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Original Research Article

Study the Production Potential of Fodder *i.e. Makkhan Grass* in Dhar district of Madhya Pradesh, India

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A B S T R A C T

A field trial was conducted during *rabi* season 2018-19 at research farm of RVSKVV-Krishi Vigyan Kendra, Dhar, Madhya Pradesh to evaluate quality and yield parameters of *rabi* season forage crops. The trial was laid out in Randomized Block Design in five replications with comprising of five treatments *viz.* local control (rye grass), *Makhan* grass, Oats, Berseem (JB-1) and Berseem (JB-5). Results showed significantly maximum fodder, dry matter and crude protein yield under T_2-*Makhan* grass over remaining treatments (oat, Berseem and rye grass). The highest leaf stem ratio (0.94) was registered in T_2-*Makhan* grass over remaining treatments. The *Makkhan* grass significantly registered maximum green fodder yield (1210.2 q/ha) as compared to T_1-local control (rye grass) and T_3-oat (565.50 and 668.60 q/ha), respectively. The maximum dry fodder yield (89.8 q/ha) was recorded in treatment T_2-*Makhan* grass followed by T_5-berseem JB-5 (78.9 q/ha) and T_4-berseem JB-1 (75.2 q/ha) as compared to local control (48.5 q/ha). Whereas, the crude protein yield (13.22 q/ha) was found maximum followed by T_5-berseem JB-5 (11.40 q/ha) and T_4-berseem JB-1 (11.16 q/ha) as compared to local control (10.12 q/ha). The *Makkhan* grass is found suitable for the cultivation in Madhya Pradesh because of maximum production (total green and dry fodder) and quality (protein content) improvement.

Keywords

Makkhan grass, l#eaf stem ratio, gr#een fodder, d#ry fodder, Crude protein yield

Introduction

The livestock production system in India is major part of a mixed crop-livestock farming system. It is a backbone of farming communities and important for the security and survival of large number of poor populace. Animal husbandry is contributing about 4.5 per cent to National GDP and shares about 15-20 per cent to the total income of rural households. Dairy sector is currently the top-ranking and essential commodity in India and estimated to contribute around 18.5 % of world total milk production from 512.1 million livestock (Sarvade and Upadhyay, 2019) with annual growth rate around 4.1 %. The milk production from livestock is very low in the country due to non-availability of good quality fodder in time. Dairy sector has been considered as the prime bottleneck in harnessing the potential of the livestock. At present, the country is facing problem of shortage of green fodder (about 63 %), dry fodder (about 24 %) and feeds (about 64 %) for livestock production.

In India, area and productivity of the permanent pastures has been declining gradually over the years and this trend could well continue in the future. Pastures in the

country have become less productive due to uncontrolled overgrazing, declining area, biotic and abiotic stresses. The opportunity for expansion of area of fodder crops seems to be far-away but there is a great scope exists to increase production and quality of fodder crops through adoption of new fodder crops and varieties along with good package of practices. In order to increase the production and quality of fodder crops and to make round the year availability of green and dry fodder for livestock production, new forage crops need to be tested and popularized among the farmers.

In order to fulfill the shortage of quality fodder in time for growing livestock population, area under fodder should ideally be increased and prime focus should be on quality production per unit area. Presently, there is needed to make quality fodder round the year for animals to increase milk production. In view, the present trial was carried out to make availability of quality fodder to animals throughout lean periods of available.

Materials and Methods

A field trial was carried out during *rabi* season of 2018-19 at research Farm of Krishi Vigyan Kendra, Dhar, Madhya Pradesh, India. Temperature varies between a minimum temperature of 12^0C in December and January months to maximum temperature of 45^0C in May and June. The soil of the experiment field was a typical medium black soil. It has high capacity to swell and shrink and high CEC due to dominance of Montmorillonite clay content. The initial status of soil of the experimental field was clay loam in texture, neutral in reaction (pH 7.70) with normal EC (0.59 dS/m) and medium organic carbon contents (0.62 %) and low in available N (223 kg/ha), medium in available P (11.50 kg/ha) and high in available K (345 kg/ha) contents. The trial was laid out in randomized block design with five replications and comprising five treatments *i.e.* local control (rye grass), sole Makkhan grass, sole Oats, sole Barseem JB-1 and sole Barseem JB-5. The fodder crops *viz.* Oat (100 kg/ha seed), local rye grass and makkhan grass (15 kg/ha seed), berseem (30 kg/ ha seed) were sown in 3 cm deep furrows opened with the help of hand hoe at 0.25 m row to row spacing. Half dose of total nitrogen was applied through urea @ 120 kg N/ha for grasses, 25 kg N/ha for legumes, 60 kg P_2O_5/ha through single super phosphate and 40 kg K_2O/ha through muriate of potash were applied uniformly as basal dose. Remaining 50 % nitrogen was top dressed at 2^{nd} and 3^{rd} cuttings in grasses.

The first cutting for all crops were taken at 55 days after sowing with the help of sickle leaving stubble height of 5-8 cm from ground for uniform and quick re-growth. Next subsequent cuttings were taken at 30 days after each cutting till crops stop to re-growth. The herbage quantity just after harvest was weighted directly for calculation of green forage yield and 0.5 kg fresh sample from each net plot (1m×1m) was taken to determine dry matter content. The samples were oven dried at 70^0 C ± 2 in hot air oven for determination of moisture loss. The finely grinded dry samples were used for estimation of nitrogen content using 2 mm sieve by method of Micro kjeldahl (Jackson, 1973). The content of crude protein was determined by multiplying nitrogen per cent with 6.25 (AOAC, 1965) and digestible dry matter content by the nylon bag method (Mehrez and Orskov, 1977). The statistical analysis was done using analysis of variance (ANOVA) technique to draw inference of the results. The valid conclusions were drawn only on significant differences between treatment means at probability of 5% level.

Results and Discussions

Study on growth parameters

Data showed that among all crops, height of plants were significantly found taller (52.4 and 58.20 cm) in treatment T_3- Oats as compared to other crops at 1st and 2nd cuttings. It might be due to genetic makeup compared to other crops while at 3rd cutting, maximum height (71.8 cm) of plants was significantly found in treatment T_2- *Makkhan* grass than remaining crops except T_3-oat, whereas, the height of the plants were statistically at par with oat at 4th cutting. The increased percentage (25.09, 10.33 and 27.2) in plants height was found under treatment T_2- *Makkhan* grass over T_4- berseem JB-1 and T_5-berseem JB-5, T_3-oat and T_1-local control, respectively. In the case of berseem, least plant height was observed at all the cuttings. The maximum tillers (8.6, 9.9, 14.2 and 13.4) were significantly observed in T_2-*Makkhan* grass at all the cuttings than remaining treatments. The maximum number of leaves (348.52, 364.55, 722.74 and 669.40) was significantly found higher in T_2-*Makkhan* grass as compared to other crops except local control (rye grass) at all the cuttings whereas the highest average leaf stem ratio (0.94) was recorded in T_2-*Makkhan* grass as compared to remaining treatments.

Table.1 Plant height (cm/plant) and number of tillers/plant

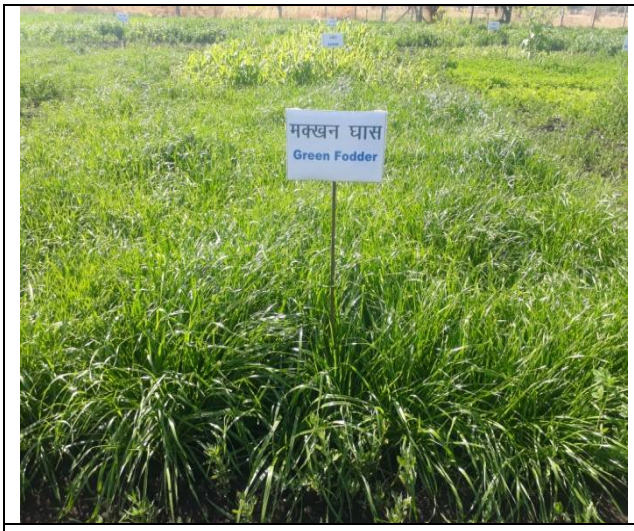
Treatments	Varieties	Plant height (cm/plant)				Number of tillers/plant			
		Cuttings				Cuttings			
		1	2	3	4	1	2	3	4
T_1	Local Control	29.6	37.5	41.2	52.2	6.8	7.8	9.6	8.4
T_2	*Makkhan* grass	40.4	51.6	71.8	66.4	8.6	9.9	14.2	13.4
T_3	Oats	52.4	58.2	64.3	60.2	5.6	7.8	11.2	9.6
T_4	Berseem JB-1	29.1	37.4	44.6	53.1	5.1	7.3	9.4	9.22
T_5	Berseem JB-5	31.2	39.7	46.7	55.2	5.8	8.1	10.5	10.2
	SEm ±	2.01	2.13	2.4	2.85	0.4	0.72	0.61	0.70
	CD at 5%	5.54	5.91	7.01	8.68	1.12	NS	1.62	2.10

Table.2 Number of leaves/m row length and Leaf stem ratio

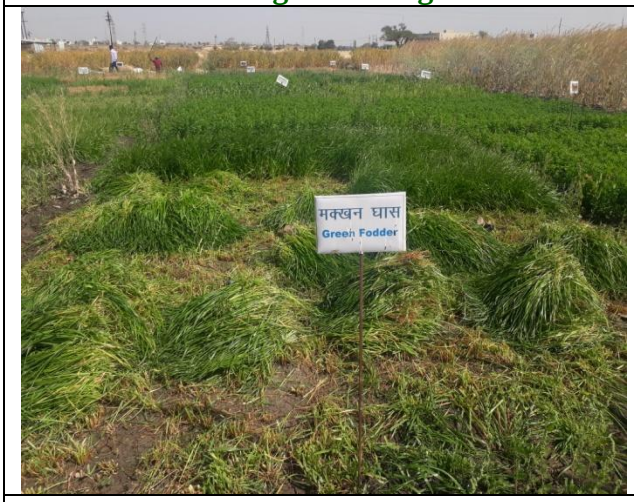
Treatments	Varieties	Number of leaves/m row length				Leaf stem ratio (LSR)
		Cuttings				Average
		1	2	3	4	
T_1	Local Control	321.22	340.60	710.20	642.32	0.66
T_2	*Makkhan* grass	348.52	364.55	722.74	669.40	0.94
T_3	Oats	219.32	307.30	653.22	641.19	0.60
T_4	Berseem JB-1	196.50	266.82	538.33	478.21	0.85
T_5	Berseem JB-5	201.30	271.4	541.62	480.84	0.88
	SEm ±	12.4	15.22	27.40	23.70	0.08
	CD at 5%	39.5	43.13	79.65	69.55	NS

Table.3 Green fodder yield, dry matter and crude protein yield (q/ha)

Treatments	Varieties	Green Forage yield (q/ha)	Dry matter (q/ha)	Crude protein yield (q/ha)
T_1	Local Control	565.50	48.5	10.12
T_2	*Makkhan* grass	1210.2	89.8	13.22
T_3	Oats	668.60	53.2	7.10
T_4	Berseem JB-1	956.40	75.2	11.16
T_5	Berseem JB-5	976.80	78.9	11.40
	C D at 5%	21.27	3.87	0.33



Fodder growth stages at RVSKVV-KVK, Dhar (M.P.) during 2018-19



Experiment conducted at RVSKVV-KVK, Dhar (M.P.) during 2018-19

Study on yield and quality parameters

The data revealed that the maximum green fodder yield (1210.2q/ha) was significantly recorded in T_2- *Makkhan* grass as compared to other crops except T_5-berseem JB-5 (976.80 q/ha) and T_4- berseem JB-1 (956.40 q/ha) as compared to local control (565.5 q/ha). *Makkhan* grass and berseem increased total green fodder yield by 114.0 and 72.73 % over oat and local control (Table 3). The maximum dry fodder yield (89.8 q/ha) was observed in T_2- *Makkhan* grass closely followed by T_5-berseem JB-5 (78.9 q/ha) and T_4- berseem JB-1 (75.2 q/ha) as compared to local control (48.5 q/ha). The treatment T_2- *Makkhan* grass also increased total dry fodder yield by 85.15, 68.79 and 19.41 %, respectively over remaining treatments (T_1-local control, T_3-oat and T_4-berseem). The maximum crude protein yield (13.22 q/ha) was recorded in T_2- *Makkhan* grass followed by T_5-berseem JB-5 (11.40 q/ha) and T_4- berseem JB-1 (11.16 q/ha) as compared to local control (10.12 q/ha). Total crude protein yield found highest in T_2- *Makkhan* grass over remaining crops. It might be due to highest production of dry matter and content of crude protein.

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