Minia J. of Agric. Res. & Develop.
Vol. (36), No. 4, pp. 589-599, 2016

FACULTY OF AGRICULTURE

INFLUENCE OF NITROGEN FERTILIZER RATES AND CUTTING INTERVALS ON FORAGE PRODUCTIVITY AND QUALITY OF SUDAN GRASS.

Ibrahim, M. M.[1]; A. M. A. Abd El-Monem[2]; M. A. A. El-Said[1] and A. M. E. Mohamed[1]

(1) Dept. of Agron., Fac. of Agric., El-Azhar Univ., Assiut branch, Egypt.

(2) Dept. of Agron., Fac. of Agric., Assiut Univ., Elwady Elgadeed branch, Egypt.

Received: 9 October (2016) Accepted: 6 December (2016)

ABSTRACT

Two field experiments were conducted at the Agricultural Experiment Farm of El-Azhar University at Assiut Governorate, Egypt, during successive summer seasons of 2013 and 2014 to study the effect of nitrogen fertilizer rates (45, 60 and 75 kg N/fad.) and three cutting intervals (40, 50 and 60 days from sowing and the first cut) on growth, fresh and dry forage yields and forage quality of Sudan grass (*Sorghum sudanense*, L. Moench) *var*. Giza-2. A split plot layout within randomized complete block design with three replications was used. Main plots were ayigned to three rates of nitrogen fertilizer and sub-plots were allocated to three times of the cutting. The combined analysis was conducted across the two seasons. Plant height, stem diameter, leaves and stems dry weight/plant, fresh and dry forage yields/fad., as well as crude protein and crude fiber percentages in leaves increased by increasing nitrogen fertilizer rates up to 75 kg/fad.. Delayed cutting from 40 up to 50 or 60 days increased plant height, leaves and stems dry weights/plant, fresh and dry forage yields/fad., as well as leaves and stems crude fiber percentages. On the other hand, leaves/stem ratio as well as leaves and stems crude protein% were decreased by delaying cutting. The interaction between nitrogen fertilizer rates and cutting intervals had significant effect on plant height in the second cut, stems dry weight/plant in two cuts, fresh and dry forage yields t/fad. and

leaves/stem ratio in the second cut only, crude protein in leaves and crude fiber in stem percentages in first cut only.

INTRODUCTION

Sudan grass (*Sorghum sudanense* (L.) Moench**)** as forage crop is considered one of the most important summer fodder crops in many countries in the world due to its high fodder yielding potential and good better quality. Sudan grass has excellent growing habit, quick growing growth after first cut and high palatability, digestibility, and various forms of its utilization like green chop, silage and hay Karwasar, *et al.*(1996) and Dahiya, *et al*. (1997). El-Khawaga and Geweifel (1991) indicated that supplying of 90 Kg N/fad. was significant in plant height, stem diameter, leaf dry weight (g/plant) and stem dry weight (g/plant) of forage sorghum. Afzal, *et al*. (2012) reported that increasing nitrogen dose increased all growth attributes of sorghum forage. The maximum plant heights, fresh weight plant^{-1}, dry weight plant^{-1} and protein % was observed in N_4 (100 Kg N/acre). Shahin, *et al*. (2013) found that significant increases were appeared in plant height (cm) during the two growing seasons as nitrogen fertilization rates increased, while leaf/stem ratio was not affected significantly during the two growing seasons. Green forage yield/fad. was significantly increased as nitrogen application rates increased during the two growing seasons except at the third cut of the first season. Increasing nitrogen fertilization rates up to 75 kg N/fad. caused significant increases in dry forage yield. Soliman (2013) showed that growth characteristics of Sudan grass *i.e.,* plant height and dry forage yield were affected by nitrogen fertilizer. Addition of nitrogen significantly increased dry forage yield where, the highest dry forage yield was obtained when 86 kg N/ha. was added. Abou-Amer and Kewan (2014) showed that application of the highest rates of nitrogen increased the fodder sorghum yield and improved the fodder quality; crude protein and crude fiber. Gamal and Abdel-Galil (2001) indicated that statistical differences between the dates of first cut management in two seasons for both fresh and dry forage yields as well as crude protein and fiber. Zeidan, *et al*. (2003) showed that delaying cutting from 56 to 66 days after sowing increased both fresh and dry yields/fad. as well as protein yield/fad.. Ayub, *et al*. (2009) studied the effect of harvesting intervals (40, 50 and 60 days after sowing) on forage yield and quality of pearl millet. Dry matter and crude fiber contents, plant height, forage yield and stem diameter were consistently increased up to final harvest (delaying the harvest increased yield but decreased the forage quality). Crude protein content was decreased with delaying the harvest. They concluded that for obtaining higher yield of pearl millet harvest it 60 days after sowing. El-Sarag and Abu Hashem (2009) observed that increasing nitrogen fertilizer rate from

45 to 90 kg N/fad., increased all studied growth characters (plant height and stem diameter) at the three cuts were taken throughout the growth season at (60, 105 and 136 days after sowing) and over them in both seasons. ArshadUllah, *et al*. (2010) revealed that the highest dry matter yield was obtained by harvesting elephant grass at 60 days interval while the lowest dry matter was obtained at 30 days harvesting interval. They showed that crude protein decreased with longer harvesting intervals in elephant grass. The higher crude fiber was noted in plants harvested after longer interval of cutting, 45 or 60 days interval contained crude fiber as 30.0 and 32.7%, respectively.

The main objective of his work was designed to study effect of nitrogen fertilizer rates and three time cut on forage productivity and quality of Sudan grass under Assiut conditions.

MATERIALS AND METHODS

Two field experiments were conducted at the Agricultural Exp. Farm of El-Azhar Univ. at Assiut Governorate, Egypt, during successive summer seasons of 2013 and 2014 to study the effect of nitrogen fertilizer rates (N_1= 45, N_2= 60 and N_3= 75 kg N/fad.) and cutting intervals (The first cut was taken after D_1= 40, D_2 = 50 and D_3= 60 days from sowing and the second cut was taken after the same periods from the first cut).

A split plot layout within randomized complete block design with three replications was used. The main plots were assigned to nitrogen rates and the sub plots to cutting intervals. The sub plot unit comprised five ridges, each 3.5m length and 0.6 m wide (10.5 m^2 in area = 1/400 fad.). Sudan grass grains were sown by hand as the usual dry method of sowing on one side of ridges (60 x 20 cm) on June 10 at the two seasons. Grains of Sudan grass variety were provided by the Forage Research Division, Field Crops Research Institute, Giza, Ministry of Agricultural and Land Reclamation, A.R.E. The physical and chemical analyses of soil field experiments were showed in Table (1).

The nitrogen fertilizer rates in the form of Urea 46.5 % were applied in two equal doses where, the first one was applied after 15 and 30 days (half and half) and the second was applied after the first cut. Phosphorus fertilizer as calcium super-phosphate (15.5%) was added at rate of 100 kg/fad., as a basal application during soil preparation in the first and the second seasons. Other cultural practices were carried out as usual for Sudan grass production under Assiut conditions. The preceding winter crop was Egyptian clover (*Trifolium alexandrinum* L.) in both seasons.

A - Forage yield and its attributes:

At each cut, the whole plot was cut and weighted to determine fresh forage yield/plot and calculation of fresh forage yield/fad. at ton. Five plants were taken randomly from each plot to determine the growing characteristics (plant height at cm and stem diameter at mm) then leaves were

separated from stems and were taken as samples. The samples were air dried for two days after that these dried in oven at 70 ^{0}C until constant weight to determine leaves and stems dry weights (g/plant) and subsequently dry forage yield (t/fad.) was calculated at the two cutting systems.

Table (1): The physical and chemical analysis of soil field experiments.

Physical analysis			Chemical analysis		
Characteristics	2013	2014	Characteristics	2013	2014
Sand (%)	25.00	24.65	Organic matter (%)	1.09	1.02
Silt (%)	39.65	39.00	Available N (ppm)	77.30	74.50
Clay (%)	35.35	36.35	Available P (ppm)	9.70	9.55
Soil texture	Clay loam		Available K (ppm)	337.31	375.25
			ph (sp. m^{-1}	7.87	7.88
			E.C. (ds. m^{-1}	1.15	1.13
			Total $CaCo_3$ (%	2.50	2.65

B - Forage quality characters:

After the leaves and stems samples dried and weighted, Leaves: Stem ratio was calculated using the following formula:

$$\text{Leaves: Stem ratio} = \frac{dry\ weight\ of\ leaves/plant(g)}{dry\ weight\ of\ stems/plant(g)}$$

After that, the flowing crude protein and crude fiber percentages were determined by using recommend by A. O. A. C. (1980**)** in the samples of leaves and stems in the both cuts.

All obtained data were subjected to statistical analysis using the computer MSTAT-C statistical analysis, the combined analysis of variance was conducted across the two seasons as mentioned by Snedecer and Cochran (1967) mean comparisons were done using least significant differences (L.S.D.at 5%).

RESULTS AND DISCUSSION

A - Forage yield and its attributes:

The result in Table (2) reveal that there were significant effect of nitrogen fertilizer rates on all the agronomic traits measured in this study in both cuts, with the exception of leaves dry weight in the first cut and stem dry weight/plant in the second cut. Plant height, stem diameter and leaves and stem dry weights/plant increased with nitrogen fertilizer rate increasing regularly up to 75 kg N/fad. in the first and second cut. The tallest plants i.e. 287.72 and 292.28 cm and the thickest stems i.e. 12.02 and 12.17 mm were recorded when nitrogen fertilizer rate was75 kg N/fad. in the first and second cut, respectively. The increase of plant height and stem diameter by increasing nitrogen rate is could be ascribed to the role of nitrogen in stimulating cell division and elongation, consequently internodes elongation and thickness. Similar results were recorded by Ayub, *et al.* (2009) and Afzal, *et al.* (2012). When nitrogen fertilizer was applied at a rate of 75 kg N/fad., the dry weight of leaves/plant recorded the highest

value (27.33 g/plant in the second cut) as well as the highest value of stem dry weight/plant (22.83 g/plant in the first cut). The increase on leaves and stems on dry weight basis mainly due to the increase in plant height, stem diameter and number of leaves/plant. These results are in agreement with those reported by El-Khawaga and Geweifel (1991).

Plant height, leaves and stems dry weight/plant as shown in Table (2) exhibited significantly response to cutting intervals where, there were an increase by increasing the period from sowing to first cut as well as first and second cut intervals. The highest values of plant height i.e. 324.72 and 316.89 cm for the first and second cut, respectively were obtained when the cutting intervals was 60 days. The highest weight of dry leaves/plant 26.39 g was recorded when the cutting intervals was 60 days for the first cut while, in the second cut the highest dry weigh /plant of leaves 28.33 g was observed when the cut intervals was 50 days. Stem dry weight g/plant recorded the highest values 32.22 and 31.83 g/plant when the cutting intervals 60 days for the first and second cut, respectively. These increases in plant height, leaves and stems dry weight basis may be due to longer period for 50 and 60 days than 40 days which obtained increasing cells elongation and dry matter accumulation in different parts of plants. These results agree with those obtained by Ayub, *et al.* (2009).

The interaction effect between nitrogen fertilizer rates and cutting intervals was significantly on plant height only in the second cut and stems dry weight/plant in the two cuts. The tallest plant 329.50 cm was obtained when cutting period was 60 days after the first cut and nitrogen fertilizer was applied at a rate of 75 kg N/fad. while, the shortest plant 206.33 cm was obtained when cutting period was 40 days after the first cut and nitrogen fertilizer was applied at a rate of 45 kg N/fad. (Table 2). At the first cut, the highest stems dry weight/plant 37.50 g was recorded when cutting intervals was 60 days and nitrogen fertilizer was applied at a rate of 75 kg N/fad. while, the lowest dry weight of stems/plant 11.00 g was obtained when cutting intervals was 40 days and nitrogen fertilizer was applied at a rate of 45 kg N/fad.. At the second cut, the highest stems dry weight/plant 33.50 g was recorded when cutting intervals was 60 days and nitrogen fertilizer was applied at a rate of 45 kg N/fad. while, the lowest dry weight of stems/plant 15.33 g was obtained when cutting intervals was 40 days and nitrogen fertilizer was applied at a rate of 45 kg N/fad..

The results as shown in Table (3) reveal that fresh and dry forage yields (t/fad.) responded significantly to nitrogen fertilizer rates where these increased regularly by nitrogen rate increasing up to 75 kg N /fad. in the two cuts. The increase in fresh forage yield (t/fad.) of plants supplied with75 kg N /fad. over those received 45 and 60 kg N /fad. were 18.57 and 16.21 %, respectively in the first cut while, this increases were 14.54 and 8.71 %,

respectively over the same respective nitrogen rates in the second cut. The increase in dry forage yield (t/fad.) of plants supplied with75 kg N /fad. over those received 45 and 60 kg N /fad. were 22.07 and 24.69 %, respectively in the first cut while, this increases were 21.74 and 8.43 %, respectively over the same respective nitrogen rates in the second cut. Similar results were recorded by Shahin, *et al*. (2013) and Abou-Amer and Kewan (2014).

Table (2): Effect of nitrogen fertilizer rates and cutting intervals on plant height, stem diameter, and leaves and stems dry weights/plant of Sudan grass.

Parameters	Plant height (cm)		Stem diameter (mm)		Leaves dry weight g./plant		Stems dry weight g./plant	
Treatment	Cut_1	Cut_2	Cut_1	Cut_2	Cut_1	Cut_2	Cut_1	Cut_2
Nitrogen Fertilizer Rate (kg N/fad.)								
N_1	276.33	273.67	10.40	10.58	22.94	23.22	19.89	25.94
N_2	285.61	285.94	11.56	11.32	23.83	25.61	19.33	28.28
N_3	287.72	292.28	12.02	12.17	24.06	27.33	22.83	28.44
LSD at $_{0.05}$	8.38	6.23	1.19	1.05	--	1.08	1.42	--
Cutting Intervals (days)								
D_1	217.22	233.00	10.71	10.92	21.50	23.28	12.00	19.50
D_2	307.72	302.00	11.49	11.24	22.94	28.33	17.83	31.33
D_3	324.72	316.89	11.78	11.91	26.39	24.56	32.22	31.83
LSD at $_{0.05}$	9.36	10.74	--	--	1.86	1.45	1.56	2.14
Interactions								
N_1D_1	206.50	206.33	10.06	9.94	20.67	20.83	11.00	15.33
N_1D_2	308.17	298.67	10.60	10.63	20.83	25.33	18.00	29.00
N_1D_3	314.33	316.00	10.55	11.17	27.33	23.50	30.67	33.50
N_2D_1	219.17	247.50	10.77	10.79	22.33	23.50	12.83	19.00
N_2D_2	302.00	305.17	11.69	11.39	24.33	29.67	16.67	32.83
N_2D_3	335.67	305.17	12.21	11.78	24.83	23.67	28.50	33.00
N_3D_1	226.00	245.17	11.30	12.03	21.50	25.50	12.17	24.17
N_3D_2	313.00	302.17	12.19	11.69	23.67	30.00	18.83	32.17
N_3D_3	324.17	329.50	12.56	12.78	27.00	26.50	37.50	29.00
LSD at $_{0.05}$	--	18.60	--	--	--	--	2.71	3.71

The time of cut exhibited significant effect on fresh and dry forage yields (t/fad.) in both cuts, Table (3). Fresh and dry forage yields (t/fad.) increased gradually by increasing the period from sowing to first cut up to 60 days. The increase in fresh forage yield for cutting time 50 and 60 days compared to 40 days from sowing were 42.68 and 74.65 %, respectively, while, the increase in dry forage yield for cutting time 50 and 60 days compared to 40 days from sowing were 69.40 and 206.94 %, respectively. At the second cut, fresh and dry forage yields (t/fad.) increased

significantly by increasing the cutting intervals where the highest yields were obtained when the cut time was 50 days after the first cut, without significant difference between 50 and 60 days for fresh forage yield. The increase in fresh forage yield for cutting time 50 and 60 days compared to 40 days from the first cut were 20.00 and 17.51 %, respectively, while, the increase in dry forage yield for cutting time 50 and 60 days compared to 40 days from the first cut were 55.96 and 43.73 %, respectively. These results are in line with the results found by Gamal and Abdel-Galil (2001) and Ayub, *et al*. (2009).

Table (3): Effect of nitrogen fertilizer rates and cutting intervals on fresh and dry forage yields (t/fad.) and leaves/stem ratio of Sudan grass.

Parameters	Fresh forage yield (t/fad.)		Dry forage yield (t/fad.)		Leaves/stem ratio	
Treatment	Cut_1	Cut_2	Cut_1	Cut_2	Cut_1	Cut_2
Nitrogen Fertilizer Rate (kg N/fad.)						
N_1	31.02	19.94	5.71	3.91	1.32	0.95
N_2	31.65	21.01	5.59	4.39	1.38	0.96
N_3	36.78	22.84	6.97	4.76	1.26	0.98
LSD at $_{0.05}$	1.90	2.25	0.85	0.25	--	--
Cutting Intervals (days)						
D_1	23.83	18.90	3.17	3.27	1.81	1.23
D_2	34.00	22.68	5.37	5.10	1.31	0.88
D_3	41.62	22.21	9.73	4.70	0.84	0.79
LSD at $_{0.05}$	2.27	0.96	0.50	0.27	0.14	0.12
Interactions						
N_1D_1	21.99	15.31	2.94	2.46	1.90	1.36
N_1D_2	32.85	22.20	5.19	4.64	1.17	0.80
N_1D_3	38.21	22.32	8.99	4.64	0.90	0.70
N_2D_1	22.20	18.92	2.89	3.35	1.75	1.24
N_2D_2	31.95	21.96	4.73	5.03	1.50	0.92
N_2D_3	40.80	22.17	9.15	4.80	0.88	0.73
N_3D_1	27.29	22.49	3.67	4.01	1.77	1.08
N_3D_2	37.21	23.89	6.18	5.62	1.27	0.94
N_3D_3	45.85	22.15	11.05	4.65	0.73	0.94
LSD at $_{0.05}$	-	1.66	--	0.47	--	0.20

Fresh and dry forage yields (t/fad.) were significant affected by the interaction between nitrogen fertilizer rates and cutting intervals in the second cut only. The highest fresh and dry forage yields (23.89 and 5.62

t/fad., respectively) were obtained when nitrogen fertilizer was applied at a rate of 75 kg N/fad. and cutting intervals was 50 after the first cut.

B - Forage quality characters:

The results in Tables (3 and 4) show that no significant effect for nitrogen fertilizer rates on quality characters of forage in both cuts except, leaves crude protein percent in the first cut and leaves crude fiber % in both cut. Crude protein content in leaves increased when nitrogen rates increased up to 75 kg N/fad. in the first cut. The increase in crude protein due to the addition of N may be attributed to the beneficial effect of non protein formation. These results agree with those reported by Ayub, *et al*. (2009) and Abou-Amer and Kewan (2014**)**. The crude fiber in leave% increased when nitrogen rates increased up to 75 kg N/fad. in the both cuts, without significant difference between a rate of nitrogen of 45 and 60 kg N/fad. in the first cut and between a rate of nitrogen of 60 and 75 kg N/fad. in the second cut.

The obtained results in Table (3 and 4) point that there were significantly effect of cutting intervals on all quality characters i.e. leaves/stems ratio and crude protein and fiber percentages in leaves and stems in the two cuts, except leaves crude protein% in the first cut was no significant. Leaves/stems ratio, stems crude protein% in the both cuts and leaves crude protein% in the second decreased gradually by cutting intervals increasing. The decrease in protein contents may be due to dilution factor. A decrease in protein contents with delaying the harvest has also been reported by Ayub, *et al*. (2009) and ArshadUllah, *et al*. (2010). On contrary that, crude fiber % in leaves and stems increased by the cutting intervals for the first and second cut. These findings are in a good line with those obtained by Ayub, *et al*. (2009) and ArshadUllah, *et al*. (2010).

The interaction between nitrogen fertilizer rates and cutting intervals had significantly effect on leaves/stems ratio in the second cut only, crude protein% in leaves and crude fiber% in stems in the first cut only.

CONCLUSION

The nitrogen application improved the forage yield and quality characters, whereas, delaying the cut increased yield but decreased the forage quality. Keeping in view both yield and quality the Sudan grass *var*. Giza-2 may be fertilized at the rate of 75 Kg N/fad. and cutting at 60 and 50 days from sowing and the first cut, respectively.

Table (4): Effect of nitrogen fertilizer rates and cutting intervals on crude protein and crude fiber in leaves and stem of Sudan grass.

Parameters	Crude protein in leaves%		Crude protein in stem%		Crude fiber in leaves%		Crude fiber in stem %	
Treatment	Cut_1	Cut_2	Cut_1	Cut_2	Cut_1	Cut_2	Cut_1	Cut_2
Nitrogen Fertilizer Rate(kg N/fad.)								
N_1	10.62	9.65	4.24	4.81	23.97	24.58	26.33	26.67
N_2	10.79	9.89	4.76	4.99	23.15	26.02	26.33	27.33
N_3	11.39	9.96	4.77	5.34	24.69	26.34	26.74	27.08
LSD at $_{0.05}$	0.34	--	--	--	0.97	0.90	--	--
Cutting Intervals(days)								
D_1	10.89	10.61	5.24	5.97	21.38	22.08	22.71	23.53
D_2	10.96	9.55	4.44	4.73	23.65	26.65	27.24	28.03
D_3	10.96	9.35	4.10	4.44	26.78	28.21	29.45	29.52
LSD at $_{0.05}$	--	0.32	0.47	0.56	0.93	0.78	0.53	0.66
Interactions								
N_1D_1	10.93	10.22	4.80	5.33	21.53	20.93	23.48	23.30
N_1D_2	10.73	9.52	4.18	4.53	23.24	24.97	26.33	27.58
N_1D_3	10.21	9.22	3.75	4.56	27.14	27.83	29.20	29.14
N_2D_1	10.19	10.82	5.67	6.39	20.45	22.44	21.64	23.80
N_2D_2	11.14	9.43	4.63	4.53	22.34	27.60	27.32	28.36
N_2D_3	11.04	9.43	3.98	4.04	26.64	28.04	30.04	29.82
N_3D_1	11.54	10.81	5.24	6.20	22.14	22.86	23.00	23.50
N_3D_2	11.00	9.70	4.50	5.13	25.38	27.37	28.09	28.16
N_3D_3	11.63	9.39	4.58	4.71	26.55	28.78	29.12	29.60
LSD at $_{0.05}$	0.66	--	--	--	--	--	0.91	--

REFERRENCE

A.O.A.C. (1980). Official Methods of Analysis, 13th Ed. Association of Official Analysis Chemists, Washington, D.C.

Abou-Amer, A.I. and K.Z. Kewan (2014). Effect of NP fertilization levels on sorghum (*Sorghum bicolor L.*) yield and fodder quality for animals. Alix. J. Agric. Res. 59(1): 51-59.

Afzal, M.; A. Ahmad and A.U.H. Ahmad (2012). Effect of nitrogen on growth and yield of sorghum forage (*Sorghum bicolor* (L.) Moenchcv.) under three cuttings system. Cercetari Agronomice in Moldova. 45(4): 57-64.

ArshadUllah, M.; M. Anwar and A. Saeed, Rana (2010). Effect of nitrogen fertilization and harvesting intervals on the yield

and forage quality of elephant grass (*Pennisetum purpureum*) under mesic climate of Pothowar Plateau. Pak. J. Agri. Sci. 47(3): 231-234.

Ayub, M.; M.A. Nadeem; M. Tahir; M. Ibrahim and M.N. Aslam (2009). Effect of nitrogen application and harvesting intervals on forage yield and quality of pearl millet (*Pennisetum americanum* L.). Pak. J. Life soc. Sci. 7(2): 185-189.

Dahiya, O.S.; B.S. Dahiya; R.C. Punia and C. Ram (1997). Respiration rate as a measure of seedling establishment in forage sorghum (*Sorghum bicolor* (L.) Moench). Forage Res. 23 (3&4): 149-152.

El-Khawaga, A.A.H. and H.G.M. Geweifel (1991). Effect of seeding rate and nitrogen fertilization on forage sorghum I- Growth analysis. Zagazig J. Agric. Res., 18(6): 1805-1816.

El-Sarag, E.I. and G.M. Abu Hashem (2009). Effect of irrigation intervals and nitrogen rates on forage sorghum under north Sinai conditions. Zagazig J. Agric. Res. 36(1): 19-39.

Gamal, M.A. and M.M. Abdel-Galil (2001). Effect of first cutting date and plant population density on production and quality of forage Teosinten (*Zea mexicana Schard*). Minia J. of Agric. Res. and Develop. 21(1): 51-66.

Karwasar, R.S.; R.S. Kadin and D.R. Dahiya (1996). Effect of varieties and nitrogen on yield and yield attributes in forage sorghum. Forage Res. 22 (2&3): 203-206.

Shahin, M.G.; R.T. Abdrabou.; W.R. Abdelmoemn and M.H. Maha (2013). Response of growth and forage yield of pearl millet (*Pennisetum galucum*) to nitrogen fertilization rates and cutting height. Annals of Agricultural Science 58(2): 153-162.

Snedecer, G.W. and W.G. Cochran (1967). Statistical methods. Univ. Press, Iowa State, P. 189.

Soliman, N.S.Y. (2013). Effect of seed rate and nitrogen fertilizer on forage yield of Sudan grass (*Sorghum sudanense* ''Piper'' Stapf) in central Sudan. M.Sc. Thesis, Fac. Agric., Al-Gezira., Univ., Sudan.

Zeidan, E.M.; I.E. Ramadan; M.A. Gomaa and H.M. Hend, Hassan (2003). Effect of sowing date, mixture pattern and cutting date on forage yield productivity of fodder maize, cowpea and guar. Zagazig J. Agric. Res. 30(4): 1311-1326.

الملخص العربى

تأثير معدلات التسميد النيتروجينى ومواعيد الحش على إنتاجية العلف وجودته فى حشيشة السودان

مصطفى محمد إبراهيم[1] ، أحمد محمد أحمد عبد المنعم[2] ، محمد عبد العزيز أحمد السيد[1] ، أبوالمعارف محمد الأمير محمد[1]

[1] قسم المحاصيل – كلية الزراعة – جامعة الأزهر فرع أسيوط – مصر

[2] قسم المحاصيل – كلية الزراعة – جامعة أسيوط فرع الوادى الجديد– مصر

تمت تجربتان حقليتان فى المزرعة البحثية لكلية الزراعة جامعة الأزهر بأسيوط خلال الموسمين الزراعيين 2013 و 2014 وذلك بهدف دراسة تأثير معدلات التسميد النيتروجينى (45 ، 60 و 75 كجم نيتروجين للفدان) وثلاث مواعيد للحش (40 ، 50 و 60 يوم من الزراعة ومن الحشة الأولى) على المحصول وجودته لحشيشة السودان صنف جيزة–2.

ويمكن إيجاز أهم النتائج المتحصل عليها فى الآتى :

أدت زيادة التسميد النيتروجينى إلى زيادة معنوية فى إرتفاع النبات و قطر الساق و الوزن الجاف للأوراق والسيقان للنبات و محصول العلف الأخضر والجاف للفدان بالطن وكذلك نسبة البروتين الخام والألياف الخام فى الأوراق.

أدى تأخير ميعاد الحش من 40 إلى 50 أو 60 يوم من الزراعة إلى زيادة معنوية فى إرتفاع النبات والوزن الجاف للأوراق والسيقان للنبات و محصول العلف الأخضر والجاف للفدان بالطن وكذلك نسبة الألياف الخام فى الأوراق والسيقان بينما نقصت نسبة الأوراق للسيقان وكذلك نسبة البروتين الخام فى الأوراق والسيقان بتأخير ميعاد الحش.

أدى التفاعل بين معدلات التسميد النيتروجينى وميعاد الحش إلى تأثير معنوى على إرتفاع النبات فى الحشة الثانية والوزن الجاف للسيقان للنبات فى الحشتين و محصول العلف الأخضر والجاف بالطن للفدان و النسبة بين الأوراق والسيقان فى الحشة الثانية، أيضا" كان للتفاعل تأثير معنوى على نسبة البروتين الخام فى الأوراق و الألياف فى السيقان فى الحشة الأولى، بينما لم يكن للتفاعل تأثير معنوى على باقى الصفات تحت الدراسة.