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## ASD20 (AS89044) : A SHORT DURATION HIGH YIELDING RICE VARIETY FOR TAMIL NADU

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### ABSTRACT

ASD 20, derivative of IR 18348-38-3/IR 25863/IR 58 was released in January 1997 for general cultivation in Tamil Nadu. It recorded a mean yield of 6.7 t/ha in 110 days with 6.0 (ASD 16) to 21.2 per cent (IR 50) increased yield in *Kar* season. During late *Pishanam*, ASD 20 recorded a mean yield of 5.6 t/ha in 108 days with 12.9 (ASD 16) to 25.4 per cent (ADT 36) increased yield over checks. Its overall mean yield in 320 trials (1988-1996) was 5.7 t/ha with 5.6 (ADT 36) to 9.6 per cent (IR 50/ASD 18) increased yield over checks. The biological yield of ASD 20 was 18.5 t/ha (6.7 t/ha of grain; 11.8 t/ha of straw) and its potential grain yield was 9.7 t/ha. It is semidwarf in stature with long slender white rice. ASD 20 is resistant to stem borer, leaf folder, sheath rot and moderately resistant to blast and RTV. ASD 20 can be sown in April-July, October-November and December-January throughout Tamil Nadu and is the best alternative to IR 50.

**KEY WORDS :** Rice, early duration, high yielding long slender rice

IR50 is a high yielding long slender white rice variety with good cooking quality. But it is highly susceptible to blast and brown planthopper and not suitable for late *Pishanam*/late *Thaladi* seasons. Hence, to have a better variety to replace IR50 with high yield coupled with resistance to pests and diseases and suitable for late planted situations, a project was initiated at the Rice Research Station, Ambasamudram. International Rice Testing Programme (IRTP) co-ordinated by the International Rice Research Institute (IRRI), Philippines, provides World's elite germplasm around the world either for direct introduction or for use in hybridisation programme to develop varieties for specific conditions. Among the elite germplasm received through 16th IRYN(E) 1988, IR 44595-70-2-3-3 was identified as promising entry against IR 50, subjected to further selection and AS 89044 was identified.

### MATERIALS AND METHODS

ASD 20 (AS 89044) is a derivative of IR 18348-38-3/IR 25863-61-3- 2/IR 58 and the cross was effected at IRRI Philippines and the culture IR 44595-70-2-3-3 received through IRTP in 1988 was subjected to further selection at the Rice Research

Station, Ambasamudram and AS 89044 was identified. The culture AS 89044 was evaluated for its performance from 1988 to 1996 and also tested in multilocation trial (MLT), adaptive research trial (ART), minikit trial (MKT), and in national trial (NT).

### RESULTS AND DISCUSSION

At the Rice Research Station, Ambasamudram, ASD 20 recorded a mean grain yield of 6.7 t/ha in 110 days during *kar* season (June - September 1989 to 1996) registering an increase of 21.2, 17.9, 14.0, 6.0 and 8.1 per cent over IR 50, ASD 18, TKM 9, ASD 16 and ADT 36 respectively. During late *Pishanam* (October - February), ASD 20 registered a mean yield of 5.6 t/ha in 108 days (1990-91 to 1995-96) which was 25.4, 20.4, 12.9, 19.9 and 19.5 per cent over ADT 36, ASD 18, ASD 16 TKM 9 and IR 50 respectively (Table 1).

ASD 20 was compared under different levels of nitrogen viz., 50, 100, 150 and 200 kg/ha for four years in *Kar* season (1991 to 1994). The results showed that 150 N/ha was the economical dose for ASD 20 since the recorded mean yield was 6.4 t/ha (1991-1994) which was on par with 200 kg N/ha (6.7 t/ha) Table 2.)

Table 1. Mean performance of ASD 20 (AS89044) in different trials (1988 to 1996)

Trial and year	No. of trials	ASD 20	Mean grain yield (t/ha)						National Annada	checks Tulasi
			Local checks							
			ADT 36	IR 50	ASD 16	ASD 18	TKM 9	ADT 42		
Rice Research Station										
Ambasamudram										
Kharif season (1988 - 1996)	11	6.7	6.2	5.5	6.3	5.7	5.9	6.6	-	-
% over checks			8.1	21.2	6.0	17.9	14.0	2.1	-	-
Late Pishanam (1990-91 to 1995-96)	6	5.6	4.5	4.7	5.0	4.7	4.7	-	-	-
% over checks			24.5	19.5	12.9	20.4	19.9	-	-	-
Multilocation trials (1991 and 1992)	19	4.8	-	4.5	-	4.4	-	4.9	-	-
% over checks			-	8.2	-	8.9	-	(-)1.8	-	-
Adaptive Research Trials (1992, 1993 and 1996)	197	5.5	5.4	5.3	5.9	5.3	-	5.8	-	-
% over checks			3.1	4.5	(-)6.1	5.3	-	(-)4.2	-	-
National Trials (1992 to 1994)	25	5.3	-	-	-	-	-	-	4.5	4.6
% over checks			-	-	-	-	-	-	17.7	15.5
Minikit trials (1992 and 1996)	65	6.3	(minimum range)	3.9 to 6.1 t/ha;					Maximum range 6.1 to 9.1 t/ha	
Over all mean yield (1988-1996)	320	5.7	5.4	5.2	5.9	5.2	5.7	5.7	4.5	4.6
% increase/decrease over checks			5.6	9.6	(-)3.4	9.6	0	0	26.7	23.9

During 1991 and 1992, ASD 20 was tested in MILT in different research stations where it registered a mean grain yield of 4.8 t/ha in 110 days (19 trials) with 8.9 and 8.2 per cent increased yield over ASD 18 and IR 50 by securing first rank in 1991 and third rank in 1992 among 11 entires in nine centres.

In the ART conducted in 197 locations for three years (1992, 1993 and 1996) in 16 district of Tamil Nadu, ASD 20 recorded a mean grain yield of 5.5 t/ha with 3.1, 4.5 and 5.3 per cent increased yield over ADT 36, IR 50 and ASD 18 respectively (Table 1). ASD 20 was higher yielding than ASD 18 in 76 out of 140 trials (52.3%), ADT 36 in 73 out of 125 trials (58.4%) and IR 50 in 69 out of 126 trials (54.8%).

In MKT conducted at 65 centres during 1992-93 and 1996-97 in Chidambaram and Nelli Kattabomman districts, ASD 20 recorded a mean

yield of 6.3 t/ha (Table 1). In the 25 NT conducted during Kharif 1992 to 1994, ASD 20 (IET13181) registered a mean yield of 5.3 t/ha (AICRIP 1992,1993,1994) with 15.5 and 17.7 per cent increased yield over national checks Tulasi and Annada respectively (Table 1). The overall mean yield of ASD 20 was 5.7 t/ha (mean for 320 trials) with 5.6, 9.6 and 9.6 per cent increased yield over ADT 36, ASD 18 and IR 50 respectively. The total biomass production of ASD 20 was 18.5 t/ha (6.7 t grains and 11.8 t straw). Its potential grain yield was 9.7 t/ha. ASD 20 is resistant to stem borer, leaf folder and sheath rot (SLTP, 1994) and moderately resistant to blast and RTV. It has long slender white rice with good cooking quality. Protein content of ASD 20 (8.0%) is higher than IR 50 (7.6%). Its milling recovery to total rough rice is 68.5 per cent as against 66.9 per cent in IR 50 and its 1000-grain weight is 22.1 g. It is semidwarf in stature (89cm) and matures in 110 days (110-115 days).

ASD 20 is recommended for general cultivation in Kar/Kuruvai/Sornavari (April-July), late Pishanam/late Thaladi (October-November) and Navarai/summer (December-January) seasons through out Tamil Nadu in place of ADT 36, ADT 42, ASD 16, ASD 18, TKM 9 and IR 50. It is the best alternative to IR 50.

Table 2. Manurial trial on ASD 20 at Rice Research Station, Ambasamudram (1991 to 1994)

N level (kg/ha)	Grain yield (t/ha)				
	1991	1992	1993	1994	Mean
0	3.8	4.3	5.3	4.5	4.5
50	5.3	5.8	5.6	5.5	5.6
100	5.5	6.1	6.0	5.6	5.8
150	6.3	6.9	6.7	5.8	6.4
200	6.8	7.3	6.5	6.1	6.7
CD (P=0.05)	0.61	9.34	0.31	0.56	

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## RESEARCH NOTES

## GENOTYPIC AND PHENOTYPIC VARIABILITY, HERITABILITY AND GENETIC ADVANCE IN SOME IMPORTANT TRAITS IN RICE

Rice production in India has shown remarkable increase in the past two decades due to spread of high yielding modern varieties. These modern rice varieties though yield well above 5-6 t/ha, yield plateau has been reached. The high level of genotypic and phenotypic variability is essential for selection of traits. Moreover, heritability estimate along with genetic advance were more useful than heritability estimate alone, in predicting the resultant effect for the selection of the best individual from, segregating population. Hence, in the present study two male sterile line (IR 58025 A and IR 62829 A) and 18 varieties of rice were crossed in L x T design. The resultant 36 hybrids were raised in randomised block design and observations recorded on ten important biometrical characters of rice. Genotypic co-efficient of variation (GCV) and phenotypic co-efficient of variation (PCV) were calculated by using routine methods. The estimate of PCV and GCV were classified as low, medium and high (Sivasubramanian and Madhavamenon, 1973). (Less than 10% = low; 10-20% = moderate; greater than 20% = high). Heritability estimates (broad sense) for yield components of hybrids were worked out following Singh and Chaudhary (1985).

The heritability was categorised as suggested by Robinson *et al.* (1949). (0-30% = low; 31-60% = moderate; above 60% = high). Also genetic advance was estimated by adopting the method of Johnson *et al.* (1955) (more than 20% = high; 10-20% = moderate; less than 10% = low).

Moderate genotypic and phenotypic co-efficient of variability (Table 1) was observed for days to 50 per cent flowering (10.82 and 10.92%), plant height (16.25 and 16.32%), number of spikelets per panicle (19.89 and 19.34%) spikelet fertility (13.79 and 14.63%) and 1000 grain weight (16.97 and 11.26%) indicating considerable amount of variability in  $F_1$  hybrids. Panicle length recorded low genotypic (9.64%) as well as phenotypic (9.99%) co-efficient of variability. This low variability may be due to the presence of both positive and negative alleles for panicle length in the population. High genotypic and phenotypic co-efficient of variability was observed for number of productive tillers per plant, number of filled grains per panicle and grain yield per plant indicating the control of genetic component for these traits, compared to environmental influence. High heritability was observed in plant height (99.15%) followed by days

Table 1. Estimates of variability, heritability and genetic advance

Character	GCV	PCV	$h^2$ (%)	GA as % of mean
Days to 50 per cent flowering	10.82	10.92	98.20	22.05
Plant height	16.25	16.32	99.15	33.29
Number of productive tillers per plant	21.67	21.87	98.19	44.15
Panicle length	9.64	9.99	93.19	19.14
Panicle exsertion	9.91	10.60	87.52	18.78
Number of spikelets per panicle	18.89	19.34	95.39	37.85
Number of filled grains per panicle	25.18	25.53	97.29	51.01
Spikelet fertility	13.79	14.63	88.94	26.82
1000 grain weight	10.97	11.26	94.78	22.04
Grain yield per plant	33.07	34.79	90.35	64.50

GCV : Genotypic co-efficient of variation ; PCV : Phenotypic co-efficient of variation