Multi Locational Evaluation of Candidate Varieties of Coarse Rice in Pakistan

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Abstract:

Seven candidate varieties of coarse rice along with one check variety KSK-133 were evaluated at seven locations throughout Pakistan in National Uniform Yield Trials (NUYT) during 2013 to determine genetic variation among these varieties for paddy yield and to find out better high yielding varieties to release for general cultivation in the country. Significant differences for paddy yield were exhibited among entries in pooled analysis. Maximum mean paddy yield (6046.6 kg/ha) of seven locations was observed in entry DR-59, followed by entry NARC-13-1 that produced mean paddy yield of 5464.1 kg/ha . On the basis of mean paddy yield, entries DR-59 and NARC-13-1may be recommended for general cultivation in Pakistan.

Key words: Oryza sativa L., coarse rice, paddy yield, national uniform yield trails, Pakistan

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Introduction

Rice is one of the most important crops that provides food for about half of the world population and occupies almost one-fifth of the total land area covered under cereals (Sasaki, 1999; 2002). Approximately 11% of the world's arable land is planted to rice annually, and it ranks next to wheat (Chakravarthi and Naravaneni, 2006; Bashir *et al.*, 2010).

Rice is grown under diverse cultural conditions and over wide geographical range. Most of the world's rice is cultivated and consumed in Asia, which constitutes more than half of the global population (Chakravarthi and Naravaneni, 2006). Coarse grain varieties are early maturing while fine grain varieties are late maturing.

Plant breeding is a continuous process (Singh et. al., 2000). Society supports plant breeders for only one purpose: to develop more productive varieties for farm use (Jenning et.al., 1979; Hallauer, 1981). Genetic improvement in rice plant made a great contribution to achieving food security in Asia over the last 3 decade (Hossain and Fischer, 1995; Khush, 1995; Hossain, 1996). Human needs plentiful, rich and cheap food that requires continuous research for development of new varieties. Several other factors compel changes. The variety complex under goes changes in response to biotic and a biotic compulsion (Rothchild, 1996; Singh et. al., 2000; Mann 1999).

The present research study was conducted to assess the genetic variation among different candidate varieties of coarse rice for paddy yield and to find out better high yielding coarse rice genotypes. The ultimate goal of varietal improvement programs is the evolution of superior varieties. The multi-location National Uniform Yield Trials (NUYT) is a vital link between genetic improvements and the production environments. Provincial institutions have rare chances to test their improved materials across the country within their own sources. Evaluation of elite lines at several levels including

initial screening at the experimental stations, preliminary testing in micro plot trials and final evaluation in the National Uniform Yield Trials (NUYT) are the main steps before the release of new varieties. This study is concerned with the final testing of the evaluation phase particularly the analysis and collection of data required to justify cultivar release and recommendations for commercial production.

Materials and Methods

Seven candidate varieties of coarse rice along with one check variety KSK-133 were evaluated during 2013 using Randomized Complete Block Design (RCBD) with three replications. The trails were carried out at the following seven locations throughout the country in National Uniform Yield Trails.

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2. Nuclear Institute for Agriculture And Biology (NIAB), Faisalabad, Pakistan
3. Nuclear Institute of Agriculture (NIA), Tandojam, Sindh
4. Rice Research Institute, Kala Shah Kaku, Lahore, Pakistan
5. Office of the Sugarcane Specialist, Sugarcane Research Station, Sujawal
6. Rice Research Institute, Dokri, Distt. Larkana, Sindh
7. PARC Rice Unit, Agri. Adaptive Research Farm, Gujranwala

The nursery of coarse rice entries viz., RUSTUM DHAN, DR-59, NARC-13-1, ABBASI-1, ABBASI-II, KSK-462, KSK-463 and KSK-133 were sown during the month of June. Thirty days old nursery was transplanted in the field with a plant spacing of 20 cm x 20 cm.

The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. At maturity, data were recorded for paddy yield at all the locations. The data were subjected to analysis of variance as outlined by Steel et al; 1997.

Results and Discussion

Entries exhibited significant differences for paddy yield (kg/ha) as shown in Table 1. Entry NARC-13-1 produced maximum paddy yield of 6993.3 Kg/ha, 6471.1 kg/ha at NARC and Kala Shah kaku location, respectively (Table 2). Entry DR-59 produced maximum paddy yield at Dokri (7750 kg/ha, Sujawal (7079.3 kg/ha) and Tandojam locations, respectively (8840 kg/ha). Entry KSK-463 gave maximum yield of 3667.6 Kg/ha at NIAB, Faisalabad whereas no entry exhibited more paddy yield than the check variety KSK-133 (5088 kg/ha) at AR Farm Gujranwala location.

As far as mean paddy yield of all the 7 locations is concerned, Entry DR-59 produced maximum paddy yield of 6046.6 kg/ha, followed by entry NARC-13-1 (5464.1 kg/ha). All other entries exhibited less paddy yield than the check variety KSK-133 that gave 5246.9 kg/ha paddy yield.

Table 1: Analysis of variance for the influence of genotypes on grain yield of coarse rice at 7 locations

SOV	DF	Sum of square	Mean sum of square	F value	P value
Replication	2	711194	355597		
Location	6	2.113E+08	3.521E+07	96.59	0.0001
Error replication location	12	4375223	364602		
Entries	7	2.403E+07	3432648	8.79	0.0001
Location entries	42	9.623E+07	2291279	5.87	0.0001
Error replication location entries	98	3.826E+07	390391		
Total	167	3.749E+08			

SOV: Sources of variation; DF: Degree of freedom; CV: Coefficient of variation; Grand Mean =5219.0; CV = 11.57

Table 2: Influence of genotypes on plant grain yield of coarse rice at 7 locations

Locations Entries	NARC	DOKRI	SUJAWAL	KALA SHAH KAKU	A.R FARM	TANDOJAM	NIAB	Entries means
DR-59	4733.3 bc	7750 a	7079.3 a	5530.1 b	5004.0 c	8840 a	3389.4 bc	6046.6 a
NARC-13-1	6993.3 a	5416 bc	5924.0 bc	6471.1 a	4296.0 e	5870 e	3277.9 c	5464.1 b
KSK-133	5946.7 abc	3500 d	5464.7 c	5301.0 b	5088.0 a	8110 b	346.3 bc	5268.2 bc
KSK-463	6520.0 ab	3916 bcd	5481.7 c	4549.2 c	4813.0 d	7780 c	3667.6 a	5246.9 bc
RUSTUM DHAN	5880.0 abc	4500 bcd	6174.3 b	4002.1 c	4708.0 e	7870 bc	2661.1 e	5113.6 bcd
KSK-462	4620.0 bc	5625 b	5460.0 c	4503.4 c	5033.0 b	6010 f	3557.6 ab	4973.8 cd
ABBASI-1	5160.0 abc	5250 bcd	5937.0 bc	5951.8 ab	3908.0 g	5640 gh	2432.4 f	4898.0 cd
ABBASI-II	4313.3 c	3666 cd	5694.0 bc	5720.5 b	3896.3 h	6900 d	3039.5 d	4012.7d
Location means	5520.8 c	4953.1 de	5902.0 b	5253.3 cd	4593.3 e	7130.0 a	3186.6 f	

Means with the same case letter do not differ significantly at p<0.05.

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