Madras Agric. J. 89 (10-12) : 683-687 October-December 2002
https://doi.org/10.29321/MAJ.10.A00287

CO (S) 28 - A high yielding short duration sorghum variety suited for Tamil Nadu

P. VEERABADHIRAN, M. SURESH, R. MARIMUTHU, P. RAMASAMY, N. SUBBARAMAN, C. SURENDRAN, B. RAJASEKARAN, K. PONNUSWAMY AND T. GANAPATHY
Dept. of Millets, Centre for Plant Breeding and Genetics, Tamil Nadu Agrl. Univ., Coimbatore - 641 003.

Abstract: **The sorghum culture TNS 296 (CO 25 x SPV 942) was released as a high yielding new sorghum variety CO (S) 28. It matures in 100-105 days and possesses a tall plant type. The plant remains green at maturity and non-lodging. It recorded an average grain yield of 2493 kg ha^{-1} under rainfed condition which was 23.4 and 22.7 per cent more over the checks CO 26 and APK1 respectively. Its average grain yield under irrigated condition was 2568 kg ha^{-1}. CO (S) 28 was moderately resistant to grain mould disease and moderately susceptible to shoot fly.**

Key words: ***Sorghum, CO (S) 28, Resistance, Grain mould, Shoot fly.***

Introduction

Sorghum, the great millet of India is the most important food crop and used as cattle feed. It is popularly cultivated in Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh, Rajasthan, Tamil Nadu and Gujarat. The area under sorghum cultivation has decreased from 18 m. ha to 11 m. ha. in India due to grain mould and shoot fly incidence. In Tamil Nadu, it is cultivated in about of 4.88 lakh ha with an annual production of 2.81 lakh tonnes, which accounts for 986 kg ha^{-1} as average productivity (Anon., 2000). In order to improve the yield of sorghum further, the variety CO (S) 28 was released for general cultivation in Tamil Nadu.

Materials and Methods

The sorghum culture TNS 296 was evolved at the Department of Millets, TNAU, Coimbatore. The culture was tested in station trials at the Department of Millets, TNAU, Coimbatore from 1995 to 1999 along with the checks CO 26 and APK 1 and in multilocation trials from 1997 to 1998. The Adaptive Research Trials were organized during 1998-99 and 1999-2000 under *kharif, rabi* and summer irrigated conditions. It was also tested in various locations in India under All India Co-ordinated Trials during 1997-98 as SPV 1410 along with the checks CSV 13 and CSV 15. The pest and disease incidence during *kharif* 1997 and summer 1998 was recorded.

Table 1. Performance of CO (S) 28 (TNS 296) in station trials at Coimbatore.

Year	Season	Grain yield (kg ha^{-1})			Dry fodder yield (kg ha^{-1})		
		CO (S) 28	CO 26	APK 1	CO (S) 28	CO 26	APK 1
1995	Summer	3480	2770	-	14942	13964	-
	Kharif	3600	2650	-	15405	15240	-
1996	Summer	3275	2980	-	13843	12462	-
	Kharif	3360	2890	2660	14742	14108	12580
1997	Summer	3410	3100	3080	14382	13864	13676
	Kharif	3300	2780	2925	14956	11464	12538
1998	Summer	3450	3000	2850	13878	13104	11542
	Kharif	3625	2800	2960	14328	12642	10500
1999	Summer	3610	3100	3075	14468	13444	12400
	Mean	3457	2897	2368	14549	13365	12206
% over Co 26			19.3			8.8	
% over APK 1			18.1			19.2	

Table 2. Performance of CO (S) 28 (TNS 296) in Multilocation Trials

S. No.	Location	Grain yield (kg ha^{-1})				Dry fodder yield (kg ha			
		CO (S) 28	CO 26	APK 1	K8	CO (S) 28	CO 26	APK 1	K8
	Kharif 97								
1	Coimbatore	3087	2870	3056	1728	15807	13993	15548	14446
2	Bhavanisagar	1292	1042	417	233	2441	7669	3069	1948
3	Paiyur	1319	1194	967	1925	11027	9982	8084	14168
4	Vellore	1372	875	633	600	11470	7315	5292	5016
	Summer 97-98								
5	Coimbatore	3488	3056	2481	3696	19160	15548	10741	17202
6	Bhavanisagar	1483	338	419	408	4038	2825	3502	3410
	Mean	2007	1563	1329	1432	10657	9555	7706	7698
% over CO 26			28				11.5		
% over APK 1			51				38.2		

Table 3. Performance of the variety CO (S) 28 (TNS 296) in the All India Co-ordinated Trials (1997-98)

Location	Grain yield (kg ha^{-1})			Dry fodder yield (kg ha^{-1})		
	CO (S) 28	CSV 13	CSV 15	CO (S) 28	CSV 13	CSV 15
Karnataka - Dharwad	5015	4805	-	29129	27628	-
Andhra Pradesh - Palem	3303	2913	3123	9309	10210	12613
Madhya Pradesh - Indore	1902	1848	1675	8838	6734	10943
Tamil Nadu - Coimbatore	5251	3638	4831	10362	9934	11720
Gujarat - Surat	3294	2841	3051	10210	10210	11111
Mean	3753	3209	3170	13570	12553	11597
% over CSV 13	16.9			8.1		
% over CSV 15	18.3			17.0		

Table 4. Mean performance of CO (S) 28 (TNS 296) in ART

Year & season	No.of Districts	No.of Trials	Mean grain yield (kg ha^{-1})		
			CO (S) 28	CO 26	APK1
98-99 - *Kharif*	13	32	2033	1834	1622
98-99 - *Rabi*	6	18	2590	1799	2300
98-99 - Summer	8	26	2149	2090	2144
99-2000 - *Kharif*	11	25	2572	2159	1981
99-2000 - *Rabi*	4	10	2945	2506	2269
99-2000 - Summer	2	5	2722	2606	1722
Mean		116	2370	2049	1982

Table 5. Mean grain yield performance of sorghum variety CO (S) 28 (TNS 296)

Irrigated :

Experiment	No.of trials	Mean grain yield (kg ha^{-1})			% over CO 26	% over APK 1
		TNS 296	CO 26	APK 1		
Station Trials; TNAU, Cbe.	9	3457	2897	2925	19.3	18.0
Multilocation Trials	6	2007	1563	1329	28.4	51
Adaptive Research Trials						
Summer (98-99) & (99-2000)	31	2240	2173	2088	3	7.2
	46	2568	2211	2114	16.1	21.5
Co-ordinated Trials	5	3753	3209*	3170**		

* CSV 13 used as check in co-ordinated Trials- % over CSV 13 - 17.0
** CSV 15 used as check in co-ordinated Trials -% over CSV 15 - 18.0

Rainfed :

Experiment	No.of trials	Mean grain yield (kg ha^{-1})			% over CO 26	% over APK 1
		TNS 296	CO 26	APK 1		
Adaptive Research Trials						
Kharif (98-99) & (99-2000)	57	2269	1970	1772	15.2	28.0
Rabi (98-99) & (99-2000)	28	2717	2069	2290	31.3	18.6
	85	2493	2020	2013	23.4	22.7

Table 6. Reaction of sorghum variety CO (S) 28 (TNS 296) to diseases at Coimbatore

Entry	Grain mould		Downy Mildew	Ergot	Leaf Blight
	Field	Threshed	(%)	(1-5)	(1-5)
Kharif 97 (Sep - Oct)					
CO S 28	3.0	3.0	2.7	3.7	4.1
CO 26	4.0	3.0	10.2	3.5	3.9
CSV 15	4.0	2.5	17.0	4.3	3.5
CSV 13	4.0	2.5	17.7	3.1	3.4
Summer 2000 (Jan - Feb)					
CO S 28	1.0	1.0	*	*	*
CO 26	2.0	2.0	*	*	*
Kharif 2000 (June - July)					
CO S 28	1.0	1.0	*	*	*
CO 26	2.0	2.0	*	*	*

* No incidence was noticed

Grade : 1. HR - Highly Resistant, 2. R - Resistant, 3. MR - Mpderately Resistant, 4. MS - Modertely Susceptible, 5. HS - Highly Susceptible

Table 7. Reaction of CO (S) 28 (TNS 296) to pest incidence (AICSIP 1997)

Year	Entry	Shootfly %	Stem borer		Head bug No./Panicle
			Dead heart %	Leaf injury %	
Kharif 1997	CO (S) 28	19.30	10.70	12.80	32
	CO 26	21.03	6.22	23.09	50
	CSV 13	18.90	9.50	14.50	41
	CSV 15	13.30	9.00	13.40	64
	DJ 6514 (S)	50.50	-	-	-
	IS 2312 (R)	7.10	-	-	-
	CSH 5 (S)	-	8.30	10.20	45
	IS 2205 (R)	-	2.42	12.39	-
Kharif 1999	CO (S) 28	28.30	6.14	32.77	34
	CO 26	35.55	4.30	29.56	30
	CSV 13	44.47	3.60	20.80	47
	CSV 15	39.96	8.67	16.43	16
	DJ 6514 (S)	66.68	-	-	-
	IS 2312 (R)	19.25	-	-	-
	CSH 5 (S)	-	9.74	26.73	22
	IS 2205 (R)	-	1.59	15.02	-
Summer 2000	CO (S) 28	29.93	8.96	28.28	17
	CO 26	20.61	5.74	35.97	15
Kharif 2000	CO (S) 28	5.68	2.38	13.10	78
	CO 26	4.18	2.73	21.27	73
	DJ 6514 (S)	16.35	-	-	-
	IS 2312 (R)	7.97	-	-	-

Table 7a. Shootfly incidence (%) in Coordinated Trial (Dharwad)

Sl.No.	Entry	Shootfly incidence (%)
1.	TNS 296	35.0
2.	DJ 6514 (S)	71.0
3.	IS 2312 (R)	15.8
4.	CSV 15	23.5
5.	CSV 13	24.7

Table 8. Nutritional analysis of sorghum samples

S.No.	Sample	Crude fat	Total Carbohydrate	Starch	Amylose	Protein	Tannin
				% on dry weight basis			
	Grains						
1.	CO S 28	1.00	80.2	72.00	27.8	10.25	1.25
2.	CO 26	0.80	78.20	68.52	26.00	10.10	0.40
	Plant						
3.	CO S 28	0.02	56.25	-	-	7.50	-
4.	CO 26	0.04	40.10	-	-	8.0	-

esults and Discussion

In station trials, the culture TNS 296 :corded an average grain yield of 3457 kg a^{-1} as against 2897 and 2368 kg ha^{-1} in CO 6 and APK 1 respectively. The mean dry odder yield recorded by TNS 296 was 14549 g ha^{-1}, which was 8.8 and 19.2 per cent nore over CO 26 and APK 1 respectively Table 1).

The culture, TNS 296 recorded a grain ield of 2007 kg ha^{-1} under MLT, which was 8 and 51 per cent increase over CO 26 and APK 1 respectively. It also registered a high ry fodder yield of 10657 kg ha^{-1}, while the hecks CO 26, APK 1 and K 8 recorded 9555, 706 and 7698 kg ha^{-1} respectively (Table 2).

The promising culture, TNS 296 also erformed very well in All India Coordinated rials conducted during 1997-98 and registered grain yield of 3753 kg ha^{-1}, which was 16.9 er cent and 18.3 per cent higher over the ational checks *viz.* CSV 13 and CSV 15 espectively. The culture also produced high ry fodder yield of 13570 kg ha^{-1}, while the hecks CSV 13 and CSV 15 recorded 12553 kg ha^{-1} and 11597 kg ha^{-1} respectively (Table 3).

The over all mean performance of TNS 296 under ART during 1998 to 2000 was better and registered 2370 kg ha^{-1} compared to CO 26 (2049 kg ha^{-1}) and APK 1 (1982 kg ha^{-1}) (Table 4).

Under rainfed situation, the sorghum culture TNS 296 recorded an average grain yield of 2493 kg ha^{-1} which was 23.4 and 22.7 per cent increase over CO 26 and APK 1 respectively. Under irrigated situation, its average grain yield was 2568 kg ha^{-1} which was 16.1 and 21.5 per cent increase over CO 26 and APK 1 respectively (Table 5).

It matures in 100-105 days requiring 65 days for 50 per cent flowering. The earhead is semi-compact and elliptical. Seeds are white in colour and medium in size. The 1000 grain weight was 25.2 g. The average grain yield was 2568 kg ha^{-1} under irrigated condition and 2493 kg ha^{-1} under rainfed condition.

The culture TNS 296 was highly resistant (grade 1) to grain mould (summer and *kharif* 2000) and moderately resistant to grain mould (*kharif* 1997) while the checks CO 26, CSV15 CSV 13 showed moderate susceptibility to grain mould (grade 4) (*kharif* 1997). The percentage of downy mildew incidence was less in the culture TNS 296, while it was high in CO 26, CSV 15 and CSV 14 (Table 6). With respect to ergot and leaf blight diseases, the culture TNS 296 showed moderate susceptibility.

Under Coordinated Trials conducted in Dharwad during 1997, the percentage of shoot fly incidence was 19.3 in TNS 296 as against 50.50 per cent recorded in the check DJ 6514 and more than 10 per cent observed in the resistant check, IS 2312 (Anon., 1997). The sorghum culture, TNS 296 was moderately susceptible to shoot fly (*kharif* 1999, 2000 and summer 2000) (Table 7).

Nutritional analysis of sorghum grain samples showed that TNS 296 contained higher fat, carbohydrate, starch, protein and tannin content than the check, CO 26 (Table 8).

Since the culture TNS 296 recorded higher grain and fodder yields than the check varieties, CO 26 and APK 1 under both rainfed and irrigated ecosystems and was moderately resistant to grain mould disease and superior in nutritional aspects over the check CO 26, it was released as a new sorghum variety CO (S) 28 for commercial cultivation in Tamil Nadu.

References

Anonymous. (1997). Annual Progress report of All India Coordinated Sorghum Improvement Project 1996-1997, National Research Centre for Sorghum, Rajendranagar, Hyderabed. p. SE. 1.

Anonymous. (2001). Annual Progress report of All India Corrdinated Sorghum Improvement Project 2000-2001, National Research Centre for Sorghum, Rajendranagar, Hyderabed. p. XVII.

(Received : July 2001; Revised : January 2002)