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INFLUENCE OF SEEDING RATES AND N FERTILIZATION ON FORAGE YIELD AND QUALITY OF BERSEEM–RYEGRASS MIXTURE.

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ABSTRACT

This investigation was conducted at two locations (Ismailia) representing East Delta and (Nubaria) representing North West Delta during 2003/2004 and 2004/2005 growing seasons to investigate the effect of seeding rates and nitrogen fertilization on forage yield and quality of berseem-ryegrass mixture. Results showed significant variation in the total fresh and dry forage yields due to ryegrass seeding rates and N fertilizer rates at Ismailia in the first and second seasons, respectively. No significant differences were recorded in the total fresh and total dry forage yields at Nubaria in the first and second seasons, respectively. The highest total fresh and dry yields were generally obtained with the seeding rate of 20 kg berseem/fed. and 12 kg ryegrass /fed. and adding 60 kg N/fed. The highest CP and ash % and the lowest CF% were generally obtained with the seeding rate of 20 kg berseem /fed. and 8 kg ryegrass /fed. and adding 60 kg N/fed., Meanwhile the highest Ca/P ratio was generally obtained from the pure berseem and the lowest Ca/P ratio obtained with the seeding rate of 20 kg berseem /fed. and 12 kg ryegrass /fed. and adding 60 kg N/fed., while the highest level of nitrate accumulation was generally obtained with the seeding rate of 20 kg berseem /fed. and 12kg ryegrass /fed. and adding 60 kg N/fed.

Keywords: Berseem, ryegrass, forage mixtures, seeding rates, Nitrogen fertilization, forage yield, chemical constituents, Nitrate accumulation and Ca/P ratio.

INTRODUCTION

According to the fact that the cultivated area in Egypt is limited, therefore our country is in great need to increase the agricultural production to meat the high growth rate in population. Cultural methods play a decisive role in increasing yield of forage crops and improving its quality.

Berseem is known as a highly nutritious forage and very succulent herb which is rich in both protein and moisture contents. Its richness in protein and moisture contents considers a two weakness points in the first harvest (cut). So, mixing berseem with grass was proposed as a technique to improve the quality, productivity and botanical composition of forage through lowering berseem contents of both protein and moisture and eventually a more balanced diet is obtained.

Recent studies have emphasized the advantage of mixing grasses with leguminous (Reid *et al.*, 1987; Mostafa *et al.*, 1991 and Gabra *et al.*, 1992). However there are few reports about mixing Egyptian clover with ryegrass grown in new reclaimed lands which is a promising area for expanding animal production in future especially under a non traditional irrigation system. Therefore it was necessary to investigate the yield and quality of Egyptian clover, ryegrass and their mixture when grown in these areas.

Mixtures were generally found to be less than or equal to berseem alone on both yield and forage quality (Abou- Raya *et al.*, 1965; Habib and Badawy, 1967). In same cases berseem – ryegrass mixtures were shown to be superior at the first cut but produce similar seasonal yield (Abou- Raya *et al .*, 1974; and Rammah and Radwan ,1977).On the other hand Makky (1961) and more recently Ibrahim (1975) reported a definite superiority for mixtures over berseem at all cutting in terms of yield and quality.

Abou-Raya *et al.* (1974); Ibrahim (1975); and Rammah and Radwan (1977) Pointed out that the seeding rate of both berseem and grass in mixture has a significant influence in the performance of mixtures. Hussein and Abdel-latif (1982) revealed that the optimum seeding rate of berseem was found to be 30kg/fed. mixed with15kg/fed. barley produced higher green and dry matter yields.

Parsons (1958), Sprague and Garber (1950) and Washko and Pannington (1956) concluded from their investigations that yield increased due to nitrogen application has been influenced by the amount of grass in the mixture. The greater the proportion of grass, the greater the yield increase from applied nitrogen. Addition of nitrogen usually had increased the competitive ability of the grass and had decreased the proportion of legume in the mixture.

Chisci (1974) obtained the highest yield mixtures of rye with legumes fertilized with N.

Shaaban and Omran (1973) revealed that herbage could be increased by 25% when suitable amount of fertilizers is used. The increasing dose of nitrogen increased the yield of all berseem cuts.

El-Nahrawy *et al.*, (1996) determined the forage productivity of pure stand of Egyptian clover and annual ryegrass and their mixture in newly reclaimed lands. The yield of first and total harvests of mixtures was generally superior to those of pure stands of berseem and ryegrass. Mixture surpassed berseem in total herbage yield with % ranged from 11-20 averaged over 4 locations and 3 seasons in on - farm trails.

Ibrahim *et al.*, (1978) stated that interseeding Italian ryegrass with clover increased the percentage of dry matter, crude protein, crude fiber, ether extract, ash and nitrogen free extract.

Gluthmann (1970) concluded that crude protein yields of clover-grass mixtures fertilized with 120 or 240 kg N /ha were higher than pure stand of red clover.

Mostafa *et al.*, (1996) evaluated the feeding value of Egyptian clover, ryegrass and their mixture cultivated in new reclaimed land in Egypt. They found that there was significant variation between the 4 cuts for all forages particularly between the 1^{st} and 4^{th} cuts in chemical composition and feeding values (TDN and DCP). Positive N-balance was recorded with sheep fed all tested forage. The mixture had higher ($P<0.05$) TDN than the other forage. While the ryegrass had the highest CP and DCP value ($P<0.05$).

NRC (2001) reported that the requirement for major mineral nutrients for gestating beef cows or lactating beef cows is 0.18 – 0.44% for Ca and 0.18 – 0.39% for P. Mineral elements balance are very important to keep animal health. These elements could be certain ratio. For example, Ca and P are closely related to animal health and metabolism. It is very important to keep a proper balance of Ca and P in relation to vit. D. A desirable ratio of Ca/P between 2:1 and 1:1 (Miller and Reetz (1995))

Tekeli and Ates (2005) determined the Ca/P ratio of white clover and fescue mixtures. They found that the highest Ca/P ratio (3.41) was obtained from pure white clover pure stand and the lowest Ca/P ratio (2.60) was obtained from 25% clover + 75% fescue mixture.

Nitrogen is considered the plant nutrient most widely deficient in the world's soils. Various agricultural practices have been developed to increase its concentration in the soil. These practices include incorporating legume species in pasture and applying various nitrogen- rich fertilizers (urea, ammonium sulphate) to crops. Such practices sometimes cause grown plants in these soils to have nitrate levels above safe limits, resulting in livestock poisonings. Nitrate toxicity is misnomer because nitrite (No2) is poisonous to animals. After a plant is eaten, rumen bacteria rapidly reduce nitrates in the forage to nitrites. Normally, the nitrites are converted to ammonia and used by rumen microorganisms as a nitrogen source. However if nitrites intake is faster than its breakdown to ammonia, nitrites will begin to accumulate in the rumen. If forage contain from 0-3000 ppm they should be considered virtually save but if contain more than 6000 ppm nitrate they should be considered potentially toxic (Peter (2002)).

Therefore, this investigation was carried out to find out how to mix berseem with the annual ryegrass in order to obtain maximum forage yield quantitatively and qualitatively under the conditions of Ismaila and Nubaria by using different rates of seeds and Nitrogen fertilization.

MATERIALS AND METHODS

This study was carried out at the Agricultural Research Stations farms of Ismailia (Sandy soil new reclaimed lands) and Nubaria (Calcareous soil) A.R.C, during the two successive winter seasons of 2003/2004 and 2004/2005.Physical and chemical analysis of both soils are shown in Table(2). The date of sowing varied between seasons and locations, but all experiments were sown during October in both seasons (Table 1).

Table (1): Date of sowing and cutting in the two locations for 2003/2004 and 2004/2005 growing seasons.

Date of sowing and cuts	Nubaria		Ismailia	
	1st season	2nd season	1st season	2nd season
Sowing date	29/10 /2003	22/10 /2004	12/10/ 2003	19/10 /2004
Cut 1	22/12 /2003	29/12 /2004	20/12 /2003	25/12 /2004
Cut 2	18/2 /2004	28/2 /2005	10/2 /2004	3/2 /2005
Cut 3	21/3 /2004	1/4 /2005	25/3 /2004	18/3 /2005
Cut 4	27 /4 /2004	6/5 /2005	23/4 /2004	29/4 /2005

Table (2): Physical and chemical analysis of the soil before conducting the experiment.

	Ismailia	Nubaria
1- Mechanical analysis:		
Coarse sand %	58.62	58.0
Fine sand %	34.97	--
Silt %	3.88	30.6
Clay %	2.53	11.4
Soil texture	Sandy	Sandy loam
2- Chemical analysis:		
pH (1:25 suspension)	7.56	8.23
EC (m mohos Cm^{-1} (1:5)	0.098	1.35
Organic matter %	0.029	--
$Caco_3$ %	0.5	23.25
Total N %	0.04	0.005
Available P ppm	1.27	2.1
" " K ppm	51.90	80.00

Berseem (*Trifolium alexandrinum L.*) Helaly cultivar was sown in mixture with Italian ryegrass (*lolium multifiorum L.*) var. Cramba at corresponding rates of (a_1- 20 kg berseem (pure), a_2- 20 kg berseem + 8 kg ryegrass, a_3- 20 kg berseem + 10 kg ryegrass and a_4- 20 kg berseem + 12 kg/fed. seed ryegrass) Berseem and ryegrass mixtures were arranged at random in the main plots and N-fertilizer rates (b_1- zero(control), b_2- 20, b_3- 40 and b_4- 60 kg N/fed.) in the sub-plots of a split-plot design with four replications. Plot size was 2×3 m in the two locations and seeds were sown by hand broadcast method. Super phosphate (15.5% P_2O_5) and Potassium sulphate (48% k_2O) fertilizers were applied before seeding at 150 and 50 kg/fed. in the two locations, respectively. Nitrogen fertilizer was added as Ammonium sulphate (21.5% N). The N rates were divided into three equal portions and added after seedlings emergence and after each cut. Four cuts were taken as shown in Table (1).

Studied traits:

1- Forage yield:

A- Fresh forage yield (ton/fed.): Plots were hand clipped and weighed in kg/plot, then transferred to ton/fed.

B- Dry forage yield (ton/fed.): Samples of 100 gm were dried at 105°C to constant weight and dry matter percentage was estimated. The dry forage yield (ton/fed.) was calculated by multiplying fresh forage (ton/fed.) with the dry matter percentage (DM %).

2- Forage quality (Chemical composition, Nitrate and Ca/P ratio nitrogen accumulation):

Chemical analysis followed the conventional methods recommended by the Association of Official Agricultural Chemists A.O.A.C.(1980) on the dried sample for each cut at the first season in Ismailia location to determined Crude Protein (CP%),Crude Fiber (CF%) and ash %.The Calcium (Ca) content was determined by using atomic absorption spectrophotometer

apparatus (Perkin Elmer, Model 372). The Phosphorus (P) content was measured colorimetrically according to Taussky and Shorr (1953).
Nitrate content was determined using colorimetric assay method as described by Peach and Tracey (1955)

The results were analyzed statistically according to the procedure outlined by Sinedecor and Cochran (1980) Using MSTAT Computer program V.4 (1986). Means obtained were differentiated by using Duncan's new multiple range test as described by Duncan, (1955).

RESULTS AND DISCUSSION

The present investigation was carried out to maximize the productivity of forage mixture under different seeding and nitrogen fertilization rates. The investigated forage mixtures were the combinations of berseem as legume crop and ryegrass as a graminous crop. The available results will be discussed under the topics of the effect of seeding rates, nitrogen fertilization rates and their interaction on forage yield and quality.

1- Forage yield:

1-1-Effect of seeding rates on forage yield :

Results in Table (3) revealed that fresh, dry and total forage yields (ton/ fed.) were significantly affected by different seeding rates. This was true for all harvested cuts in the two growing seasons except the third cut at the second season at Ismailia location. The highest fresh, dry and total forage yields were obtained with the treatment of 20 kg berseem + 12 kg ryegrass and the lowest yield value was recorded when using pure berseem treatment. The increase in the total fresh forage yield amounted 64.09 % of pure stand of berseem in the 1st season and 16.72% of pure stand of berseem in the 2nd season. The response of dry forage yield to the investigated seeding rates followed the same previous trend of fresh forage yield, and the increase in the total dry forage yield amounted 98.58% of pure stand of berseem in the 1st season and 20.57% of pure stand of berseem of pure stand of berseem in the 2nd season.

These result confirm the finding of Radwan *et al.*,(1977) who mentioned that yield from mixture was significantly affected by the rate of seeding of berseem and ryegrass.

Under Nubaria location (Table 4) no significant differences were detected among the four seeding rates treatments for fresh, dry and total fresh and dry forage yields in the 1st season. With respect to the performance of seeding rates of the second season at Nubaria (Table 4) no significant differences among all treatments were recorded except third cut and the treatment 20 kg berseem + 12kg ryegrass gave the highest total fresh and dry forage yields. The response of the dry forage yield followed the same previous trend of fresh forage yield in the first and second season, respectively.

Table (3): Effect of seeding, N fertilizer rates and their interaction on fresh and dry forage yields (ton/fed.) of berseem-ryegrass mixtures at Ismailia location.

Treatments		First season 2003/2004									
		Fresh yield (ton/fed.)					Dry yield (ton/fed.)				
		Cut1	Cut2	Cut3	Cut4	Total	Cut1	Cut2	Cut3	Cut4	Total
a	a_1	2.524^d	2.714^d	2.936^c	2.467^b	10.641^d	0.546^d	0.330d	0.358^d	0.320^c	1.554^d
	a_2	3.162^c	3.318^c	3.045^c	2.630^b	12.155^c	0.756^c	0.418c	0.397^c	0.420^b	1.991^c
	a_3	3.793^b	4.086^b	3.905^b	3.224^a	15.008^b	0.951^b	0.543b	0.543^b	0.466^{ab}	2.502^b
	a_4	4.613^a	4.948^a	4.431^a	3.469^a	17.461^a	1.246^a	0.684a	0.642^a	0.512^a	3.086^a
F-Test		**	**	**	**	**	**	**	**	**	**
b	b_1	2.670^d	2.752^d	2.756^d	2.376^d	10.553^d	0.598d	0.332^d	0.339^d	0.322^d	1.591^d
	b_2	3.085^c	3.191^c	3.186^c	2.633^c	12.095^c	0.738c	0.392^c	0.418^c	0.382^c	1.930^c
	b_3	3.682^b	4.121^b	3.889^b	3.092^b	14.785^b	0.930b	0.547^b	0.525^b	0.442^b	2.443^b
	b_4	4.655^a	5.002^a	4.486^a	3.689^a	17.832^a	1.233a	0.706^a	0.659^a	0.570^a	3.168^a
F-Test		**	**	**	**	**	**	**	**	**	**
a_1	b_1	2.044	2.211	2.600	2.096	8.951	0.355	0.253	0.295	0.264	1.167
	b_2	2.148	2.316	3.068	2.298	9.830	0.452	0.275	0.361	0.275	1.383
	b_3	2.551	2.868	2.911	2.551	10.912	0.590	0.361	0.356	0.335	1.641
	b_4	3.323	3.460	3.165	2.921	12.870	0.788	0.430	0.420	0.385	2.023
a_2	b_1	2.423	2.324	3.535	2.159	9.441	0.585	0.277	0.302	0.330	1.494
	b_2	2.870	3.137	2.970	2.206	11.182	0.653	0.378	0.379	0.362	1.772
	b_3	3.397	3.670	3.010	2.845	12.931	0.823	0.464	0.405	0.436	2.131
	b_4	3.957	4.142	3.665	3.312	15.076	0.961	0.550	0.504	0.553	2.568
a_3	b_1	2.997	2.991	3.035	2.610	11.632	0.726	0.362	0.376	0.312	1.776
	b_2	3.408	3.347	3.213	2.836	12.805	0.826	0.414	0.447	0.415	2.102
	b_3	3.782	4.419	4.094	3.413	15.708	0.937	0.593	0.573	0.479	2.581
	b_4	4.986	5.586	5.279	4.035	19.887	1.315	0.805	0.775	0.657	3.552
a_4	b_1	3.215	3.480	2.853	2.640	12.188	0.726	0.437	0.382	0.384	1.929
	b_2	3.915	3.965	3.493	3.190	14.564	1.022	0.500	0.485	0.458	2.465
	b_3	4.969	5.528	5.541	3.560	19.598	1.369	0.766	0.764	0.521	3.420
	b_4	6.353	6.820	5.836	4.486	23.495	1.867	1.040	0.937	0.684	4.528
LSD 0.05		0.433	0.314	0.503	0.413	0.809	0.136	0.064	0.045	0.079	0.187

a= seeding rates (a_1= 20kg pure berseem, a_2= 20kg pure berseem + 8kg ryegrass, a_3= 20kg pure berseem + 10 kg ryegrass, a_4 = 20kg pure berseem + 12 kg ryegrass/fed.)
b= N- rates (b1= control, b2 =20 kg N/fed., b3 = 40 kg N/fed. , b4 = 60 kg N/fed.)

Table (3): Cont.

Treatments		Second season 2004/2005									
		Fresh yield (ton/fed.)					Dry yield (ton/fed.)				
		Cut_1	Cut_2	Cut_3	Cut_4	Total	Cut_1	Cut_2	Cut_3	Cut_4	Total
a	a1	2.772^{c}	3.739^{b}	3.948^{a}	3.427^{c}	13.886^{c}	0.545^{c}	0.819^{b}	0.891^{b}	0.812^{c}	3.067^{c}
	a2	2.731^{c}	4.069^{a}	4.231^{a}	3.794^{b}	14.824^{b}	0.562^{bc}	0.918^{a}	0.983^{a}	0.894^{b}	3.357^{b}
	a_3	3.068^{b}	4.198^{a}	4.169^{a}	3.810^{b}	15.245^{b}	0.608^{b}	0.955^{a}	0.987^{a}	0.904^{b}	3.454^{b}
	a_4	3.531^{a}	4.273^{a}	4.411^{a}	3.994^{a}	16.208^{a}	0.749^{a}	0.947^{a}	1.050^{a}	0.952^{a}	3.698^{b}
F-Test		**	*	NS	**	**	**	*	*	**	**
b	b_1	2.664^{c}	3.973^{b}	4.060^{a}	3.593^{a}	14.290^{c}	0.537^{c}	0.890^{a}	0.944^{a}	0.852^{a}	3.222^{c}
	b_2	3.006^{b}	4.069^{ab}	4.252^{a}	3.873^{a}	15.199^{ab}	0.617^{b}	0.914^{a}	0.991^{a}	0.916^{a}	3.437^{b}
	b_3	3.143^{ab}	4.048^{ab}	4.181^{a}	3.706^{a}	15.078^{b}	0.629^{b}	0.887^{a}	0.976^{a}	0.882^{a}	3.375^{b}
	b_4	3.289^{a}	4.190^{a}	4.265^{a}	3.852^{a}	15.595^{a}	0.681^{a}	0.947^{a}	1.001^{a}	0.913^{a}	3.541^{a}
F-Test		**	*	NS	NS	**	**	NS	NS	NS	**
a1	b_1	2.501	3.535	3.702	2.951	12.690	0.468	0.771	0.826	0.700	2.764
	b_2	2.735	3.885	4.486	3.769	14.874	0.542	0.835	1.014	0.886	3.276
	b_3	2.851	3.669	3.719	[illegible].302	13.540	0.570	0.807	0.837	0.786	3.000
	b_4	3.002	3.869	3.885	[illegible].685	14.441	0.600	0.863	0.886	0.877	3.226
a2	b_1	2.118	3.969	3.985	3.669	13.740	0.430	0.885	0.921	0.866	3.101
	b_2	2.785	3.985	3.885	3.952	14.607	0.579	0.897	0.893	0.929	3.298
	b_3	2.901	4.135	4.336	3.769	15.141	0.598	0.935	1.010	0.897	3.440
	b_4	3.118	4.185	4.719	3.785	15.208	0.639	0.954	1.109	0.885	3.587
a_3	b_1	2.868	4.135	4.169	3.769	14.941	0.574	0.935	0.980	0.889	3.377
	b_2	2.985	4.219	4.035	3.635	14.874	0.607	0.970	0.960	0.865	3.403
	b_3	3.135	4.102	4.269	3.869	15.374	0.569	0.935	1.008	0.921	3.432
	b_4	3.285	4.336	4.202	3.969	15.791	0.683	0.980	1.000	0.940	3.603
a_4	b_1	3.168	4.252	4.586	3.185	15.791	0.675	0.969	1.048	0.952	3.645
	b_2	3.518	4.185	4.604	4.135	16.442	0.639	0.954	1.095	0.984	3.773
	b_3	3.685	4.285	4.402	3.885	16.258	0.781	0.871	1.051	0.925	3.628
	b_4	3.752	4.369	4.752	3.969	16.342	0.799	0.992	1.008	0.949	3.748
LSD 0.05		NS	NS	0.574	NS	0.904	NS	NS	0.136	NS	0.203

a= seeding rates (a_1= 20kg pure berseem, a_2= 20kg pure berseem + 8kg ryegrass, a_3= 20kg pure berseem + 10 kg ryegrass, a_4 = 20kg pure berseem + 12 kg ryegrass/fed.)
b= N- rates (b1= control, b2 =20 kg N/fed., b3 = 40 kg N/fed. , b4 = 60 kg N/fed.)

1-2-Effect of nitrogen fertilizer rates on forage yield:

Regarding to the effect of different rates of N fertilizer on forage yield. Results in Table (3) showed significant differences between the different rates of N fertilizer on forage yields. This was true for all harvested cuts, and total forage yield in the first growing season also, in the first and second cut and total fresh forage yield in the second season at Ismailia location. The results in Table (3) showed that treatment 60 kg N/fed. gave the highest value of total fresh forage yield and total dry forage yield, while the control treatment gave the lowest values of total fresh and total dry forage yields. The increase in the total fresh forage yield amounted 68.97% of control in the first season and 9.13% of control in the second season. The response of the dry forage yield to the investigated N fertilizer rates followed the same previous trend of fresh forage yield in both the first and second seasons except the second cut in the second season, and the increase in the total dry forage yield amounted 98.68% of control in the first season and 9.90% of control in the second season.

Concerning the Nubaria location Table (4). Significant differences among the four treatments were recorded in the third cut and total fresh forage yield, while no significant differences among all studied treatments were recorded in the first, second and fourth cut in the first growing season and the treatment 60 kg N/fed. gave the highest value of total fresh forage yield (28.202 ton/fed.), while the control treatment gave the lowest value of total fresh forage yield (24.596 ton/fed.). In the second season, differences among all treatments reached to the level of significance except in the third cut, and the treatment 60 kg N/fed. gave the highest value of total fresh forage yield (39.051 ton/fed.), while the control treatment gave the lowest value of the total fresh forage yield (32. 725ton/fed).

With respect to dry forage yield at Nubaria location, results in Table (4) showed significant differences between the studied rates of nitrogen fertilizer on dry forage yield in the third and fourth cuts and total dry forage yield, while differences in the first and second cuts did not reach the significance level in the first season, and the treatment 60 kg N/fed. gave the highest value of total dry forage yield (3.333 ton/fed.), while the control treatment gave the lowest value (2.908 ton/fed.). In the second season , differences reached to the level of significant in the first, second and fourth cuts and total dry forage yield, while no significant differences were recorded in the third cut. The treatment of 60 kg N/fed. gave the highest value of total dry forage yield (6.365 ton/fed.), while the control treatment gave the lowest value (5.216 ton/fed.).

These results confirm the finding of Parsons (1958), Sprague and Garber (1950) and Washko and Pannington (1956) that concluded from their investigations that yield increased due to nitrogen application has been influenced by the amount of grass in the mixture. The greater the proportion of grass, the greater the yield increase from applied nitrogen. Addition of nitrogen usually had increased the competitive ability of the grass and had decreased the proportion of legume in the mixture.

Nitrogen application has a significant effect on increasing the yield of the mixture, although it reduced the yield of berseem. The reduction in yield of berseem may be due to the fact that nitrogen fixing bacteria tend to cease fixation in the presence of large amounts of available nitrogen as found by Woodhouse *et al.*, (1958). In the main time, the plant must still fulfill its nitrogen requirements by drawing upon the nitrogen supply of the soil. Pasture legumes usually contain about twice as much nitrogen per ton of dry hay as grass. So, legumes may, in fact deplete reserves of soil nitrogen faster than grasses and cereals. Therefore the reduction in the yield of berseem may be due to the shortage of available nitrogen in the soil after it has been depleted.

1-3- Effect of seeding and N fertilizer rates interaction on forage yield:

The data presented in Table (3) demonstrate the effect of the above interaction on fresh and dry forage yields in the four harvested cuts as well as the total fresh and dry forage yields of the studied treatments in the two growing seasons at Ismailia and Nubaria locations. Generally, the fresh and dry forage yields of the studied treatments under investigation were increased as the amount of ryegrass seeding rate and N fertilization rates increased and consequently these increases reflected on the total fresh and dry forage yields in the two growing seasons. Under Ismailia location, the effect of N fertilizer and ryegrass seeding rates interaction on total fresh (ton/fed.) and total dry (ton/fed.) forage yields were statistically significant as shown in Table (3).Therefore, the highest values fore total fresh forage yield (23.495 ton/fed.) and total dry forage yield (4.528 ton/fed.) were obtained from using 12 kg ryegrass when fertilized by 60 kg N/fed in the first season. In the second season, significant differences recorded in the third cut and total fresh and dry forage yields only, and no significant differences were recorded in the first, second and fourth cuts. The highest values for total fresh forage yield (16.442ton/fed.) and total dry forage yield (3.773ton/fed.) were obtained from mixing 12 kg ryegrass seeds in the mixture and fertilized by 60 kg N/fed.

Concerning the interaction effect of nitrogen fertilizer and ryegrass seeding rates on both fresh and dry forage yields in the four harvested cuts as well as the total fresh and dry forage yields at Nubaria location (Table 4) showed insignificant differences for fresh forage yield in the four harvested cuts as well as the total fresh forage yield in the two growing seasons. With respect to dry forage yield, the results in Table (4) indicated significant differences in the second and third cuts only in the first season, and no significant differences were recorded in the second season.

2-Forage quality:

2-1-Chemical composition:

Means of CP, CF and ash % of a berseem- ryegrass mixture was affected by ryegrass seeding rates and N fertilizer rate shown in Table (5). Significant differences were detected in CP, CF and ash% in the four cuts in the first season at Ismailia location.

ffect of seeding, N fertilizer rates and their interaction on fresh and dry forage yields (ton/fed.) of berseem-ryegrass mixtures at Nubaria location.

	First season 2003/2004									
s	Fresh yield (ton/fed.)					Dry yield (ton/fed.)				
	Cut_1	Cut_2	Cut_3	Cut_4	Total	Cut_1	Cut_2	Cut_3	Cut_4	Total
	5.148a	8.390a	8.192a	3.846a	25.575a	0.439a	0.869a	1.130a	0.538a	2.976a
	5.294a	9.192a	8.650a	4.117a	27.253a	0.448a	0.900a	1.269a	0.610a	3.227a
	4.356a	8.775a	8.546a	3.929a	25.607a	0.377a	0.779a	1.204a	0.562a	2.922a
	5.378a	9.150a	8.046a	3.856a	26.430a	0.453a	1.092a	1.068a	0.523a	3.137a
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	4.950a	8.285a	7.566b	3.794a	24.596b	0.441a	0.851a	1.073b	0.544b	2.908b
	4.836a	8.921a	8.067b	3.512a	25.336b	0.405a	0.839a	1.091b	0.480b	2.815b
	5.346a	8.859a	8.504ab	4.023a	26.732ab	0.461a	1.052a	1.142b	0.550b	3.206a
	5.044a	9.442a	9.296a	4.419a	28.202a	0.410a	0.899a	1.365a	0.658a	3.333a
	NS	NS	*	NS	*	NS	NS	*	*	**
	5.836	8.546	8.171	3.252	25.805	0.518	0.984	1.186	0.479	3.167
	4.836	7.837	7.921	3.502	24.095	0.419	0.800	1.103	0.491	2.812
	5.920	7.004	8.004	4.210	25.138	0.487	0.598	1.184	0.630	2.899
	4.002	10.172	8.671	4.419	27.264	0.331	1.094	1.047	0.552	3.024
	5.086	9.338	6.920	4.002	25.346	0.461	0.986	1.037	0.602	3.086
	4.919	9.171	8.087	3.377	25.555	0.415	0.884	1.023	0.429	2.750
	5.336	10.005	9.338	4.502	29.181	0.445	0.955	1.343	0.658	3.402
	5.836	8.254	10.255	4.586	28.931	0.470	0.776	1.671	0.753	3.669
	4.336	7.671	7.087	4.002	23.095	0.377	0.655	0.991	0.563	2.586
	4.294	8.754	8.171	3.335	24.554	0.356	0.701	1.108	0.464	2.629
	4.544	8.338	8.588	3.794	25.263	0.430	0.884	1.195	0.532	3.041
	4.252	10.339	10.339	4.586	29.515	0.345	0.876	1.524	0.687	3.431
	4.544	7.587	8.087	3.919	24.137	0.407	0.777	1.076	0.532	2.792
	5.294	9.922	8.087	3.835	27.139	0.429	0.969	1.131	0.538	3.067
	5.586	10.088	8.087	3.585	27.347	0.483	1.771	0.847	0.381	3.481
	6.086	9.005	7.921	4.085	27.097	0.494	0.852	1.219	0.642	3.207
	NS	NS	NS	NS	NS	NS	0.345	0.321	NS	NS

s (a_1= 20kg pure berseem, a_2= 20kg pure berseem + 8kg ryegrass, a_3= 20kg pure berseem + 10 kg ryegrass, a_4 = 20kg pure berseem + 12 kg ryegrass/fed.)
(b1= control, b2 =20 kg N/fed., b3 = 40 kg N/fed. , b4 = 60 kg N/fed.)

ble(4) Cont

Treatments		Second season 2004/2005									
		Fresh yield (ton/fed.)					Dry yield (ton/fed.)				
		Cut$_1$	Cut$_2$	Cut$_3$	Cut$_4$	Total	Cut$_1$	Cut$_2$	Cut$_3$	Cut$_4$	Te
a	a1	6.430a	11.777a	9.442b	6.034a	33.684b	0.750a	1.486a	1.934b	1.429a	5.5
	a2	6.774a	12.016a	10.547a	6.472a	35.810b	0.796a	1.469a	2.134ab	1.444a	5.8
	a$_3$	7.035a	11.850a	10.599a	6.393a	35.876ab	0.822a	1.496a	2.151ab	1.332a	5.8
	a$_4$	7.222a	13.365a	11.568a	6.316a	38.471a	0.843a	1.594a	2.287a	1.368a	6.0
F-Test		NS	NS	*	*	NS	NS	NS	*	NS	N
b	b$_1$	6.086c	11.224b	9.922a	5.492b	32.725d	0.714c	1.347c	2.024a	1.132c	5.2
	b$_2$	6.566bc	12.019b	10.328a	6.232a	35.145c	0.762bc	1.444bc	2.089a	1.370b	5.6
	b$_3$	7.295ab	12.362ab	10.672a	6.591a	36.921b	0.853ab	1.561ab	2.175a	1.500ab	6.0
	b$_4$	7.514a	13.403a	11.235a	6.899a	39.051a	0.882a	1.693a	2.219a	1.570a	6.3
F-Test		**	*	NS	*	**	**	**	NS	**	*
	b$_1$	5.419	10.589	9.171	5.044	30.223	0.620	1.343	1.856	1.271	5.
	b$_2$	5.711	11.589	9.588	6.295	33.183	0.667	1.484	1.914	1.446	5.
	b$_3$	7.337	11.673	9.588	6.337	34.934	0.846	1.490	1.988	1.438	5.
	b$_4$	7.254	13.257	9.421	6.462	36.393	0.867	1.628	1.979	1.560	6.
	b$_1$	5.711	11.047	9.755	6.003	32.516	0.674	1.339	2.066	1.136	5.
	b$_2$	6.712	11.589	10.422	6.295	35.018	0.790	1.376	2.086	1.426	5.
	b$_3$	7.295	12.006	10.672	6.587	36.560	0.868	1.418	2.156	1.638	6.
	b$_4$	7.379	13.423	11.339	7.004	39.145	0.853	1.742	2.226	1.575	6.
	b$_1$	6.462	10.422	9.963	5.670	32.516	0.752	1.227	2.018	1.079	5.
	b$_2$	6.795	12.006	10.172	6.086	35.059	0.792	1.418	2.042	1.299	5.
	b$_3$	7.170	12.340	10.422	6.603	36.535	0.843	1.653	2.154	1.434	6.
	b$_4$	7.712	12.631	11.839	7.212	39.395	0.901	1.686	2.392	1.514	6.
	b$_1$	6.753	12.840	10.797	5.253	35.643	0.809	1.479	2.154	1.041	5.
	b$_2$	7.045	12.890	11.131	6.253	37.319	0.797	1.498	2.313	1.309	5.
	b$_3$	7.379	13.432	12.006	6.837	39.653	0.856	1.682	2.402	1.491	6.
	b$_4$	7.712	14.299	12.340	6.920	41.271	0.908	1.718	2.280	1.631	6.
LSD 0.05		NS	NS	NS	NS	NS	NS	NS	NS	NS	N

eding rates (a$_1$= 20kg pure berseem, a$_2$= 20kg pure berseem + 8kg ryegrass, a$_3$= 20kg pure berseem + 10 kg ryegrass, a$_4$ = 20kg pure berseem + 12 kg ryegrass/fed.)

- rates (b1= control, b2 =20 kg N/fed., b3 = 40 kg N/fed. , b4 = 60 kg N/fed.)

2-1-1-Effect of seeding rates:

Results in Table (5) revealed that CP, CF and ash % were significantly affected by studied seeding rates. This was true for all harvested cuts in the first season at Ismailia location. It is obvious that the treatment of 20 kg berseem seed + 8 kg ryegrass seed gave the highest values in CP and ash as an averaged over all cuts which gave 20.26 and 12.58 %, respectively. While the same treatment gave the lowest value in CF 24.07 %.

These results confirm with those obtained by Ibrahim *et al.*, (1978). who reported that interseeding ryegrass with berseem increased the percentage of crude protein.

2-1-2-Effect of N fertilizer:

The patterns of CP, CF and ash % as affected by the studied rates of N fertilizer are furnished in Table (5). The analysis of variance showed significant differences between the different treatments in CP, CF and ash %. Also the data presented in the same table indicate that the treatment of 60 kg N/fed. gave the highest value of CP (20.54 %) and ash (12.63 %), while the same treatment gave the lowest value in CF (24.10 %).

These results confirm the finding of Peterson and Bendixin (1961) which revealed that protein content of berseem/ryegrass mixtures was increased by adding nitrogen fertilizer.

2-1-3-Effect of seeding and N fertilizer rates interaction on chemical composition:

The data presented in Table (5) demonstrate the effect of the above interaction on the forage quality. As general, results revealed that the percentage of crude protein and ash were increased as the amount of N fertilization rates increased and ryegrass seeding rates decreased, while the crude fiber showed the opposite trend. Seeding rates × N fertilizer interaction was significant for CP, CF and ash % as shown in table (5). It is clear from the same table that the highest CP (21.65 %) and ash (13.04 %) were recorded from 8 kg/fed. ryegrass seeding rate with nitrogen application of 60 kg/fed., while the same treatment gave the lowest value in CF (22.53%).

2-2- Nitrate nitrogen accumulation:

2-2-1- Effect of seeding rates:

The results in Table (6) showed that the tested treatments exhibited significant differences regarding the nitrate nitrogen accumulation in the means of the four taken cuts in the first season of Ismailia location. It could be noticed that the treatment of 20 kg berseem + 12 kg ryegrass contained the highest level of nitrate nitrogen (147.10 ppm), while the pure stand of berseem treatment gave the lowest level (41.6 ppm). Data available in the literature about these influence of seeding rate on nitrate content of forages are very little. Crawford *et al.*, (1961) mentioned that oats and ryegrass accumulated different quantities of nitrate.

Table (5): Effect of seeding, N fertilizer rates and their interaction of berseem ryegrass mixtures on chemical composition at Ismailia locat

Treatments		Chemical Composition (%)													
		CP %					CF %					Ash %			
		Cut_1	Cut_2	Cut_3	Cut_4	Mean	Cut_1	Cut_2	Cut_3	Cut_4	Mean	Cut_1	Cut_2	Cut_3	Cut_4
a	a1	21.13^{a}	19.11^{b}	18.35^{c}	19.20^{c}	19.45^{b}	23.80^{c}	26.05^{b}	26.78^{a}	25.70^{b}	25.58^{b}	12.70^{a}	12.15^{c}	11.99b^{c}	11.96^{b}
	a2	20.69^{b}	19.71^{a}	19.98^{a}	20.65^{a}	20.26^{a}	23.06^{d}	24.64^{d}	24.62^{d}	23.95^{c}	24.07^{d}	12.73^{a}	12.62^{b}	12.77^{a}	12.21^{a}
	a_3	19.60^{d}	17.60^{c}	18.74^{b}	20.13^{b}	19.02^{c}	25.05^{a}	26.70^{c}	25.27^{c}	24.00^{c}	25.26^{c}	12.15^{b}	12.60^{a}	11.85^{c}	12.32^{a}
	a_4	20.15^{c}	19.14^{b}	17.76^{d}	17.23^{d}	18.57^{d}	24.47^{b}	25.22^{a}	26.14^{b}	27.30^{a}	25.78^{a}	11.75^{c}	12.67^{a}	12.10^{b}	11.77^{c}
F-Test		**	**	**	**	**	**	**	**	**	**	**	**	**	**
b	b_1	18.53^{d}	16.97^{d}	17.89^{c}	17.51^{d}	17.72^{d}	24.76^{b}	27.76^{a}	26.05^{a}	26.94^{a}	26.38^{a}	12.09^{c}	11.68^{d}	11.94^{d}	11.33^{d}
	b_2	19.89^{c}	18.75^{c}	18.75^{b}	19.39^{c}	19.20^{c}	24.95^{a}	25.71^{b}	26.05^{a}	25.11^{b}	25.46^{b}	12.03^{c}	12.17^{c}	12.46^{a}	11.55^{c}
	b_3	21.11^{b}	19.63^{b}	18.79^{b}	19.82^{b}	19.84^{b}	23.69^{c}	24.95^{c}	25.55^{b}	24.86^{c}	24.76^{c}	12.33^{b}	12.43^{b}	12.21^{b}	12.61^{b}
	b_4	22.04^{a}	20.21^{a}	19.40^{a}	20.49^{a}	20.54^{a}	22.97^{d}	24.18^{d}	25.17^{c}	24.05^{d}	24.10^{d}	12.88^{a}	12.76^{a}	12.10^{c}	12.77^{a}
F-Test		**	**	**	**	**	**	**	**	**	**	**	**	**	**
a_1	b_1	19.72	18.15	17.70	18.51	18.52	22.79	27.59	27.65	26.35	26.09	12.13	11.75	11.50	11.52
	b_2	20.04	18.49	17.94	18.90	18.84	23.15	26.78	27.90	26.14	25.99	12.68	11.90	11.91	11.70
	b_3	21.90	19.66	18.28	19.52	19.84	23.88	25.15	26.47	25.29	25.20	12.22	12.15	12.18	12.45
	b_4	22.85	20.16	19.48	19.87	20.59	25.38	24.69	25.13	25.04	25.06	13.78	12.78	12.39	12.16
a_2	b_1	18.75	17.48	18.80	19.11	18.54	25.33	26.69	26.29	25.91	26.05	12.96	12.20	12.19	11.50
	b_2	19.88	19.10	19.50	20.84	19.84	24.08	24.86	24.90	23.80	24.41	11.69	12.44	13.07	11.67
	b_3	21.42	20.61	20.71	21.29	21.00	22.40	24.12	23.24	23.39	23.28	12.80	12.85	13.31	12.47
	b_4	22.73	21.65	20.88	21.35	21.65	20.45	22.88	24.06	22.72	22.53	13.48	12.97	12.50	13.21
a_3	b_1	17.39	15.73	19.50	16.26	17.22	25.29	29.07	22.19	27.61	26.04	12.84	9.82	11.87	11.28
	b_2	18.50	17.77	20.73	20.51	19.63	27.44	26.38	23.90	23.21	25.23	11.91	11.64	12.53	11.45
	b_3	20.59	18.17	17.10	20.91	19.19	24.10	26.05	27.10	23.59	25.21	11.74	12.24	11.44	13.21
	b_4	20.91	18.72	17.64	22.87	20.03	23.36	25.32	27.91	21.60	24.54	12.11	12.71	11.56	13.36
a_4	b_1	18.27	16.52	15.57	16.15	16.63	25.66	27.69	28.07	27.91	27.33	10.48	12.95	12.20	11.04
	b_2	20.13	19.66	16.80	17.33	18.48	25.16	24.83	27.51	27.28	26.19	11.84	12.68	12.33	11.38
	b_3	20.54	20.07	19.06	17.57	19.31	24.37	24.51	25.40	27.16	25.36	12.57	12.48	11.92	12.30
	b_4	21.68	20.31	19.61	17.90	19.87	22.71	23.86	23.61	21.86	24.26	12.18	12.58	11.96	12.37
LSD 0.05		0.217	0.154	0.137	0.154	0.097	0.154	0.168	0.154	0.248	0.097	0.137	0.097	0.154	0.137

a= seeding rates (a_1= 20kg pure berseem, a_2= 20kg pure berseem + 8kg ryegrass, a_3= 20kg pure berseem + 10 kg ryegrass, a_4 = 20kg pure berseem + 12 kg ryegrass/fed.)
b= N- rates (b1= control, b2 =20 kg N/fed., b3 = 40 kg N/fed. , b4 = 60 kg N/fed.)

6): Effect of seeding, N fertilizer rates and their interaction of berseem ryegrass mixtures on nitrate nitrogen and Ca/P ratio at Ismailia location.

nts	Nitrate nitrogen (ppm)					Ca/P ratio				
	Cut1	Cut2	Cut3	Cut4	Mean	Cut1	Cut2	Cut3	Cut4	Mean
a1	34.78[d]	47.31[d]	63.08[d]	21.25[d]	41.61[d]	6.03[a]	6.25[a]	7.30[a]	6.92[a]	6.62[a]
a2	49.51[c]	51.85[c]	66.15[c]	27.22[c]	48.68[c]	4.19[d]	4.99[c]	5.42[b]	5.65[b]	5.07[b]
a3	60.66[b]	63.61[b]	59.72[b]	48.87[b]	57.97[b]	4.62[b]	5.12[b]	4.92[d]	5.31[c]	4.99[c]
a4	130.60[a]	158.00[a]	191.60[a]	108.10[a]	147.10[a]	4.49[c]	5.13[b]	4.97[c]	5.23[c]	4.96[c]
st	**	**	**	**	**	**	**	**	**	**
b1	60.69[d]	69.62[d]	85.00[a]	41.22[d]	64.13[d]	5.50[a]	6.15[a]	6.34[a]	6.36[a]	6.08[a]
b2	67.68[c]	80.74[c]	90.33[b]	52.33[c]	72.77[b]	5.00[b]	5.69[b]	6.18[b]	6.15[b]	5.76[b]
b3	72.08[b]	83.54[b]	99.82[c]	53.39[b]	77.21[c]	4.54[c]	5.14[c]	5.33[c]	5.65[c]	5.17[c]
b4	75.07[a]	86.91[a]	105.40[d]	57.46[a]	81.21[a]	4.31[d]	4.52[d]	4.76[d]	4.93[d]	4.63[d]
st	**	**	**	**	**	**	**	**	**	**
b1	32.06	44.43	60.33	20.29	39.28	7.08	6.75	8.39	7.06	7.32
b2	32.51	45.76	61.73	20.83	40.21	6.54	6.52	8.21	7.05	7.08
b3	36.16	48.57	62.72	21.44	42.22	5.47	6.05	6.48	7.31	6.32
b4	38.41	50.47	67.57	22.45	44.72	5.06	5.69	6.15	6.26	5.79
b1	43.78	44.52	61.86	24.90	43.77	4.76	5.63	6.06	5.96	5.60
b2	47.15	49.84	64.60	27.49	47.27	4.30	5.39	5.72	5.86	5.32
b3	51.72	54.77	68.44	27.75	50.67	4.07	4.39	5.72	5.86	5.32
b4	55.38	58.28	69.68	28.74	53.02	3.64	4.58	4.50	5.27	4.49
b1	53.47	52.78	48.35	44.33	49.73	4.84	5.95	5.55	6.12	5.61
b2	60.69	66.24	56.44	48.33	57.98	4.60	5.40	5.33	5.88	5.30
b3	62.22	67.27	65.90	48.63	61.00	4.44	5.18	4.74	4.94	4.82
b4	66.07	68.14	68.21	50.19	63.15	4.62	3.96	4.07	4.31	4.24
b1	113.50	136.80	169.40	75.37	123.80	5.31	6.27	5.36	6.31	5.82
b2	130.20	161.10	178.60	112.70	145.60	4.57	5.46	5.47	5.82	5.33
b3	138.20	163.60	202.20	115.70	154.90	4.15	4.95	4.72	4.84	4.67
b4	140.40	170.70	216.20	128.40	164.00	3.92	3.84	4.35	3.90	4.00
.05	**0.32**	**0.32**	**0.23**	**0.20**	**0.20**	**0.14**	**0.11**	**0.14**	**0.11**	**0.07**

rates (a_1= 20kg pure berseem, a_2= 20kg pure berseem + 8kg ryegrass, a_3= 20kg pure berseem + 10 kg ryegrass, a_4 = 20kg pure berseem + 12 kg ryegrass/fed.)

(b1= control, b2 =20 kg N/fed., b3 = 40 kg N/fed. , b4 = 60 kg N/fed.)

2-2-2-Effect of N fertilizer rates:

Concerning to the effect of nitrogen fertilization on nitrate nitrogen, the data presented in Table (6) indicated that the values of nitrate ranged from 64.13 to 81.21ppm. It could be noticed that the treatment of 60 kg N/fed. gave the highest level of nitrate nitrogen (81.21 ppm), while the control treatment gave the lowest level (64.13 ppm).

Crawford *et al.*, (1961) reported that forage in the application of nitrogen fertilizer increased the nitrate content in the plants. The amount of nitrate in plant depended upon the stage and the availability of nitrogen in the soil. A though higher of nitrate were found to accumulate with increasing rates of nitrogen fertilization. These may be due to that nitrate anion is formed by the oxidation nitrogen of the fertilizer.

2-2-3-Effect of seeding and N fertilizer rates interaction on nitrate nitrogen accumulation:

The data presented in table (6) demonstrate the effect of the above interaction on nitrate nitrogen accumulation. As general, results revealed that nitrate nitrogen was increased as the amount of nitrogen fertilization and ryegrass seeding rates increased. According to the data presented in Table (6) it appears that the highest nitrate nitrogen level (164.0 ppm) was produced by 20 kg berseem + 12 kg ryegrass seeding rates with nitrogen application at the rate of 60 kg N/fed.

Although the results revealed that the highest nitrate nitrogen (164.0 ppm) produced by using 20 kg berseem + 12 kg ryegrass seeding rates with nitrogen application at the rate of 60 kg N/fed. it should be considered virtually saved for ruminant. Peter (2002) reported that the forage which contain from 0 - 3000 ppm nitrate they should be virtually save but if contain more than 6000 ppm nitrate they should be considered potentially toxic.

2-3-Calcium/ Phosphorus ratio:

2-3-1- Effect of seeding rates:

Results in Table (6) revealed that Ca/P ratio was significantly affected by the studied seeding rates. This was true for all harvested cuts in the first season at Ismailia location. It is obvious that the pure stand of berseem treatment gave the highest value in Ca/P ratio as average over all cuts which gave 6.62. While the treatment of 20 kg berseem + 12 kg ryegrass seed gave the lowest value (4.96).

Abou-Raya and Ibrahim (1974) reported that Calcium and Phosphorus contents in clover were somewhat higher than in clover-ryegrass mixture and Ca/P ratio relatively wide when compared with the optimum ratio recommended in feeding (1.5 - 2 :1).

2-3-2-Effect of N fertilizer:

Concerning to the effect of nitrogen fertilization on Ca/P ratio, the data presented in Table (6) indicated that the values of Ca/P ratio ranged from 4.63 to 6.08. It could be noticed that the control treatment gave the highest ratio of Ca/P (6.08), while the treatment of 60 kg N/ fed. gave the lowest ratio (4.63).

2-3-3-Effect of seeding and N fertilizer rates interaction on Ca/P ratio:

The data presented in table (6) demonstrate the effect of the above interaction on Ca/P ratio. As general, results revealed that Ca/P ratio was decreased as the amount of nitrogen fertilization and ryegrass seeding rates increased. According to the data presented in table (6) it appears that the highest ratio of Ca/P (7.32) was recorded from using berseem pure stand with no addition of nitrogen.

CONCLUSION

Total yield, quality of forage may be greater importance to the livestock producer. Growing berseem with ryegrass yield is balanced through the growing season. Besides, all mixtures were given a balanced feed for animals through the growing season. However; 20 kg berseem + 12 kg ryegrass/fed. mixture can be given maximum forage yield under condition of sandy soil .

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تأثير معدلات التقاوي و التسميد الازوتي على حاصل العلف و نوعيته في مخلوط البرسيم و الراي جراس.

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أجري هذا البحث بهدف دراسة تأثير معدل التقاوي و التسميد الأزوتي على حاصل العلف و نوعيته في مخلوط البرسيم و الراي جراس بمحطتي البحوث الممثلة لشرق الدلتا (الأسماعيلية) و شمال غرب الدلتا (النوبارية) خلال موسمي ٢٠٠٣/٢٠٠٤ و ٢٠٠٤/ ٢٠٠٥ .

و قد أظهرت النتائج وجود اختلافات معنوية في حاصل العلف الأخضر و الجاف الكلي نتيجة استخدام المعدلات المختلفة من تقاوي الراي جراس و كذلك التسميد الأزوتي في الأسماعيلية في الموسميين الأول و الثاني على التوالي.بينما لم يتم تسجيل فروق معنوية في حاصل العلف الأخضر الكلي والحاصل الجاف الكلي في النوبارية في الموسميين الأول و الثاني على التوالي.

تأثر حاصل المخلوط معنويا بالمعدلات المختلفة من تقاوي الراي جراس و التسميد الأزوتي و بصفة عامة فأن أعلى حاصل كلي تم الحصول عليه بأستخدام معدل تقاوي ٢٠ كجم برسيم / فدان مع ١٢ كجم راي جراس / فدان و بأضافة ٦٠ كجم/ فدان سماد أزوتي. بينما أعلى نسبة منوية من البروتين الخام و الرماد و أقل نسبة من الألياف الخام تم الحصول عليها بأستخدام معدل تقاوي ٢٠كجم برسيم / فدان مع ٨ كجم راي جراس / فدان.و بصفة عامة كانت أعلى نسبة من الكالسيوم للفوسفور للبرسيم المنفرد وأقل نسبة من الكالسيوم للفوسفور بأستخدام معدل تقاوي ٢٠ كجم برسيم/ ف مع ١٢ كجم راي جراس/ فدان و بأضافة ٦٠ كجم سماد أزوتي / ف. بينما اعلى مستوى من النترات المتراكمة تم الحصول عليها بأستخدام معدل تقاوي ٢٠كجم برسيم / فدان مع ١٢ كجم راي جراس / فدان و بأضافة ٦٠ كجم سماد أزوتي / فدان.