

Evaluation of drip and surface irrigation methods for banana in Dharwad district of Northern Karnataka

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ABSTRACT : The study was conducted on drip and surface irrigation banana in Dharwad district of Northern Karnataka to know the performance of banana under surface and drip irrigation methods revealed that, the increase in application efficiency in drip irrigation over surface method of irrigation was in the range of 12.13 to 14.24, 14.33 to 15.64 and 12.28 to 17.17 per cent in small, medium and large farmers, respectively. The increase in distribution efficiency in drip irrigation over surface method of irrigation was in the range of 11.27 to 13.42, 13.37 to 15.08 and 13.56 to 15.91 per cent in small, medium and large farmers, respectively. The water saved in drip irrigation over surface method of irrigation was in the range of 44.46 to 47.95, 40.28 to 44.80 and 42.83 to 48.08 per cent in small, medium and large farmers, respectively. The increase in banana fruit yield in drip irrigation over surface method of irrigation was in the range of 25.73 to 31.53, 26.14 to 34.97 and 26.78 to 36.91 per cent in small, medium and large farmers, respectively.

KEY WORDS : Drip irrigation, Surface irrigation, Application efficiency, Distribution efficiency

Article Chronicle : Received : 04.07.2012; Revised : 15.09.2012; Accepted : 05.10.2012

How to cite this Article : Meti, C.B. (2012). Evaluation of drip and surface irrigation methods for banana in Dharwad district of Northern Karnataka. *Engg. & Tech. in India*, 3(2) : 107-110.

INTRODUCTION

India has made a appreciable progress in creating irrigation potential. However, it is still insufficient to meet the long term requirement of irrigation. The ever increasing population has put tremendous pressure on food demand. Every unit of available land resource and other critical inputs needs to be exploited to reap maximum benefits. In future, the most critical input happens to be water, which has become scarce. In an effort to make irrigation more efficient to obtain more crop per drop, farmers have adopted alternatives to flooding and other conventional irrigation methods. Among all the irrigation methods drip irrigation is an efficient method to provide irrigation water directly into the soil at the root zone of plants and it permits the irrigator to limit the watering closely to the crop water requirements.

EXPERIMENTAL PROCEDURE

The study was conducted during the year 2010-11 and

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2011-12 in Dharwad district of Northern Karnataka and among the five Taluks of Dharwad district, three Taluks namely Dharwad, Hubli and Khalghatagi were purposively selected based on the highest area under drip irrigation. The village wise list of drip irrigation farmers was obtained from the Deputy Director of Horticulture, Dharwad district. The revenue villages were arranged in descending order based on the drip area and top ten villages in each taluka were selected. The selection of the farmers was made on the basis of major crops, holding size and year of plantation. The study was restricted to those crops which are in normal yielding stage, accordingly banana was the only crop and hence, it, was selected for the study. The seventy five per cent of the farmers who have installed drip irrigation system for banana, planted during 2009-10 amounting to eighty eight were selected from the Dharwad, Hubli and Khalghatagi Taluks of Dharwad district by following proportionate random sampling technique. The corresponding number of farmers with all criteria except drip irrigation were selected randomly from surface irrigation farmers. Two terms that describes the performance of the drip and surface irrigation are water application efficiency and water distribution efficiency. Quantity of water applied was measured with 1000

ml beaker in drip irrigation and in surface 1 Cusec capacity parshall flume was used. The fruit yield, quality parameters such as hands per bunch, fingers per bunch, length of banana finger, girth of banana finger and bunch weight were recorded. Appropriate statistical tools such as Frequency distribution, percentage, mean, range, standard deviation, t test, z test were used to summarize data and draw the inferences.

EXPERIMENTAL FINDINGS AND ANALYSIS

It was observed from Table 1 that the water application efficiency in drip irrigation was in the range of 90.67 to 93.57, 89.53 to 91.74 and 88.33 to 89.55 per cent in small, medium and large farmers, respectively. The water application efficiency in surface irrigation method was in the range of 79.35 to 83.45, 78.31 to 79.33 and 76.15 to 78.67 per cent in small, medium and large farmers, respectively. The increase in application efficiency in drip irrigation over surface method of irrigation was in the range of 12.13 to 14.24, 14.33 to 15.64 and 12.28 to 17.17 per cent in small, medium and large farmers, respectively. The over all increase in application efficiency in drip irrigation over surface method of irrigation was 14.58 per cent. The average water application efficiency in drip irrigation was 91.21, 90.55 and 89.72 per cent in Dharwad, Hubli and Khalaghatagi Taluks, respectively. The average water application efficiency in surface irrigation method was 80.48, 78.59 and 77.94 per cent in Dharwad, Hubli and Khalaghatagi Taluks, respectively. The higher application efficiency in drip irrigation was due to the superiority of the drip irrigation. The findings of the study are consistent with the results of Belaganvi and Kumathe (2005), Shashidhara *et al.* (2007), Alison *et al.* (2009) and Dunage

et al. (2009).

The data from the Table 2 revealed that the water distribution efficiency in drip irrigation was in the range of 92.27 to 95.17, 91.23 to 93.65 and 90.43 to 92.35 per cent in small, medium and large farmers, respectively. The water distribution efficiency in surface irrigation method was in the range of 81.35 to 85.53, 80.43 to 81.38 and 78.75 to 80.77 per cent in small, medium and large farmers, respectively. The increase in application efficiency in drip irrigation over surface method of irrigation was in the range of 11.27 to 13.42, 13.37 to 15.08 and 13.56 to 15.91 per cent in small, medium and large farmers, respectively. The findings of the study are consistent with the results of Belaganvi and Kumathe (2005), Shashidhara *et al.* (2007), Alison *et al.* (2009) and Dunage *et al.* (2009).

It was observed from Table 3 that the water applied in drip irrigation was in the range of 1097.33 to 1185.73, 1155.17 to 1305.07 and 1198.05 to 1377.54 mm in small, medium and large farmers, respectively. The water applied in surface irrigation method was in the range of 2047.45 to 2277.85, 2073.07 to 2205.77 and 2267.69 to 2409.75 mm in small, medium and large farmers, respectively. The water saved in drip irrigation over surface method of irrigation was in the range of 44.46 to 47.95, 40.28 to 44.80 and 42.83 to 48.08 per cent in small, medium and large farmers, respectively.

The average water applied in drip irrigation was 1289.45, 1199.84 and 1150.18 mm in Dharwad, Hubli and Khalaghatagi Taluks, respectively. The average water applied in surface irrigation method was 2290.99, 2180.90 and 2142.74 mm in Dharwad, Hubli and Khalaghatagi Taluks, respectively. The findings of the study are consistent with the results of Gulshan *et al.* (2007), Shashidhara *et al.* (2007) and Timbadia *et al.*

Table 1: Taluka and holding wise application efficiency and increase in application efficiency in drip over surface irrigation

Sr. No.	Taluka	Holding size	Application efficiency (%)		Increase in application efficiency in drip over surface irrigation (%)
			Drip irrigation method	Surface irrigation method	
1.		Small	93.57	83.45	12.13
2.		Medium	91.74	79.33	15.64
3.	Dharwad	Large	88.33	78.67	12.28
4.		Average	91.21	80.48	13.35
5.		Small	92.34	80.86	14.20
6.		Medium	89.76	78.47	14.39
7.	Hubli	Large	89.55	76.43	17.17
8.		Average	90.55	78.59	15.25
9.		Small	90.67	79.35	14.24
10.		Medium	89.53	78.31	14.33
11.	Khalaghatagi	Large	88.96	76.15	16.82
12.		Average	89.72	77.94	15.13
13.	Over all average		90.49	79.00	14.58

Table 2: Taluka and holding wise distribution efficiency and increase in distribution efficiency in drip over surface irrigation

Sr. No.	Taluka	Holding size	Distribution efficiency (%)		Increase in distribution efficiency in drip over surface irrigation (%)
			Drip irrigation method	Surface irrigation method	
1.		Small	95.17	85.53	11.27
2.		Medium	93.65	81.38	15.08
3.	Dharwad	Large	92.35	80.77	14.34
4.		Average	93.72	82.56	13.56
5.		Small	94.36	83.87	12.51
6.		Medium	91.67	80.43	13.97
7.	Hubli	Large	91.28	78.75	15.91
8.		Average	92.44	81.02	14.13
9.		Small	92.27	81.35	13.42
10.	Khalaghatagi	Medium	91.23	80.47	13.37
11.		Large	90.43	79.63	13.56
12.		Average	91.31	80.48	13.45
13.	Over all average		92.49	81.35	13.72

Table 3: Taluka and Holding wise water applied and water saved in drip over surface irrigation

Sr. No.	Taluka	Holding size	Water applied (mm)		Water saved in drip over surface irrigation (%)
			Drip irrigation method	Surface irrigation method	
1.		Small	1185.73	2277.85	47.95
2.	Dharwad	Medium	1305.07	2185.37	40.28
3.		Large	1377.54	2409.75	42.83
4.		Average	1289.45	2290.99	43.69
5.		Small	1149.37	2069.33	44.46
6.	Hubli	Medium	1217.52	2205.77	44.80
7.		Large	1232.63	2267.61	45.64
8.		Average	1199.84	2180.90	44.97
9.		Small	1097.33	2047.45	46.41
10.	Khalaghatagi	Medium	1155.17	2073.07	44.28
11.		Large	1198.05	2307.69	48.08
12.		Average	1150.18	2142.74	46.26
13.	Over all average		1213.16	2204.88	44.97

Table 4: Taluka and holding wise banana fruit yield and increase in fruit yield in drip over surface irrigation

Sr. No.	Taluka	Holding size	Fruit yield (t/ha)		Increase in fruit yield in drip over surface irrigation (%)
			Drip irrigation method	Surface irrigation method	
1.		Small	75.79	57.77	31.19
2.	Dharwad	Medium	72.33	53.59	34.97
3.		Large	69.37	50.67	36.91
4.		Average	72.50	54.01	34.36
5.		Small	71.35	56.75	25.73
6.	Hubli	Medium	69.78	54.95	26.99
7.		Large	67.79	53.47	26.78
8.		Average	69.64	55.06	26.50
9.		Small	76.88	58.45	31.53
10.	Khalaghatagi	Medium	75.37	59.75	26.14
11.		Large	74.65	57.33	30.21
12.		Average	75.63	58.51	29.29
13.	Over all average		72.59	55.86	30.05

(2008).

The data presented in the Table 4 revealed that the banana fruit yield in drip irrigation was in the range of 71.35 to 76.88, 69.78 to 75.37 and 67.79 to 74.65 t/ha in small, medium and large farmers, respectively. The banana fruit yield in surface irrigation method was in the range of 56.75 to 58.45, 53.59 to 59.75 and 50.677 to 57.33 t/ha in small, medium and large farmers, respectively. The increase in banana fruit yield in drip irrigation over surface method of irrigation was in the range of 25.73 to 31.53, 26.14 to 34.97 and 26.78 to 36.91 per cent in small, medium and large farmers, respectively. The findings of the study are consistent with the results of Gulshan *et al.* (2007), Misra *et al.* (2008) and Dunage *et al.* (2009).

over surface method of irrigation was in the range of 12.13 to 14.24, 14.33 to 15.64 and 12.28 to 17.17 per cent in small, medium and large farmers, respectively. The increase in distribution efficiency in drip irrigation over surface method of irrigation was in the range of 11.27 to 13.42, 13.37 to 15.08 and 13.56 to 15.91 per cent in small, medium and large farmers, respectively. The water saved in drip irrigation over surface method of irrigation was in the range of 44.46 to 47.95, 40.28 to 44.80 and 42.83 to 48.08 per cent in small, medium and large farmers, respectively. The increase in banana fruit yield in drip irrigation over surface method of irrigation was in the range of 25.73 to 31.53, 26.14 to 34.97 and 26.78 to 36.91 per cent in small, medium and large farmers, respectively. Therefore, it is concluded that drip irrigation is superior over surface irrigation.

Conclusion :

The increase in application efficiency in drip irrigation

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