Impact of Drip Irrigation among the Onion Growers in Tamil Nadu, India

ABSTRACT

Drip irrigation significantly reduces water consumption, optimizes water-energy relationships, and enhances crop growth by minimizing soil evaporation and deep percolation. It improves water use efficiency and crop yield, making it a sustainable solution for agriculture, especially in arid regions. Drip irrigation in onion cultivation enhances water use efficiency, reduces fertilizer costs, and minimizes disease risk. This study investigates theimpact of drip irrigation among the Onion growers. The survey was conducted to collect primary data from 119 cotton growing farmers in Thondamuthur block of Coimbatore district. Findings reveal thatmore than three-fourths (77.31%) of the respondents had medium impact of drip irrigation system. with reference to the aspect wise impact of drip irrigation system among onion growers, majority (84.90%) of the respondents were able to fulfil their needs, slightly more than two-fifths (45.38%) of the respondents had increased respect in their village, majority (96.60%) of the respondents felt that water usage has been decreased after adopting drip irrigation system, cent (100.00%) of the respondents felt that weed growth was suppressed after using drip irrigation system, cent (100.00%) of the respondents felt that labour usage was reduced in fertilizer application, vast majority (93.30%) perceived that quality produce was obtained 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 of drip irrigation system among Onion farmers, which could be utilized for further strengthening the drip irrigation system in onion cultivation.

1.INTRODUCTION

Drip irrigation system is the propelled strategy to defeat the different issues of water misfortunes like drought, underground water depletion etc., This technique is quickly picking up significance in the zone where water is at alarm and high esteem crops are created. (Chandran et al. 2015). Drip irrigation system is a viable and proficient technique for giving water straightforwardly to the root zone of plant. Hence, drip irrigation system is considered as one of the quickest growing advances in present day water system horticulture.

Drip irrigation has become regionalized water discharging technique as water is pumped directly to the root area of the crop deliberately and continuously. The slow pace of water execution in a distinct venue with low pressure results in reduced water demands as contradictory to the technique of flooding and other surface irrigation techniques. (Mahesh 2016). Drip irrigation method provides several unique agronomic, agro-technical and cost-effective benefits, like those of diminished water usage, improved plant development and productivity, reduced salinity threats, sustained fertilizer and chemical usage, suppressed weed growth, power consumption, better cultural improvements etc.,

Even though, several theoretical concepts and indices have been developed to measure and assess the impact of drip irrigation system among farmers, very few studies have been taken up on the impact of drip irrigation among the Onion growers. In line with this background, this paper deals with the mainobjective onthe attitude of Onion growers towards drip irrigation system.

2. REVIEW OF LITERATURE

Rathakrishnan and Padma (2012) 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. (2012) 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.

Behera et al. (2013) found that fertigation produced maximum herbage yield of 32.00 t/ha and oil yield of 236 kg /ha, which was 16.00 per cent and 17.00 per cent more than surface irrigation respectively.

Chandrakanth et al. (2013) indicated that the drip farmers had high output per acre (12100 kg), mulberry (4981 kg) and grapes (11577 kg) compared to conventional irrigation method output per acre of tomato (11015 kg), mulberry (3662 kg) and grapes (7975kg).

Pawar et al. (2013) found that drip fertigation showed 41.80 per cent increase in yield against conventional method of irrigation.

Singh et al. (2013) 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 (2015) observed that more than 50.00 per cent yield increased through drip fertigation, compared to conventional irrigation methods.

Qureshi et al. (2015) reported that 26.00 per cent increase in yield with drip irrigation over the furrow irrigation method in the sunflower crop

Shantaram (2014) 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.

Report (2014) 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 (2015) revealed that the Andhra Pradesh Micro irrigation Project has so far brought more than 9.75 lakh ha of area under micro irrigation.

Mahesh (2016) observed that Andhra Pradesh Micro irrigation Project has shown medium (45.83%) level of impact followed by high (29.17%) and low (25.00%) levels of impact on the respondents

Suganthkumar (2018) perceived that more than three-fifths (66.70 %) of the farmers in Orathanadu block of Thanjavur district had medium level of impact of climate change on paddy farming followed by equal (16.60 %) of respondents with high and low level of impact of climate change on paddy farming.

3. MATERIALS AND METHODS

The study was conducted in the Thondamuthur block of Coimbatore district, Tamil Nadu. Coimbatore ranks first in the productivity of small Onion in Tamil Nadu. Horticultural crops are predominantly grown in the Thondamuthur block, among which small Onion tops the table with high productivity. The study was conducted in five villages of the block, with maximum production viz., Devarayapuram, IkkaraiBoluvampatti, Narasipuram, Vellimalaipattinam and Pooluvampatti. The ex-post facto research design was used in the

study. A sample size of 119 was selected as total, from two per cent of the Onion farmers using the drip irrigation system in that specified block by using Proportionate Random Sampling method. The statistical tools used in the study were percentage analysis and cumulative frequency method.

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. They were studied under nine categories viz., change in self-sufficiency after the adoption of drip irrigation system, change in social status after the adoption of drip irrigation system, conserved water usage after the adoption of drip irrigation system, save in fertilizer and plant protection usage after the adoption of drip irrigation system, save in weed control usage after the adoption of drip irrigation system, save in labour utilization after theadoption of drip irrigation system, increase in crop production and quality produce after the adoption of drip irrigation system, general factors.The scoring procedure was developed for the studyby 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 of drip irrigation system among Onion growers

The data on overall impact of drip irrigation system among Onion growers were collected, analyzed and classified in to three levels, viz., low, medium and high by using cumulative frequency method and percentage analysis are presented in Table 1.

Table 1. Distribution of respondents according to their overall impact of drip irrigation system among Onion growers (n=119)

S. No	Category	Number	Per cent
1	Low	13	10.92
2	Medium	92	77.31

3	High	14	11.77
Total		**119**	**100.00**

From Table 1, it is clear that more than three-fourths (77.31%) of the respondents had medium level impact of drip irrigation system followed by slightly more than one- tenth (11.77%) of the respondents had high level impact of drip irrigation system and one-tenth (10.92%) of the respondents had low level impact of drip irrigation system.

It could be concluded from the above result that more than three-fourths (77.31%) of the respondents had medium level impact of drip irrigation system. The possible reason could be that the respondents might be very much satisfied with the output received due to usage of drip irrigation system. They might have felt the importance of drip irrigation system in the context of water and labour scarcity. It could also be due to the reason that,the respondents had medium effect of drip irrigation system on production, medium maintenance of system and medium satisfaction with drip irrigation system.

The above findings are on par with the findings of Shantaram (2014)

4.2. Aspect wise impact of drip irrigation system among Onion growers

Aspect wise impact of drip irrigation system among Onion growers were also studied in order to obtain clear and detailed understanding of the findings. They were studied under nine aspects viz., change in self-sufficiency after the adoption of drip irrigation system, change in social status after the adoption of drip irrigation system, conserved water usage after the adoption of drip irrigation system, save in fertilizer and plant protection usage after the adoption of drip irrigation system, save in weed control usage after the adoption of drip irrigation system, save in labour utilization after the adoption of drip irrigation system, increase in crop production and quality produce after the adoption of drip irrigation system, general factors.

4.2.1. Change in self-sufficiency after the adoption of drip irrigation system

The data were collected on change in self-sufficiency after the adoption of drip irrigation system were analyzed by using percentage analysis and presented on Table 2.

Table 2. Distribution of respondents according to their change in self -sufficiency

(n=119)*

S. No	Category	Number	Per cent
1.	Needs are fulfilled	101	84.90
2.	Need was not raised to borrow money	54	45.40
3.	Sufficient money is available to feed the family	67	56.30
4.	High standard of life can be maintained	11	9.20

***Multiple responses**

It is inferred from Table 2 that majority (84.90%) of the respondents were able to fulfil their 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 toborrow 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 the adoption of drip irrigation system

The data were collected on change in social status after the adoption of drip irrigation system were analyzed using percentage analysis and presented on Table 3.

Table 3. Distribution of respondents according to their change in social status

(n=119)*

S. No	Category	Number	Per cent
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**

It is understood from Table 3, that slightly more than two-fifths (45.38%) of the respondents 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.

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 the adoption of drip irrigation system

The data were collected on conserved water usage after the adoption of drip irrigation system were analyzed using percentage analysis and presented on Table 4.

Table 4. Distribution of respondents according to their conserved water usage

(n=119)*

S. No	Category	Number	Per cent
1	Additional area has been irrigated	50	42.01
2	Water usage was decreased	115	96.64

***Multiple responses**

Table 4, revealed that majority (96.64%) of the respondents felt that water usage has been decreased after adopting drip irrigation system followed by 42.01 per cent of the respondents had positivity towards an increase in the area after the adoption of drip irrigation system.

This may be due to the case that the whole area was brought under drip irrigation system in the initial stage itself. As, irrigation water is carried through a concealed tube and as it is multi-functional the water usage could be tremendously saved.

4.2.4. Save in fertilizer, plant protection and weed control usage after the adoption of drip irrigation system

The data were collected on save in fertilizer, plant protection and weed control usage after the adoption of drip irrigation system in were analyzed using percentage analysis and presented on Table 5.

Table 5. Distribution of respondents according to their save in fertilizer, plant protection and weed control usage

(n=119)*

S. No	Category	Number	Per cent
1	Fertilizer application was reduced	27	22.69
2	Reduced usage of plant protection chemicals	26	21.85
3	Suppressed weed growth	119	100.00
4	Decreased application of weed control chemicals	118	99.16

***Multiple responses**

From Table 5, it is acknowledged that, cent per cent (100.00%) of the respondents felt that weed growth was suppressed after using drip irrigation system, followed by 99.16 per cent of the respondents felt that the application of weed control chemicals has also been reduced after using the drip irrigation system.

Also, more than two-fifths (22.69%) of the respondents perceived that the quantity of fertilizer application has been reduced after using drip irrigation system and 21.85 per cent of the respondents perceived that the plant protection chemicals usage has been reduced after using drip irrigation system.

This is due to the rationale that, as the water is been discharged only at certain nozzles in the drip-tube, water cannot be spilt from other spots of the drip tube. As the weeds are controlled, the utilization of synthetic concoctions to control the weeds have also been decreased, which in turn lessens the cost of Onion cultivation.

4.2.5. Save in labour utilization after the adoption of drip irrigation system

The data were collected on save in labour utilization after the adoption of drip irrigation system were analyzed using percentage analysis and presented on Table 6.

Table 6. Distribution of respondents according to their save in labour utilization

(n=119)*

S. No	Category	Number	Per cent
1	Reduced labour usage in inter cultivation practices	102	85.71
2	Reduced labour usage in fertilizer application practices	119	100.00
3	Reduced labour usage in weed control practices	109	91.60
4	Reduced labour usage in irrigation operation practices	106	89.08
5	Reduced labour usage plant protection practices	115	96.64

***Multiple responses**

It is identified from Table 6 that cent per cent (100.00%) of the respondents felt that labour usage was reduced in fertilizer application followed by 96.64 per cent of the respondents felt reduced labour usage in plant protection chemicals and 91.60 per cent of the respondents perceived that labour usage reduced in weed control practices.

This might be due to the fact that, in surface irrigation, two labour has to be engaged for every irrigation but under drip irrigation system only one labour is adequate to operate the motor for irrigation purpose likewise, the tillage activities were also diminished by using a drip irrigation system, which in general requires more labour.

4.2.6. Increase in crop production after the adoption of drip irrigation system

The data were collected on increase in crop production after the adoption of drip irrigation system were analyzed using percentage analysis and presented on Table 7.

Table 7. Distribution of respondents according to their increase in crop production

(n=119)*

S. No	Category	Number	Per cent
1	Crop production was increased	97	81.50
2	Quality produce were obtained	111	93.30

***Multiple responses**

It is understood from Table 7 that a vast majority (93.30%) perceived that quality produce were obtained and 81.50 per cent of the respondents felt crop production has been increased after using drip irrigation system.

The reason for the above trend might be that usage of drip irrigation system will enhance the water and input use efficiency, which in turn improves the quality and quantity of produce and also reduces the weed growth, pest and disease problem.

4.2.7. General factors

The data were collected on general factors were analyzed using percentage analysis and presented on Table 8.

Table 8. Distribution of respondents according to their changes in general factors

(n=119)*

S. No	Category	Number	Per cent
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**

It is evident from Table 8 that majority (98.30%) of the respondents felt that the crop matured early followed by 40.30 per cent of the respondents felt that disease incidence in field have been reduced after using drip irrigation system and 29.40 per cent of the respondents felt that there is no danger of leaf burn due to saline water.

It could be due to the fact that the usage of drip irrigation system has reduced the disease incidence as controlled level 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 of drip irrigation system among Onion growers would throw light on the 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.

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