Forage Res., **41** (4) : pp. 228-232 (2016) **http://forageresearch.in**

EFFECT OF PLANTING MATERIAL AND GEOMETRY ON SEWAN (*LASIURUS SINDICUS* HENR.*)* PRODUCTIVITY

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(Received : 14 December 2015; Accepted : 15 March 2016)

SUMMARY

A field experiment was conducted during **kharif** 2011, 2012 and 2013 for consecutive three years at Agricultural Research Station, S. K. Rajasthan Agricultural University, Bikaner to study the effect of planting material and crop geometry on growth, yield and quality of sewan grass. The experiment consisted of eight treatment combinations with planting material and crop geometry viz., seed sowing+100 x 75 cm spacing, seed sowing+100 x 50 cm spacing, seed sowing+75 x 50 cm spacing, seed sowing+50 x 50 cm spacing, root slip sowing+100 x 75 cm spacing, root slip sowing+100 x 50 cm spacing, root slip sowing+75 x 50 cm spacing and root slip sowing+50 x 50 cm spacing. The experiment was laid out in randomized block design and replicated thrice. Results showed that maximum plant height (79 cm), total tillers/m row length (83), number of spikes/plant (49.71) and seed yield (14.32 q/ha) were recorded with seed sowing+100 x 50 cm spacing, whereas highest grass yield (54.62 q/ha) was recorded with seed sowing+75 x 50 cm spacing. Maximum values of sustainability yield index were recorded with root slip sowing+50 x 50 cm spacing both for grass (80.98%) and seed (27.17%) yield of sewan grass. Planting material and crop geometry did not influence quality parameters viz., crude protein, crude fibre and total ash content of sewan.

Key words : Crop geometry, crude protein, grass yield, seed and root slip sowing, seed yield, sustainability yield index

Grasses are important in the economy and development of arid regions. Firstly, the grasses play a vital role in the conservation of soil and secondly they form the fodder resources for the large number of animal population in the region. On account of high evaporation rate, low and erratic rainfall and high wind velocity, erosion by wind is a common feature of the desert landscape and the grasses help in a great measure to bind the soil from being blown away. *Lasiurus sindicus* (sewan) is the primary grass of extremely arid parts of Jaisalmer, Barmer and Bikaner districts of western Rajasthan in the Indian Thar Desert. It thrives well under moisture stress on sandy plains, low dunes and hummocks of this region, receiving annual rainfall below 200 mm. Until the last decade, about 80 per cent of the total geographical area of Jaisalmer covering Nachana, West Puggal, Mohangarh, Sultana and Binjewala with 100-150 mm annual rainfall supported sewan grasslands. For decades, these grasslands in turn supported an ever increasing livestock population in the Indian desert, where animal husbandry remained the predominant occupation of the inhabitants (Mertia, 1992). During years of normal rainfall, the available forage from farming, cultivable wastes, fallow and pasturelands meet only about two-third of the requirement of the existing livestock. In arid regions, there is nothing more effective than the grass to immobilize the moving sand. A drought resistant grass with a stoloniferous habit, a rapid rate of growth, branching and a good soil binding system is essential for soil conservation on loose sands. The information on establishment of improved pastures by seed and root slip sowing and crop geometry on sewan grass is meagre in western Rajasthan. Thus, the present study was, therefore, designed to evaluate the effects of

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planting material and crop geometry on growth, yield and quality of sewan grass.

MATERIALS AND METHODS

A field experiment was conducted on sewan grass during **kharif** 2011, 2012 and 2013 for consecutive three years at Agricultural Research Station, S. K. Rajasthan Agricultural University, Bikaner situated in arid western hyper arid zone of Rajasthan. The soil of experimental field was sandy loam in nature, having field capacity of 6.50 per cent, PWP 1.52 per cent, bulk density 1.51 g/cc, pH (1 : 2) 8.09 and electrical conductivity (1 : 2) 0.09 dS/m. The soil was very low in organic carbon (0.15%), available nitrogen (111 kg/ ha), medium in available P (15.6 kg/ha) and high in available K (245.7 kg/ha). Mean weekly meteorological data are presented in Figs. 1, 2 and 3.

The experiment was laid out in randomized block design and replicated thrice. The experiment comprised eight treatment combinations with planting material and crop geometry viz., seed sowing+100 x 75 cm spacing, seed sowing+100 x 50 cm spacing, seed sowing+75 x 50 cm spacing, seed sowing+50 x 50 cm spacing, root slip sowing+100 x 75 cm spacing, root slip sowing+100 x 50 cm spacing, root slip sowing+75 x 50 cm spacing and root slip sowing+50 x 50 cm spacing. Sewan grass “Local selection” was sown with

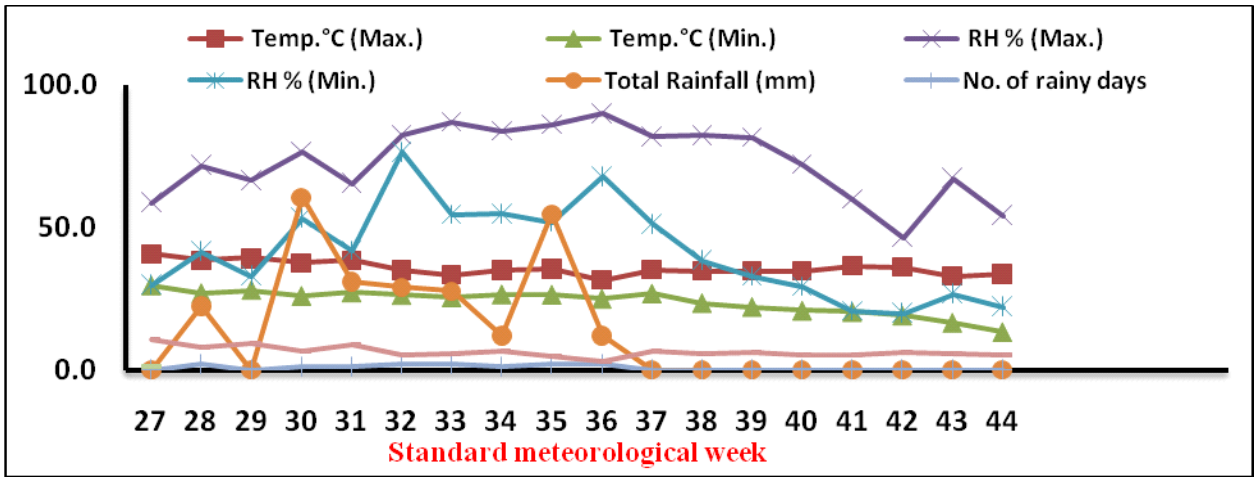

Fig. 1. Mean weekly meteorological data during **kharif** 2011 at Agril. Research Station, SK RAU, Bikaner.

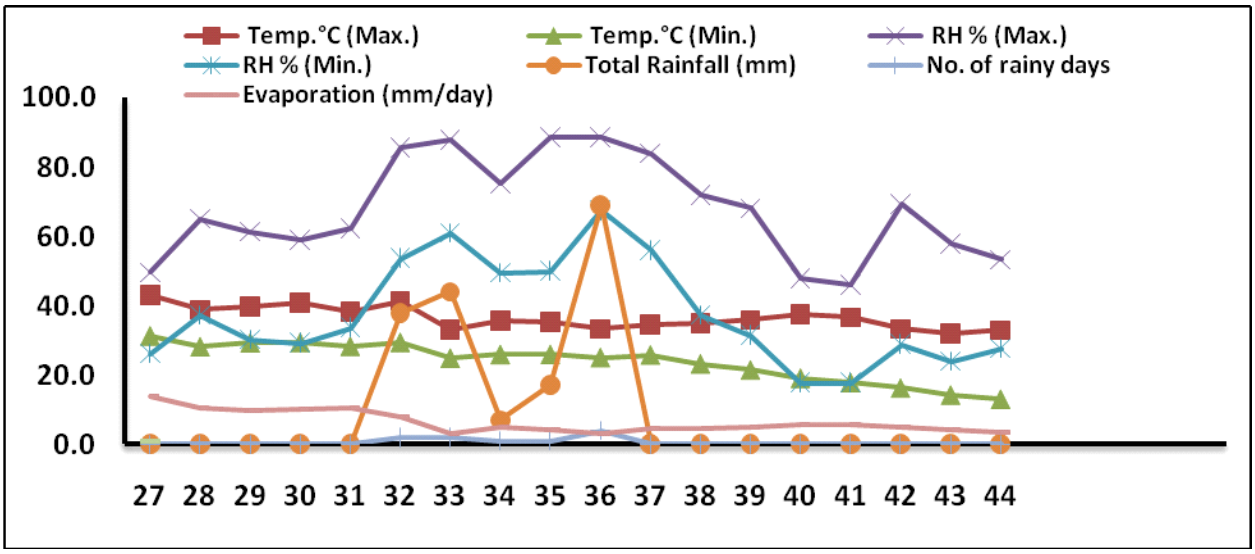

Fig. 2. Mean weekly meteorological data during **kharif** 2012 at Agril. Research Station, SK RAU, Bikaner.

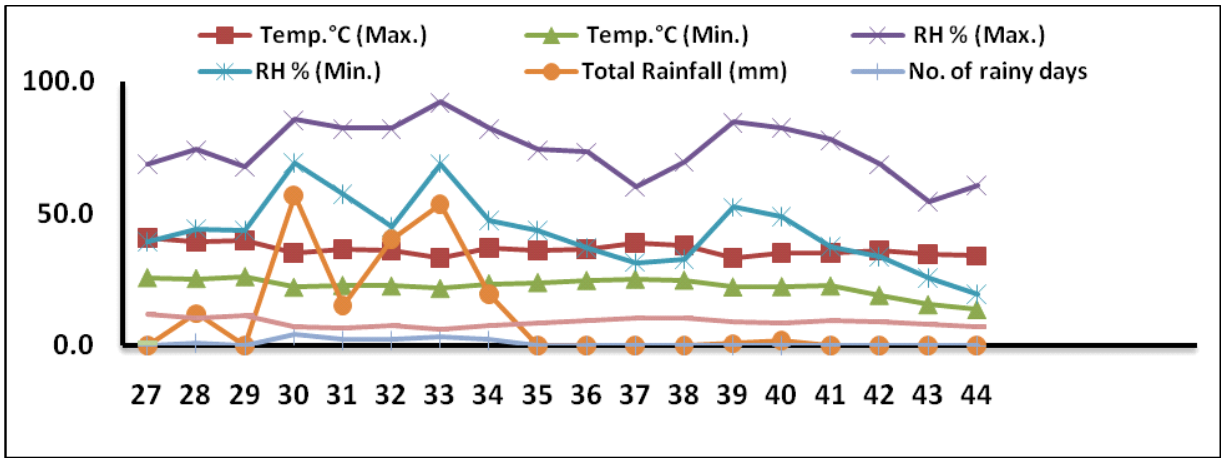

Fig. 3. Mean weekly meteorological data during **kharif** 2013 at Agril. Research Station, SK RAU, Bikaner.

the receipt of good monsoon rains (30th July) in **kharif** 2011 using 6 kg seed/ha for seed sowing as per the treatment. Seed was mixed with moist soil of the same field (1 : 5 ratio) immediately before sowing in such a way that each crunch of the mixture of soil contained 7-10 seeds. The crunch of seed-soil mixture was dibbled at 1-2 cm depth at proper crop geometry as per the treatment. For root slip sowing, active root slips were separated from the sewan bunch and 2-3 root slips at each hill as per the treatment were planted and pressed with moist soil in such a way that there was no air circulation from surface to root zone depth. Immediately after planting, a light irrigation was applied for proper growth and development of sewan. Recommended dose of fertilizers (20 : 20 : 0) was applied at tillering stage with the onset of monsoon showers. During the subsequent years (2nd and 3rd years) the same crop stand was used for treatment application and for taking observations for yield and yield attributes and evaluation of quality parameters. Only life saving irrigation was applied during long dry spell. Sewan grass was harvested 30-40 days after panicle emergence when matured caryopsis with husk started dropping after attaining physiological maturity from the upper end of panicle. Harvesting of seed was done by hand picking of matured panicle or sometimes individual matured caryopsis. For the determination of crude protein percentage, nitrogen percentage was multiplied with 6.25. Crude fibre (%) and total ash (%) were determined by adopting A. O. A. C. (1995) method using the following formulae :

$$\text{Crude fiber (\%)} = \frac{W_2 - W_3}{W_1} \times 100$$

Where,

W_1–Weight of sample, W_2–Weight of silica crucible+residue (after oven drying i. e. before washing) and W_3–Weight of silica crucible+residue (after ashing).

$$\text{Total ash (\%)} = \frac{W_3 - W_2}{W_1} \times 100$$

Where,

W_1–Weight of sample, W_2–Weight of silica crucible and W_3–Weight of silica crucible+ash. All the cultural operations were carried out as per recommendations.

RESULTS AND DISCUSSION

Plant Height and Yield Attributes

Planting material and crop geometry had significant effect on plant height and yield attributes viz., total tillers/m row length, spike length/plant and test weight of sewan grass. Maximum plant height (79 cm), total tillers/m row length (82) and number spike length/ plant (49.71) were recorded with seed sowing+100 x 50 cm spacing, whereas maximum test weight (2.92 g) was recorded with root slip sowing+50 x 50 cm spacing. However, seed sowing with 100 x 50 cm, 75 x 50 cm, 50 x 50 cm spacing and root slip sowing with 100 x 75 cm and 50 x 50 cm spacing gave at par values for total tillers/m row length (Table 1). This might be due to the

TABLE 1
Effect of planting material and crop geometry on plant height, yield attributes, yield and sustainability index of sewan grass (Pooled of three years)

Treatment	Plant height (cm)	Total tillers/m row lengeh	No. of spikes/plant	Test weight (g)	Grass yield (q/ha)	Seed yield (q/ha)	Sustainability	
							Grass	Seed
T_1	72	77	39.34	2.58	49.59	13.24	80.39	24.71
T_2	79	83	49.71	2.75	54.59	14.32	74.77	25.29
T_3	76	82	45.44	2.70	54.64	12.68	75.89	16.97
T_4	74	82	44.49	2.72	53.95	12.85	75.79	21.99
T_5	69	82	43.16	2.71	53.41	10.37	73.34	16.29
T_6	75	81	39.97	2.68	51.73	12.09	73.65	17.98
T_7	75	80	42.55	2.76	49.74	13.60	73.85	19.64
T_8	73	82	41.44	2.92	47.45	14.14	80.98	27.17
C. D. (P=0.05)	2.0	1.0	3.86	0.05	1.23	0.71	-	-

T_1–Seed sowing+100 x 75 cm spacing, T_2–Seed sowing+100 x 50 cm spacing, T_3–Seed sowing+75 x 50 cm spacing, T_4–Seed sowing+50 x 50 cm spacing, T_5–Root slip sowing+100 x 75 cm spacing, T_6–Root slip sowing+100 x 50 cm spacing, T_7–Root slip sowing+75 x 50 cm spacing and T_8–Root slip sowing+50 x 50 cm spacing.

fact that sowing of seed after moisture soil treatment resulted in higher growth and vigour of sewan grass, whereas proper crop geometry facilitated sufficient interception of sunlight and satisfactory absorption of nutrients and water from the soil due to proper development of root system.

Yield and Sustainability Yield Index

Seed and grass yield of sewan was also significantly influenced by planting material and crop geometry. Highest seed yield (14.32 q/ha) of sewan grass was recorded with seed sowing+100 x 50 cm spacing, whereas highest grass yield (54.62 q/ha) was recorded with seed sowing+75 x 50 cm spacing. However, seed sowing with 100 x 50 cm, 75 x 50 cm, 50 x 50 cm spacing and root slip sowing with 100 x 75 cm spacing gave at par values for grass yield (Table 1). Chaniyara *et al*. (2001) reported that planting geometry significantly influenced the seed and fodder yield of groundnut. Maksoud Abd-El (2008) also reported that increase in row spacing increased kernel yield of groundnut. Further, maximum values of sustainability yield index were recorded with root slip sowing+50 x 50 cm spacing both for grass (80.98%) and seed (27.17%) yield of sewan grass.

Quality Parameters

The study on planting material and crop

TABLE 2
Effect of planting material and crop geometry on nitrogen uptake and quality parameters of sewan grass (Pooled of three years)

Treatment	Nitrogen content (%)	Nitrogen uptake (kg/ha)	Crude protein (%)	Crude protein yield (q/ha)	Crude fibre (%)	Total ash (%)
T_1	1.23	60.78	7.66	3.80	29.09	3.71
T_2	1.31	71.27	8.16	4.45	30.86	4.60
T_3	1.36	74.57	8.53	4.66	31.12	4.69
T_4	1.27	68.54	7.94	4.28	30.60	4.35
T_5	1.25	66.57	7.79	4.16	30.08	4.29
T_6	1.23	63.57	7.68	3.97	29.77	3.93
T_7	1.20	59.85	7.52	3.74	28.78	3.65
T_8	1.19	56.56	7.45	3.54	27.46	3.62
C. D. (P=0.05)	0.09	3.12	NS	0.43	NS	NS

Treatment details are given in Table 1. NS–Not Significant.

geometry indicated that quality parameters viz., crude protein (8.53%), crude fibre (31.12%) and total ash (4.69%) contents were recorded maximum with seed sowing+75 x 50 cm spacing. However, planting material and crop geometry did not influence the quality parameters of sewan (Table 2). This might be attributed to the fact that planting material and crop geometry did not influence the nutrient content and uptake by the plant, thus planting material viz., seed and root slip and different row to row and plant to plant spacings had non-significant effect on crude protein, crude fibre and total ash content of sewan grass. Whyte *et al*. (1962) reported that crude protein content was generally associated with forage characteristics.

ACKNOWLEDGEMENTS

The authors are grateful to the Government of Rajasthan for providing funds under RKVY for conducting study on sewan grass. Also, thanks to the authority of S. K. Rajasthan agricultural University, Bikaner for their technical guidance and support during the period of this research.

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