farmer's Attitude towards Drip and Traditional Irrigation System in Junagadh District, Gujarat". Asian Journal of Advances in Agricultural Research 24 (10):53-59. https://doi.org/10.9734/ajaar/2024/v24i10556.*

irrigationmethods as positive trend with value 66.25% was observed among drip respondents. This positive attitude reflects the behavioural intention towards the acceptance of irrigation systems. The study also revealed that 48.75% of the non-adopter farmers had the positive attitude toward the traditional irrigation methods whereas 51.25% of them had a negative and neutral attitude.

Keywords: Cotton (Gossypium herbaceum); farmer's attitude; drip irrigation system; traditional irrigation system; likert's scale.

1. INTRODUCTION

"In India, more than 80 per cent of the available water is used for irrigation. Irrigation is the controlled application of water through man-made system to meet the water requirements of agriculture. Irrigation is an artificial application of water to crop or plants, especially when an agricultural field does not get enough water through rains. Having perhaps the largest irrigated area in the world, India faces acute water scarcity. We need to adopt irrigation method that help in not only in saving freshwater, but also provide sufficient water to plants for growth. One such method now being followed in India is micro irrigation" [1]. "Micro-irrigation is used in farm as well as commercial greenhouses. It has proven successful in a commercial sense due to automation. Also, with piping and pressurized pumps, fertilizer can be added to the water. This automates the water inland feeding of plants and is hilly or sloped, micro-irrigation can be the answer in avoiding run-off. The cost of micro-irrigation would cost less than levelling the land for any type of farming and can help control erosion. On farm growing crops spaced closely together such as strawberries, micro-irrigation can help in more direct watering methods. For crops grown under cover, requiring more water, micro-irrigation can help control the flow" [2].

"Cotton, one of the most important commercial and fibre crops of global significance is called as the king of fibre, it is a multipurpose crop grown under various agro-climatic conditions" [3,4]."Cotton accounts for around 25 per cent of total global fibre production. It plays a notable role in the sustainable economy of India and livelihood of the Indian cotton farming community (5.8 million cotton farmers). Cotton is the most favoured fibre among the Indian textile mills, as a major raw material for the textile industry. In the raw material consumption of the Indian textile industry the proportion of cotton is around 60 per cent [5]. "According to India Brand Equity Foundation report on cotton industry and export [6], the Indian textile industry contributes around 5 per cent to country's Gross Domestic Product (GDP), 14 per cent to industrial production and 11 per cent to total export earnings. It is also the second largest employer in the country after agriculture, providing employment to over 51 million people directly and 68 million people indirectly including unskilled workers. Because of this social and economic significance, it is famously renounced as white gold" [7].

"As per the Cotton Corporation of India Limited, Statistics [7], world cotton production is estimated at 24.22 million metric tons, with the area of 32.04 million hectares. The major cotton growing countries in the world are India (12.96 million hectares), United States of America (3.52 million hectares), China (3.17 million hectares), Pakistan (2.19 million hectares), Brazil (1.52 million hectares) and Uzbekistan (1.03 million hectares)" [7]. "India has the highest cotton production and area, with 6.05 million metric tons and 12.96 million hectares accounting for 26 per cent and 41 per cent of global cotton production and area respectively. The cotton growing region in the country is classified in to 3 zone Northern zone comprises Punjab, Haryana and Rajasthan, Central zone comprises of Maharashtra, Madya Pradesh and Gujarat and Southern zones Comprises of Telangana, Andhra Pradesh, Karnataka and Tamil Nadu. Among them, the 3 major cotton producing states are Gujarat (22.79 lakh hectares), Maharashtra (42.86 lakh hectares) and Telangana (24.51 lakh hectares)" [7].

"Irrigation systems are meant to supplement crop water requirements and to support the farmers by drawing water from different water sources (rivers, reservoirs, canals, channels, lakes, and wells) and diverting to farms or fields" [8,9]."From pre-historic times in India, several cost-efficient and sustainable Traditional/indigenous Irrigation Systems (TIS) have been developed based on harnessing and collection of rainwater and utilization of surface and groundwater. From different Archaeological excavations, it is found that TIS are a part of Indian agriculture for at least 5000 years. These TIS are typically

designed for small-scale community applications, which are designed, constructed and managed by local farmers. However, only very limited TIS have remained as of today, which are under community ownership and at religious places" [10].

"In old time most of the farmers were using well, tube well, tank and canal for irrigating crops. There is lack of sufficient irrigation water. Due to limitation on availability and scarcity of irrigation water farmers adopted advance irrigation system. Drip irrigation is a method of irrigation wherein water is carried to the plant under low pressure, through small diameter plastic pipes and delivered at the root zone, drop by drop through an emitting device. This is based on the fundamental concept of irrigation only the root zone of the crop rather than the entire land surface, as done in the surface irrigation. It is most suitable for the crops which are shown at mind distance and find applicability in hard rock areas where groundwater is scare which helps in optimization use of the limited water resources. The drip irrigation system (DIS) has its advantages and limitations. Its advantages are in terms of savings of water over flow irrigation, effective use of fertilizer, less labour and energy cost. The limitation for adopting of this method is its high initial cost, which is beyond the purchasing capacity of small and marginal farmers and thus mainly adopted by large farmers" [11].

"In drip irrigation system, water is supplied to the crop drop by drop at very low rate from a system of small diameter plastic pipes fitted with outlets called emitters for drippers. It is also called as trickle irrigation. It does not wet the whole soil profile like surface or sprinkler method of irrigation, it only gets a part of soil in which roots grow. In other words, it delivers water and nutrients directly to the plant roots on in the right amount at the right time so that each plant can achieve its proper growth and development. Drip irrigation is 40% more efficient because it uses 40% less water than conventional method of irrigation. Usage of fertilizer can also be optimized this way" [12]. "Identification of farmers attitude towards any practices is very much important to decide the success of any technology" [13-16]. Due to different factors and perception of farmers towards drip irrigation, it has become inevitable to use drip irrigation practices in agriculture, especially in agriculture and horticultural crops to obtain higher yields of good quality products and to earn good revenue by the farmers[17-24].

2. METHODOLOGY

2.1 Data Source

The data used in this study were obtained from survey questionnaires and interviews among farmers of Junagadh district of Gujarat. A multi-stage random sampling method was used to select the samples during the actual survey. In the first stage of sampling, the Junagadh district was selected. In the second stage five talukas was selected. At the third stage, two villages from each taluka were selected. From each village 8 drip users and 8 drip non-users' farmers were selected. In this way total 160 farmers comprising 80 drip user and 80 drip non-users were selected for the study purpose.

2.2 Statistical Method

The Likert's scale technique was used to study the attitude of cotton grower towards drip and traditional irrigation system. Mean score and Standard Deviation was calculated for assigning the ranks [25].Rank was assign using the Likert's scale with three-divisions was used to classify the respondents of traditional and drip irrigation user [26]. Observations against the 10 statements were collected by using the questionnaire, consisting of positive and negative statements [27]. The attitude of each farmer is measured against the level of his agreement to each of the statement in the following categories: 1=agree, 2=natural, and 3= disagree [28].

3. RESULTS AND DISCUSSION

3.1 Farmer's Attitude Towards Drip Irrigation Method

Table 1 the farmer's attitude toward use of drip irrigation method. The positive statements such as: "Can save time, effort and energy?" (Mean 201; SD 0.865); "Does not require trained labour?" (Mean 2.075; SD 0.791); "Can cause difficulty in the application of fertilizers and pesticides?" (Mean 2.0375; SD 0.8335); and "By applying the irrigation method, light and frequent irrigations can be made efficiently" (Mean 2.025; SD 0.8855); were ranked from the first to the fourth order to indicate the farmers' attitude toward drip irrigation methods with a mean more than 2.0 for each statement. With the mean 1.63; SD 0.799, the statement "Can cause wastage of water as the farmer has no control over the amount of water to be applied to the crops?" received the lowest rank. The 2nd lowest means

1.812; SD 0.791 was observed for the statement "Economical". The statement "Can manage the irrigation system automatically?" received the 3rd lowest mean 1.83; SD 0.802.

3.2 Farmer's Attitude towards Traditional Irrigation System

Table 2 the farmer's attitude towards traditional irrigation method. The statement "Can involve high initial cost?" with the highest mean 1.8875 and SD 0.8713 got the highest rank from the perspective of farmers toward the traditional irrigation methods. The statement "Can deliver water to all parts of the field uniformly and efficiently?" achieved the 2nd highest mean 1.85 and SD 0.7647. The statement "Can cause wastage of water as the farmer has no control over the amount of water to be applied to the crops?" with the mean 1.8375 and SD 0.8485 remained with the 3rd highest rank, and the statement "Can manage the irrigation system automatically?" attains the fourth position with the mean of 1.825 and SD 0.7919. With the mean 1.6625 and SD 0.8259, the lowest rank was observed for the statement "Can cause difficulty in the application of fertilizers and pesticides?". Whereas the 2nd lowest means 1.7 and SD 0.8018 was attached to the statement "Easy to implement". The statement "Easy to use farm machinery" received the 3rd lowest rank with mean 1.7375 and SD 07914. These statements were ranked at the bottom, being with the lowest means, indicating the farmers' attitude toward traditional irrigation methods with an arithmetic mean less than 1.75.

3.3 Distribution of Farmers Regarding Their Attitudes Based on the Numeric Values

The distribution of farmers on the basis of the numeric values that represent the attitudes toward traditional and drip irrigation methods is presented in Table 3. Here 10 statements have been used to determine the attitudes of farmers by employing 3-point Likert scale, whereas 10×1=10 indicates the minimum and 10×3=30 is the maximum score to indicate the attitude. Similarly, 30–10=20 is the range we do have to express attitude. To indicate the level of acceptance for a particular irrigation system we used three categories like negative, neutral, and positive [27]. The numeric values to indicate their neutral attitudes toward both the irrigation methods range between 40 degrees and less than 60 degrees. And negativeattitudes toward both the irrigation methods range between 0 to 40 degrees. The third category includes the farmers with positive trends. 48.75% farmers showed the positive attitudes toward traditional irrigation methods whereas 66.25% farmers were found with positive attitudes toward drip irrigation methods [29]. The study identifies a significant portion of the experimental population

Table 1. Farmer's attitude towards the drip irrigation system (n=80)

Statement	Drip Irrigation System		
	Mean	Standard Deviation	Rank
Does not require trained labour?	2.075	0.791969185	2
Easy to implement	1.8875	0.856749081	7
Can involve high initial cost?	1.9	0.805047369	6
Can cause difficulty in the application of fertilizers and pesticides?	2.0375	0.833533731	3
Easy to use farm machinery	1.825	0.791969185	9
By applying the irrigation method, light and frequent irrigations can be made efficiently	2.025	0.885537811	4
Can deliver water to all parts of the field uniformly and efficiently?	1.9625	0.877911071	5
Can manage the irrigation system automatically?	1.8375	0.802586799	8
Can save time, effort and energy?	2.1	0.865659915	1
Can cause wastage of water as the farmer has no control over the amount of water to be applied to the crops?	1.6375	0.799426218	10

Table 2. Farmer's attitude toward use of traditional irrigation method (n=80)

Statement	Drip Irrigation System		
	Mean	Standard Deviation	Rank
Does not require trained labour?	1.7875	0.806520107	6
Easy to implement	1.7	0.801896486	9
Can involve high initial cost?	1.8875	0.871398556	1
Can cause difficulty in the application of fertilizers and pesticides?	1.6625	0.825905717	10
Easy to use farm machinery	1.775	0.795159406	7
By applying the irrigation method, light and frequent irrigations can be made efficiently	1.7375	0.791469551	8
Can deliver water to all parts of the field uniformly and efficiently?	1.85	0.764728793	2
Can manage the irrigation system automatically?	1.825	0.791969185	4
Can save time, effort and energy?	1.8125	0.843347009	5
Can cause wastage of water as the farmer has no control over the amount of water to be applied to the crops?	1.8375	0.848584078	3

Table 3. Distribution of farmers according to the numeric value for their attitudes toward drip irrigation and traditional irrigation methods

Numeric value for the Drip and Traditional irrigation methods	Drip Irrigation System		Traditional Irrigation System	
	No.	%	No.	%
Negative trend	8	10	17	21.25
Neutral trend	19	23.75	24	30
Positive trend	53	66.25	39	48.75
Total	**80**	**100**	**80**	**100**

(respondents) with positive attitudes toward irrigation methods [30]. Positive attitudes were expressed with the numeric value 60 degrees or more as revealed in the Table 3 [31].

4. CONCLUSION

The positive attitude of farmers toward technology proved its success. The concept of drip irrigation technology is gaining attraction or becoming familiar to cotton farmers of Junagadh district with majority 66.25 % of the total respondent farmers were having positive attitudestoward drip irrigation methods, but still one third respondents have negative attitude. While for the conventional irrigation system farmers have neutral to negative trend. Based on the results, agriculture extension professional should focus on training programs for the farmers to mitigate the negative attitudes and modify the neutral attitudes toward the drip irrigation methods.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

ACKNOWLEDGEMENTS

The authors extend their sincere gratitude to the dedicated team members who conducted the field survey. Their hard work and commitment were instrumental in gathering the necessary data. Additionally, we are deeply appreciative of the farmers who generously took time out of their busy schedules to engage with the survey team and share their valuable insights and information. We would also like to clarify that the funding agency had no involvement in the design of the study, the collection, analysis, or interpretation of the data, nor in the writing of this manuscript.

COMPETING INTERESTS

Authors have declared that they have no known competing financial interests or non-financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

1. Anonymous. Introduction to Micro Irrigation System;2019a
   Available:https://ncert.nic.in
   Accessed on April 5, 2024.
2. Anonymous. Introduction to Micro-Irrigation; 2019b.
   Available:http://ecoursesonline.iasri.res.in/
   Accessed on April 5, 2024.
3. Reddy PS, Kumari RV, Baba MM, Chary D. S.Economic analysis of Bt cotton cultivation in Warangal District of Telangana State. Multilogic in Science. 2020;10(35):1122–1127.
4. Prajapati GV, Subbaiah R, Vithlani NS, Maheta HY, Makwana JJ, Patel PV. Conjunctive stimulus of irrigation regimes frequency and mulching on Bt cotton. Innovative Farming. 2018;3(2): 51–54.
5. Ministry of Textiles. Annual Report. 2020-21.
   Available:https://texmin.nic.in/documents/annual-report
   Accessed on April 10, 2024.
6. India Brand Equity Foundation. Cotton Industry and export; 2021.
   Available:https://www.ibef.org/exports/cotton-industry-india
   Accessed on April 10, 2024.
   Available:https://www.ibef.org/exports/cotton-industry-india
   Accessed on April 10, 2024.
7. The Cotton Corporation of India Limited. Current Cotton Scenario; 2021.
   Available:https://www.cotcorp.org.in/current_cotton.aspx
   Accessed on April 10, 2024.
8. Adamala S, Raghuwanshi NS, Mishra A. Development of surface irrigation systems design and evaluation software (SIDES). Computers and Electronics in Agriculture. 2014;100:100–109.
   Available:https://doi.org/10.1016/j.compag.2013.11.004
9. Rohit BR, Maheta HY, Khorajiya MH, Chaudhari VP. Current status, potential and economics of micro irrigation system in Sabarkantha district of Gujarat. Trends in Biosciences. 2015;8(9): 2446–2454.
10. BrebbiaCA, Marinov AM, Bjornlund H. Sustainable irrigation management, technologies and policies III. WIT Transactions on Ecology and the Environment. 2010;134:251.
11. Anonymous. Concept of Drip Irrigation System;2019c.
    Available:http://skunkmagazine.com/a-brief-history-of-drip-irrigation/
    Accessed on April 5, 2024.
12. Smith RJ, Uddin M, Gillies MH, Clurey PM. Evaluating the performance of automated bay irrigation. Irrigation Science. 2016;34(1):175–185.
13. Wu IP, Gitlin HM. Drip irrigation application efficiency and schedules. Transactions of the ASAE. 1983;26(1):92–99.
14. Vavilala P, Singh V, Singh D, Singh L. Attitude of the staff towardsfarmer producers organization: Development and standardization of the scale. Indian Journal of Extension Education. 2024;60(1):116–119.
15. Gupta SK, Nain MS, Singh R, Mishra JR. Development of scale to measure agripreneurs' attitude towards entrepreneurial climate. Indian Journal of Extension Education. 2022;58(2):153–157.
16. Kumar A, Bareth LS, Ghaswa R, Yadav J. P. Attitude of farmers towards groundnut cultivation in Bikaner district of Rajasthan. Indian Journal of Extension Education. 2021;58(1):157–160.
17. Meena MS, Singh KM. Impact of self-help groups on attitudes of members. Indian Journal of Agricultural Sciences. 2013;83(9):971–976.
18. Berbel J, Gutierrez-Marín C, Expósito A. Impacts of irrigation efficiency improvement on water use, water consumption, and response to water price at field level. Agricultural Water Management. 2018;203:423–429.
19. Sathish KM, Maheta HY, Kalpesh Kumar, Bharodia CR, Srinivas M. Factors affecting the adoption of water-soluble fertilizers by banana growers in Trichy district, Tamil Nadu. International Journal of Agriculture Sciences. 2019;11(12):8645–8646.
20. Sathish KM, Maheta HY, Lad YA, Mahera, AB. Factors influencing banana growers to purchase water-soluble fertilizers in Trichy district, Tamil Nadu. British Journal of Marketing Studies. 2022;10(4):55–63.
21. Pithiya KN, Maheta HY, Kalpesh Kumar, Bharodia CR. Bridging the gap: Factors influencing farmers' willingness and behaviour in biopesticide application. Journal of Agriculture and Ecology Research International. 2024;25(5):1–6.
22. Oganja YH, Maheta HY, Kalpesh Kumar, Bharodia CR. Factors influencing farmers'

purchase intention toward insecticides of Rajkot district, India. Archives of Current Research International. 2024;24(8):67–74.
23. Kumar N, Maheta HY, Kumar K, Bharodia, CR. Perception towards plant growth regulators among vegetable growers in Junagadh District of Gujarat, India. Asian Journal of Advanced Agricultural Research. 2024;24(8):93–101.
24. Kumar N, Maheta HY, Kumar K, Bharodia, CR. Discriminant analysis of plant growth regulators among vegetable growers in Junagadh District of Gujarat, India. Asian Research Journal of Agriculture. 2024;17(4):88–99.
25. Shelar R, Singh AK, Maji S. A measurement tool for the assessment of farmers' perception about the impact of changing climate on agriculture in India. Indian Research Journal of Extension Education. 2022;22(1):123–127.
26. Shathyapriya E, Naveenkumar MR, Dhivya V. An empirical Study on Drip Irrigation; 2017.
27. Chovatia JV, KalsariyaBN, Kanani NK. Scale development for measuring the attitude of cotton growers towards drip irrigation system. Gujarat Journal of Extension Education. 2017;28(2):245–247.
28. Al-Zaidi AA, Baig MB, Elhag EA, Al-Juhani MBA. Farmer's attitude towards traditional and drip irrigation methods in Tabuk region – Kingdom of Saudi Arabia. Springer. 2014;10(8):109–122.
29. Chovatia JV, KalsariyaBN, Odedra RK. Attitude of cotton growers towards drip irrigation system of Saurashtra region. In Proceedings of National Seminar;2018.
30. Singh DV, Sinha N. Knowledge and attitude of farmers towards sprinkler irrigation system in Raikia block in Kandhamal district of Odisha. International Journal for Current Microbiology and Applied Sciences. 2018;6(4):370–374.
31. Boora S, Kaur B, Tyagi R. Attitude of farmers toward intercropping in Haryana. Indian Journal of Extension Education. 2022;58(4):91–95.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/125048