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Evaluation of Elite Early Duration Cold Tolerant Cultures of Rice Advance Variety Trial-1 under Irrigated Condition

G.N. Hosagoudar[1]* and Sheshaiah[2]

[1]*Junior Rice Pathologist, AICRP on Rice, AHRS, Ponnampet, Karanataka-571 216, India*
[2]*(GPB) on contract basis, AHRS, Ponnampet, Karanataka-571 216, India*

**Corresponding author*

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A B S T R A C T

An AICRIP (Rice) experiment was conducted at Agricultural and Horticultural Research Station, Ponnampet and the objective of the experiment is to study the comparative performance of elite early duration cold tolerant cultures under irrigated condition in hilly condition. The experiment consists of 14 cultures, which were evaluated in two replications in Randomized Complete Block Design (RCBD) fashion. Observations on days to fifty percent flowering, plant height, number of panicle per plant and grain yield were recorded and cultures were also scored for leaf and neck blast by following SES scale of IRRI (1996) in the nursery and field condition respectively. The results showed that the culture IET-26573 recorded low scores for both leaf and neck blast, IET-26576 (80 days) for significant earliest days to 50 % flowering, the IET-25818 (70.50 cm) and IET-26573 (71.50 cm) for the significant dwarf plant height, IET-26563 (469.33) for significantly higher number of panicles per square meter and where as the culture IET-25826 recorded significant highest grain yield (5798 kg/ha) compared to all genotypes and which is recorded 5.34 % more grain yield over the best and local check variety Tunga (IET-13901). The culture IET-25826 in this trial is most promising in terms of grain yield (Kg/ha) and neck blast compared to all elite cultures and the local check variety Tunga.

Introduction

Rice is one of the principal food crops of India and its cultivation occupies extraordinarily high portion area in our country. Rice is directly fed more people over a longer time than has any other crop and it is unique because it can grow in wet environments that other crops cannot survive in. It is spectacularly diverse in the way of its cultivation and how it is used by humans. (http://ricepedia.org/rice-as-a-crop/where-is-rice-grown). It is the most common grain and the most common food in India, however, its production is likely to shrink in our country due to concurrence of a number of abiotic and biotic stresses during its cultivation and also due to farmers' shift in alternative crops.

To meet the food requirement of ever growing population, 70 % more food is needed by 2050 stated by World Summit on Food Security, (www.fao.org/wsfs/world-summit/en/). To tackle this demand, there is urgent need to develop or identify the high yielding varieties especially in principal food crops like rice, because these high yielding varieties producing more yield per unit area and tailored the plants to exhibit several unique responses to stress factors along with other common responses. Hence, this experiment aimed to identify the culture which giving blast resistance and higher yield over the local check variety.

Materials and Methods

An AICRIP (Rice) experiment given under the trail name of Advance Variety Trial 1 –Early (Hills) – AVT 1 –E (H)- Irrigated was conducted at Agricultural and Horticultural Research Station, Ponnampet during Kharif-2018. An experiment consists of 14 elite early duration cold tolerant cultures including eleven test entries and Vivekdhan 86 as National Check, Shalimar Rice 3 as Zonal Check and a local check (Tunga). The seeds of each culture were sown in nursery bed to raise the seedlings of paddy cultures. The seedlings of each culture were transplanted in the main field in two replications with spacing of 15 cm × 15 cm in a plot size of 10.12 m^2 and comparative performance of early duration cold tolerant cultures were evaluated in a Randomized Complete Block Design (RCBD). All agronomic practices were followed based on the zonal recommendations to raise a good crop. The observations on plant height and number of panicle per plant were recorded on five randomly selected plants from each culture plot. Observations on days to 50 per cent flowering and grain yield were taken on plot basis. The grain yield values recorded from the net plot (kg/plot) were converted into hectare (kg/ha). The genotypes were also evaluated for disease reaction especially leaf and neck blast reaction because of AHRS, Ponnampet is considered as one of the hot spot for rice blast disease hence the genotypes were scored by following SES scale of IRRI (1996) in the nursery and field condition for leaf and neck blast incidence respectively.

Results and Discussion

The AICRIP trail were evaluated 14 elite early duration cold tolerant cultures at AHRS, Ponnampet to study comparative performance of cultures under irrigated condition of hilly area mainly for days to fifty percent flowering, plant height, number of panicle per plant and grain yield and their performance given in the Table 1. All the cultures of paddy were evaluated for the leaf blast reaction during nursery stage and the cultures IET-25819, IET-26566, IET-26561, IET-26573 and IET-26576 were recorded low scores (2) and the cultures Tunga (LC) recorded the highest scores (5) for leaf blast reaction accorded to the SES scale of IRRI (1996). Similarly the variations for leaf blast disease in rice genotypes or germplasm were also reported by Dar *et al.,* (2015), Hossain and Hegde (2016), Hosagoudar and Umesh Babu (2018) and Sheshaiah *et al.,* (2018) under natural conditions for leaf blast scores. The neck blast scores recorded during after maturity of the panicles in the cultures. The highest neck blast scores (7) recorded in the cultures of IET-26566, IET-26561, Shalimar Rice 3 (ZC) and IET-26576 and where as lowest were in cultures of IET-25826 and IET-26573. Similarly the variations for neck blast disease in rice genotypes were also reported by Hosagoudar *et al.,* (2019).

The overall mean for days to 50 % flowering recorded in the experiment was 101 days and it ranges from 80 days to 127 days. The culture IET-26576 and local check variety

Tunga recorded the earliest (80 days) and latest (127 days) for days to 50% flowering and the significantly early flowered cultures are IET-26576 (80 days), IET-25818, IET-25819 (91 days), Vivekdhan 86 (NC) and Shalimar Rice 3 (ZC) (93 days). The average plant height recorded in the experiment was 85.75 cm and the lowest and highest plant height recorded cultures are IET-25818 (70.50 cm) and Shalimar Rice 3 (ZC) (100.50 cm) respectively. The cultures IET-25818 (70.50 cm) and IET-26573 (71.50 cm) were the significant dwarfest cultures for the plant height. The significant differences among the genotypes for days to 50% flowering and plant height noticed in the studies of by Hosagoudar *et al.*, (2017 and 2018) and Sheshaiah *et al.*, (2018).

The number of panicles per square meter area varies from 271 to 469. The average was 354.62 and the significantly highest number recorded for the culture IET-26563 (469) and where as the culture IET-26564 recorded lowest number of panicles (271). Significant genotypes for number of panicles were also obtained in the studies of Hosagoudar *et al.*, (2017 and 2018), Huang *et al.*, (2013), Joshia *et al.*, (2018), Sadimantara *et al.*, (2018) and Sheshaiah *et al.*, (2018).

Table.1 Comparative performance of elite early duration cold tolerant cultures under irrigated condition at AHRS, Ponnampet

Sl. No.	Entries	Growth Parameters			Yield Parameter	Blast Disease reaction	
		Days to 50% Flowering	Pl. height (cm)	Panicles per m^2	Grain yield Kg/ha.	Leaf blast	Neck blast
1	IET-25818	91*	70.50*	323	3666	3	5
2	IET-25826	109	76.50	359	5798*	4	1
3	IET-25819	91*	97.67	330	4723	2	5
4	Vivekdhan 86 (NC)	93*	97.67	308	3906	3	5
5	IET-26566	99	88.00	323	4736	2	7
6	IET-26565	99	81.00	396	4563	3	3
7	IET-26563	110	81.17	469*	2218	4	5
8	IET-26561	99	80.00	323	4830	2	7
9	Shalimar Rice 3 (ZC)	93*	100.50	345	4333	3	7
10	IET-26575	104	79.67	411	4805	4	3
11	IET-26573	115	71.50*	403	4797	2	1
12	IET-26576	80*	98.67	293	2868	2	7
13	IET-26564	103	82.83	271	4461	3	3
14	Tunga (LC)	127	94.83	411	5504*	5	3
	Mean	**100.57**	**85.75**	**355.62**	**4372.00**		
	CV (%)	**0.80**	**5.89**	**14.43**	**8.44**		
	CD (0.05)	**1.74**	**10.90**	**110.53**	**797.38**		

The overall mean grain yield recorded in the experiment was 4372 (kg/ha) and grain yield ranged from 2218 kg/ha (IET-26563) to 5798 kg/ha (IET-25826). Significant higher grain yield recorded in the cultures of IET-25826 (5798 kg/ha) and Tunga (5504 kg/ha). Similarly significant genotypes for yield were also found in the studies of Hosagoudar *et al.*, (2017 and 2018), Huang *et al.*, (2013), Joshia *et al.*, (2018), Sadimantara *et al.*, (2018) and Sheshaiah *et al.*, (2018).

This paper described the comparative performance of rice early hill cultures under irrigated conditions. The study found that the culture IET-25826 recorded yield advantage of 48.44 % over the National (Vivekdhan 86), 33.81 % over the zonal (Shalimar Rice 3) and 5.34 % over the local check variety (Tunga). Hence, IET-25826 culture is most promising in terms of yield over the check varieties and showed resistance to the neck neck blast caused by *Pyricularia oryza*.

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