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IRRIGATION SYSTEMS AND NITROGEN FERTILIZER IN RELATION TO YIELD AND QUALITY OF SUGAR CANE VARIETIES

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Abstract

Two field experiments were carried out in El-Mattana Research Station (Qena governorate) in the two successive seasons of 1992 and 1993 in order to evaluate the relative effect of some irrigation systems and nitrogen fertilizer on growth characters of some sugar cane varieties. The two experiments included eighteen treatments which represent the combination between two irrigation systms (drip and furrow irrigation), three nitrogen levels (150, 180 and 210 kg N/fed.) and three sugar cane varieties (G.T. 54-9, F.153 and G.74-96).

A split plot design with four replications was used. Irrigation systems were arranged in the main plots and the combination between sugar cane varieties and nitrogen levels were allocated in the sub-plots. The results indicated that drip irrigation was superior to furrow irrigation in both cane and sugar yields. Both cane and sugar yields significantly increased by increasing nitrogen application up to 210 kg/fed. Sugarcane variety G.T. 54-9 surpassed the other two varieties in cane and sugar yields. The percentages of nitrogen, brix, reducing sugar, sucrose, fiber, purity and sugar recovery were insignificantly affected by irrigation systems and cane varieties. Brix, sucrose, purity and recovery percentages showed a reverse relationship due to nitrogen fertilizer application. There was a gradual increase in fiber percentage of cane stalk accompanied the increase of the added doses of nitrogen.

INTRODUCTION

Sugar cane is the main sugar crop in Egypt. Its water requirements are very high and this contributes to the limitation of area planted with sugar cane. Improvment of irrigation system is of great importance in saving water for sugar cane and other stratigic crops extension. Availablitity of water during different stages of growth especially at full leaf / canopy development stage, nitrogen application at the recommended dose and the proper time as well as new varieties introduction are the main factors in maximizing cane production.

Adequate water is necessary for vigorous vegetative and physiological growth stages. Water stress at that stage will result in low final yields. Percent of sucrose in juice and in cane is adversely affected by excess water during the maturation stage. (Gascho and Shih, 1982). Moreover, Phogat, et al. (1987) used irrigation levels of 88, 114 and 160 mm with sugar cane cultivars, Co. 7717, Co. 1158 and Co. 1148. They found that application of water at 88 mm increased number of millable cane. Abd El-Latif, et al. (1993) found that number of millable cane significantly increased as the applied doses of nitrogen increased up to 240 kg N/fed. in the 1st season and 210 kg N/fed. in the 2nd one.

Shrestha and Gopalaksishnan, (1991) reported that using drip irrigation increased cane yield by 15% and reduced water amount to almost 12% than furrow irrigation due to the improved characteristics of drip technology. Hapase, et al. (1992) elucidated that using daily micro irrigation system with sugar cane variety Co. 7219 increased cane yield by 12-37%, saved water by 50-55% and increased water use efficiency by 2-3 times compared to conventional furrow irrigation. Also, they mentioned that the economic analysis indicated that drip irrigation system was a good investment. Soopramanien, et al. (1989) elucidated that using drip irrigation increased cane yield from 104.6 to 179.3 t/ha. Yang and Chen (1991) stated that application of nitrogen from 150-250 Kg/ ha increased cane yield by 10-40 t/ha. Yadav and Singh (1991) observed that application of 150 Kg N/he as urea increased cane yield significantly. Abd El-Gawad, et al. (1992-b) found that net cane yield responded positively and significantly to nitrogen fertilizer up to 240 Kg N/ fed. Bangar, et al. (1992) showed that when sugar cane cv. Co. 6304, Co. 3718 and Co. 1305 received nitrogen fertilizer at rates of 0, 150, 300 and 450 Kg N/ha, there was a significant positive correlation between nitrogen levels and cane yield.

Gupta and Sharma. (1990) stated that drip irrigation improved juice quality of sugar cane plants. Prasad, et al. (1990) demonstrated that when sugar cane variety Bo. 108 was irrigated with 6 cm water (IW) : (CPE)* ratio of 0.4, 0.6, 0.8 or 1.0 treatments they had no effect on brix percentage. Moreover, Said Rahaman, et al. (1991) evaluated tweleve promising lines and sugar cane varieties, under three levels of irrigation (1, 2 and 3-week intervals) and found that cane commercial cane sugar (CCS) was least affected by treatments. They added that the highest CCS about 13% was obtained with sugar cane variety CP. 65-357 at the 2-week intervals. However, CP 73-375 and CP 72-2083 varieties responded best to reduced irrigation intervals. Abd El-Gawad, et al. (1992-a) found that application of nitrogen fertilizer at rates of 150, 180 and 240 kg N/fed reduced sugar percentage. Reducing sugar responded positively to nitrogen rates. They added that nitrogen supplied had no effect on brix percentage and negative effect on sucrose percentage in juice of sugar cane plants and reflected the positive and significant response in fiber percentage and negative response with juice purity percentage due to the nitrogen rates. Abd El-Hadi, et al. (1994) mentioned that juice quality in terms of purity and rendment were not clearly affected by adding nitrogen fertilizer at rates of 150, 175 and 200 kgN/ha.

This investigotion was carried out to study the effect of irrigation system as well as nitrogen fertilizer on yield and juice quality of some sugar cane varities.

MATERIALS AND METHODS

Two field experiments were conducted at El-Mattana Research Station (Qena governorate) in the two successive seasons of 1992 and 1993 to evaluate the relative effect of some irrigation systems and nitrogen fertilizer levels on the qualitative and quantitative properties of some sugar cane varieties. Each field trial included eighteen treatments which represent the combination between two irrigation systems (drip and surface irrigation), three nitrogen levels (150, 180 and 210 kg N/fed.) and three sugar cane varieties (G.T 54-9, F 153 and G. 74-96). A split plot design with four replications was used. Irrigation systems were arranged in the main plots and the combinations between sugar cane varieties and nitrogen levels were allocated in the sub-plots.

Sub-plot area was 70 m2 (8 ridges of 7 meters in length and 1.25 m apart). Sugar cane varieties were planted in autumn, i.e.,during the first week of November in both seasons. Nitrogen fertilizer was added as Urea (46% N). Under furrow irrigation, nitrogen fertilizer was applied in two equal doses, the first application was after three months from planting (1 st February) and the second one was added two months later (1 st April).Whereas, for plants grown under the drip irrigation; the amount of nitrogen was applied each 15 days, the last dose was added on April 1 st.

Data recorded

1- Yield and yield components :

1- Number of millable cane per feddan.

2- Yield of six guarded rows was weighed and cane yield/feddan was calculated.

3- Sugar yield/feddan was estimated according to the following equation:

Row sugar production = cane (tons)/Feddan x sugar recovery %.

II- Juice quality and chemical composition :

At harvest, a sample of 30 stalks representing each treatment was taken at random and the following data were recorded:

1- Brix percentage in the laboratory which was measured using brix hydrometer standared.

2- Sucrose percentage was determined using saccaremeter according to AOAC (1955).

3- Purity percentage was calculated according to the following equation:

$$\text{Purity \%} = \frac{\text{Sucrose \%}}{\text{Brix \%}} \times 100$$

4- Sugar recovery percentage was calculated :

Sugar recovery % = Richness % x Purity %

where Richness = (Sucrose in 100 grams x Factor) /100

Factor = 100 {Fiber % + physical impurties % + percent water free from sugar}

5- Reducing sugar percentage was determined in the extracted juice of cane according to chemical control in Egyptian production factories (Anonymous, 1981).

At harvest, a sample of 2-stalk was taken, cut oven dried, ground and kept to determine N% using micro keldahal apparatus according to Pergle (1945). Fiber percentage was determined according to (Pleskhow, 1976).

Statistical analysis :

The collected data were subjected to proper statistical analysis of split plot design according to procedure outlined by Snedecor and Cochran (1967). For comparison between mean, L.S.D. at 5% level of probability was used according to Waller and Duncan (1969). Homogenity of variances of the two investigated seasons was tested useing F-test i.e. greater mean squar/ smaller mean squar. Calculated values for the studies characters were compared with the tabulated values with the corresponeding degrees of freedom. A combined analysis between the two growing seasons was carried out for the collected data.

RESULTS AND DISCUSSION

1- Yield and yield components.

1- Number of millable cane .

Data presented in Table (1) showed that both irrigation systems and nitrogen fertilizer failed to attain a signifcant increase in the number of millable cane. However, sugar cane varieties showed a significant effect on the number of millable cane at harvest. Sugar cane variety viz F. 153 exhibited a significant superiority over the other two varieties. i.e., G.T. 54-9 and G. 74-96. The relative advantage of F. 153 variety in respect to number of millable cane is due to that millable cane number is mainly affected by genetical makè up. This finding is in accordannce with those by Abd El-latif, et al., (1993) who mentioned that both G.T. 54-9 and G.68-88 produced a higher number of millable cane in the first and second season than G. 85-37 variety.

2- Net cane yield :

The obtained data in Table (2) indicated a significant influence for drip irrigation system on sugar cane yield where drip irrigation surpassed surface irrigation. The drip irrigation system attained 11.2% increase in stalk yield over the furrow irrigation. This result is in line with that reported by Minas, et al., (1992) who stated that using drip irrigation with sugar cane increased cane yield by 15% and reduced water almost by 12% than furrow irrigation. The relative advantage in sugar cane yield under drip irrigation system may be due to the continuous availability of water supply around root system which improved water use and ensured an ideal condition for nutrients absorption and in turn improved growth and yield. These observations mostly are in accordane with those elucidated by Shrestha and Gopala-Krishman (1991). As to the effect of genetical make up i.e. varieties,there were

Table (1): Effect of irrigation systems and nitrogen fertilizer on number of millable cane of some sugar cane varieties at harvest.

(combined of analysis 1992 and 1993 seasons).

Treatments	Varieties	Number of millable cane/fed			Average
		kg N/fed.			
		150	180	210	
Drip Irrigation	G.T. 54-9	58200	62280	65000	61800
	F153	69400	70850	68000	69400
	G.74-96	58800	65000	63400	62400
Average		62133.3	66043.3	65466.6	64533
Furrow Irrigation	G.T. 54-9	58850	54200	61000	58000
	F153	66200	70200	70850	69000
	G.74-96	59400	65000	65400	62700
Average		61480	63000	65750	63233
VxN	G.T. 54-9	58850	58280	63000	60000
	F153	66850	70000	96200	68680
	G.74-96	59400	65000	64000	62800
Total average		61740	64500	65575	61668

L.S.D. at 5% level for:

Irrigation (I)	NS
Varieties (V)	5463
Nitrogen (N)	NS
I x V	NS
I x N	NS
V xN	NS
IxVxN	NS

Table (2): Effect of irrigations systems and nitrogen fertilizer on cane and sugar yields of some sugar cane varieties at harvest-combined analysis of 1992 and 1993 seasons).

Treatments	Varieties	Cane yield (Tom/Fed.) Kg.N/fed			Average	Sugar yield (Ton/Fed.) Kg.N/fed			Average
		150	180	210		150	180	210	
Drip Irrigation	G.T. 54-9	48.93	55.72	57.55	54.06	5.780	6.327	6.330	6.146
	F153	43.29	48.07	53.10	48.15	5.236	5.317	5.710	5.421
	G.74-96	40.15	45.67	49.61	45.14	4.813	5.571	5.202	5.195
Average		44.12	49.82	53.42	49.12	5.276	5.738	5.747	5.587
Furrow Irrigation	G.T. 54-9	41.70	47.76	53.71	47.72	4.765	5.416	5.826	5.3366
	F153	38.76	42.71	45.43	42.30	4.101	4.751	4.814	4.555
	G.74-96	39.05	42.80	45.65	42.50	4.390	4.996	4.580	4.655
Average		39.83	44.42	48.26	44.17	4.414	5.055	5.073	4.849
VxN	G.T. 54-9	45.31	51.74	55.63	50.89	5.273	5.872	6.078	5.741
	F153	41.02	45.39	49.26	45.23	4.669	5.034	5.262	4.988
	G.74-96	39.60	44.23	47.63	43.82	4.601	5.284	4.891	4.925
Total average		41.98	47.12	50.84	46.65	4.848	5.397	5.410	5.120

L.S.D. at 5% level	Cane yield	Sugar yield
Irrigation (1)	15.82	1.86
Varieties (V)	2.38	0.30
Nitrogen (N)	2.38	0.30
I x V	NS	NS
I x N	NS	NS
VxN	NS	NS
IxVxN	NS	NS

wide and statistical differences between varieties in their stalk yield. Sugar cane variety G.T. 54-9 recorded the highest cane yield followed by F. 153 and G. 74-96 varieties. This finding throws some light on the importance of genetical make up i.e. varietal selection. Sugar cane variety G.T. 54-9 produced the lowest number of millable cane stalks compared with the other two varieties (Table 1), however, it succeeded to produce the highest yield of stalks. This result may be due to the high weight of the individual plants of this variety. This observation coincides with that found by Nafei (1993) who showed that sugar cane variety viz G.T. 54-9 produced the highest cane yield and sugar over G. 68-88 variety.

Concerning nitrogen effect on cane yield, it is clearly shown from the data in Table (2) that it was gradually increased as N level increased up to 210 kg N fed. This result is completly in agreement with that found by Abd El-Gawad et al. (1992-b) and Abd Hadi, et al., (1994).

3- Sugar yield :

Data obtained in Table (2) indicated insignificant response of sugar yield due to irrigation systems which exhibted a considerable increment in sugar yield amounted to 0.739 ton per feddan representing 15.2% increase over the quantity of sugar produced uner furrow irrigation system. The positive response of sugar yield under drip irrigation system is mainly due to the two corner stons of sugar yield i.e., stalk yield (Table 1) and sugar recovery percentage (Table 5). The higher the stalk yield and the higher the sugar recovery Percentage the higher sugar yield.

Concerning the varietal effect on sugar yield, it is obviously shown that sugar cane variety G.T. 54-9 attained a superiority in sugar yield over the other two varieties. This advantage for G.T. 54-9 variety is due to its superiority in stalk yield (Table 1) and sugar recovery percentage over F. 153 and G. 74-96 varieties. Moreover, nitrogen fertilizer showed a positive effect on sugar yield. This increment is related to the enhanced effect of nitrogen fertilizer on number of millable stalks (Table 1), cane yield and sugar recovery percentage . These results are in line with those showed by Abd El-Gawad, et al., (1992-b).

II- Juice quality.

1- Nitrogen percentage:

Data presented in Table (3) showed that nitrogen content of sugar cane stalks

Table (3): Effect of irrigation systems and nitrogen fertilizer on nitrogen, brix and reducing sugar percntages of some sugar cane varieties at harvest.

(combined analysis of 1992 and 1993 seasons).

Treatments	Varieties	Nitrogen %			Average	Brix %			Average	Reducing sugar %			Average
		Kg N./fed.				Kg.N/fed				Kg.N/fed			
		150	180	210		150	180	210		150	180	210	
Drip Irrigation	G.T. 54-9	0.540	0.650	0.750	0.647	23.02	22.47	21.39	22.29	1.680	1.810	1.960	1.820
	F153	0.462	0.588	0.600	0.555	23.66	22.29	21.84	22.60	1.370	1.690	2.410	1.830
	G.74-96	0.650	0.625	0.737	0.671	23.93	23.07	21.93	22.98	1.830	1.880	1.990	1.900
Average		0.551	0.621	0.696	0.623	23.54	22.61	12.72	22.62	1.630	1.790	2.120	1.840
Furrow Irrigation	G.T. 54-9	0.547	0.575	0.662	0.595	22.98	21.83	21.00	21.93	1.750	1.860	2.300	1.980
	F153	0.525	0.538	0.638	0.567	22.18	21.81	21.23	21.74	1.820	1.860	2.210	1.960
	G.74-96	0.587	0.500	0.688	0.592	22.84	22.49	21.00	22.10	1.800	1.820	2.070	1.890
Average		0.553	0.538	0.662	0.584	22.66	22.04	21.06	21.92	1.790	1.840	2.200	1.940
VxN	G.T. 54-9	0.544	0.613	0.706	0.621	23.00	22.15	21.19	22.11	1.720	1.830	2.140	1.900
	F153	0.494	0.563	0.619	0.558	22.92	22.05	21.53	232.17	1.600	1.770	2.310	1.890
	G.74-96	0.619	0.563	0.712	0.631	23.38	22.78	21.45	22.54	1.810	1.840	2.030	1.900
Total average		0.552	0.579	0.679	0.603	23.10	22.33	21.39	22.27	1.710	1.820	2.160	18.90

L.S.D. at 5% level for:	Nitrogen %	Brix %	Reducing sugar %
Irrigation (I)	NS	NS	NS
Varieties (V)	NS	NS	NS
Nitrogen (N)	0.069	0.54	0.22
I x V	NS	NS	NS
I x N	NS	NS	NS
VxN	NS	NS	NS
IxVxN	NS	NS	NS

gave a significant response to the applied doses of nitrogen. Increasing N application increased nitrogen content of sugar cane. An opposite result was recorded by Abd El-Gawad et al. (1992-c) who stated that the highest nitrogen level applied to cane plant showed the lowest percent of nitrogen in cane stems. Once more, it could be noticed from the illustrated results in Table (3) that neither irrigation systems nor sugar cane varieties had a distinct effect on percent of nitrogen in sugar cane stalk.

2- Brix percentage :

Data in Table (3) showed that Brix percentage was insignificantly responded to irrigation systems and varietal differences. On the other hand, nitrogen fertilizer attained a positive effect of the additional doses of nitrogen in respect to Brix percentage. The lowest nitrogen dose (150 kg N/fed.) produced the highest brix percentage (23.10 %).This result is in agreement with that found by Batchelar and Shipley (1989).

3- Reducing sugar percentage (RS%) :

Results in Table (3) obviously showed that there was a gradual increase in RS% due to the applied dose of nitrogen fertilizer. This finding is in accordance with that found by Khalifa et al (1985) who noted that increasing nitrogen rates increased reducing sugar in cane stalk. However, the differences between irrigation systems as well as the used varieties did not reach the level of significance in relation to reducing sugar percentage.

4- Sucrose percentage :

The regular water supply through the drip irrigation system had insignificant increase in sucrose percentage over that under the traditional method of irrigation i.e., furrow irrigation as shown in Table (4). Drip irrigation system attained an increase in sucrose percentage amounted to 4.12% over that under furrow irrigation, however, the increase was not enough to reach the level of significance. This result is in agreement with that reported by Gary Gasho (1985) who stated that sucrose in juice and in cane is adversely affected by excess water during the maturation stage. The used varieties had no effect on sucrose percentage. However, nitrogen fertilizer showed a reverse relationship between the additional doses of nitrogen and sucrose percentage in juice of sugar cane plants. These results were completly true with the different sugar cane varieties as well as under the two irrigation systems. These findings are in harmony with those obtained by Abd El-Gawad, et al., (1992-c).

Table (4): Effect of irrigation systems and nitrogen fertilizer on sucrose and fiber percentage of some sugar cane varieties at harvest (combined analysis of 1992 and 1993 seasons).

Treatments	Varieties	Sucrose %			Average	Fiber %			Average
		Kg.N/fed				Kg.N/fed			
		150	180	210		150	180	210	
Drip Irrigation	G.T. 54-9	19.34	18.56	17.83	18.58	12.06	12.40	12.55	12.33
	F153	20.08	18.60	17.69	18.79	12.95	13.12	13.38	13.15
	G.74-96	19.64	19.11	17.55	18.76	12.25	12.25	12.50	12.33
Average		19.69	18.76	17.69	18.71	12.42	12.59	12.81	12.60
Furrow Irrigation	G.T. 54-9	18.74	18.22	17.00	17.98	12.00	12.37	12.42	12.27
	F153	18.22	17.79	16.82	17.61	13.15	13.30	13.72	13.39
	G.74-96	18.91	18.83	17.27	18.34	12.17	12.19	12.75	12.37
Average		18.62	18.28	17.03	17.97	12.44	12.62	12.97	12.67
VxN	G.T. 54-9	19.04	18.39	17.41	18.28	12.03	12.38	12.50	12.30
	F153	19.50	18.19	17.26	18.20	13.05	13.21	13.55	13.27
	G.74-96	19.27	19.00	17.41	18.55	12.21	12.22	12.62	12.35
Total average		19.15	18.52	17.36	18.34	12.43	12.60	12.89	12.64

L.S.D. at 5% level for:

	Sucrose %	Fiber %
Irrigation (I)	NS	NS
Varieties (V)	NS	0.12
Nitrogen (N)	0.56	0.12
I x V	NS	NS
I x N	NS	NS
VxN	NS	NS
IxVxN	NS	NS

From the results obtained in Tables 3 and 4, it is evedent that the higher the nitrogen application the higher the values of N% and R.S. % in sugar cane juice (Table 3), this condition caused a significant reduction in surcose percentage (Table 4).

5- Fiber percentage :

The results collected in Table (4) indicated that the used irrigation systems had no significant effect on this character. As to varietal influence on this parameter, it could be noticed that fiber percentage was significantly affected by varieties. This observation may assure that fiber percentage is manily controlled by genetical make up. Regarding the effect of nitrogen fertilizer on fiber percentage of sugar cane plant, the obtained data in Table (4) clearly showed that there was a gradual increase in fiber percentage of cane stalk accompanied the increase in the additional doses of nitrogen. This result is in line with that found by Abd El-Gawad, et al., (1992-c).

6- Purity percentage :

Results presented in Table (5). showed a reversible but insignificant response for purity percentage to increasing doses of nitrogen. This result is in line with that of Yaduvanshi, et al. (1990). Concerning the varietal and irrigation systems effect on juice purity, the results in Table (5) indicated that the differences among varieties and/or irrigation systems did not reach the level of significance.

7- Sugar recovery percentage :

Data presented in Table (5) showed that sugar recovery percentage was not significantly influenced by irrigation systems, varieties and N levels. Once more, nitrogen application attained a statistical negative influence on sugar recovery percentage. The lowest rate of nitrogen produced the highest sugar recovery percenatge. The fruitful effect of the loweest dose of nitrogen on sugar recovery is manily due to its effect on sucrose % (Table 4) and purity% (Table 5). These results are in agreement with those obtained by Mohamed (1989) who cleared that the trend of sugar recovery percentage is similar to sucrose percentage, hence increasing N level decreased sucrose and consequently sugar recovery percentage .

Table (5): Effect of irrigations system and nitrogen fertilizer on purity and recovery percentage of some sugar cane varieties at harvest (combined analysis of 1992 and 1993 seasons).

Treatments	Varieties	Purity % Kg.N/fed			Average	Recovery% Kg.N/fed			Average
		150	180	210		150	180	210	
Drip Irrigation	G.T. 54-9	83.27	82.16	82.24	82.56	11.83	11.36	11.10	11.43
	F153	85.02	83.28	80.22	82.84	12.17	11.36	10.85	11.46
	G.74-96	81.78	82.95	80.17	81.63	11.99	12.01	10.35	11.45
Average		83.36	82.80	81.00	82.34	12.00	11.58	10.77	11.45
Furrow Irrigation	G.T. 54-9	81.49	81.24	81.06	81.26	11.72	11.40	11.08	11.40
	F153	81.97	83.00	79.00	81.30	10.93	11.23	10.62	11.00
	G.74-96	83.63	84.19	80.59	82.80	11.54	11.70	10.38	11.20
Average		82.36	82.81	80.19	81.79	10.40	11.44	10.69	11.18
VxN	G.T. 54-9	82.38	81.70	81.65	81.91	11.78	11.38	11.09	11.42
	F153	83.49	83.14	79.57	82.07	11.55	11.29	10.73	11.19
	G.74-96	82.70	83.57	80.38	82.22	11.76	11.85	10.37	11.33
Total average		82.86	82.80	80.53	82.07	11.70	11.51	11.73	11.31

L.S.D. at 5% level for:	Purity	Recovery
Irrigation (I)	NS	NS
Varieties (V)	NS	NS
Nitrogen (N)	NS	NS
I x V	NS	NS
I x N	NS	NS
VxN	NS	NS
IxVxN	NS	NS

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نظم الرى والتسميد الازوتى وعلاقتهما بمحصول وجودة بعض اصناف قصب السكر

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أقيمت تجربتان حقليتان فى موسمين متتاليين بمحطة المطاعنة - محافظة قنا خلال موسمى الزراعة الخريفى ١٩٩٢ ، ١٩٩٣ و ذلك بفرض دراسة تأثير بعض نظم الرى والتسميد الأزوتى على المحصول وصفات الجودة لبعض أصناف قصب السكر وقد اشتملت التجربة على نظامين للرى (رى بالتنقيط والرى السطحى)، ثلاثة معدلات من السماد الأزوتى (١٥٠ ، ١٨٠، ٢١٠ كجم ن / فدان) وثلاثة اصناف من قصب السكر هى الصنف جيزة تايوان ٥٤ - ٩ والصنف اف ١٥٣ والصنف جيزة ٧٤ / ٩٦ وقد اتبع نظام القطع المنشقة مرة واحدة فى ٤ مكررات بحيث وضعت معاملات الرى فى القطع الرئيسية والتوافقات بين التسميد الازوتى والاصناف فى القطع الشقية وقد اوضحت النتائج المتحصل عليها مايلى :

١ - تفوق نظام الرى بالتنقيط عن نظام الرى السطحى فى محصول العيدان والسكر . وقد زاد كل من محصول العيدان والسكر زيادة معنوية نتيجه زيادة مستويات الازوتى حتى السماد ٢١٠ كجم / فدان. كذلك تفوق الصنف جيزة تايوان ٥٤ - ٩ عن الصنفيين الاخريين فى صفتى محصول العيدان والسكر.

٢ - لم تتأثر معنويا صفة كل من ٪ للنيتروجين، ٪ للبركس، ٪ للسكريات المختزلة، ٪ للسكروز، ٪ ألالياف، ٪ للنقاوة و ٪ للناتج السكر بنظم الرى المستخدمة والاصناف.

اظهرت صفة كل من ٪ البركس والسكروز وناتج السكر علاقة عكسية نتيجة لأصنافة التسميد الازوتى. توجد زيادة تدريجية فى ٪ للالياف نتيجة زيادة معدلات السماد الازوتى.