OIU Journal of Agricultural Sciences (JOAS)
Vol. 4. No.(1) June, 2019
ISSN : **1585 -6465**

مجلة العلـــــوم الـزراعيـــة(JOAS)
المجلد.(4).العدد (1) يونيو 2019م
ISSN : **1585-6465**

مجلة العلوم الزراعية
Journal of Agricultural Sciences (JOAS)
Journal homepage:
http://journal.oiu.edu.sd/index.php/FAJAS

Effect of Time of Nitrogen Application on Growth and Yield Components of Safflower (*Carthamus tinctorius*)

Elkheir Hassaballah Abdallah Ahamed[1*] and Abdelbagi Ahamed Abdelbagi Elseemat[1]

[1]Department of Agronomy, Faculty of Agriculture, Omdurman Islamic University, Sudan

[*]**Correspondent Author:** **Mobile**: +249-911117205 **E-mail**:ahamedelkheir@yahoo.com

DOI: https://doi.org/10.52981/fajas.v4i1.2751

ABSTRACT

One of the main problems of safflower cultivation in Sudan is the lack of information dealing with its production, mainly cultural practices. The present work was carried out, to investigate the effect of time of nitrogen application (TNA) on growth and yield of safflower under irrigation conditions of South Omdurman region, Sudan. The study was conducted in two consecutive winter seasons (2009/2010 and 2010/2011) at the Demonstration Farm of the Faculty of Agriculture – Omdurman Islamic University, *Alfitaihab*, Sudan. Four TNA were used, namely, at sowing (T1), and then after 15, 30 and 45 days from sowing (denoted as T2, T3 and T4, respectively). The time of nitrogen application was randomly assigned in a randomized complete block design with three replicates. The growth parameters studied include: plant height, number of leaves/plant, plant fresh and dry weight. The first three parameters were taken 8 weeks after sowing. Yield and yield components studied were: days to start and to 50% flowering, disc weight/plant, number of seeds/plant, 100-seed weight, seed weight /disc, seed weight /plant and

seed yield/unit area. The findings of the study indicated that, TNA significantly affected number of leaves/plant and plant fresh weight during 2010, whereas plant height, plant dry weight and days to start and to 50% flowering were not significantly affected by time of N application. Application of N 45 days from sowing (T4) resulted in a significantly lower number of leaves/plant as compared to T1, T2 and T3 treatments. On the other hand, both T1 and T4 during the 1st season gave significantly higher plant fresh weight than T2 and T3.

Keyword: *Nitrogen; Application time; Growth; Yield and Yield components; Safflower*

1. INTRODUCTION

Safflower (*Carthamus tinctorius* L.) *Usfur* or *Gurtum* in Arabic is belongs to the family Composite /Asteraceae. It is an annual crop, with strong tap root and broad leaf with spiny edge**.** The crop is cultivated for different purposes, especially the compositional contents of seed such as oil, fabric dyes, food coloring, medicinal and industrial purposes ***(***Katole and Meena, 1988; Cho and Hahn, 2000; Zarei *et al.,* 2011; Abd El-Mohsen, and Mahmoud 2013; Eryiğit *et al*., 2014**).** Currently safflower is cultivated mainly for its edible oil. Safflower is known to be well adapted to irrigated cropping system, dry land and resistant to salinity (Rohini, and Sankara, 2000; Bassil and Kaffka, 2000; Eslam *et al.,* 2010; Khalil *et al.,* 2011).

The beginning of Safflower evaluation in USA started in 1925 and the commercial production did not begin until the 1950s (Jaradat and Shahid, 2006). In Sudan, commercial interest of safflower cultivation started in the early $1950_{S,}$ but the lack of information associated with its cultural practices during both the vegetative and reproductive development in addition to its competition of winter crops led to rule out the extension of

the crop as oil crop (khider, 1981). Nur (1976) observed that yield of safflower was significantly increased by application of three levels of N fertilizer and the higher level (84.6 Kg N/ha) significantly exceeded the control by 100%. The growth and yield of safflower are influenced by many biotic and a biotic factors, such as genotype, climatic factors, soil factors and agronomic practices (Singh and Singh, 1984; Dalip *et al.*, 1994; Kolsarici and Güney, 2002; Olsarıcı *et al.*, 2005; Dordas and Sioulas, 2008 and Omidi and Sharifmogadas, 2010). Application of fertilizer especially N element is the most important factor which determine safflower yield because of its multidimensional aspect on the growth, development and cell differentiation. Safflower like many other crops has highest need for N than other nutritional elements due to its role in vegetative and generative development (Nur, 1976; Bitarafan *et al.*, 2011; Morvarid *et al.*, 2012; Mohamed *et al.*, 2012). Management of crop nutrients, especially method and optimum time of application is one of the critical inputs for good growth and high yield (Mündel *et al.*, 2004; Siddiqui and Oad, 2006; Rajesh, and Amitesh, 2013). However, the objective of this study; was to evaluate effect of time of nitrogen application (TNA) on the growth and yield performance of safflower.

2. MATERIALS AND METHODS

A field experiments were conducted during two consecutive winter seasons (2009/2010 and 2010/2011) at the Demonstration Farm of the Faculty of Agriculture - Omdurman Islamic University - Sudan at *El-Fetehab*, latitude 15° 34 N, Longitude 32° 34 E and altitude of about 393m above sea level. The soils of the experimental site as described by Hassan and Fadual (2007) suffer from low depth and fertility, with pH ranging between 7.0 - 7.5. The treatments were one level of N in form of urea 46% applied at four different periods during plant life, namely, at sowing (T1), and then after 15, 30 and 45 days from sowing (denoted as

T2, T3 and T4, respectively). The experiment was set in a randomized complete block design (RCBD) with three replicates.

The Field Experiments

Before establishment of plots, the soil of the experimental site was first disc ploughed, leveled and then ridged. The experimental unit was a plot of 12 m^2 (3X4m) and the treatments were assigned randomly to plots. Before the 1st irrigation, a common dose of 50 kg P_2O_5 (H_2PO_4 48%) was applied. Four seeds/hole of spine safflower, variety *(Giza*) were sown manually on the top of the ridges (70 cm in width and 20 cm plant spacing). Sowing date was at mid-November for both seasons. The seeds were obtained from the Department of Agronomy, Faculty of Agriculture – Sudan University of Sciences and Technology - *Shambat*, Khartoum state, Sudan. Plants were irrigated weekly, and thinned to 1 – 2 plants/hole and also re-sowing of the missing holes at the 3rd irrigation. Weeding was done manually immediately before the 3rd, 5th and 7th irrigations. Moreover, Cyper Methrin 25% E.D. insecticide was applied for controlling of white fly.

Plant Measurements

After 8 weeks from sowing, plant height, number of leaves/plant, plant fresh and dry weight were taken from the mean of five randomly selected plants for each treatment, whereas days to start of flowering and to 50% flowering were taken. At plant maturity and from the five selected plants for vegetative growth parameters, the following were measured as yield components parameters: disc weight/plant, number of seeds/disc, 100 - Seed Weight, seed weight/ disc and seed weight/Plant. Seeds from an area of 4.2 m^2 were harvested for each treatment in each plot and weighed in grams and then seed yield/fed was calculated as follows:

$$\textbf{Seed yield (Kg/fed)} = \frac{\textbf{4200 m2} \times \textbf{yield per m2 (g)}}{\textbf{1000}}$$

Statistical Analysis

Data were analyzed using Analysis of Variance (ANOVA) according to Gomez and Gomez (1984).

3. RESULTS AND DISCUSSION

Growth attributes, which include plant height, number of leaves/plant and plant fresh and dry weight were presented in table1.Whereas, yield and yield components (days to start and to 50% flowering, disc weight/plant, number of seeds/disc, 100-seed weight, seed weight/disc, seed weight/ plant and seed yield/unit area were presented in table 2 and table3.

Plant Height (cm)

Table1 showed that, plant height of safflower in both seasons was not significantly affected by time of nitrogen application (TNA) and its value ranged between 15.70 cm for T3 and 22.90 cm for T1 in the 1st season and between 31.06 cm for T4 and 58.6 cm for T1 in the 2nd season. As shown in the table that T1 in both seasons resulted in significantly higher mean of plant height. This result may indicate the effect of early N application on this parameter (although insignificant) and it was in line with Precious *et al*., 2015 finding**.**

Table 1. Growth attributes of safflower as affected by time of nitrogen application during winter of 2010-2011 seasons

Treatments	Plant height (cm)		Number of leaves/ plant		Plant fresh weight (g)		Plant dry weight (g)	
Years	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**
T1	22.90	58.60	19.00	40.00	57.00	45.53	14.94	11.93
T2	16.50	51.60	18.00	42.00	43.00	66.96	11.60	18.06
T3	15.70	45.60	20.00	39.00	48.00	45.30	09.25	08.73
T4	20.80	31.06	15.00	30.00	55.00	44.06	09.99	08.00
L.S.D	23.83	31.97	02.93	15.02	05.17	52.78	01.33	10.89
Error d.f	6	6	6	6	6	6	6	6
F - value	0.27	01.22	05.17	01.36	0.01	00.52	0.04	02.12
C.V%	63.02	34.26	08.15	19.90	05.10	52.28	05.80	46.66

Number of Leaves/ Plant

Number of leaves/ plant as shown in table1 was significantly different between treatments in the first season, but not in the second season. In the first season, T1, T2 and T3 treatments recorded significantly higher number of leaves/ plant (19.00, 18.00 and 20.00, resp.) thanT4 (15.00), with an increase estimate of about 26.7%, 20.0% and 33.3%, respectively. Effect of early N application on number of nodes and branches may be behind the reason of significantly higher mean of number of leaves/ plant associated with these treatments as compared to T4 treatment (late application).

Plant Fresh and Dry Weight (g)

Statistical analysis revealed that, TNA significantly affected fresh weight of plant in the first season Whereas this parameter in the 2nd season as well as plant dry weight in both seasons were not significantly affected by treatments as shown in table1. The significantly higher plant fresh weight (57.00 gm), which was obtained by T1 as compared to T2 and T3 (43.00 and 48.00 gm, resp.) may be attributed to the effect of early N application on plant height and to some extent number of leaves and leaf area as well as the number of branches/plant.

Early N application (T1) although did not significantly increase plant dry weight during the 1st season, but it was reported to be the highest value of this parameter (14.94gm) as compared to other treatments, which may indicate the relationship between plant fresh and dry weight. This observation also could be observed for T2 during the 2nd season, where it was reported the highest plant fresh and dry weight, but with no significant difference (Table1).

Days to Start and to 50% Flowering

These parameters were not significantly affected by TNA in both seasons, but as shown in Table 2 that days to start of flowering was slightly reduced in T2 in both seasons, Whereas days to 50% flowering

for both seasons was slightly shortened in T1 than all other treatments, except T2 during the 2nd season. Many studies indicated that days to start and to 50% flowering are genetically controlled rather than environmentally controlled (Jaradat, and Shahid, 2006; Omidi, and Sharifmogadas, 2010).

Number of Seeds/ disc

Number of seeds/disc in the present study was not significantly affected by TNA in both seasons, and it ranged between 17.00 and 43.00 seeds/disc for T2 in the 1st and 2nd seasons, respectively and 12.00 seeds/disc for T4 in the 1st season and 29.00 seeds/disc for T3 in the 2nd season. It was clear that application of N, 15 days after sowing (T2) had better result regarding this parameter as compared to all other treatments, which could be attributed to the believe that application of N at this stage may encourage the seedling growth and hence the plant vegetative growth particularly during the 2nd season, as has been noticed previously in plant fresh and dry weight, which was finally reflected on this parameter.

Disc Weight/plant (g)

Disc weight may be used as indicator of seed size and seed yield/plant. In the present study, this parameter showed no significant differences between treatments in both seasons (Table 2), but as shown in table2 that the heavy weight in both seasons was associated with T1 treatment (21.10 and 49.10 gm/disc, respectively). As shown previously, T1 treatment showed good performance in respect to vegetative growth, which may be reflected on this parameters and other yield component parameters, which in turn is a manifestation of a proportional relationship between plant dry weight and yield components.

Seed Weight/disc (g)

Seed weight/disc was not significantly affected by TNA in both seasons and the value of this parameter ranged between 0.33 - 0.57 gm for the 1st

season obtained by T1and T3, respectively and 2.37- 2.64gm for the 2nd season recorded under T4, and T1, respectively. The result of the 2nd season indicates direct proportion between disc weight and seed weight/disc regarding the performance of T1 (Table 3).

Table 2. Effect of Time of Nitrogen Application (TNA) on Some Yield Components of Safflower during winter of 2010-2011 Seasons

Treatments	Days to start of flowering		Days to 50% flowering		Number of seeds/ Disc		Disc weigh/plant (g)	
Year	2010	2011	2010	2011	2010	2011	2010	2011
T1	76.00	93.00	84.00	99.00	09.00	34.00	21.10	49.10
T2	74.00	89.00	85.00	99.00	17.00	43.00	15.27	41.74
T3	77.00	93.00	86.00	100.0	13.00	29.00	14.90	36.00
T4	75.00	93.00	87.00	103.0	12.00	41.00	16.20	36.30
L.S.D	04.16	19.20	06.52	07.18	10.90	13.54	34.29	27.60
Error d.f	6	6	6	6	6	6	6	6
F-value	00.77	03.17	00.34	00.72	00.97	00.13	03.96	00.59
C.V%	02.76	02.00	03.82	03.58	42.74	18.42	101.64	33.83

100- Seed Weight (g)

Table3 showed that in both seasons, 100-seed weight was significantly affected by TNA treatments, and that T1 and T2 in 2010 had a significantly higher mean of this parameter (04.40 gm for each) than T3 and T4 (03.70 and 03.40 gm, resp.), Whereas in 2011 T1 significantly exceeded other treatments for this parameter (04.07 gm), Previous justification dealing with the effect of T1 and T2 on vegetative growth and hence number of seeds and disc weight may be valid for justifying this parameter.

Seed Weight/Plant (g)

No significant differences were observed for seed weight/plant due to TNA treatments (Table 3). This parameter in the 1st season was higher in T3 (21.30 gm) as compared to T1 (16.50 gm), T2 (08.87 gm) and T4 (14.27 gm) by about 28.5%, 138.2% and 48.3%, respectively, while during the 2nd season T1 achieved insignificantly higher mean of 22.74 gm corresponding to 17.87, 19.14 and 15.87 gm for T2, T3 and T4,

respectively, with an increase estimated by about 26.8%, 18.9% and 42.8%, respectively. The insignificantly higher value of seed weight /plant observed during the 1st season associated with T1 may be due to the positive effect of this treatment on seed size and weight. On the other hand, the higher seed weight/plant reported under T3 may reflect the impact of seed weight/disc as determining factor of seed weight/plant.

Seed Yield (kg/fed.)

Safflower yield was significantly affected by treatments in both seasons (table 3). Both treatments T1 and T2 in the first season, achieved the highest yield (483.00 and 449.91kg/ Fed., resp.), whereas T4 recorded the lowest yield (375.70 kg/ Fed.). In the second season, treatments T1, T3 andT4 achieved higher mean yield/unit area (619.50, 682.79 and 563.79 kg/ Fed.) respectively than T2 (393.38 Kg/fed.) with an increase estimated by about 57.5%, 73.6% and 43.3%, respectively. The good performance of T1 and T3 regarding the vegetative attributes as well as yield components may be behind their higher yield/unit area.

Table 3. Effect of Nitrogen Application Time (NAT) on Seed Weight (g)/ Disc, 100-Seed Weight (g), Seed Weight (g)/ Plant and Yield of Seed (kg)/ fed of Safflower

Treatments	Seed weight/disc (g)		100- Seed Weight (g)		Seed Weight/ Plant (g)		Seed Yield (kg/fed.)	
Years	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**
T1	0.33	02.64	04.40	04.07[a]	16.50	22.74	483.00	619.50
T2	0.35	02.64	04.40	03.05[b]	08.87	17.87	449.91	393.38
T3	0.57	02.50	03.70	03.43[b]	21.30	19.14	442.52	682.79
T4	0.37	02.37	03.40	03.53[a]	14.27	15.87	375.70	563.79
L.S.D	0.53	01.55	00.56	00.60	15.09	13.87	67.51	163.66
Error d.f	6	6	6	6	6	6	6	6
F-value	01.00	00.13	03.51	08.33	1.41	00.52	5.33	0.69
C.V%	65.33	30.50	06.98	08.02	49.50	36.66	07.71	14.48

4. CONCLUSION

Based on the findings of the present study it could be concluded that:

1. Early nitrogen application for safflower plants (either at sowing or two weeks after sowing) resulted in good performance for most vegetative growth parameters and yield components.
2. The highest value of coefficient of variation (CV) observed in most studied parameters may indicate the heterogeneity of the experimental units. This factor beside the small number of replications (degree of freedom error is less than10) may be behind the absence of significant effect of treatments for the most parameters even in the presence of great differences between them.
3. It was observed that the value of coefficient of variation (CV) for most studied parameters was higher, which may be due to soil variability where experiment was conducted. It was observed that there was a variation between selected plant sampling within each treatment regarding these attributes although all cultural practices for the studied genotype in each experimental unit was done as the same manner
4. More investigations on the effect of time of N application on growth and yield of safflower in different aspects are recommended.

Acknowledgement

The authors wish to thank the administration of the Faculty of Agriculture-Omdurman Islamic University for its support and permission to conduct these experiments. This work was a part of graduate project conducted by 5th year students during 2010 and 2011for fulfillment of B. Sc., in Agriculture, Department of Crop Production.

REFERENCES

Abd El- Mohsen, A. A. and Mahmoud, G. O. (2013). Modeling the influence of nitrogen rate and plant density on seed yield, yield components and seed quality of safflower. American Journal of Experimental Agriculture, 3(2): p. 336-360. http://dx.doi.org/10.9734/AJEA/2013/2886

Bassil, E.S. and Kaffka, S. R. (2002). Response of safflower (*Carthamus tinctorius L.*) to saline soils and irrigation. I. Consumptive water use. Agric Water Manage,. 54: p. 67-80. http://dx.doi.org/10.1016/S0378-3774(01)00148-2

Bitarafan, Z., Shirani-Rad A. H. and Delkhosh, B. (2011). Nitrogen rates and sowing date effect on yield and oil content of spring safflower. International Journal of Science and Advanced Technology.1 (6).

Cho, M.H. and Hahn, T.R. (2000). Purification and characterization of precarthamin decarboxylase from the yellow petals of (*Carthamus tinctorius L*). Arch Biochem Biophys, 382(244): p. 238-244 . http://dx.doi.org/10.1006/abbi.2000.1984.

Dalip, S., Deedar, S. and Kolar, J.S. (1994). Effect of nitrogen and row spacing on growth, yield and nitrogen uptake in rainfed safflower (Carthamus tinctorius). Indian Journal of Agricultural Sciences, 64(3): p. 189-191.

Dordas C. A., Sioulas, C. (2008). Safflower yield, chlorophyll content, photosynthesis, and water use efficiency response to nitrogen fertilization under rainfed conditions // Industrial Crops and Products. –, vol. 27, p. 75–85

Eryiğit, T ., Aki. Ç. R. and aya, A. R. (2014). Screening of different nitrogen rates and intra-row spacing effects on yield and yield components of safflower (Carthamus tinctorius under microclimate conditions, Iğdır Plain, Turkey. Canadian Journal of Plant Science,. 95(1): p. 141-147. http://dx.doi.org/10.4141/cjps-2014-188

Eslam, B.P., Monirifar, H., and Ghassemi, M.T. (2010). Evaluation of late season drought effects on seed and oil yields in spring safflower genotypes. Turk J. Agric. For., 34: p. 373-380.

Gomez, K. A. and Gomez, A. A. (1984). Statistical analysis of factorial system In: *Statistical Procedures for* Agricultural *Research* (New York: John Wailey and Sons)

Hassan, M.A.A. and Fadual, H.M. (2007). Preliminary description of soil profile at the old farm of the agricultural faculty of Omdurman Islamic University. Journal of Islamic World Research Studies Institute (IWRSI) PP: 247-258.

Jaradat, A.A. and Shahid, M. (2006). Patterns of phenotypic variation in a germplasm collection of *Carthamus tinctorius* L. from the Middle East. *Genet Resource crop Evol.*, 2, 129-140.

Katole, N.S. and Meena, G.P. (1988). Effect of row spacing, nitrogen and irrigation on seed yield, oil content and water requirement of safflower. Indian Journal of Agronomy, 33(3): p. 339-341

Khalil, N. A. A., Dagash, Y.M. and Yagoub, S. O. (2013). Effect of Sowing Date, Irrigation Intervals and Fertilizers on Safflower (*Carthamus tinctorius* L.) Yield. Discourse Journal of Agriculture and Food Sciences, 1(5): p. 97-102.

Khider, `M. O. (1981). Safflower in Sudan Proceedings of the First International Safflower Conference. University of California, Davis, California 12-16 July, 1981.

Kolsarici, O. and Güney, E. (2002). Effect of different row distances and various nitrogen doses on the yield components of a safflower variety. Sesame and Safflower Newsletter No. 17 (2002),. 17: p. 108-111.

Mohamed, S.J., Jellings, A.J. and Fuller, M. P. (2012). Effect of nitrogen on safflower physiology and productivity. African Crop Science Journal. 20(4): p. 225-237.

Morvarid, G., Amir, H. S., Babak, D. and Zahra, B. (2012). Safflower (*Carthamus tinctorius* L.) response to different nitrogen and phosphorus fertilizer rates in two planting seasons. Žemdirbystė Agriculture, vol. 99, No. 2 (2012), p. 159–166.

Mündel, H. H., Morrison, R. J., Blackshaw, R. E., Roth, B.(2004). Safflower production on the Canadian prairies: revisited in 2004 // Agricultural Research Stations. – Lethbridge, Canada, 43 p.

Nur, I. M. (1976). Effect of nitrogen fertilizer levels on the performance of safflower at Gizera Research Station. AAASA J. 3(1):52-53.

Olsarıcı, , S., AlluĢoğlu, and aya, D. (2005). The effects of tillage and nitrogen doses on water use efficiency, soil moisture and seed characters of safflower (Carthamus tinctorius in wheat-safflower rotation system , Engin aatbacilik td ġti Ġstanbul p 3 6, 126-131.

Omidi, A. H. and Sharifmogadas, M.R. (2010). Evaluation of Iranian safflower cultivars reaction to different sowing dates and plant densities. World Applied Sciences Journal, , 8(8): p. 953-958.

Precious, E. A., Namo O. A. T. (2015). Effect of time of fertilizer application on growth and yield of maize (*Zea mays L.*) in Jos-Plateau Environment. Global Journal of Agricultural Sciences. Vol 14.

Rajesh, K. S.and Amitesh. K. S. (2013). Effect of nitrogen, phosphorus and sulphur fertilization on productivity, nutrient-use efficiency and economics of safflower (*Carthamus tinctorius*) under late-sown condition. Indian Journal of Agronomy 58 (4): 583-587

Rohini, V.K. and Sankara, K.R. (2000). Embryo transformation, a practical approach for realizing transgenic plants of safflower (*Carthamus tinctorius L.*). Annals of Botany,. 86: p. 1043±1049.

Siddiqui, M.H. and Oad, F.C. (2006). Nitrogen requirement of safflower (C*arthamus tinctorius* L.) for growth and yield traits. *Asian Journal of Plant Sciences, 5: 563-565.*

Singh, U. R. and Singh, U. B. (1984). Response of safflower to different inter-row spacings and various levels of fertility. Indian Journal of Agronomy, 29(1): p. 90-93.

Zarei, G., Shamsi, H. and Fazeli, F. (2011). Effect of Planting Density on Yield and Yield.

.

OIU Journal of Agricultural Sciences (JOAS)
Vol. 4. No.(1) June, 2019
ISSN : **1585 -6465**

مجلة العلـــــوم الـزراعيــة(JOAS)
المجلد.(4).العدد (1) يونيو 2019م
ISSN : **1585-6465**

Effect of Time of Nitrogen Application on Growth and Yield Components of Safflower (*Carthamus tinctorius*)

Elkheir Hassaballah Abdallah Ahamed[1*] and Abdelbagi Ahamed Abdelbagi Elseemat[1]

[1]Department of Agronomy, Faculty of Agriculture, Omdurman Islamic University, Sudan

[*]**Correspondent Author:** **Mobile:** +249-911117205 Email:ahamedelkheir@yahoo.com

DOI: https://doi.org/10.52981/fajas.v4i1.2751

المستخلص

أحد المشاكل الرئيسية لزراعة القرطم في السودان هو نقص المعلومات المرتبطة بإنتاجه وبالأخص العمليات الفلاحية. هذا البحث يهدف إلى دراسة أثر مواعيد إضافة السماد النيتروجيني علي نمو وإنتاجية محصول القرطم تحت ظروف منطقة جنوب أم درمان. أُجريت تجربة حقلية لموسمين شتويين متتاليين (2010/2009 – 2011/2010م) بالحقل الإيضاحي بمزرعة كلية الزراعة – جامعة أم درمان الإسلامية (الفتيحاب)، السودان. المعاملات تمثلت في أربعة مواعيد إضافة للسماد وهي الإضافة مع الزراعة (T1) وبعد 15، 30، 45 يوم من الزراعة وهي (T2، T3، T4)علي التوالي. التصميم المستخدم في الدراسة هو تصميم القطاعات العشوائية الكاملة بثلاثة مكررات لتنفيذ التجربة وتحليل بياناتها إحصائياً. معايير النمو الخضري التي دُرست هي طول النبات، عدد الأوراق، الوزن الرطب والجاف للنبات، أُخذت هذه المؤشرات لثمانية أسابيع متتالية من الزراعة. مؤشرات الإنتاجية ومكوناتها كانت تاريخ ظهور أول زهرة و50% ازهار، وزن القرص/النبات، عدد البذور في النبات، وزن الـ 100 بذرة، وزن البذور/القرص، وزن البذور في النبات وإنتاجية البذور لوحدة المساحة. أوضحت النتائج أن مواعيد إضافة السماد النيتروجيني أترث معنوياً لعدد الأوراق في النبات والوزن الرطب للنبات في موسم 2010– 2011م، في حين أن طول النبات، الوزن الجاف للنبات، تاريخ ظهور أول زهرة و50% أزهار لم تتأثر بمواعيد إضافة السماد النيتروجيني. إضافة السماد النيتروجيني بعد 45 يوم من الزراعة أوضحت النتائج أنه أقل متوسط بالنسبة لعدد الأوراق مقارنة بالمعاملات T1،T2T3، ومن ناحية أخري فإن المعاملات T1وT4 لنفس الموسم حققت أعلي متوسط بالنسبة للوزن الرطب للنبات مقارنة بالمعاملات T2 وT3.

الكلمات المفتاحية: *نايتروجين؛ مواعيد الإضافة؛ النمو؛ مكونات الإنتاجية؛ القرطم*