

QUALITY EVALUATION OF FEED RESOURCES AT THE NEWLY RECLAIMED AREA IN EGYPT

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ABSTRACT

The objective of this study was to examine the productivity of Egyptian clover (*Trifolium alexandrinum* L.) interseeded with ryegrass (*Lolium multiflorum*) and alfalfa (*Medicago sativa* L.). These species were planted in newly reclaimed land in Ismailia, Egypt under two fertilization systems; organic (OF) or chemical (CF) during winter season of (1994-1995) using a split plot design. Feeding quality of forages was evaluated by conducting digestibility trials with rams and feeding trials with growing lambs where forage was offered ad. libitum with 1% of LBW concentrate. Productivity data indicated that organic fertilization yielded significantly more DM. Chemical analysis showed that DM content with (CF) was higher than with (OF) and it was found that alfalfa had higher CP content than that of E. Clover mixture. Digestibility of nutrients was higher with (CF) than with (OF) and it was found that CP was more digested in alfalfa than the Egyptian clover mixture. TDN values for both forages were determined by proximate analysis. Group of lambs fed chemically fertilized alfalfa attained significantly better weight gain which was attributed to high forage DM intake.

KEYWORDS

Reclaimed soils, Egyptian clover, ryegrass, alfalfa, fertilizer, sheep.

INTRODUCTION

Egyptian clover is the main forage crop in Egypt and occupies about one million hectares in the old valley which satisfies animal population requirements in winter. Interseeding Egyptian clover with ryegrass was found promising as it improves quality and productivity (Abou-Raya *et al.*, 1978 and Gabra *et al.*, 1991). Agricultural policy has been directed for 40 years towards intensive reclamation of land particularly in sandy soils to cover the population needs with a special emphasis on animal products. Egyptian clover is cultivated successfully in newly reclaimed land, but also alfalfa is an important perennial legume well adapted to the situation and resists drought and heat. Cultivation of forages in such areas requires a special system of fertilizing to ensure sustainability and good productivity. The objective of this study is to examine the productivity and feeding quality of Egyptian clover/ryegrass mixtures compared with alfalfa sown singly on reclaimed soils under two different systems of fertilizing, organic or chemical. Productivity was estimated for the winter season and feeding quality was evaluated by conducting digestibility trials and feeding trials with sheep.

MATERIALS AND METHODS

The tested forages were planted on reclaimed soil on Ismailia Agric. Res. Station, Ismailia, Egypt 1994/1995 in the winter season. A split plot design with 3 replicates was adopted, where the main plots were sown with alfalfa seeds (48 kg ha⁻¹) or with a mixture of Egyptian clover: ryegrass seeds (60:30 kg ha⁻¹) in Nov. 1994. The sub-plots were fertilized with organic (OF) and chemical (CF). Plot size was (25m X 27m²). The (CF) forages received 55 kg P ha⁻¹ before sowing, 120 kg potassium sulfate ha⁻¹ and 36 kg N ha⁻¹ was added after germination and after each cutting. The (OF) forage received 70m³ farm yard manure ha⁻¹ before sowing plus 36 kg N ha⁻¹ after germination. Three cuttings from the forages were obtained during the winter season. Twenty lambs (Cross Remanouf X Rahmani) averaging 24.2 kg live body weight were divided into four homogenous groups which were fed the 4 tested forages ad. libitum

with 1% of LBW concentrate mixture for 105 days. Refusals of feed were recorded daily and all lambs were weighed every week on two successive days before the morning meal. Eight digestibility trials were carried out with mature rams (3 for each) to evaluate the feeding values of the 2nd and 3rd cutting of the tested forages. A seven day collection period preceded by a 14 day preliminary period was adopted. Dry matter yields for the three cuttings of each tested forage were estimated. Samples of feeds and faces were collected and analyzed for proximate composition according to A.O.A.C (1980). Data were statistically analyzed according to Snedechor and Cochran (1982).

RESULTS AND DISCUSSION

Productivity. The productivity of the three cuttings of the two tested forages during winter season (Table 1) showed that organic fertilizer yielded significantly (P<0.05) more DM than the chemical fertilizer and this difference was more pronounced with alfalfa. Fouda (1988) concluded that the pronounced effect of organic manures added to light-textured soil is partly due to improved physical and chemical properties of the soil and partly to the extra supply of nutrients. It was also found that the yield of all tested forages was relatively small in the first cut and increased with the subsequent cuttings due to production of more tillers. Averages total DM yield in winter was found significantly (P<0.05) higher from Egyptian clover mixture (11.48 t ha⁻¹) than that from alfalfa (9.58 t ha⁻¹). However, it should be considered that alfalfa, as a perennial, can give further cuttings in summer while with Egyptian clover mixture, summer forage has to be grown to cover summer period.

Chemical composition. Results of chemical analysis for samples taken from 2nd and 3rd cuts of the 4 experimental forages are presented (Table 2). The DM% of the forages was higher with (CF) in all cases than with (OF) and there was also a general trend for DM% to increase with subsequent cuttings. Alfalfa had higher content of CP than Egyptian clover/ryegrass mixture, overall averages were 19.1 and 16.1% of DM respectively, without showing a significant effect for the order of cutting or type of fertilization. NFE and crude fiber contents averaged 39.7, 27.6% and 41.9, 28.6% of DM for alfalfa and Egyptian clover mixture respectively. Also, the fertilization treatment had no effect on the contents of both nutrients. Generally, the chemical composition values obtained in this study were similar to those figures recorded by Gabra and Sherif (1985).

Digestibility and nutritive values. Data obtained (Table 2) showed that the values of digestibility of all nutrients were higher in forages fertilized by CF than those fertilized by OF for both cuttings. It was observed that the digestibility values were somewhat higher in the 2nd cutting than in the 3rd cutting for both tested forages. The overall averages of digestibility coefficients were 60.2, 62.9, 69.5, 55.1, 49.4, 66.4% for DM, OM, CP, EE and NFE, respectively for Egyptian clover/ryegrass mixture. They were 59.9, 60.7, 75.9, 45.2, 48.6 and 68.6% in the same order for alfalfa. It can be shown that CP was more digested with alfalfa than with Egyptian clover/ryegrass while CF was less digested. It was found that the TDN values were higher for forages fertilized with CF than for forages fertilized with OF. Overall averages TDN values were 58.2 and 57.4% for Egyptian clover/ryegrass mixture and alfalfa, respectively. Overall averages for DCP were 11.2 and 14.5% for Egyptian clover/ryegrass mixture

and alfalfa, respectively. The digestibility and nutritive values obtained were somewhat lower than those recorded by Gabra *et al.* (1992) and El-Kholy (1981).

Performance of growing lambs. Results of the feeding trial presented (Table 3) indicated that the group fed alfalfa fertilized with (CF) attained significantly better daily body weight gain (189 gm/lamb/day), followed by the group fed Egyptian clover/ryegrass (OF) and the lowest gain was recorded for the group fed Egyptian clover/ryegrass (CF) (157 gm/lamb/day). Generally, the growth rate was related to the forage DM intake which amounted to 1.07 and 0.89 kg/lamb/day for the alfalfa (CF) and Egyptian clover mixture (CF) respectively. Gabra *et al.* (1993) reported that the lambs fed Egyptian clover/ryegrass mixture had consumed more feed as DM than from Egyptian clover alone and that resulted in higher body weight gain and feed efficiency.

CONCLUSION

It can be concluded that the addition of farm yard manure to reclaimed land was most beneficial for forage productivity because of improving its physical and chemical properties. Response for organic fertilization was more pronounced for alfalfa, but the total DM yield in winter was higher from Egyptian clover mixture than from alfalfa. However, the growth of growing lambs fed alfalfa was better than those for Egyptian clover/ryegrass mixture. Further investigation is needed to know the optimal combination of organic and chemical fertilizer required for economical productivity.

Table 1

Productivity of the tested forages under chemical or organic fertilization during winter season.

Items	E.clover-ryegrass mixture		Alfalfa	
	CF	OF	CF	OF
	DM yield (t ha ⁻¹)			
1st cutting	1.64	1.98	1.26	2.26
2nd cutting	3.67	4.76	2.74	3.69
3rd cutting	5.52	5.38	4.05	5.12
Total	10.83	12.12	8.05	11.10

CF & OF = Chemical & organic fertilizer.

Table 3

Performance of lambs fed the tested forages ad. libitum with 1% of L.B.W. concentrates.

Items	E.clover-ryegrass mixture		Alfalfa	
	CF	OF	CF	OF
Number of animals	5	5	5	5
Feeding period (days)	105	105	105	105
Initial LBW (kg)	24.28	24.24	24.20	24.28
Final LBW (kg)	40.76	42.08	44.04	40.95
Av. daily LBW gain (mg)	157 ^a	170 ^a	189 ^b	168 ^a
DM intake/head/day:				
Forage (kg)	0.89	0.93	1.07	0.94
Concentrate (kg)	0.32	0.32	0.33	0.32
Total	1.21	1.25	1.40	1.26
Feed efficiency:				
kg DM feed/kg gain	7.72	7.37	7.40	7.51

^{a, b} Values on the same line with different superscripts are different, P<0.05.

CF & OF = Chemical and organic fertilization.

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Table 2

Chemical composition, digestibility and nutritive values of 2nd and 3rd cuttings of the tested forages.

Items	E.clover-ryegrass		Alfalfa					
	2nd cut	3rd cut	2nd cut	3rd cut				
	CF	OF	CF	OF				
Chemical composition:								
DM%	18.4	17.1	20.7	18.1	18.9	16.9	22.4	20.2
% of DM								
CP	16.5	16.4	16.0	15.6	18.9	19.7	18.7	18.9
CF	27.5	27.8	29.5	29.5	27.6	26.5	28.3	28.0
EE	2.9	2.9	2.9	2.8	3.0	2.9	3.3	2.8
NFE	43.1	42.9	40.8	40.9	41.8	40.3	38.8	38.1
Ash	9.9	9.9	10.7	11.2	8.2	10.6	10.9	12.3
Digestion coefficient %								
DM	62.6	60.5	59.7	57.9	61.9	60.2	59.4	58.4
OM	65.6	63.5	61.9	60.6	64.6	63.0	62.0	59.4
CP	70.8	71.3	70.6	65.3	78.1	76.7	75.1	73.9
CF	57.0	54.4	55.5	53.4	46.1	45.4	45.5	43.6
EE	52.8	53.7	46.5	44.7	51.9	51.4	47.4	43.53
NFE	70.1	67.1	64.3	65.0	71.5	68.8	69.0	64.9
Feeding value %								
TDN	61.1	59.2	57.0	55.3	60.8	58.2	57.2	53.6
DCP	11.7	11.7	11.3	10.2	14.8	15.1	14.0	13.9

CF and OF = chemical and organic fertilization