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Effect of Irrigation Regimes and Nitrogen Levels on Yield and Uptake of Finger Millet (*Co. 11*)*

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An experiment was conducted at Bhavanisagar and Coimbatore during summer and monsoon seasons of 1978, respectively to study the effect of different irrigation regimes and N levels on yield and uptake of nutrients by fingermillet. The results indicated that highest grain yield was obtained under the irrigation regime of 60 percent ASM in both the seasons with 150 kg N/ha.

Finger millet is an important food crop of South India. It is grown extensively under rainfed as well as irrigated conditions. With rapid evolutions of high yielding varieties, its cultivation under irrigated conditions is also extending. The studies on the effect of irrigation regimes employing the climatological approach is of recent origin. In general, the moisture supply limits the availability and uptake of nutrients. As the moisture supply increases the uptake of nutrients also increases. Since the climatological approach has been reported to be simple, rapid and more reliable (Dastane and Singh, 1964) a study was under taken to find out the optimum IW/CPE ratio for irrigation to finger millet (Co II).

MATERIAL AND METHODS

The experiment was conducted at the Agricultural Research station, Bhavanisagar and Central Farm, Tamil Nadu Agricultural University, Coimbatore, in summer and monsoon season of 1978 respectively. Soils of both the experimental sites had low available N, medium available P_2O, and high available K_2O. The pH of the soil at Bhavanisagar was 7.2 and at Coimbatore 8.1.

The experiment was laid out in a split plot design and replicated thrice. Irrigation levels were allotted to the main plots and N levels to the sub plots. The treatments were: (I) Irrigation regimes, viz., I_1 (Farmers method of irrigation), I_2 (Irrigation at 60 per cent ASM), I_3 (Irrigation at 0.60 IW/CPE ratio), I_4 (Irrigation at 0.75 IW/CPE ratio), I_5 (Irrigation at 1.05 IW/CPE ratio) and (II) Nitrogen levels, viz., N_0 (No nitrogen) N_{50} (50 kg N/ha), N_{100} (100 kg N/ha) and N_{150} (150 kg N/ha). Daily evaporation was recorded from the USWB class A pan evaporimeter. The depth of irrigation water was fixed as 5 cm. A buffer space of 60 cm between plots and

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75 cm between irrigation channels were provided. Twenty days old seedlings were transplanted at two seedlings per hill with a spacing of 15 × 15 cm. Nitrogen was applied in two doses, half as basal and the other half 30 days after transplanting. P and K were applied at 45 kg/ha each as basal dose. The crop was irrigated as per treatment schedule. The summer cros received 153.8 mm of rainfall in 11 rainy days and the monsoon crop received 56.4 mm of rainfall in 6 rainy days. Plant samples were collected on 30th (S_{30}), 45th (S_{45}), 60th (S_{60}) and 75th (S_{75}) days after transplanting. The samples were analysed for their N, P and K contents and total uptake was calculated in kg/ha. The crop was harvested in two stages. The grain and straw yield were recorded 1. Interaction effect between irrigation and nitrogen levels were not significant and hence not discussed in this paper.

RESULTS AND DISCUSSION :

Grain Yield :

In summer, maximum grain yield was obtained under the irrigation regime of 60% ASM and was on par with 0.90 and 1.05 IW/CPE ratios Table-I. In monsoon, grain yield was maximum under the irrigation regimeof 60% ASM and was on par with 0.90 and 0.75 IW/CP Eratios. Lowest grain yield was recorded in 0.60 IW/CPE ratio in both the seasons. This indicated the sufficiency of irrigation at 0.90 IW/CPE ratio in both the seasons. The low yield at I_3 and I_6 may be due to the low availability of moisture limiting the nutrient uptake in the former and more vigetative growth in the latter. Similar results have been reported by Kaliappa *et al.* (1974) and Thimme Gowda *et al.* (1976). In both the seasons, highest grain yield was recorded at 150 Kg N/ha which was on per with 100 Kg N/ha. Ramaswami (1976) and Siddeswaran (1978) also obtained higher yield for increased N application.

Straw Yield :

In both the seasons, irrigation at 1.05 IW/CPE ratio (I_6) and 150 Kg N/ha recorded maximum straw yield. Higher straw yield under higher irrigation regime and high nitrogen level was due to the positive influence of these factors on growth characters Boovendran (1977) and Sardar Sing *et al.* (1974) obtained higher straw yeld under higher irrigat on regime and increased N levels, respectively.

Uptake of N :

In both the seasons, the uptake increased linearly with stages and the maximum was recorded at harvest. The uptake was maximum under the irrigation regime of 1.05 IW/CPE ratio (I_6) and minimum at 0.60 IW/CPE ratio (I_3). High N uptake at high irrigat on regimes might be due to increased dry matter production. Wahab (1978) also reported increased N uptake with increased soil moisture. N uptake increased linearly with increased level of N and reached a maximum at 150 kg N/ha and was significantly superior

to all the other levels in both the seasons.

Uptake of P:—

Similar to N, P uptake increased with time and reached the maximum at harvest in both the seasons. Phosphorus uptake increased with wetter irrigation regimes and higher N levels recording a maximum at 1.05 IW/CPE ratio and at 150 kg N/ha

Uptake of K:

K uptake increased linearly with time end reached a maximum at harvest as in the case of N and P uptake. Irrigation regimes significantly influenced K uptake in both the seasons and 1.05 IW/CPE ratio recorded the maximum uptake. K uptake was significantly influenced by different levels of N and the highest uptake was recorded at 150 kg N/ha level. This is in conformity with the findings of Thirupathy and Morachan (1973).

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TABLE I Effect of stages, irrigation regimes and nitrogen levels on nutrient uptake and yield in fingermillet CO. 11

Treatments	Summer Uptake (kg/ha) N	P	K	Yield (kg/ha) Grain	Straw	Monsoon Uptake (kg/ha) N	P	K	Yield (kg/ha) Grain	Straw
S30	58.91	11.44	73.93			60.38	11.98	75 65		
S45	105.10	17.20	147.10			109.35	19.13	150.64		
S60	127.31	18.79	180.80			130.37	20.85	186.48		
S75	132.15	18.92	190.94			136.43	21.10	189.74		
S. E.	0.74	0.20	0.75			0.76	0.27	0.79		
C. D. (5%)	2.11	0.56	2.12			2.16	0.77	2.24		
I1	105.76	15.85	146.77	3195	6858	112.49	17.39	148.28	3460	7767
I2	111.28	17.16	156.97	3436	8185	115.68	18.52	157.59	3864	9047
I3	99.80	15.59	139.94	2903	6188	103.90	16.90	140.19	3328	7036
I4	109.41	16.53	151.00	3151	6997	113.65	17.55	155.44	3687	8193
I5	110.93	16.84	155.78	3304	7504	115.27	18.30	156.77	3802	8803
I6	111.76	17.22	158.02	3240	8276	116.39	18.81	158.94	3524	9144
S. E.	0.91	0.24	0.98	63	185	0.93	0.33	0.96	70	174
C. D. (5%)	2.59	0.69	2.79	198	585	2.65	0.94	2.74	221	548
N0	91.81	14.44	142.17	2392	6069	95.61	15.48	143.21	2815	7080
N50	111.91	16.02	151.22	3259	7023	118.69	17.14	153.29	3641	8007
N100	117.28	17.57	161 03	3545	7864	124.92	18.49	161.24	3956	8873
N150	120.81	17.87	163.74	3628	8383	127.31	18.95	162.49	4031	9368
S. E.	0.74	0.20	0.75	55	97	0.76	0.27	0.79	58	91
C. D. (5%)	2.11	0.56	2.12	158	274	2.16	0.77	2.24	162	260
Interaction	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.

N. S. Not significant.