

results suggest that under condition of delayed sowing, what did not utilize the extra amount of fertilizer. The optimally sown crop had better root and

shoot growth which resulted in an enhancement of N, P and K uptake, perhaps due to increase in the total dry matter production.

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<https://doi.org/10.29321/MAJ.10.A01959>

Madras Agric. J. 77 (7&8) 316-320 July-August, 1990

## Co 1—A DROUGHT TOLERANT BLOU BUFFEL GRASS

SUKANYA SUBRAMANIAN, N.SIVASAMY, S.R.SREERANGASAMY,

L.D. VIJENDRADAS, P.VAIDYANATHAN and S. SURESH

Department of Forage Crops, Tamil Nadu Agricultural University, Coimbatore 641 003.

#### ABSTRACT

A search and study of the *Cenchrus* germplasm collection resulted in the identification of FS-391, a genotype from Vellakoil taluk of Coimbatore district. It has high green fodder yielding potential of 40 t/ha/yr under rainfed condition with higher DM and CP yield than *C.ciliaris* and *C.glaucus* Local. It was identified to be a type of *C.glaucus* being an aneuploid ( $2n=42$ ) and an obligate apomict.

KEY WORDS: Blou buffel, Drought tolerant High yielding variety

The genus *Cenchrus* Linn. belonging to *Gramineae* has about 35 species, of which a few are important as fodder grasses. In Tamil Nadu *Cenchrus ciliaris* L. is the dominant pasture grass of the Kangayam area where the well known Kangayam breed of cattle is bred. This is popularly known as White *Kolukattai* grass with white or straw coloured spikelets. A closely similar grass, *C. setigerus* Vahl. with blackish purple involucre of bristles and spikelets which is also found grown in the same tract is known as Black *Kolukattai*. Both the species are highly nutritious and highly relished by cattle. Yet another species introduced in Coimbatore, *C. glaucus* Mudaliar et. Sundararaj, has spread in some area of the tract. This is popularly known as Blou Buffel and has been reported to be one of the leafiest of all the grasses having a leaf-stem ratio of 16:9 as against 8:9 in *C. ciliaris* and *C. setigerus* (Narayanan and Dabadghao, 1972). In order to identify a high yielding drought tolerant grass for the pastures, varieties in all the three species were studied and the results are presented below.

#### MATERIALS AND METHODS

Eleven selected types from the available source of germplasm in the Department of Forage Crops, Tamil Nadu Agrl. University, Coimbatore were evaluated for green fodder yield during 1977-78, 1978-79 and 1980-81. During 1981-82, the seeds from the best clones were multiplied and comparative yield trial was conducted with *Cenchrus ciliaris* and *C. glaucus* local. Mixed cropping trial with horse gram, Clitoria, Siratro, Desmodium and *Stylosanthes scabra* was conducted during 1983-85. Multilocation trials were conducted in eight centres during 1984-85 and 1987-88. All India Co-ordinated trial was conducted in two centres during 1987-

88. From 1986-87 grazing trial and sylvipasture trial were conducted.

#### RESULTS AND DISCUSSION

During 1977-78, 1978-79 and 1980-81, a total of 11 genotypes was tested for green fodder yield. The yield ranged from 21.00 to 73.60, 17.95 to 40.42 and 2.00 to 50.00 t/ha/yr with a mean of 38.67, 26.34 and 23.31 t/ha/yr in the three years of trial (Table 1). The average yield of three years ranged from 19.79 to 46.81 t/ha/yr, with an overall average of 29.44 t/ha. The genotype FS. 391 was found to yield high consecutively for the three years and this was a collection from Vellakoil taluk of Coimbatore district. This was again compared against *C. ciliaris* and *C. glaucus* local (Table 2). FS. 391 registered 40 t/ha/yr which worked out to 38.4% and 27.8% higher yield than *C. ciliaris* and *C. glaucus* local respectively. The dry matter yield and crude protein yield were 38.3% and 38.5% more than *C. ciliaris* and 27.3 and 25.9% more than *C. glaucus* local respectively.

The type expressed higher values for the morphological characters such as plant height, number of tillers per clump, number of leaves, length of internode, stem thickness, length and width of leaf, panicle length and leaf-stem ratio than the others. The distinguishing features are bluish green glaucous appearance of the leaves and light purple colour of spikelets in the inflorescence. Though the dry matter content and phosphorus content were slightly below than others, the type contained more crude protein, calcium, carbohydrate, iron, zinc, copper and manganese. The crude fibre was lower while the IVDMD was higher than the other species (Table 3).

The seeds (fluffs) can be collected after attaining maturity as they

do not shatter during the maturity period. The self sown seeds also germinate and establish in the pasture. The seeds have been found to have a dormancy period of three months when the germination percentage was 31% which increased to 47% by the end of the year.

In the MLT laid out in eight centres during 1984-85 and 1987-88, the FS. 391 registered 26.96 t/ha/yr as against 18.71 t/ha/yr recorded by the control (Table 4), which worked out to 44.1% increase. The results showed that this type is suitable for Coimbatore, Periyar, Salem, Dharmapuri, Chengleput, South Arcot, Tirunelveli and Ramanathapuram districts in Tamil Nadu.

At Hyderabad and Jhansi the type was tested under All India Coordinated trials and the overall mean of green fodder yield was 13.04 t/ha with dry matter yield of 3.34 t/ha ranking first and third respectively among the entries tested.

Srinivasa Rao (1986) identified this genotype to be *Cenchrus glaucus* being an aneuploid having  $2n=42$ . The embryological study and breeding behaviour conducted by him confirmed

it to be an obligate apomict.

The mixed cropping with horse gram, *Clitoria*, Siratro, *Desmodium* and *Stylosanthes scabra* revealed that though the total green fodder yield was higher in the combination of Siratro, the fodder quality was higher in the combination of *S. scabra* with higher dry matter and crude protein yield than the other combinations (Table 5). It is to be noted that the combination of this grass + *S. scabra* registered 20.8% and 28.55% more dry matter yield and crude protein yield over the pure grass alone. This grass can be grown under sylvipasture system between the Subabul trees planted 6 to 10 meters apart. Under pasture condition the cattle can be grazed four times in an year with an yield of 12.34 t/ha/grazing. The grass is highly palatable and has good regeneration capacity.

Based on the above desirable performance, the genotype FS. 391 was released as Co 1 *Neelakolukattai* by the Department of Forage Crops, School of Genetics, Tamil Nadu Agricultural University, Coimbatore during January 1989.

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TABLE 1.  
Comparative green fodder yield (t/ha/yr) of *Cenchrus* cultivars.

S.No	Varieties	1977-78	1978-79	1980-81	Average
1.	FS. 210	44.60	27.28	2.00	24.63
2.	FS. 283	37.40	27.33	24.80	29.84
3.	FS. 297	35.80	32.19	9.20	25.46
4.	FS. 343	28.40	22.19	34.40	28.33
5.	FS. 348	31.21	24.16	4.00	19.79
6.	FS. 354	24.00	22.52	28.00	24.84
7.	FS. 356	21.00	19.95	41.00	26.98
8.	FS. 374	39.40	17.95	9.00	22.12
9.	FS. 391	50.00	40.42	50.00	46.81
10.	FS. 403	40.00	30.66	30.00	33.55
11.	FS. 404	73.60	25.05	24.00	40.88
	Mean	38.67	26.34	23.31	29.44

Table 2.  
Comparative Yield Trial

	Fs. 391 <i>Cenchrus glaucus</i>		<i>Cenchrus ciliaris</i>		<i>Cenchrus glaucus</i>
	Yield	<i>C.ciliaris</i>	<i>C.glaucus</i>	Yield	% on <i>C.glaucus</i> local
Green fodder yield(t/ha/yr)	40.0	138.4	127.8	28.9	92.3
Dry matter yield(t/ha/yr)	11.2	138.3	127.3	8.1	92.0
Crude protein yield(kg/ha/yr)	101.5	128.5	125.9	73.3	92.3

TABLE 3.  
Metric and Quality parameters

S.No.	Parameters	Fs. 391 <i>Cenchrus glaucus</i>	<i>Cenchrus ciliaris</i>	<i>Cenchrus glaucus</i> local
1.	Mean plant height(cm)	127.0	109.0	82.0
2.	No. of tillers per clump	64.0	52.1	55.0
3.	No. of leaves per clump	612.0	539.0	557.0
4.	Internodal length (cm)	9.4	8.2	6.2
5.	Stem thickness (cm)	0.3	0.23	0.25
6.	Leaf length (cm)	27.0	16.8	20.2
7.	Leaf width (cm)	0.92	0.60	0.85
8.	Panicle length (cm)	33.7	31.5	26.7
9.	Leaf-stem ratio	0.93	0.62	0.83
10.	Fluff wt. per plant (g)	12.50	9.6	6.4
11.	Green fodder yield per plant (g)	445.0	328.0	356.0
12.	Dry matter (%)	28.00	29.00	28.40
13.	Crude protein (%)	9.06	8.75	7.80
14.	Calcium (%)	0.58	0.56	0.50
15.	Phosphorus (%)	0.26	0.30	0.28
16.	Crude fibre (%)	34.62	35.75	34.00
17.	Carbohydrate (%) (Soluble)	41.01	40.00	40.20
18.	IVDMD	49.45	49.44	49.00
19.	Iron (ppm)	385.00	257.00	287.00
20.	Zinc (ppm)	24.00	22.00	18.00
21.	Copper (ppm)	16.00	16.00	16.00
22.	Manganese (ppm)	56.00	50.00	50.00



TABLE 4.  
Performance of FS. 391 in MLT. (Green fodder yield t/ha/yr) of two yrs.

S.No.	Location	Mean of two yrs.		% on Control
		Control	FS. 391	
1.	Coimbatore	24.13	38.14	158.1
2.	Erode	21.37	30.15	141.1
3.	Pottaneri	9.18	13.22	144.0
4.	Palyur	32.90	42.80	130.1
5.	Kattupakkam	22.61	30.05	133.9
6.	Vellore	14.75	17.21	116.7
7.	Killikulam	8.13	20.95	257.7
8.	Aruppukottai	15.58	23.17	139.7
9.	Overall Mean	18.71	26.96	144.1

TABLE 5.  
Preliminary trial of Mixed cropping (1983-85)

Pure/Mixed Crop	Dry Mat- ter (%)	Crude protein (%)	Green fodder yield (t/ha/yr)	Dry Mat- ter yield (t/ha)	Crude Protein yield (kg/ha)	Percentage of increase over Fs 391	
						DM Yield	CP Yield
FS. 391						-	-
Pure crop	28.0	9.0	29.00	8.12	731	-	-
FS. 391+ horse gram (3:1)	28.0	9.0	26.31	6.71	675	-	-
FS. 391 + Clitoria (3:1)	18.0	15.0	19.93	5.87	734	-	0.39
FS. 391 + Siratro (3:1)	33.8	21.2	32.78	6.72	725	-	-
FS. 391 + Desmodium(3:1)	20.5	16.2	25.62	6.84	766	-	4.80
FS. 391 + S.scabra (3:1)	28.0	9.0	30.58	9.15	940	20.8	28.55
	33.1						

Madras Agric. J. 77 (7&8) 320-325 July-August, 1990

## DISTRIBUTION OF MANGANESE IN SOIL

KAPPAVU, and U.S.SREE RAMULU

Department of Soil Science and Agricultural Chemistry,  
Tamil Nadu Agricultural University, Coimbatore 641 003

### ABSTRACT

The distribution of total and available manganese (exchangable + water soluble forms) and their relationship to different soil properties were studied in twenty three soil profiles, representing seven major soil series of Namakkal taluk in Tamil Nadu. The total manganese content varied from 206 to 792 ppm. The content increased with depth in black and red soil series, while irregular pattern of distribution was observed in alluvial and laterite soil series. Black soils contained more of total manganese than alluvial, red and laterite soils. Total manganese content was closely related to clay, calcium carbonate, fine sand and coarse sand. The available manganese content varied from 0.63 to 26.64 ppm and the content decreased with depth in alluvial and