

A paddy variety GNR-3 suitable for value addition

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ABSTRACT

In Gujarat, rice occupies about 5 % of the gross cropped area and is being grown on about 6.5 to 7.0 lakh hectares, of which about 50-60 % is under low land (transplanted) and remaining 40-45 % under upland rice (drilled) situation.. Gurjari is the most popular rice variety in low land. As it is suitable for pohnu preparation, it fetches higher price in south Gujarat. South Gujarat in general and Navsari in particular has the maximum number of pohnu mills. Particularly from Navsari, 500 tones of pohnu are being transported daily to other parts of the country. In view of superior quality of pohnu being produced in Navsari area, it fetches premium price in national market. Because of its suitability of Gurjari for pohnu making, its demand is tremendous and there are ample chances to increase the demand for Gurjari type rice variety. Hence, it is necessary to develop such rice variety which is suitable for pohnu preparation of superior quality, so that the farmers can have a viable option for Gurjari variety. This will also lead to multi-culture combination of rice varieties. In this context, the proposed variety GNR-3 (Gujarat Navsari Rice-3) derived from a cross IR-28 x GR-4 was bulked from the advanced generation in the year 2007, which is similar to Gurjari and appear suitable for pohnu making. The proposed genotype was evaluated in various categories of trial from 2007 to 2011 in South and Middle Gujarat. The genotype performed very well under South Gujarat condition and it exhibited 19.4% grain yield superiority over Gurjari under irrigated transplanted condition and 29.3% grain yield advantage over GR-7 under rainfed transplanted condition. With respect to pest and diseases, it was found almost similar to Gurjari. The opinion from the pohnu mill owners was obtained for judging its suitability for preparing pohnu. As per their opinion, this genotype was found to be suitable for pohnu preparation and specially released as a suitable alternative to Gurjari.

Key words: genotype, coarse grain, GNR-3, pohnu

Explosive increase in the world population, deterioration of arable land and availability of quality irrigation water are forcing crop production into more and more marginal environments facing abiotic stresses, limiting the adaptation and productivity of staple food crops (Sharma and Goyal 2003). As rice is one of the major food crops, development of new cultivars with coarse grain type with higher yield will undoubtedly have an important effect on food production in Gujarat as general and South Gujarat in particular. There is huge demand

of coarse grain type in South Gujarat as maximum number of pohnu mills were situated in South Gujarat particularly in Navsari area. Gurjari was only the option for farmers of South Gujarat which released fifteen years back. The demand of the farmers of this region since long back for such a rice variety suitable for pohnu preparation of superior quality with high yield potential and other desirable characters. In this context, the proposed genotype, GNR-3 derived from a cross IR-28 x GR-4 was bulked from the advance generation

in the year 2007.

Hybridization was carried out between IR-28 and GR-4 at Main Paddy Research Station, Soil and Water Management Research Unit, Navsari Agricultural University, Navsari, Gujarat during *Kharif*, 2003. The female parent IR-28 is a cross between IR-833-6-1-1-1 and IR1561-149-1. The donor parent, GR-4 is a fine grain variety derived from a cross between Zenia and IR-8-246. The variety GNR-3 was bulked in its F₅ generation during *Kharif*, 2006. GNR-3 was evaluated for its performance from 2007 to 2011 in the small scale varietal trials (SSVT), large scale varietal trial (LSVT) and District trials at different locations under transplanted field condition of South Gujarat. The yield data of various trials were statistically analysed according to Panse and Sukhatme (1967).

GNR-3 (IR-28 x GR-4) was evaluated at different locations of South Gujarat. The culture, GNR-3 performed very well at all the locations of South Gujarat (Table 1) where it exhibited 5998 kg/ha grain

Table 1. Comparative performance of paddy culture GNR-3 under irrigated transplanted condition at different locations of South Gujarat

Expt. and Year	Location	Grain yield (kg/ha)			C D	CV %
		GNR-3	Gurjari	Jaya		
PET						
Khari-2007	Navsari	6159	5615#	-	1115	9.7
Mean		6159	5615	-		
SSVT						
Khari-2008	Navsari	6749*	5185	-	586	6.8
	Vyara	4900	4502	-	869	12.4
Mean		5825	4844	-		
LSVT						
Khari-2009	Navsari	5050	-	4747	729	10.0
	Vyara	6076	-	6565	545	5.7
Mean		5937	-	5571		
LSVT						
Khari-2010	Navsari	6111*	5243	-	858	8.8
	Vyara	5490*	4519	-	433	5.2
	Waghai	7544*	6252	-	828	7.3
Mean		6382	5338	-		
LSVT						
Khari-2011	Navsari	5744*	4444	-	896	10.9
	Vyara	5356*	4290	-	679	8.56
	Waghai	5922*	4550	-	772	8.79
Mean		5674	4428	-		
Over All South-Gujarat Average		5918	4955			
% increase over-check Gurjari		19.4				

yield on average basis with the yield advantage of 19.4% per cent over Gurjari (4955 kg/ha) under irrigated transplanted condition.

The same culture was evaluated under rainfed transplanted condition at different locations of South Gujarat with rainfed transplanted recommended variety GR-7, where it exhibited 5698 kg/ha grain yield on average basis with the yield advantage of 29.3% over GR-7 (4408 kg/ha on average basis) (Table 2).

The variety was nominated in AICRIP trial and was tested during *khari-2010* and *khari-2011* under IVT-IME and AVT 1-IME respectively. On pooled basis, it recorded 5097 kg grain yield per hectare and remained at par with national, regional and local checks (Table 3). While in case of Western region (R₄) it recorded 5710 kg grain yield per hectare on pooled basis and found superior over national, regional and local checks (Table 4). On the basis of its better performance in western region (R₄), the proposed genotype was promoted to AVT 2-IME.

During 2010 and 2011, under irrigated transplanted condition, GNR-3 was tested in district trials where it registered a mean grain yield of 5869 kg/ha with an increased grain yield of 17 per cent over coarse grain variety, Gurjari (4955 kg/ha) (Table 5). In case of rainfed transplanted condition in district

Table 2. Comparative performance of paddy culture GNR-3 at different locations of South Gujarat under rainfed transplanted condition

Expt. and Year	Location	Grain yield (kg/ha)		CD	CV %
		GNR-3	GR-7		
LSVT (RFTP) 2010	Vyara	3475*	3047	299	6.21
	Waghai	6536*	3268	1215	13.2
	Vanarasi	5934*	4819	738	7.3
LSVT (RFTP) 2011	Vyara	5673*	4760	587	6.7
	Waghai	6354*	4810	776	9.2
	Vanarasi	6217	5747	547	5.32
Mean		5698	4408		
% increase over-check GR-7		29.3			

Table 3. Performance of IET- 22103 (GNR-3) at National Level

Expt. & year	Locations	Grain yield (kg/ha)	% increase over		
			NC	RC	LC
IVT-IME					
Khari-2010	28	5164	17.36	12.75	12.82
AVT 1-IME					
Khari-2011	40	5030	2.67	-	-
Average		5097			

Table 4. Performance of IET-22103 (GNR-3) in Western Region

Expt. & year	Locations	Grain yield (kg/ha)	% increase over		
			NC	RC	LC
IVT-IME					
Khariif-2010	5	5482	48.16	37.29	24.02
mAVT 1-IME					
Khariif-2011	4	5938	14.70	7.20	10.25
Average		5710			

R4: 1. Maharashtra:- Karjat, Sakoli and Sindewahi

2. Gujarat:- Navsari and Nawagam

trial, it exhibited a grain yield of 5748 kg/ha⁻¹ during 2011 with an increase in grain yield of 17.7 per cent over GR-7 (4882 kg/ha⁻¹) (Table 6).

The rice variety GNR-3 is semi-tall in plant stature (121-125 cm plant height), medium in duration (120-125 days), non-lodging and non-shattering grain type (Table 7). The culture GNR-3 possess 9.59 mm grain length with the grain width of 2.97 mm having the L/B ratio of 3.23 which is more than enough to categorize it in to coarse grain group. It has higher panicle length (23-26 cm) with more test weight (31-33g) having kernel length: breadth ratio of 2.70. It has a milling outturn of 77.3 % with 65.5 % head rice recovery. It fetches better price because of its white kernel color and good pohuva making quality in addition to potential of wide acceptability. The variety GNR-3 screened for its reaction to various diseases and insect

Table 6. Comparative performance of paddy culture GNR-3 in district trials at different locations of South Gujarat under rainfed transplanted condition

Trial/Year	Location	GNR-3	GR-7	% Increase over GR-7
District Trial	Vyara	5613	4588	
Khariif-2011	Waghahi	6560	4970	17.7
	Vanarasi	5070	5090	
Overall Average		5748	4882	

Table 7. Salient features of GNR-3

Grain quality characteristics:	
Aroma test	: Nil
Vol. Exp.	: 2.87
Water uptake (ml)	: 335
Amylose content (%)	: 21.1
Hulling recovery (%)	: 80.0
Milling recovery (%)	: 77.27
HRR (%)	: 65.5
Kernel Length (mm)	: 7.10
Kernel Breadth	: 2.62
L/B ratio	: 2.70

Table 5. Comparative performance of paddy culture GNR-3 in district trials at different locations of South Gujarat under irrigated transplanted condition

Trial/Year	Location	GNR-3	Gurjari	% Increase over Gurjari	
District trial	Navsari	6050	5370		
	Khariif- 2010	Vyara	5760	5040	15.3
	Waghahi	6480	5450		
District Trial	Navsari	6250	5160		
	Khariif-2011	Vyara	5824	4928	18.0
	Waghahi	6280	4860		
	Bardoli	4850	4499		
	Danti	5460	4841		
Overall Average		5869	5018	16.95	

pests in state and national testing programmes where it showed resistance against BLB, blast and moderate resistance to sheath rot, grain discoloration, leaf folder and stem borer.

Trader's opinion for market price of the same variety has also been obtained from different co-operatives and pohuva mill owners of South Gujarat. Looking to its suitability for pohuva preparation traders pays premium price of this variety over Gurjari (Table 8).

Table 8. Traders opinion for the market price of paddy culture NVSR-178 (Rs. per quintal)

Sr.	Name of the Traders	GNR-3	Gurjari
1	Sharvoday khedut Seva S. Mandali Ltd., Mangrol, Maroli.	1250	1179
2	Shree Maroli Bazar V. V. K. S. , MandaliMaroli Bazar, Navsari	1257	1125
3	Shree Navsari Khedut Sahakari Society Ltd., Maneklal Road, Navsari	1143	1125
4	Navsari Taluka Co-operative Purchase Sale Union Ltd., Jalalpor, Navsari	1179	1179
5	Shree Ganesh Rice Mill, Bardoli Road, Kabilpore	1232	1196
6	Shree Ganesh Agro Industries, Kabilpore,Navsari	1179	1179
Average (Rate in Rs.)		1207	1164
Average yield (kg/ha)		6158	5219
Net income per hectare (Rate in Rs.)		74327	60749
Net profit in comparison to checks in Rs.- and per cent		13578	(22%)

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