



## Research Article

# CORH 3 - A Short Duration Non aromatic rice hybrid

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### Abstract

The new early maturing rice hybrid CORH 3 is a combination of TNAU CMS 2A and CB 87R. This hybrid matures in 115 days. The hybrid was found to produce on an average 7.2 tonnes per hectare which was more than 12% higher than the hybrid checks, ADTRH 1 and KRH2, and more than 25% higher than the variety checks, ADT 43 and ADT 39. The hybrid produces good quality rice possessing intermediate amylose, soft gel consistency, and good linear elongation on cooking. It has white, non-sticky, non-aromatic rice which tastes good and has been well accepted by the consumers. Besides, the hybrid CORH3 is tolerant to Rice Tungro Disease (RTD) and blast. It is also resistant to Green Leaf Hopper (GLH) and tolerant to Brown Plant Hopper (BPH) and White Backed Plant Hopper (WBPH).

**Key words:** Rice hybrid, CORH 3, non aromatic.

### Introduction

Rice is the world's most important cereal crop. The recorded rice consumption in 2005 in India was around 85 million tonnes. Ten years down the line, it is expected to soar up to 92 million tonnes demanding more production from the paddy fields which is most unlikely to happen given the scenario of dwindling paddy fields. In Tamil Nadu, rice is being grown in an area of 22 lakh hectares with an annual production of 7.2 million tonnes. The current rice production needs to be strengthened with a scope for additional yield to the tune of 2 million tonnes every year. The potential yields of the modern semi-dwarf rice varieties released after IR 8 are more or less the same if not lower than that of IR 8, showing a yield plateau or ceiling (Cassman and Pingalli, 1995). Among the available genetic resources to increase rice productivity, hybrid rice has fared well and secured a good track record in uplifting the curse of 'yield barrier'. Rice hybrids have an yield advantage of about 15 to 20 percent or more over the best conventionally bred varieties (Virmani *et al.*, 1994).

Hybrid rice became a reality in China for the first time in the world by the release of commercial hybrids, suited for subtropical and temperate zones. A break through in rice production was achieved with the identification of a wild abortive type of cytoplasmic male sterility system and within 6 years in 1976 three line hybrids were released for commercial cultivation in China. Since then many of the rice growing countries had accepted the strategical approach of exploitation of hybrid vigour through the development of commercial hybrids. With the release of three line rice hybrids in China, more than 53% of the total 32 million ha were covered with hybrid rice and recording an average yield of 6.1 to 6.7 t/ha. This is a phenomenal achievement due to hybrid rice technology and has produced an additional yield of 200 million tonnes of paddy. Considering the potential of hybrid rice technology, the Indian Council of Agricultural Research (ICAR), started a project on hybrid rice during 1989. Although in India, the technology was attempted belatedly, the potential is presently felt widespread and several private firms have intensified their research on hybrid rice. To offer a fair market for the poor farmers, the public sector institutes also have to contribute significantly to the development and deployment of hybrid rice. Although more than 30 rice hybrids have so far been released in India not many could fulfill the just demands of South Indian

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consumers to get a non-sticky, non-aromatic market and consumer friendly rice hybrid. A big challenge is the assembling process to combine all of the favorable alleles into a single cultivar and ensure their proper functioning. In this regard, it may be more advantageous to breed for hybrids than conventional pure line cultivars, because it may take less effort to have two complementary sets of genes in two parental lines than stacking all of the genes in a single genetic background (Zhang 2007). With this objective, breeding programme was initiated to develop parental lines and hybrids with good grain quality and resistance to pests and diseases.

### Materials and Methods

The new rice hybrid CORH 3 was developed at the Department of Rice, Tamil Nadu Agricultural University, Coimbatore. It is having the parentage of TNAU CMS 2A and CB 87R. The parents were chosen in such a way that the rice do not possess aroma which is not preferred by the consumers. The CMS line TNAU CMS 2A was developed through substitution back cross programme with agronomically superior genotype. Source nursery was raised during Khariff 2000 and hybridization was made with TNAU CMS 2A with many adopted lines. Crossed seeds of all the hybrid combinations were evaluated in the Test Cross Nursery during Rabi 2000-01. The hybrid combination TNAU CMS 2A / CB 87 R (TNRH 87) was identified as promising along with many hybrids. Mini seed production was taken up during Rabi 2000-01 and Preliminary hybrid Trial was conducted during Khariff 2001. In all the station trials, this hybrid recorded a higher grain yield and was nominated to Multi Location Trial and Initial Hybrid Rice Trial. Based on the results this hybrid was promoted to ART and OFT all over the Tamil Nadu. The hybrid was evaluated in a total of 47 trials stretching from station trials to Front Line Demonstrations. The hybrid was tested against the hybrids (ADTRH1, KRH 2) and varieties (ADT43, IR64 and ADT 39) as checks.

### Results and Discussion

The results received from the different trials were given in the tables from 1 to 6. Based on a total of 47 trials consisting of MLTs, Station trials, OFTs, FLDs and AICRIP trials, the new hybrid recorded an average yield of 6475 Kg/ha which was 24.33, 28.42, 13.18 and 19.29 per cent increase over ADT39, ADT43, ADTRH 1 and KRH2, respectively (Table 1). The hybrid was evaluated under Front Line Demonstration in eight locations in the Western Tamil Nadu zone. ADT43, the most popular pure line variety was treated as the check. CORH 3 (TNRH 87) recorded a mean grain yield of 6672

Kg/ha which was 26.89 per cent increase over ADT43.

### Reaction to Pest and Diseases

Rice is affected by many diseases in almost all of the rice-producing areas causing great yield loss. Three diseases, bacterial blight caused by *Xanthomonas oryzae* pv. *oryzae*, blast caused by *Pyricularia grisea*, and sheath blight caused by *Rhizoctonia solani*, are considered to be the most devastating diseases in most rice growing regions. CORH 3 is tolerant to RTD and blast. It is also resistant to GLH and tolerant to BPH and WBPH.

### Agonomic Adaptability

CORH 3 is a having a heavy tillering plant type with a robust early seedling vigour on establishment and hence found to be ideal for SRI method of cultivation. It produces high percentage of productive tillers with long panicles and high number of grains per panicle under SRI (Table 2). CORH 3 (TNRH 87) is suitable for aerobic system of cultivation also and found to perform well under mid-season drainage.

### Grain and Cooking quality

CORH 3 is a good quality hybrid possessing rice with intermediate amylose, soft gel consistency, and good linear elongation on cooking. The hybrid has white, non-sticky, non-aromatic rice which tastes good and well accepted by the consumers. Grain is of medium slender type with white translucent endosperm. This hybrid is with intermediate amylose content (21.7%) which is essential for softness of cooked rice (Table 3). Also found to have good kernel elongation after cooking. The organoleptic tests and the preference of consumers for its soft nature showed that the general acceptability of the grain type was good (Table 4). The grain type was well accepted with high grade by the farmers during "all-stake holders participatory grain quality evaluation programme" conducted on 15.03.2005. The hybrid with appealing rice colour, good kernel elongation after cooking and non sticky non-aromatic characteristics scored high by the 68 participants during the event. The hybrid was widely accepted by the consumers and millers.

The hybrid matures in 115 days and attains flowering 80 days after sowing. It has erect plant type with 96 cm height. Thousand grain weight is 22 g. (Table 5). Considering the superior performance of the culture TNRH 87 over the check varieties and hybrids based on the above desirable features, it was released as CORH 3 (a high yielding early duration rice hybrid with acceptable grain quality) by the Tamil Nadu Agricultural University, Coimbatore during 2006. This hybrid, is recommended for cultivation throughout



Tamil Nadu during Kar (May) / Kuruvai (June) / Sornawari (April) and Navarai (Dec-Jan) season.

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**Table 1. Overall yield performance of CORH 3 (TNRH 87)**

Trials	Year	No. of trials	Mean grain yield (kg /ha) TNRH 87	% increase over			
				ADTRH 1	KRH 2	ADT 39	ADT 43
On station trials	2001-05	9	7552	6.85	11.2	34.63	29.96
MLT	2004-05	18	5627	-	-	14.03	-
AICRIP IHRT (ME)	2004	4	7668	-	27.38	-	-
	2005	8	6378	19.51	-	-	-
OFTs/ FLDs	2005	8	6672	-	-	-	26.89
Overall mean		47	6475	13.18	19.29	24.33	28.42

**Table 2. Expression of characters in CORH 3 (TNRH 87) under normal and SRI methods of cultivation: PBS farm, 2005**

Particulars	Standard method	SRI method
Tillers	10.4	19.2
Panicle length (cm)	21.4	21.4
Panicle weight (g)	2.4	2.6
Chaffy grain / plant	32	19
Grain yield (t/ha)	5.820	6.780
Straw yield (t/ha)	7.275	8.475
<b>Fertilizer 150:60:60 kg/ha</b>		
50%	5560	6470
100%	5963	6935
150%	6148	7250

**Table 3. Grain and cooking quality characteristics of CORH 3 (TNRH 87) and ADT39**

Entries	TNRH 87	ADT 39
Hulling %	72.9	79.3
Milling %	68.2	70.7
Head rice recovery %	60.3	63.5
Kernel length (mm)	6.50	5.4
Kernel breadth (mm)	2.20	2.1
L/B ratio	2.95	2.57
Kernel length after cooking (mm)	10.0	8.9
Kernel breadth after cooking (mm)	2.6	2.70
Linear elongation ratio	1.54	1.64
Breadth wise elongation ratio	1.24	1.28
Volume expansion ratio	4.3	4.5
Alkali spreading value	4.0	3.00
Gel consistency (mm)	70.0	83.00
Amylose content (%)	21.0	22.5

**Table 4. Results of Organo-leptic Test on CORH 3 (TNRH 87) by a panel of 11 consumers.**

Characteristics	Mean score	Classification
Appearance	4.73	White
Cohesiveness	4.82	Well- separated
Tenderness on touch	4.27	Moderately soft to soft
Tenderness on chewing	4.16	Moderately soft to soft
Taste	3.82	Good
Aroma	1.10	No scent
Kernel Elongation	3.27	Good
Overall Acceptability	2.88	Good

**Table 5. Distinguishing morphological characters of CORH 3**

Plant height (cm)	96
Early plant vigour	Good
Coleoptile	Green
Basal leaf sheath colour	Green
Leaf sheath	Green
Leaf blade colour	Green
Leaf pubescence	intermediate
Leaf length (cm)	35
Leaf width (cm)	1
Days to 50% flowering	80 days
Panicle exertion	exerted panicle
Stigma colour	White
Apiculus colour	Green
Number of effective tillers	25
Panicle length (cm)	25
Panicle type	long, compact, drooping
Awning	Absent
Days to maturity (days)	115-120
Seed coat (Kernel) colour	White
Grain length width ratio	3.44
Junction of auricle	pale green
1000 grain weight (g)	22.0



Hull (husk) colour	straw
Threshability	Good
Aroma	Absent
Grain yield per plant (g)	30
Grain	Medium slender
LXBXT (mm)	8.6 X 2.5 X1.4
<u>Brown rice</u>	
LXBXT (mm)	6.2 X 2.1 X1.2
L / B ratio	2.95
Rice grade	Medium slender
Milled rice colour	White slender
Abdominal white	occasionally present

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