



## CO(R) 49: A High Yielding Medium Duration Fine Grain Rice Variety for Tamil Nadu

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**Medium duration rice culture CB 99019, a derivative of the cross C 20 / RNR 52147 was released as CO(R) 49 during the year 2008 as an alternative variety for BPT 5204. CO (R) 49 is a semi dwarf, non lodging erect plant type which matures in 135 days. In the overall analyses of 110 yield trials conducted for six years in different locations, it recorded a mean grain yield of 6041 Kg ha<sup>-1</sup> which was 6.5 per cent increase over BPT 5204. It is moderately resistant to stem borer, GLH, blast and RTD. It has medium slender white fine rice with an L/B ratio of 2.79 variety. Variety CO(R) 49 has superior cooking quality with intermediate amylose content (23.25%), soft gel consistency and moderate gelatinization temperature. The variety with higher yield, better pests and diseases resistance and superior cooking quality in comparison to the checks, IWP and BPT 5204 is suitable for cultivation during late samba / thaladi season in Tamil Nadu.**

**Key words:** CO(R) 49, fine grain rice, medium duration.

Rice is the predominant crop of Tamil Nadu that occupies about 30% of the total cropped area. At 2015 the area under rice will be around 19 lakh ha and the production 71 lakh tonnes at an annual growth rate of 4%. During the current year rice occupied 18.45 lakh ha with a production level of 56.65 lakh tones ([www.tn.gov.in/dept/agriculture/pdf](http://www.tn.gov.in/dept/agriculture/pdf)). Major challenge is to develop rice varieties with a quantum jump in the yield over that of existing rice varieties. (Bastia *et al.*, 2010). High yielding rice varieties play an important role in increasing the production level. During late samba / thaladi season of Tamil Nadu medium duration rice varieties like CO 43, Improved White Ponni (IWP), BPT 5204, ASD 19, ADT 39 and ADT(R) 46 are grown by the farmers of Tamil Nadu. IWP and BPT 5204 are grown extensively for their superior grain quality. Rice grain quality has become an important issue associated with domestic consumption and marketing of rice. In Tamil Nadu, consumers prefer medium slender grain type with intermediate amylose content, moderate gelatinization temperature and medium gel consistency. The gelatinization temperature, gel consistency and amylose content are the major rice traits that are directly related to cooking and eating quality. The gel consistency is responsible for softness and amylose content is responsible for texture and appearance in rice (Hossein Sabouri, 2009). The quality in rice is generally considered from the view point of milling quality, grain size, shape and appearance, and cooking characteristics. The

rice quality can be improved genetically through the improvement of grain quality (Abdus Salam Khan *et al.*, 2009). Presently farmers are cultivating fine grain rice varieties *viz.*, IWP and BPT 5204 which are susceptible to major pests and diseases and hence suitable variety for replacement is needed. Hence, the variety CO(R) 49 with high yield good cooking quality characteristics and pest and disease resistance is developed.

### Materials and Methods

CO(R) 49 is a hybrid derivative of the cross C20 / RNR 52147 effected during *Kharif* 1996 at Department of Rice, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore, stabilized in F<sub>4</sub> generation and fixed as CB 99019 during *Kharif* 1999. Performance of the culture was tested in different yield trials at Department of Rice, TNAU from 2001-2005 along with medium duration checks. Culture was tested in MLT-Quality Rice medium for three years in 2004- 05, 2005-06 and 2006-07 in different rice research stations of TNAU covering different ecosystems of Tamil Nadu. Under All India Coordinated Rice Improvement Programme (AICRIP) this new culture was evaluated as IET 19385 in Initial Varietal Trial – slender grain (IVT-SG) in 2005 in all the AICRIP centres of India. Based on the performance under MLT, it was tested under Adaptive Research trial during 2006-07 in farmers holdings covering 17 districts comprising of 70 locations of Tamil Nadu. Pest and disease performance was tested under

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artificial and field conditions at Aduthurai, Coimbatore and Madurai. Agronomical performance of the culture was tested under SRI system of cultivation during 2006-07 at Department of Rice. Physical, cooking and biochemical properties of rice were tested along with check BPT 5204 at Directorate

of Rice Research, Hyderabad and Post Harvest Technology Centre, TNAU, Coimbatore.

### Results and Discussion

Culture CB 99019 was tested in station trial in thaladi season for six years at Department of Rice,

**Table 1. Overall yield performance of CO(R) 49 (CB 99019) in different trials**

Name of the Trials	No. of trials	Grain Yield (Kg ha <sup>-1</sup> )		
		CO(R) 49 (CB 99019)	BPT 5204	I.W. Ponni
Dept. of Rice <sup>®</sup> , Coimbatore Station trials (2001-2005)	6	6594 (132)	5206 (138)	5198 (141)
Multi-location trials <sup>®</sup> (MLT quality rice medium(2004-05)	5	5439 (137)	4634 (139)	5231 (140)
Multi-location trials <sup>®</sup> (MLT quality rice medium (2005-06)	5	4590 (136)	4220 (137)	4628 (139)
Multi-location trials <sup>®</sup> (MLT quality rice medium (2006-07)	5	4888	4410	4528
Adaptive Research trial (2005-06)	94	6157 (137)	5946 (138)	-
AICRIP- IVT SG trial (2004-'05)*	17	3970 (131)	3538 (IR 64) (126)	3602 (PR 106) (133)
No. of trials	110	110	-	-
<sup>®</sup> Overall weighted mean yield in Kg/ha under on-station trials	5521	4646	4911	-
<sup>®</sup> Percentage increase over the check under on-station trials	-	18.8	12.4	-
Overall weighted Mean Yield in Kg/ ha	6041 (135)	5670 (138)	-	-
Percentage increase over the checks	-	6.5	-	-

Mean duration in the trials are furnished in the parenthesis

\*Checks for AICRIP trials are PR 106 and IR 64 and the data were not included in the calculation of the weighted mean.

TNAU, Coimbatore during 2001-2005. The culture recorded a mean grain yield of 6594 Kg ha<sup>-1</sup> in 132 days with 26.7 and 26.9 per cent increase over BPT 5204 and IWP respectively.

CO(R) 49 was evaluated as CB 99019 at different rice research stations of Tamil Nadu Agricultural University in MLT-Quality Rice- Medium for three years in 2004-05, 2005-06 and 2006-07. In 2004-

**Table 2. Distinguishing morphological characters of CO(R) 49**

Coleoptile	: Green	Plant height (cm)	: 85-90 cm
Basal leaf sheath colour	: Green	Panicle length (cm)	: 25-28 cm
Leaf sheath	: Green	Panicle type	: Long, compact, droopy
Leaf blade colour	: Green	Awning	: Absent
Leaf pubescence	: Glabrous	Seed coat (Kernel) colour	: White
Leaf length	: 45.0 cm (± 5.0 mm)	Junction of auricle	: Pale green
Leaf width	: 1.50 cm (± 0.2 mm)	Hull (husk) colour	: Straw
Days to 50% flowering	: 100-105 days	Aroma	: Absent
Panicle exertion	: Well-exerted panicle	Grain yield per plant (g)	: 40 g
Stigma colour	: White	1000 grain weight	: 15.9 g
Apiculus colour	: Green	Rice grade	: Medium slender
Number of effective tillers	: 20-23	Milled rice colour	: White
		Abdominal white	: Occasionally present

05, its mean grain yield was 5439 Kg ha<sup>-1</sup> which was 17.4 and 4.0 per cent higher than BPT 5204 and IWP respectively. This variety yielded 4950 Kg ha<sup>-1</sup> which was 17.3 and 7.0 percent higher than BPT 5204 and IWP respectively in 2005-06, During 2006-07, CO (R) 49 yielded 4888 Kg ha<sup>-1</sup> which was 10.8 and 8.0 per cent higher than BPT 5204 and IWP respectively.

The variety was evaluated as IET 19385 in Initial

Varietal Trial - Slender Grain under All India Coordinated Rice Improvement Programme in kharif 2005 and it recorded a mean grain yield of 5094 Kg ha<sup>-1</sup> which was 12.2 and 10.2 per cent increased yield over national checks, IR 64 and PR 106. Under this trial, the culture ranked third in Tamil Nadu state and it recorded the mean grain yield of 4636 Kg ha<sup>-1</sup> which was 37.9 and 21.9 per cent increased yield over IR 64 and PR 106.

Under Adaptive Research Trials (ART) conducted in farmers holdings, CO(R) 49 (CB 99019) was tested in 21 districts of Tamil Nadu, of which the culture out yielded the checks in 14 districts. In 24 locations this culture recorded more

**Table 3. Grain quality characteristics of CO(R) 49 (CB 99019)**

Characters	CO(R) 49	BPT 5204
<u>Milling quality traits</u>		
Hulling %	84.6	83.1
Milling%	72.3	72.4
Head Rice Recovery %	68.3	67.2
<u>Physical grain quality</u>		
Kernal Length (mm)	5.6	5.6
Kernal Breadth (mm)	2.01	2.00
LB ratio	2.79	2.80
<u>Cooking quality traits</u>		
KLAC (mm)	10.1	10.0
KBAC(mm)	2.6	2.5
LER	1.87	1.79
BER	1.29	1.25
Volume Expansion (ml)	5.6	5.4
Gelatinization temperature	Intermediate	Intermediate
Gel consistency	Soft	Soft
Amylose content (%)	23.25	22.34

than 7000 Kg ha<sup>-1</sup> in ART. It recorded a mean grain yield of 6157 Kg ha<sup>-1</sup> in 94 locations which was 3.6 per cent higher than BPT 5204. The variety CO(R)

49 recorded an overall mean grain yield of 6041 Kg ha<sup>-1</sup> which was 6.5 per cent improvement over BPT 5204 (Table 1).

Medium duration rice variety CO(R) 49 is semi dwarf (85-90 cm), erect with strong culm and well exerted panicle with duration of 135 days (seed to seed). Distinguishing morphological characters of this variety is given in Table 2. It has long, compact and droopy panicle with a length of 25-28 cm. The variety has 1000 grain weight of 15.9 g. CO(R) 49 variety has medium slender grain type with an L/B ratio of 2.79. It has good milling percentage (72.3%) and head rice recovery (68.3%) which is in accordance with Shivani *et al.*, (2007) who reported significant positive association of head rice recovery with milling outturn. It has intermediate amylose content (23.25), soft gel consistency and intermediate gelatinization temperature which are the desirable traits for good cooking quality. Upon cooking, linear elongation ratio (LER - 1.87) and volume expansion (5.6ml) were found to be higher than BPT 5204 which recorded 1.79 and 5.4 ml respectively (Table 3).

Variety CO(R) 49 was evaluated under SRI system of cultivation in Rabi 2006-07 at Department of Rice, Coimbatore. The culture recorded higher yield under SRI than normal method. It also showed

**Table 4. Performance of CO(R) 49 (CB 99019) in Agronomy trials (2006-07)**

	CO (R) 49 (CB 99019)			BPT 5204		
	Normal Transplant	SRI	Direct seeding	Normal Transplant	SRI	Direct seeding
SPAD reading 25 DAP at flowering	17.00	18.50	17.50	14.50	18.50	16.50
Grain yield (Kg ha <sup>-1</sup> )	5250	6750	4900	4850	5950	4650
Straw yield (Kg ha <sup>-1</sup> )	6400	7360	6125	5910	6485	5810
Crop duration (seed to seed)	134	126	132	136	128	134
Agronomic efficiency (%)	33.3	43.1	29.4	28.0	33.4	23.8

improved agronomic efficiency over both the systems. The recommended levels of fertilizer and the plant population for late samba/thaladi season rice variety hold good for this variety (Table 4).

The variety CO(R) 49 was screened against all the five major diseases *viz.*, blast, bacterial blight, sheath rot, sheath blight and rice tungro disease (RTD) under field and artificially inoculated conditions during 2005-06, 2006-07 and 2007-08. It was moderately resistant to blast (score 5), bacterial leaf blight (score 5), sheath rot (score 5), and RTD (score 3). The variety was evaluated at Coimbatore, Madurai and Aduthurai against the major pests and was found to be moderately resistant to yellow stem borer (score 3), leaf folder (score 5) and GLH (score 3).

CO(R) 49 rice variety (CB 99019) with higher yield, pest and disease resistance with superior

cooking quality in comparison to the check variety BPT 5204 was released during 2008 and it can be cultivated as a transplanted crop in late samba / thaladi season in Tamil Nadu.

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