Andhra Pradesh J Agril. Sci : 3(4): 217-219, 2017

IDENTIFICATION OF PHYSIOLOGICALLY EFFICIENT AND HIGH YIELDING RAGI GENOTYPES FOR RAINFED CONDITIONS

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Date of Receipt: 30-12-2016 Date of Acceptance: 14-03-2017

ABSTRACT

A field experiment was conducted during *kharif,* 2015 at Agricultural Research station (Millets), ANGRAU, Tirupati. Field experiment was laid out in factorial randomized block design, replicated thrice with two ma in treatments i.e. adequately irrigated, rainfed and ten sub treatments (genotypes). Growth and physiological traits viz. plant height, dry matter accumulation, leaf area index (LAI), harvest index and grain yield significantly reduced under rainfed conditions compared to irrigated control. Among the genotypes, the three pre release genotypes *viz.,* BR-36, PPR-1012 and PPR-2773 were under ranifed as well as irrigated conditions recorded significantly higher physiological efficiency in terms of LAI, total plant drymatter along with higher HI and yield. It denotes their efficiency in performing under drought condition. Hima (released variety) recorded low performance and it may not fit for cultivation in rain fed areas.

KEYWORDS: Ragi, rainfed, genotypes, physiological efficiency, harvest index, yield.

INTRODUCTION

Finger Millet, known locally as Ragi in the Indian sub-continent is mostly cultivated as a base crop in a mixed cropping. The crop is mostly cultivated in sub marginal lands and limited moisture conditions. Much of the ragi area is grown in *kharif* season and 70 per cent of *kharif* area is grown under rainfed situations .This is the prime reason for poor productivity of the ragi crop in India. Among drought mitigation technologies, development or identification of drought tolerant finger millet genotypes is a potential option and easily adopted by the resource poor farmers.

MATERIALS AND METHODS

Hence, the present investigation was aimed at evaluating the relative performance of ten (seven pre-release and three released) ragi genotypes for morphological, physiological characters, drought tolerant traits, yield and its attributes and grain quality parameters. These genotypes were evaluated in a field experiment, laid out in factorial randomized block design, replicated thrice with two main treatments i.e. adequately irrigated, rainfed and ten sub treatments (genotypes) in *kharif* 2015 at Agricultural Research Station(Millets), Perumallapalli, ANGRAU, Andhra Pradesh. Prophylactic measures were taken for protecting the crop from pest and diseases. During the experimental period there was long dry spell for 35 DAS to 65 DAS, which has coincided with panicle initiation and flowering stages. Data on plant height (cm), total plant dry weight (g plant^{-1}), Leaf area index, Grain yield and Harvest index were recorded at harvest in both rainfed and irrigated treatments. The data were statistically analyzed ad described by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The ragi genotypes differed in their response to rainfed and irrigated treatments in terms of physiological and yield traits. All the physiological characters used for evaluating ragi genotypes under moisture stress conditions *viz.,* plant height, leaf area, total plant dry matter significantly varied between moisture stress treatments and genotypes at harvest (Table 1).

Among the genotypes, the three pre release genotypes viz., BR-36, PPR-1012 and PPR-2773 recorded significantly higher plant height, LAI and higher dry matter under ranifed as well as irrigated conditions. Hima (Released variety) recorded lowest values other genotypes PPR 2885, PPR-1044, PPR-1040, PR-10-30, Srichitanya and Vakula recorded moderate values. Dry matter

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Table 1. Physiological characters of ragi genotypes

Genotypes	Plant height (cm)			Drymatter (g plant^{-1})			Leaf area index			Grain yield (kg ha^{-1})			Harvest index (%)		
	Irrigated	Rainfed	Mean	Irrigated	Rainfed	Mean	Irrigated	Rainfed	Mean	Irrigated	Rainfed	Mean	Irrigated	Rainfed	Mean
PPR-1012	93.35	80.35	86.85	43.43	31.46	37.45	2.98	3.32	3.15	2170.33	1920.09	2045.21	34.57	29.29	31.93
PPR-2885	84.17	75.60	79.89	44.56	35.46	40.01	2.83	2.11	2.47	2025.87	985.17	1855.52	26.07	18.38	22.23
PPR-2773	92.19	80.95	86.57	41.89	35.66	38.78	3.31	3.00	3.16	2107.33	1406.72	2007.03	29.83	29.47	29.65
BR-36	96.63	88.79	92.71	48.92	37.22	43.07	3.51	3.49	3.50	2207.33	1901.45	2054.39	45.80	42.35	44.08
PPR-1044	86.25	71.74	79.00	41.19	33.24	37.22	3.33	2.91	3.12	2044.40	977.73	1861.07	29.48	20.05	24.77
PPR-1040	81.87	74.69	78.28	41.00	29.81	35.41	3.00	2.08	2.54	1911.07	1688.87	1799.97	28.58	25.01	26.80
PR-10-30	87.85	66.54	77.20	38.15	28.64	33.40	3.22	2.45	2.83	1903.67	899.97	1751.82	29.77	18.64	24.21
Sri chaitanya	86.25	73.78	80.02	39.46	29.12	34.29	3.36	2.20	2.78	1903.67	1659.23	1781.45	29.15	17.44	23.30
Vakula	79.35	66.54	72.95	39.51	30.34	34.93	3.20	2.35	2.77	1994.60	1704.13	1849.37	30.14	24.57	27.36
Hima	76.47	65.39	70.93	40.32	32.65	36.49	2.26	1.51	1.88	1503.67	1085.13	1394.40	19.70	20.38	20.04
Mean	**86.44**	**74.44**		**41.84**	**32.36**		**3.10**	**2.54**		**1977.19**	**1715.04**		30.309	24.558	
	T	**G**	**T x G**	**T**	**G**	**T x G**	**T**	**G**	**T x G**	**T**	**G**	**T x G**	**T**	**G**	**T x G**
SE m±	**1.5472**	**3.4596**	**4.8927**	**2.0355**	**4.5514**	**6.4367**	**0.1341**	**0.2999**	**0.4241**	**8.1435**	**18.2995**	**25.7521**	**1.97**	**4.41**	**6.24**
CD (P=0.05)	**4.4307**	**9.9073**	**N.S**	**5.8289**	**N.S**	**N.S**	**0.3841**	**0.8588**	**N.S**	**23.3205**	**52.1461**	**73.764**	**5.65**	**12.63**	**17.86**

accumulation and distribution is an important factor indicating partitioning efficiency of a genotype. In general, soil moisture determines the accumulation of dry matter in different plant parts. Similar results were reported in ragi (Muhammod and Azam Ali 2007, Venkatesh Babu *et al.,* 2014.)

The important green leaf growth parameters *viz.,* leaf area index (LAI) which denotes light interception and current photosynthesis were affected in rainfed treatments compared to irrigated control. The genotypes, BR-36,PPR-1012 and PPR-2773 which maintained higher leaf area and dry matter also maintained higher LAI under both irrigated and rainfed conditions. It denotes that drought tolerant capability of these genotypes as they maintained higher physiological activity in terms of higher green leaf area, thus sustained higher total plant dry weight

Grain yields and Harvest Index were significantly reduced due to moisture stress compared to control. The genotypic differences and their interaction effects were also showed significant. BR-36, PPR-1012 and PPR-2773 recorded higher yield and harvest index both under irrigated and imposed moisture stress conditions. The higher harvest index of these genotypes represents an increased physiological capacity to mobilize photosynthates and translocate them efficiently to organs of economic value, i.e. grain yield as opined by Wallace *et al.* (1972).

CONCLUSION

Among the genotypes, the three pre release genotypes *viz.,* BR-36, PPR-1012 and PPR-2773 are superior in terms of physiological efficiency, drought tolerance, yield and yield components under ranifed as well as irrigated conditions. These can be further tested under minikit trails to recommend for rainfed areas.

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