SHORT NOTE

Effect of nitrogen fertilizer on growth and yield of grain sorghum variety *Abu Timan*

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In Africa and Asia, sorghum grain is milled to make flour that is used for a variety of traditional foods. Its embryo is rich in protein, lipids and vitamin B (Murty and Ronard, 2001). The crop residues were used to feed animals . Sorghum variety Abu Timan (local variety from Western Sudan) phenolog showed that, the plant is tall and each glume contains two grains, a character from which the crop draws its name Abu Timan (Twin sorghum) .Abu Timan seeds brought from Jabel Marra were examined with other varieties namely *Gadam Al Hamam* and *Wad Ahmed* (released varieties) under field conditions to investigate the effect of three levels of nitrogen on grain yield and yield components of the three sorghum varieties.

Field experiments were conducted in seasons 2004/05 and 2005/06 at the Demonstration Farm of the Faculty of Agriculture Abu Naama, Universty of Sinnar, Sinnar State, Sudan, 400 km South East of Khartoum. The field area is vertisols, with 67% clay 1.2 – 12ppm phosphorus, 0.02 -0.64% nitrogen and the pH is ranging from 7.5 to 9.3 (Elhassan, 1999) .Experiments were arranged in a randomized complete block design with four replications . The experimental site was disc ploughed, harrowed, leveled and ridged at 80 cm apart and 30 cm between plants. Plot size 6 X 7 m. Three nitrogen levels (0, 43 and 86 kg N/ha) were applied in form of urea .Seeds of sorghum were sown on the 13 th and the 14 th of July for the first and second seasons , respectively. Sowing was carried at a rate of 3 – 4 seeds/hole, thinned to three plants/hole at three weeks after sowing .

The experiment was irrigated till crop establishment, then suppl-ementary irrigation was applied when needed. Growth traits, plant height, days to 50% flowering , grain yield and yield components (number of grains per head and 1000 grain weight) were measured. The climatic conditions minimum and maximum temperature; and rainfall during seas-ns 2004/05 and 2005/06 were 23.1/36.3 and 23.1/36.8 ^{0}C and 478.3 and 591.6 mm, respectively. Phenological differences were observed betw-en the three sorghum varieties. Abu Timan had the tallest plants (203.6 cm) while *Wad Ahmed* was the shortest (111.3 cm). Abu Timan has two grains per glume while the other two varieties have a single grain per glume .

The study showed that Abu Timan was the latest to flower , followed by *Gadam Al Hamam* , however , *Wad Ahmed* being the earliest . Days to 50% flowering were 86 , 76 and 73, respectively (data not shown) . Data on number of grains per head, 1000–grain weight and mean grain yield of the three sorghum varieties are shown in tables (1 , 2 and 3). *Gadam Al Hamam* had the highest grain yield in both seasons followed by *Abu Timan* and *Wad Ahmed* was in the third with mean grain yield of 5.42 and 6.55; 4.99 and 6.48; 4.04 and 6.04 t/ha , respectively (Table 2) .

The rate of nitrogen application had no effect neither, on the yield components (number of grain per plant or 1000–grain weight) nor on the final grain yield except in season 2005/06 where the application of 86 kg N/ha significantly increased the grain yield of the three varieties over the other two treatments. This could be attributed to the better climatic conditions mainly the amount of rainfall in the second season . Similar findings were found by Ishag and Babiker (1972) and Hassan (2004). The results of this study indicate that *Abu Timan* is a land race of great potentialities and further studies are needed to determine other optimum cultural practices to achieve the maximum possible grain yield.

Table 1. Number of seeds per head of three sorghum varieties as affected by levels of nitrogen fertilizers grown in Abu Naama Demonstration Farm during seasons 2004/05 and 2005/06.

Nitrogen levels	First season (2004/05)			
	Abu Timan	Gadam Al-Hamam	Wad Ahmed	Mean
0 N	2265 a	2186 a	1778 b	2076 A
43 N/ha	2382 a	2349 a	1747 b	2159 A
86 N/ha	2168 a	2432 a	1989 b	2196 A
Mean	2272 A	2322 A	1838 B	
	Second season (2005/06)			
0 N	2345 a	1530 b	1883 b	1919 A
43 N/ha	2409 a	1834 b	1713 b	1985 A
86 N/ha	2453 a	1865 b	2124 a	2147 A
Mean	2402 A	1743 B	1907 B	

Means followed by the same letter(s) are not significantly different at 0.05% level of significance according to Least Significant Difference test (LSD).

Table 2. 1000-seeds weight (g) of three sorghum varieties as affected by levels of nitrogen fertilizers grown in Abu Naama Demonstration Farm during seasons 2004/05 and 2005/06.

Nitrogen levels	First season (2004/05)			
	Abu Timan	Gadam Al-Hamam	Wad Ahmed	Mean
0 N	13.0 b	18.0 a	20.5 a	17.2 A
43 N/ha	15.8 b	20.4 a	18.5 a	18.2 A
86 N/ha	13.3 b	20.3 a	20.5 a	18.0 A
Mean	14.0 B	19.6 A	19.8 A	
	Second season (2005/06)			
0 N	28.4 a	28.3 a	29.4 a	28.7 A
43 N/ha	26.7 a	26.2 a	30.3 a	27.7 A
86 N/ha	29.1 a	27.9 a	28.6 a	28.5 A
Mean	28.1 A	27.5 A	29.4 A	

Means followed by the same letter(s) are not significantly different at 0.05% level of significance according to Least Significant Difference test (LSD).

Table 3. Grain yield (t/ha) of three sorghum varieties as affected by levels of nitrogen fertilizers grown in Abu Naama Demonstration Farm during seasons 2004/05 and 2005/06.

Nitrogen levels	First season (2004/05)			
	Abu Timan	Gadam Al-Hamam	Wad Ahmed	Mean
0 N	6.08 b	6.22 a	4.15 g	5.48 A
43 N/ha	4.96 d	4.97 d	4.38 e	4.68 B
86 N/ha	4.20 f	5.08 c	3.61 h	4.29 C
Mean	4.99 B	5.42 A	4.04 C	
		Second season (2005/06)		
0 N	5.75 h	5.50 h	5.93 g	5.73 C
43 N/ha	6.73 c	6.15 d	4.58 i	5.82 B
86 N/ha	6.75 c	8.00 a	7.61 b	7.52 A
Mean	6.48 B	6.55 A	6.04 C	

Means followed by the same letter(s) are not significantly different at 0.05% level of significance according to Least Significant Difference test (LSD).

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تأثير سماد النيتروجين على نمو وإنتاجية محصول الذره الرفيعة صنف أبو تيمان

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الخلاصة

أُجريت هذه التجربة الحقلية لموسمين زراعيين (05/2004، 06/2005) بالمزرعة الإيضاحية، كلية الزراعة أبو نعامة لمعرفة تأثير ثلاث مستويات من النتروجين على مؤشرات النمو والإنتاجية لصنف ماريق أبو تيمان (صنف محلي من غرب السودان). تمت مقارنة أبو تيمان مع صنفي قدم الحمام وود أحمد (أصناف مجازة). أظهرت الدراسة أن هنالك إختلافاً في الشكل الظاهري بين الأصناف الثلاثة .صنف أبو تيمان يتفوق في الطول (203سم) علي صنف قدم الحمام (111.4سم) وصنف ود أحمد (111.3سم) . كما أن القنابات لصنف أبوتيمان تحتوي علي بذرتين بينما تحتوي علي بذرة وأحدة للصنفين الآخرين . من نتائج الدراسة تبين أن أبوتيمان متأخر في الأزهار بينما ود أحمد كان المبكر في الإزهار . كان عدد الأيام لـ 50% أزهار لكل من أبوتيمان ، قدم الحمام وود أحمد 86 ، 76 ، 73 علي التوالي . تأثير إضافة سماد النتروجين علي مؤشرات مكونات الإنتاج - عدد البذور في القندول ووزن الألف بذرة والإنتاجية غير معنوي . أثبتت الدراسة أن الصنف قدم الحمام قد حقق أعلي إنتاجية (5.42 ، 6.55 طن/هـ) وماريق أبو تيمان في المرتبة الثانية بإنتاجية (4.99 ، 6.48 طن/هـ) وفي المرتبة الأخيرة ود أحمد بإنتاجية (4.04، 6.04 طن/هـ) في موسمي 05/2004 و06/2005 ، علي التوالي . إضافة 2N (86 كجم نتروجين/هـ) أدي إلي زيادة معنوية في إنتاجية أصناف الذرة الرفيعة الثلاثة في موسم (06/2005) . نتائج الدراسة توضح أن ماريق أبو تيمان له مقدره إنتاجية عالية. والتوصية بالمزيد من الدراسات لتحديد المعاملات الفلاحية المناسبة للحصول علي أعلي إنتاجية ممكنة .