

## RESPONSE OF OKRA CULTIVARS *Abelmoschus esculantus* (L.) Meonch TO THE DIFFERENT LEVELS OF NITROGEN AND DI-AMMONIUM PHOSPHATE

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### ABSTRACT

An experiment conducted to know the effect of nitrogen and DAP on growth and yield of okra cultivars. It laid down in (SRCD), with three replications. The treatments are control Co, two levels of nitrogen and DAP referred to as; N<sub>1</sub>, N<sub>2</sub>, D<sub>1</sub>, and D<sub>2</sub>, it is equal to 0, 36, 72, 72, 144 g plot<sup>-1</sup>, respectively, and cultivars of Bassanty, Jamoia, Khartomia. The results revealed that treatments significantly affected all parameters except yield per plant and hectare. Higher nitrogen gave the heaviest fresh and dry weight, while control gave higher dry matter. The greatest number of pods per plant recorded by the higher dose of DAP. Bassanty significantly increased vegetative and productive parameters and slightly pod yield per plant. Bassanty received the higher dose of DAP significantly increased growth, while Jamoia with lower dose of nitrogen increased yield components. This result concludes that the attributes of okra influenced by both treatments.

**Keywords:** Nitrogen DAP; Okra Cultivars; Growth Yield.

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## 1. INTRODUCTION

Okra *Abelmoschus esculantus* L. Moench. is one of the most important vegetables belong the family Malvaceae, which is approximately contains forty to fifty genus and about one thousand types [1]. The fresh fruits of okra are important as human food because of its taste, flavor and nutritional values. It is rich in vitamin A, B, C and minerals viz. calcium, phosphorous and iron [2]. It plays an important role in the meet the demand of the countries when vegetables are scanty in the market [3]. The geographical area of Sudan and Ethiopia is the origin of this crop, now a day, it's distributed to Africa, Middle East, India, Europe and America [4]. Okra is more consume as fresh pods, canned as well as dry powdery matter, especially in the rural [5]. In Sudan the growing season (March – June) can be devoted mainly for fresh production due to the high returns obtained during this period (early season) and to avoid rain damage of mature pods [6]. There are various ways for improving yield of Okra but the best way is to provide the appropriate amount of fertilizers and to select high yielding cultivars [7; 8]. The growth of the okra related to the application of fertilizers with nitrogen being the most prominent, due to the direct relationship of photosynthesis and vegetative growth of the plant [9]. Okra is a most important vegetable in Sudan, it is primarily grown for pods that are widely consumed in a civilian and rural as a fresh or dry powder. Despite, the highest consumption of Okra fruits, which lead to grow in a wide specialized farm under irrigation and in a rainy zone, but it lacks their orientation in the national agricultural scheme, which reflected on a fewer research information. The information of Okra plantation based mainly on-recorded data of the other field crops of the same family such as cotton. This study aimed to evaluate the effect of the nitrogen and DAP fertilizers on vegetative and reproductive growth of different Okra cultivars under the climate and soil of the New Halfa scheme.

## 2. MATERIALS AND METHODS

An experiment was carried out at 1<sup>st</sup> March 2021, in the demonstration land of the Faculty of Agriculture and Natural Resources, University of Kassala, Sudan (Long. 35° – 36° E, Lat. 15°- 18°N and 450 m above sea level). The experiment applied in Split Randomized Block Design (SRBD), replicated three times. The experimental unit is two and three meters in

dimensions and two plants per hole, (25x33cm interval) were planted. The treatments consisted of five fertilizer doses: control and two levels of nitrogen and Di-ammonium Phosphates DAP referred to as; Co, N<sub>1</sub>, N<sub>2</sub>, D<sub>1</sub>, D<sub>2</sub>, it equal to 0, 60, 120, 120, 240 Kg plot<sup>-1</sup>, respectively, used as main plot and three cultivars of okra Bassnty, Jamoia, Khartomia referred to as; Ba, Ja, Kh respectively, used as sub plot. Both fertilizers applied as one dose, DAP at the time of planting, while nitrogen after twenty-one days from sowing. The data on vegetative growth of plant fresh and dry weight and plant dry matter, after forty days from sowing, and reproductive growth of number of pods per plant and pod yield plant and per hectare was recorded. The data was statistically analyzed using computer software program (MSTAT-C) and the means separated using the Least Significant Difference (LSD) at  $P \leq 0.05$ .

### **3. RESULTS**

#### **3. 1. Effect of nitrogen and dap fertilizers and okra cultivars on plant fresh and dry weight and plant dry matter**

The fresh and dry weight of the plant, in addition to the dry matter is considerably affected by fertilizer, cultivar and their interaction, Table 1. The highest plant fresh and dry weight given by the higher dose of nitrogen, contrary lower dose of nitrogen presented smallest plant fresh weight and dry weight (in addition to control). The dry matter increased by the plant that received no fertilizer, followed by the lower dose of DAP, and decreased with the increase of both fertilizers. Bassanty cultivar significance is endowed by a greatest fresh weight, dry weight and dry matter compared with Jamoaaia cultivar, Moreover, it increases positively plant fresh weight, slightly plant dry weight and significant plant dry matter compared with Khartoumia cultivar. Bassantiy cultivar received the highest amount of DAP fertilizer significantly produced heavy fresh and dry weight in addition to the dry matter, moreover Jamaaoia cultivar, received a few amounts of nitrogen produced feathery fresh and dry weight, and lower plant dry matter with higher doses of DAP fertilizer.

#### **3. 2. Effect of nitrogen and dap fertilizers and okra cultivars on number of pods per plant, pod yield per plant and yield ton per hectare**

The total number of pods per plant was significantly affecting by applying various doses of

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fertilizer. The maximum and minimum number of pods per plant recorded by the higher and lower dose of DAP fertilizer respectively, while pod yield per plant and per hectare were not affected. Cultivars had a significant impact on pod counts per plant, pod yield per hectare and vice versa with pod yield per plant. Bassanty and Jamoia cultivars yielded the highest number of pods per plant compared with Khartoumia cultivar which record decreased. There was significant difference due to the interaction between fertilizer and cultivar. Jamoia cultivar with a lower dose of nitrogen noticed a superior yield component compared with both cultivars, followed by Bassanty cultivar received lower doses of DAP whereas statistically similar, while lower doses of nitrogen negatively decreased the yield components of Khartoumia cultivar (Table 2).

**Table 1.** Effect of nitrogen and dap fertilizers and okra cultivars on plant fresh and dry weight and plant dry matter

	Plant Fresh Weight (g)				Plant Dry Weight (g)				Plant dry matter (%)			
	Ba	Ja	Kh	Means	Ba	Ja	Kh	Means	Ba	Ja	Kh	Means
<b>Co</b>	106.7	90.83	98.33	98.61	12.00	9.67	9.50	10.39	8.582	7.447	7.405	7.811
<b>N<sub>1</sub></b>	83.33	78.67	78.67	80.22	11.67	9.00	11.42	10.69	7.673	6.785	6.321	6.926
<b>N<sub>2</sub></b>	103.7	109.3	108.33	107.1	15.00	14.33	14.67	14.67	7.913	6.720	6.190	6.941
<b>D<sub>1</sub></b>	105.3	85.33	104.7	98.44	14.33	12.42	15.67	14.14	8.056	6.507	7.953	7.505
<b>D<sub>2</sub></b>	116.3	85.67	102.3	101.4	17.00	12.00	14.00	14.33	8.287	5.895	7.008	7.063
<b>Means</b>	.1031	89.97	98.47		14.00	11.48	13.05		8.102	6.671	6.975	
<b>C v %</b>				13.64				14.65				9.78
<b>LSD</b>	C 10.1	F 13.0	CF 22.6		C 1.43	F 1.85	CF 3.21		C 0.540	F 0.697	CF 1.21	



**Table 2.** Effect of nitrogen and dap fertilizers and okra cultivars on number of pods per plant, pod yield per plant and per hectare of okra plant.

	No. of Pods Per Plant				Pods Yield Per Plant (g)				Pod Yield Per Hectare (Kg/ha)			
	Ba	Ja	Kh	Means	Ba	Ja	Kh	Means	Ba	Ja	Kh	Means
<b>Co</b>	10.73	11.87	10.40	11.00	63.40	68.37	62.40	64.72	2.54	2.74	.250	2.59
<b>N<sub>1</sub></b>	11.40	13.47	7.400	10.76	64.87	76.80	34.67	58.78	.260	3.19	1.39	2.39
<b>N<sub>2</sub></b>	11.03	11.53	11.07	11.21	62.40	53.67	59.13	58.40	.250	2.15	2.37	2.34
<b>D<sub>1</sub></b>	12.80	10.07	8.533	10.47	75.80	53.87	51.40	60.36	3.03	2.16	2.06	2.41
<b>D<sub>2</sub></b>	11.60	11.20	12.80	11.87	69.60	48.87	64.00	60.82	2.78	1.96	2.44	2.39
Means	11.51	11.63	10.04		67.21	60.13	54.32		2.69	2.44	2.15	2.59
C v %				10.12				10.15				12.39
LSD	C 0.85	F 1.10	CF 1.91		C6.12	F 7.89	CF 13.7		C 0.23	F 0.295	CF 0.51	



#### 4. DISCUSSION

The availability of nitrogen and phosphorus in both higher doses provide the plants by the adequate amount of their nutrient needs, leading to the dramatic increase in plant fresh and feasible in dry weight and that reflect in a lower plant dry matter which is being higher in the control treatment. This result is confirmed by the finding of reference [10] they found that the higher dose of nitrogen gave the greatest dry weights of the plant, while the plants grown without nitrogen decreased plant dry weight. The cultivar Bassantiy have a highly response better to the higher dose of DAP compared with both cultivars, it presented the heaviest shoot fresh and dry weight and dry matter of plants, this in agree of the findings of [11] they concluded that Maize variety Jalal performed better as compared to Azam. ). The increase in the number of pods per plant due to the higher dose of both DAP and nitrogen, may be due to the adequate balance between nitrogen and Phosphates that hold by higher doses of DAP or due to the quite enough of a nitrogen hold by urea . The authers [12] found that the applications of nitrogen in a proper amount recorded higher yield attributes of the number of pods per plant. Jana [13] noticed a significant difference in the number of fruits per plant for levels of nitrogen. The researchers [14] examined different doses of phosphorus, mentioned a contrary result. They found that the application of phosphorus had no significant effect on number of pods per plant, while pods weight were significantly affected, being maximum at the highest level and minimum at the lowest one. This may return to the differences of the environmental conditions, the individual use of nitrogen-free phosphorus or to the different of the cultivar. [15] revealed that nitrogen and phosphorus had a highly significant effect on pod number per plant. The highest total fruit yield was recorded from treatment combination of nitrogen and phosphorus. Genetic variability of cultivars leads to variation in the pod yield per plant (slightly), number of pods per plant and pod yield per hectare produced, this result supported by the result of [16-19].

#### 5. CONCLUSION

From the results of this investigation, it can be concluded that growth and yield of okra strongly influenced by the cultivars and both fertilizer dose and type. The higher values of vegetative growth distributed between fertilizer treatments, while the lower values presented by the lower dose of nitrogen, furthermore fertilizer had no effect on yield parameters except number of pods per plant. Bassanty cultivar had a strongest vegetative growth, which reflected in a best yield component. Higher dose of DAP increased vegetative attributes of Bassanty cultivar, while lower doses of nitrogen increased yield components.



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