

A high yielding and early maturing panivaragu variety CO (PV) 5

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Abstract: A high yielding and early maturing panivaragu culture TNAU 143 was developed at Department of Millets, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore and released as CO(PV) 5. It is a derivative of the cross involving PV 1403 x GPUP 21. It yields on an average 2381 kg/ha of grain and 6675 kg/ha of straw under rainfed condition. Being a short duration variety (70 days), it fits well in the existing double cropped rainfed situation of Coimbatore, Erode, Salem, Namakkal and Villupuram districts where panivaragu is grown in about 5000 ha. This culture has registered 24.4 and 35 per cent increased grain yield over the standard varieties CO 4 and GPUP 21 (National check) in station trials, multilocation trials, All India Coordinated trials, adaptive research trials and on farm trials respectively.

Key words : *Panivaragu, short duration, rainfed, high yield, quality, value - addition*

Introduction

A member of sub-family Panicoideae of the family Poaceae, Panivaragu (*Panicum miliaceum* L.) 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 2700 feet (Hussain Sahib, 1997). The crop is hardy and provides 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 panivaragu is grown throughout India in more than half a million hectare with major areas being in the states of Tamil Nadu, Karnataka, Andhra Pradesh and Uttarkhand. 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, panivaragu is preferred for extreme

soil and climatic conditions. 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(PV) 5 variety was developed to increase the production and productivity of panivaragu in Tamil Nadu where panivaragu is grown predominantly under double cropped rainfed situation.

Materials and Methods

The panivaragu culture TNAU 143 was evolved at Department of Millets, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore and released as CO(PV) 5 during 2007. The cross was made between PV 1403 and GPUP 21. Elite plants with desirable characters which contribute towards high grain yield were selected from

Table 1. Performance of Panivaragu culture TNAU 143 at Millet Breeding Station, Coimbatore

Season / Year	Grain yield (kg/ha)		Straw yield (kg/ha)	
	TNAU 143	CO 4	TNAU 143	CO 4
Kharif, 1997	2686	2308	8450	7860
Rabi, 1997-98	2435	2017	8015	7640
Kharif, 1998	2910	2315	8580	8010
Rabi, 1998-99	2724	2110	8330	7990
Kharif, 1999	2467	1985	7950	6880
Rabi, 1999-2000	2615	2007	7980	6960
Mean of 6 trials	2640	2124	8218	7557
Per cent increase over CO 4	24.40		9.00	

Table 2. Performance of Panivaragu culture TNAU 143 in Multi location trials (2000-2001)

Location	Grain yield (kg/ha)		Straw yield (kg/ha)	
	TNAU 143	CO 4	TNAU 143	CO 4
Kovilpatti	1280	975	6530	5950
Paiyur	1450	1098	6870	6130
Yethapur	2828	1839	8290	7840
Kalavai	2495	2018	8015	7713
Virinjipuram	1720	1228	7820	7075
Bhavanisagar	1783	1446	6980	6415
Coimbatore	2850	2320	8740	8095
Aruppukottai	2370	1785	6940	6020
Ramanathapuram	1780	1235	6330	5870
Vaigaidam	1958	1308	7100	6820
Tiruchirappalli	1030	913	5950	5050
Mean of 11 trials	1959	1470	7233	6634
Percent increase over CO 4	33.2		9.0	

Table 3. Performance of Panivaragu culture TNAU 143 in ART (2002)

Districts	No.of trials	Grain yield (kg/ha)	
		TNAU 143	CO 4
Karur	4	1362	1070
Cuddalore	4	1353	1306
Thiruvannamalai	4	588	525
Dharmapuri	4	1438	1172
Vellore	4	623	465
Theni	4	1031	797
Erode	4	1055	953
Coimbatore	4	1186	950
Total	32		
Mean		1080	905
Per cent increase over CO 4		19.3	

Table 4. Performance of Panivaragu culture TNAU 143 in On Farm Trials (2003-2006)

District	Grain yield (kg/ha)		% inc. over CO 4	Straw yield (kg/ha)		% inc. over CO 4
	TNAU 143	CO 4		TNAU 143	CO 4	
Coimbatore (30 trials)	2142	1903	12.6	6705	6281	6.8
Erode (35 trials)	2459	2068	18.9	7022	6419	9.4
Namakkal (25 trials)	2728	2327	19.6	5882	5462	7.7
Salem (25 trials)	2803	2384	17.6	6256	5750	8.8
Villupuram (25 trials)	2908	2171	34.0	6958	6185	12.5
Mean of 140 trials	2701	2170	24.5	6565	6019	9.1

F₂ generation onwards. They were evaluated for their sustained performance, homozygosity and the culture TNAU 143 was identified as the best. The culture TNAU 143 was evaluated with checks at Millet Breeding Station, Coimbatore starting from 1997 to 2000, under multilocation trials during 2000-2001, under adaptive research trials during 2002, under All India Coordinated

trials from 2004 to 2006 and under on farm trials from 2003 to 2006 at farmers' holdings of various districts of Tamil Nadu. Thus a total of 201 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 5. Performance of Panivaragu culture TNAU 143 in All India Coordinated Trials (2004-2005; 2005-2006) (kg/ha)

Location	State	2004-2005				2005-2006			
		Grain yield		Straw yield		Grain yield		Straw yield	
		TNAU 143	GRUP 21	TNAU 143	GRUP 21	TNAU 143	GRUP 21	TNAU 143	GRUP 21
Nandyal	AP	3951	3333	8000	7600	2080	1543	4900	6800
Dholi	Bihar	932	852	5700	5700	651	623	7300	6700
Bangalore	Karnataka	3235	1891	4900	6200	2296	2114	3600	3500
Hagari	Karnataka	—	—	-	-	1639	1250	7000	2100
Hanumanamatti	Karnataka	3570	667	3500	3600	1138	1577	2400	3100
Mandya	Karnataka	—	—	—	—	722	663	7000	7000
Coimbatore	Tamil Nadu	2495	2320	9000	8500	2000	1309	6000	2500
Mean		2837	1813	6260	6320	1505	1297	5451	4529
Per cent increase over GPUP 21		56.5	—	—	—	16.0	—	20.5	—
Mean (2004-06)		1934		1433		5950		5171	
Per cent increase over GPUP 21		35.0		15.1					

(Source : AICSMIP Annual Report 2004 - 05 ; 2005-06)

Table 6. Pest and disease reaction of Panivaragu culture TNAU 143 during 2005-2006.

	TNAU 143	CO4
Pest		
Brown spot (G)	0.0	1.0
Rust (G)	1.0	2.0
Grain smut (%)	2.0	5.0
Diseases		
Dead heart symptom (%)	2.0	6.0
Shoot fly incidence (%)	6.3	10.0

Table 8. Nutritional and cooking quality of Panivaragu culture TNAU 143.

Characteristics	TNAU 143	CO 4
a) Nutritional Quality		
Protein (g/100g)	12.8	12.4
Carbohydrate (g/100g)	71.8	70.6
Oil (g/100g)	1.2	1.0
Crude fibre (g/100g)	2.2	2.4
Mineral matter (g/100g)	2.0	1.9
Pottassium(g/100g)	1.9	1.9
Phosphorus (mg/100g)	208.0	200.0
Calcium (mg/100g)	16.0	14.0
Iron (mg/100g)	11.3	11.2
β-carotene (µg/100g)	112.0	106.3
1000 grain weight (g)	3.2	2.9
1000 grain volume (ml)	4.0	4.4
b) Cooking qualities		
Water uptake (ml)	943	926
Cooking time (min)	28	25
Initial Volume (ml)	100	105
Cooked volume (ml)	720	640
Initial weight (g)	100	100
Cooked weight (g)	715	592
c) Sensory evaluation score		
Colour & appearance	9.0	8.0
Flavour	9.0	8.5
Texture	9.0	7.0
Taste	9.0	8.0
d) Fodder quality		
Dry matter (%)	20.30	19.50
Crude protein (%)	6.28	5.76
Crude fibre (%)	20.15	24.34
Potassium (%)	2.86	3.01
Phosphorus (%)	0.16	0.14
Miner matter (%)	1.96	1.85

Results and Discussion

The evaluation trial data of the culture TNAU 143 from the Station Trials conducted at Millet Breeding Station, Coimbatore are presented in Table 1. The culture TNAU 143 was tested in Station Trials from 1997 to 2000. It recorded a grain yield of 2640 kg/ha and straw yield of 8218 kg/ha where as the check CO 4 recorded the grain yield of 2124kg/ha and straw yield of 7557 kg/ha which were 24.4 per cent increased grain yield and 9.0 per cent increased straw yield over the check respectively. In eleven multilocation trials, the culture TNAU 143 recorded a grain yield of 1959 kg/ha and straw yield of 7233 kg/ha which were 33.2 and 9.0 per cent increased grain and straw yield respectively over the check CO 4 (Table 2). The performance

of culture in ART is given in Table 3 and it gave an average grain yield of 1080kg/ha which was 19.3 per cent increase over the check CO 4 . On testing the culture in OFT for three years (2003-2006), it gave an average grain yield of 2701 kg/ha which was 24.4 per cent increase over the check CO 4 (Table 4). In All India Coordinated Trials, the culture recorded a grain yield of 2837 kg/ha which was 56.5 per cent higher over the national check GPUP 21 (Table 5).

Reaction to pests and diseases

There were no major pest and disease problems in this crop. Shootfly incidence was however noticed in some seasons (Table 6) during experimentation.

Table 9. Overall performance of Panivaragu culture TNAU 143

Name of the trial	No.of trials	Grain yield (kg/ha)			Straw yield (kg/ha)		
		TNAU 143	CO 4	GPUP 21	TNAU 143	CO 4	GPUP 21
Station trials	6	2640	2124	—	8218	7557	—
Multilocation trials	11	1959	1470	—	7233	6634	—
Adaptive research trials	32	1080	905	—	—	—	—
On farm trials	140	2701	2170	—	6565	6019	—
All India Coordinated trials	12	1934		1433	5950		5171
Total no.of trials	201						
Overall mean of 189 trials		2381	1914		6675	6121	
Per cent increase over CO 4		24.4			9.1		
Per cent increase over GPUP 21 *		35.0			15.1		

*Yield of TNAU 143 and GPUP 21 in AICSMIP alone is considered.

Grain quality

This culture is rich in nutrients and having acceptable flavour and taste (Table 7).

Morphological characters

Panivaragu culture, TNAU 143 attained 50 per cent flowering in 33-41 days after sowing and mature at 64-75 days after sowing. It had an erect plant habit with 80-124 cm plant height. The panicle was compact and dense with bold grains which were oval in shape and golden yellow in colour (Table 8).

Considering the superior performance (Table 9) of the culture TNAU 143 over the check variety CO 4, it was released as a new variety, by name CO(PV) 5 for large scale cultivation in Tamil Nadu during 2007.

References

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