Madras Agric. J. 90 (1-3) : 57-59 January-March 2003

Microsprinkler - A boon for groundnut crop

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Abstract : Field experiments were conducted with nine treatments *viz.* surface irrigation at 0.60 IW/CPE ratio, microsprinkler irrigation once in two days at 100%, 80%, 60% and 40% of pan evaporation, 100%, 80%, 60% and 40% of ETC, during 1999-2001 at Agricultural Research Station, Bhavanisagar. The results revealed that irrigating the groundnut crop through microsprinkler at 80% of pan evaporation recorded the highest pod yield which was 20 per cent increase over surface method of irrigation and 10-12% of water can be saved under this method.

Key words: Groundnut crop, Microsprinkler

Introduction

The water users of agriculture now started realising the importance of water management. To meet the growing demand under different categories such as domestic and industries, the necessity have arised for the optimum use of available water. Economic use of water for agriculture is the utmost necessity to bring more area under increased production. Sprinkler irrigation system is one of the water saving technique which can be adopted for the suitable crops in almost all the soils (Michael, 1989). Microsprinkler system can be very well used for close growing crops which requires less pressure compared to sprinkler system. Among the oilseed crops, groundnut *(Arachis hypogaea)* is one of the most important crop for the rice eating peoples of India, Southeast Asia and Indonesia. Groundnut is grown mostly in India and is the largest producer and exporter of groundnut. Tamil Nadu occupies major area under groundnut crop ie. 40% of total area.

For judicious water supply and also to maintain optimum moisture condition during the critical stage it is assumed that microsprinkler would be more advantageous for getting higher yield. There is a lack of information on microsprinkler for groundnut crop. Hence it is necessary to formulate a suitable microsprinkler irrigation design with simple and efficient scheduling of irrigation to groundnut crop.

Table 1. Effect of treatments on yield of groundnut kg ha^{-1}.

Treatments	I Crop	II Crop
$_1$ - Surface method	3379	2797
$_2$ - Microsprinkler 100% of pan evoporation	3047	2860
$_3$ - Microsprinkler 80% of pan evaporation	3601	3823
$_4$ - Microsprinkler 60% of pan evaporation	2770	3407
$_5$ - Microsprinkler 40% of pan evaporation	3407	2992
$_5$ - Microsprinkler 100% ETC	3296	3324
$_7$ - Microsprinkler 80% ETC	3296	3130
$_8$ - Microsprinkler 60% ETC	3047	3047
$_9$ - Microsprinkler 40% ETC	2631	2770
Ed	52	55
D (P = 0.05)	108	153

Table 2. Effect of treatments on number of pods per plant

Treatments	I Crop	II Crop
I_1 - Surface method	13.1	13.7
I_2 - Microsprinkler 100% of pan evoporation	16.5	14.6
I_3 - Microsprinkler 80% of pan evaporation	17.2	16.2
I_4 - Microsprinkler 60% of pan evaporation	15.6	15.3
I_5 - Microsprinkler 40% of pan evaporation	13.3	14.2
I_6 - Microsprinkler 100% ETC	13.9	14.0
I_7 - Microsprinkler 80% ETC	11.7	13.6
I_8 - Microsprinkler 60% ETC	11.8	13.2
I_9 - Microsprinkler 40% ETC	12.1	12.9
SEd	1.90	1.62
CD (P = 0.05)	3.93	3.41

Table 3. Total water consumed and water use efficiency kg/mm/ha

S.No.	Particulars	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_9
1.	Irrigation water applied (mm)	250	237.49	210.14	182.43	155.06	199.61	176.52	153.71	130.26
2.	Effective rainfall (mm)	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3
3.	Total water used (mm)	316.3	303.79	276.17	248.73	221.36	255.91	242.82	219.41	196.56
4.	Yield (kg/ha)	3379	3047	3601	2770	3407	3296	3296	3047	2631
5.	Water use efficiency (kg.mm/ha)	10.68	10.02	13.39	11.13	15.39	12.40	13.57	14.01	13.38
6.	Water saving (%)	-	3.9	12.68	21.14	30.0	19.09	23.23	30.63	37.86
S.No.	Particulars	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_9
1.	Irrigation water applied (mm)	200	348.9	301.5	258.4	202.8	293.08	253.26	217.06	170.35
2.	Effective rainfall (mm)	209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2
3.	Total water used (mm)	409.2	558.1	510.7	467.6	412.0	502.28	462.46	426.26	379.55
4.	Yield (kg/ha)	2797	2860	3823	3407	2992	3324	3130	3047	2220
5.	Water use efficiency (kg.mm ha^{-1})	6.80	5.12	7.48	7.29	7.26	6.62	677	7.15	5.85

Materials and Methods

Field experiments were conducted with nine treatments *viz.* surface irrigation at 0.60 IW/CPE ratio, 100, 80, 60 and 40% of pan evaporation, 100%, 80%, 60% and 40% of ETC once in two days during *Kharif* and summer 2000, at Agricultural Research Station, Bhavanisagar, Tamil Nadu. The experiment was laid out in strip plot design and the treatments were replicated thrice.

For surface irrigation bed system was adopted at 0.60 IW/CPE ratio. For microsprinkler systems, sprinklers were placed at 3m interval along the lateral line with a discharge capacity of 35 lit. hr^{-1} each. Each microsprinkler covers an area of $3m^2$. The size of the plot is 6m x 6 m^2. The groundnut crop was sown on 06.01.2000 and harvested on 26.04.2000. The second crop was sown on 14.06.2000 and harvested on 03.10.2000. The treatmental irrigations were

mposed from the date of sowing. The quantity f water in microsprinkler treatments was worked ut based on daily pan evaporation value (eg. Microsprinkler irrigation at 80% of pan evaporation .60 x 0.80 x pan evaporation mm).

Results and Discussion

a) Yield

The yield data of groundnut revealed that irrigation regimes influenced the pod yield significantly. Irrigating through microsprinkler at 80% of evaporation (I_3) recorded the highest pod yield of 3601 kg ha^{-1} and 3823 kg ha^{-1} during summer and *kharif* respectively, which was superior to other treatments. The results confirms with findings of Santhana Bosu *et al.* 1995, where as the surface irrigation (I1) registered the lowest yield and was inferior to microsprinkler treatments (Table 1). Among the levels the microsprinkler irrigation @ 40% of evaporation registered the lowest yield.

b) Number of pods/plant

The data on number of pods per plant revealed that the microsprinkler at 80% of pan evaporation recorded the highest number of pods per plant and were superior to surface method of irrigation (Table 2).

c) Total water consumed and water use efficiency

The total water consumed was very low in 15 treatments 155.06 and 202.80 mm. The water use efficiency was very high in microsprinkler irrigation at 40% of surface irrigation followed by 60% of ETC. There was a saving of 3.9 per cent to 30.0 per cent water (Table 3).

Conclusion

Microsprinkler once in 2 days at 80% of pan evaporation (I_3) recorded the higher yields over surface method of irrigation. The yield increase was 12% over surface method of irrigation. The percent irrigation water saving was 3 to 30%. Microsprinkler irrigation once in 2 days at 80% of pan evaporation recorded the maximum yield and there was a water saving of 10-12% besides and yield increase of 12-15% compared to conventional method of irrigation at 0.60 IW/CPE ratio.

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(Received : October 2001; Revised : January 2002)