Scientific Journal of Agricultural Sciences 4 (1): 92-101, 2022
Print (ISSN 2535-1796) / Online (ISSN 2535-180X) DOI: 10.21608/sjas.2022.123839.1199

Effect of fertilization treatments on yield and its quality of some forage crops in sandy soils

Atta, A.R.; EL-Hawary, M.A.; EL-Sayed, M.A.; and E.M.; Abd EL-Kader

Agronomy. Dep., Fac. of Agric, Cairo, Al. Azhar, Univ.

Received on: 24-2-2022 **Accepted on: 26-3-2022**

ABSTRACT

Two field experiments were conducted at farm of Fac. Agric., Al-Azhar Univ., Sadat Branch, at Menoufia Governorate, Egypt. during 2020 and 2021seasons. The investigation aimed to study the effect of thirteen fertilization treatments i.e. control (0), N at a rate of 30 and 45 kg N /cut, P at a rate of 7.75 and 12.92 kg P_2O_5 /cut and K at a rate of 16.67 kg K_2O /cut and their combination on growth, fodder yield and its quality of two forage crops i.e. sudan grass var. Giza-2 and single hybrid sorghum "Mabrok" in sandy soil condition. The obtained results showed that Single hybrid sorghum "Mabrok" surpassed Sudan grass in plant fresh weight, protein percentage and fodder yield/feddan in both seasons. Application of 45 kg N + 12.92 kg P_2O_5 + 16.67 kg K_2O/cut gave the highest values of all studied characters as compared with the tested other fertilization treatments in both seasons. Fertilized Single hybrid sorghum "Mabrok" with of 45 kg N + 12.92 kg P_2O_5 + 16.67 kg K_2O/cut gave the highest values of plant fresh weight, protein percentage and fodder yield/feddan as compared with other tested treatments in both seasons.

KEYWORDS: Forage sorghum, nitrogen, phosphorus, potassium, sudan grass, crude protein.

1. INTRODUCTION

Nowadays, Egypt faces a great problem concerned with the lake of summer forage production. The shortage of green fodder quantity is caused by the highest competition between main summer crops i.e. cotton, com and rice. Therefore, increasing forage production is necessary to meet demands of animals. These increase in forage productivity is like to be achieved by increasing the area, quantity and quality of forage crops in the new reclaimed areas.

One of the approaches to increase forage production is by sowing adequate forage crops. Mabrouk single hybrid sorghum (*Sorghum. bicolor* L.) Moench) x Sudan grass (*Sorghum sudanense* (Piper) Stapf, cv. Mabrok) is important summer forage crop in Egypt. Among summer forage crops, multi cut mabrok is an important one that processes a wide range of ecological adaptability because of its xerophytes characteristics. Sudan grass is a promising summer forage crop essentially in arid and semiarid regions as it is less sensitive to water shortage and produces large amounts of biomass. Abd-Elbakheit (2007) found that Abu Sabein produced 32% higher yield compared to Sudan grass. Osman (2015) showed that Abu sabein gave the highest fresh weight, whereas Sudan grass showed good for plant height. Gulumser and Mut (2016), Aneto and Bovital hybrids (Sorghum x Sudan grass hybrids) were superior in plant height compared to sudan grass. Ibrahim *et. al*. (2016) indicated that Sudan grass was superior in fresh weight /plant, fresh forage yield /fad, compared to sweet sorghum. Mut *et. al*. (2017) studied the effect of different level of nitrogen fertilizer on sudan grass (Gozde-80) and two sorghum x sudan grass hybrids (Aneto and Bovital). They found that the highest crude protein ratio was recorded with Bovital (14.49%) and Aneto (14.02%) hybrids compared with the sudan grass.

Applied the optimum agricultural practices such as improved soil fertility by applied inorganic fertilizer such as nitrogen, phosphorus and potassium fertilizers in the new reclaimed areas considered an important way to increase the forage productivity to face the gape of fodder forage. Nitrogen is an important constituent of promotes vegetative growth, rapid early growth and improves the quality and biomass production by increasing the protein content and dry matter yield of fodder crops. Phosphorus gradually increase plant height, stem diameter, number of leaves and leaf area per plant and fodder yield. Azam *et. al*. (2010) found that there was a gradual increase in crude protein and green fodder yield of sorghum variety (F-9917) with the application of NPK fertilizer at 80-50-25 kg ha^{-1}. Hussein and Alva (2014) in Egypt recorded that the crop fertilized with 100 N + 50 P_2O_5 + 50 K_2O kg ha^{-1} significantly increased content of crude protein of single cut genotype (SPH 1752). Patil *et. al*. (2018) showed that plant height of fodder sorghum (cv. CoFS-29) was higher significantly in plots

fertilized with 150:60:40 kg NPK/ha as compared to other fertilizer levels. Aditi *et. al*. (2019) showed that application of 80:40:0 kg NPK/ha significantly registered maximum green and dry fodder yield and plant height of fodder sorghum. Astuti *et. al*. (2020) revealed that NPK fertilization significantly increased plant height of fodder sorghum compared to those without NPK fertilization. Brima and Abusuwar (2020) revealed that adding (N17 P17 K17) with 120 or 240 kg/ha significantly increased forage fresh, dry yield and crude protein of Rhodes grass. Singh *et. al*. (2021) showed that application of nitrogen at 120 kg N ha^{-1} maximized plant height, fresh weight, green fodder production and crude protein of Sudan grass.

This investigation was carried out to study the effect of nitrogen, phosphorus and potassium fertilizers and their combinations on growth and yield of sudan grass and Mabrok single hybrid of forage (*S. bicolor L* .x Sudan grass) under sandy soil condition at Sadat city, Menoufia Governorate, Egypt.

2. MATERIALS AND METHODS

Two field experiments were carried out in sandy clay soil under drip irrigation at farm of Faculty of Agriculture, Al-Azhar University, Sadat Branch, at Menoufia Governorate, Egypt. During summer seasons 2020 and 2021. The investigation aimed to study the effect of nitrogen, phosphorus and potassium fertilizers and their combination treatments on growth, fodder yield and quality of sudan grass and single hybrid sorghum (Mabrok). Mechanical and chemical analysis at the experimental soil in 2020 and 2021 seasons according to Page *et al* (1982) are shown in Table 1.

Table1. Mechanical and chemical analysis of the experimental soil in 2020 and 2021 seasons.

Parameters	Seasons	
	2020	2021
Mechanical analysis		
Find Sand (%)	42.75	45.60
Coarse Sand (%)	19.45	14.35
Silt (%)	21.47	25.31
Clay (%)	16.33	14.74
Soil texture class	Sand clay	
Chemical analysis		
Soil Ph	8.47	7.79
Available N (ppm)	28.35	34.12
Available p (ppm)	9.94	11.30
Available k (ppm)	357	315

The experiment treatments were as follows:

A. Forage crop :

The following **t**wo forage crops were studied:

1- Sudan grass (*S. sudanense (Piper*), cv.Giza 2
2- Single hybrid sorghum (*S. bicolor L*.) Moench) x Sudan grass (*S. sudanense (Piper*) , cv. Mabrok

The seeds of sudden grass were obtained from Forage Research Department، Agricultural Research Center, Geza, Egypt, on the other, hand seeds of single hybrid sorghum (Mabrouk) obtained from Hi-tech Company. Seeds of the two forage crops were hand sown in rows spaced 40 cm on 15th and16 th April in 2020 and 2021 seasons, respectively.

B. Fertilization treatments:

The following thirteen fertilization treatments were applied at three cuts as follows:

Thirteen fertilization treatments were applied i.e. (1)-Control (without added any fertilization), (2)-30 kg N/cut, (3)-30 kg N/cut + 16.67 kg K_2O/ cut ,(4)-30 kg N/cut + 7.75 kg P_2O_5/ cut, (5)-30 kg N/cut + 12.92 kg P_2O_5/ cut , (6)-30 kg N/cut + 7.75 kg P_2O_5/ cut + 16.67 kg K_2O/ cut, (7)-30 kg N/cut + 12.92 kg P_2O_5/ cut + 16.67 kg K_2O/ cut, (8)- 45 kg N/cut , (9)-45 kg N/cut + 16.67 kg K_2O/ cut, (10) - 45 kg N/cut + 7.75 kg P_2O_5/ cut, (11)- 45 kg N/ cut + 12.92 kg P_2O_5/ cut, (12)-45 kg N/cut + 7.75 kg P_2O_5/ cut + 16.67 kg K_2O/ cut and (13)- 45 kg N/cut + 12.92 kg P_2O_5/ cut + 16.67 kg K_2O/ cut.

The experiments were laid out in a split plot in randomized complete block design with three replications. The main plots were assigned to forage crops and subplots were at random allocated to fertilization treatments at random. The experimental plot area was 10.5 m^2 (2.8m widths × 3.75m length). The preceding winter crop was wheat in both seasons.

Nitrogen fertilizer in the form of ammonium nitrate (33.5% N) were applied. Nitrogen fertilizer at a rate of 90 kg N/fed was splited to three doses and added as 30 kg N/cut also nitrogen fertilizer at a rate of 135 kg N/fed. splited into three doses and added as 45 kg N/cut in both seasons . Phosphorus fertilizers as phosphoric acid (61% P_2O_5) was used. Phosphorus acid fertilizers at a rate of 23.25 kg P_2O_5/fed. was splited into three doses and added as 7.75 kg P_2O_5/ cut, also phosphorus fertilizers at a rate of "38.75 kg P_2O_5/fed. added as 12.92 kg P_2O_5/ cut in both seasons. Potassium fertilizer at a rate of 50 kg K_2O/fed. in the form of potassium sulfate 48% K_2O were applied in three doses as 16.67 kg K_2O/ cut in both seasons.

The other agronomic practices were followed as usually done for the forage sorghum crop under drip irrigation system.

2.1.Studied characters:

Plants of five middle rows of each sub plot were cutted at each cutting and uprooted to recorded the following traits in both seasons.

1- Plant fresh weight (g) was measured as a mean of 10 plants .
2- Curde protein %. The nitrogen content of forage plants was determined by the Kjeldahl Method (A.O.A.C. 1980) and crude protein was calculated by multiplying N with 6.25.
3- Total fodder yield/feddan (ton): Total fodder yield of the three cuts was consuming and measured as a total fodder yield/feddan.

2.2. Statistical Analysis:

The data of the studied agronomic traits were collected and subjected to analysis of variance according to Steel *et al.* (1997) to sort out significant differences among treatments. Differences among means were compared using LSD at 5% probability level.

3. RESULTS AND DISCUSSION

Plant fresh weight (g) and crude protein percentage of Sudan grass and Single hybrid sorghum "Mabrok" as affected by nitrogen, phosphorus and potassium fertilizers rates at first, second and third cuts and total fodder yield/fed.(ton) was also studied in 2020 and 2021 seasons are shown in Tables 2 to 6.

The results recorded in Tables 2 to 6 shows clearly that forage crops significantly differed in plant fresh weight, protein percentage and total fodder yield/feddan at the three cuts in both seasons. Single hybrid sorghum "Mabrok" surpassed Sudan grass in plant fresh weight by 17.40, 18.40 and 18.45% as well as 20.03, 18.87 and 9.06%, protein percentage by 7.63,7.29 and 14,76% as well as 7.13, 9.42 and 17.33% in first, second and third cuts in 2020 as well as 2021 seasons, respectively. In this connection single hybrid "Mabrok" gave 21.34 and 23.01% increase in total fodder yield/feddan as compared with Sudan grass in 2020 and 2021 seasons, respectively.

The superiority of single hybrid sorghum "Mabrok" than Sudan grass in total fodder yield/feddan might be attributed to this hybrid gave the highest values of plant fresh weight (Tables 2 and 3) and total fodder yield/feddan .These results are in agreement with those of Gulumser and Mut (2016), Ibrahim *et. al*. (2016) and Mut *et. al.* (2017).

Results presented in Tables 2 to 6 indicated that, there were significant effects of fertilization treatments on all studied traits at the three cuts in both seasons. The obtained results exhibited that forage cops plants received 45 kg N + 12.92 kg P_2O_5 + 16.67 kg K_2O/cut gave the highest values of all suited characters followed by plants received 45 kg N + 7.75 kg P_2O_5 + 16.67 kg K_2O/cut at all cuts in both seasons .

However ,fertilized plants with 45 kg N + 12.92 kg P_2O_5 + 16.67 kg K_2O/cut increased plant fresh weight by 190.91,184.60 and 178.69% as well as 197.24, 201.74 and 208.77% and protein percentage by 37.74, 39.11 and 52.44% as well as 44.87, 56.72 and 55.04% as compared with those plants grown on the control (did not received any fertilization) at first, second and third cuts in 2020 as well as 2021 reasons, respectively, but it increased total fodder yield/feddan by 204.55 and 217.81% as compared with those plants grown on the control in 2020 and 2021 seasons respectively.

Also it could seen that fertilizing plants with 45 kg N + 12.92 kg P_2O_5 + 16.67 kg K_2O gave higher total fodder yield/feddan than 45 kg N/cut by 31.48 and 24.73%, 45kg N + 16.67 kg K_2O/cut by 16.26 and 11.21%, 45 kg N + 12.92 kg P_2O_5 by 17.41 and 18.16% and 45 kg N + 7.75 kg P_2O_5+16.67 kg K_2O/cut by 4.69 and 5.71% in 2020 and 2021 seasons, respectively.

The increase in total green fodder yield/feddan of plants treated by 45 kg N + 12.92 kg P_2O_5 + 16.67 kg K_2O/cut may be due to this treatment increased the highest values of plant fresh weight (Tables 2 and 3) hence raising total green fodder yield/feddan(Table 6). These results are in accordance with the results reported by Patil *et. al*. (2018), Aditi *et. al*. (2019), Astuti *et. al*. (2020), Brima and Abusuwar (2020) and Singh *et. al*. (2021). The results revealed that the interaction effect among forage crops and fertilization treatments was significant on all studied traits except protein percentage at the three cuts in both seasons. Fertilizing Single hybrid "Mabrok" by 45 kg N + 12.92 kg P_2O_5 + 16.67 kg K_2O gave the highest values of all measured characters at the three cuts in both seasons. Also the highest total fodder yields 46.56 and 47.64 ton/feddan was obtained with the same fertilizer treatment as compared all this interaction treatments in 2020 and 2021 seasons, respectively.

Generally it could be concluded that, fertilized single hybrid "Mabrok" with fertilization treatment having combination of 45 kg N, 12.92 kg P_2O_5 and16.67 kg K_2O increased total fodder yield/feddan under sandy soil condition at Sadat city, Menoufia Governorate, Egypt.

.

Table 2. Average plant fresh weight (g) of sudan grass and single hybrid sorghum "Mabrok" as affected by nitrogen, phosphorus and potassium fertilizers rates as well as their combination and their interactions at first, second and third cuts in 2020 season.

Fertilization treatments	First cut		Mean	Second cut		Mean	Third cut		Mean
	Forage crop			Forage crop			Forage crop		
	Sudan grass	Mabrok		Sudan grass	Mabrok		Sudan grass	Mabrok	
$N_0P_0K_0$	45.84	56.68	51.26	23.79	31.65	27.72	17.95	21.75	19.85
$N_{30}P_0K_0$	62.29	72.89	67.59	32.39	38.35	35.37	24.24	28.23	26.24
$N_{30}P_0K_{16.67}$	71.69	81.19	76.44	39.65	45.25	42.45	30.79	35.01	32.90
$N_{30}P_{7.75}K_0$	68.00	77.83	72.92	37.73	40.87	39.30	26.16	30.62	28.39
$N_{30}P_{12.92}K_0$	77.87	91.57	84.72	40.97	49.03	45.00	28.14	33.15	30.65
$N_{30}P_{7.75}K_{16.67}$	83.03	99.94	91.49	42.71	51.11	46.91	33.31	38.37	35.84
$N_{30}P_{12.92}K_{16.67}$	92.93	108.39	100.66	48.19	56.76	52.48	36.02	40.69	38.36
$N_{45}P_0K_0$	95.38	115.17	105.28	50.07	62.47	56.27	40.33	45.22	42.78
$N_{45}P_0K_{16.67}$	113.08	128.08	120.58	62.43	69.80	66.12	46.03	56.39	51.21
$N_{45}P_{7.75}K_0$	102.60	120.05	111.33	52.49	65.72	59.11	42.86	50.56	46.71
$N_{45}P_{12.92}K_0$	121.52	138.63	130.08	64.80	74.09	69.45	45.31	55.13	50.22
$N_{45}P_{7.75}K_{16.67}$	127.61	147.58	137.60	66.72	79.49	73.11	48.71	59.48	54.10
$N_{45}P_{12.92}K_{16.67}$	133.20	165.03	149.12	71.91	85.86	78.89	49.40	61.24	55.32
Mean	91.93	107.93		48.76	57.73		36.10	42.76	
L.S.D at 0.05 % for:									
Forage crop (FC)			*			*			*
NPK Fertilizers (NPK)			2.98			2.68			3.18
FC x NPK			4.22			3.79			4.72

Table 3. Average plant fresh weight (g) of sudan grass and single hybrid sorghum "Mabrok" as affected by nitrogen, phosphorus and potassium fertilizers rates as well as their combination and their interactions at first, second and third cuts in 2021 season.

Fertilization treatments	First cut		Mean	Second cut		Mean	Third cut		Mean
	Forage crop			Forage crop			Forage crop		
	Sudan grass	Mabrok		Sudan grass	Mabrok		Sudan grass	Mabrok	
$N_0P_0K_0$	43.53	59.34	51.44	23.17	29.70	26.44	20.27	18.26	19.26
$N_{30}P_0K_0$	57.02	69.59	63.31	29.96	40.77	35.36	22.02	23.54	22.78
$N_{30}P_0K_{16.67}$	73.79	87.08	80.44	41.50	47.19	44.35	34.67	37.37	36.02
$N_{30}P_{7.75}K_0$	60.98	80.78	70.88	34.96	44.10	39.53	26.04	27.52	26.78
$N_{30}P_{12.92}K_0$	76.40	93.63	85.02	44.03	48.01	46.02	32.92	34.53	33.72
$N_{30}P_{7.75}K_{16.67}$	79.11	97.78	88.45	45.03	54.81	49.92	38.03	41.47	39.75
$N_{30}P_{12.92}K_{16.67}$	94.78	110.95	102.86	51.29	59.00	55.15	41.63	43.60	42.62
$N_{45}P_0K_0$	90.03	113.98	102.01	53.31	66.64	59.98	44.40	47.34	45.87
$N_{45}P_0K_{16.67}$	114.58	131.59	123.09	59.89	71.78	65.84	50.32	50.23	50.28
$N_{45}P_{7.75}K_0$	99.25	115.82	107.54	55.06	68.96	62.01	41.21	45.39	43.30
$N_{45}P_{12.92}K_0$	124.39	139.54	131.97	64.08	70.50	67.29	46.46	56.24	51.35
$N_{45}P_{7.75}K_{16.67}$	131.26	151.60	141.43	68.84	82.95	75.90	52.48	61.01	56.74
$N_{45}P_{12.92}K_{16.67}$	137.72	168.08	152.90	75.43	84.13	79.78	54.61	64.32	59.47
Mean	90.99	109.21		49.73	59.12		38.85	42.37	
L.S.D at 0.05 % for:									
Forage crop (FC)			*			*			*
NPK Fertilizers (NPK)			3.21			2.99			3.60
FC x NPK			4.54			4.23			5.10

Table 4. Average protein percentage of sudan grass and single hybrid sorghum "Mabrok" as affected by nitrogen, phosphorus and potassium fertilizers rates as well as their combination and their interactions at first, second and third cuts in 2020 season.

Fertilization treatments	First cut		Mean	Second cut		Mean	Third cut		Mean
	Forage crop			Forage crop			Forage crop		
	Sudan grass	Mabrok		Sudan grass	Mabrok		Sudan grass	Mabrok	
$N_0P_0K_0$	9.09	10.90	9.99	8.55	10.36	9.46	8.02	8.79	8.41
$N_{30}P_0K_0$	10.72	12.43	11.58	9.84	11.37	10.61	9.53	10.66	10.10
$N_{30}P_0K_{16.67}$	11.68	12.80	12.24	11.00	11.43	11.22	10.27	11.32	10.80
$N_{30}P_{7.75}K_0$	11.49	12.75	12.12	10.62	12.06	11.34	9.82	10.95	10.39
$N_{30}P_{12.92}K_0$	12.30	13.08	12.69	11.45	12.25	11.85	10.18	11.59	10.88
$N_{30}P_{7.75}K_{16.67}$	12.65	13.41	13.03	11.94	12.33	12.14	10.45	11.82	11.14
$N_{30}P_{12.92}K_{16.67}$	12.97	13.68	13.33	11.82	12.94	12.38	10.57	11.90	11.24
$N_{45}P_0K_0$	12.52	13.25	12.88	11.49	11.88	11.69	10.03	12.19	11.11
$N_{45}P_0K_{16.67}$	12.88	12.87	12.88	12.10	12.53	12.32	10.92	12.85	11.89
$N_{45}P_{7.75}K_0$	12.07	13.63	12.85	12.16	12.73	12.45	9.79	12.21	11.00
$N_{45}P_{12.92}K_0$	13.21	13.75	13.48	12.39	13.03	12.71	10.68	12.55	11.62
$N_{45}P_{7.75}K_{16.67}$	13.29	13.88	13.58	12.61	13.35	12.98	11.18	13.14	12.16
$N_{45}P_{12.92}K_{16.67}$	13.50	14.02	13.76	12.88	13.44	13.16	12.22	13.42	12.82
Mean	12.18	13.11		11.45	12.28		10.28	11.80	
L.S.D at 0.05 % for:									
Forage crop (FC)			*			*			*
NPK Fertilizers (NPK)			0.90			0.55			0.95
FC x NPK			NS			NS			NS

Table 5. Average protein percentage of sudan grass and single hybrid sorghum "Mabrok" as affected by nitrogen, phosphorus and potassium fertilizers rates as well as their combination and their interactions at first, second and third cuts in 2021 season.

Fertilization treatments	First cut		Mean	Second cut		Mean	Third cut		Mean
	Forage crop			Forage crop			Forage crop		
	Sudan grass	Mabrok		Sudan grass	Mabrok		Sudan grass	Mabrok	
$N_0P_0K_0$	9.35	10.54	9.94	7.66	10.03	8.85	7.71	9.54	8.63
$N_{30}P_0K_0$	10.63	12.01	11.32	9.74	10.71	10.23	8.15	9.85	9.00
$N_{30}P_0K_{16.67}$	12.02	13.20	12.61	10.27	11.65	10.96	9.83	11.68	10.76
$N_{30}P_{7.75}K_0$	11.28	13.13	12.20	10.13	11.22	10.68	8.77	10.33	9.55
$N_{30}P_{12.92}K_0$	12.65	13.51	13.08	10.50	12.01	11.26	9.10	10.65	9.88
$N_{30}P_{7.75}K_{16.67}$	12.28	12.81	12.54	11.08	12.41	11.75	9.96	12.01	10.98
$N_{30}P_{12.92}K_{16.67}$	12.97	12.97	12.97	11.82	12.86	12.34	10.60	12.72	11.66
$N_{45}P_0K_0$	12.98	13.74	13.36	11.23	11.75	11.49	10.23	12.13	11.18
$N_{45}P_0K_{16.67}$	13.46	13.47	13.46	12.77	13.38	13.08	11.11	13.08	12.10
$N_{45}P_{7.75}K_0$	12.10	13.88	12.99	12.45	12.92	12.69	10.87	12.92	11.89
$N_{45}P_{12.92}K_0$	13.31	13.54	13.43	12.81	13.65	13.23	11.61	13.31	12.46
$N_{45}P_{7.75}K_{16.67}$	13.80	14.59	14.20	13.00	13.96	13.48	12.20	13.65	12.93
$N_{45}P_{12.92}K_{16.67}$	13.95	14.85	14.40	13.50	14.25	13.87	12.73	14.02	13.38
Mean	12.37	13.25		11.30	12.37		10.22	11.99	
L.S.D at 0.05 % for:									
Forage crop (FC)			*			*			*
NPK Fertilizers (NPK)			0.90			1.46			1.44
FC x NPK			NS			NS			NS

Table 6. Average total fodder yield/ feddan (ton) of sudan grass and single hybrid sorghum "Mabrok" as affected by nitrogen, phosphorus and potassium fertilizers rates as well as their combination and their interactions at first, second and third cuts in 2020 and 2021 seasons.

Fertilization treatments	2020 season		Mean	2021 season		Mean
	Forage crop			Forage crop		
	Sudan grass	Mabrok		Sudan grass	Mabrok	
$N_0P_0K_0$	14.74	23.95	19.35	16.14	21.69	18.92
$N_{30}P_0K_0$	21.57	35.34	28.45	24.15	31.59	27.87
$N_{30}P_0K_{16.67}$	34.41	40.73	37.57	35.71	43.22	39.46
$N_{30}P_{7.75}K_0$	29.36	37.88	33.62	29.09	36.41	32.75
$N_{30}P_{12.92}K_0$	34.90	40.89	37.90	29.69	38.82	34.26
$N_{30}P_{7.75}K_{16.67}$	41.26	43.80	42.53	41.20	46.75	43.97
$N_{30}P_{12.92}K_{16.67}$	44.42	46.71	45.57	41.06	50.83	45.94
$N_{45}P_0K_0$	39.62	50.01	44.82	45.24	51.17	48.21
$N_{45}P_0K_{16.67}$	45.76	55.62	50.69	49.67	58.48	54.07
$N_{45}P_{7.75}K_0$	39.98	52.50	46.24	43.15	53.05	48.10
$N_{45}P_{12.92}K_0$	45.33	55.05	50.19	45.5	56.28	50.89
$N_{45}P_{7.75}K_{16.67}$	52.34	60.23	56.29	49.73	64.02	56.88
$N_{45}P_{12.92}K_{16.67}$	55.24	62.62	58.93	53.20	67.07	60.13
Mean	38.37	46.56		38.73	47.64	
L.S.D at 0.05 % for						
Forage crop (FC)			5.51			2.12
NPK Fertilizers (NPK)			3.65			3.24
FC x NPK			2.06			2.23

4. REFERENCES

Abd-Elbakheit A.K.E. (2007). The performance of Abu, Sabien (*Sorghum bicolor* L), and Sudan grass (*Sorghum Sudanese*) under different Levels of Phosphorus fertilizer. M.Sc.Thesis in (Agric). Univ. of Khartoum. Khartoum Sudan.

Aditi C., Tripathi S., Singh N., Saini L. (2019).Effect of fertilizer levels, biocompost and biofertilizer on growth and yield attributes of fodder sorghum (*Sorghum bicolor* (L.) Moench). *J. of Pharmacognosy and Phytochemistry*, *8*(6): 617-620.

Astuti D., Suhartanto B., Umami N., Irawan A. (2020). Effect of density between intercropped sorghum and stylosanthes on biomass production and quality under varying NPK fertilizer application rates. *J. Crop Sci. and Biotech.*, *23*(3): 197-205.

A.O.A.C. (1980). "Association of Official Agriculture Chemists" Official Methods of Analysis" 3rd. Ed., Washington, DC, USA.

Azam M., Waraich E.A., Pervaiz A., Nawaz F. (2010). Response of a newly developed fodder sorghum (*Sorghum bicolor* (L.). monech) variety (F-9917) to NPK application. *Pakistan J.of Life Sci*, *8*: 117-120.

Brima F.I., Abusuwar A.O. (2020). Influence of seed rate and NPK fertilizer on yield and quality of Rhodes grass (*Chloris gayana L.* kunth.). Inter. J. Agric. and Appl. Sci.,1(1): 80-86.

Gulumser D.D., Mut H. (2016). Effects of different nitrogen rates on hay yield and some quality traits of Sudan grass and sorghum x Sudan grass hybrid varieties. Arisstotle University of Thessalniki (Greece), Hellenic Range and Pasture Society, Thessaloniki (Greece), 114, pp.253-257.

Hussein M.M., Alva A.K. (2014). Growth, yield and water use efficiency of forage sorghum as affected by NPK fertilizer and deficit irrigation. American J. Plant Sci, *5*, 2134-2140.

Ibrahim A., Zeidan E.M., Gweifel H.G.M., IMM A.E.H., Mahfouz S.A. (2016). Influence of planting density and nitrogen fertilizer levels on fresh forage yield and quality of some forage sorghum genotypes. *Zagazig J. Agric. Res.*, *43*(3): 729-743.

Mut H., Gulumser E., Dogrusoz M.C., Basaran U. (2017). Effect of Different Nitrogen Levels on Hay Yield and Some Quality Traits of Sudan Grass and Sorghum Sudan Grass Hybrids. *Animal Nutrition and Feed Techno*, *17*(2): 269-278.

Osman A.M. (2015). Effect of nitrogen fertilizers on growth and yield of three forage genotypes. Doctoral dissertation, Sudan Univ. Sci. Techno.

Page A.L., Miller R.H., Keeny D.R. (1982). Method of soil Analysis part 2. Soil Sci. Soc. Amer. Inc. Madison. Wisconsin, USA.

Patil B., Kumar V., Merwade M.N. (2018). Effect of inter row spacing and fertilizer levels on crop growth, seed yield and seed quality of perennial fodder sorghum cv. CoFS-29. *Rang Management and Agroforestry*, *39*(1): 59-64.

Singh S.R., Singh M.K., Meena K., Vishwakarma S.P. (2021). Effect of Different NPK Levels on Fodder Production of Sudan Grass (*Sorghum bicolor* var. Sudanese). *International J. of Bio-Resource & Stress Management*, *12*(3).

Steel R.G., Torrie J.H., Dickey D.A. (1997). Principals and procedures of statistics. a Biometrical Approach. 3rd Eds. McGraw-Hill, Inc. Book Co., New York, U.S.A., 352-358.

الملخص العربي

تأثير التسميد على محصول العلف وجودته فى بعض محاصيل العلف فى الأراضي الرملية .

أحمد رضا عطا عبد الحليم، محمد الأسمر الهوارى، منير عبدالله عبد العزيز السيد والمتولى محمد على عبد القادر

قسم المحاصيل كلية الزراعة (القاهرة) – جامعة الأزهر – مصر

أجريت تجربتان حقليتان فى موسمى٢٠٢٠ و٢٠٢١م فى مزرعة كلية الزراعة جامعة الأزهر – فرع السادات – محافظة المنوفية لدراسة تأثير التسميد على إنتاجية محصولين علف فى الأراضي الرملية .

المعاملات المدروسة :-

أ- محاصيل العلف

١- حشيشة السودان "صنف جيزة2" ٢- هجين فردى سورجم "مبروك"

ب- المعاملات السمادية :-

وقد اشتملت التجربة على ثلاثة عشر معاملة تسميد مختلفة من السماد النيتروجينى والفوسفاتى والبوتاسى وهى:-

١- كنترل (بدون إضافة) .
٢- ٣٠ كجم آزوت / حشة .
٣- ٣٠ كجم آزوت + ١٦.٦٧ كجم **بو**٢أ / حشة .
٤- ٣٠ كجم آزوت + ٧.٧٥ كجم **فو**٢٥ / حشة .
٥- ٣٠ كجم آزوت + ١٢.٩٢ كجم **فو**٢٥ / حشة.
٦- ٣٠ كجم آزوت + ٧.٧٥ كجم **فو**٢٥ + ١٦.٦٧ كجم **بو**٢أ / حشة .
٧- ٣٠ كجم آزوت + ١٢.٩٢ كجم **فو**٢٥ + ١٦.٦٧ كجم **بو**٢أ / حشة.
٨- ٤٥ كجم آزوت / حشة.
٩- ٤٥ كجم آزوت + ١٦.٦٧ كجم **بو**٢أ / حشة .
١٠- ٤٥ كجم آزوت + ٧.٧٥ كجم **فو**٢٥/ حشة.
١١- ٤٥ كجم آزوت + ١٢.٩٢ كجم **فو**٢٥ / حشة .
١٢- ٤٥ كجم آزوت + ٧.٧٥ كجم **فو**٢٥ + ١٦.٦٧ كجم **بو**٢أ / حشة .
١٣- ٤٥ كجم آزوت + ١٢.٩٢ كجم **فو**٢٥ + ١٦.٦٧ كجم **بو**٢أ / حشة .

وقد صممت التجربة فى تصميم القطع المنشقة مرة واحدة فى ثلاث مكررات حيث خصصت القطع الرئيسية لمحصولى العلف ووضعت معاملات التسميد فى القطع الشقية.

وتتلخص أهم النتائج فى الآتى :-

- تفوق الهجين الفردى (مبروك) على حشيشة السودان فى الوزن الطازج للنبات ، النسبة المئوية للبروتين ومحصول العلف الأخضر الكلى / للفدان فى كلا موسمى الدراسة .
- أعطى التسميد بمعدل ٤٥ كجم وحدة آزوت + ١٢.٩٢ كجم **فو**٢٥ + ١٦.٦٧ كجم **بو**٢١ / حشة أعلى القيم لكلا من الوزن الطازج للنبات والنسبة المئوية للبروتين ومحصول العلف الأخضر الكلى / للفدان فى مقارنة بمعاملات التسميد الأخرى فى كلا موسمى الدراسة.
- أوضحت النتائج أن تأثير التفاعل بين محاصيل العلف ومعاملات التسميد كان معنويا على كل الصفات المدروسة ماعدا النسبة المئوية للبروتين كانت غير معنوية فى الثلاث حشات فى كلا موسمى الدراسة . وقد سجلت النتائج أن تسميد الهجين الفردى مبروك بمعدل ٤٥ كجم وحدة آزوت + ١٢.٩٢ كجم **فو**٢٥ + ١٦.٦٧ كجم **بو**٢١ / حشة أعلى قيمة لمحصول العلف الأخضر الكلى للفدان فى كلا موسمى الدراسة.

عموما توصى الدراسة أن تسميد الهجين الفردى مبروك بمعدل ٤٥ كجم وحدة آزوت + ١٢.٩٢ كجم **فو**٢٥ + ١٦.٦٧ كجم **بو**٢١/ حشة ، أدى إلى زيادة محصول العلف الأخضر للفدان تحت ظروف الأراضى الرملية بمدينة السادات بمحافظة المنوفية – مصر.