

Water Requirement of Ragi Co. 10 Under Graded Levels of Nitrogen

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The water requirement of *ragi* studied using climatological approach indicated the irrigation regime of 0.6 ratio between irrigation water and cumulative pan evaporation to be optimum with a water use of 35 cm. The maximum grain production efficiency was obtained in the treatment combination 0.6 IW/CPE irrigation regime coupled with 120 kg N/ha.

India occupies an important place among the countries that cultivate millets with an area of 37.59 million hectares and with an annual production of 20.50 million tonnes of food grains (Anon, 1975). Among the millets the 'finger millet' is predominantly cultivated in Karnataka, Tamil Nadu and Andhra Pradesh owing to its wider adaptability to varying agro-climatic conditions.

MATERIALS AND METHODS

A study was undertaken at Agricultural College and Research Institute, Madurai to study the water requirement under graded dose of nitrogen with Co 10 *ragi* during kharif 1974.

The soil type was of sandy loam with a pH of 7.7, medium in available N and P and high in potassium. Split plot design with four levels of irrigation (main plots) and four levels of Nitrogen (sub-plots) was adopted and the irriga-

tion treatments were based on IW/CPE ratio *viz.*, 0.6 (I_1), 0.75 (I_2), 0.9 (I_3) and 1.05 (I_4) and the levels of Nitrogen were 0, 40, 80 and 120 kg/ha.

RESULTS AND DISCUSSION

The water requirements under different irrigation regimes and their production efficiency are given in Table. The water requirement under the irrigation regime IW/CPE ratio 0.6 (I_1) was only 35 cm involving five irrigations. On the other hand the irrigation regimes 1.05 (I_4) consumed a maximum of 53 cm of water with a total number of eight irrigations. The interval of irrigation under I_1 regime was around 10 days and that in I_4 it was four to five days. The available soil moisture corresponding to the respective IW/CPE ratios estimated at flowering stage ranged between 20 and 25 per cent at 0.6 IW/CPE ratio and at 0.75, 0.90 and 1.05 IW/CPE ratios it

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TABLE. Grain production efficiency and net profit as influenced by irrigation regimes and nitrogen levels in ragi Co. 10

Treatments	No. of irrigations	Irrigation water supplied (cm)	Total water requirement Col. 3 + rain-fall of 5 cm (cm)	Grain yield (kg/ha)	Straw yield (kg/ha)	Grain production efficiency kg/ha cm water	Percentage of efficiency over I ₁	Profit per ha. in Rs.
I ₁ N ₀	5	30.00	35.00	2713	10884	78		1857
I ₁ N ₄₀	5	30.00	35.00	4408	11487	126		3422
I ₁ N ₈₀	5	30.00	35.00	4443	12668	127		3356
I ₁ N ₁₂₀	5	30.00	35.30	4846	15227	138		3727
Mean I ₁	5	30.00	35.00	4102	—	117	164	—
I ₂ N ₀	6	36.00	41.00	2630	5985	64		1489
I ₂ N ₄₀	6	36.00	41.00	3871	12855	94		2793
I ₂ N ₈₀	6	36.00	41.00	4419	13285	108		3323
I ₂ N ₁₂₀	6	36.00	41.00	4523	14832	110		3344
Mean I ₂	6	36.00	41.00	3861	—	94	132	—
I ₃ N ₀	7	42.00	47.00	3071	6466	65		1914
I ₃ N ₄₀	7	42.00	47.00	3730	10491	79		2615
I ₃ N ₈₀	7	42.00	47.00	4446	12287	95		2261
I ₃ N ₁₂₀	7	42.00	47.00	4320	14033	92		3061
Mean I ₃	7	42.00	47.00	3892	—	83	116	—
I ₄ N ₀	8	48.00	53.00	2558	4335	48		1249
I ₄ N ₄₀	8	48.03	53.00	3647	10342	69		2484
I ₄ N ₈₀	8	48.00	53.00	4598	11832	87		3349
I ₄ N ₁₂₀	8	48.00	53.00	4323	11840	82		3065
Mean I ₄	8	48.00	53.00	3782	—	71	100	—

SE (m) CD
 Irrigation : 181 NS
 Nitrogen : 150 305

* Profit was worked out combining the value of grain and straw. The cost per irrigation and kg N were taken as Rs. 40.00 and Rs. 4.00 respectively.

Note :

Field duration : 65 days
 Cost of grain per kg : Re. 1.00
 Cost of straw per ton : Rs. 50.00
 Per day production under I₁ N₁₂₀ : 75 kg/ha.

The expenditure on other inputs and cultivation charges Rs. 1200/ha

was 40, 60 and 75-80 per cent respectively. The difference in grain yield due to different irrigation regimes tried was not significant thereby indicating the sufficiency of the lowest moisture regime I_1 , i.e. 0.6 IW/CPE ratio which consumed only 35 cm of water. Sivanappan and Balasubramanian (1974) reported that a transplanted short duration crop of *ragi* CO 10 required 39.0 cm of water under Coimbatore condition.

Grain production efficiency :

The grain production efficiency per hectare centimetre of water used and net profit under different irrigation regimes as influenced by levels of nitrogen were worked out and the data are presented in the Table. The production efficiency was 117 kg, 94 kg, 83 kg and 71 kg per hectare centimetre of water for I_1 , I_2 , I_3 and I_4 irrigation regimes respectively. There was an increase of 64 per cent in the water use efficiency under the treatment I_1 , which consumed the least amount of water, over the treatment I_4 . The percentage of increase over I_4 was only 32.0 and 16.0 for I_2 and I_3 . This is understandable since increased moisture supply by way of increase in irrigation number has not resulted in increased yield.

Grain yield of 101 kg at Siruguppa and 93.3 kg at Coimbatore were obtained for the application of one hectare centimetre of water in *ragi* (Anon., 1975); while in rice it was only

78 kg/ha cm of water (Shanmugasundaram and Morachan, 1974). Similarly nitrogen application at different levels of irrigation also influenced the grain production efficiency appreciably. The maximum efficiency was (138.0 kg) obtained in the combination of $I_1 N_{120}$ and the least with $I_1 N_0$. The per day production under $I_1 N_{120}$ was 75 kg/ha.

It is also interesting to note that under the regime I_1 and I_2 progressive increase in the production efficiency was observed between the levels of nitrogen. But under I_3 and I_4 , the grain production efficiency was maximum at N_{80} .

The net profit worked out for the different combination of treatments indicated that the maximum profit of Rs. 3727/- was obtainable under the combination of $I_1 N_{120}$. The least profit was under the combination of $I_4 N_0$.

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