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Evaluation of varieties and irrigation levels on the preformance of finger millet in sodic soil

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Abstract

Two field experiments were conducted at Anbil Dharmalingam Agricultural College and Research Institute, Tiruchirappalli during 2018 and 2019. The main plot treatments consisted of three varieties viz; V₁: TRY₁, V₂: Paiyur₂ and V₃: CO(Ra)15. The sub-plot treatments were I₁: IW/CPE ratio of 0.4, I₂: IW/CPE ratio of 0.6, I₃: IW/CPE ratio of 0.7, and I₄: IW/CPE ratio of 0.8. The seasons were Kharif. The design used was split plot design with three replications. The study indicated that the variety, CO(Ra)15 with IW/CPE ratio 0.8 and 0.7 recorded the highest grain yield and on par.

Keywords: Finger millet, varieties, irrigation regimes, grain yield

Introduction

Finger millet is an important minor millet crop grown in India and has the superiority of having highest productivity among millets. Selection of varieties plays a key role in case of finger millet. Varieties show wide variation in their yielding ability when grown in different environments. Now-a-days, finger millet has to be grown in water scarcity condition. Hence optimum irrigation scheduling is needed to economise the water use. As a predominantly rainfed kharif crop, finger millet does not require irrigation. However, irrigation at tillering and flowering is conducive for realising higher yields, wherever long dry spells in the season are experienced. During rabi season, the crop requires 2-3 irrigations coinciding with tillering, flowering and grain filling stages. Drainage is more important in kharif season, at times of heavy rainfall. Hence with a view to evaluate the varieties and suitable irrigation regimes, this study was undertaken.

Materials and methods

The experiments were conducted at the college farm, Anbil Dharmalingam Agricultural College and Research Institute, Tiruchirappalli during 2018 and 2019. The treatments included main plot treatments of varieties viz; V₁: TRY 1, V₂: Paiyur 2 and V₃: CO(Ra)15. The sub-plot treatments consisted of I₁: IW/CPE ratio of 0.4, I₂: IW/CPE ratio of 0.6, I₃: IW/CPE ratio of 0.7, and I₄: IW/CPE ratio of 0.8. The design followed was split plot design. The seasons were Kharif. The soil type was sodic soil.

Results and discussion

The varieties recorded height on par with each other. The varieties are non-significant. The irrigation schedules have recorded plant height on par with each other during the first year. During 2019, the varieties, CO(Ra)15 and TRY 1 have recorded plant height on par with each other. The variety Paiyur 2 has recorded plant height which is the lowest. Among the irrigation regimes, IW/CPE ratio of 0.8 has recorded significantly the highest value for plant height. This is followed by IW/CPE ratio of 0.7.

During 2018, the variety TRY 1 has recorded 8 number of tillers per plant. It is on par with other varieties. They are non-significant. The irrigation regimes are non-significant. In the year 2019, the variety CO(Ra)15 recorded significantly the highest number of tillers per plant. This confirms the findings of Abhishek (2018) ^[1]. Among the irrigation regimes, IW/CPE ratio of 0.8 had recorded significantly the highest number of tillers per plant.

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During 2018, the variety, Co(Ra)15 recorded 6-8 fingers per earhead. It is on par with other varieties, TRY 1 and Paiyur 2. Similarly irrigation regime of I₁ recorded highest number of fingers per ear head. However, it was on par with I₂.

In the year 2019, number of fingers per ear head was on par with varieties TRY 1 and CO(Ra)15. This was followed by Paiyur 2. Among the irrigation regimes, IW/CPE ratio of 0.7 and 0.8 were on par.

In the year 2018, Paiyur 2 recorded significantly the highest number of grains per finger. And it was on par with variety CO(Ra)15. The irrigation regimes were non-significant with regard to number of grains per finger. During 2019, the varieties CO(Ra)15 and TRY 1 were on par. This is followed by Paiyur 2. Among the irrigation regimes, IW/CPE ratio of 0.7 and 0.8 were on par and superior over IW/CPE ratio of 0.4 and 0.6.

The ear head weight was 8.9g with the variety CO(Ra)15 which was significant in the year 2018. The irrigation regimes had no effect on the ear head weight. In 2019 also, the variety, Co(Ra)15 recorded significantly the highest value for ear head weight. The irrigation regimes, 0.7 and 0.8 are on par and significantly superior over 0.4 and 0.6.

The thousand grain weight was on par with the varieties. The irrigation levels have no significant effect on thousand grain weight in the year, 2018. During 2019, the varieties are non-significant. Among the irrigation regimes, IW/CPE ratio of 0.7 and 0.8 are on par and significantly superior over IW/CPE ratio of 0.4 and 0.6.

Regarding the grain yield, Paiyur 2 recorded significantly the highest grain yield of 3758 kg ha⁻¹ in 2018. During 2019, the variety, CO(Ra)15 recorded the highest grain yield. This was followed by the variety, TRY 1. This confirms the findings of Munirathnam and Kumar (2015)^[3], Divya *et al.* (2017)^[2] and Abhishek (2018)^[1]. Among the irrigation regimes, IW/CPE ratio of 0.8 recorded significantly the highest grain yield followed by IW/CPE ratio of 0.7.

Regarding the stover yield, Paiyur 2 recorded significantly the highest yield of 7882 kg ha⁻¹. This was followed by TRY 1 which was on par with CO(Ra)15 in 2018. IW/CPE ratio of 0.4 recorded the highest stover yield of 8230 kg ha⁻¹. During 2019, the stover yield followed the same trend as that of grain yield.

Hence it can be concluded that the variety, CO(Ra)15 with IW/CPE ratio of 0.7, and 0.8 recorded significantly the highest grain yield and on par.

Table 1: Effect of varieties and irrigation levels on the plant height, number of tillers per plant and number of fingers per ear head

Treatments	Plant Height (cm)		No. of tillers /Plant		No. of fingers/ear head	
	2018	2019	2018	2019	2018	2019
Main Plot						
V ₁ : TRY ₁	89.8	99.8	8.0	7.9	6.3	6.6
V ₂ : Paiyur ₂	95.2	92.1	8.0	7.9	6.2	5.7
V ₃ : Co(Ra)15	96.0	104.4	6.0	9.6	6.8	7.0
SEd	-	2.2	-	0.3	--	0.2
CD(0.05)	NS	6.2	NS	0.8	NS	0.6
Sub-Plot						
I ₁ : IW/CPE: 0.4	92.8	90.6	8.0	7.0	6.9	5.7
I ₂ : IW/CPE: 0.6	95.6	92.0	8.0	7.4	6.7	6.3
I ₃ : IW/CPE: 0.7	92.0	104.5	7.0	9.2	6.2	7.0
I ₄ : IW/CPE: 0.8	94.0	108.0	7.0	10.2	6.4	6.8
SEd	-	1.6	-	0.2	0.2	0.2
CD(0.05)	NS	3.3	NS	0.5	0.5	0.4

Table 2: Effect of varieties and irrigation levels on the yield attributes and yield

Treatments	No. of grains/finger		Ear head wt (g)		Test Weight (g)		Grain yield (kg ha ⁻¹)		Stover yield (kg ha ⁻¹)	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
Main Plot										
V ₁	220	338	5.0	8.3	4.9	4.8	2787	2990	5586	4276
V ₂	306	293	8.4	7.8	4.9	4.8	3758	2296	7882	3284
V ₃	304	354	8.9	9.1	5.0	5.0	3010	3601	6165	5150
SEd	16.0	11.0	0.1	0.2	-	0.1	95.0	148	382	211
CD(0.05)	46.0	31.0	0.3	0.6	NS	0.2	265.0	410	1062	587
Sub-Plot										
I ₁	273	298	7.8	6.7	5.0	4.6	3433	2041	8230	2919
I ₂	272	300	7.0	7.4	4.8	4.4	3306	2727	6519	3900
I ₃	275	352	8.0	9.9	4.9	5.2	2798	3310	4915	4733
I ₄	287	363	7.0	9.7	5.1	5.3	3202	3771	6513	5393
SEd	-	8.0	-	0.2	-	0.1	-	125	416	179
CD(0.05)	NS	17.0	NS	0.5	NS	0.2	NS	263	875	376

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