

A high yielding samai variety CO(Samai) 4

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Abstract : A high yielding and early maturing samai culture TNAU 91 was developed at the Department of Millets, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore and released as CO(Samai) 4. It is a derivative of the cross involving CO 2 x MS 1684. It yields on an average 1567 kg ha⁻¹ of grain and 5783 kg ha⁻¹ of straw under rainfed condition. Being a short duration variety (75-80 days), it fits well in the existing double cropped rainfed situation of North, North Western and Western zones of Tamil Nadu where samai is grown in June-July as a preceding crop to horsegram in about 80,000 ha. This culture has registered 14.2, 12.7 and 19.9 per cent increased grain yield over the standard varieties CO3, Paiyur 2 and OLM 203 (National check) in station trials, multilocation trials, All India coordinated trials, adaptive research trials and on farm trials respectively.

Keywords : CO (Samai)4, Samai, high yielding, short duration.

Introduction

A member of sub-family Panicoideae of the family Poaceae, Samai (*Panicum miliare* Lamk) [Syn. *P.sumatrense* Roth ex Roem. and Schult] is widely cultivated as a cereal across India, Nepal, Western Burma, Sri Lanka, Pakistan and South East Asian countries. It is grown both in the tropics and sub-tropics and even at an altitude of 7000 feet (Daniel Sundararaj and Thulasidas, 1993). The crop is hardy and provide reasonable harvest even in degraded soils under unfavourable weather conditions. Nutritionally the grains are comparable or even superior to major cereals. The grain protein is rich in essential amino acids. Presently samai is grown throughout India in more than half a million hectare with major areas being in the states of Karnataka, Andhra Pradesh, Tamil Nadu, Orissa, Bihar, Maharashtra and Madhya Pradesh. The crop is often sown with

the onset of monsoon and is the first crop to be harvested in the season (Haider, 1997). Because of high tolerance to heat and drought, samai is preferred for extreme soil and climatic conditions. In Tamil Nadu, samai is grown in 80,000 ha with the productivity of 732 kg ha⁻¹ at Dharmapuri, Krishinagiri, Salem, Namakkal, Erode, Coimbatore, Madurai and Vellore districts. A high yielding, drought resistant and short duration strain is the long felt need of the dry land, hill area and tribal farmers of Tamil Nadu.

With this objective breeding work was initiated and a new high yielding CO(Samai) 4 variety was developed to increase the production and productivity of samai in Tamil Nadu, where samai is grown predominantly under double cropped rainfed situation.

Table 1. Performance of Samai culture TNAU 91 in Station Trials at Department of Millets, Coimbatore (1994-1999).

Year	Grain yield (kg ha ⁻¹)			Straw yield (kg ha ⁻¹)		
	TNAU 91	CO 3	Paiyur 2	TNAU 91	CO 3	Paiyur 2
1994 (RRYT)	2028	1830	1659	6049	5780	2975
1995 (PYT)	2000	1704	1748	5785	5120	3319
1996 (PYT)	1059	690	874	4640	2970	3000
1997 (CYT)	2459	2281	2148	7210	6710	5800
1998 (CYT)	1530	1185	1642	5025	3650	3675
1999 (CYT)	2396	1926	1333	6920	5980	5085
Mean	1912	1603	1567	5938	5035	4142
Per cent increase over CO 3	19.3			17.9		
Per cent increase over Paiyur 2	22.0			43.4		

Table 2. Performance of Samai culture TNAU 91 in Multi Location Trials (1999-2000)

Location	Grain yield (kg ha ⁻¹)			Straw yield (kg ha ⁻¹)		
	TNAU 91	CO 3	Paiyur 2	TNAU 91	CO 3	Paiyur 2
Aruppukottai	1345	1025	106	4019	3840	3530
Bhavanisagar	1815	1345	1619	6810	6430	7025
Coimbatore	1778	1481	1630	5150	4285	4879
Karaikkal	2820	1940	2120	8100	7550	7830
Kovilpatti	915	792	594	8709	8462	7076
Paiyur	1100	900	935	3800	2950	3015
Vamban	1815	1616	110	5280	4895	4065
Mean	1655	1300	1293	5981	5487	5346
Per cent increase over CO 3	27.3			9.0		
Per cent increase over Paiyur 2	28.0			11.9		

Table 3. Performance of Samai culture TNAU 91 in ART.

Districts	No.of trials	Grain yield (kg ha ⁻¹)		
		TNAU 91	CO 3	Paiyur 2
Cuddalore	2	1111	1034	1020
Dharmapuri	2	851	772	747
Erode	4	820	765	683
Karur	5	732	667	661
Perambalur	3	1238	1051	1125
Salem	2	591	554	400
Thiruvannamalai	2	651	608	613
Vellore	3	698	608	575
Total	25			
Mean		824	728	755
Per cent increase over CO 3		13.2		
Per cent increase over Paiyur 2		9.2		

Table 4. Performance of Samai culture TNAU 91 in OFT (District wise mean 2003-2005).

Location	No.of trials	Grain yield (kg ha ⁻¹)			Straw yield (kg ha ⁻¹)		
		TNAU 91	CO 3	Paiyur 2	TNAU 91	CO 3	Paiyur 2
Coimbatore	18	1882	1737	1566	5448	4985	4631
Cuddalore	6	1927	1533	1598	5637	4510	5000
Dharmapuri	16	1934	1644	1727	6026	5570	5724
Erode	12	1017	945	881	3803	3815	3507
Karur	4	1185	1074	948	4040	3507	3209
Nagai	4	1221	1007	1048	4091	3256	3426
Namakkal	11	2240	1849	1690	5877	5573	5408
Perambalur	13	2143	1913	1872	5995	5675	5457
Salem	14	1990	1779	1694	5975	5434	5313
Thiruvannamalai	11	1415	1175	1258	4320	3785	4100
Thiruvarur	4	910	923	805	2795	3080	2806
Vellore	17	2069	1814	1701	7469	6404	6250
Krishnagiri	8	1487	1298	1342	5026	4329	4420
Total	138						
Mean		1774	1554	1503	5497	4981	3793
Per cent increase over CO 3		14.2			10.4		
Per cent increase over Paiyur 2		18.0			44.9		

Table 5. Pest and Disease reaction of Samai culture TNAU 91.

Entry	Brown spot (G)	Grain smut (%)	Dead heart per cent due to shootfy infection
TNAU 91	1.0	0.3	5.4
CO 3	1.0	1.3	16.7
Paiyur 2	1.0	1.0	41.6

Table 6. Nutritional and cooking quality of Samai culture TNAU 91.

Particulars	TNAU 91	CO 3	Paiyur 2
a. Nutritional Quality characters			
Crude protein (%)	9.2	9.2	8.9
Phosphorus (%)	0.27	0.25	0.28
Potassium (%)	1.91	1.84	1.82
b-carotene ($\mu\text{g/g}$)	93.0	75.5	87.5
b. Cooking qualities			
Water uptake	965 ml	940 ml	971 ml
Cooking time	26 min.	25 min.	25 min.
Volume (Raw)	100 ml	105 ml	110 ml
Cooked volume	700 ml	450 ml	550 ml
Weight (Raw)	100 g	100 g	100 g
Cooked weight	709 g	482 g	572 g
c. Sensory evaluation score			
Colour & appearance	9.0	8.5	8.0
Flavour	9.0	8.5	8.3
Texture	9.0	8.5	8.0
Taste	9.0	8.0	8.4
d. Fodder quality analysis of Samai			
Crude protein (%)	7.8	7.2	7.0
Crude fat (%)	1.25	1.18	1.20
Crude fibre (%)	28.0	30.6	32.5
Total ash (%)	10.0	9.3	9.6

Table 7. Distinguishing Morphological Characters of Samai culture TNAU 91.

Character	TNAU 91	
	Range	Mean
Days to 50% flowering	44-48	46
Plant height (cm)	95-125	108
No.of basal tillers	12-21	18
Flag leaf length (cm)	22-31	29.5
Flag leaf width (cm)	1.0-1.9	1.5
Peduncle length (cm)	15-20	19.0
Panicle exertion (cm)	12-16	14.5
Days to maturity	75-80	78
Grain yield per plant (g)	8.0-14.5	10.5
Fodder yield per plant (g)	12.5-22.0	19.8
Harvest index	0.32-0.38	0.35
Thousand grain weight (g)	2.96-3.12	2.98
Plant habit	Erect	
Plant pigmentation at flowering	Green	
Blade pubescence	Low pubescent	
Sheath pubescence	Glabrous	
Degree of lodging at maturity	Slight	
Senescence	Partial drying at maturity	
Inflorescence compactness	Open and loose	
Fruit colour	Grayish yellow	
Grain shape	Oval	
Seed size	Bold	

Materials and Methods

The samai culture TNAU 91 was evolved at Department of Millets, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore and released as CO(Samai) 4. The cross was made between CO 2 and MS 1684. Elite plants with desirable characters which contribute towards high grain yield were selected from F₂ generation onwards. They were evaluated for their sustained performance, homozygosity and the culture TNAU 91 was identified as the best. The culture TNAU 91

was evaluated with checks at Millet Breeding Station, Coimbatore starting from 1994 to 1999, under multilocation trials during 1999-2000, under adaptive research trials from 2000 to 2002, under All India Coordinated trials from 2001 to 2004 and under on farm trials from 2003 to 2005 at farmers' holdings of various districts of Tamil Nadu. Thus a total of 198 trials were conducted. Besides, the reaction of the culture against important pests and diseases was screened. Based on the standard procedures the grain qualities and its acceptability were also analyzed.

Table 8. Overall performance of Samai culture TNAU 91.

Name of the trial	No.of trials	Grain yield (kg ha ⁻¹)				Straw yield (kg ha ⁻¹)			
		TNAU 91	CO 3	Paiyur 2	OLM 203	TNAU 91	CO 3	Paiyur 2	OLM 203
Station trials	6	1912	1603	1567	--	5938	5035	4142	--
Multi location trials	7	1655	1300	1293	--	5981	5487	5346	--
Adaptive research trials	25	824	728	755	--	--	--	--	--
On farm trials	138	1774	1554	1503	--	5497	4981	3793	--
All India Co-ordinated trials	22	990	--	--	826	7475	--	--	7510
Total no.of trials	198								
Overall mean		1567	1372	1391	826	5783	5286	3879	7510
Percent increase over CO 3		14.2				9.4			
Per cent increase over Paiyur 2		12.7				49.1			
Per cent increase over OLM 203		19.9				--			

Results and Discussion

The evaluation trial data of the culture TNAU 91 from the Station Trials conducted at Millet Breeding Station, Coimbatore are presented in Table 1. The culture TNAU 91 was tested in Station Trials from 1994 to 1999. It recorded a grain yield of 1912 kg ha⁻¹ with straw yield of 5938 kg ha⁻¹ where as the checks CO 3 and Paiyur 2 recorded the grain yield of 1603 and 1567 kg ha⁻¹ respectively with the straw yield of 5035 and 4142 kg ha⁻¹ and these were 3 9.3 and 22.0 per cent increased grain yield and 17.9 and 43.4 per cent increased straw yield over the

checks respectively. In seven multilocation trials the cultures TNAU 91 recorded the grain yield of 1655 kg ha⁻¹ with a straw yield of 5981 kg ha⁻¹ which were 27.3 and 9.0 per cent increased grain and straw yield respectively over the check CO 3 (Table 2). The performance of culture in ART is given in Table 3. On testing the culture in OFT for three years (2003-2005), it gave an average grain yield of 1774 kg ha⁻¹ which is 14.2 and 18.0 per cent increase over the checks CO 3 and Paiyur 2 respectively (Table 4). In All India Coordinated Trials, the culture recorded a grain yield of 990 kg ha⁻¹ which

is 19.9 per cent higher over the national check OLM 203 (Table 8).

Reaction to pests and diseases

There were no major diseases and pest problems in this crop. Shootfly incidence was however noticed in some seasons (Table 5) during experimentation.

Grain quality

This culture is rich in nutrients and having acceptable flavour and taste (Table 6).

Morphological characters

Samai culture, TNAU 91 attains 50 per cent flowering in 44-48 days after sowing and matures at 75-80 days after sowing. It has an erect plant habit with 95-125 cm plant height. The panicle is open and loose with bold grains which are oval in shape and greyish yellow in colour (Table 7).

Considering the superior performance (Table 8) of the culture TNAU 91 over the check varieties namely CO 3 and Paiyur 2, it was released as a new variety, by name CO(Samai) 4 for large scale cultivation in Tamil Nadu during 2006.

References

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