

Co-47 - A new short duration rice variety

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Abstract : CO 47 is a derivative of the cross IR 50 / CO 43. It is semidwarf (80-90 cm), non lodging and matures in 110-115 days. Average grain yield is 5.8 t ha⁻¹. It possesses medium slender translucent white rice, with acceptable cooking qualities. It is resistant to blast disease. The rice variety, CO 47 is suitable for Sornavari, Kar and Kuruvai seasons and is a best alternative for ASD 18 and ADT 36 and it is recommended for replacing TKM 9 and IR 50. (*Key words : Rice, CO 47, Blast resistant, Short duration*)

Tamil Nadu is the one of the traditional rice growing states, which has exploited the potential of high yielding varieties and technologies. During 1997-98 rice was grown in about 22 lakh ha with a production of 73.56 lakh tonnes and productivity of 3.3 t ha⁻¹. At present, the area under rice cultivation is diminishing and there is an utmost need for increasing the productivity of the crop. Development of high yielding varieties with pest and disease resistance will play a major role in increasing the productivity. With this objective, Co 47 short duration rice variety was developed by pedigree breeding, which involved hybridization of IR 50 / CO 43 with vigorous selection.

Materials and Methods

The variety CO 47, was developed at the Department of Rice, TNAU, Coimbatore by pedigree breeding. Crossing was effected in the summer, 1989 and single plant selection in F₂ was made in *rabi* 1989-90. Homozygous culture was developed in 1991. During 1991-94, the yield potential was assessed as a culture *viz.*, TNAU 91002. Its productivity was tested in adaptability trials *viz.*, Multi Location Trial (1995-96), AICRIP trial (1994-97) and Adaptive Research Trail (1996-98). This culture TNAU 91002 has also been recognized for its high yield potential besides other desirable attributes in All India Trials (IET 14298) and based on the performance over the past four years (1994-97) it has been recommended for evaluation in minikit trials during 1999-2000.

Results and Discussion

The culture TNAU 91002 was tested in four yield trials from 1991-94 during *kharif* seasons in the Department of Rice, Coimbatore. It has recorded an average grain yield of 6292 kg ha⁻¹ in 111 days with an increase of 17.1, 20.0, 23.9 and 20.0 per

cent over IR 50, ASD 18, TKM 9 and ADT 36 respectively (Table 1).

The culture TNAU 91002 was evaluated in Multi Location Trial (MLT) during 1995 in 9 locations and during 1996 in 8 locations in *kharif* season. In both years, its yield was consistently superior than the checks TKM 9, IR 50 and ASD 18 and ranked first. An average of 17 MLT trials in two years revealed that its mean grain yield was 5790 kg ha⁻¹ which was 10.3, 10.5 and 12.3 per cent increase over that of TKM9, ASD 18 and IR 50 respectively (Table 2).

The stability in yield potential of TNAU 91002 was confirmed through 133 Adaptive Research Trials conducted in two years *viz.*, 1996-97 (69 locations in 13 districts) and 1997-98 (64 locations in 15 districts). The results of 133 locations revealed that the culture TNAU 91002 was superior than the check variety, by registering an increased yield of 6.6 per cent over ADT 36. It has recorded an average yield of 5824 kg ha⁻¹ in 166 days duration (Table 3).

In All India Co-ordinated Trials (AICRIP), the culture TNAU 91002 (IET 14298) was tested from 1994 to 1997 in *Kharif* season. The culture has been recommended for minikit trials to be conducted during 1999-2000 and its performance was found to be consistently superior in all the four years. During 1994, it ranked first in Andhra Pradesh, second in Tamil Nadu and first in overall state mean. During 1996, it ranked first in Andhra Pradesh and Gujarat and second in overall state mean. During 1997, it ranked first in Gujarat, second in Andhra Pradesh and Haryana and third in overall state mean. It had recorded 11.0, 11.4, 11.0 and 10.26 per cent increased yield over the national check Tulsi during the years 1994, 1995, 1996 and 1997 respectively (Table 4).

The results of 154 trials conducted over six years (Table 5) in different environments of Tamil Nadu indicated that it has high yield potential. The highest yield of 12,500 kg ha⁻¹ was recorded in Anamalai, Coimbatore district. The mean grain yield of the variety CO 47 was 5832 kg ha⁻¹. It out yielded the checks ADT 36 and IR 50 by 7.0 and 22.2 per cent respectively. The biological yield of this culture was 1533 kg ha⁻¹ comprising 5832 of grain yield and 9500 of straw yield.

CO 47 is semidwarf (80 - 92 cm) in stature with high tillering ability and matures in 110 - 115 days. It responds to normal fertiliser dose of 125 : 50 : 50 NPK kg ha⁻¹. It is non-lodging and non-shattering. It is suitable for cultivation in *Sornavari*/

Kar/Kuruvai seasons in Tamil Nadu. The grain is medium slender in size with translucent appealing white rice. The hulling percentage is 71.8. The percentage of milled (polished rice to the total rough rice (Paddy) is 66.1. Its head rice recovery has consistently been more than 55 per cent. It has desirable cook characters with high gelatinization temperature and high amylose content (Table 6). It is also resistant to blast disease (Table 7).

Considering all the desirable attributes and high yielding potential, the rice culture TNAU 91002 was released as CO 47 during 1999 in Tamil Nadu.

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Table 1. Grain yield (kg ha⁻¹) of CO 47 (TNAU 91002) at Paddy Breeding Station, Coimbatore (1991-1994 *Kharif* season)

S. No.	Trial	Year and season	TNAU 91002	ASD 18	IR 50	TKM 9	ADT 36
1	Observational Yield Trial (OYT)	1991(K)	4731(115)	3763(105)	4247(110)	3925(108)	4056(112)
2	Preliminary Yield Trial (PYT)	1992(K)	6017(109)	5352(103)	5094(105)	4946(102)	5254(105)
3	Comparative Yield Trial (CYT)	1993(K)	7091(105)	6165(106)	6433(113)	6311(111)	6033(108)
4	Advanced Yield Trial (AYT)	1994(K)	7330(114)	5690(113)	5715(111)	5130(108)	5635(110)
	Mean		6292(111)	5243(107)	5372(110)	5073(107)	5245(109)

Figures in the parenthesis indicate duration in days

Table 2. Grain yield (kg ha⁻¹) of CO 47 (TNAU 91002) in Multilocation Trial Group 1 - 100-110 days

S. No.	Centre	Year	TNAU 91002	ASD 18	IR 50	TMK 9
1	Coimbatore	1995-96	6944 (121)	6272 (109)	5963 (102)	5952 (107)
		1996-97	6248 (121)	5524 (119)	4736 (119)	4912 (113)
2	Aduthurai	1995-96	4543 (118)	6234 (110)	4451 (106)	5303 (107)
		1996-97	5290 (116)	5230 (118)	3998 (110)	6075 (114)
3	Ambasamudram	1995-96	5995 (120)	5396 (120)	4076 (114)	5356 (115)
		1996-97	7411 (112)	8249 (110)	7184 (105)	86207 (107)
4	Madurai	1995-96	4050 (109)	3750 (107)	2950 (109)	4335 (109)
		1996-97*	3050 (109)	3135 (110)	3100 (100)	3035 (105)
5	Tirur	1996-97	5500 (110)	5850 (110)	4028 (105)	6750 (105)
6	Thanjavur	1996-97	5611 (114)	4667 (102)	3194 (106)	3861 (101)
7	Trichy	1995-96	5420 (114)	4068 (111)	5918 (111)	5997 (107)
		1996-97	5371 (120)	4029 (116)	1923 (110)	4974 (110)

Table 2. Contd...

S. No.	Centre	Year	TNAU 91002	ASD 18	IR 50	TMK 9	
8	Thiripathisaram	1995-96	6503 (110)	5591 (113)	4250 (105)	5851 (106)	
		1996-97	4589 (114)	4401 (112)	4165 (105)	4264 (106)	
9	Karaikal	1995-96	4489 (117)	4368 (113)	3606 (112)	5299 (112)	
		1996-97*	1720 (115)	1020 (125)	1580 (121)	1580 (120)	
10	Killikulan	1995-96	7587 (124)	7033 (121)	6454 (117)	6779 (112)	
		1996-97	5945 (118)	6778 (114)	6445 (105)	4612 (104)	
11	Paiyur	1995-96	6940 (114)	6575 (113)	6771 (120)	6573 (120)	
		Mean (9 locations)	1995-96	5830 (116)	5476 (113)	4938 (111)	5716 (111)
		Mean (8 locations)	1996-97	5746 (116)	5591 (113)	4459 (108)	5509 (108)
		Mean (17 locations)	1995-96	5790 (116)	5530 (113)	4686 (109)	5619 (110)
		+1996-97					
	% increase over	1995-96		10.47	12.29	10.30	
	check	+1996-97					

Figures in the parenthesis indicate duration in days

* Not included in the mean due to low experimental mean yield at Madurai and Karaikal

Table 3. Mean (1996-97 and 1997-98) yield performance of CO 47 (TNAU 91002) in Adaptive Research Trial

S. No.	Location	Year	No. of locations tested	No. of locations stands first	Grain Yield (kg ha ⁻¹)		
					TNAU 91002	ASD18	ADT36
1	Kancheepuram	(96-97)	4	2	5597(116)	6178(109)	5925(109)
		(97-98)	2	1	5470(118)	5919(113)	6044(113)
		Mean	6		5555(117)	6091(110)	5965(110)
2	Vellore	(96-97)	5	1	4914(130)	5703(122)	5078(122)
		(97-98)	5	3	5632(118)	4909(118)	5039(118)
		Mean	10		5273(124)	5306(120)	5059(120)
3	Thiruvannamalai	(96-97)	5	4	5177(122)	4582(112)	4731(124)
		(97-98)	5	2	5487(115)	4050(115)	4423(115)
		Mean	10		5332(118)	4316(114)	4577(120)
4	Cuddalore	(96-97)	5	2	4493(112)	4239(112)	4143(109)
		97-98	5	5	6162(108)	5276(107)	5227(105)
		Mean	10		5328(110)	4758(110)	4688(107)
5	Salem	96-97	5	2	4502(125)	4757(126)	4407(126)
		97-98	3	3	6188(116)	5853(113)	5080(115)
		Mean	8		5134(120)	5168(121)	4659(122)
6	Erode	96-97	5	4	7718(117)	6808(114)	7197(114)
		97-98	5	4	5843(116)	5317(114)	5078(115)
		Mean	10		6781(117)	6063(114)	6134(115)
7	Dharmapuri	97-98	5	4	6159(111)	5988(111)	5318(112)
8	Coimbatore	96-97	5	2	5883(112)	6214(113)	5564(113)
		97-98	5	3	7745(120)	7707(120)	7275(120)
		Mean	10		6814(116)	6961(117)	6420(117)
9	Dindigul	96-97	5	1	7015(108)	6614(106)	5690(106)
		97-98	5	5	6335(110)	5460(106)	6728(106)
		Mean	10		6675(109)	6037(106)	6209(106)
10	Madurai	96-97	5	1	6562(112)	6725(111)	6370(111)
		97-98	2		4900(119)	5338(112)	5125(109)
		Mean	7		6087(114)	6329(111)	6014(110)
11	Theni	97-98	3	1	6396(124)	6662(119)	5922(119)

S. No.	Location	Year	No. of locations tested	No. of locations stands first	Grain Yield (kg ha ⁻¹)		
					TNAU 91002	ASD18	ADT36
12	Pudukottai	96-97	5	2	45533(119)	4633(119)	4576(119)
		97-98	5	2	4877(116)	4405(111)	5207(111)
		Mean	10		4705(117)	4519(115)	4892(115)
13	Trichy	96-97	5	3	5243(113)	4707(111)	4586(111)
14	Thanjavur	97-98	5	4	5453(116)	5144	5169
15	Nagapattinam	96-97	5	1	4414(116)	4518(112)	4807(116)
16	Thirunelveli	96-97	5	1	7759(116)	6961(124)	8225(113)
		97-98	4	2	7470(122)	6733(121)	6885(118)
		Mean	9		7631(119)	6860(123)	7629(115)
17	Tuticorin	96-97	5	5	3712(111)	2898(111)	6014(111)
		97-98	5	5	7147(112)	6691(111)	4593(113)
		Mean	10		5430(112)	4793(111)	4593(113)
Mean over 133 locations (69+64)					5824(116)	5513(114)	5464(114)
Yield Increase Over checks						5.6%	6.6%

Figures in the parenthesis indicate duration in days

Table 4. Mean Grain Yield (kg ha⁻¹) CO 47 (TNAU 91002) (JET 14298) under AICRIP trials in different states (1994-1997)

Year & Season	States	TNAU 91002	TULSI
1994 Kharif	Tamil Nadu	5837 (2 nd Rank)	4951
	Kerala	5694	6805
	Andhra Pradesh	8083 (1 st Rank)	6928
	Gujarat	3745 (9 th Rank)	2867
	Mean	5421 (1 st Rank)	4884
1995 Kharif	Tamil Nadu	5221 (1 st Rank)	4182
	Kerala	3625 (3 rd Rank)	2750
	Karnataka	4807 (2 nd Rank)	5876
	Mean	4819	4234
1996 Kharif	Tamil Nadu	5582	5570
	Kerala	4935	4810
	Andhra Pradesh	4506 (1 st Rank)	2740
	Gujarat	5638 (1 st Rank)	4325
	Haryana	3866	4710
	Mean	5191 (2 nd Rank)	4675
1997 Kharif	Tamil Nadu	4108 (6 th Rank)	3973
	Karnataka	3555	4978
	Andhra Pradesh	5394 (2 nd Rank)	5108
	Gujarat	5495 (1 st Rank)	4392
	Haryana	4850 (2 nd Rank)	3482
	Mean	5226 (3 rd Rank)	5090

Table 5. Overall performance of CO 47 (TNAU 91002)

Particulars	No. of	TNAU 91002	ASD 18	IR 50	TKM 9	ADT 36
Station trial (1991-94)	4	6292	5243	5372	5078	5245
MLT (1995-96 & 1996-97)	17	5790	5530	4686	5619	-
ART (1996-97 & 1997-98)	133	5824	5513	-	-	5464
Average	154	5832	5507	4817	5516	5458

Per cent over ASD 18	: 5.9
Per cent over IR 50	: 22.2
Per cent over TKM 9	: 6.7
Per cent over ADT 36	: 7.0

Table 6. Quality characteristics of CO 47 (TNAU 91002)

Characters	Observations		
	TNAU 91002	ASD 18	ADT 36
Physical Characters			
Hulling percentag	71.8	75.5	73.0
Milling percentage	66.1	68.2	67.6
Head rice recovery (%)	55.3	52.4	56.5
Chemical characters			
Amylose content (%)	31.6	33.2	28.0
Alkali disintegration value (%)	2.0	2.0	2.5
Cooking quality			
Cooked volume (Cooked rice/100g)	320	280	320
Water uptake at 100°C (g/100g)	236.6	176	226.8
Elongation ratio	1.8	1.8	1.7

Table 7. Reaction of CO 47 (TNAU 91002) to major diseases

S. No.	Name of the disease	Centre	Year	Varietal score				
				TNAU 91002	ASD 18	IR 50	ADT 36	TKM 9
1	Blast	Coimbatore (FS)	1993(K)	0	NT	7	NT	NT
		Coimbatore (FS)	1993(R)	3	NT	7	NT	NT
		Coimbatore (FS)	1994(K)	3	NT	7	NT	NT
		Coimbatore (FS)	1994(R)	1	NT	7	NT	NT
		Coimbatore (FS)	1996	1	NT	9	NT	NT
		Coimbatore (GS)	1996	3	NT	9	3	7
		Aduthurai (GS)	1996	5	5	7	3	5
2	Bacterial blight	Aduthurai (FS)	1996	7	7	7	7	7
3	Rice tungro	Coimbatore (GS)	1996	32%	48%	36%	68%	68%
4	Sheathrot	Madurai (FS)	1996	5	5	5	5	5

GS Glass house screening
 FS Field screening
 NT Not tested