J. Agric. Sci. Mansoura Univ., 27 (2): 707 - 716, 2002

EFFECT OF PLANT SPACING, NITROGEN RATES AND ITS FREQUENCY ON YIELD AND QUALITY OF KAWEMIRA SUGAR BEET VARIETY UNDER UPPER EGYPT CONDITIONS

Abo-El-Wafa, A.M.
Dept. of Agron, Fac. of Agric. El-Azhar Univ.

ABSTRACT

Field experiments were carried out during the two successive growing seasons of 1999/2000 and 2000/2001 to study the effect of varying plant spacing as well as levels and frequency of N on the yield and yield components of sugar beet.

Results showed that increasing plant spacing from 20 to 30 cm between hills increased root length, diameter and weight a swell as root yield, weight of leaves per plant sucrose percentage and juice purity.

Planting kawemira sugar beet plants at hills 30 cm apart and supplying them with 80 kg N/fed as three equal batches before the first, second and third irrigation was responsible for producing an economical yield. While, the highest sucrose percentage was recorded when sowing it at 30 cm between hills and adding 60 kg N/fed at three equal batches at the same previous time. These results were true under Upper Egypt conditions.

INTRODUCTION

Sugar beet and sugar cane are considered the main sources for manufacturing sugar in Egypt. Vertical aside from horizontal expansion of sugar beet is considered an important step of the Egyptian strategy aiming to meet the increase in sugar consumption. The importance of sugar beet comes not only from its great success for growing in the newly reclaimed sandy soils, but also for producing higher yield of sugar compared with sugar cane.

Achieving higher yield and high quality of sugar beet is well governed by adjusting the proper plant density and the optimum nitrogen level and its frequency of application.

Choosing the best plant density for various sugar beet varieties play an important role in improving growth, yield and yield components.

Previous studies showed that plant density had remarkable effects on yield and quality of sugar beet varieties (Hassanin, 1991; Edris *et al.*, 1992; Milivojevic *et al.*, 1992; Takada *et al.*, 1992; Minx, 1993; Mokadem, 1993a; Smit, 1993; Marlander and Rover, 1994 and Sultan *et al.*, 1996).

Adjusting the proper level and frequency of N revealed a great benefits for improving yield and yield components in different sugar beet varieties (Ueno *et al.*, 1986; Takahashi, 1987; Taha *et al.*, 1991; El-Geddawi *et al.*, 1992; and El-Kassaby and Leilah, 1992). Many workers found that vary levels and frequencies of N had an announced influence on yield and quality of various sugar beet varieties (Mokadem, 1993 b; Salama and Badawi, 1996; Al-Labbody, 1998 and Mokadem, 1998).

The effect of nitrogen splitting was argued by Hemissa *et al.* (1970); Hills *et al.* (1978); Mahmoud (1979) and Abd-El-Hafeez *et al.* (1984) stated that yield of sugar beet insignificantly affected by nitrogen time of application.

The present study aimed to find out the effect of plant density as well as levels and frequencies of N on yield and its components of Kawemira sugar beet variety as it is recommended growing under Upper Egypt conditions.

MATERIALS AND METHODS

Two field experiments were conducted during each of the two successive growing seasons of 1999/2000 and 2000/2001 at Shandaweel Agricultural Research Station, Sohag Governorate. Soil texture of the experimental field was loamy soil. Soil chemical analysis Table 1 was carried out according to procedures described by Wilde *et al.* (1985). The obtained data according to (Table 1).

Table (1): Soil chemical properties of experimental site are presented (Average of the two seasons).

Depth	Chemical properties	%
0-40 (cm)	PH	7.96
	Ecm Mhose/cm	0.47
	N Available (ppm)	20
	P Available (ppm)	4.30
	K Available (ppm)	548
	$CaCO_3$	0.62

This experiment included three factors, the first factor included two spaces between hills (20 and 30 cm). The second factor consisted from three levels of N (60, 70 and 80 kg N/fed) and the third factor was two N frequencies application of N at two equal batches before the first and the second irrigation and application of N at three equal batches before the first, second and third irrigation.

The design of the experiment was split split plot with four replications. The main plots included the plant density and the sub plots included the levels of nitrogen where the sub sub plots included the nitrogen frequency. The preceding crop in the two seasons was fallow after berseem (Trifollium alexandrinum, L.).

Each plot consisted of five redges 3.5 meters long and 60 cm apart. The area of each sub-sub plot was 10.5 m^2 i.e. 1/400 fed. Sowing was carried out in the second week of October in both seasons. The usual dry method of planting was performed on one side of redges. The plants were thinned after 30 and 45 days from sowing to two and one plant per hill, respectively. Phosphorus fertilizations in the form of calcium superphosphate (15.5% P_2O_5) was added during preparation of soil. Potassium sulphate (48% K_2O) was applied twice at a rate of 50 kg K_2O/fed at 45 and 75 days after thinning. Other cultural practices were conducted as recommended.

After 195 days, ten plants were harvested at random from each plot to estimate root length (cm.), root diameter (cm), root weight (kg/plant) and leaves weight (kg plant). Bulck plant samples included the whole plots were taken to estimate yield of roots (kg/fed), then expressed into ton/fed. The juice of ten roots was extracted to determine total soluble solids % using hand refractometer, sucrose percentage using the direct polarization method and purity percentage using the following formula (purity = sucrose % T.S.S. % x 100).

The data of each season were tabulated and subjected to the proper statistical analysis according to the procedure outlined by Gomez and Gomez, 1984. The combined analysis of variance was established after testing the homogeneity of errors, on the data of the two seasons. The differences among treatments were compared, using LSD test.

RESULTS AND DISCUSSION

1. Root length and diameter :

Combined analysis in Table (2) clearly show that increasing the distance between hills from 20 to 30 cm caused significant increment in root length and had a slight and insignificant increase in the root diameter. The widest plant density namely 30 cm was favorable for enhancing both length and diameter of root. The great reduction in competition for water, nutrients and light in regard to using the planting light density could explain the present results.

Table (2): Effect of plant spacing, nitrogen rates and its frequence on root length and diameter of Kawemira sugar beet variety in 1999/2000 and 2000/2001 seasons, as combined data.

Characters	Root length (cm)			Root diameter (cm)		
Distance between hills (A) and N	Number of N doses			Batches (C)		
levels (B)	Two^{c1}	Three^{2}	Means	Two^{c1}	Three^{2}	Means
a_1 20 cm	35.32	35.25	35.28	9.20	9.89	9.54
a_2 30 cm	38.79	39.69	39.24	9.65	10.39	10.20
b_1 60 kg N/fed	36.74	36.36	36.55	9.26	9.73	9.50
b_2 70 kg N/fed	36.33	38.32	37.32	9.21	10.06	9.64
b_3 80 kg N/fed	38.09	37.73	37.91	9.80	10.60	10.20
a_1 b_1	34.66	34.81	34.73	9.14	9.57	9.36
a_1 b_2	34.67	35.54	35.11	9.01	9.68	9.34
a_1 b_3	36.62	35.41	36.02	9.46	10.37	9.91
a_2 b_1	38.83	37.92	38.37	9.38	9.90	9.64
a_2 b_2	37.98	41.09	39.53	9.42	10.43	9.93
a_2 b_3	39.56	40.06	39.81	10.15	10.84	10.49
Mean (c)	37.05	37.47	Y=2.27	9.42	10.13	Y=NS

LSD at 5%	A	B	C	AB	AC	BC	ABC	A	B	C	AB	AC	BC	ABC
	1.12	NS	NS	NS	NS	NS	NS	NS	0.59	0.20	NS	NS	NS	NS

These results are in harmony with those obtained by Hassanin (1991), Edris *et al.* (1992) and Milivojevic *et al* (1992).

Data concerning the effect of levels and frequencies of N application on the root length and diameter clearly show that there was a gradual promotion in each of them with increasing N levels from 60 to 80 kg/fed and N frequencies from two to three batches. However, differences between various levels and frequencies of N on root length were not significant. Meaning less increase in such two parameters was observed when N levels were raised from 70 to 80 kg N/fed or when plant density was raised from 30 to 20 cm between hills.

All the studied interactions failed to show significant influence on length and diameter of root. The best results were obtained when plants were planted at 30 cm apart and received 80 kg N/fed at three equal batches before the first, second and third irrigation.

The beneficial of N especially at the optimum level and frequency in the biosynthesis of organic foods and in the stimulation of cell division (Nijjar, 1985) could explain the present results.

These results regarding the effect of N on such growth parameters are in harmony with those obtained by Takahashi (1987) and Taha *et al.* (1991).

2. Root and leaves weights per plant :

The combined data of 1999/2000 and 2000/2001 seasons Table 3 show that increasing plant spacing from 20 to 30 cm between hills raised weight of root and leaves. However, the differences between two distances were significant only in root weight/plant. Wide distance between hills was very beneficial in reducing competition between plants moisture, light and nutrients.

These results were supported by the **finding of Edris *et al.* (1992)**, Takada *et al.* (1992) and Mokadem (1993 a).

There was a gradual and significant increment in weights of roots and leaves per plant with increasing the applied rates of N from 60 to 80 kg/fed. as well as increasing number of N batches from two to three batches.

Most of the investigated interactions had significant influence on both weights of roots and leaves per plant. The maximum values were recorded on Kawemira sugar beet plants when planted at 30 cm. apart and received 80 kg N/fed. as three equal splits.

The beneficial of N in improving the biosyntheses is of organic foods as well as encouraging cell division (Nijjar, 1985) could explain the present results.

These results are nearly in the same line with those obtained by El-Geddawi *et al.* (1992); El-Kassaby and Leilah(1992); Mokadem (1993 b) and Salama and Badawi (1996).

3. Root yield (ton per fed) :

It is evident from the combined data in Table (4) that planting Kawemira sugar beet variety in hills 30 cm apart slightly increased root yield (ton/fed), compared to with 20 cm between hills.

Table (3): Effect of plant spacing, nitrogen rates and its frequence on root and leaves weights per plant of Kawemira sugar beet variety in 1999/2000 and 2000/2001 seasons, as combined data.

Characters	Root weight (kg)/plant			Leaves weight (kg)/plant		
Distance between hills (A) and N Levels (B)	Number of N doses			Batches (C)		
	Two^{C1}	Three^{2}	Means	Two^{C1}	Three^{2}	Means
a_1 20 cm	1.09	1.10	1.10	0.70	0.80	0.75
a_2 30 cm	1.16	1.30	1.23	0.80	0.87	0.83
b_1 60 kg N/fed	1.05	1.14	1.10	0.69	0.75	0.72
b_2 70 kg N/fed	1.11	1.16	1.13	0.73	0.84	0.79
b_3 80 kg N/fed	1.23	1.30	1.26	0.83	0.92	0.87
a_1 b_1	1.05	1.13	1.09	0.69	0.75	0.72
a_1 b_2	1.05	1.02	1.03	0.66	0.78	0.72
a_1 b_3	1.11	1.15	1.17	0.76	0.89	0.82
a_2 b_1	1.05	1.16	1.11	0.69	0.74	0.72
a_2 b_2	1.17	1.30	1.23	0.81	0.91	0.86
a_2 b_3	1.26	1.45	1.36	0.90	0.96	0.93
Mean (c)	1.13	1.20	Y=NS	0.75	0.84	Y=NS

LSD at 5%	A	B	C	AB	AC	BC	ABC	A	B	C	AB	AC	BC	ABC
	0.04	0.04	0.03	0.06	0.04	NS	0.07	NS	0.04	0.03	0.06	NS	NS	NS

Table (4): Effect of plant spacing, nitrogen rates and its frequence on root yield of Kawemira sugar beet variety in 1999/2000 and 2000/2001 seasons, as combined data.

Character	Root yield (ton/fed)		
Distance between hills (A) and N levels (B)	N Batches (C)		
	Two^{C1}	Three^{2}	Means
a_1 20 cm	37.28	38.25	37.76
a_2 30 cm	39.81	41.25	40.53
b_1 60 kg N/fed	36.71	38.16	37.44
b_2 70 kg N/fed	38.91	39.30	39.11
b_3 80 kg N/fed	40.02	41.78	40.90
a_1 b_1	34.87	36.19	35.53
a_1 b_2	37.04	37.50	37.27
a_1 b_3	39.93	41.05	40.40
a_2 b_1	38.55	40.13	39.34
a_2 b_2	40.78	41.11	40.95
a_2 b_3	40.10	42.52	41.31
Mean (c)	38.55	39.75	Y=1.98

LSD at 5%	A	B	C	AB	AC	BC	ABC
	NS	2.22	0.52	NS	NS	NS	NS

The stimulation occurred on length, diameter and weight due to employing wide distance between hills could explain the present results. These results are in harmony with those obtained by Minx (1993) and Smit (1993).

A remarkable promotion on root yield was observed due to raising N levels and its frequency of application disappeared when N levels raised from 60 to 70 KN/fed In this connection varying N levels from 60 kg/fed. to 80 kg/fed. caused a significant increase.

All the studied interactions failed statistically to exhibit any beneficial effect on root yield. Planting Kawemira sugar beet plant as 30 cm. between hills and supplying the plants with 80 kg N/fed at three equal splits produced the higher yield which reached (42.52 tons/fed).

The beneficial influence of N particularly at the optimum rate and batch in improving growth and nutritional status of the plant, in favour of producing higher roots yield could explain the present results.

The improving effect on root yield due to application of N at the proper level and exact number of batch was supported by the results of Mokadem (1993 b); Salama and Badawi (1996); Al-Labbody (1998) and Mokedem (1998) in various sugar beet varieties.

4. Percentages of total soluble solids, sucrose and purity :

The combined data of 1999/2000 and 2000/2001 seasons included in Tables (5 and 6) reveal that varying planting density of Kawemira sugar beet variety caused an obvious and not significant differences in chemical quality of the juice. Increasing plant spacing from 20 to 30 cm between hills hastened such three chemical traits but the differences between the two distances on total soluble solids percentage was significant.

The great supply of wide distance between hills for nutrients and light through reducing the competition between plants could interpret present results.

The improving effect of wide distance (lower planting density) on juice quality was emphasized by the results of Minx (1993); Mokedm (1993 a); Smit (1993); Marlander and Rover (1994) and Sultan *et al.* (1996) on different sugar beet varieties.

The combined data of the two seasons show that increasing the levels of N from 60 to 80 N/fed as followed by gradual reduction on the percentages of total soluble solids, sucrose and purity. Significant reduction in the total soluble solids % was observed when level of N was raised from 60 to 80 kg N/fed. However, the reduction in both sucrose and purity % in response to raising N levels was not significant. Nitrogen frequency had not effect on the percentages of total soluble solids, sucrose and purity.

Most of the studied interactions was of beneficial effect on total soluble solids and sucrose percentages. Purity was not significantly with the studied interactions. The best results with regard to total soluble solids % and sucrose % were obtained owing to planting at 30 cm between hills and supplying the plants with 80 kg N/fed at two equal batches.

The effect of N on delaying ripening could explain the present results. These results are in harmony with those obtained by Mokadem (1993 b) Salama and Badawi (1996) and Mokadem (1998).

As a conclusion and on the basis of the obtained results that planting Kawemira sugar beet at 30 cm plant density and supplying the plants with N at 80 kg N/fed at three equal batches before the first, second and third irrigations produced the highest root yield/fed. While, the highest sucrose percentage was recorded when planting it at 30 cm between hills and adding 60 kg N/fed at three equal batches at the same previous time. Sowing kawemira variety at 20 cm between hills and adding 70 kg N/fed at three equal batches before the first, second and third irrigation gave the best purity percentage of juice. These results were true under Upper Egypt conditions.

Table (5) : Effect of plant spacing, nitrogen rates and its frequence on total soluble solids and sucrose percentages of Kawemira sugar beet variety in 1999/2000 and 2000/2001 seasons, as combined data.

Characters / Distance between hills (A) and N levels (B)	Total soluble solids (%)			Sucrose (%)		
	Number of N doses			Batches (C)		
	Two c1	Three 2	Means	Two c1	Three 2	Means
a_1 20 cm	16.34	16.78	16.56	14.75	15.24	14.99
a_2 30 cm	17.29	16.76	17.02	15.53	15.07	15.30
b_1 60 kg N/fed	16.65	17.29	16.97	14.91	15.77	15.34
b_2 70 kg N/fed	17.30	16.53	16.91	15.60	14.95	15.28
b_3 80 kg N/fed	16.49	16.48	16.49	14.91	14.74	14.83
a_1 b_1	16.13	16.87	16.50	14.43	15.34	14.89
a_1 b_2	16.71	16.49	16.60	15.23	15.12	15.18
a_1 b_3	16.18	16.98	16.58	14.60	15.25	14.93
a_2 b_1	17.18	17.72	17.45	15.40	16.20	15.80
a_2 b_2	17.88	16.57	17.23	15.98	14.79	15.39
a_2 b_3	16.80	15.98	16.39	15.22	14.23	14.73
Mean (c)	16.81	16.77	Y=NS	15.14	15.15	Y=1.98

LSD at 5%	A	B	C	AB	AC	BC	ABC	A	B	C	AB	AC	BC	ABC
	0.11	0.39	NS	0.55	0.42	0.51	NS	NS	NS	NS	NS	0.39	0.48	NS

Table (6): Effect of plant spacing, nitrogen rates and its frequence on purity percentage of Kawemira sugar beet variety in 1999/2000 and 2000/2001 seasons, as combined data.

Character / Distance between hills (A) and N levels (B)	Purity (%)		
	Number of N doses		
	Two c1	Three 2	Means
a_1 20 cm	90.26	90.28	90.54
a_2 30 cm	89.99	89.89	89.89
b_1 60 kg N/fed	89.53	91.21	90.37
b_2 70 kg N/fed	90.27	90.42	90.34
b_3 80 kg N/fed	90.42	89.43	89.92
a_1 b_1	89.39	90.97	90.18
a_1 b_2	91.15	91.62	91.38
a_1 b_3	90.24	89.88	90.06
a_2 b_1	89.67	91.45	90.56
a_2 b_2	89.39	89.22	89.30
a_2 b_3	90.60	88.99	89.79
Mean (c)	90.07	90.35	T=NS

LSD at 5%	A	B	C	AB	AC	BC	ABC
	NS	NS	NS	NS	NS	NS	NS

REFERENCES

Abd El-Hafeez, A.A.; M.S. Osman; N.F. Dawla and A.F. Abdalla (1984). Effect of population density and time of nitrogen application onsome sugar beet varieties. Bul. of Agric., Univ. of Cairo, 35 (I) : 141-150.

Al-Labbody, A.H. (1998). Effect of fertilization and harvesting dates on yield and quality of sugar beet M.Sc. Thesis, Fac. Agric. Al-Azhar Univ., Egypt.

Edris, A.S.A.; N.A.N. El-Din; I.H.M. El-Geddawy and A.M.A. El-Shafe (1992). Effect of plant density, nitrogen and potassium fertilizer on yield and its attributcs of sugar beet. Pakistan Sugar, J. 6 (3) : 21-24.

El-Geddawy, I.H.; N.A.N. El-Din; A.S.A. Edris and A.M.A. El-Shafe (1992). Sugar beet quality as affected by plant density, nitrogen and potassium fertilizer. Pakistan Sugar J., 6 (2) : 26-38.

El-Kassaby, A.T. and A.T. Leilah (1992). Influence of plant density and nitrogen fertilizer levels on sugar beet productivity. Proc. 5th Conf. Agron. Zagazig, (2): 954-962.

Gomez, K.A. and A.A. Gomez (1984). Statistical Procedurs for Agricultural Research. John Wileyand Sons. New York. 2nd ed.

Hassanin, M.A. (1991). Response of some sugar beet varieties to plant population. Bull. Fac. Agric. Cairo Univ., 42(3): 653-662.

Hemissa, M.R.; A. Hamam; M.K. Adawi; A.H.M. Nour; F.M. Abd El-Ghaffar T.M.A. Fayed and F.H.El-Helbawi (1970). Time of nitrogen application for sugar beet. Agric. Res. Rev., 48 : 351-358.

Hills, F.J.; F.E. Broadbent and M. Fried (1978). Timing and rate of fertilizer nitrogen for sugar beets related to nitrogen uptake and polution potential. J. Environ. Quality, 7: 368-72. (C.F. CDROM Computer System).

Mahmoud, E.A. (1979). Effect of time and rate of nitrogen application on yield and sugar content of sugar beet (*Beta vulgaris,* L.). Fac. Agric., Ain Shams Univ. Res. Bull., 1118.

Marlanden, B. and A.Rover (1994). Influence of variety and population density and yield and quality of sugar beet a contribution to competition for light. Zuckerindu. Strie,119 (1): 39-47. (C.F. CDROM Computer System).

Milivogevic, J.; D. Dusic and M. Nedic (1992). Optimizing the irrigation regime at different planting densities of sugar beet on marshy black soils. Proc. 16th ICID European Regional Conf. Vol. 2. Ecological Technological and Socio economical impatsm agriucltural waqter management. 197.

Minx, L. (1993). The effect of row spacing on the productive utilization of distances betwen plants in the sugar beet stand. Rostlinna Vytoba, 39 : (6): 531-541.

Mokadem, Sh.A. (1993 a). Evaluation of some sugar beet varieties with varying plant population under El-Minia Governorate conditions. Assiut J. Agri. Sci., 24 (4) : 77-93.

Mokadem, Sh.A. (1993 b). Productivity of some sugar beet varieties under different N and K fertilizer regimes in newly reclaimed soils. Minia J. Agric. Res. and Dev., 15 (2) : 500-520.

Mokadem, Sh.A. (1998). Adjusting the appropriate irrigation intervals as wellas nitrogenand potassium fertilization levels for sugar beet under El-Minia conditions. Annals Agric. Sci., Moshtohor, 36 (1): 71-82.

Mijjar, G.S. (1985). Nutrition of Fruit Trees. Mrs Usha Raj Kumar for kalyani publishers, New Delhi. pp. 10-52.

Salama, A.M. and M.A. Badawi (1996). Evaluation of six sugar beet cultivars under N levels and harvesting dates. J. Agric. Sci., Mansoura Univ., 21 (1): 139-153.

Smit, A.L. (1993). The influence of sowing date and plant density on the decision to resow sugar beet. Field Crops Res., 34 (2): 159-173.

Sultan, M.S.; A.N. Attia; A.E. Sharief; M.A.M. Ibrahim and T.K. Emara (1996). Irrigation efficiencies of sugar beet in relation to plant populationand water quantity. Proc. 7th Conf. Agronomy, Mansoura Univ., (2) : 513-522.

Taha, E.M.; M.S.F. El-Ashmoony and A.A. El-Sharbeeny (1991). Influence of plant population, time of application rates of NK fertilization on sugar beet. Minia J. Agric. Res. and Dev., 13 (2) : 953-966.

Takada, S.; T. Kawamura and T. Susuki (1992). The characterization of new sugar beet variety Melody. Proc. Japanese Soc. Sugar Beet Tech., 34: 58-63.

Takahashi, R. (1987). Responose of sugar beet line Hokkai No.s1 to different quantities of nitrogen fertilizer and different plant densities. Proc. Sugar Beet Res. Assoc. Japan, 29: 107-111.

Ueno, S.; T. Suzuki; M. Mitani; M. Sawada; T. Tanaka and T. Takahashi (1986). Effect of soil nitrogen application on quality of sugar beet in peat soils Shari Proc. of sugar beet Res. Assoc. Japan, 28: 133-140.

Wilde, S.A.; R.B. Corey; J.g. Layer and G.K.voigt (1985). Soil and Plant Analysis for Tree Culture. Oxford and IBIT Publishing Co., New Delhi India pp. 10-100.

تأثير مسافة الزراعة وكمية السماد الأزوتى وعدد مرات إضافته على المحصول وجودته لبنجر السكر صنف كاويميرا تحت ظروف مصر العليا

أحمد محمود أبو الوفا
قسم المحاصيل - كلية الزراعة - جامعة الأزهر بأسيوط

أجريت تجربتان حقليتان خلال موسمى ١٩٩٩/٢٠٠٠ و ٢٠٠٠/٢٠٠١ على بنجر السكر صنف Kawemira وذلك لدراسة تأثير اختلاف مسافة الزراعة ومعدلات وعدد مرات إضافة السماد النيتروجينى على المحصول ومكوناته.

اشارت نتائج الدراسة أنه بزيادة مسافة الزراعة بين الجور من ٢٠ إلى ٣٠ سم أدت إلى زيادة فى طول وقطر ووزن الجذر ومحصول الجذور بالطن للفدان ونسبة المواد الصلبة الذائبة الكلية والسكر.

كما أدت زيادة السماد الأزوتى وإضافته على ثلاث دفعات إلى زيادة فى سمك جذر النبات ووزنه ووزن أوراقه ومحصول الجذور. وأن الزراعة على مسافة ٣٠ سم بين الجور وإضافة السماد بمعدل ٦٠ كيلوجرام للفدان على ثلاث دفعات متساوية تعطى زيادة فى النسبة المئوية للسكروز. أما الزراعة على مسافة ٢٠ سم بين الجور وإضافة السماد الأزوتى بمعدل ٧٠ كيلوجرام للفدان على ثلاث دفعات أعطت أعلى درجة نقاوة للعصير.

مما سبق يتضح أن زراعة نباتات بنجر السكر صنف Kawemira فى جور على أبعاد ٣٠ سم وتسميد هذه النباتات بمعدل ٨٠ كيلوجرام نتروجين للفدان على ثلاثة دفعات متساوية قبل الرية الأولى والثانية والثالثة يعطى أعلى محصول و يحقق أعلى عائد اقتصادى فى منطقة مصر العليا.