Asian Journal of Agricultural Extension, Economics & Sociology

Volume 42, Issue 11, Page 1-8, 2024; Article no.AJAEES.124619
ISSN: 2320-7027

Impact Caused by the Drip Irrigation System among Onion Growing Farmers in Coimbatore District of Tamil Nadu, India

Asokhan, M [a++], A. Abinaya [a#] and T.N. Sujeetha [a†*]

[a] Department of Agricultural Extension and Rural Sociology, Tamil Nadu Agricultural University, 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/ajaees/2024/v42i112586

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/124619

Original Research Article

Received: 04/08/2024
Accepted: 07/10/2024
Published: 10/10/2024

ABSTRACT

Drip irrigation significantly reduces water consumption, optimizes water-energy relationships, and enhances crop growth by minimizing soil evaporation and deep percolation. It enhances the efficiency of water usage and also the crop's yield, making it a sustainable solution for agriculture, especially in arid areas. Drip irrigation in onion cultivation enhances water use efficiency, reduces fertilizer costs, and minimizes disease risk. This study investigates the impact caused by the drip irrigation system for the onion growing farmers. The research was conducted in Thondamuthur block in Coimbatore district. Total of 119 onion-growing farmers were selected for the research

[++] Professor;
[#] M.Sc (Agricultural Extension);
[†] Post Doctoral Fellow;
**Corresponding author: E-mail: jenithawalking087@gmail.com;*

Cite as: *M, Asokhan, A. Abinaya, and T.N. Sujeetha. 2024. "Impact Caused by the Drip Irrigation System Among Onion Growing Farmers in Coimbatore District of Tamil Nadu, India". Asian Journal of Agricultural Extension, Economics & Sociology 42 (11):1-8. https://doi.org/10.9734/ajaees/2024/v42i112586.*

study. Findings reveal most (77.31%) of the onion-growing farmers had a moderate level of impact caused by drip irrigation. Concerning the category-wise impact caused by drip irrigation among onion-growing farmers, the majority (84.90%) of the onion-growing farmers were capable of fulfilling their needs, followed by 45.38 percent of the respondents had increased respect in their village, most (96.60%) of the farmers reported that usage of water has dropped after the adoption of the drip irrigation, cent percent of the onion growing farmers reported that vigorous growth of weeds was suppressed after adopting drip irrigation, all the respondents reported that usage of labor was reduced in applying fertilizers, majority (93.30%) of the onion growing farmers felt that the produce obtained was of high quality and with reference to the general factors, majority (98.30%) of the respondents felt that the crop matured early. This paper would throw light on the impact caused by the drip irrigation system among the respondents, which could be utilized for further strengthening the drip irrigation system in onion cultivation.

Keywords: Drip irrigation; onion; impact; drip irrigation; herbage yield.

1. INTRODUCTION

Drip irrigation system is the propelled strategy to natural loss of water source like drought, underground water depletion etc., This technique is increasing visibility in the zone where water is at alarm and high esteem crops are created [1]. Drip irrigation is an efficient and viable technique for providing water directly to the root zone of plant. Hence, drip irrigation system is considered as one of the fastest growing advances in present day water system horticulture. (Yang et al. 2023).

Drip irrigation has become localised water delivery method as water is pumped directly to the root area of the crop deliberately and continuously. The efficiency in reducing water consumption in a distinct venue with low pressure results in reduced water demands as contradictory to the technique of flooding and other surface irrigation techniques [2]. Drip irrigation method provides several unique agronomic, agro-technical and cost-effective benefits, like those of reduced water usage, improved plant development and productivity, reduced salinity threats, sustained fertilizer and chemical usage, suppressed weed growth, power consumption, better cultural improvements etc [3].

Even though, several theoretical concepts and indices have been developed to measure and assess the impact caused by the drip-irrigation system among the respondents, very few studies have been taken up on the impact caused by the drip irrigation system among onion growing farmers. With this background, this paper deals with the main objective on the attitude of onion growers towards drip irrigation system.

2. REVIEW OF LITERATURE

Rathakrishnan and Padma [4] observed that respondents got increased income due to adoption of drip irrigation technology which is due to less cost of cultivation, reduced labour requirement and less weed infestation.

Tagar et al. [5] reported that drip irrigation method saved more than half (56.40%) water and gave 22.00 per cent more productivity in comparison with that of furrow irrigation method in onion crop.

Behera et al. [6] found that fertigation produced maximum herbage yield of 32.00 t/ha and oil yield of 236 kg /ha, which was 16.00 percent and 17.00 percent more than flood irrigation respectively.

Pawar et al. [7] found that drip fertigation showed 41.80 percent increase in yield against conventional method of irrigation in onion crop.

Singh et al. [8] suggested that micro irrigation technology adoption had resulted in reduction in water application and improvement in crop yield varied from crop to crop. On an average, the net returns from micro-irrigation plots were higher than that of plots irrigated by conventional method.

Chandran and Surendran [1] observed that more than 50.00 percent yield increased through drip fertigation, compared to conventional irrigation methods.

Qureshi et al. [9] reported that 26.00 percent increase in yield with drip irrigation over the furrow irrigation method in the sunflower crop.

Shantaram [10] indicated that more than two-thirds (68.33%) of the drip using farmers possessed socio-economic impact at medium category, whereas 16.66 per cent possessed higher level of impact. However, less than one-fifth (15.00%) of the drip using farmers possessed lower level of socio-economic impact towards drip irrigation system.

Report [11] revealed that the proportion of total irrigated areas among the beneficiary farmers had increased by more than one-tenth (10.80%) after adopting the micro irrigation systems. Such an increase in total irrigated area was due to the adoption of micro irrigation systems for enabling cultivating on the rain-fed and marginal/uncultivable lands.

Harinathareddy and Chennareddy [12] revealed that the Andhra Pradesh Micro irrigation Project has so far brought more than 9.75 lakh ha of area under micro irrigation.

3. MATERIALS AND METHODS

This research was carried out in Thondamuthur block belonging to the Coimbatore district of

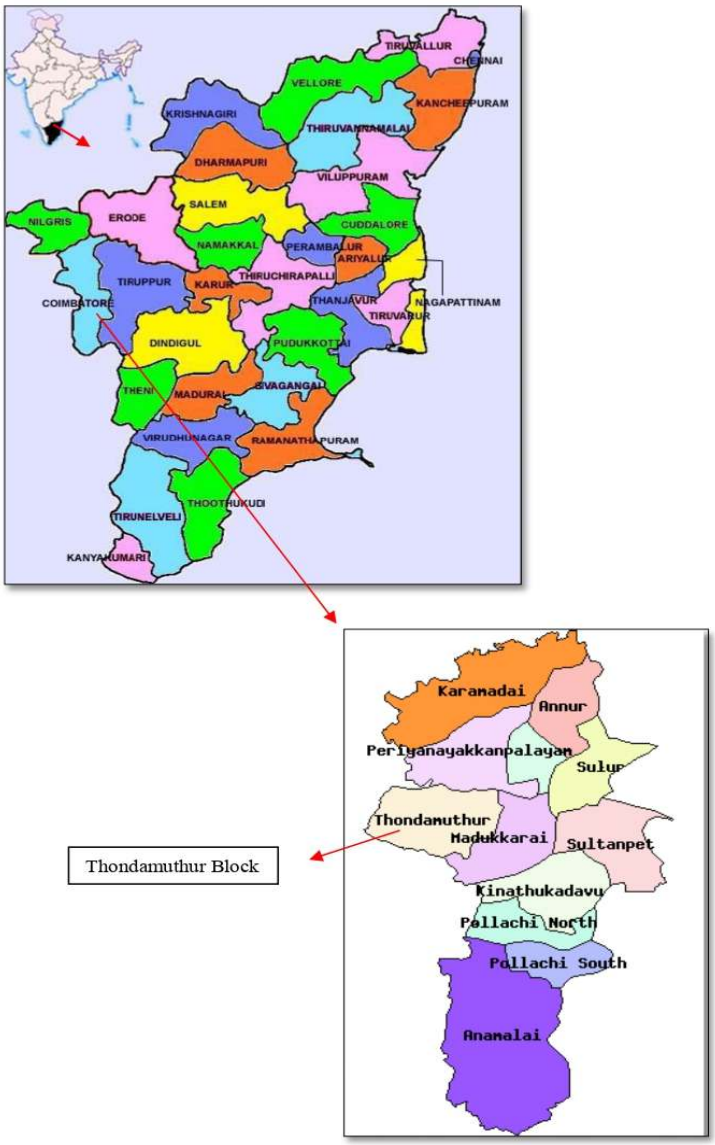

Fig. 1. Map showing the study area (Coimbatore)

Tamil Nadu (Fig. 1). Coimbatore holds the first rank in the context of small onion productivity. in Tamil Nadu. Thondamuthur block was selected purposively as it ranks first in small Onion productivity in Coimbatore district also, Thondamuthur block has maximum drip irrigation system adoption due to high ground water depletion. The data were collected from the respondents belonging to the five selected villages belonging to the block, with highest onion production viz., Ikkarai Boluvampatti, Vellimalaipattinam, Devarayapuram, Narasipuram and Pooluvampatti. Ex-post facto research design was used as the research design in this study. According to Kerlinger [13], ex post facto research is a research design that studies how an independent variable affects a dependent variable when the independent variable has already occurred. Total of 119 onion growing farmers using drip irrigation in the selected block were selected as the sample for the study employing the Proportionate Random Sampling. Simple percentage analysis and cumulative frequency method were the statistical tools used for the study [14-17].

In this study, the resultant changes occurred among drip farmers cultivating small onion, as a result of adoption of drip irrigation system have been taken into account as impact of drip irrigation system. The scoring procedure was developed for the study by the author. To achieve the overall impact of an onion farmer who has adopted drip irrigation system, the score generated from each aspect was summed up. The respondents were divided into three groups' viz., low, medium and high using mean and standard deviation.

4. RESULTS AND DISCUSSION

4.1 Overall Impact Caused by the Drip Irrigation among onion Growing Farmers

The data on the overall impact caused by the drip irrigation among onion growing farmers were collected, analyzed and classified into three categories, viz., low, medium and high using percentage analysis and cumulative frequency that are presented in Table 1.

From the Table 1, it is evident that the selected farmers had only a moderate level (77.31%) impact caused by the drip irrigation. Around 11.77 percent of the respondents had high impact caused by drip irrigation.

It could be concluded from the above result that the respondents had medium level (77.31%) impact caused by drip irrigation. This might be due to the fact that the selected respondents would have been more satisfied by the output that they received from drip irrigation ie, reduced water usage and labour.

4.2 Aspect Wise Impact Caused by Drip Irrigation among Onion Growing Farmers

Aspect-wise impact caused by drip irrigation among selected respondents were further studied under nine aspects i.e., change in self-sufficiency, change in social status, conserved water usage, save in fertilizer and plant protection usage, save in weed control usage, save in labour utilization, increase in crop production and quality produce, general factors.

4.2.1 Change in self-sufficiency after adopting drip irrigation

The data collected in this category were analyzed using the percentage analysis and are presented in Table 2.

It is inferred from Table 2 that majority (84.90%) of the respondents were able to fulfil their felt needs followed by 56.30 per cent of the respondents had sufficient money to feed their family and 45.40 per cent of the respondents felt that there was no need to borrow money. Also, less than one-tenth (9.20%) of the respondents were able to maintain a high standard of life.

This might be due to the likely reason that the farmers had a medium level of economic motivation. It could also be due to the reason that majority of the farmers still consider farming as a livelihood occupation and don't consider it as a profit-making road.

4.2.2 Change in social status after adopting drip irrigation

The data collected were analysed using the percentage analysis and are presented on Table 3.

It is understood from Table 3, the respondents (45.38%) had increased respect in their village followed by 36.13 per cent of the respondents had increased involvement in village level politics. Also, 11.76 per cent of the respondents felt that they were able to compromise a quarrel and 10.08 per cent of the respondents had more invitation from village people for social.

Table 1. Distribution of respondents according to the overall impact caused by the drip irrigation among onion-growing farmers (n=119)

S. No	Levels	No	% Reduced use of weed control chemicals.
1	Low-level impact	13	10.92
2	Medium level impact	92	77.31
3	High-level impact	14	11.77
Total		**119**	**100.00**

Table 2. Change in self -sufficiency (n=119)*

S. No	Change in self -sufficiency	No	%
1.	Felt Needs are met	101	84.90
2.	Need was not for borrowing money	54	45.40
3.	Sufficient money is enough to feed family	67	56.30
4.	High standard of living can be achieved	11	9.20

**Multiple responses*

Table 3. Change in social status (n=119)*

S. No	Change in social status	No	%
1	Increased respect among village people	54	45.38
2	More invitation from village people for social functions	12	10.08
3	People give more importance to their presence in times of quarrel	14	11.76
4	Increased involvement in village level politics	43	36.13

**Multiple responses*

Table 4. Distribution of respondents according to their conserved water usage (n=119)*

S. No	Conserved water usage	No	%
1	An expanded area has been successfully irrigated	50	42.01
2	Reduced usage of water	115	96.64

**Multiple responses*

Table 5. Reduction in fertilizer usage, plant protection and weed control (n=119)*

S. No	Reduction in fertilizer usage, plant protection and weed control	No	%
1	Reduced application of fertilizers	27	22.69
2	Minimized application of chemicals used for plant protection.	26	21.85
3	Prevent the growth of weeds	119	100.00
4	Reduced use of chemicals that control weeds	118	99.16

**Multiple responses*

Table 6. Save in labour usage (n=119)*

S. No	Save in labour usage	No	%
1	Efficient usage of labour in inter-cultivation.	102	85.71
2	Efficient usage of labour in application of fertilizers	119	100.00
3	Efficient usage of labour in controlling weeds.	109	91.60
4	Efficient usage of labour in irrigation practices	106	89.08
5	Efficient usage of labour in applying chemicals for plant protection.	115	96.64

**Multiple responses*

Table 7. Enhanced crop production (n=119)*

S. No	Enhanced crop production	No	%
1	Crop production has been significantly boosted	97	81.50
2	Availability of the finest quality produce	111	93.30

Multiple responses

Table 8. Changes in general factors (n=119)*

S. No	Changes in general factors	No	%
1	There is no danger of leaf burn in plant due to saline water	35	29.40
2	Reduced disease incidence in the field	87	73.11
3	Early maturity of crop	117	98.30

Multiple responses

This might be due to the reason that most of the farmers in those villages had adopted drip irrigation system and been using it for a longer duration. Hence the social status had very little role to play with the farmers who have been using drip irrigation system.

4.2.3 Conserved water usage after adopting of drip irrigation

The data collected were analyzed using the percentage analysis and are presented in Table 4.

Table 4, revealed that 96.64 percent of the selected respondents reported reduce usage of water while 42.01 percent of the onion growing farmers had reported that an expanded area has also been successfully irrigated after adopting drip irrigation. This might be due to that the irrigation water is pumped through a closed tube which is multi-functional that leads to the saving of water tremendously.

4.2.4 Reduction in usage of fertilizer, protection of plants and control of weeds after adopting of drip irrigation

The data collected were analyzed using the percentage analysis and are presented in Table 5.

From the Table 5, it is evident that all the selected respondents reported that vigorous growth of weeds was controlled while 99.16 percent of the selected respondents reported that the application of chemicals that control weeds has also been reduced after adopting the drip irrigation.

Also, more than two-fifths (22.69%) of the selected respondents perceived that the amount of fertilizer application has also been drastically reduced and 21.85 per cent of the respondents perceived that the plant protection chemicals usage was also drastically reduced after the adoption of drip irrigation. As the water is being discharged at particular nozzles present in the drip pipe, water cannot ooze out from other parts of the drip pipe. When weeds get controlled, the utilization of synthetic concoctions to control weeds are also decreased, which lessens the cost of cultivation in onion farming.

4.2.5 Reduced labour utilization after adopting drip irrigation

The data collected were analyzed using the percentage analysis and are presented in Table 6.

From the Table 6, it is evident that all the respondents reported that the usage of labor was enormously reduced in the application of fertilizers. Most of the selected respondents perceived reduced usage of labor for the application of plant protection chemicals and in the practices involving in the control of weeds (91.60%). This is because in surface irrigation, two labours are required for every irrigation while in the drip irrigation, one labour is sufficient to execute the motor for the irrigation likewise, tillage activities that demands more labour were also drastically reduced because of drip irrigation.

4.2.6 Enhanced crop production

The data were collected and analyzed using the percentage analysis and are presented in Table 7.

From the Table 7, a vast majority (93.30%) of the selected respondents perceived that the finest

quality of the produce was attained while 81.50 percent of the selected respondents perceived that the crop production has been significantly boosted due to the adoption of drip irrigation. It might be due to that the adoption of drip irrigation will enhance efficiency of water usage and input usage which also aids in improving the quality of the produce which in turn reduces the growth of weeds, pests and diseases in onion crop.

4.2.7 General factors

The data were collected and analysed using the percentage analysis and presented on Table 8.

From the Table 8, it could be inferred that majority (98.30%) of the respondents reported that the crop matured early followed by 40.30 percent of the selected respondents who felt that disease incidence in field have been reduced after using drip irrigation system and 29.40 percent of the respondents felt that there is no danger of leaf burn due to saline water.

It could be because the usage of drip irrigation has reduced the disease incidence as controlled levels of fungicides are only permitted through the drip irrigation system (fertigation). Also as onion is a water-sensitive crop the water has been provided as and when required at an adequate level, hence as opposed to rotting as in surface irrigation methods, it might achieve early maturity.

5. CONCLUSION

Drip irrigation significantly benefits onion growers by enhancing yield, water efficiency, and crop quality. It can increase onion yields by up to 30% and reduce water usage by 30-50%, making it ideal for water-scarce regions. The system also improves bulb quality and size, leading to higher market value. Additionally, it reduces foliar diseases by keeping leaves dry. Despite high initial costs and the need for proper management, drip irrigation offers a sustainable and efficient solution for onion cultivation. The analysis on impact caused by the drip irrigation among onion growing farmers would throw light on extent of positivity possessed by onion farmers towards drip irrigation system which could be utilized for further strengthening of impact of drip irrigation system.

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 the writing or editing of manuscripts.

ACKNOWLEDGEMENTS

We would like to express our gratitude to the officials and respondents in the study area for their enormous help in data collection.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Chandran KM, Surendran U. Effect on crop yield and perceptions of farmers on drip fertigation: Study From Kerala State, India. International Journal of Scientific Research. 2015;4(10):456-458.
2. Mahesh BT. Impact of Andhra Pradesh Micro Irrigation Project (Apmip) In Chittoor District of Andhra Pradesh. Acharya NG Ranga Agricultural University; 2016.
3. Bansal G, Mahajan A, Verma A, Singh DB. A review on materialistic approach to drip irrigation system. Mater. Today: Proc. 2021;46:10712–10717.
4. Rathakrishnan T, Padma SR. Drip irrigation- A water wise approach. Journal of Extension Education. 2012;3:4875-4879.
5. Tagar A, Chandio FA, Mari IA, Wagan B. Comparative Study of drip and furrow irrigation methods at farmer's field in Umarkot. World Academy of Science, Engineering and Technology. 2012;69:863-867.
6. Behera M, Verma O, Mahapatra P, Singandhupe R, Kumar A. Effect of irrigation and fertility levels on yield, quality and economics of Japanese mint (*Mentha arvensis*) under drip irrigation system." Indian Journal of Agronomy. 2013;58(1):109-113.
7. Pawar D, Dingre S, Surve U. Growth, yield and water use in sugarcane (*Saccharum officinarum*) under drip fertigation. Indian Journal of Agronomy. 2013;58(3):396-401.
8. Singh N, Dangi K, Bairwa R, Samota SD. Future prospects of drip irrigation system. Ind. J. Extn. Educ. & RD. 2013;21:93-96.
9. Qureshi AL, Ali MG, Mahessar AA, Memon NA, Abdul GS, MAH. Effect of drip and furrow irrigation systems on sunflower

yield and water use efficiency in dry area of Pakistan. American-Eurasian Journal of Agriculture and Environmental Sciences. 2015;15(10):1947-1952.
10. Shantaram BD. Impact of drip irrigation on socio-economic development of the farmers. Mahatma Phule Krishi Vidyapeeth, Rahuri; 2014.
11. Report PC. Evaluation study on integrated scheme of micro – Irrigation. In Programme Evaluation Organization: Planning Commission, GOI; 2014.
12. Harinathareddy CB, Chennareddy D. Impact of Andhra Pradesh micro irrigation project on the farm returns of selected farmers. Indian Journal of Applied Research. 2015;5(5):19-22.
13. Kerlinger FN. Foundations of behavioral research. Holt, Rinehart and Winston: New York; 1966.
14. Chandrakanth M, Priyanka C, Mamatha P, Patil KK. Economic benefits from micro irrigation for dry land crops in Karnataka. Indian Journal of Agricultural Economics. 2013;68(902-2016-66842):326.
15. Singh K. Rational pricing of water as an instrument of improving water use efficiency in the agricultural sector: a case study in Gujarat, India." Water Resources Development. 2007;23(4):679-690.
16. Singh N. Problems and prospects of drip irrigation system in Southern Rajasthan. Department of Extension Education, Rajasthan College of Agriculture: Udaipur; 2010.
17. Suganthkumar P. Impact of climate change among rice growers of Thanjavur District Towards Livelihood and Food Security. Unpub. M.Sc. (Ag) Thesis, AC&RI, TNAU; 2018.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/124619