Productivity of Perennial Grasses under *Machillus bombicinii* Tree in Assam

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Keywords: Congo-signal grass, Perennial grasses, *Setaria* grass, Tree shade

Introduction

Homestead agroforestry system is the most common production system in Assam. It varies with the agroclimatic zones and economic condition of the farmers. In lower Brahmaputra valley zone, generation of employment under such system varies from 16.5 to 19.1% whereas in upper Brahmaputra valley zone, it ranges from 30.6 to 64.1%. For increasing forage productivity homestead garden can play a major role in augmenting fodder production for year round supply of green forage through non competitive land use system. There is scope for growing suitable perennial grasses like Guinea, setaria and Congo-signal for increasing fodder production. However research information on the performance of setaria and Guinea grasses are not available in Assam under tree shade. Through the performance of Guinea grass under tree shade has already been tested and found to be feasible for growing. On the other hand in Assam there are many plantation areas where *Machilus bombicina* King (Family Lauraceae) locally known as "Som" tree is grown. This is a very common tree for Munga silk worm rearing (Dutta, 1985) which is middle to big tree with spreading crown. Wood is hard and used as ordinary timber. It is a good fire wood and suitable for making charcoal. The present study was proposed to study the productivity and quality of two perennial grasses *viz*. Setaria and Congo-signal at varying levels of nitrogen under tree shade of *Machilus bombicia*.

Materials and Methods

A field experiment was conducted by growing two perennial grasses *viz*. Setaria (*Setaria sphacelata*) and Congo-signal (*Brachiaria ruziziansis*) under the tree shade of *Machillus bombycina* king under different levels of N in the Instructional Cum Research Farm of the Assam Agricultural University,Jorhat-78013.A 20 years old plantation of *M. bombicina* was selected for the study. Another set of experiment was also conducted under open condition by taking same treatment combination. The experiment was laid out in Split Plot Design taking tree shade and open condition in main plot and combination of grasses and N levels in sub plots replicated thrice. Perennial grasses *viz*. Setaria (var. PSS-1) and Congo-signal (CV. DRSB-7), respectively was grown with four N levels *i.e*. F1-25% less than RDNF, RDNF and 25% more than RDNF, respectively where RDNF stands for recommended dose of nitrogenous *i.e*. 40 kg N /ha as basal and 30 kg N/ha after each cut. A total number of three cuts per year were taken during the experimentation. The trial was conducted during 2012-14. The site of the experiment belongs to subtropical humid with average annual rainfall of 1800 mm. Major rainfall is received during the month of June to September (70-80%). The textural class of soil is sandy loam with pH 5.5-5.8.Fertility status of soil indicated that the soil is medium in available N and P but low in available K.

The recommended dose of fertilizer (120kg N 60kg P_2O_5 and 40kg K_2O/ha) was applied for both grasses. A basal application of 40kgN/ha plus whole of P and K were applied during final land preparation. There after remaining amount of N was applied in three equal split after each cut.

Results and Discussion

Perusal of data presented in Table. 1 indicated that mean green forage yield (GFY) during 2012-14 was found to be 567 q/ha under tree shade, which was 45% of the GFY obtained under open condition. The GFY obtained under open condition was 1247 q/ha. The reduction in yield under tree shade was due to low availability of sunlight. The light transmission ratio (LTR) observed throughout the growing period indicated that there was a variation of LTR from 25% to 40%. Both Congo-signal and Setaria grass produced 905 and 909 q/ha of green forage yield, respectively. As far as the dry matter yield was concerned the similar trend was observed with that of GFY. The dry matter yield of Congo-signal grass was found to be higher than Setaria being 169q and 152q/ha, respectively. The highest GFY and DMY were recorded with the application of 25> RDNF being 1027 q and 196 q/ha. Total crude protein yield of 13.97 q/ha was obtained under open condition that produced 42% higher Crude Protein (CP) yield over shaded condition. Congo-signal grass produced higher CP yield (11.86 q/ha) than *Setaria* (10.25 q/ha).

Under shaded condition the plant heights of perennial grasses were more than open condition. On the other hand the number of tillers/tussock was less under tree shade than open condition. However, Congo-signal grass produced more tillers than *Setaria* being 69 and 50/tussock, respectively.

The highest net return (Rs. 102579/ha) was recorded under open condition which was 51% higher than shade condition. Under tree shade the net return of Rs 50189/ha was obtained. However, with the increased levels of nitrogen the profitability increased from Rs 70867/ha in 25< RDNF to Rs 95522/ha in 25>RDNF application.

Table 1: Productivity and profitability of perennial grasses with and without tree shade on pr (2012-14)

Treatment	Green forage yield (q/ha)	Dry matter yield (q/ha)	Crude protein yield (q/ha)	Average plant height (cm)	Average tiller/ tussock	Net monetary return (Rs/ha)
A. Growing conditions (S)						
Under tree shade	567.94	114.10	8.19	153.72	41	50189
Open condition	1247.44	208.21	13.97	149.35	78	102579
CD at 5%	117.96	23.78	1.40	NS	18.4	8723
B. Grasses (P)						
Seteria anceps	909.75	152.56	10.25	151.06	50	76289
Brachiaria brizantha	905.62	169.50	11.86	150.39	69	76479
CD at 5%	NS	NS	NS	NS	NS	NS
C. Nitrogen levels (N)						
25% < RDNF	773.65	151.59	10.06	146.28	49	70687
RDNF	922.26	174.56	12.04	150.03	59	85177
25% > RDNF	1027.19	196.69	13.58	154.08	63	95522
CD at 5%	139.84	28.14	1.61	10.95	26.75	10550
D. Interaction						
	NS	NS	NS	NS	NS	NS
CV %	13.42	16.82	15.93	8.95	15.40	20.09

Conclusion

Setaria and Congo-signal can be grown successfully under tree shade with higher productivity in Assam. Irrespective of growing condition both the grasses responds positively towards increased level of nitrogenous fertilizer.

References

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Acknowledgement