

## An Early Maturing New Sorghum Variety for Tamil Nadu

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An attempt to develop a high yielding sorghum variety resulted in the release of Co.22 sorghum in Tamil Nadu Agricultural University, Coimbatore. Co 22 sorghum is a dwarf variety matures in 85 days and is also suitable for cultivation throughout Tamil Nadu. It yields on an average of 4300 kg of grain per hectare under irrigated conditions and under rainfed conditions it gives an hectare yield of 2300 kg of grains. Being a very short early maturing variety, it can be included in multiple and mixed cropping. It also comes up well as ratoon crop and the yield recorded was as high as the first sown crop (3560 kg/ha).

Early maturing high yielding varieties of sorghum have a significant role in stepping up food production in Tamil Nadu. Earliness, drought hardiness, high yield potential and inherent ability to use water much more efficiently than the long duration varieties are desirable attributes of a good variety. High in per day productivity and economic land use are also important potentialities. Breeding work on Sorghum in the Tamil Nadu Agricultural University on the above aspects resulted in the development of an early maturing high yielding sorghum variety.

### MATERIAL AND METHODS

Three male sterile lines of proven general combining ability, namely MS 2077A, 2219A and 3660A were crossed individually with the high general combining pollinator line CS 3541 so as to have three hybrid combinations 2077A x CS 3541, 2219A x CS 3541 and 3660A x CS 3541. Equal proportions of seeds from these F<sub>1</sub> hybrids were collected,

mixed and the composite F<sub>2</sub> progeny was raised. The male sterile plants in the segregating progenies of the mixed population were tagged and were allowed for random pollination within the population itself.

Seeds were collected only from the tagged male sterile plants, thoroughly mixed and were sown in the next generation. The procedure was repeated for two more generations. In the fourth generation selection pressure was applied on the male fertile plants, for short stature, long and well branched panicles and early maturity. Accession No. 2/2 was thus, isolated for its dwarf stature, long panicle and short duration. The material after having been stabilised for all agronomic characters was designated U.S.V. 2. Extensive evaluation of U.S.V. 2 was made by conducting replicated trials at the Tamil Nadu Agricultural University as well as in other States and also in cultivators' holdings in different locations in Tamil Nadu.

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TABLE I. Abstract of Yield Trials on USV. 2 Sorghum

Details of locations	Grain yield kg/ha			Straw yield tonnes/ha		
	USV. 2 (Co. 22)	Co. 21	CSV. 4	USV. 2 (Co. 22)	Co. 21	CSV. 4
<b>Irrigated</b>						
Tamil Nadu	4638	4157	3505	10.0	14.6	11.9
Multilocation trials	4202	3288	3387	6.4	12.9	7.7
Overall Mean	4386	3729	3438	9.2	14.5	9.6
<b>Rainfed</b>						
Tamil Nadu	2245	1975	1939	9.1	13.4	10.5
Multilocation trials	2360	1938	1965	5.1	10.0	6.1
Overall Mean	2310	1946	1964	6.8	14.4	11.0

TABLE II. Performance of USV. 2 in Tamil Nadu During 1974-75 to 1977-78

Name of the centre	Grain yield kg/ha			Straw yield tonnes/ha		
	USV. 2 (Co. 22)	Co. 21	CSV. 4	USV. 2 (Co. 22)	Co. 21	CSV. 4
<b>a) Irrigated</b>						
Naickenpalayam	5645	4700	—	6.7	10.0	—
Udumalpet	4375	5008	—	18.0	21.2	—
Valiampalayam	4147	3787	—	10.3	11.3	—
Bhavani	3750	3750	—	9.8	15.6	—
Coimbatore I	4680	4280	—	10.1	16.7	—
Coimbatore II	4906	4845	—	10.9	17.1	—
Coimbatore III	3500	2470	—	10.5	12.0	—
Coimbatore IV	3910	3730	—	9.8	15.0	—
Coimbatore V	4808	4841	380	9.3	12.7	9.0
Coimbatore VI	4816	—	4681	10.0	—	9.5
Coimbatore VII	4698	—	3326	12.9	—	13.6
Coimbatore VIII	4322	—	2933	11.1	—	13.0
Coimbatore IX	4962	—	3086	10.1	—	10.9
Coimbatore X	3414	—	3205	11.3	—	15.1
Mean	4638	4157	3505	10.0	14.6	11.9
<b>b) Rainfed</b>						
Govindanur	1755	1650	—	15.0	20.0	—
Perianaickenpalayam	1900	1800	—	9.0	18.0	—
Velandipalayam	2000	2250	—	10.6	12.8	—
Thondamuthur	1625	1510	—	11.0	13.0	—
Bhavanisagar	2346	2518	2494	8.6	19.5	9.9
Krishnagiri	3037	3333	1704	4.2	5.3	3.6
Coimbatore I	2880	2460	—	10.1	16.8	—
Coimbatore II	1875	1800	—	8.0	12.0	—
Coimbatore III	1525	1375	—	4.4	6.0	—
Coimbatore IV	2819	1049	3184	7.8	10.0	10.4
Coimbatore V	2263	—	1236	10.9	—	15.7
Coimbatore VI	2880	—	1080	9.9	—	13.1
Mean	2242	1974	1935	9.1	13.4	10.5

TABLE III. Performance of USV.3 in multilocation trials (1974-75-1977-76)

Name of the Centre	Grain yield kg/ha			Straw yield tonnes/ha		
	USV.2 (CO.22)	CO.21	CSV.4	USV.2	CO.21	CSV.4
<b>A) IRRIGATED</b>						
Digraj Maharashtra	4533	3020	4415	4.6	8.3	6.3
Rahuri "	4148	4420	3630	7.5	13.6	7.8
Amaravathi "	4049	4346	4679	9.2	23.3	10.8
Nanded "	4889	2988	3556	10.1	21.2	11.3
Mandeur, Madhya Pradesh	2735	1812	2488	2.8	7.2	3.1
Dharwar, Karnataka	4533	3600	—	4.1	17.0	—
Arbhavi "	5550	3806	4405	7.5	6.1	8.8
Bagalkot, "	2346	2344	2188	5.6	7.0	5.9
Bangalore "	5020	3264	1738	—	—	—
Mean	4202	3288	3387	6.4	12.9	7.7
<b>B) RAINFED</b>						
Jalgaon I, Maharashtra	1881	1709	1751	6.6	13.1	8.1
Jalgaon II, "	2314	2620	3301	1.6	5.1	3.0
Parbhani I, "	2264	2025	2553	3.7	11.7	5.2
Parbhani II, "	2407	2427	2215	4.0	9.2	4.1
Akola "	2063	2257	1430	5.5	8.0	3.2
Nagpur "	2488	1821	1911	4.8	11.2	7.0
Digraj "	3410	2035	3222	4.3	7.9	5.3
Dhulia "	2854	3222	2659	4.3	7.9	5.3
Bulda' "	2785	1909	2909	4.3	16.0	5.9
Gotimal "	2185	1662	1659	1.0	1.6	1.0
Ambajogai "	1955	3030	1790	—	—	—
Indore I Madhya Pradesh	2753	1609	2329	5.7	15.9	7.5
Indore II "	2332	1866	1374	4.7	10.0	3.9
Chindwara "	1926	1926	839	—	—	—
Rewa "	1802	921	938	10.9	11.8	14.9
Vallabhanagar, Gujarat	2963	1795	3104	8.9	11.4	8.9
Navasari, I "	1657	1975	2412	3.9	7.2	10.7
Navasari, II "	2519	2319	1559	6.2	12.6	8.1
Dharwar, Karnataka	2790	2383	1323	4.0	11.2	2.6
Bijapur, "	1605	2531	1636	3.1	6.2	3.8
Tyavangi "	913	623	498	5.1	4.9	7.7
Rajendranagar, Andhra Pradesh	3259	1655	3539	10.3	17.7	9.6
Adilabad "	1591	850	1459	3.2	4.2	3.9
Palem, "	2730	1709	1923	5.4	14.0	5.7
Udaipur, Rajasthan	3909	2679	2704	5.4	11.0	4.6
Kanpur, Uttar Pradesh	3102	1821	1713	—	—	—
Pantnagar, "	2146	1702	—	—	—	—
Hissar, Hariyana	1485	1183	348	6.3	10.3	5.6
Mean	2360	1938	1965	5.1	10.0	6.1

## RESULTS AND DISCUSSION

The yield data furnished in Table-I reveal the high yield potential of USV.2 both under irrigated as well as in rainfed conditions.

Tests over 23 locations under irrigated conditions all over the country over a period of three years were conducted, in comparison with CSV.4 (CS 3541) and Co.21 (Table II and III). The results indicated that USV.2 besides being an early variety, it also recorded yields ranging 2346 to 5645 kg per ha. On an average, the variety yielded 4300 kg/ha. The increase being 23 and 15 per cent over the standard varieties, CSV 4 and Co.21 respectively. Tests under rainfed conditions over 40 locations also proved that the variety is capable of yielding 2300 kg of grain per hectare, on an average, which was higher by 17 and 18 per cent over Co. 21 and CSV. 4 respectively (Table-II and III). By virtue of its early maturity, the per day production in USV.2 is 48.5 kg under irrigated conditions and 26.5 kg under rainfed conditions as against 37.2 kg and 19.0 kg recorded for Co.21 respectively,

As a ratoon crop it recorded a grain yield of 3560 kg/ha in 75 days, which is almost equal to that of the direct sown crop (Table IV).

Similar to Co.21 and CSV.4, this variety is also moderately resistant to downy mildew and other foliar diseases and is moderately tolerant to shoot-fly (Table V). In grain quality aspects, it is equal to already released sorghum varie-

ties. The protein content of this variety is 7.75 per cent and the amino acid like

TABLE IV. Performance of USV. 2 Under ratooning

Description	USV.2 (Co. 22)	Co. 21
Grain Yield (Kg/ha)		
Sown crop	3844	3750
Ratoon crop	3560	2736
Total	7404	6406
Fodder yield (Kg/ha)		
Sown crop	3620	8133
Ratoon crop	3380	6100
Total	7000	14233
Duration (Days)		
Sown crop	85	100
Ratoon crop	75	85
Per day grain production (kg/ha)	46.28	35.06
Per day straw production (kg/ha)	43.75	76.94
Relative per day income (in Rs.)	69.00	57.00

leucine and isoleucine account for 5.52 and 1.41 gm per 100 gm of protein which are well within the safety limits.

The most useful approach for increasing grain yield potential is to increase the grain to straw ratio by reducing plant height, to develop better standing ability and to improve performance under high plant population. Tall plants

are not suited to carry large heads, without lodging and to hold high plant populations. All these essential features necessary for high grain production under pure cropping, mixed cropping, relay cropping and ratooning are possessed by the new dwarf variety USV.2. In view of these appreciative attributes, the Tamil Nadu Agricultural University has released the sorghum variety USV.2 as Co.22 for general cultivation in Tamil Nadu.

The authors acknowledge with gratitude the help and guidance given by the Head of the Department of Agricultural Botany and the Professor of Millets, Tamil Nadu Agricultural University. The help rendered by the Assistant Pathologist and Assistant Entomologist of the All India Coordinated Sorghum Improvement Project in evaluating variety for disease and pest reaction is acknowledged with thanks.

TABLE V. Pests and diseases reaction of USV.2 under field conditions (Average of 3 seasons)

Details	USV.2 (CO.22)	CO.21	CSV.4
Shootfly (%)	25.00	25.30	—
Stem borer (%)			
a) Dead hearts	7.79	7.10	26.90
b) Tunnel damage	7.50	16.00	—
Midge (%)	20.60	25.60	
Downy mildew (%)	0.80	2.20	1.30
Head mould (Category value)	2.00	2.00	1.30
Rust ..	1.00	2.00	1.30
Leaf Blight ..	2.30	1.30	2.00
Cercospora leaf spot (Category value)	0.00	0.70	0.80
Disease Reaction under artificial condition			
Downy mildew (%)	3.60	6.00	3.00
Head mould (Category value)	2.00	2.00	2.00
Rust ..	2.50	2.30	2.00
Leaf blight ..	2.00	2.30	2.00
Cercospora leaf spot ..	1.00	1.70	1.00