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Research Article

Response of various grasses to different levels of fertilizer

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Abstract : An experiment was conducted to study the response of various grasses to different levels of fertilizer during the *Kharif* seasons of 2002-03, 2003-04 and 2004-05 at Grassland Research Station, Junagadh Agricultural University, Dhari. The treatments comprised of four grasses *viz.,* anjan (*Cenchrus ciliaris*), dharaf (*Chrysopogon montanus*), marvel (*Dichanthium annulatum*) and shaniar (*Sehima nervosum*) and four levels of chemical fertilizer (F_1=00-00-00, F_2= 20-10-00, F_3= 40-20-00 and F_4= 60-30-00 NPK kg/ha). In order to find out the best suitable pasture grass and optimum level of fertilizer for securing the maximum forage yield, the experiment was laid out in randomized block design (Factorial) and it was replicated thrice. The pooled results indicated that among different grasses, significantly the highest green biomass (99.9 q/ha) and dry matter yield (33.1 q/ha) were recorded by marvel grass. Among different fertilizer levels, the fertilizer dose of 60-30 NP kg/ha gave significantly the maximum green biomass (90.4 q/ha) and dry matter yield (30.2 q/ha), but statistically it was at par with the fertilizer level of 40-20 NP kg/ha for green as well as dry matter yield. With the economic point of view, the maximum net return of 3809 Rs./ha was recorded by the treatment combination of marvel grass and 60-30-00 NPK kg/ha fertilizer level.

Key Words : Green biomass, Dry matter, Grasses, Fertilizer

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INTRODUCTION

India has huge livestock wealth which plays an important role in its agricultural economics. The deficiency of green forage is one of the major causes of malnutrition in the livestock resulting in low animal productivity. The annual production of green and dry fodder in the country is 250 and 441 million tones as against the requirement of 932 and 780 million tones, respectively (Anonymous, 2000). At present, natural grassland area have been degraded through over grazing and careless exploitation of the bio diversity. It is now a days considered important to utilize the uncultivated land and cultivated wastelands. The main reason of low productivity of forage yield in Saurashtra region is mainly attributed to its cultivation in poor and marginal lands under rainfed condition with no or little use of fertilizer. Fertilizer plays an important role in increasing forage production with better nutritive value. Fertilizer is a costly input and so it should be used judiciously to get maximum monetary returns per unit cost incurred. In order to find out the best suitable pasture grass and optimum level of fertilizer for securing the maximum forage yield, the experiment was laid out.

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EXPERIMENTAL METHODS

The field experiment was conducted during the *Kharif* seasons of 2002-03, 2003-04 and 2004-05 at Grassland Research Station, Junagadh Agricultural University, Dhari

(Gujart). The soil of the experiment site was marginal land with shallow depth. The treatments comprised of four grasses *viz.,* G_1=anjan (*Cenchrus ciliaris*), G_2=marvel (*Dichanthium annulatum*), G_3= dharaf (*Chrysopogon montanus*) and G_4=shaniar (*Sehima nervosum*) and four levels of fertilizer *viz.,* F_1=00-00-00, F_2= 20-10-00, F_3=40-20-00 and F_4=60-30-00 NPK kg/ha. The experiment was laid out in Factorial Randomized Block Design and was replicated thrice. All these grasses were sown on 09/07/2001 by using the seed @ 5 kg/ha during *Kharif* season of 2001-02 *i.e.* during first year of experiment. These grasses are perennial pasture grasses, so in the remaining two years of the experiment, sowing was not done. All these grasses were sown with keeping 60 cm spacing between two rows and 60 cm spacing within row. Treatment wise half dose of nitrogen in the form of urea and treatment wise full dose of phosphorus in the form of single superphosphate were applied as basal. The remaining half dose of nitrogen in the form of urea was top dressed at 25 days after sowing during2002-03 and at 25 days after first monsoon rainfall during 2003-04 and 2004-05. General cultural practices were followed as per recommendation. The grasses were harvested at 50 per cent flowering stage at a stubble height of 12 cm from the soil surface. The *Kharif* seasonal rainfall received was 481.7, 434.5 and 632.20 mm during 2002, 2003 and 2004, respectively. Standard statistical procedure was followed for analyzing the results obtained.

EXPERIMENTAL RESULTS AND ANALYSIS

The results obtained from the present study have been presented under following heads :

Effect of grasses:

The differences in green as well as dry matter yield

Table 1 : Green biomass and dry matter yield as affected by grasses and different fertilizer levels

Treatments	Green biomass (q/ha)				Dry matter yield (q/ha)			
	2002	2003	2004	Pooled	2002	2003	2004	Pooled
Grasses (G)								
Anjan	56.70	92.14	66.16	71.46	18.29	29.68	22.92	23.63
Dharaf	48.71	90.10	60.70	66.50	16.76	28.94	21.76	22.50
Marvel	87.51	144.22	98.06	99.93	28.61	36.67	34.03	33.10
Shaniar	75.56	108.94	86.95	90.48	24.54	35.00	30.42	29.90
S.E..±	2.34	5.38	2.59	2.14	0.74	1.72	0.30	0.70
C.D. (P=0.05)	6.76	15.53	7.48	6.01	2.14	4.96	2.61	1.95
Fertilizer (F) (NP kg/ha)								
F_1=00-00	59.34	92.55	71.12	74.34	19.82	29.72	24.49	24.68
F_2=20-10	64.47	95.84	74.59	78.30	20.84	30.74	26.39	26.00
F_3=40-20	70.75	103.30	82.09	85.38	23.19	33.24	28.80	28.40
F_4=60-30	73.29	113.71	84.13	90.38	24.45	36.58	29.45	30.16
S.E..±	2.34	5.38	2.59	2.14	0.74	1.72	0.90	0.70
C.D. (P=0.05)	6.76	15.53	7.48	6.01	2.14	4.96	2.61	1.95
Interactions								
G x F								
S.E..±	4.68	10.76	5.19	4.27	1.48	3.44	1.81	1.39
C.D. (P=0.05)	13.52	NS	14.59	12.62	4.31	NS	5.23	4.06
Y x G								
S.E..±	-	-	-	3.70	-	-	-	1.20
C.D. (P=0.05)	-	-	-	NS	-	-	-	NS
Y x F								
S.E..±	-	-	-	3.70	-	-	-	1.20
C.D. (P=0.05)	-	-	-	NS	-	-	-	NS
Y x G x F								
S.E..±	-	-	-	7.40	-	-	-	2.78
C.D. (P=0.05)	-	-	-	NS	-	-	-	NS

NS=Non-significant

due to various grasses were significant in individual year and in pooled. Significantly the highest green biomass and dry matter yield were recorded by marvel grass during all the individual years and in pooled (Table 1). The marvel grass recorded the green biomass of 99.93 q/ha and dry matter yield of 33.10 q/ha in pooled result. The marvel grass gave 50.3, 39.3 and 10.44 per cent higher green biomass yield as compared to dharaf, anjan and shaniar grass, respectively and it gave 47.1, 40.0 and 10.4 per cent higher dry matter yield as compared to dharaf, anjan and shaniar grass, respectively in pooled result. Rathod *et al.* (2000) reported the variation in different grasses with respect to green biomass and dry matter yield.

Effect of fertilizer levels:

The results revealed that differences in green biomass as well as dry matter yield due to various fertilizer levels were significant in individual year as well as in pooled. Among different fertilizer levels, the fertilizer level 60-30 and 40-20 NP kg/ha being at par with each other and gave significantly the highest green biomass and dry matter yield during 2002, 2003, 2004 and in pooled results (Table 1). The fertilizer level 60- 30 NP kg/ha recorded 90.38 and 30.16 q/ha green biomass and dry matter yield and 40-20 NP kg/ha fertilizer level recorded 85.38 and 28.40 q/ha green and dry matter yield in pooled. Rafique and Thakuria (2002) reported that green biomass and dry matter yield of the grass increased, with increase in levels of nitrogen. Sharma and Agrawal (2003) concluded that green and dry matter yield of forage sorghum increased with increase in levels of fertilizer from 00-00-00 to 90-40-30 NPK kg/ha.

Interaction effect:

The interaction effect of grasses x fertilizer levels were found significant for green as well as dry matter yield during 2002, 2004 and in pooled result. The interaction of Y x G, Y x F and Y x F x G were found non significant in pooled results.

Grasses x fertilizer effect:

Significantly the highest green biomass (121.17 q/ha) and dry matter yield (41.07 q/ha) were resulted by the combination of marvel grass and 60-30 NP kg/ha fertilizer level in pooled. This combination was found superior.

Economics:

With regarding to economics point of view, the maximum net return of 3809 Rs./ha was recorded by the combination of marvel grass and 60-30 NP kg/ha fertilizer level (Table 2).

It can be concluded that among different grasses, the marvel grass was found superior and among different fertilizer levels, 60-30 NP kg/ha fertilizer level was found

Table 2 : Economics of grasses and fertilizer level combinations (mean of three years)

Treatment combinations	Green biomass yield (q/ha)	Gross return (Rs./ha)	Cost of cultivation (Rs./ha)	Net return (Rs./ha)	Benefit cost ratio (BCR)
1	2	3	4	5	6
G_1F_1	69.40	3470	950	2520	1:2.65
G_1F_2	71.86	3593	1450	2143	1:1.48
G_1F_3	73.29	3665	1850	1815	1:0.98
G_1F_4	71.21	3561	2250	1311	1:0.58
G_2F_1	59.40	2970	950	2020	1:2.13
G_2F_2	58.89	2945	1450	1495	1:1.03
G_2F_3	76.17	3809	1850	1959	1:1.06
G_2F_4	71.53	3577	2250	1327	1:0.59
G_3F_1	86.30	4315	950	3365	1:3.54
G_3F_2	93.53	4677	1450	3227	1:2.23
G_3F_3	98.67	4934	1850	3084	1:1.67
G_3F_4	121.17	6059	2250	3809	1:1.69
G_4F_1	83.48	4174	950	3224	1:3.39
G_4F_2	87.69	4385	1450	2935	1:2.02
G_4F_3	93.30	4665	1850	2815	1:1.52
G_4F_4	97.51	4876	2250	2626	1:1.70

Selling price : 50 Rs./q green biomass
Common cost of cultivation : 950 Rs./ha for no fertilizer
Purchase price : 11.00 Rs./kg nitrogen
18.00 Rs./kg phosphorus

superior and among different combinations, marvel grass x 60-30 NP kg/ha fertilizer levels was found superior for obtaining maximum green and dry matter yield under rainfed conditions of North Saurashtra region.

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