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CNFS-1: NEW HIGH YIELDING SINGLE CUT FORAGE SORGHUM VARIETY FOR SOUTHERN DRY ZONE (ZONE-6) OF KARNATAKA

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SUMMARY

CNFS-1 is a new single cut forage sorghum variety is a selection from Kagalavadi local fodder sorghum variety. Based on its performance under rainfed condition in station, multilocation trials and farm trials, CNFS-1 recorded 33.70, 34.88 and 29.88 percent more green fodder yield over the check MP Chari. Performance of CNFS-1 in Co-ordinated trial, Second place in the green fodder yield at All India level, with zone wise data it was recorded second rank in Zone I and fourth rank in Zone II for green fodder yield respectively. It had more of protein (9.87%), Total Soluble Sugar (11.68%) and IVDMD (51%). Lower Ash (6.77%), Fibre (35.20%) and HCN content (12.77ppm) than the check MP Chari. It showed resistant reaction to leaf spot and found to be less susceptible to shoot fly damage. By considering the high green fodder yield potential of CNFS-1 better nutritional qualities and resistance to pest and diseases over check MP Chari. It was, therefore, released under the CNFS-1 for green fodder yield under rainfed condition of Southern Dry Zone (Zone 6) of Karnataka.

Key words : CNFS-1, MP Chari, green fodder yield and HCN

Sorghum is mainly cultivated in the tropical and sub tropical climate and predominately grown in semi arid tropics. In India, cultivation of sorghum for dual purpose is a common practice under dryland situations, to meet the food requirement of the rural population as well as fodder for livestock. Presently in India the area under the fodder crop is about 8.4m.ha, which is around 5.4% of the total geographical area. On the other hand, that population of livestock is about 536.76 million (Anonymous, 2020). Livestock is one of the important subsistence activities in Karnataka adding to agricultural income irrespective of the land holdings. The progress and economy of livestock depends on the availability of quality fodder and adequate quantities. The gap between supply and demand of the good quality forage continues to enlarge due to constraints in land and resource inputs, the requirements of green and dry fodder for the state's livestock production of over 27.76 million at its optimum plan of nutrition has been estimated at 47,504 million tones indicating a huge deficit of more than 50% as compared to its requirement. Thus there is an urgent need to improve upon the present forage supply position in quantitative and qualitative terms through research based development programmes (Shekar *et al.*, 2019). Hence, there is a great demand for cultivation of fodder crops to meet the fodder requirement and also there is a 36% deficiency in green fodder supply for livestock feeding (IGFRI,2017). In this regard, newly developed fodder sorghum cultivar CNFS-1 have the potential to overcome the above constraints with an advantage of high biomass production and being suitable for varied soil and climatic situations.

MATERIALS AND METHODS

The genotype CNFS-1 is developed at AICRP on Sorghum, Chamarajanagara under UAS, Bangalore through selection from Kagalavadi local. Due to it's higher green fodder yield potentiality it was evaluated in the fodder sorghum station trial for four years from 2018-2021 at Chamarajanagara. It was evaluated in the state Multilocation trials in Chamarajanagara, Mandya and Tumkur districts of Zone 6 of Karnataka. Further it was approved for the farm trials in Zone 6

of Karnataka for higher green fodder yield in the year 2021 by the Zonal research and extension programme. By considering the high green fodder yield potential, it was included in co-ordinated single cut forage sorghum trial in the year 2021-22 under the name SPV-2878 along with the national best check CSV-35F and local Check. It was evaluated at Zone I and Zone II for green fodder yield, other yield and quality parameters. The Zone I comprising the Gujarat (Deesa and Surat), Haryana (Hisar), Punjab (Ludhiana), Uttarakand (Pantnagar) and Rajasthan (Udaipura). Zone II comprising the Maharashtra (Akola and Solapura), Karnataka (Chamarajanagara) and Tamil Nadu (Coimbatore). Varietal trials were conducted as per the testing norms and recommended packages as prescribed in AICSIP (Anonymous,2010). The observations on growth and yield were collected and subjected to statistical analysis by adopting the procedures given by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Performance in Station, Multi-location and Farm trials

The pooled data on green fodder yield (t/ha) of CNFS-1 in comparison with check MP Chari are presented in Table 1. In Four years of Station trials CNFS-1 recorded higher green fodder yield (56.86 t/ha) over the check MP Chari (37.70t/ha) which was 33.70% per cent increase green fodder yield over MP Chari. Data from the three multi-location trials (MLT) reveals that CNFS-1recorded increased green fodder yield (48.36t/ha) over the MP Chari (31.49 t/ha). From 31 farm trials conducted at Zone 6 of Karnataka CNFS-1 obtained the higher green fodder yield (44.07t/ha) over MP Chari (30.90t/ha).By considering the overall performance in station, MLT and farm trials (4 years of Station, 3 MLT and 31 Farm trials), CNFS-1 recorded the increased green fodder yield (49.76t/ha) over the check MP Chari(33.36t/ha). It was 32.95 per cent increased green fodder yield over MP Chari (Anonymous, 2022).

Performance in Co-ordinated trial

The genotype CNFS-1 was evaluated for single cut forage sorghum trial with checks, CSV-35F and local check for green fodder yield (GFY) in the year 2021-2022 and results are presented in the Table 2. The green fodder yield differences due to genotypes at all the locations and when data pooled were statistically significant in the year 2021-22. The co-ordinated trials Initial Varietal Hybrid Trial Single Cut (IVHT-SC) were conducted at 10 locations *viz*., Deesa, Hisar, Ludhiana, Pantnagar, Surat and Udaipura of zone I and Akola, Chamarajanagara, Coimbatore and Solapura of Zone II during 2021-22. The genotype CNFS-1 was evaluated in the name of SPV 2878. Based on overall performance for year 2021-22 averaged over 10 trials, the genotype SPV 2878 recorded significantly higher mean green fodder yield (52.85t/ha) as against CSV-35F (51.63t/ha) and local check

TABLE 1
Overall performance of CNFS-1 for green fodder yield in comparison over MP Chari in different trials

Trials	No. of trials	Mean green fodder yield (t/ha) CNFS-1	MP chari (t/ha)	% superiority over MP Chari
Station Trials (2018-2021)	4	56.86	37.70	33.70
MLT	3	48.36	31.49	34.88
Farm Trials	31	44.07	30.90	29.88
Mean		49.76	33.36	32.95

TABLE 2
Performance of CNFS-1 under AICRP trials -IVHT-SC in All India level during *kharif* 2021

	No. of trials	Green Fodder yield (t/ha)					
		SPV 2878	CSV-35F	Local variety	SEm±	CD @ 5%	Ranking
Zone-I	6	61.08	63.26	58.06	3.71	7.65	2
Zone-II	4	44.62	40.00	39.12	4.91	9.86	4
India average	10	52.85	51.63	48.59	3.16	6.23	2
Per cent increase			2.30	8.06			

(48.59t/ha), which amounted to 2.30 and 8.06 per cent higher than the checks, respectively.

Performance in Agronomic trials

The agronomical experiment *i.e*. effect of varying level of fertilizers on green fodder yield of sorghum varieties and Effect of different date of sowing and seed rate on growth and yield of sorghum variety CNFS-1. Both the experiments were conducted at AICRP on Sorghum, Chamarajanagara in the year 2021-22 (Table 3 and Table 4).

Results of the experiment, Varieties along with different fertilizer dose, CNFS-1 recorded significantly higher green fodder yield (55.92t/ha) over MP Chari (31.98t/ha). 125 per cent increase in Recommended Fertilizer Dose (RDF) (62.5:31.25:31.25 kg/ha NPK) recorded higher green fodder yield (47.32t/ha) and it was on par with 100 (50:25:25kg/ha NPK) per cent RDF. Recommended dose of fertilizer is 50:25:25 kg/ha NPK as par University of Agricultural Sciences, Bangalore fodder sorghum varieties under rainfed condition.

From experiment different sowing windows along with varying level seed rates in CNFS-1 fodder sorghum variety, First fortnight of May sowing shows increased in the green fodder yield (62.32t/ha), Dry matter yield(16.19t/ha), Plant height(256cm) and leaf: Stem ratio(0.244). 55 kg/ha seed rate recorded significantly increased in green fodder yield (51.48t/ha), Dry matter yield (13.58t/ha) and Plant height (238 cm) and it was on par with 50 kg/ha seed rate. Interaction was found non-significant with different sowing windows and varying levels of seed rate for all the growth and yield parameters. From both the experiment it was concluded that CNFS-1 shows the increase in green fodder yield with 100 per cent increase in RDF (50:25:25 kg/ha NPK), first fortnight May sowing is more suitable for sowing and along with the seed rate of 50 kg/ha.

TABLE 3
Effect of varying level of fertilizers green fodder yield of sorghum varieties

Treatments	Varieties		Mean of fertilizer (t/ha)
	CNFS-1 (t/ha)	MP chari (t/ha)	
75% RDF	49.77	28.70	39.24
100% RDF	58.06	32.55	45.30
125% RDF	59.93	34.71	47.32
Mean of varieties	55.92	31.98	43.95
	SEm±	CD @ 5%	
Fertilizer levels	1.12	3.27	
Varieties	0.91	2.67	

Performance for disease and pest reaction

CNFS-1 was screened for its reaction with check MP Chari to leaf spot disease and shoot fly pest at field condition during 2019 to 2021. On the basis of three year's data (Table 5), CNFS-1 showed resistance to leaf spot and less susceptible to shoot fly damage.

TABLE 4
Effect of different date of sowing and seed rate on growth and yield of CNFS-1 fodder sorghum variety

Treatments	Plant height (cm)	Leaf : Stem ratio	Green fodder yield (t/ha)	Dry matter yield (t/ha)
Main Plot : 04 Different date of sowing				
D1 : First fortnight of May sowing	256.00	0.244	62.32	16.19
D2 : Second fortnight of May sowing	230.00	0.203	47.68	12.39
D3 : First fortnight of June sowing	228.00	0.184	45.17	11.74
D4 : Second fortnight of June sowing	220.00	0.170	40.51	10.53
SEm±	10.03	0.010	2.64	0.68
C.D. @5%	23.60	0.024	6.20	1.61
Sub Plot: 03 Varying level of seed rate				
S1 : 45 kg/ha seedrate	228.00	0.183	44.43	11.54
S2 : 50 kg/ha seed rate	235.00	0.211	50.84	13.21
S3 : 55kg/ha seedrate	238.00	0.206	51.48	13.28
SEm±	6.23	0.009	1.94	0.50
C.D. @5%	18.20	0.025	5.66	1.47
Interaction (D×S)				
SEm±	14.39	0.020	4.47	1.16
C.D. @ 5%	NS	NS	NS	NS

TABLE 5
Reaction to Major disease and pest

Year	Leaf spot (*Ascochyta sorghi*)		Shoot fly (*Atherigona soccata*)	
	CNFS-1	MP Chari	CNFS-1	MP Chari
2019	1.00	4.00	14.00	16.56
2020	1.00	4.00	13.50	17.50
Mean	1.00	4.00	13.00	17.00
Reaction	R	R	T	T

R : Resistance, T: Tolerance.

Quality Characters

In forage quality studies shows that CNFS-1 recorded higher protein (9.87%), Total soluble sugar (11.68%) and IVDMD (51.00%) percent. Lower Ash (6.77%) and Fibre (35.20%) percentage. Lesser amount of HCN content (12.77ppm) compare to the check MP chari.

TABLE 6
Quality Parameters of CNFS-1

S. No.	Entries	Ash (%)	Fibre (%)	Protein (%)	TSS (%)	HCN (ppm)	IVDMD (%)
1	CNFS-1	6.77	35.20	9.87	11.68	12.77	51.00
2	MP Chari	7.54	37.80	7.59	7.15	65.96	46.50

Salient Morphological Features of CNFS-1

The salient features of CNFS-1 recorded are presented in brief (Table 7). It has a medium in height (278 cm), flowering duration (78-80 days), erect in growth habit. Pigmentation, Leaf sheath pubescence and Culm branching were absent. Variety posses the high leaf length (95cm), Leaf width (4 cm), Stem girth (10.07 mm) and leaf : Stem ratio (0.29). Panicle is open type, grain colour is reddish brown and grain shape is oval in shape.

By Considering CNFS-1 new fodder sorghum variety having high green fodder yield potential, better nutritional quality, resistance to pest and disease over the Check MP Chari. It has recommended for the release for green fodder yield under rainfed condition of Southern Dry Zone (Zone 6) of Karnataka.

TABLE 7
DUS characteristics of CNFS-1

Characters			CNFS-1
1	Growth habit	:	Erect
2	Pigmentation	:	Absent
3	Plant height (cm)	:	278 cm
4	Leaf sheath pubescence	:	Nil
5	Culm branching	:	Absent
6	Number of leaves	:	09
7	Leaf length(cm)	:	95
8	Leaf width(cm)	:	04
9	Stem girth(mm)	:	10.07
10	Leaf: Stem ratio	:	0.29
11	Panicle compactness	:	Open
12	Days to Harvest	:	78-80 days
13	Grain colour	:	Reddish brown
14	Grain shape	:	Oval

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