



A High Yielding *Kudiraivali* Variety CO (KV) 2

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A short duration high yielding *Kudiraivali* culture TNAU 43 was developed at the Department of Millets, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore and was released as CO (KV) 2 during 2009. It is a pureline selection from the Germplasm accession EF 79. This variety yields on an average 2622 kg/ha of grain and 5204 kg/ha of fodder. yield. This variety registered 21.6, 20.0, 13.2 and 31.3 percent increased grain yield over the check CO 1 in station trials, multi location trials, adaptive research trials and on farm testing respectively. It matures in 95 days and hence is a good choice for contingency planting. It escapes drought and fits well in any cropping sequence. The grain quality suits well for consumer acceptance and has industrial value.

Key words: CO (KV) 2, *Kudiraivali*, Barn yard millet, high yielding, short duration

Barnyard millet or *Kudiraivali* (*Echinochloa frumentacea* (Roxb.) Link) is native of Eurasia. In India it is an important dry land crop. It is cultivated over a wide array of environmental conditions and poor soils and is mainly confined to tribal belts of Orissa, Maharashtra, Gujarat, Madhya Pradesh, Tamil Nadu and Bihar besides hills of Uttar Pradesh (Ram Vinod Kumar *et al.*, 1997). In Tamil Nadu it is cultivated in dry lands and hill areas by tribal farmers in Ramanathapuram, Madurai, Salem, Namakkal, Villupuram, Dindigul, Coimbatore and Erode districts. It is equally important as a grain and fodder crop. It is cultivated mainly for the nutritious grains and the straw of good fodder value (Senthil *et al.*, 2005). As far as nutritional quality of the grain is concerned, it is rich in protein (11.8%) and crude fiber (9.8 %). Out of the total protein, it also consists of 16.6 per cent of amino acid Leucine, which is twice the quantity of Rice. A high yielding, short duration strain will go a long way to improve the self sustainability of farmers of dry land, hill and tribal areas of Tamil Nadu.

With this objective, breeding work was initiated and a new high yielding variety *viz.*, CO (KV) 2 was developed to increase the production and productivity of this crop in the state.

Materials and Methods

A *Kudiraivali* culture TNAU 43 was evolved at Department of Millets, Centre for Plant Breeding and Genetics, TNAU, Coimbatore and released as CO (KV) 2. It is a pureline selection from the germplasm accession EF 79. Single plant with desirable attributes and high yield was selected from the accession EF 79 and was forwarded as single plant

to progeny rows. The progenies were assessed for their performance in comparison with the check CO1 under station trials at Millet Breeding Station, TNAU, Coimbatore from *kharif* 1997 to *rabi* 1999-2000, Multi Location Trials during 2000-2001, Adaptive Research Trial during 2001-02 and in farmers holdings under On Farm Trials from 2005-2008 (215 trials). Simultaneously the culture was evaluated for its reaction to pest and diseases, grain qualities and its end user acceptability.

Results and Discussion

Yield improvement

Under station trials during 1997 to 2000, TNAU 43 recorded an average grain yield of 2622 and fodder yield of 5204 kg/ha, which were 21.6 and 18.2 per cent increase over the check CO1, respectively (Table 1). The results of station trials demonstrated the worth of TNAU 43 as a superior culture compared to CO1. Hence it was forwarded for further evaluation. Multi Location Trial of the culture was done in 11 locations spread across the entire state. The culture TNAU 43 was observed to record an average yield of 2304 kg/ha which was 20 per cent increase over check CO 1 which recorded 1920 kg/ha (Table 1). Under Adoptive Research Trial conducted during 2001 in five districts of Tamil Nadu, the culture registered an average yield of 937 kg/ha, which was 13.2 per cent higher compared to the check CO1 (828 kg/ha) (Table 1). The culture was subjected to On farm testing (OFT) in farmers holdings in 154 locations through out the state from 2005-2008. The results of the OFTs (Table 1) indicated that the culture TNAU 43 registered 31.3 per cent increased grain yield (2573 kg/ha),

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Table 1. Overall yield performance of Kudiraivali culture TNAU 43

Sl. No.	Name of the trial	No. of trials	Grain yield (kg/ha)				Straw yield (kg/ha)			
			TNAU 43	CO 1	K 1	VL 29	TNAU 43	CO 1	K 1	VL 29
1.	Station trials	6	2622 (21.6)	2156	-	-	5204 (18.2)	4400	-	-
2.	Multi location trials	11	2304 (20.0)	1920	-	-	5042 (22.6)	4111	-	-
3.	Adaptive research trials	20	937 (13.2)	828	-	-	-	-	-	-
4.	On farm trials	154	2573 (31.3)	1960	-	-	5132 (29.7)	3957	-	-
5.	All India Coordinated trials	24	2136	-	1931	1843	8105	-	6792	6413
	Total no. of trials	215								
	Overall mean of 215 trials		2114	1716	-	-	5871	4156	-	-
	Per cent increase over CO 1		23.2	-	-	-	41.3	-	-	-
	Per cent increase over K 1		10.6	-	-	-	19.3	-	-	-
	Per cent increase over VL29		15.9	-	-	-	26.4	-	-	-

Values in parentheses indicate percentage increase over check CO 1

compared to check CO1 (1960 kg /ha). It also registered 29.7 per cent higher straw yield compared to the check CO1. Under All India Coordinated trials during 2002- 2005, the culture registered an average yield of 2136 kg/ha while the check entries viz., K1 and VL 29 registered 1931 and 1843 kg/ha respectively.

Reaction to pest and diseases

The reaction of the culture against pest and diseases was also assessed from 2004-2007. TNAU 43 recorded an average brown spot susceptibility grade of 0.03 whereas the check entry, CO 1, recorded 2.0 grade. With regard to grain smut, TNAU 43 recorded an average score of 0.67 % and CO 1 registered 3.0%. Among the pests that cause economic loss in this crop, shoot fly is important. With respect to resistance to shootfly, TNAU 43 recorded an average susceptibility score of 2.5% while CO 1 recorded 7.8%. These results indicated that there was no major incidence of pest and diseases in this culture (Table 2).

Table 2. Pest and disease reaction of Kudiraivali culture TNAU 43 under field condition from 2004-05 to 2006-07

S. No	Entry	Mean score		
		Brown spot (Grade)	Grain smut (%)	Shootfly (%)
1.	TNAU 43	0.03	0.67	2.5
2.	CO 1 (Check)	2.0	3.0	7.8

Grain quality parameters

The culture registered very good nutritional and cooking qualities. It recorded 11.8 g Protein, 14.7 mg Calcium, 16.0 mg Iron per 100 g of grain . It recorded 1000 grain weight of 3.4g as compared to

CO 1 which recorded 3.0g. This ultimately reflects upon the higher grain yield recorded by this culture as compared to the check CO1. Regarding the cooking qualities, TNAU 43 recorded higher water uptake value of 938 ml and cooked rice volume of 705 ml as compared to 915ml and 634 ml respectively recorded by CO1.It was also found to have good customer appeal based on the colour, appearance, flavour, texture and taste (Table 3).

Table 3. Nutritional and cooking qualities of Kudiraivali culture TNAU 43

Sl. No.	Characteristics	TNAU 43	CO 1 (Check)
a) Nutritional Quality			
1.	Protein (g/100g)	11.8	11.0
2.	Carbohydrate (g /100g)	74.5	75.1
3.	Fat (g/100g)	5.7	5.4
4.	Crude fibre (g/100g)	9.8	10.2
5.	Mineral matter (g/100g)	4.8	4.0
6.	Phosphorus (mg/100g)	286	274
7.	Calcium (mg/100g)	14.7	13.8
8.	Iron (mg/100g)	16.0	15.6
9.	Bulk density (g/ml)	0.68	0.60
10.	1000 grain weight (g)	3.4	3.0
11.	Threshability (%)	71.8	68.0
b) Cooking qualities			
1.	Water uptake (ml)	938	915
2.	Cooking time (min)	24	21
3.	Initial Volume (ml)	100	105
4.	Cooked volume (ml)	705	634
5.	Initial weight (g)	100	100
6.	Cooked weight (g)	720	590
c) Sensory evaluation score			
1.	Colour & appearance	9.5	8.5
2.	Flavour	9.5	8.0
3.	Texture	9.0	7.5
4.	Taste	9.5	8.5

Table 4. Morphological characters of Kudiraivali culture TNAU 43

Sl. No.	Characteristics	TNAU 43	Range Mean
1.	Plant height (cm)	96-196	139
2.	No. of basal tillers	2-9	5.7
3.	Number of productive tillers	2-6	4.8
4.	Flag leaf length (cm)	22.5-32.8	27.3
5.	Flag leaf width (cm)	2.4-3.8	3.4
6.	Peduncle length (cm)	22.0-31.6	25.4
7.	Inflorescence length (cm)	21.4-28.4	23.7
9.	Length of inflorescence (cm)	21.4-28.4	23.7
10.	Length of lower raceme (cm)	4.8-7.2	6.6
11.	Days to 50% flowering	47-51	49
12.	Days to maturity	89-98	95
13.	Grain yield per plant (g)	32.2-48.4	36.3
14.	Straw yield per plant (g)	56.5-70.0	62.4
15.	Thousand grain weight (g)	2.9-3.8	3.4
16.	Harvest index	0.36-0.41	0.38
17.	Growth habit	Erect	
18.	Plant pigmentation at flowering	Green	
19.	Culm branching	Absent	
20.	Degree of lodging at maturity	Low	
21.	Inflorescence colour	Green	
22.	Inflorescence shape	Pyramidal	
23.	Inflorescence compactness	Compact	
24.	Shattering of inflorescence	Absent	
25.	Grain colour	Brownish grey	
26.	Grain shape	Oval	
27.	Grain size	Bold	

Morphological features of the culture

Kudiraivali culture TNAU 43 has erect plant type and grows up to a height of 130-140 cm. On an average it produces five tillers. It completes 50 percent flowering in 49 days and matures in 95 days. This culture on an average recorded 36.3 g of grain and 62.4 g of straw yield per plant. It produces greenish, pyramidal and compact panicles. Grains are brownish grey, oval shaped and bold in size (Table 4).

Considering the superiority of performance of TNAU 43 in a total of 215 trials in several locations (Table 1), it was proposed for release as CO (KV) 2 for large scale cultivation in the state, which could go a long way in increasing the *Kudiraivali* productivity in small and marginal farms of dry land, hill and tribal areas where *Kudiraivali* is grown as a major crop.

References

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