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Evaluation of Different Varieties of Sorghum for Green Fodder Yield Potential

Muhammad Naeem, Muhammad Shahid Munir Chauhan, Ahmed Hasan Khan and ¹Sultan Salahudin

¹Pakistan Agriculture Research Council, Islamabad, Pakistan

Ayub Agriculture Research Institute, Faisalabad, Pakistan

Abstract: Twelve varieties of sorghum including a check were evaluated. Significant differences were found among the varieties for green fodder yield, plant height, number of leaves per plant while differences for leaf area and stem thickness were non-significant. The variety Quetta Sorghum Selection showed the highest green fodder yield potential of 69.44 t ha⁻¹ followed by Tandojam Sorghum Selection, F-9603, F-9706 and J.S 88 each producing 66.20 t ha⁻¹. The check variety PARC-SS-1 produced a green fodder yield of 18.06 t ha⁻¹.

Key words: Evaluation, *Sorghum bicolor* L., varieties, yield, plant height, leaf area, stem thickness

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 rain-fed conditions. It has the potential of producing high green fodder yields. To increase the fodder production in Pakistan it is necessary to develop new high green fodder yielding varieties of sorghum.

Perez and Arevalo (1981) reported that cultivar DA-48 produced the highest grain yield but was surpassed in fodder yield by Dupla, BK-300 and 20 DA 60 R. DA-48 being eight days earlier than all the other varieties. Therefore, it was recommended for dual-purpose cultivation. Reddy and Rao (1982) compared the performance of four commercial *Sorghum* hybrids and sixteen recently developed varieties. The commercial hybrid CSH-5 was superior at growth stages for dry matter production, plant height and leaf number. Except Aispure a tall late local variety, most of the improved varieties were comparable to CHS-5 for growth period duration and plant height. Total dry matter of new varieties SPV-221 and SPV-314 exceeded that of CSH-6 at all stages. SPV-221 was taller and SPV-314 slightly dwarf as compared to CSH-1. Lodhi and Bangarwa (1983) evaluated 30 *Sorghum* lines for grain and fodder production. Six strains were found superior to local check variety in both fodder and seed yield. S-260 gave better productivity and excelled in seed production. Rao *et al.* (1985) observed that improved *Sorghum* varieties such as SPV-462 and SPV-475 were superior to commercial control hybrid CSH-1 and comparable to CSH-5 for grain yield. CSH-9 gave the highest average grain yield of 4.6 t ha⁻¹. The hybrids SPH-196 and SPH-225 produced the highest fodder yield of 2.6 and 2.1 t ha⁻¹, respectively.

Bangarwa *et al.* (1989) tested 48 *Sorghum* cultivars. They reported that green and dry matter yields were positively correlated with stem thickness, number of leaves per plant and leaf weight and also related with one another. Dry matter yield was also correlated with plant height and leaf breadth. It was suggested that selection for dry matter should be based on plant height and number of broad leaves. Mohammad (1989) evaluated forage type, dual type and grain type *Sorghum* cultivars. He concluded that both dual and forage type *Sorghum* were the best sources of maximum forage and stover yields. He further concluded that none of the *Sorghum* types tested possessed a desirable combination of all the desired traits. Hussain *et al.* (1990) studied yield and quality traits in *Sorghum* genotypes. It was concluded that two *Sorghum* cultivars No.94 and No.95 provided a better compromise of green fodder and dry matter yields and crude protein contents. Hussain *et al.* (1991) observed that higher fodder yield in Sudan grass was positively and significantly correlated with yield component

character, viz, plant height, tillers per plant, leaves per tiller and leaf area. Naeem *et al.* (1993) 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⁻¹ followed by CSH-11 (20.44 t ha⁻¹) and CSH-1 (13.33 t ha⁻¹). The plant height ranged from 129 cm (904021) to 226 cm (CSH-1). Nasim *et al.* (1993) 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⁻¹) ranked top in fodder yield followed by the hybrids CSH-9 (20.33 t ha⁻¹) and ICSV-205 (18.17 t ha⁻¹). ICSV-210 was the tallest variety having a plant height of 233 cm followed by SPV-462 (219 cm). Hussain *et al.* (1995) 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. Hence these varieties were recommended for general cultivation. This study was conducted to identify high green fodder yielding varieties of sorghum.

Materials and Methods

Eleven varieties of *Sorghum* viz. F-9601, F-9603, F-9706, F-9806, F-9809, JS-88, Hegari, No.1863, PARC-SS-2, Quetta *Sorghum* Selection, Tandojam Local Selection and a check variety PARC-SS-1 were planted at Fodder Research Sub-station, Ayub Agricultural Research Institute, Faisalabad during kharif 2000. The design of the trial was Randomized Complete Block. Each plot consisted of 4 rows 6 m long and 30 cm apart thus having a plot size of 7.2 m². Seed rate used was 75 kg ha⁻¹. Fertilizer was applied @ of 60-60-00 NPK kg ha⁻¹. The trial was planted on 08.07.2000 and harvested on 08.09.2000 at the completion of 50% flowering. Three irrigations were applied. Furadan granules were applied at the rate of 15 kg ha⁻¹ at the time of sowing for control of shoot fly and at six-leaf stage for control of stem borer.

Data for the following plant characters were recorded:

Plant height (cm), Number of leaves plant⁻¹, Leaf area (cm²), stem thickness (cm), green fodder yield (t ha⁻¹). The data recorded were statistically analyzed using the analysis of variance technique and the least significant differences at 5% probability (Steel and Torrie, 1960).

Results and Discussion

Significance differences were observed for plant height, number of leaves per plant and green fodder yield while differences for leaf area and stem

Table 1: Mean plant height, number of leaves per plant, leaf area, stem thickness and green fodder yield of different *Sorghum* varieties

Variety	Plant height (cm)	No. of leaves plant ⁻¹	Leaf area (cm ²)	Stem thickness (cm)	Green fodder yield (t ha ⁻¹)
Quetta <i>Sorghum</i> Selection	208.89	13.78	379.44	1.36	69.44
Tandojam <i>Sorghum</i> Selection	185.56	11.44	300.72	1.2	66.20
F-9603	190.67	13.78	287.96	1.23	66.20
F-9706	197.78	13.33	296.05	1.5	66.20
JS-88	188.33	11.78	309.23	1.48	66.20
Hegari	209.44	13.22	294.27	1.2	65.74
F-9601	191.33	12.67	275.15	1.28	65.74
F-9809	186.11	12.11	306.74	1.49	65.28
F-9806	193.33	13.78	290.21	1.1	59.26
PARC-SS-2	127.78	10.67	327.03	1.67	57.87
No.1863	107.22	9	272.73	1.44	24.54
PARC-SS-1(check)	101.11	11.78	264.12	1.54	18.06
L.S.D. (5%)	24.46	2.11	N.S	N.S	9.27
C.V (%)	10	12.28	20.40	32.46	11.48

thickness were non-significant (Table 1). The variety Quetta *Sorghum* Selection produced the highest green fodder yield of 69.44 t ha⁻¹ followed by Tandojam *Sorghum* Selection, F-9603, F-9706, J. S. 88 each producing an identical green fodder yield of 66.20 t ha⁻¹. The varieties Hegari and F-9601 ranked third by producing similar green fodder yields of 65.74 t ha⁻¹ followed by F-9809 (65.28 t ha⁻¹). The check variety PARC-SS-1 produced the lowest green fodder yield of 18.06 t ha⁻¹ (Table 1).

The plant height ranged from 101.11 cm (check variety PARC-SS-1) to 209.44 cm (Hegari) (Table 1). The variety Quetta *Sorghum* Selection (208.89 cm) ranked second followed by F-9706 (197.78 cm), F-9806 (193.33 cm) and F-9601 (191.33 cm). The varieties Quetta *Sorghum* selection, F-9603 and F-9806 produced the highest number of leaves per plant (13.78) followed by F-9706 (13.33), Hegari (13.22), F-9601 (12.67) and F-9809 (12.11). The check variety PARC-SS-1 produced 11.78 leaves per plant (Table 1). Leaf area ranged from 264.12 sq. cm (check variety PARC-SS-1) to 379.44 sq. cm (Quetta *Sorghum* Selection) (Table 1). PARC-SS-2 (327.03 sq. cm) ranked second in leaf area followed by J. S. 88 (309.22 cm), F-9806 (306.74 cm) and Tandojam Local Selection (300.72 sq. cm). The variety PARC-SS-2 (1.67 cm) showed the maximum stem thickness followed by check variety PARC-SS-1 (1.54 cm), F-9706 (1.5 cm), F-9809 (1.49 cm) and J. S. 88 (1.48 cm) (Table 1).

Previous researchers, Bangarwa *et al.* (1989), Hussain *et al.* (1990, 1991, 1995), Lodhi and Bangarwa (1983), Mohammad (1989), Naeem (1993), Nasim *et al.* (1993), Perez and Arevalo (1981), Rao *et al.* (1985) and Reddy and Rao (1982) reported similar results. The study revealed that the varieties Quetta *Sorghum* Selection, Tandojam *Sorghum* Selection, F-9603, F-9706, J. S. 88, Hegari and F-9601 possess high green fodder yield potential and could be considered for general cultivation.

References

- Bangarwa, K. S., R. P. S. Grewal, G. P. Lodhi and N. K. Thakral, 1989. Association analysis for some quantitative traits in forage sorghum. India J. Herd., 21: 25-28.
- Hussain, A., M. D. Sartaj and M. B. Bhatti, 1990. Genotype and environment interaction in forage *Sorghum* variety tests and implications of *Sorghum* breeding. Pak. J. Sci. Ind. Res., 33: 451-453.
- Hussain, A., M. D. Sartaj and M. B. Bhatti, 1991. Response of Sudan Grass to various levels of nitrogen in combination with phosphorous under rainfed conditions. Pak. J. Agric. Res., 12: 158-164.
- Hussain, A., M. D. Sartaj and M. B. Bhatti, 1995. Performance of various cultivars of forage (*Sorghum bicolor* (Linn. Moench) under rainfed conditions. J. Agric. Res., 33: 413-419.
- Lodhi, G. P. and K. S. Bangarwa, 1983. Performance of some dual-purpose *Sorghum* lines. *Sorghum* N. L. 26: 8-9.
- Mohammad, D., 1989. Grain Yield, Forage yield, and forage quality of different *Sorghum* types under irrigated and dry land conditions. Ph.D. Dissertation, Kansas State University, Manhattan, Kansas USA.
- Naeem, M., S. Nasim and A. Shakoor, 1993. Performance of Exotic *Sorghum* Hybrids under rain fed conditions of Pakistan. FLCG News letter, 23: 2-4.
- Nasim, S., M. Naeem and A. Shakoor, 1993. Evaluation of newly introduced varieties and hybrids of *Sorghum* under rainfed conditions. FLCG News letter, 26: 13-15.
- Perez, F. and C. Arevalo, 1981. Comparative trials of hybrids and commercial varieties of grain *Sorghum*. Revista Industrial Agrícola de Tucuman 58: 1-13.
- Rao, N. G. P., V. J. M. Rao and B. B. Reddy, 1985. Progressive genetic improvement of kharif *Sorghum* in India. Indian J. Genet. Pl. Breed. 45: 552-560.
- Reddy, B. B. and N. G. P. Rao, 1982. Bridging the gap between hybrids and varietal performance in *Sorghum*. Indian J. Genet. Pl. Breed., 42: 64-69.
- Steel, R. G. D. and J. H. Torrie, 1960. Principles and Procedures of Statistics. Mc Graw Hill Inc. NY., pp: 99.