

Rice hybrids suitable for dry direct seeding in India

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Rice Science for a Better World



Multi-location Evaluation (DSR)- CSISA

# of entries tested	2009	2010	2011
Varieties/ Breeding lines	58	38	38
Hybrids	37	38	54
Total	60E+35ME	36E+16ME+24M	24E+32ME+36M

Locations: CSSRI , Karnal ; PAU,Ludhiana ;GBPUAT, Pantnagar ; ICAR complex, Patna and Barwale Foundation, Hyderabad, Seed rate: 20 kg/ha **Replication : Three Design : Alfa Lattice**

Crop Establishment : Mechanized Dry Direct seeding Weed control : Pre emergent application of Pendimethaline and post emergent application of Bispyribac sodium



Rice





Promising hybrids based on 2009 & 2010 combined data

Entry	Maturity	Mean yield(t/ha)	% Advt. over check	Company	
PA 6129	Early	8.0	45	Bayer crop Science	
PD-16	Early	7.1	35	GBPUA&T	
NK 6303	Mid Early	8.5	29	Syngenta	
NK 6754	Mid Early	8.1	24	Syngenta	
Early Check: Govind , Medium-early Check: PR 115 in 2009					

&IR 64 in 2010



IRRI

1960-20

Promising hybrids identified (2010- wet season)

IRRI

1960-20				% Advt.			
			Mean	over			
	Entry	Maturity	yield(t/ha)	check	Range	Company	
23	US 323	Early	7.5	24	5.8-8.4	US Agri. Genetics	
	JKRH 2007	Early	6.9	14	5.6-7.9	JK seeds	
	NK 6303	Mid Early	8.3	61	6.8-9.2	Syngenta	
		Mid Early					
	NK 6754		8.2	59	6.7-8.9	Syngenta	
	MRP 5403	Medium	6.7	15	5.7-7.9	МАНҮСО	
	PAC 832	Medium	6.6	14	5.8-7.5	Advanta	
Rice	Ea	arly Check:	Govind , Me Medium Che	dium-ear ck: NDR (ly Check: 359	IR 64	
for a Bc							
Rice Science for a Be Word	NK 6303 NK 6754 MRP 5403 PAC 832 Ea	Mid Early Mid Early Medium Medium arly Check:	8.3 8.2 6.7 6.6 Govind , Me Vedium Che	61 59 15 14 dium-ear ck: NDR 3	6.8-9.2 6.7-8.9 5.7-7.9 5.8-7.5 ly Check: 359	Syngenta Syngenta MAHYCO Advanta IR 64	a D

Promising hybrids identified (2011- wet season)

IRRI

1960-20				% Advt.		
22			Mean	over		
A.	Entry	Maturity	yield(t/ha)	check	Range	Company
53	US 323	Early	6.9	37	5.2-7.8	US Agri. Genetics
	RH 257	Early	6.7	35	5.1-7.7	Dev Gen
	PAC 837	Mid Early	7.3	40	6.6-7.7	Advanta
	RH 1531	Mid Early	6.9	34	6.1-7.8	Dev Gen
	Indam 200-028	Medium	6.6	21	4.2-9.4	Indo American
	DRH 836	Medium	6.4	17	4.5-7.1	Meta Helics
Rice	Earl	y Check: G	<mark>ovind</mark> , Medi Medium Che	ium-early ck: NDR (Check:M [*] 359	TU1010
for a Bc						
WOrl	d					



Promising hybrids based on 2010 & 2011 combined

IRRI

1960-20

			Mean	% Advt.	
E	Entry	Maturity	yield(t/ha)	check	Company
5	US 323	Early	7.2	31	US Agri. Genetics
	RH 257	Early	6.8	26	Dev Gen
	PAC 837	Mid Early	7.5	45	Advanta
	RH 1531	Mid Early	7.5	45	Dev Gen
	Indam 200-028	Medium	6.5	17	Indo American
	MRP 5402	Medium	6.3	13	МАНУСО
Rice	Early C	heck: Govind Mediu	, Medium-ea m Check: ND	rly Check:l R 359	MTU1010
for a Bc Worl	d				

Promising hybrids :Zero till condition , Hyderabad (2009)

		Mean	% Advt.	
Entry	Maturity	yield(t/ha)	check	Company
PA 6129	Early	5.3	36	Bayer Crop Science
P09-023	Early	5.3	36	Pioneer
US 310	Early	5.2	35	US Ari. Seeds
NK 6303	Mid Early	6.15	54	Svngenta
NK 6320	Mid Early	6.10	52	Syngenta
Arize Tei	Mid Early	5.9	46	Bayer Crop Science



IRRI

1960-20

Early Check: Rasi, Medium-early Check: Krishna Hamsa

Promising hybrids : Zero till condition, Hyderabad (2011)

1960-20				% Advt.	
The	Entry	Maturity	Mean yield(t/ha)	over check	Company
	US 312	Mid Early	5.9	34	US Agri. Seeds
	PAC 837	Mid Early	5.5	25	Advanta
	PAC 801	Mid Early	5.3	21	Advanta
	RH 664	Mid Early	5.3	21	Dev Gen
N.		Mid Early			
			4.4		Check

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IRRI

Screening for Zinc/Fe deficiency tolerance under DSR

- **1.** More than 100 entries screened a few are tolerant
- 2. In general hybrids are more tolerant as compared to varieties/ breeding lines
- 3. Hybrids- JKRH 3333, MRP 5402, PAC 8512. One breeding line from IRRI, IR 06A150 was tolerant.





60 - 2010



Significant root and shoot growth : Hybrids Vs Varieties

Hybrids	Varieties	Difference
15.67	13.63	2.03
0.22	0.16	0.06
27.58	24.54	3.04
3.71	2.65	1.06
81.51	62.25	19.26
77.50	54.5	23.0
61.42	44.64	16.77
	Hybrids 15.67 0.22 27.58 3.71 81.51 77.50 61.42	HybridsVarieties15.6713.630.220.1627.5824.543.712.6581.5162.2577.5054.561.4244.64

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Good machines for land leveling and dry direct sowing of rice



500-2010

Major Drivers of DSR technology

- Acute shortage of labour- cost saving of USD 120 (Rs: 6000 per ha.)
- Large scale laser leveling : Better crop establishment and efficient water management(10-20 water % saving with any out yield penalty)
- 3. Better weed management : Effective pre and post emergent herbicides
- 4. Multi- crop direct seeding machines for precise seeding and fertilizer placement
- 5. Innovative farmers, pro-active co-operatives and NGOs to popularize the technology
- 6. Very good private-public partnership
- 7. No yield penalty in rice and increased yield of wheat ---- higher system productivity in the ricewheat cropping system of India

Dry & machine sown DSR in Farmers field (2011)

- 1. Area under DSR: 250 in(2009) to 20000 acres (2011)-----Haryana
- 2. Seed rate : 6-7 kg/acre (very good machines)
- 3. Area under DSR (acres): 2500 in (2009) to 40,000 (2011)------Punjab
- 4. Hybrids as Early rice ---Sugarcane or Early rice---Potato---- Maize
- 5. Hybrids : PA 6129 & RH 257

60 - 2010

Varieties: P 1121,HKR127



Conclusion

- 1. Hybrids perform better under dry DSR
- 2. Heterozygosity per se & genetic plasticity of hybrids make them more suitable for DSR
- 3. Faster crop establishment , early stage seedling vigor and better root & shoot growth of hybrids are the added advantages of hybrids under DSR
- 4. Multi- crop direct seeding machines for precise seeding and fertilizer placement has helped in reducing the seed rate to 15 kg/ha.
- 5. Dry direct seeding is a highly profitable and sustainable CA based technology in the near future.

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