

CO 23 A New High Yielding Sorghum Variety

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A new sorghum variety has been developed through population breeding followed by a multiple cross technique and released as a new strain CO 23. This variety has a wide adaptability due to its broad genetic base and possess stability in yield. This high yielding CO 23 sorghum strain can be grown both under irrigated and rainfed conditions and gives an average yield of 5000 kg and 2700 kg/ha respectively. Besides, it gives a straw yield of 12–15 tonnes/ha. CO 23 sorghum can also be grown profitably as a ratoon crop.

Sorghum is a dual purpose crop grown both for food and fodder in the State of Tamil Nadu. The need for sorghum as a raw material for industry is also growing annually. The advent of hybrid sorghum has had a dramatic impact on the seed trade for more sorghum production. The seed industry however, is yet to attain full development so as to obtain a full coverage of the sorghum tract in the State with hybrid seeds, because the hybrid seed production involves many problems

Under these circumstances genetically stable cross derivatives have obvious advantages since they do not involve the hazardous seed production procedures. With the above objective in mind, research work was continued at Tamil Nadu Agricultural University, Coimbatore which led to the release of the new sorghum strain CO 23. The details of development of which are presented in this paper.

MATERIAL AND METHODS

Two sorghum male sterile lines 2077A and 2947A and two restorers CS 3678 and CS 3687 with high combining ability were utilized for crossing. Two crosses between 2077A × CS 3678 and 2947A × CS 3637 were effected separately. Both the F₁s were found to be heterotic for various characters including yield. Equal quantities of the seeds obtained from the two hybrids were composited and raised in isolation. At the time of flowering, the male-sterile plants were marked. The male-sterile plants possessing desirable earhead characteristics and grain quality were selected and harvested. The seeds from the selected earheads were grouped into different height categories and raised in the next generation as separate families in isolation.

After three generations of random pollination and selection through

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female choice in the male-sterile plants, a few families attained a considerable degree of uniformity. Seeds from selected fertile plants of each family were collected since fourth generation composited and raised in isolation and such studies were continued for four generations and found different families got stabilised for a number of characters and also exhibited higher degrees of phenotypic uniformity. These families were then evaluated for grain yield in comparison with the local varieties and improved strains. One of the families viz., USV 3 which showed its promise in yield, was extensively tested under cultivators' field in different regions of the State as well as in India.

RESULTS AND DISCUSSION

The family USV 3 was observed to be well adapted to the varied agroclimatic conditions in the state. As a result of tests conducted at 39 locations in Tamil Nadu in comparison with CO 21, CSV 4 (CS 3541), IS 3541 and

CO 22 over a period of four years under rainfed conditions and over 14 locations in the States of Maharashtra, Karnataka, Rajasthan, Gujarat and Andhra Pradesh under the All India Coordinated trials, its superiority over other standard varieties has been well established. As a new variety, USV 3 recorded a mean yield of 2700 kg of grain per hectare under rainfed conditions registering an increase of 17.40 to 28.50 per cent over the controls

As an irrigated crop, the new variety USV 3 was tested over 26 locations for more than four years in comparison with CO 21, CSV 4 (CS. 3541) and CO. 18. This new variety recorded an average grain yield of 4910 kg/ha which is higher by 14.40 to 25.30 per cent over the standard varieties compared (Table I). Apart from these trials, it was also tested at 75 adaptive research trials and found its worthiness to be released as a variety for large scale cultivation in Tamil Nadu State.

TABLE I Abstract of grain yield of USV 3 (CO 23) in comparison with other varieties

	No. of locations	USV 3 (CO 23)	CO 21	CO 22	CS 3541 (CSV 4)	IS 3541	CO 18
Irrigated (kg/ha)	26	4910	4290	—	3920	—	4063
Rainfed (kg/ha)	53	2700	2300	2100	2124	2068	—
% increase (Irrigated)			14.40	—	25.30	—	20.80
% increase (Rainfed)			17.40	28.50	27.12	18.50	—

In addition to high grain yield, the variety USV 3 gave 12-15 tonnes of straw per hectare. As a ratoon crop, this new variety out yielded CO 21 (Table II). Like other recently released strains, this variety was also found to

TABLE II Performance of USV 3 (CO 23) under ratooning

Description	USV 3 (CO 23)	CO 21
Grain yield (kg/ha)		
Sown crop	4106	3750
Ratoon crop	3002	2736
Total	7108	6486
Fodder yield (kg/ha)		
Sown crop	7385	8133
Ratoon crop	5885	6100
Total	13280	14233
Duration (days)		
Sown crop	95	105
Ratoon crop	85	85
Total	180	190
Establishment of ratoon %	74	71
Per day grain production (kg/ha)	39.49	34.14
Per day straw production (kg/ha)	73.70	74.91

be moderately tolerant to major pests and diseases (Table III) and its quality attributes were also encouraging (Table IV).

The resultant population USV 3 thus, possessed a high degree of genetic homeostasis coupled with high yield potential as exemplified by its stable and superior performance over a variety of locations throughout the country. The Tamil Nadu Agricultural University, therefore, proposed USV 3 for release as CO 23 and the State Variety Release Committee has released it for general cultivation in the Tamil Nadu State.

The authors wish to express their thanks to the Professor and Head of the Department of Agricultural Botany, for his keen interest and valuable suggestions in carrying out the work. The authors acknowledge the contributions made by the Agronomist, Plant Pathologist of the All India Coordinated Sorghum Improvement Project. The authors are also thankful to the Indian Council of Agricultural Research for their financial help to function the All India Coordinated Sorghum Improvement Project at Coimbatore.

TABLE IV Quality Attributes of USV 3 (CO 23)

Attributes	Varieties		
	CO 21	CO 22	CO 23
Protein (%)	10.95	8.0	10.95
Leucine (gm/100 gm of Protein)	5.50	5.53	5.50
Lysine	2.64	3.45	3.90
Isoleucine	—	1.40	3.30

TABLE III Pests and Diseases Reaction of USV 3 (CO 23) under Field Condition
(Average of 3 Seasons)

Details	USV 3	CO 22	CO 21	CSH 5	CS 3541 (CSV 4)
Shootfly (%) (Dead heart)	34.81	53.05	50.78	78.00	—
Stemborer (%)					
a) Dead hearts	11.09	14.70	8.47	48.46	26.90
b) Tunnel damage	15.17	22.06	16.00	62.01	—
Midge (%)	24.70	30.60	17.80	59.30	—
Downey mildew (%)	7.1	2.5	7.3	10.3	7.1
Head mould (category value)	2	2	2	2	2
Rust (category value)	2	2	2	2	2
Leaf blight (category value)	2	2.5	2.5	2.5	2
<i>Cercospora</i> leaf spot (category value)	2	2	2	2	1.5
Diseases Reaction Under Artificial Condition					
Downey mildew (%)	7.1	6.1	6.7	12.1	3.7
Head mould (category value)	2	2	2	2	2
Rust (category value)	2	2	3	2	2
Leaf blight (category value)	2	3	3	2	3
<i>Cercospora</i> leaf spot (category value)	2	2	2	2	1