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EFFECT OF INTERCROPPING SYSTEMS OF GUAR WITH SWEET SORGHUM UNDER DIFFERENT LEVELS OF POTASSIUM FERTILIZER

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Abstract

Two fields experiments were carried out at Shandaweel Experimental Research Station, Sohag governorate during 2001 and 2002 seasons to study the effect of intercropping systems of sweet sorghum with guar (v. Balady); 1 : 1, 2 : 2 and 2 : 1 ridges of sweet sorghum to guar and potassium fertilizer; zero, 24 and 48 kg/ fed. The Experimental design was split-plot design of three replications.

Higher values were obtained by intercropping sweet sorghum with guar for plant height, no. of nods/ plant and head height with the treatments of 1 : 1, compared with pure stand which gave the lowest value. The clean stalk yields/ fed, % purity and juice yield/ fed were the highest with sweet sorghum in pure stand followed by 2 : 2 system; while the lowest one was recorded with 1 : 1 treatment.

Guar plant height and total fresh yield/ fed recorded the highest values under pure stand cultivation, but the intercropping system of 2 :2 gave higher values for no. of tillers and leaf area/ plant. The lowest values were recorded with guar pure stand.

The increase of k fertilizer up to 48 kg/ fed increased all the growth characteristics. Moreover, the stalk yield, juice yield/ fed., % sucrose, % Brix and % purity markedly increased by increasing k fertilizer level. Increasing k fertilizer had significant effect on guar plant growth and total fresh yield, except plant height.

Competitive relationships indicated that higher values of Land Equivalent Ratio (LER) and Relative Crowding Coefficient (RCC) were remarkable with the system of 2 : 2, whereas the lowest values were recorded with the system of 1 :1 furthermore, sweet sorghum was dominant and guar was dominated.

Interaction between intercropping systems and potassium fertilizer (48 kg k/ fed and 2 : 2 system) maximized total stalk yield and juice yield/ fed of sweet sorghum and total fresh yield of guar.

INTRODUCTION

Sweet sorghum is one of the alternative energy crop and good source for alcohol production, since its component include juice in the stem and the presence of sugars in the juice. Increasing sweet sorghum can be achieved through some agricultural management practices such as intercropping and potassium fertilizer. Intercropping Sweet sorghum with guar; (known as the heat, drought and saline tolerant as well as deep-rooted summer annual legume adapted to semi arid region (Francois *et al.*, 1990)) may contribute to increasing total yield productivity and net income.

Many investigators studied the intercropping sweet sorghum with other crops. Nyambo *et al.* (1980) reported increasing LER (Land Equivalent Ratio) up to 1.47 when using different intercropping system of sorghum with green gram. Also, added yield of the legume is usally more depressed than that of the non legume. Williams *et al.*, (1986) revealed that stalk sugars were higher at low populations and considerably lower at high population. Increasing number of alternating ridges substantially increased plant height, ear position and reduced leaf area of corn, but decrease the yield. Samia *et al.*, (1994) found that intercropping sesame with sweet sorghum had no significant effect on sweet sorghum plant height, total soluble sugar and sucrose percentage. Whereas, juice yield and syrup were reduced by intercropping with sesame, compared with sweet sorghum pure stand.

Potassium fertilizer is very important for sweet sorghum and fresh fodder yield. Some growth and agronomic characters of sweet sorghum i.e, plant height, stem diameter and weight and total fresh yield were significantly affected by adding K fertilizer. Increasing stand density, decreased photosynthesis and there by lower weights of leaves and stalks (Knipmeyen *et al.*, 1962). Level of NPK accelerated growth process yield of shoot dry matter and biological yield when it was in harmony with stand density (Vidovic and Pokorny, 1973). Plants were significantly affected and their yield were increased with increasing k fertilizer up to 50 kg/ ha, (Coutinho *et al.*, 1989) and to 120 kg/ ha (Golubev, 1989). With 200 kg k20/ ha, stem diameter and sugar and ethanol yields were increased (Vidal and Neptune 1989). Content of reducing sugar increased linearly with k application, up to 80 kg/ ha (Cordeiro *et al.*, 1986). Adding 60-120 kg k/ ha increased sweet sorghum chlorophyll contents, net photosynthetic productivity and photosynthetic potential (leaf area duration) and average dry matter yields of 9.72-11.85 t/ha, compared to 8.68t/ha without adding NPK, (Oleksenko and Krasnenkov, 1989).

This research aims to study the effect of intercropping systems and potassium fertilizer on yield, yield components and quality of sweet sorghum and total fresh yield of guar.

MATERIALS AND METHODS

Two field trials were conducted at the Experimental Research Station at Shandweel, Sohag Governorate during the two successive seasons of 2001 and 2002 to study the effect of intercropping systems and potassium fertilizer rates on sweet sorghum (Sorghum bicolor. L. Moench) variety Sucro Sorgho 301 with guar (Cyamposis tetragonoloba (L.) Tabu.) var. Balady on growth, yield, its components and chemical contents of sweet sorghum.

A split-plot design with 3 replications was used and treatments were as follows:

A. Intercropping systems (main-plots):

T1: Intercropping guar with sweet sorghum by planting sweet sorghum on ridges 60 cm wide in hills spaced 25 cm apart on one ridge and planting guar on the other ridge in hills 30 cm. a part (50 % of the sole crop) 1:1.

T2: Intercropping guar with sweet sorghum by planting sweet sorghum on two ridges and planting guar on the other two ridges (50 % of the sole crop) 2 : 2.

T3: Intercropping guar with sweet sorghum by planting sweet sorghum on two ridges (66 % of the sole crop) and planting guar on the other one ridges (33 % of the sole crop) 2 : 1.

T4: Planting sweet sorghum as pure stand.

T5: Planting guar as pure stand.

B. Potassium application (k) (sub-plots):

1. Without application (control)
2. 24 kg k2o/ feddan.
3. 48 kg k2o/ feddan.

Seeds of the two crops were seeded at the same time on June 3 rd and 5 th in 2001 and 2002 seasons, respectively. The physical and chemical analysis of the Agricultural Experimental Station Farm of Shandaweel is shown in Table (1): Each experiment was carried out in split-plot design with three replications. The experimental unit was 6 m in length and 4.8 m in width (28.8 m2); and consisted of 8 ridges 60 cm wide.

The preceding crop was berseem in both seasons. Normal cultural practices were applied for crops under study either in pure stand or in intercropping as recommended for the region. Super-phosphate (15.5 % P205) at a rate of as 200 kg/ fed added during land preparation.

Nitrogen fertilizer in the form of ammonium nitrate (33.5 % N) was applied for all plots at the rate of 120 kg N/ fed for sweet sorghum in three doses. The first one was applied at 30 kg N after 21 days, 45 kg N after 36 days and 45 kg N 15 days later. As for guar, three cuts were taken; the first cut was after 60 days of planting and the other cuts were after 50 days from each other. Twenty kg N was added after the first cut and another 20 kg N after the second cut.

Ten plants were taken randomly to determine yield parameters, while the yield / fed was determined from the whole plot.

Sweet sorghum: plant height (cm), stem diameter (cm), no. of internods/plant, head height (cm), stalk yield ton/ fed.

Quality attributes: % Reducing sugar, % sucrose, % Brix, and % purity were determined according to methods of Mead and Chen (1997).

% Purity = (% sucrose X100) / % Brix

Twenty-five stripped stalks were taken randomly from each plot and immediately crushed through 3 roller lab. Mill. The raw juice was filtered and weighed and % extraction was calculated:

% Extraction = (Juice yield/ fed X 100) /weight of stripped stalk (fed).

Guar: plant height (cm), no. of tillers/ plant, leaf area (cm^2) and fresh yield ton/ fed.

Table 1. Chemical analysis of the soil during the two seasons.

A: Physical analysis				
Coarse sand %	Fine sand %	Silt %	Clay %	Textural class
2.1	20.40	26.35	51.15	Clay loam
B: Chemical analysis (available contents)				
N (ppm)	P (ppm)	K (ppm)	Na meq./L	PH
28.5	17.5	552	2.50	7.7

According to methods outlined by Black (1965)

Competitive relationships:

Land equivalent ratio (LER), Relative Crowding coefficient (K) and Aggressivity (A) were respectively calculated according to Willey (1965), Dewit (1960) and Mc-Gilchrist (1974).

$$\textbf{LER} = \frac{ys}{yss} + \frac{yg}{ygg}$$

where: ys = yield intercropped of sweet sorghum with guar

yg = yield intercropped of guar with sweet sorghum

yss = yield pure stand of sweet sorghum

ygg = yield pure stand of guar

K = K1 X K2, where:

$$\textbf{K1} = \frac{Ys \times \%Z2}{(Yss - Ys) \times z1} \qquad \textbf{K2} = \frac{Yg \times Z1}{(Ygg - Yg) \times Z2}$$

where: % Z1 = Area occupied by sweet sorghum

% Z2 = Area occupied by guar

A = A1 – A2 for sweet sorghum A2 – A1 for guar

$$\textbf{A1 (sweet sorghum)} = \frac{Ys}{Yss \times \% Z1} - \frac{Yg}{Ygg \times \% Z2}$$

$$\textbf{A2 (guar)} = \frac{Yg}{Ygg \times \% Z2} - \frac{Ys}{Yss \times \% Z1}$$

Economic evaluation: The total income from each treatment was calculated in Egyptian pound/ ton at market price of L.E. 100/ ton of sweet sorghum stalks and LE 100/ ton of guar according to farm price.

Statistically analysis: Data obtained in each season were statically analyzed according to procedures outlined by Roger (1985) and the treatment means were compared significant differences (L.S.D).

RESULTS AND DISCUSSION

1. Effect of intercropping systems:

1.1. Sweet sorghum:

Data presented in Table (2) indicated that yield, yield components and chemical characteristics of sweet sorghum were significantly affected by intercropping patterns in both seasons, except reducing sugar. The results showed that plant height and head height recorded the highest values with the intercropping system of 1 : 1 followed by 2 :2, then 2 :1, compared with the sorghum pure stand which recorded the lowest value. These data are expected due to increasing of plant density of both crops which led to the increase in elongation of plant due to increased inter-competition between sweet sorghum and guar plants for light as a key factor affecting photosynthesis (Vidovic and Pokorny, 1973). On the contrary, stem diameter decreased with increasing plant density. With respect to no. of internods/ plant, the results indicated that increasing sweet sorghum plants per unit/ area was accompanied by an increase in no. of internodes/ plant. Such increase might be due to active division of inter-calary meristeim.

Stalk yield/fed of sweet sorghum intercropped with guar showed that the highest values were recorded with the system of 2 :1 (sweet sorghum : guar), followed by 2 :2, while the lowest values recorded with 1 :1 system. Stalk yield recorded 14.80, 11.80 and 11.20 ton/ fed. in the first season and 13.58, 11.50 and 11.40 in the second season, respectively. Sweet sorghum pure stand recorded the highest values of stalk yield. This was expected since the metabolites synthesis and photosynthetic co2 reduction were higher when sweet sorghum plants were grown solid (Knipimeyen *et al.*, 1962).

Regarding juice yield ton/ fed, the obtained data revealed that the increased sweet sorghum yield increased juice yield ton/ fed., recording 8.12, 6.33 and 6.00 in the first season and 8.04, 6.18 and 5.82 ton/ fed in the second season due to 2 : 1, 2 : 2 and 1 : 1 intercropping systems, respectively while, the % extraction had a vise versa trend. The sorghum pure stand gave the highest values due to its growing as full stand (Samia *et al.*, 1994).

With respect to chemical analysis, % reducing sugar, sucrose, brix and purity, data in (Table 2) showed that % total soluble sugar and % sucrose significantly increased by increasing sweet sorghum plant density. The highest values collected from the system of 2 : 2, followed by 2 : 1 and 1 : 1, whereas the %purity took the opposite trend. (Williams, *et al.*, 1968). Reducing sugar percentage was not affected.

1.2. Guar:

Effect of intercropping systems on guar yield and yield components are shown in Table (3). Results revealed that yield and yield components of guar were significantly affected by intercropping systems in both seasons. Plant height exhibited the highest values with guar pure stand followed by intercropping systems of 1:1, then 2 : 1, while the lowest values recorded with 2 : 2 system. These data are true due to the increase in plant population of guar pure stand and specific inter- row competition (Mahmoud and Khalifa, 1983).

With regard to no. of tillers/ plant, the obtained results indicated that intercropping system of 2 : 2 gave the highest values, whereas the lowest value was recorded with guar pure stand. Leaf area had the same trend as no. of tillers/ plant.These data clearly show that the intercropping systems had contributing influence on leaf area, primarily through their effect on tillers and thus leaf production.

Concerning yield/ fed, the results show that the highest values were obtained with guar pure stand (100 % population) followed by 2 : 2 then 1 : 1. The lowest values were recorded with 2 : 1 system in both season. The values were 15.97, 8.93, 8.16 and 6.05 ton/ fed in the first season and 15.72, 8.98, 8.80 and 5.00 ton/ fed in the second season, respectively.

Table 2. Effect of intercropping systems of sweet sorghum with guar on yield, yield components and quality traits of sweet sorghum.

Characters / Treatments	Plant height (cm)	Stem diameter (cm)	No. of Internods/ plant	Head height (cm)	Stalk yield ton/fed.	Reducing sugar %	Succrose %	Brix %	Purity %	Extraction %	Juice yield ton/fed
2001 season											
1 : 1(sorghum:guar)	367.00	2.17	20.13	313.17	11.20	2.33	9.53	18.03	52.86	65.22	6.00
2 : 2 (sorghum:guar)	344.50	2.30	16.93	299.83	11.80	2.41	8.40	14.28	58.82	64.59	6.33
2 : 1(sorghum:guar)	337.00	2.31	18.30	290.00	14.80	2.35	8.51	14.78	57.58	63.44	8.12
Sorghum pure stand	336.67	2.12	16.88	288.67	18.25	2.39	8.74	15.70	55.67	65.59	11.97
L.S.D at (0.05)	3.19	0.05	0.28	1.68	5.97	N.S	0.60	0.64	4.37	1.15	1.12
2002 season											
1 : 1(sorghum:guar)	364.50	2.12	20.17	313.17	11.40	2.36	9.76	18.17	53.71	61.91	5.82
2 : 2 (sorghum:guar)	347.00	2.28	17.50	300.05	11.50	2.32	8.79	15.19	57.87	61.80	6.18
2 : 1(sorghum:guar)	341.33	2.32	18.17	293.17	13.58	2.42	9.20	15.30	60.13	59.20	8.04
Sorghum pure stand	338.33	2.10	17.17	291.33	18.40	2.45	9.40	16.18	58.10	63.21	11.63
L.S.D at (0.05)	2.98	0.05	0.52	3.16	0.96	N.S	0.37	0.39	4.22	1.80	1.22

Table 3 Effect of intercropping systems on guar yield and yield components as affected by intercropping with sweet sorghum.

Characters / Treatments	Plant height (cm)	No. of tillers/plant	Leaf area (cm)	Yield ton/fed.
2001 season				
1 : 1(sorghum:guar)	63.30	6.20	32.30	8.16
2 : 2 (sorghum:guar)	60.70	7.20	33.50	8.93
2 : 1(sorghum:guar)	61.70	6.80	32.20	6.05
Guar pure stand	65.43	5.70	29.90	15.97
L.S.D at (0.05)	0.54	0.40	N.S	0.30
2002 season				
1 : 1(sorghum:guar)	61.50	6.30	31.50	8.80
2 : 2 (sorghum:guar)	55.60	7.00	33.10	8.98
2 : 1(sorghum:guar)	60.53	6.60	32.30	5.00
Guar pure stand	63.20	5.80	30.00	15.72
L.S.D at (0.05)	0.75	0.25	0.33	0.64

2. Effect of potassium fertilizer:

2.1. Sweet sorghum:

The results in Table (4) showed that yield, yield characters and chemical components of sorghum were significantly affected by increasing potassium rates. Plant height significantly increased by increasing k from zero up to 48 kg/ fed. Such effect might be due to the favourable effect of k in terms of cell division or / and cell of internodes. Similar findings were reported by (Coutino *et al.*, 1989) Also, stem diameter increased with increasing k levels. This is in accordance with results reported by (Vidal and Neptune, 1989).

Stalk yield ton/ fed significantly increased due to the increase in K levels. The percentage of increase reached 4.79 and 9.57 % in the first season and 3.94 and 7.88 % in the second season when using 24 and 48 kg K/ fed compared with zero fertilizer, respectively. These data are in accordance with that obtained by Oleksenko and Krasnenkov, (1989) and Golubev, (1989).

Juice yield/ fed had the same trend of yield/ fed, while the % extraction take the opposite trend.

With respect to chemical analysis, % reducing sugar, T.S.S, sucrose and purity, the results revealed that increasing K rates increased reducing sugar content, sucrose, Brix and purity. These results are in agreement with those given by (Cordeiro *et al.*, 1986) nd (Vidal and Neptune, 1989). The stimulatory effect of k on sucrose percentage might be related to higher activity of sucrose- phosphate syntheses, a key enzyme affecting sucrose statues in plants. Similar results were reported by (Conti and Geiger, 1982).

2.2. Guar:

Increasing K levels significantly increased plant height, but had insignificant effect on no. of tillers/ plant, leaf area and yield/ fed in both seasons (Table 5). It was noticed that K fertilizer did not greatly affect the guar total fresh fodder yield .

Table 4. Effect of potassium fertilizer on sweet sorghum yield and yield components as affected by intercropping with guar.

Characters / K2o fertilizer levels	Plant height (cm)	Stem diameter (cm)	No. of Internods/ plant	Head Height (cm)	Stalk yield ton/fed.	Reducing sugar %	Succrose %	Brix %	Purity %	Juice yield ton/fed	Extraction %
2001 season											
Zero kg/ fed	340.22	2.17	17.91	291.17	13.37	2.06	7.75	15.46	50.13	7.85	66.13
24 kg/ fed	346.29	2.22	18.06	297.92	14.01	2.37	8.80	15.70	56.05	8.10	64.75
48 kg/ fed	352.29	2.21	18.21	306.67	14.65	2.67	9.83	15.92	61.75	8.36	63.57
L.S.D at (0.05)	4.72	0.03	0.68	1.73	1.25	0.12	0.24	0.28	3.80	0.12	0.75
2002 season											
Zero kg/ fed	342.54	2.17	18.07	295.18	13.20	2.13	8.66	16.02	54.06	7.67	62.26
24 kg/ fed	347.79	2.20	18.25	299.43	13.72	2.39	9.29	16.21	57.31	7.92	61.63
48 kg/ fed	353.04	2.24	18.43	303.43	14.24	2.64	10.16	16.39	61.99	8.16	61.08
L.S.D at (0.05)	2.36	N.S	0.33	2.94	1.75	0.18	0.45	0.50	2.88	0.13	0.35

Table 5. Effect of potassium fertilizer on guar yield and yield components as affected by intercropping with sweet sorghum.

Characters / K2o fertilizer levels	Plant height (cm)	No. of tillers/plant	Leaf area (cm)	Yield ton/fed.
2001 season				
Zero k2o kg/ fed	62.36	5.97	10.10	9.60
24 k2o kg/ fed	63.35	6.47	10.28	9.78
48 k2o kg/ fed	65.78	6.97	10.45	9.95
L.S.D at (0.05)	0.85	N.S	0.28	0.28
2002 season				
Zero k2o kg/ fed	59.23	6.00	10.09	9.18
24 k2o kg/ fed	60.21	6.42	10.29	9.83
48 k2o kg/ fed	61.06	6.85	10.49	9.99
L.S.D at (0.05)	0.66	N.S	0.30	0.30

3. Interaction effect:

3.1. Sweet sorghum:

The data in Table (6) show the interaction effect between intercropping systems and potassium fertilizer on sweet sorghum yield and juice yield/ fed. The data indicated that the highest values were obtained from the intercropping system of 2 : 1 with 48 kg k/ fed (15.60 , 14.16 ton/ fed) and (8.70 , 11.0 ton/ fed) for the yield and juice yield in both seasons, respectively. While, the lowest values were recorded with the treatment of 1 : 1 with zero k fertilizer (10.70 , 11.0) and (5.70 , 5.60) in both seasons, respectively.

3.2. Guar:

The results in Table (7) show the interaction effect of intercropping systems and k fertilizer on total fresh yield. The results indicated that the highest values were obtained by the system of 2 : 2 and 48 kg k/ fed (10.03 and 10.15), while the lowest values were recorded by the system of 1 : 1 and zero k fertilizer (9.00 and 9.27 ton/ fed) in both seasons, respectively.

Table 6. Interaction effect of intercropping systems with potassium rates on yield and yield components of sweet sorghum.

Treatments	Characters	Yield ton/ fed.		Juice yield ton/ fed	
	Intercropping systems	Seasons			
		2001	2002	2001	2002
Zero K2 o/ fed	1 : 1	10.70	11.00	5.70	5.60
	2 : 2	11.30	11.00	6.06	6.00
	2 : 1	14.00	13.00	7.87	7.78
24 kg P2 o/ fed	1 : 1	11.20	11.40	6.00	5.82
	2 : 2	11.80	11.50	6.33	6.18
	2 : 1	14.80	13.58	8.12	8.04
48 kg K2 o/ fed	1 : 1	11.70	11.80	6.30	6.04
	2 : 2	12.30	12.00	6.60	6.36
	2 : 1	15.60	14.16	8.37	8.30

Table 7. Interaction effect of intercropping systems with potassium rates on yield and yield components of guar.

K2o fertilizer levels	Intercropping systems	Fresh yield ton/ fed	
		Seasons	
		2001	2002
Zero K2 o/ fed	1 : 1	9.00	9.27
	2 : 2	9.83	9.81
	2 : 1	5.90	5.88
24 kg P2 o/ fed	1 : 1	9.16	9.47
	2 : 2	9.93	9.98
	2 : 1	6.05	6.00
48 kg K2 o/fed	1 : 1	9.32	9.67
	2 : 2	10.03	10.15
	2 : 1	6.20	6.12

4. Competitive relationships and yield advantage of intercropping:

4.1. Land Equivalent Ratio (LER):

Results in Table (8) show intercropping sweet sorghum with guar in all intercropping models through the first and second seasons. Intercropping 50 % sweet sorghum : 50 % guar (2 : 2) recorded the highest values for "LER" which were 1.16 and 1.17 in the first and second seasons, respectively. Guar was more contributor with "Lg" values than sweet sorghum.

4.2. Relative Crowding Coefficient (R):

Plant density of intercropping guar with sweet sorghum is shown in Table (8). The best values were achieved by intercropping system of sweet sorghum with guar in the model of 2 : 1 in both seasons, where k values reached 2.60 and 1.30, respectively. Sweet sorghum was more contributor due to its increased population in that intercropping system.

4.3. Aggressivity (A): The data in Table (8) show that sweet sorghum was the dominant intercrop component in all intercropping systems. But, guar was the dominated intercrop component during the two seasons.

Economic evaluation:

The data in Table (8) show that the advantage of intercropping sweet sorghum with guar from the economic point view. The highest total income (L.E./ fed) was achieved by treatment of 2 : 1 (2085 L.E.) followed by 2 : 2 (2073 L.E.), compared with sorghum as a sole crop (2048 L.E.) in the first season, while the income was 2048 L.E. for the 2 : 2 system followed by 1 : 1 (2020 L.E.), compared with sweet sorghum as sole crop (1840 L.E.) in the second season.

In general, the treatment of 2 : 2 gave higher LER and total income in both seasons.

Table 8. Competitive relationships and total income of sweet sorghum as affected by intercropping with guar.

Characters / Treatments	Yield		LER			K			A		Total income
	Sweet sorghum	Guar	Ls	Lg	LER	Ks	Kg	K	As	Ag	
2001 season											
1 : 1	11.20	8.16	0.61	0.51	1.12	0.79	1.04	0.82	+0.21	-0.21	1936
2 : 2	11.80	8.93	0.65	0.56	1.21	0.84	1.27	1.07	+0.18	-0.18	2073
2 : 1	14.80	6.05	0.81	0.38	1.19	2.14	1.22	2.61	+0.41	-0.41	2085
Sweet sorghum pure	18.25	-----									1825
Guar pure	-------	15.97									1597
2002 season											
1 : 1	11.40	8.80	0.62	0.56	1.18	0.81	1.27	1.03	+0.12	-0.12	2020
2 : 2	11.50	8.98	0.63	0.57	1.20	0.83	1.33	1.10	+0.11	-0.11	2048
2 : 1	13.58	5.00	0.74	0.32	1.06	1.41	0.93	1.31	+0.15	-0.15	1858
Sweet sorghum pure	18.40	-----									1840
Guar pure	-----	15.72									1572

Total income was determined as Farm price/ ton.

Sweet sorghum = 100 L.E

Guar = 100 L.E

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تأثير نظم تحميل الجوار مع الذرة السكرية تحت مستويات مختلفة من التسميد البوتاسى

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أجريت تجربتان حقليتان موسمي ٢٠٠١ - ٢٠٠٢ بمحطة البحوث الزراعية بشندويل محافظة سوهاج لدراسة تأثير ثلاث نظم لتحميل الجوار مع الذرة السكرية (خط : خط- خطين : خطين- خطين ذرة سكرية : خط جوار) وثلاث معدلات للتسميد البوتاسى (صفر - ٢٤ - ٤٨ كجم بوتاسيوم / للفدان) على النمو وانتاج المحصول وعلى بعض الصفات الكيمائية للذرة السكرية و كانت نوع التربة بشندويل طميية طينية ودرجة الحموضة ٧,٧ واستخدم تصميم القطع المنشقة مرة واحدة ذات ثلاث مكررات.

وكانت النتائج المحصلة عليها كالتالي :

السورجم:

١- تفوقت الزراعة باستخدام نظم التحميل ١:١الصفة طول النباتات ,عدد السلاميات / للنبات وارتفاع النبات بينما تفوقت الزراعة النقية لصفة الإنتاجية /للفدان ، ٪ للنقاوة وكمية العصير /للفدان ثم يليها نظام التحميل ٢:٢بينما سجل نظام التحميل١:١ أقل النتائج .

٢- أدي زيادة التسميد البوتاسى إلى زيادة معنوية فى كل صفات النمو وكذلك زيادة كمية العصير للفدان % ,لكل من السكروز و البركس والنقاوة.

٣- أظهر التفاعل بين نظم التحميل المختلفة وبين التسميد البوتاسى إلى زيادة فى كمية الإنتاج للمحصول وزيادة كمية العصير باستخدام نظام التحميل ٢ : ٢ والتسميد بمعدل ٤٨ كجم / للفدان.

٤- أظهرت العلاقات التنافسية ارتفاع قيمة معدل استغلال الأرض (LER) باستخدام نظام التحميل ٢ : ٢ بينما سجل نظام التحميل ١ : ١ أقل النتائج.

الجوار:

١- تفوق المحصول المفرد من الجوار فى صفات طول النبات والوزن الكلى الطازج لمحصول الفدان. بينما سجل نظام التحميل ٢ : ٢ أعلا النتائج فى صفة عدد الأشطاء ومساحة سطح الورقة / للنبات.

٢- أدي زيادة التسميد البوتاسى إلى زيادة معنوية فى الصفات تحت الدراسة لمحصول الجوار ماعدا عدد الأشطاء / للنبات.

٣- أدي التفاعل بين نظم التحميل المختلفة وبين التسميد البوتاسى إلى زيادة فى كمية المحصول الكلي الطازج باستخدام نظام التحميل ٢ : ٢ والتسميد بمعدل ٤٨ كجم / للفدان.