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## Performance of One Newly Developed Forage Variety Jincao 1 (*Sorghum/sudangrass*) in China

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**Abstract:** One newly developed variety of forage sorghum along with 7 check varieties was evaluated. The significant differences were observed for plant height, number of tillers per plant, stem thickness and green fodder yield, while difference for number of leaves per plant was non-significant. Jincao 1 (272.5 cm) produced the highest average plant height and stem thickness and produced the maximum number of tillers per plant. Jumbo ranked top in average green fodder yield by producing 111.23 t ha<sup>-1</sup> closely followed by Jincao 1 (110.85 t ha<sup>-1</sup>). The varieties Jumbo, Jincao 1 produced far better yield than the other six check varieties. Jincao 1 has an average number of leaves per plant of 19 and has good tillers, which is a fine variety for forage.

**Key words:** *Sorghum bicolor* L., variety, green fodder yield, China

### INTRODUCTION

Sorghum (*Sorghum bicolor* L.) is a crop for semi arid regions in tropical and sub-tropical zones where moisture is a limiting factor for crop growth. It can be grown successfully throughout the country both under irrigated and rainfed conditions. It has the potential of producing high green fodder yields. It was suggested by Silvey and Ford<sup>[1]</sup> that the perennial interspecific forage sorghum were a potential source of fermentable in biomass fuels systems, since they could be harvested repeatedly, whenever a bulk of stem material had regrown. Hussain *et al.*<sup>[2]</sup> studied yield and quality traits in Sorghum genotypes. It was concluded that two Sorghum cultivars No. 94 and 95 provided a better compromise of green fodder and dry matter yield and crude protein contents. Chaudhry *et al.*<sup>[3]</sup> recorded highest green fodder yield for Sorghum variety JS-88 followed by FC26 x 1119. The check variety produced 20% less green fodder yield. Plant characters like leaf area, number of leaves per plant, plant height and stem thickness were significantly positive correlated with green fodder yield. Hussain *et al.*<sup>[4]</sup> observed that higher green fodder yield in Sudangrass was significantly positive correlated with yield component characters such as plant height, tillers per plant, leaves per tiller and leaf area. Kumar and Ram<sup>[5]</sup> evaluated 25 genotypes of Sorghum and observed that the genotypes AKFS4 and

AKFS3 produced 181 and 138% more fodder yield than the control HC136. Manhoran *et al.*<sup>[6]</sup> reported that Sorghum cultivar K7 produced the highest green fodder yield (22.5 t ha<sup>-1</sup>) and dry matter (7.20 t ha<sup>-1</sup>) while JS-20 had the highest protein content (13.75%). The cultivar CO27 combined high productivity (5.34 t DM) with high protein content (10.63%). Naeem *et al.*<sup>[7]</sup> evaluated six Sorghum hybrids for grain and fodder yield. Significant differences were observed for fodder yield and plant height. The hybrid CSH-9 produced the highest fodder yield of 28 t ha<sup>-1</sup> followed by CSH-11 (20.44 t ha<sup>-1</sup>) and CSH-1 (13.33 t ha<sup>-1</sup>). The plant height ranged from 129 cm (904021) to 226 cm (CSH-1). Nasim *et al.*<sup>[8]</sup> studied the performance of five varieties and six hybrids of sorghum. They observed significant differences for fodder yield and plant height. The variety ICSV-210 (22.22 t ha<sup>-1</sup>) ranked top in fodder yield followed by the hybrids CSH-9 (20.33 t ha<sup>-1</sup>) and ICSH-205 (18.17 t ha<sup>-1</sup>). ICSV-210 was the tallest variety having a plant height of 233 cm followed by SPV-462 (219 cm). Hussain *et al.*<sup>[9]</sup> evaluated the performance of seven cultivars of forage Sorghum for various morphological characters and fodder yield. They noted that genotypes like No. 94, Hegari, Roma and No. 119 were medium in plant height had more leaf area and higher green fodder yield. Forage sorghum often used to produce silage, hay or pasture during summers when adequate moisture does not exist for other crops<sup>[10]</sup>. Naeem *et al.*<sup>[11]</sup> evaluated eleven varieties of Sorghum

for their green fodder yield potential and its components. They observed that green fodder yield ranged from 18.06 to 69.44 t ha<sup>-1</sup>. Number of leaves per plant varied from 9.0 to 13.78 while plant height ranged from 101.11 to 209.44 cm. Leaf area varied from 264.12 to 379.44 cm and stem thickness ranged from 1.1 to 1.67 cm. Paroda and Lodhi<sup>[12]</sup> reported multicut varieties generally provide 25-30% more dry matter than single-cut varieties under the same management system. In China, the increase in the livestock population has widened the gap between demand for and supply of fodder. This gap can be narrowed by increasing productivity through breeding superior hybrids and varieties of forage crops. Among the forage crops, sorghum offers great potential to supplement fodder resources because of its wide adaptation, rapid growth, high green and dry fodder yields and good quality<sup>[13]</sup>. The objectives of the study reported were to evaluate green fodder yield potential of one newly developed variety of Sorghum. We want to develop more multicut forage sorghum hybrids to meet the present-day demand for fodder in China.

#### MATERIALS AND METHODS

**Experimental design and culture:** A newly developed Sorghum variety Jincao 1 was tested along with seven check varieties Wancao 2, Jumbo, Superdan, Leshi, Dalishi, Haima and Liaocao 2 at Sorghum Institute, Shanxi Academy of Agricultural Sciences, Yuci during 2002-2003. The design of the trial was Randomized Complete Block Design with three replications. Each plot consisted of 8 rows of 5 m long and 37.5 cm apart thus having a plot size of 15 m<sup>2</sup>. Seed rate used was 22.5 kg ha<sup>-1</sup>, but the seedlings were thinned to two or three plant per hill two weeks after emergence giving a plant density of 375×10<sup>3</sup> ha<sup>-1</sup>. Fertilizers were applied N 171 kg, P<sub>2</sub>O<sub>5</sub> 172.5 kg ha<sup>-1</sup>. 103.5 kg additional N ha<sup>-1</sup> was applied to the fodder crops after the harvest of the first cut in treatments. The necessary plant protection, irrigation and other management practices were followed during crop growth. 1.5 month after sowing to keep the field weed-free. No serious incidence of insects or diseases was observed. Crops were harvested six inside rows of each plot manually by sickle from 10 cm above-ground level and the total biomass was removed from each plot as per treatment and the fodder yield was recorded. The trial was planted on 5th May, 2002 and planted on 4th May, 2003 and two cuttings were made. The first cut was at 75 Days After Sowing (DAS) and second was at 130 DAS.

Two irrigations were applied during the entire period of crop growth. Data for the following plant characteristics were recorded: plant height (cm), number of leaves per plant, number of tillers per plant, stem thickness (cm) and green fodder yield (t ha<sup>-1</sup>).

**Statistical analyses:** The data recorded was statistically analysed, using the analysis of variance technique and least significant differences at 5% probability<sup>[14]</sup>.

#### RESULT AND DISCUSSION

The significant differences were observed among the varieties for plant height, number of tillers per plant, stem thickness and green fodder yield while difference for number of leaves per plant was non-significant. Plant height ranged from 145 cm (Dalishi) to 270 cm (Jincao 1) in 2002. Stem thickness ranged from 1.02 cm (Superdan) to 1.85 cm (Jincao 1 and Wancao 2). Jincao 1 produced the highest plant height and stem thickness and produced the maximum number of tillers per plant. Jumbo ranked top in green fodder yield by producing 112.83 t ha<sup>-1</sup> closely followed by Jincao 1 (111.62 t ha<sup>-1</sup>). The variety Liaocao 1 ranked third by producing green fodder yields of 107.16 t ha<sup>-1</sup> followed by Wancao 2(104.12 t ha<sup>-1</sup>) (Table 1).

The significant differences were observed among the varieties for plant height, number of tillers per plant, stem thickness and green fodder yield while difference for number of leaves per plant was non-significant. Plant height ranged from 165 cm (Dalishi) to 295 cm (Jumbo) in 2003. Jumbo (295 cm) produced the highest plant height. Jincao 1 produced the highest stem thickness and green fodder yield and produced the maximum number of tillers per plant. The variety Wancao 2 ranked third by producing green fodder yields of 98.67 t ha<sup>-1</sup> followed by Liaocao 1 (90.85 t ha<sup>-1</sup>) (Table 2).

Table 1: Effect of different varieties of sorghum on yield and vegetative growth parameters (2002)

Varieties	Plant height (cm)	No. of leaves per plant	No. of tillers per plant	Stem thickness (cm)	Green fodder yield (t ha <sup>-1</sup> )
Jumbo	210	21	1.46	1.51	112.83
Superdan	200	20	1.49	1.02	98.75
Wancao 2	220	19	1.54	1.85	104.12
Liaocao 1	210	19	1.53	1.56	107.16
Jincao 1	270	19	1.75	1.85	111.62
Haima	240	18	1.72	1.36	77.26
Dalishi	145	17	1.35	1.34	79.92
Leshi	160	18	1.47	1.22	74.59
LSD (5%)	11.84	NS	0.36	0.14	19.48
CV%	13.80	6.6	34.10	8.42	34.00

Table 2: Effect of different varieties of sorghum on yield and vegetative growth parameters (2003)

Varieties	Plant height (cm)	No. of leaves per plant	No. of tillers per plant	Stem thickness (cm)	Green fodder yield (t ha <sup>-1</sup> )
Jumbo	295	21	1.62	1.12	109.63
Wancao 2	285	19	2.45	1.01	98.67
Superdan	270	20	1.56	0.73	90.08
Liaocao 1	280	19	1.84	0.89	90.85
Jincao 1	275	19	2.52	1.45	110.07
Haima	245	18	1.72	1.32	75.21
Dalishi	165	17	1.35	1.34	78.33
Leshi	170	18	1.47	1.25	72.96
LSD (5%)	15.45	NS	0.20	0.13	16.42
CV%	14.50	6.6	33.80	8.50	33.60

For two years' results, the significant differences were observed among the varieties for plant height, number of tillers per plant, stem thickness and green fodder yield while difference for number of leaves per plant was non-significant (Table 1 and 2). Jincao 1 (272.5 cm) produced the highest average plant height and stem thickness and produced the maximum number of tillers per plant. Jumbo ranked top in average green fodder yield by producing 111.23 t ha<sup>-1</sup> closely followed by Jincao 1 (110.85 t ha<sup>-1</sup>). The varieties Jumbo, Jincao 1 produced far better yield than the other six check varieties. Jincao 1 has an average number of leaves per plant of 19 and has good tillers, which is a fine variety for forage. Jumbo, Jincao 1, Wancao 2 and Liaocao 1 possess high green fodder yield potential and could be considered for general cultivation.

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