J. Agric. Sci. Mansoura Univ., 28 (3): 1567 – 1577, 2003

EVALUATION OF INTERCROPPING SUGAR BEET AND SUGAR CANE AND IT'S EFFECT ON GROWTH, YIELD AND JUICE QUALITY.

Farghaly, B.S.
Crop Intensification Res. Sec., Field Crops Res. Ins., A.R.C, Giza, Egypt.

ABSTRACT

Two field experiments were conducted at Shandaweel experimental station, Sohag govemorate, upper Egypt during 2000 / 2001 and 2001 / 2002 seasons to study effect of intercropping sugar beet and sugar cane. Sugar beet was planted with one row on the ridge of sugar cane under different plant densities of sugar beet . Each experiment included five treatments; 3 treatments for distances of sugar beet at 20, 25 and 30 cm among the hills and 2 treatments for pure stand of sugar pure stand of beet. Randomized complete block design was used in the experiment with four replication plot area was 25 m^2. The main results could be summarized as follows:

1. Sugar cane yield was decreased from intercropping with sugar beet and lowest value was obtained from planting sugar beet at 20cm between hills.
2. Brix degree, sucrose, purity, rendement and sugar yield were unaffected by Intercropping in both seasons.
3. Pure stand of sugar beet had higher top and root yields/fad Than intercropped sugar beet.
4. Sugar beet quality characters were decreased by intercropping except total soluble solids (T.S.S %), was increased by intercropping in both seasons.
5. Intercropping sugar beet with sugar cane increased land usage by 48.5 to 64 %.
6. The relative crowding coefficient for both crops was increased by increasing distance between hills of sugar beet.
7. The economical analysis clearly showed that intercropping sugar beet with sugar cane gave the highest gross profit comparing with sole cropped treatments. Moreover, the results indicated that the best treatment was when the intercropped sugar beet was sown at distance of 30 cm between hills.

It could be recommended that planting one row of sugar beet at a distance of 30 cm between hills on cane ridges is successful and profitable for production under conditions of Upper Egypt.

INTRODUCTION

Many farmers who grow sugar cane were accustomed to doing intercropping many crops on the same ridge of sugar cane.

During winter season, sugar cane grows slowly due to prevailing low temperatures. Therefore, attention was focused on some annual, short duration, winter crops that may be grown as companion crops with sugar cane. Many investigators have shown the importance of intercropping other crops with sugar cane.

Nour *et al.* (1980) found that when the sugar cane was intercropped with onion, cane yield was slightly reduced but sucrose and purity percentages were unaffected. El-Bashbishy (1982) found that juice quality parameters i.e. riches, purity, rendement and glucose and sucrose percents

were not significantly affected by intercropping some field crops with sugar cane.

Mohamed (1985) demonstrated that the average number of stalks and sucrose yield per fad tended to increase by increasing distances between sugar beet plants, crop purity of cane tended to decrease with increasing intercropping sugar beet densities. Land equivalent ratio (LER) was greater than one by intercropping sugar cane with different sugar beet densities. The highest value of LER was obtained by growing sugar beet plants at a distance of 30 and 10 cm apart according to sugar beet cultivars. Sugar beet was the dominated intercropped component. Increasing plant distances between sugar beet plants decreased aggressivity. The relative crowding coefficient for both sugar cane and sugar beet became great by increasing plant density of sugar beet.

Singh and Singh (1985) found that yields of sugar cane and sugar beet were decreased when grown together compared with their pure stands, it increased the sugar cane equivalent yield, LER and economic returns. Belfquih *et al.* (1989) reported that the standard cultivars grown in double rows gave the highest sugar beet and sugar extract yields.

Lal and Mukerji (1993) reported that sugar cane yield in pure stands was higher from autumn than spring planting (93.19 vs.. 52.11 t/ha). Sugar cane yields were decreased by intercropping with sugar beet and gave the highest gross economic returns. El – Geddawy *et al.* (1994) found that intercropping beet with sugar cane increased sucrose percentage of sugar beet roots, whereas, sucrose content of sugar cane decreased with the intercropping as compared with the pure stand.

Zohry (1997) found that cane yield slightly decreased by intercropping, the greatest yield reductions (9.9 and 8.4%) in the two season occurred when intercropped with 5 rows of onion. Most sugar quality parameters (brix, sucrose and purity percentages) were unaffected by intercropping Land equivalent ratio and economic analysis showed that intercropping sugar cane with 5 rows of onion was the most productive and profitable system, with an LER of 1.59.

El-Geddawy *et al.* (1988) and (1994), Eweida *et al.* (1996) and Zohry (1997) cleared that intercropping bean, wheat, soybean or onion with sugar cane increased land usage (LER), also the high values of the relative crowding co-efficient (K) indicated a distinct yield advantage from intercropping of these crops with sugar cane.

Mahmoud *et al.* (1999) found that increasing the distance between hills from 15 to 20 cm significantly increased length, diameter and weight of individual roots and sugar yields / fad While sucrose and purity percentages were decreased.

Bassal *et al.* (2001) reported that increase in hill spacing until 30 cm was associated with marked increases in length and diameter of roots, top and root fresh weight / plant as well as root / top ratio and purity percentage of sugar beet.

The present investigation aims to find out the competition influence of intercropping sugar beet with sugar cane on some agronomic traits and both yields under conditions in upper Egypt.

MATERIALS AND METHODS

Two field experiments were conducted at shandaweel Agric. experimental station, Sohag governorate in the two successive seasons of 2000/2001 and 2001/2002 to investigate the effect of intercropping sugar beet " cv. Gloria " with sugar cane "cv. GT.C 54 / 9 " under different plant densities of sugar beet on yield and yield components of cane and beet. Randomized complete blocks design with four replications was used. Plot area was 25 m^2 with five ridges each 5m long and one m width, each experiment included five treatments as follows:

1- Intercropping cane with one row of beet planted at a distance of 20 cm between hills (T_1).
2- Intercropping cane with one row of beet planted at a distance of 25 cm between hills (T_2).
3- Intercropping cane with one row of beet planted at a distance of 30 cm between hills (T_3).
4- Sugar beet pure stand planted as recommended (T_4).
5- Sugar cane pure stand planted as recommended (T_5).

Sugar cane and beet were planted on October 20 and 25 in the first and second seasons, respectively. Sugar cane was planted in ridges spaced one meter in width while sugar beet was planted in one row between sugar cane ridges. Recommended fertilization for sugar cane was done as 200 kg /fad calcium super phosphate 15.5 % P_2O_5 and 50 kg/fad potassium sulphate (50 % K_2O) were applied during land preparation.

For pure stand of sugar cane 200 Kg N/fad as urea 46 % N was added in three equal doses one dose after 45 days from planting, the second dose was added after 145 days after the first dose and the third dose was added after one month later.

For pure stand of sugar beet 75 kg N /fad as urea 46 % N was added in two equal doses, one half after 45 days from planting and the second one after one month later. For intercropping sugar beet with sugar cane treatments 235 Kg N /fad (200 Kg N sugar cane + 35 Kg N sugar beet) as urea 46 % N was added, one half of sugar beet dose plus third of sugar cane dose after 45 days from planting sugar beet and the second half after one month later of sugar beet and the other two thirds of sugar cane was added after harvesting sugar beet. The normal agronomic practices for sugar cane and sugar beet were performed.

The two inner ridges of sugar beet from each plot were harvested and cleaned after 190 days from sowing; roots and tops were separated and weighted and the following data were recorded:

1- Root length (cm)
2- Root diameter (cm)
3- Root fresh weight (g)
4- Top fresh weight / plant (g)
5- Top yield / fad (ton)
6- Root yield / fad (ton)

The following measurements were determined on five roots chosen randomly from the central two rows of each plot:

7- Total soluble solids (T.S.S %),was determined by using " handrefractometer ".
8- Source percentage, was measured by automatic fresh system (HYCEL) for analysis of sugar beet quality according to Le Docte (1927).
9- Apparent purity percentage, was determined as ratio between sucrose percentage and T.S.S % of root.
10- Sugar yield /fad (ton),was calculated by multiplying root yield by root sucrose percentage.

Sugar cane was harvested after 12 months from planting

At harvest, a sample of 20 stalks / plot was taken at random for following morphological and chemical properties:

1- Stalk height (cm)
2- Stalk number / m^2
3- Number of nods / stalk
4- Stalk diameter (cm)
5- Cane yield /fad (ton)

Apparent juice purity % of cane was calculated according to Spencer and Mead (1945).

6- Brix percent was determined by using brix hydrometer standardized at 20 °C.
7- Sucrose percent was determined by using saccharimeter apparatus cording to A.O.A.C. (1970)
8- Apparent purity = $\frac{\text{Apparent sucrose} \times 100}{\text{T.S.S}}$

9- Rendement of sucrose = $\frac{(\text{Sucrose \% / cane}) - 0.8}{\text{Purity}} \times \frac{\text{Purity} - 40}{100 - 40}$

(40 = purity of cane molasses)

10- Sugar yield was calculated according to the following equation:

Sugar yield /fad (ton) = cane yield /fad (ton) × Sugar Rendement %.

For, competitive relationships the following parameters were calculated:
LER. (Land Equivalent Ratio) according to Willey (1979) a.
K. (Relative crowding coefficient) according to Hall (1974).

Economical evaluation:

The total income from each treatment in Egyptian pound / ton at market prices of L.E. 100 / ton of sugar beet, 95 / ton of sugar cane according to Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Statistics. *

Data collected were subjected to the statistical analysis according to Snedecor and Cochran (1980).

* **Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Statistics, Volume 2, March 2002 pp. 119,302.**

RESULTS AND DISCUSSION

I. Effect of intercropping on sugar cane.

Data in Table 1 showed that characters under study of sugar cane were significantly affected by intercropping forms in the two seasons except plant height and stalk diameter in both seasons.

Values of stalk number / m^2, number of nods / stalk and cane yield ton /fad were reduced by intercropping with sugar beet.

The reduction in the above mentioned characters was great when sugar cane intercropped with sugar beet at 20 cm between hills (T_1 high density) while the reduction in the same characters was low when intercropped with sugar beet at 30 cm between hills (T_3 low density).

The intercropped cane yield was estimated with 92.8, 93.7 and 95.3 %; and 93.0, 94.2 and 94.5 % of pure stand for 20, 25 and 30 cm between hills of sugar beet in both seasons, respectively.

These results showed that the greatest yield reduction (7.2 and 7.0 %) were recorded when sugar beet planted at a distance of 20 cm between hills (high density) in the first and second seasons, respectively.

The detrimental effect of the heavy inter– specific competition between both components for light and the severe below competition for nutrients and water on yield components, consequently reflected on the average yield of cane per Fad .

These results are in agreement with those obtained by Mohamed (1985), Singh and Singh (1985), Lal and Mukerji (1993 and Zohry (1997).

Table (1): Plant height (cm), stalk number/ m^2, number of nods/ stalk, stalk diameter (cm), cane yield /fad (ton) of sugar cane as affected by intercropping forms of sugar beet with sugar cane in 2000/ 2001 and 2001/ 2002 seasons.

Characters / Treatment	Plant height (cm)	Stalk number / m^2	Number of nods/ stalk	Stalk diameter (cm)	Cane yield /fad (ton)
2000/2001 Season					
T_1 Cane + beet at 20 cm	245.8	11.6	13.9	2.48	51.77
T_2 Cane + beet at 25 cm	249.5	11.6	13.8	2.51	52.30
T_3 Cane + beet at 30 cm	248.3	12.1	13.8	2.57	53.20
T_5 Sugar cane pure stand	253.6	13.1	14.7	2.56	55.80
L .S.D. at 5 %	N.S.	0.62	0.61	N.S.	0.90
2001/2002 Season					
T_1 Cane + beet at 20 cm	253.7	11.7	14.7	2.50	53.77
T_2 Cane + beet at 25 cm	250.0	11.9	14.2	2.51	54.43
T_3 Cane + beet at 30 cm	248.3	12.4	14.3	2.57	54.60
T_5 Sugar cane pure stand	252.8	13.0	15.5	2.59	57.80
L .S.D. at 5 %	N.S.	0.46	0.31	N.S.	1.68

Data in Table 2 showed that different intercropping forms had no significant effect on cane quality characters (Birx degree, sucrose, purity, rendment and sugar yield) in both seasons.
These results are in good accordance with those reported by Nour *et al* (1980), El–Bashbishy (1982) and Zohry (1997).

Table (2): Brix degree, sucrose, purity and rendement percentages and sugar yield /fad (ton) of sugar cane as affected by intercropping forms of sugar beet with sugar cane in 2000/ 2001 and 2001/ 2002 seasons.

Characters / Treatment	Brix dergree	Sucrose %	Purity %	Rendement %	Sugar yield /fad (ton)
2000/2001 Season					
T_1 Cane + beet at 20 cm	21.03	17.77	89.81	12.45	6.45
T_2 Cane + beet at 25 cm	21.10	18.72	86.79	13.69	7.15
T_3 Cane + beet at 30 cm	21.10	18.79	88.30	13.79	7.33
T_5 Sugar cane pure stand	21.11	18.93	86.35	13.97	7.79
L .S.D. at 5 %	N.S.	N.S.	N.S.	N.S.	N.S.
2001/2002 Season					
T_1 Cane + beet at 20 cm	21.22	18.40	88.68	11.85	6.36
T_2 Cane + beet at 25 cm	20.36	18.30	84.42	12.39	6.75
T_3 Cane + beet at 30 cm	21.03	18.57	89.01	13.54	7.39
T_5 Sugar cane pure stand	21.21	18.32	89.67	13.10	7.56
L .S.D. at 5 %	N.S.	N.S.	N.S.	N.S.	N.S.

B. Effect of intercropping on sugar beet:

Data presented in Tables 3 & 4 show that all estimated characters were significantly affected by intercropping except, top fresh weight / plant in both seasons and total soluble solids percentage (T.S.S %) in the second season.

The results in Table 3 show that the values of root length, root diameter, root fresh weight and top fresh weight / plant were high when sugar beet planted with low density (30 cm between hills). However the lowest values were obtained by high density (20 cm between hills).

Pure stand of sugar beet had high top and root yield /fad In the first season the reduction in top yield of sugar beet intercropped with sugar cane averaged 50.65, 51.95 and 54.80 % when sugar beet planted at a distance of 20, 25 and 30 cm between hills, respectively. In the second season, it was 49.26, 51.57 and 54.69 % for the same respectively treatments. In the first season, the reduction in root yield/fad (ton) of sugar beet intercropped with sugar cane averaged 54.4, 61.6 and 69.80 % when sugar beet planted at a distance of 20, 25 and 30 cm between hills, respectively. In the second season it was 56.80, 61.30 and 68.70 % for the same treatments respectively.

Sugar beet quality characters (Table 4) were decreased by intercropping except total soluble solids percentage (T.S.S %) which increased by intercropping in both seasons.

Intercropping sugar yield /fad (ton) were 58.1, 59.0 and 61.3 % in the first season and 60.4, 60.2 and 60.6 % in the second season from sugar beet pure stand when planted with 20, 25 and 30 cm between hills respectively.

Table (3): Root length and diameter (cm), root fresh weight / plant (kg), top fresh weight/ plant (g) and top and root yields /fad (ton) of sugar beet as affected by intercropping forms of sugar beet with sugar cane in 2000/ 2001 and 2001/ 2002 seasons.

Characters / Treatment	Root length (cm)	Root diameter (cm)	Root fresh weight kg	Top fresh weight/ plant(g)	Top yield/ fad (ton)	Root yield/ fad(ton)
2000/2001 Season						
T_1 Cane + beet at 20 cm	37.37	7.93	1.73	310.0	4.27	21.50
T_2 Cane + beet at 25 cm	43.60	8.28	1.87	326.7	4.38	24.33
T_3 Cane + beet at 30 cm	45.23	8.45	2.12	336.7	4.62	27.57
T_4 Sugar beet pure stand	36.83	8.14	1.54	313.3	8.43	39.50
L .S.D. at 5 %	1.78	0.21	0.04	N.S.	0.22	0.96
2001/2002 Season						
T_1 Cane + beet at 20 cm	37.53	8.06	1.61	320.0	4.35	23.47
T_2 Cane + beet at 25 cm	44.07	8.52	1.81	306.7	4.51	25.30
T_3 Cane + beet at 30 cm	45.70	8.74	2.06	346.7	4.83	28.37
T_4 Sugar beet pure stand	37.17	8.32	1.47	330.0	8.83	41.30
L .S.D. at 5 %	1.37	0.25	0.07	N.S.	0.35	0.47

Table (4): Total soluble solids % (T.S.S.%), apparent purity percentage, sucrose percentage and sugar yield /fad (ton) of sugar beet as affected by intercropping forms of sugar beet with sugar cane in 2000/2001 and 2001/2002 seasons.

Characters / Treatment	Total soluble solids % (T.S.S.%)	Apparent purity %	Sucrose %	Sugar yield /fad (ton)
2000/2001 Season				
T_1 Cane + beet at 20 cm	14.57	82.23	12.00	2.58
T_2 Cane + beet at 25 cm	14.27	77.87	11.11	2.62
T_3 Cane + beet at 30 cm	13.27	74.25	9.85	2.72
T_4 Sugar beet pure stand	13.37	84.14	11.25	4.44
L .S.D. at 5 %	0.83	3.88	0.47	0.11
2001/2002 Season				
T_1 Cane + beet at 20 cm	14.63	82.44	12.05	2.82
T_2 Cane + beet at 25 cm	14.30	77.93	11.13	2.81
T_3 Cane + beet at 30 cm	13.57	73.50	9.97	2.83
T_4 Sugar beet pure stand	13.70	82.68	11.32	4.67
L .S.D. at 5 %	N.S.	5.74	0.16	0.15

It's clear that increasing the distance between hills from 20 to 30 cm significantly increased length, diameter and weight of individual roots and top fresh weight/plant, top yield /fad (ton) and root and sugar yields /fad (ton) While total soluble solids % (T.S.S.%), sucrose and purity percentages were decreased. The reduction in sugar beet yield due to the severe inter-specific competition between sugar cane and sugar beet plants for light, water and nutrients. Similar results were reported by Singh and Singh (1985), Lal and Mukerji (1993), Zohry (1997), Mahmoud *et al.* (1999) and Bassal *et al.* (2001).

C. Competitive relationships and yield advantages:

Competitive relationships and yield advantages for intercropping sugar beet with sugar cane are presented in Table 5 .The results showed that values of land equivalent ratio (L.E.R.) were greater than one for all intercropping forms under study.

Intercropping sugar cane and sugar beet increased land usage by 47.0, 56.0 and 65.0% and 50.0, 55.0 and 63.0% when sugar beet was sown at a distance of 20, 25 and 30 cm between hills in one row between cane ridges in both seasons, respectively.

Sugar cane relative yield (RY) was the largest at low plant density of sugar beet (30 cm between hills). Whereas, sugar beet relative yield (RY) was increased by increasing distance between hills of sugar beet from 20 to 30 cm. In Table 5 also data on relative crowding coefficient (R.C.C.) was shown.

It increased by increasing distance between hills of sugar beet. It could be concluded that the product of the coefficient showed that land use efficiency increased by intercropping sugarcane and sugar beet.

These results are in agreement with those obtained by Mohamed (1985), Singh and Singh (1985), El-Geddawy *et al.* (1994), Eweida *et al.* (1996), and Zohry (1997).

Table (5):Effect of intercropping forms of sugar beet with sugar cane on competitive relationships in 2000/2001 and 2001/2002 seasons.

Treatment	Land equivalent ratio Beet cane total	Relation crowding coefficient
	2000/2001 Season	
T_1 Cane + beet at 20 cm	0.54 + 0.93 = 1.47	14.04
T_2 Cane + beet at 25 cm	0.62 + 0.94 = 1.56	16.54
T_3 Cane + beet at 30 cm	0.70 + 0.95 = 1.65	22.76
	2001/2002 Season	
T_1 Cane + beet at 20 cm	0.57 + 0.93 = 1.50	14.65
T_2 Cane + beet at 25 cm	0.61 + 0.94 = 1.55	17.73
T_3 Cane + beet at 30 cm	0.69 + 0.94 = 1.63	19.25

D. Economical evaluation and gross profit:

Table 6 shows the gross profit in L.E. for sugar cane pure stand, sugar beet pure stand and intercropping forms.

The results indicated that intercropping sugar beet planted with sugar cane gave the highest gross profit compared with sole cropped treatments.

It could be concluded that the higher values of the intercropping sugar beet planted at a distance of 30 cm between hills in one row between cane ridges while those planted at a distance of 20 cm between hills gave the lowest values.

These results are in a good agreement with those found by Singh and Singh (1985), Lal and Mukerji (1993) and Zohry (1997).

Finally, it could be recommended that planting one row of sugar beet at a distance of 30 cm between hills on cane ridges is successful and profitable for production under local condition of Upper Egypt.

Table (6): Effect of intercropping forms of sugar beet with sugar cane on equivalent gross profit in Egyptian pounds in 2000/2001 and 2001/2002 seasons.

Treatment	Gross profit	
	2000/2001 Season	2001/2002 Season
T_1 Cane + beet at 20 cm	7068.15	7455.15
T_2 Cane + beet at 25 cm	7401.50	7700.85
T_3 Cane + beet at 30 cm	7811.00	8024.00
T_4 Sugar beet pure stand	3950.00	4130.00
T_5 Sugar cane pure stand	5301.00	5491.00

REFERENCES

A.O.A.C. (1970). Association of official Agricultural chemists. Official Methods of Analysis 11 th ed Washington D.C.

Bassal, S. A. A.; A. A. Zohry and K. A. EL – Douby (2001). Effect of row and hill spacing and bio–mineral N–fertilization rates on sugar beet productivity. J. Agric. Sci. Mansoura Univ. , 26 (9) : 5217 – 5226.

Belfquih, A.; F. W. Hesse and A. Mad Ran (1989). Cultivation of sugar beet in sugarcane interrows in the Gha Sucrerie Maghrebine, 41:39-43.

EL – Bashbishy, A. Y. A. (1982). Studies on intercropping sugar beet, faba bean, sun flower and nitrogen fertilization in sugar cane as main crop in Egypt. Ph.D. Thesis., Fac. Agric., Cairo Univ., A. R. E. .

EL – Geddawy, I. H.; F. A. Abdul latif; A. S. EL- Gergawi and Laila M. Saif. (1994). Studies on intercropping sugar beet with sugar cane and its effect on yield and quality attributes. Egypt. J. APPL. Sci., 9 (1): 647 – 656.

EL – Geddawy, I. H.; A. H. Nour; T. M. Fayed and M. A. EL – Said (1988). Possibility of intercropping wheat with sugar cane. Communication in Sci. and Develop Res., 24 (285): 29 – 41.

Eweida, M. H. T.; M. S. A. Osman; S. A. A. Shams and A. H. A. Zohry (1996). Effect of some intercropping treatments of soybean with sugar cane on growth, yield and quality of both components. Annuls of Agric. Sci. Moshtohor., 34 (2): 473 – 486.

Hall, R. L. (1974). Analysis of the nature of interference between plants of different species. Aust. J. Res., 25: 749-756.

Lal, M. and N. Mukerji (1993). Productivity of intercropping system in sugar cane with sugar beet and wheat. Madras – Agric. J., 80 (4): 177- 179.

Le Docte, A. (1927). Commercial determination of sugar in the beet root using the sacks – Le Docte process. Int. sugar J. 29: 488–492 (C. F. sugar beet nutrition, April, 1972 Applied science publishers LTD, London, A. P. Draycott).

Mahmoud, E. A.; A. El-Metwally and M. E. M. Gobarh (1999).Yield and quality of some multigerm sugar beet as affected by plant densities and nitrogen levels, J. Agric. Sci. Mansura Univ., 24 (9): 499-516.

Mohamed, G. G. S. (1985). Studies on the effect of intercropping sugar beet with sugar cane on yield. M Sc. Thesis., Fac. Of Agric. Ain shams Univ.

Nour, A. H.; H. L. L. Abd El–Hady; A. Saber; I. H. El–Geddawy and A. K. El–Kafory (1980). The effect of intercropping of onion on yield and quality of sugar cane. Res. Bull. 1288 - June, Ain Shams Univ., Egypt.

Singh, Y. and G. R. Singh (1985). Performance of sugar cane and sugar beet intercropping with varying sugar beet population and nitrogen rates. Indian –J. of Agron., 30 (4): 445– 449.

Snedecor, G. W. and W. C. Cochran (1980). Statistical Methods 7 th Ed. Iowa State Univ. Press, Ames, Iowa U. S. A., 325– 330.

Spencer, G. L. and G. P. Mead (1945). Cane sugar hand – book. John Wiley and Sons, New York 843.

Willey, R. W. (1979 a). Intercropping, its importance and research needs. Part 1: competition and yield advantages. Field Crop Abst, 32: 1-10.

Zohry, A. H. A. (1997). Effect of intercropping onion with autumn planted sugar cane on cane yield and juice quality. Egypt. J. Agric. Res., 77 (1): 273 – 287.

تقييم تحميل بنجر السكر وقصب السكر على النمو و المحصول و جودة العصير

بدر سعد فرغلي
قسم بحوث التكثيف المحصولى – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – الجيزة/ مصر .

أجريت تجربتان بمحطة البحوث الزراعية بشندويل بمحافظة سوهاج في مصر العليا خلال الموسمين ٢٠٠٠/٢٠٠١ ، ٢٠٠١/٢٠٠٢ لدراسة تأثير تحميل بنجر السكر على قصب السكر تحت كثافات نباتية مختلفة من بنجر السكر و اشتملت الدراسة على خمسة معاملات هي :
الزراعة النقية لكل من بنجر السكر و القصب ، القصب + بنجر السكر و زراعة البنجر على مسافة ٢٠سم بين الجور، القصب + بنجر السكر وزراعة البنجر على مسافة ٢٥سم بين الجور، القصب + بنجر السكر وزراعة البنجر على مسافة ٣٠سم بين الجور. واستخدم تصميم القطاعات الكاملة العشوائية في أربعة مكررات وكانت مساحة القطعة التجريبية ٢٥م^2 وأجريت جميع العمليات الزراعية طبقا للتوصيات ويمكن تلخيص النتائج فيما يلي:-

١) نقص محصول القصب المحمل معنويا بالمقارنة بالزراعة النقية وكان أكبر انخفاض في المحصول عند زراعة بنجر السكر المحمل على مسافة ٢٠سم بين الجور.
٢) لم تتأثر صفات الجودة للعصير ومحصول السكر للقصب معنويا خلال الموسمين.
٣) الزراعة النقية من بنجر السكر أعطت زيادة في محصول العروش والجذور مقارنة بالزراعة المحملة.
٤) أدى تحميل بنجر السكر مع القصب إلى انخفاض معنوي في صفات الجودة لمحصول بنجر السكر ماعدا النسبة المئوية للمواد الصلبة الذائبة الكلية فقد زادت بالتحميل خلال الموسمين.
٥) أدى تحميل بنجر السكر مع قصب السكر إلى زيادة كفاءة استغلال الأرض وزاد المعدل بزيادة المسافة بين جور بنجر السكر وكان ١,٤٧، ١,٥٦، ١,٦٥ في الموسم الأول بينما كان ١,٥٠، ١,٥٥، ١,٦٣ في الموسم الثاني عند زراعة البنجر على مسافات ٢٠،٢٥،٣٠ سم على الترتيب.
٦) زاد معامل الحشد النسبي للقصب وبنجر السكر بزيادة المسافة بين جور بنجر السكر في الموسمين.
٧) أدى تحميل بنجر السكر مع القصب إلى الحصول على عائد اقتصادي أعلى بالمقارنة بالزراعة النقية لكل من بنجر السكر أو القصب المنفردين وزاد العائد الاقتصادي للزراعة المحملة بزيادة المسافة بين جور بنجر السكر المحمل حتى ٣٠سم في الموسمين.

توصى الدراسة إلى أن أفضل معاملات تحميل البنجر مع القصب عندما زرع البنجر على مسافة ٣٠سم بين الجور في خط واحد بين خطوط القصب حيث أنها حققت أعلى إنتاجية وأعلى عائد اقتصادي تحت ظروف مصر العليا.