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Adoption of drip system of irrigation of vegetable growers in the adopted villages of SKNAU, Jobner

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Abstract
Water is the mainly important for agricultural production and day-to-day living of human beings. Drip irrigation is precise and regulated application of water and plant nutrients at frequent intervals and low pressure through emitters/drippers into the root zone of the plant with the help of close network of pipes. The present study was conducted in four adopted villages of SKNAU, Jobner. The total of 120 farmer respondents were selected from four selected villages by using of random sampling through proportional allocation method. It may be concluded that the majority of the vegetable growers (83.33%) were medium to high adoption level on drip system of irrigation.

Keywords: vegetable growers, drip system of irrigation, adoption

Introduction
In drip irrigation technique, the water is applied to the root area of plant drip by drip because of which large amount of water can be saved (Tupe *et al*., 2015) [8]. Micro irrigation, earlier known as drip or trickle irrigation is a more potent method of irrigation. It is the application of controlled amounts of water to plants root zone at needed interval.
Drip irrigation helps in growing agricultural crops in limited water available and maintaining landscapes during periods of less than average rainfall (Mishra *et al.*, 2018) [5]. Drip irrigation is precise and regulated application of water and plant nutrients at frequent intervals and low pressure through emitters/drippers into the root zone of the plant with the help of close network of pipes. Drip system of irrigation is more profitable as it saves 50-70% water as compared to surface irrigation method and minimize labour cost, minimize plant diseases by reducing humidity in atmosphere.
Rajasthan is the biggest state of India in terms of area and it covers about 10.4 per cent of the total area of India but only 1.04 per cent of the water resources. There are 295 blocks in Rajasthan state, out of which 185 blocks were under dark zone. In Jaipur district out of 15 blocks, 14 blocks were under dark zone. Because of arid and semi-arid climate *i.e.* poor soil quality, negative moisture index and use of traditional agriculture practices the available water is depleting day by day. The source of irrigation water in the state are wells and tube wells.
Rajasthan state ranks 7th in terms of coverage of area under drip system of irrigation. Rajasthan covers an area of 245301 hectares under drip irrigation after Andhra Pradesh (1295658 ha), Maharashtra (1199963 ha), Gujarat (723222 ha), Karnataka (6581171 ha), Tamil Nadu (487511 ha) and Madhya Pradesh (313887 ha) (Annonymous, 2019).

Methodology
The present study was undertaken in the adopted villages of S.K.N. Agriculture University, Jobner. The University adopted four villages *viz*., Pachar, Idan ka Bas, Khejrawas and Dhani Boraj. The total of 120 farmer respondents were selected from 212 respondents in four selected villages by using of random sampling through proportional allocation method.
For measuring the extent of adoption of the selected technology of drip system of irrigation, the methodology adopted by Singh (2001) [6] to measure the extent of utilization of drip system of irrigation was used with slight modification in light of suggestions given by experts. In light of the responses of the experts the modifications were incorporated in the schedule. Finally, 24 statements/items were retained for measuring the extent of adoption. The responses of the farmers were recorded on three-point continuum *i.e.* "Fully" "Partially" and "Never" and the 2, 1 and 0 scores were assigned, respectively. In this way minimum and maximum scores which a respondent could obtain on this schedule were 0 and 48, respectively

Based on frequency and percentage of respondents in each category *i.e.*, low, medium and high were calculated. The adoption index for each recommended practice as scores given by respondent was calculated by using the following formula:

$$\text{Adoption index} = \frac{\text{Total adoption score obtained by an individual}}{\text{Maximum obtainable score}} \times 100$$

Based on mean and standard deviation so obtained, the respondents were categorized in to low, medium and high level of adoption.

Results and Discussion

The extent of adoption of vegetable growers about drip system of irrigation of vegetable growers was measured with the help of procedures developed by Singh (2001) [6] with some modification and scoring procedure was done accordingly. Based on the scores obtained by the vegetable growers, the mean score (32.35) and standard deviation (6.38) were computed for the purpose of categories of the adoption level into three classes namely 'low, medium and high'.

The data given in table 1 and diagrammatically Fig. 1 revealed that 16.67 per cent, 65 per cent and 18.33 per cent vegetable growers occupies under categories of low, medium and high level of adoption about drip system of irrigation of vegetable growers.

Table 1: Distribution of vegetable growers on the basis of their extent of adoption about drip system of irrigation n= 120

S. No.	Adoption Categories	Frequency	Percent
1	Low adopters (below 25.97 Score)	20	16.67
2	Medium adopters (from 25.97 to 38.73 score)	78	65.00
3	High adopters (above 38.73 score)	22	18.33
	Total	120	100.00

Mean = 32.35, SD = 6.38

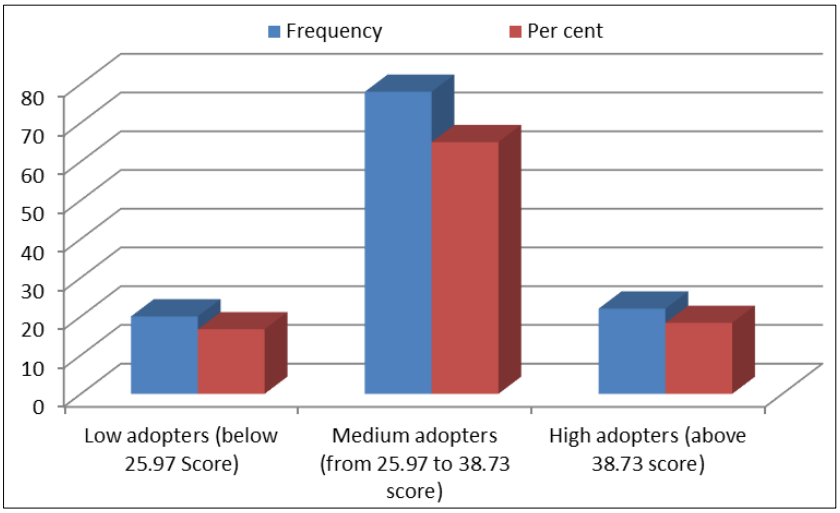

Fig 1: Distribution of vegetable growers on the basis of their extent of adoption about drip system of irrigation

Aspect wise extent of adoption of drip system of irrigation of vegetable growers

The data given in table: 2 reveal and diagrammatically Fig: 2 explains that out of twenty-four aspects about extent of adoption of drip system of irrigation of vegetable growers, the highest adoption (80.83 per cent) was found about the aspect *viz.*, 'Did you save the water through drip system of irrigation as compared to other method of irrigation system?', hence, it was ranked first. The aspect 'Do you increase the irrigation efficiency through drip system of irrigation?', was ranked second and it was adopted by (78.30 per cent) vegetable growers followed by 'Did you save the labour cost by using the drip system of irrigation?' (77.80 per cent), 'Have you used water filter, pressure regulator and valves to prevent clogging of the small emitter flow path?' (77.50 per cent), 'Did you check the soil erosion through drip irrigation system?' (77.08 per cent), 'Have you used hydrochloric acid/sulphuric acid for cleaning the drip system?' (76.25 per cent), 'Do you use the pressure gauge to check the pressure in the drip Irrigation System?' (76.14 per cent), 'Did you use drip system to grow fruit plants on your farm?' (73.66 per cent), 'Did you save the labour cost by using the drip system of irrigation?' (73.39 per cent), 'Do you use optimum water pressure in your drip system of irrigation?' (73.13 per cent) 'Did you use the drip irrigation system on your field?' (71.25 per cent), 'Have you minimized the cost of fertilizer and nutrients by using drip system of irrigation?' (70.41 per cent), 'Did you use recommended emitters per plants?' (70 per cent), 'Did you bury the laterals at 12" to 18" below soil surface?' (69.58 per cent), 'Do you use strainer filter to control physical impurities in the drip system of irrigation?' (65.83 per cent), 'Do you use the emitters designed according to your crop?' (63.75 per cent), 'Have you benefited in raising nursery of different vegetables/fruit plants through drip irrigation system?' (62.50 per cent), 'Did you get trainings regularly related to operation and maintenance of drip irrigation system?' (58.33 per cent), 'Have you applied the weedicides through drip system to control weeds in the crops?' (57.00 per cent), 'Have you applied liquid fertilizers through drip system of irrigation?' (56.66 per cent), 'Did you use solar power in drip system of irrigation?' (56.00 per cent), 'Have you maintained the appropriate distance between drippers in drip irrigation system?' (55.41 per cent). 'Did you use the plant protection chemicals through drip system of irrigation?' (52.00 per cent) and the least 'Did you place the emitters at root zone to supply the water through drip system of irrigation?' (45.00 per cent), which were ranked III, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII, XVIII, XIX, XX, XXI, XXII, XXIII and XXIV respectively.

Table 2: Aspect wise extent of adoption of drip system of irrigation of vegetable growers n = 120 multiple response

S. No.	Adoption aspect	MPS	Rank
1	Did you save the water through drip system of irrigation as compared to other method of irrigation system?	80.83	I
2	Do you increase the irrigation efficiency through drip system of irrigation?	78.30	II
3	Did you save the labour cost by using the drip system of irrigation?	77.80	III
4	Have you used water filter, pressure regulator and valves to prevent clogging of the small emitter flow path?	77.50	IV
5	Did you check the soil erosion through drip irrigation system?	77.08	V
6	Have you used hydrochloric acid/sulphuric acid for cleaning the drip system?	76.25	VI
7	Do you use the pressure gauge to check the pressure in the drip Irrigation system?	76.14	VII
8	Did you use drip system to grow fruit plants on your farm?	73.66	VIII
9	Did you save the labour cost by using the drip system of irrigation?	73.39	IX
10	Do you use optimum water pressure in your drip system of irrigation?	73.13	X
11	Did you use the drip irrigation system on your field?	71.25	XI
12	Have you minimized the cost of fertilizer and nutrients by using drip system of irrigation?	70.41	XII
13	Did you use recommended emitters per plants?	70.00	XIII
14	Did you bury the laterals at 12” to 18” below soil surface?	69.58	XIV
15	Do you use strainer filter to control physical impurities in the drip system of irrigation?	65.83	XV
16	Do you use the emitters designed according to your crop?	63.75	XVI
17	Have you benefited in raising nursery of different vegetables/fruit plants through drip irrigation system?	62.50	XVII
18	Did you get trainings regularly related to operation and maintenance of drip irrigation system?	58.33	XVIII
19	Have you applied the weedicides through drip system to control weeds in the crops?	57.00	XIX
20	Have you applied liquid fertilizers through drip system of irrigation?	56.66	XX
21	Did you use solar power in drip system of irrigation?	56.00	XXI
22	Have you maintained the appropriate distance between drippers in drip irrigation system?	55.41	XXII
23	Did you use the plant protection chemicals through drip system of irrigation?	52.00	XXIII
24	Did you place the emitters at root zone to supply the water through drip system of irrigation?	45.00	XXIV

* Mean Percent Score

It could be concluded from above results that the vegetable growers were found very conscious about the ‘Did you save the water through drip system of irrigation as compared to other method of irrigation?’ was least adopted by the vegetable growers like ‘Did you place the emitters at root zone to supply the water through drip system of irrigation?’.

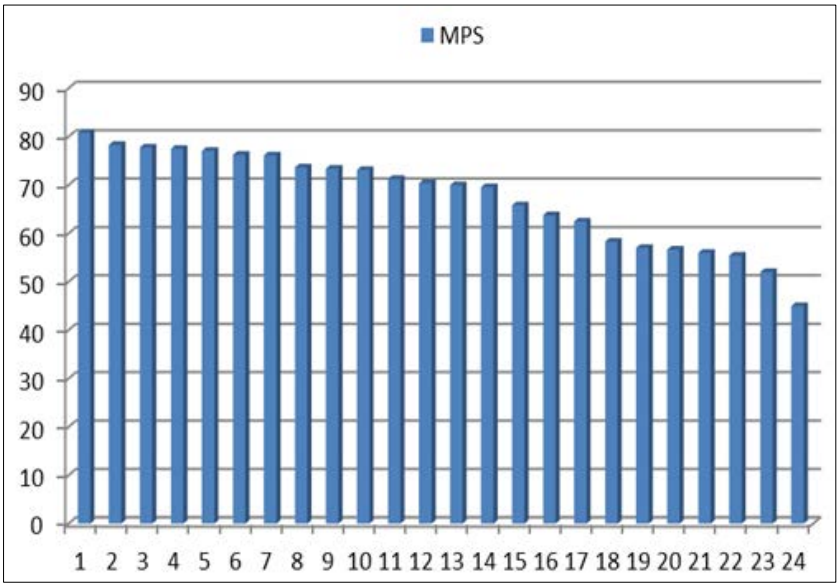

Fig 2: Aspect wise extent of adoption of drip system of irrigation by the vegetable grower

Conclusion

The majority of the vegetable growers (65.00 per cent), medium adopters and followed by (16.67 per cent) and (18.33 per cent) vegetable growers low and high adopter of drip system of irrigation of vegetable growers. It may be concluded that the majority of the vegetable growers (83.33%) were medium to high adoption level on drip system of irrigation.

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