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STANDARDIZING THE SOWING WINDOW AND SEED RATE FOR SINGLE CUT FODDER SORGHUM (*SORGHUM BICOLOR* (L.) MOENCH)

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ABSTRACT

A field experiment was conducted at the All India Co-ordinated Research Project on Sorghum, Haradanahalli Farm, Chamarajanagara during *kharif* season of 2021 to study the response of fodder sorghum variety CNFS-1 to different sowing intervals and varied levels of seed rate. The experiment was laid out in split plot design with three replications. The main plot consists of four different intervals of sowing and subplot with three levels of seed rate. The data revealed that, among the sowing intervals, sowing at first fortnight of May recorded significantly higher plant height (255.58 cm), leaf : stem ratio (0.244), leaf area (6966.08cm^2), stem diameter (8.83mm), green fodder yield (62.32t/ha), dry fodder yield (16.19t/ha), gross returns (Rs. 1,24,636 /ha), net returns (Rs. 69,627/ha) and benefit: cost ratio (2.26) compare to other dates of sowing. While, the seed rate of 55kg/ha has recorded significantly higher growth and yield components with higher gross returns (Rs.1,02,970/ ha) compared to other levels. However, maximum leaf : stem ratio (0.211), leaf area (6426.67 cm^2), stem diameter (8.25mm), net returns (Rs.52,381/ha) and benefit cost ratio (2.04) was observed with a seed rate of 50 kg/ha.

Keywords : Sowing, Seed rate, Green fodder, Dry fodder, Net returns, Benefit : cost ratio

Sorghum (*Sorghum bicolor* (L.) Moench) is the fifth most important cereal crop in the world after rice, wheat, maize and barley. It 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). 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 cultivars have the potential to overcome the above constraints with an advantage of short duration, high biomass production and being suitable for varied soil and climatic situations. Further, under rainfed conditions, timely sowing is very important to get better yields, delayed sowing in low soil moisture conditions may greatly affect the fodder yield and quality. On the other hand, use of optimum seed rate is necessary to obtain higher yields. Because seed rate will strongly influence inter and intra plant competition for nutrients, space, light and water (Tahir *et al.,* 2019). By considering the above facts, the experiment was conducted to know the best time of sowing and optimum seed rate for the new fodder sorghum variety (CNFS-1) under rainfed conditions.

MATERIAL AND METHODS

A field experiment was conducted at All India Co-ordinated Research Project on sorghum, Haradanahalli farm, Chamarajanagara during *kharif* season of 2021 to study the effect of different sowing intervals and varied levels of seed rate on growth, yield and economics of fodder sorghum variety CNFS-1. The experiment was laid out in split plot design and replicated thrice. The main plot consists of four sowing intervals *viz*., first fortnight of May, second

fort night of May, first fortnight of June and second fort night of June. In subplot with varied levels of seed rate *viz.*, 45 kg/ha, 50 kg/ha and 55 kg/ha. There were 12 treatment combinations. The treatments were imposed as per the plan by adopting all the agronomic practices recommended by University of Agricultural Sciences, Bangalore. 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

Growth and yield parameters

The data revealed that, sowing at different dates significantly influenced the growth and yield of fodder sorghum. Sowing at first fort night of May recorded significantly maximum plant height (255.58 cm), higher leaf: stem ratio (0.244), increased leaf area (6966.08cm^2), stem diameter (8.83mm), green fodder yield (62.32 t/ha) and dry matter yield (16.19 t/ha) compared to other dates of sowing. The increased growth and yield at first fortnight of May could be due to better availability of soil moisture throughout the crop growth and reduced incidence of pests and disease. The results are in accordance with earlier findings by Somu *et al.,*(2019), Suresh kumar *et al*.,(2013) and Rajender kumar(2012). While the lower growth and yield parameter observed at delayed sowing may be due to low soil moisture availability.

Among the levels of seed rates, sowing with a seed rate of 55kg/ha recorded significantly higher plant height (237.27cm), green fodder yield (51.48 t/ ha) and dry matter yield (13.38 t/ha) (Table 1 and 2) followed by 50kg/ha (234.70cm, 50.84t/ha and 13.21t/ ha respectively). However, seed rate of 55 kg/ha and 50kg/ha are found to be on par with each other for all the parameters under the study. The increase in yield under higher seed rate may be due to accommodation of more plant population per unit area and better utilization of natural resources. Similar results were reported by Umer faroaq *et al.,*(2016) and Abdulgani Nabooji *et al.,*(2018).

Whereas, higher leaf : stem ratio(0.211), leaf area (6426.67 cm^2) and stem diameter (8.25mm) was noticed with a seed rate of 50kg/ha. While, with respect to leaf area per plant and stem diameter, sowing with 50kg/ha and 45kg/ha seed rates are found to be on par with each other. The increased leaf size and reduced stem girth with seed rate of 50kg/ha seed rate may be due to higher plant population per unit area, which resulted in more grassy shoots. These results are confrimatory with Ashish Pal *et al* ., (2022).

TABLE 1
Growth attributes of fodder sorghum (CNFS-1) as influenced by sowing intervals and levels of seed rate

Treatments	Plant height (cm)	Leaf : stem ratio	Leaf area (cm^2)	Stem diameter (mm)
Main Plot (D): Sowing intervals				
D_1 : First fortnight of May	255.58	0.244	6966.08	8.83
D_2 : Second fortnight of May	229.91	0.203	6156.09	8.46
D_3 : First fortnight of June	227.78	0.184	5878.55	7.18
D_4 : Second fortnight of June	219.80	0.170	5352.69	6.97
S. Em±	10.03	0.010	334.30	0.36
C. D. @5 %	23.60	0.024	786.61	0.86
Subplot(S): levels of seed rates				
S_1 : 45 kg/ha	227.83	0.183	6067.37	8.19
S_2 : 50 kg/ha	234.70	0.211	6426.67	8.25
S_3 : 55 kg/ha	237.27	0.206	5771.02	7.15
S. Em±	6.23	0.009	220.50	0.32
C. D. @5 %	18.20	0.025	643.86	0.93
Interaction (D× S)				
S. Em±	14.39	0.020	509.22	0.74
C. D. @5 %	NS	NS	NS	NS

NS-Non Significant.

TABLE 2
Green fodder yield and dry matter yield of fodder sorghum (CNFS-1) as influenced by sowing intervals and levels of seed rate

Treatments	Green fodder yield (t/ha)	Dry matter yield (t/ha)
Main Plot (D): Sowing interval		
D_1 : First fortnight of May	62.32	16.19
D_2 : Second fortnight of May	47.68	12.39
D_3 : First fortnight of June	45.17	11.74
D_4 : Second fortnight of June	40.51	10.53
S. Em±	2.64	0.68
C.D. @ 5 %	6.20	1.61
Subplot (S): levels of seed rate		
S_1 : 45 kg/ha	44.43	11.54
S_2 : 50 kg/ha	50.84	13.21
S_3 : 55 kg/ha	51.48	13.38
S. Em±	1.94	0.50
C. D. @ 5 %	5.66	1.47
Interaction (D×S)		
S. Em±	4.47	1.16
C. D. @ 5 %	NS	NS

NS-Non Significant.

ECONOMICS

Sowing at first fortnight of May recorded higher gross returns (Rs.1,24,636/ ha), net

TABLE 3
Economics of fodder sorghum (CNFS-1) as influenced by sowing intervals and levels of seed rate

Treatments	Gross returns (Rs./ha)	Net Returns (Rs./ha)	B : C ratio
Main Plot: Sowing interval			
D_1 : First fortnight of May	1,24,636	69,627	2.26
D_2 : Second fortnight of May	95,355	47,667	1.96
D_3 : First fortnight of June	90,340	43,905	1.94
D_4 : Second fortnight of June	81,029	36,922	1.83
Subplot: levels of seed rate			
S_1 : 45 kg/ha	88,864	44,785	2.00
S_2 : 50 kg/ha	1,01,685	52,381	2.04
S_3 : 55 kg/ha	1,02,970	51,424	1.95

returns(Rs.69,627/ha) and B: C ratio(2.26) compared to other dates of sowing (Table 3). The increased income may be attributed to higher biomass yield and unit price, which reflected in the economics of the fodder sorghum. These results are in accordance with Somu *et al.,*(2020).

Similarly sowing at a seed rate of 55 kg/ha recorded increased gross returns (Rs.1,02,970/ha) compared to seed rate of 45kg/ha (Rs. 88,864/ha) and 50 kg/ha (Rs. 1,01,685/ha). While, higher net returns (Rs.52,381/ha) and benefit: cost ratio(2.04) was observed with a seed rate of 50 kg/ha. Confirmatory results were obtained with Somashekar *et al.,*(2015).

INTERACTION

Interaction effect was found to be non significant with respect to all the parameters under the study. However sowing at first fortnight of May with a seed rate of 55kg /ha has recorded higher green fodder yield(51.48t/ha), dry matter yield (13.38t/ha) and gross returns(Rs.1,02,970/ha) compared other combinations.

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