Indian J. Pl. Genet. Resources 12(3): 395-398, 1999

Short Communication

C14-8, A HIGH POTENTIAL RICE GENETIC RESOURCE IN BAY ISLANDS

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C 14-8, a very tall, lodging susceptible, stringently photosensivitive, traditional *indica* variety assumed to have been introduced from Myanmmar about a hundread year back; currently grows over 80% rice growing area in Bay Islands. It produces very low grain yield of 2-2.5 Mgha^{-1} indeed extensively preferred by the farmers owing to its wide adaptability across south-, middle- and north Andamans, moderate level of inbuilt tolerances towards biotic and abiotic stresses prevailing in the hot humid tropics of Bay Islands and the amazing character of growing under zero management. Agro- botanical characters of this variety have been profiled in detail in this article.

Located in the emerald blue sea of Bay of Bengal about 1200 km away from mainland India, the humid tropics of Andaman and Nicobar Islands is endowed with maritime climate that offers a conducive agroclimatic for rice cultivation in its low lying lands in the valleys and in the coastal belt. About 3100 mm annual rainfall, 18-31°C minimum and maximum temperature, fertile soil with high organic C, moderate P and K content are the favourable environmental components to support successful rice hunsbandry. Rice is the second most important crop after plantation species in these islands occupying about 12000 ha of land. Agriculture in Bay Islands is comparatively of recent origin which started as early as 140 years back at the expense of forests. It started with stray cultivation of anonymous varieties, brought about by the convicts during penal settlement. Subsequently, other varieties were also introduced by the refugee settlers during early forties and after wards. Many modern high yielding varieties (HYV) seeped into rice culture system due to massive efforts made by the state government as well as by the Central Agricultural Research Institute of ICAR during the green revolution era onwards. However, except a few viz. Jaya, Manas Sarovar, Bhavani, IET 5656 and Taichen Sen Yu, majority more wiped out plausibly because of the new environment (?) constrained with heavy disease and insect pressure (hot humid tropical environment seems to be congenial for survival and propagation of disease and insect pests) as well as due to high degree of inbuilt abiotic stresses in the soil, the unpredictable stress dynamics, their interaction with other edaphic factors and compounded climatic hazards. Accordingly, successful transplantation of such varieties and their imbibation across farming community got haulted. Interestingly, one cultivar namely C 14-8 which is assumed to have been introduced from Myanmar (the then Burma) during the neonatal stage of agriculture development in these Islands could successfully survive and perpetuated over the time. At present in Bay Islands, this variety occupies more than 80 per cent of the growing area and highly preferred by the farmers. It has been attempted to profile C 14-8 in terms of agronomical traits,

biotic and abiotic stress tolerance norms and to pinpoint the secrets of its high popularity in these islands.

One month old seedlings were transplanted in Crop Research Experimental Farm of Central Agricultural Research Institute at Bloomsdale, Port Blair (Lat. 10°41'13.04" N; long 92°43'30.16" E) during the rice cropping season (May-December) in 1994, '95 and '96. Single seedling per hill was employed in 20 × 15 cm spacing. No fertilisers were applied whereas plant protection measures were adopted. Five random samples from 10 sq m area were used to document the different agrobotanical traits to assess varietal performance. Yield performance of 10 sqm area were extrapolated to calculate per hectare yield.

Field tolerance to biotic stresses viz., disease and insect pests were scored in 0-9 scale following SES, IRTP, IRRI, Philippines 1988. To deterime abiotic stress tolerances, young seedlings were grown under hydroponics in Hoagland solution (Yoshida *et al.*, 1976). Different stresses were artificially created by adding salts eg NaCl : $CaCl_2$ in 1:1 ratio to the level of 8 dSm^{-1} and 12 dSm^{-1} (pH 5.0 tolerant check : Pokkali and Nona Bokra; susceptible check : IR 28) for excess salt tolerance; 30 ppm of Al in the form of $AlCl_3$, $6H_2O$ (pH 4.0; Biological check : MW 10) for Al toxicity tolerance; 400 ppm of Fe in the form of $FeSO_4$, $7H_2O$ and citric acid (pH 4.2, tolerant check : Mashuri, susceptible check : IR 24) for Fe toxicity tolerance and 0.5 ppm of phosphorus in the form of KH_2PO_4 (pH 6.5, Biological check:IR28) for P deficiency tolerance assessment. Alternate day pH adjustment and weekly renewal of Hoagland solution were performed till the date of final observation following Majumder *et al* 1995. To assess drought tolerance, seeds were sown on hilly upland soils under rainfed condition and crops were grown and managed under zero management. Submergence tolerance was scored in farmers' field (low lying) frequently inundated with flash flood during seedling and active tillering phase.

C 14-8 belongs to *indica* subspecies of *Oryza sativa* L. This is a very tall, highly lodging susceptible (due to its long weak internodes) traditional variety assumed to had been introduced about hundred years back from Myanmar. It is stringently photosensitive flowers only after the first week of November i.e. in short days. Open type plants bear profuse lax tillers. (Table 1). Leaves are very green, low senescent drooping

Table 1. Synoptic dossier of an indigenous cultivar C 14-8 in Bay Islands

Character	Specificity/Magnitude
General feature	
Subspecies	*Indica*
Type	Traditional
Photosensitivity	Stringently (+)ve
Lodging	Highly susceptible
Plant type	Lax having open tillers
Leaf canopy	Vigorous shading type
Internodes	very long,weak
Regeneration after lopping	Very high
Resurgence after insect pest infestation	Very high
Quantitative trait	
Crop duration (days)	180
Days to initial flowering	140
Days to 50% flowering	153
Plant height (cm)	185
Number of tillers per plant	16.0
Number of ear bearing tillers (EBT) per plant	12.0
Panicle length (cm)	29.8
Number of grains per panicle	153
Spikelet sterility (%)	14.0
100 seed weight (g)	3.3
Yield (tonnes per hectare)	2.4
Harvest index (%)	29.6

type; upper leaves cause considerable shading to the lower ones that obviously hinders photosynthesis and this inhibits realization of full physiological yield potential. Vegetative growth rate is very high; withstands 2-3 lopping which provide good amount of green fodder is an additional quality for being preferred by the local farmers. Vegetative phase is also very long. Resurgence ability of the variety after disease and pest incidences is very high in comparison to modern HYVs.

C 14-8 is a very long duration variety. It takes about 6 months for seed to seed Vigorous tall plants produces about 16 tillers of which ~ 75 per cent are ear bearing. Plants bear long panicles and low spikelet sterility which are the desirable characters resting in it. Grains are bold having test weight of about 3.3 g. Under zero management, this variety found to produce 2-2.5 mg ha^{-1} of brown rice. Harvest index is very low alike other traditional rice germplasm which is indicative of channelisation of much photosynthate into vegetative parts. The variety is found to be well adaptive across south-, middle- and north Andamans endowed with ~3100 mm erratic rainfall distributed over 8 months, 18-33°C minimum and maximum temperatures, ~8 hours sunshine and of 5-15 kmph wind speed.

Despite high disease and insect pests pressure in the congenial hot humid tropical environment of Bay Islands, C14-8 manages to keep yield loss below economic threshold value due to its moderate level of inbuilt tolerances to major insect and disease pests harbouring in Andamans (Table 2). The variety displays high degree tolerance to salinity (*albiet* in flowering phase it is moderate only), Fe and Al toxicity tolerance but susceptible to P deficiency. Probably due to frequent collision with the abiotic and abiotic stresses prevailing in the Andamans, the variety could develop considerable amount of tolerances during the last hundred years which seems to be the driving force behind its successful culture in Andamans. The amazing ability of this cultivar to grow under zero management and thereby less requirement of labour and efforts to execute the very simple transplanting- harvesting protocol is the major reason for its extensive popularity across farming community. The variety could not be replaced with modern HYV from mainland inspite of state government's multipronged drive including havoc encouragement and incentives. High amount of straw which is recovered upon harvesting is a good cattle fodder provides additional return to the farmers. The variety needs to be improved without making much penalty on the adaptability trait through well framed systematic recombination breeding *in situ* in Bay Islands.

Table 2. Biotic and abiotic stress tolerance* profile of C 14-8

Biotic												Abiotic						
Disease*					Insect			Excess salt				Fe toxicity	Al toxicity	P deficiency	Drought	Submergence		Phenotypic index
ShB	Hel	BLB	Blast leaf	Blast Neck	SB	LF	GB	V	T	F	M					Seedling	Active tillering	
4	2	2	5	3	4	6	7	2(3)	4(4)	5(6)	2(5)	2	3	6	2	3	2	6

*ShB : Sheath blight, Hel : *Helminthosporium* leaf spot, BLB : Bacterial leaf blight, Blast: Leaf blast, SB : Stem borer, LB : Leaf folder, GB : Gundi bug, V : Vegetative phase, T : Tillering phase, F : Flowering phase, M : Maturing phase
*Data scored in 0-9 scale following SES, IRTP, IRRI 1988
*Figures within parenthesis are the tolerance norms at 12 dSm^{-1} salt stress.

ACKNOWLEDGEMENTS

Authors like thank Dr A.B. Bandyopadhyay, Director, Central Agricultural Research Institute, Port Blair for his keen interest, constant encouragement and facilities to execute this work.

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