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# Economic Gain Through Adoption of Drip Irrigation System in Mango Orchard

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## ABSTRACT

**The present study was carried out in six talukas of Junagadh district in Gujarat to ascertain the extent of economic gain accrued by the mango orchard growers as a result of adoption of drip irrigation system (DIS). The data collected from the same respondents by arranging personal interview with randomly selected 175 mango orchard growers of the twenty four selected villages with the help of interview schedule. The results of the research revealed that majority (71.43 per cent) of the respondents had accrued medium level of overall economic gain of DIS. It is also reflected from the study that majority of the respondents had benefitted by saving of water, weed control expenses and labour for irrigation and inter-culture operations. A little more than one-fourth of the respondents availed the benefit in respect of fertilizers economy. In addition to this, the respondents got the benefits of better yields, better fruit size, early maturity of fruits and higher market price of the produce under DIS. Moreover, it is also stated that respondents education, farm power, credit orientation, economic motivation, innovativeness, risk preference, scientific orientation, attitude towards DIS, knowledge level about DIS, satisfaction with DIS, contact with extension agencies and utilization of information sources had positive and significant relationship with their extent of economic gain reaped through adoption of DIS.**

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## INTRODUCTION

The agriculture sector occupies a prominent place in the economy of Gujarat. The contribution of agriculture sector is around 35 to 40 per cent in state domestic product. However, such contribution is not stable as agriculture in Gujarat mainly depends on its erratic and irregular pattern of rainfall. To solve the above said problem to some extent, drip irrigation system was introduced in Gujarat State with assumption that its wide sprayed adoption will generate a dynamic spark resulting into the techno-economic developments among the mango orchard growers. The consequent effects of drip irrigation system are reflecting in terms of generating more income from agriculture by saving of water, labour, fertilizers and plant protection measures, improving yields and quality of produce, which ultimately improving the overall economic condition of mango orchard growers. Hence, there is an absolute need to know which benefits of drip irrigation system in terms of economic gain are attained by the mango orchards growers. Looking to the above said facts the present study was carried out to ascertain the extent of economic gain accured by the mango orchard growers as a result of adoption of drip irrigation system.

## MATERIALS AND METHODS

The present study was conducted in six talukas of Junagadh district namely Talala, Malia, Una, Medarada, Vanthli and Visavadar. These talukas were the first six talukas in the district which were having maximum number of orchards. From each

of the selected talukas, four villages having maximum numbers of drip sets installed in mango orchards were selected. The mango orchard growers, those who had installed and used drip irrigation system in their mango orchards for successively more than three years, were chosen at random from each identified village in such a manner that there would be proportional to total size of mango orchard growers in respective village fell under each of the six talukas. Thus, the sample consisted of 175 respondents for the study which constituted 24 per cent of the total size of drip sets under mango orchards in the district. The data were collected by arranging personal interview with 175 mango orchard growers of the twenty four selected villages with the help of interview schedule.

**Extent of economic gain**

It is operationalised as the degree to which the mango orchard growers accrued the benefits of DIS in terms of economic aspects. A list of seven aspects concerning the economic gain of DIS was prepared in consultation with the agronomists, horticulturists, economists, water management scientists and irrigation engineers. Before and after approach was followed for getting information about each aspect. The scoring procedure adopted for these aspects was as under :

**Saving in water**

Actual area increased in hectare (s) under irrigation was taken as saving in water after deducting the area under irrigation from the area prior to adoption of DIS. Scoring was done based on Mean $\pm$ S.D.

**Saving in fertilizers cost**

Saving in cost of chemical fertilizers was taken as benefit after deducting the cost of chemical fertilizers from the cost prior to adoption of DIS. Scoring was followed on the basis of Mean.

**Saving in plant protection cost**

Saving in cost of plant protection measures was taken as benefit after deducting the cost towards plant protection measures from the cost prior to adoption of DIS. Scoring was done based on Mean.

**Saving in weed control expenses**

Saving in expenses towards weed control was taken as benefit after deducting the weed control expenses from the expenses prior to adoption of DIS. Scores were assigned based on Mean $\pm$ S.D.

**Saving in labour utilization**

Saving in labour utilization after adoption of DIS was taken as benefit i.e. difference between mandays / year required prior to adoption and after adoption of DIS. Scoring procedure was adopted based on Mean $\pm$ S.D.

**Increase in fruit production**

Increase in fruit production after adoption of DIS was taken as benefit i.e. difference between fruit production / ha prior to adoption and after adoption of DIS. Scoring was followed based on Mean $\pm$ S. D.

**Improving quality of produce**

I. Increasing fruit size in terms of voulme :

Increase in fruit size after adoption of DIS was taken as benefit. Scoring was done based on Mean $\pm$ S. D.

II. Increasing fruit size in terms of weight :

Difference between no. of fruits per 20 kg weight prior as adoption and after adoption of DIS was taken as benefit.

Scoring procedure followed on the basis of Mean ± S. D.

III. Early maturity of fruits :

Early maturity of fruits was taken as benefit after adoption of DIS i.e. difference between fruit maturity days prior to adoption and after adoption of DIS. Scores were based on Mean.

IV. Higher market price of the produce :

Higher market price of the produce was taken as benefit after adoption of DIS. Scoring procedure was followed on the basis of Mean ± S. D.

In order to obtain overall economic gain of all the seven aspects (combined extent of economic gain) for an individual respondent, the score obtained for each aspect was summed up. The total score obtained by the respondents indicated their 'extent of economic gain'. The respondents were classified into three categories viz., low (below Mean - S. D.), medium (in between Mean ± S. D.) and high (above ± S.D.)

## RESULTS AND DISCUSSION

The extent of economic gain in this study is the degree which the mango orchard growers accrued the benefits of drip irrigation system in terms of economic aspects. The extent of benefits that accrued after adoption of drip irrigation system viz., saving in water, saving in fertilizers and plant protection cost, saving in weed control expenses, saving in labour utilization, increase in fruit production and improving quality of produce with respect to increase in fruit size, early maturity of fruits and higher market price of the produce was considered as extent of economic gain of drip irrigation system. The information on these aspects was collected and the respondents were classified into three categories viz., low (upto 13 score), medium (in between 14 to 18 score) and high (above 18 score). The data presented in Table - 1.

*TABLE 1*

**Distribution of respondents according to the extent of economic gain accrued by them.**

N = 175

| *Sr. No.* | *Category* | *Score range* | *Frequency* | *Per cent* |
|---|---|---|---|---|
| 1. | Low | Upto 11 | 36 | 20.57 |
| 2. | Medium | 12 to 20 | 125 | 71.43 |
| 3. | High | Above 20 | 14 | 8.00 |

Mean = 15.486 SD - 4.879

It can be seen from the data presented in Table-1, that majority (71.43 per cent) of the respondents were having medium level of overall economic gain, followed by 20.57 per cent respondents with low level of overall economic gain. Whereas only 8.00 per cent of respondents had accrued high level of overall economic gain of drip irrigation system.

It can be concluded that majority of the respondents (71.43 per cent) were having medium level of overall economic gain. This finding is in line with the findings of Bankar (1989), Nagare (1989), Rao (1989), Tilekar (1989), Thorat and Bhoite (1992).

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**Nature of benefits of drip irrigation system**

*TABLE 2*

**Distribution of respondents according to the nature of benefits of drip irrigation system accrued by them.**

N - 17

| *Nature of benefits* | *Respondents* | |
|---|---|---|
| | *Frequency* | *Per cent* |
| *1* | *2* | *3* |
| **Saving in water** | | |
| (i) Upto 25 per cent saving | 1 | 00.57 |
| (ii) 26 to 50 per cent saving | 38 | 21.72 |
| (iii) 51 to 75 per cent saving | 100 | 57.14 |
| (iv) More than 75 per cent saving | 36 | 20.57 |
| **Saving in fertilizers cost** | | |
| (i) No saving | 76 | 43.43 |
| (ii) Upto 15 per cent saving | 15 | 8.57 |
| (iii) 16 to 30 per cent saving | 22 | 12.57 |
| (iv) 31 to 45 per cent saving | 45 | 25.72 |
| (v) More than 45 per cent saving | 17 | 9.71 |
| **Saving in plant protection cost** | | |
| (i) No saving | 61 | 34.86 |
| (ii) Upto 15 per cent saving | 20 | 11.43 |
| (iii) 16 to 30 per cent saving | 75 | 4.86 |
| (iv) 31 to 45 per cent saving | 7 | 4.00 |
| (v) More than 45 per cent saving | 12 | 6.85 |
| **Saving in weed control expenses** | | |
| (i) Upto 25 per cent saving | 9 | 5.14 |
| (ii) 26 to 50 per cent saving | 98 | 56.00 |
| (iii) 51 to 75 per cent saving | 43 | 24.57 |
| (iv) More than 75 per cent saving | 25 | 14.29 |
| **Swing in labour utilization** | | |
| (i) Upto 25 per cent saving | 2 | 1.14 |
| (ii) 26 to 50 per cent saving | 62 | 35.43 |
| (iii) 51 to 75 per cent | 97 | 55.43 |
| (iv) More than 75 per cent saving | 14 | 8.00 |
| **Increase in fruit production** | | |
| (i) No increase | 56 | 32.00 |
| (ii) Upto 10 per cent increase | 11 | 6.29 |
| (iii) 11 to 20 per cent increase | 86 | 49.14 |
| (iv) More than 20 per cent increase | 22 | 12.57 |

| 1 | | 2 | 3 |
|---|---|---|---|
| **Improving quality of produce** | | | |
| **Increase in fruit size (by volume)** | | | |
| (i) | No increase | 34 | 19.43 |
| (ii) | Upto 25 per cent increase | 136 | 77.71 |
| (iii) | More than 25 per cent increase | 5 | 2.86 |
| **Early maturity of fruits** | | | |
| (i) | No difference | 94 | 53.72 |
| (ii) | Upto 5 days early maturity | 9 | 5.14 |
| (iii) | 6 to 10 days early maturity | 64 | 36.57 |
| (iv) | More than 10 days early maturity | 8 | 4.57 |
| **Higher market price of the produce (in Rs. / Quintal)** | | | |
| (i) | No difference | 42 | 24.00 |
| (ii) | Upto Rs. 50 higher price | 11 | 6.29 |
| (iii) | Rs. 51 to Rs. 100 higher price | 58 | 33.14 |
| (iv) | Rs. 101 to Rs. 150 higher price | 49 | 28.00 |
| (v) | More than Rs. 150 higher price | 15 | 8.57 |

The mango orchard growers had reaped many advantages of drip irrigation system. Majority (i.e. 57.14 per cent, 56.00 per cent and 55.43 per cent) of the respondents had benefited by saving of water (51 to 75 per cent), weed control expenses (26 to 50 per cent) and labour for irrigation and inter-culture operations (51 to 75 per cent), respectively. A little more than one-fourth (25.72 per cent) of the respondents availed the benefit in respect of fertilizers economy to the extent of 31 to 45 per cent. Considerable number (42.86 per cent) of them could save in plant protection cost to the tune of 16 to 30 per cent. About half (49.14 per cent) of the mango orchard growers expressed that the yields could also be increased by about 11 to 20 per cent. As regards the increase in size of mango fruit by volume, in majority (77.71 per cent) cases the fruit size got increased by about 25 per cent. Apart from this, nearly two-fifth (36.57 per cent) of the respondents had obtained early maturity of mango fruits by 6 to 10 days. However, more than 50% of respondent had obtained no difference maturity time of fruits. In case of higher market price of the produce, majority cases (61.14 per cent) received higher price ranged from Rs. 51 to Rs. 150 per quintal under drip system of irrigation.

*TABLE 3*

**Zero order correlation coefficient between the presonal - social, agro-economic, psychological, communication characeristics of the respondents and different variables.**

N = 175

| *Sr. No.* | *Independent variables* | *Correlation coefficients ('r' values) Extent of Economic Gain* |
|---|---|---|
| **I.** | **Personal - Social** | |
| 1. | Age | -0.0973 |
| 2. | Education | 0.2428 ** |
| 3. | Caste | 0.0680 |
| 4. | Type of family | -0.0994 |
| 5. | Size of family | -0.0493 |
| 6. | Social participation | 0.0746 |
| 7. | Socio-economic status | 0.0930 |
| **II.** | **Agro-Economic** | |
| 8. | Occuption | 0.0488 |
| 9. | Farm power possessed | 0.01662 * |
| 10. | Material possession | 0.0732 |
| 11. | Herd size | -0.1135 |
| 12. | Size of land holding | 0.0226 |
| 13. | Area under DIS | 0.0102 |
| 14. | Area under mango orchard | 0.0030 |
| 15. | Irrigation potentiality | -0.0088 |
| 16. | Cropping intensity | -0.0864 |
| 17. | Annual income | -0.0886 |
| 18. | Credit orientation | 0.2439 ** |
| **III.** | **Psychological** | |
| 19. | Economic motivation | 0.2302 ** |
| 20. | Innovativeness | 0.2176 ** |
| 21. | Risk-preference | 0.3157 ** |
| 22. | Scientific orientation | 0.4143 ** |
| 23. | Attitude towards DIS | 0.6750 ** |
| 24. | Knowledge level about DIS | 0.5450 ** |
| 25. | Satisfaction with DIS | 0.5660 ** |
| **IV.** | **Communication** | |
| 26. | Contact with extension agency | 0.2606 ** |
| 27. | Utilization of information sources | 0.1484 * |

* Significant at 0.05 level of probability.

** Significent at 0.01 level of probability.

Among the selected characteristics of the respondents, education, farm power, credit orientation, economic motivation, innovativeness, risk-preference, scientific orientation, attitude towards drip irrigation system, knowledge level about drip irrigation system, satisfaction with drip irrigation system, contact with extension agencies and utilization of information sources had positive and significant relationship with their extent of economic gain reaped through adoption of drip irrigation system. While, the variables namely age, caste, type of family, size of family, social participation, socio economic status, occupation, material possession, herd size, size of land holding, area under drip irrigation system, area under mango orchard, irrigation potentiality, cropping intensity and annual income of the respondents had no significant relationship with their extent of economic gain of drip irrigation system.

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