

# Effect of harvest age and seed rate on yield and quality of some sugarcane varieties

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## ABSTRACT

A field experiments were conducted at Agric. Res. St. (latitude of 26.33° N and longitude of 31.41° E), Sohag Governorate, Egypt during 2020/2021 and 2021/2022 seasons to find out the optimal of seeds rates (1.0, 1.5 and 2.0 drills) and harvest ages (10, 11 and 12 months) for yield and quality of three sugarcane varieties "*Saccharum officinarum* L." (G.T. 54-9, G. 2003-47 and G. 2004-27). A split-split plot arrangement with three replications was used. The main-plots devoted for harvest ages, seed rates in sub plots, while, sugarcane varieties distributed in the sub-sub plots, in both seasons. Findings revealed that delaying the harvest age from 10 to 12 resulted in a significant increase in millable stalk height, diameter, number of millable canes/fed, cane and sugar yields/fed, along with brix, sucrose, and sugar recovery%, in both seasons. The results revealed that, planting sugarcane using 2.0 drills improved height, number of millable canes/fed, cane and sugar yields/fed. While, planting by using 1.0 drill improvised millable stalk diameter and quality characteristics in both seasons. Sugarcane variety G.2004-27 superiority in cane yield and millable stalk height and diameter compared to the variety G.T.54-9. While, G.2003-47 variety was superior in quality characteristics and sugar yield/fed. However, G.2004-27 variety attained greater number of millable canes/fed, in both seasons. Under conditions of this work, it is recommended to cultivate these sugarcane varieties by rates of 2.0 drills and harvest age to 12 months to achieve a high cane and sugar yields/fed.

**Key words:** sugarcane, harvest age, seeds rate, varieties.

## INTERACTIONS RODUCTION

Harvesting age is the major important factor affecting sugarcane yield and quality traits. Sugarcane is harvested in the subtropical regions under conditions of low temperature (early harvesting) and high temperature (late harvest). Harvesting of sugarcane at a proper time by adopting the right age is necessary to realize the maximum weight of the millable canes produced with least possible field losses under the given growing environment (Muchow, *et al.* 1998). (Jadhav, *et al.* 2000) noted major differences among harvesting ages in reducing sugars percentage. Other factors such as varieties, weather conditions, and soil type may have a more direct bearing on the real maturity of canes than the crop age, however, the percentage of quality of cane juice mainly depends on various factors such as the sugarcane variety, the maturity of the sugarcane in the case of plant cane, weather, and harvesting conditions (Liu and Bull, 2001). Cane and sugar yields are determined by the age of harvesting at which the cane matures (Verma, 2004). On the other hand, harvesting either under-aged or over-aged cane with the improper time of harvest leads to a loss in cane yield, sugar recovery, poor juice quality, and problems in milling (Khandagave and Patil, 2007). El-Geddawy- Dalia, *et al.* (2011) revealed that, delaying harvest from 11 and/or 12.5 months after planting attained the highest significant values for sugar yield and quality parameters. El-Geddawy *et al.* (2012) found that harvest age up to 13 months give the highest values of millable stalk height, diameter, number of millable canes/fed and (cane and sugar yields/fed), as well as brix, sucrose, and sugar recovery %. Terauchi *et al.* (2012) cleared that, an earlier harvest itself shortens first growing period and reduced yield in the spring planting crop and gave low sugar content. Hagos *et al.* (2014) reported that the harvest age had a very significant influence on the percentage of brix, sucrose, and purity. Endris *et al.*, (2016) observed that the maximum sugar yield value (ton/ha) was reported at 14 months of harvesting age. Abu-Ellail *et al.*, (2020) studied three harvest dates at ages of 11,12 and 13 months, they found that harvest age up to 13 months recorded the highest values of cane and sugar yields.

Many researchers in Egypt and most countries of the world showed that cane yield increase with increasing seeding rate, probably due to the maximum utilization of growth factors as solar radiation, water and nutrients by an optimal number of cane plants, which will be reflected in more photosynthesis and dry matter accumulation in cane stalks. In this respect, Ismail *et al.*, (2008) indicated that growing sugarcane using 50400 buds/fed gave the highest number of millable canes, millable stalk height, brix, sucrose, sugar recovery, cane and sugar yields/fed compared to 25200 and/or 37800 buds/fed. Shalaby *et al.*, (2011) showed that planting sugarcane with 50400 buds/fed recorded higher values of millable stalk height, sucrose, sugar recovery, number of millable canes/fed, cane and sugar yields/fed, while using 37800 buds/fed resulted in higher stalk diameter and brix. El-Geddawy-Dalia *et al.* (2015) reported that drilling two rows of sugarcane sets attained the highest values of millable stalk length, diameter, number of millable canes/fed, brix, sucrose, cane and sugar yields/fed. Bekheet and Abd El-Aziz-Rania, (2016) indicated that increasing seeds rate from 1.5 to 2.0 drills produced significant increases in millable stalk height, diameter, number of millable canes, brix, sucrose, cane and sugar yields/fed. Makhlof *et al.* (2016) found that planting sugarcane by 37800 buds/fed produced higher millable stalk diameter and stalk fresh weight, while planting it by 50400 buds/fed attained the highest brix, sugar recovery, number of millable canes/fed, cane and sugar yields/fed. Gadallah *et al.* (2020) concluded that there is significant improvements in brix%, sucrose% and sugar recovery% were recorded in case of growing using 1.0 drill, while using 1.5 drill resulted in the highest millable weight, however, planting by 2.0 drills (50400 buds/fed) recorded the best value from number of millable canes/fed, cane and sugar yields/fed.

In Egypt, the commercial cane variety GT.54-9 "*Saccharum officinarum L.*" occupies most of sugarcane cultivated area. Recently, Sugar Crops Research Institute developed several promising varieties of sugarcane, as G.2003-47 and G.2004-27 in addition to G.2005-47. The newly bred varieties showed variable response to different agronomic practices, basically, time of maturity. Some varieties of sugarcane have relatively high concentrations of sucrose in the early season and are defined as early maturation, while others are known as late maturation (Calderon *et al.*, 1996). Makhlof *et al.* (2016) found that sugarcane variety GT.54-9 over passed the two promising varieties (G.2003-47 and G.2003-49) in length, diameter and fresh weight/stalks, while, the two promising varieties over passed in brix, purity, sugar recovery% and number of millable canes/fed, however, G.2003-47 variety gave the highest sugar yield/fed. Fahmy *et al.* (2017) showed that sugarcane variety GT.54-9 and G.2003-47 surpassed the other two varieties (Phil 8013 and C. 57-14) in number of millable canes/fed, cane and sugar yields/fed. El-Bakry, (2018) revealed that the promising sugarcane variety G.2003-47 showed a superiority in juice quality traits. Sugarcane variety G.2003-47 had a significant superiority in the number of millable canes/ha and quality traits (Galal *et al.*, 2018). The promising sugarcane G.2004-27 variety surpassed the other ones in stalk length, stalk weight as well as cane and sugar yields/ha in the plant cane and 1<sup>st</sup> ratoon. Ali *et al.* (2019) showed that sugarcane varieties G.T. 54-9 and C. 57-14 were superior over the other varieties in cane and sugar yields/fad. Gadallah and Abd-El-Aziz-Rania, (2019) showed that sugarcane variety GT.54-9 superior on the other varieties in millable stalk height and cane yield/fed, while, G.2003-47 variety was superior in millable stalk diameter, brix, sucrose, sugar recovery and sugar yields/fed in both seasons, however, G.2004-27 variety attained the highest values of number of millable canes/fed. Gadallah *et al.* (2020) observed that the commercial variety GT.54-9 was superior in most of the studied traits. G.2003-47 variety was superior in brix%, sucrose% and sugar recovery %, meanwhile, G.2004-27 variety attained the highest number of millable cane/fed. Gadallah and Mehareb, (2020) found that sugarcane G.T.54-9 variety recorded the highest cane yield/fed, while G.2003-47 was superior in sucrose%, sugar recovery% and sugar yield/fed. The aim of the present work was to find out the appropriate harvesting age and the optimum seed rate for three sugarcane varieties to get the highest cane and sugar yields/fed.

## MATERIALS AND METHODS

Field experiment was conducted at Shandaweel Agricultural Research Station (latitude of 26.33° N , longitude of 31.41° E and altitude of 69m), Sohag Governorate, Egypt in 2020/2021 and 2021/2022 seasons to evaluate the performance of two new sugarcane varieties viz. G.2003-47 (Giza 3) and G.2004-27 (Giza 4), compared to the commercial variety G.T.54-9 (C 9). The three varieties planted with three rates of seeds [1.0, 1.5 and 2.0 drills of 3-budded cane cuttings (25200, 37800 and 50400 buds/fed obtained by planting 8400, 12600 and 16800 of three- budded seed setts/fed, respectively) to three harvest age 10, 11 and 12 months. Sugarcane was planted

in the 2<sup>nd</sup> week of March in both seasons. A split-split plot design with three replications was used. Harvest age was allocated in the main plots, while seed rates were randomly distributed in the sub plots, while, sugarcane varieties were randomly distributed in the sub-sub plots. Each plot area was 35 m<sup>2</sup> 1/120 from feddan including 5 rows of 7 m in length and 1.0 m apart. Nitrogen fertilizer was applied as urea (46% N) at the rate of 210 kg N/fed, which was split interactions o two equal doses; after the 1<sup>st</sup> and 2<sup>nd</sup> hoeing, *i.e.* (60 and 90 days from planting). Phosphorus fertilizer was added once during seed-bed preparation as calcium super phosphate (15% P<sub>2</sub>O<sub>5</sub>) at the rate 30 kg P<sub>2</sub>O<sub>5</sub>/fed. Potassium fertilizer was added once as potassium sulfate (48% K<sub>2</sub>O) at the rate of 48 kg K<sub>2</sub>O/fed with the 2<sup>nd</sup> dose of N fertilizer. The other agricultural practices were done as recommended by Sugar Crops Research Institute.

Chemical and physical properties of the experimental soil are presented in [Table \(1\)](#).

**Table 1.** Chemical and mechanical properties of the upper 40-cm of the experimental soil

Season		2020/2021	2021/2022
Mechanical analysis	Sand%	56.34	59.20
	Silt	28.44	24.30
	Clay	15.22	16.50
	CaCO <sub>3</sub> %	1.20	1.47
Soil texture		Sandy loam	Sandy loam
Chemical analysis	N Available (ppm)	0.20	0.24
	CO <sub>3</sub> Meq/100g	0	0
	H CO <sub>3</sub> Meq/100g	0.30	0.33
	Cl <sup>-</sup> Meq/100g	0.89	0.89
	SO <sub>4</sub> <sup>-</sup> Meq/100g	1.02	1.13
	Ca <sup>++</sup> Meq/100g	0.53	0.54
	Mg <sup>++</sup> Meq/100g	0.27	0.35
	Na <sup>+</sup> Meq/100g	1.25	1.31
	K <sup>+</sup> Meq/100g	0.16	0.15
	EC(ds/m) (1:5)	0.24	0.26
	pH	7.5	7.3

#### Recorded data:

The following data were recorded at harvest:

1. Millable stalk highest (cm).
2. Millable stalk diameter (cm).
3. Number of millable canes in (thousand/fad) was counted in one square meter base then converted interactions o a number per fed (4200 m<sup>2</sup>).

#### Juice quality parameters:

A sample of 20 millable canes from each treatment was taken at random, cleaned and crushed to extract the juice, which was analyzed to determine the following quality traits:

1. Brix% (total soluble solids of juice) was determined using "brix Hydrometer" according to the method described by "The Chemicalical Control Lab" of Sugar and Interactions egrated Industries Company (Anonymous, 1981).
2. Sucrose% was determined using "Sacharemeter" according to (A.O.A.C., 2005).
3. Sugar recovery% was calculated according to Yadav and Sharma, 1980) as follows:  
 Sugar recovery% = [sucrose% - 0.4 (brix% - sucrose %) × 0.73] Where 0.4 and 0.73 constants.

#### Yields

The harvested sugarcane of the middle three rows of each experimental unit were cut, topped, cleaned up from trash and weighed and counted to estimate the following traits:

1. Cane yield/fed (ton).
2. Sugar yield/fed (ton), which was estimated according to the following equation: Sugar yield/fed (ton) = cane yield/fed (ton) × sugar recovery%/100.

### Statistical analysis

The collected data were statistically analyzed according to (Gomez and Gomez, 1984) using the computer "MSTAT-C" statistical analysis package described by (Freed et al., 1989). The least significant differences (LSD) at 0.05 level of probability were calculated to compare the differences among means of treatments.

## RESULTS

### 1. Millable stalk height:

Results in Tables (2) pointed out that late harvest date up to 12 months increased significantly values of millable stalk height, in the 1<sup>st</sup> and 2<sup>nd</sup> seasons. Harvest age (12 months) recorded the highest mean values of millable stalk height by 26.3 and 12.5 cm, compared to that harvest age (10 and 11 months) respectively, in the 1<sup>st</sup> one, corresponding to 29.9 and 11.6 cm, in the 2<sup>nd</sup> one. Data in Table (2) showed that the used seed rates significantly affected millable stalk height, in both seasons. Planting sugarcane using 2.0 rows of cane cuttings (50400 buds/fed) increased millable stalk height by 17.2 and 8.2 cm, compared to that planted with 1.0 and 1.5 drills of 3-budded setts (25200 and 37800 buds/fed, respectively), in the 1<sup>st</sup> one, corresponding to 14.3 and 4.6 cm, in the 2<sup>nd</sup> season.

**Table 2.** Effect of seed rates, sugarcane varieties, harvest age and their interactions on millable stalk height (cm) in 2020/2021 and 2021/2022 seasons

Harvest age	Seed rate	2020/2021				2021/2022			
		Sugarcane varieties			Mean	Sugarcane varieties			Mean
		G.T. 54/9	G. 2003/ 47	G. 2004/ 27		G.T. 54/9	G. 2003/ 47	G. 2004/ 27	
10 Months	1.0 drill (25200 buds)	273.0	267.7	270.0	<b>270.2</b>	264.0	259.7	269.3	<b>264.3</b>
	1.5 drills (37800 buds)	276.9	273.9	283.9	<b>278.2</b>	274.3	270.7	276.3	<b>273.8</b>
	2.0 drills (50400 buds)	289.5	284.2	296.8	<b>290.2</b>	281.7	274.0	282.7	<b>279.4</b>
Mean		<b>279.8</b>	<b>275.2</b>	<b>283.6</b>	<b>279.6</b>	<b>273.3</b>	<b>268.1</b>	<b>276.1</b>	<b>272.5</b>
11 Months	1.0 drill (25200 buds)	286.5	282.5	286.5	<b>285.2</b>	284.7	280.7	283.3	<b>282.9</b>
	1.5 drills (37800 buds)	297.9	290.3	295.3	<b>294.5</b>	295.7	291.0	296.0	<b>294.2</b>
	2.0 drills (50400 buds)	303.1	294.0	304.0	<b>300.4</b>	299.3	288.3	298.7	<b>295.4</b>
Mean		<b>295.9</b>	<b>288.9</b>	<b>295.3</b>	<b>293.4</b>	<b>293.2</b>	<b>286.7</b>	<b>292.7</b>	<b>290.9</b>
12 Months	1.0 drill (25200 buds)	298.6	296.0	297.3	<b>297.3</b>	296.0	288.7	298.7	<b>294.4</b>
	1.5 drills (37800 buds)	308.1	303.0	309.2	<b>306.7</b>	303.7	299.0	306.3	<b>303.0</b>
	2.0 drills (50400 buds)	319.5	304.0	317.4	<b>313.6</b>	313.3	305.0	311.3	<b>309.9</b>
Mean		<b>308.7</b>	<b>301.0</b>	<b>308.0</b>	<b>305.9</b>	<b>304.3</b>	<b>297.6</b>	<b>305.4</b>	<b>302.4</b>
Average of Seed rate	1.0 drill (25200 buds)	286.1	282.1	284.6	<b>284.2</b>	281.6	276.3	283.8	<b>280.6</b>
	1.5 drills (37800 buds)	294.3	289.1	296.1	<b>293.2</b>	291.2	286.9	292.9	<b>290.3</b>
	2.0 drills (50400 buds)	304.1	294.1	306.1	<b>301.4</b>	298.1	289.1	297.6	<b>294.9</b>
Mean of harvest age		<b>294.8</b>	<b>288.4</b>	<b>295.6</b>		<b>290.2</b>	<b>284.1</b>	<b>291.4</b>	
LSD 0.05:									
Harvest age	A	1.42	A x B	1.98	A	2.36	A x B	NS	
Seed rates	B	1.14	A x C	NS	B	1.55	A x C	1.45	
Varieties	C	1.46	B x C	2.53	C	2.84	B x C	1.45	
			AxBxC	1.51			AxBxC	2.52	

Promising G.2004-27 variety gave the highest stalk millable without insignificant difference with the commercial variety GT.54-9 in this trait, only in the 1<sup>st</sup> season Table (2). Meanwhile, it was found that G.2003-47 variety had the shortest millable canes, in the 1<sup>st</sup> and 2<sup>nd</sup> seasons.

Millable stalk height was significantly influenced by the interactions between the studied factors except for that among harvest age x sugarcane varieties in the 1<sup>st</sup> season, and that of interactions eraction between harvest ages x sugarcane varieties in the 2<sup>nd</sup> season. The highest stalk millable was obtained when G. 2004/27 and/or G.T. 54-9 cultivars was planted with 2.0 drills of seeds and harvested at 12 months of age, in both seasons.

### 2. Millable stalk diameter:

Data in [Tables 3](#), pointed out that late harvest date up to 12 months increased significantly values of in millable stalk diameter, in the 1<sup>st</sup> and 2<sup>nd</sup> seasons. Harvest age (12 months) recorded the highest mean values of millable stalk diameter, in both seasons.

Reducing the used planting material to 1.0 drill of cane cuttings (25200 buds/fed) significantly resulted in producing the thickest millable stalk diameter, compared to those obtained in case of planting with 1.5 and 2.0 drills of cane sets (37800 and 50400 buds/fed, successively), in both seasons [Table \(3\)](#).

**Table 3.** Effect of seed rates, sugarcane varieties, harvest age and their interactions on millable stalk diameter (cm) in 2020/2021 and 2021/2022 seasons

Harvest age	Seed rate	2020/2021				2021/2022			
		Sugarcane varieties			Mean	Sugarcane varieties			Mean
		G.T. 54/9	G. 2003/47	G. 2004/27		G.T. 54/9	G. 2003/47	G. 2004/27	
10 Months	1.0 drill (25200 buds)	2.42	2.45	2.42	2.43	2.48	2.41	2.43	2.44
	1.5 drills (37800 buds)	2.39	2.39	2.39	2.39	2.38	2.37	2.38	2.38
	2.0 drills (50400 buds)	2.37	2.37	2.39	2.38	2.35	2.33	2.36	2.35
Mean		2.39	2.40	2.40	2.40	2.40	2.37	2.39	2.39
11 Months	1.0 drill (25200 buds)	2.46	2.50	2.45	2.47	2.53	2.45	2.51	2.50
	1.5 drills (37800 buds)	2.44	2.44	2.44	2.44	2.51	2.42	2.43	2.45
	2.0 drills (50400 buds)	2.44	2.41	2.41	2.42	2.43	2.39	2.43	2.42
Mean		2.45	2.45	2.44	2.44	2.49	2.42	2.46	2.45
12 Months	1.0 drill (25200 buds)	2.52	2.56	2.51	2.53	2.59	2.53	2.57	2.56
	1.5 drills (37800 buds)	2.47	2.47	2.46	2.64	2.47	2.48	2.45	2.47
	2.0 drills (50400 buds)	2.46	2.44	2.45	2.45	2.49	2.43	2.46	2.45
Mean		2.48	2.48	2.47	2.48	2.52	2.48	2.50	2.50
Average of Seed rate	1.0 drill (25200 buds)	2.47	2.50	2.47	2.48	2.53	2.46	2.50	2.50
	1.5 drills (37800 buds)	2.43	2.43	2.43	2.43	2.45	2.42	2.42	2.43
	2.0 drills (50400 buds)	2.43	2.40	2.42	2.42	2.42	2.38	2.42	2.41
Mean of harvest age		2.44	2.45	2.44		2.47	2.42	2.45	
LSD 0.05:									
Harvest age		A	0.01	A x B	NS	A	0.02	A x B	NS
Seed rates		B	0.01	A x C	0.01	B	0.02	A x C	NS
Varieties		C	0.01	B x C	0.01	C	0.02	B x C	NS
				AxBxC	NS				

The tested sugarcane varieties varied significantly in millable stalk diameter in both seasons. The commercial variety G.T.54-9 had the thickest stalks, while G.2004-27 variety recorded the lowest value of this growth character.

Millable stalk diameter significantly influenced by the interactions between harvest age x sugarcane varieties and seed rate x sugarcane varieties only in the 1<sup>st</sup> season, while, the other interactions had insignificant in the 1<sup>st</sup> and 2<sup>nd</sup> seasons.

### 3. Number of millable canes/fed:

The result in [Table \(4\)](#), showed that the dates of harvest differed significantly in number of millable canes, where the highest number of millable canes/fed was obtained at harvest age of 12 months in both seasons.

Data in [Table \(4\)](#), cleared that the used seed rates significantly affected number of millable canes/fed, in both seasons. Planting sugarcane using 2.0 rows of cane cuttings (50400 buds/fed) increased number of millable canes/fed by 5.186 and 1.483 thousand/fed, compared to that planted with 1.0 and 1.5 drills of sets (25200 and 37800 buds/fed, respectively), in the 1<sup>st</sup> season, being 5.682 and 1.692 thousand/fed in the 2<sup>nd</sup> one.

The tested sugarcane varieties differed significantly in number of millable canes in both seasons. The new sugarcane variety viz. G.2004-27 significantly surpassed the other variety G. 2003/47 in millable cane number/fed by 0.66 and 5.83% in the 1<sup>st</sup> season corresponding to 0.97 and 4.82% in the 2<sup>nd</sup> season.

**Table 4.** Effect of seed rates, sugarcane varieties, harvest age and their interactions on number of millable cane (thousand/fed) in 2020/2021 and 2021/2022 seasons

Harvest age	Seed rate	2020/2021				2021/2022			
		Sugarcane varieties			Mean	Sugarcane varieties			Mean
		G.T. 54/9	G. 2003/47	G. 2004/27		G.T. 54/9	G. 2003/47	G. 2004/27	
10 months	1.0 drill (25200 buds)	42.692	40.182	43.370	42.081	41.977	39.567	42.547	41.363
	1.5 drills (37800 buds)	46.540	44.332	46.933	45.935	45.723	44.270	45.883	45.292
	2.0 drills (50400 buds)	48.127	45.960	48.277	47.454	47.350	45.930	47.923	47.068
Mean		45.786	43.491	46.193	45.157	45.017	43.256	45.451	44.574
11 months	1.0 drill (25200 buds)	43.328	40.360	43.580	42.423	42.443	39.698	42.737	41.626
	1.5 drills (37800 buds)	46.567	44.484	47.043	46.019	45.920	44.533	46.333	45.596
	2.0 drills (50400 buds)	48.203	46.027	48.330	47.520	47.478	46.403	48.100	47.327
Mean		46.033	43.612	46.318	45.321	45.281	43.545	45.723	44.850
12 months	1.0 drill (25200 buds)	43.433	40.453	43.070	42.530	42.633	39.793	42.887	41.771
	1.5 drills (37800 buds)	46.817	44.510	47.080	46.136	46.193	44.713	46.620	45.842
	2.0 drills (50400 buds)	48.233	46.090	48.373	47.566	47.513	46.495	48.227	47.412
Mean		46.161	43.684	46.386	45.410	45.447	43.667	45.919	45.008
Average of Seed rate	1.0 drill (25200 buds)	43.151	40.332	43.551	42.345	42.351	39.686	42.723	41.587
	1.5 drills (37800 buds)	46.641	44.430	47.019	46.030	45.946	44.506	46.279	45.577
	2.0 drills (50400 buds)	48.188	46.026	48.327	47.513	47.447	46.276	48.083	47.269
Mean of harvest age		45.993	43.596	46.299		45.248	43.489	45.695	
<b>LSD 0.05:</b>									
Harvest age		A	0.090	A x B	0.160	A	0.073	A x B	0.301
Seed rates		B	0.092	A x C	0.154	B	0.173	A x C	0.227
Varieties		C	0.089	B x C	0.154	C	0.131	B x C	0.227
				AxBxC	0.267			AxBxC	0.393

Number of millable canes/fed significantly responded to the interactions among all studied in both seasons, Planting sugarcane variety G.2004-27 by using 2.0 rows and harvest sugarcane at 12 months, had the highest number of millable canes/fed.

#### 4. Brix %:

Data in Table (5), showed that delaying harvest age from 10 up to 12 months significantly increased brix% in both seasons. According to the significant effect of harvest ages, it was noted that harvest age (12 months) registered the highest mean values of brix compared to harvest ages (10 and 11 months) in both

seasons. The increase in brix% was 3.16 and 1.31% in the 1<sup>st</sup> season corresponding to 2.51 and 1.19% in the 2<sup>nd</sup> season respectively. Data in Table (5), revealed that decreasing seed rate to 1.0 drill of cane cuttings (25200 buds/fed) significantly increased brix% by 0.21 and 0.42% in the 1<sup>st</sup> season as well as 0.35 and 0.65% in the 2<sup>nd</sup> one, compared to that planted with 1.5 or 2.0 drills of setts (37800 and 50400 buds/fed, respectively).

The results in Table 5 manifested that G.2003-47 sugarcane variety had the highest values of brix% which amounted to 21.84 and 20.72% in the 1<sup>st</sup> and 2<sup>nd</sup> seasons respectively of brix%. On the contrary, variety G.2004-27 recorded the lowest values of 18.18 and 17.65% for this trait in the 1<sup>st</sup> and 2<sup>nd</sup> seasons respectively.

**Table 5.** Effect of seed rates, sugarcane varieties, harvest age and their interactions on brix (%) in 2020/2021 and 2021/2022 seasons

Harvest age	Seed rate	2020/2021				2021/2022			
		Sugarcane varieties			Mean	Sugarcane varieties			Mean
		G.T. 54/9	G. 2003/47	G. 2004/27		G.T. 54/9	G. 2003/47	G. 2004/27	
10 Months	1.0 drill (25200 buds)	17.90	20.33	16.92	<b>18.38</b>	17.85	20.38	16.65	<b>18.29</b>
	1.5 drills (37800 buds)	17.64	20.13	16.77	<b>18.18</b>	17.65	19.51	16.28	<b>17.81</b>
	2.0 drills (50400 buds)	17.56	19.67	16.72	<b>17.98</b>	17.49	16.07	16.11	<b>17.56</b>
Mean		<b>17.70</b>	<b>20.04</b>	<b>16.80</b>	<b>18.18</b>	<b>17.66</b>	<b>19.65</b>	<b>16.35</b>	<b>17.89</b>
11 Months	1.0 drill (25200 buds)	20.20	22.40	18.14	<b>20.25</b>	19.63	21.26	17.23	<b>19.37</b>
	1.5 drills (37800 buds)	19.89	22.40	17.87	<b>20.05</b>	19.31	20.81	17.79	<b>19.30</b>
	2.0 drills (50400 buds)	19.71	22.00	17.63	<b>19.78</b>	19.00	20.61	17.21	<b>18.94</b>
Mean		<b>19.93</b>	<b>22.27</b>	<b>17.88</b>	<b>20.03</b>	<b>19.31</b>	<b>20.90</b>	<b>17.41</b>	<b>19.21</b>
12 Months	1.0 drill (25200 buds)	21.10	23.37	20.15	<b>21.54</b>	20.87	22.16	19.45	<b>20.83</b>
	1.5 drills (37800 buds)	20.95	23.19	19.80	<b>21.32</b>	20.34	21.46	19.19	<b>20.33</b>
	2.0 drills (50400 buds)	20.85	23.05	19.59	<b>21.16</b>	19.92	21.24	18.96	<b>20.04</b>
Mean		<b>20.97</b>	<b>23.20</b>	<b>19.85</b>	<b>21.34</b>	<b>20.38</b>	<b>21.62</b>	<b>19.20</b>	<b>20.40</b>
Average of Seed rate	1.0 drill (25200 buds)	<b>19.73</b>	<b>22.03</b>	<b>18.40</b>	<b>20.06</b>	<b>19.45</b>	<b>21.27</b>	<b>17.78</b>	<b>19.50</b>
	1.5 drills (37800 buds)	<b>19.50</b>	<b>21.91</b>	<b>18.15</b>	<b>19.85</b>	<b>19.10</b>	<b>20.59</b>	<b>17.75</b>	<b>19.15</b>
	2.0 drills (50400 buds)	<b>19.37</b>	<b>21.57</b>	<b>17.98</b>	<b>19.64</b>	<b>18.80</b>	<b>20.31</b>	<b>17.43</b>	<b>18.85</b>
Mean of harvest age		<b>19.53</b>	<b>21.84</b>	<b>18.18</b>		<b>19.12</b>	<b>20.72</b>	<b>17.65</b>	
<b>LSD 0.05:</b>									
Harvest age		A	0.11	A x B	0.14	A	0.10	A x B	0.20
Seed rates		B	0.08	A x C	0.16	B	0.12	A x C	0.17
Varieties		C	0.09	B x C	NS	C	0.10	B x C	0.17
				AxBxC	NS			AxBxC	0.30

Brix was significantly affected by all the interactions in the 1<sup>st</sup> and 2<sup>nd</sup> order in both seasons, except for the interactions between seeds rate x sugarcane varieties and among three factors which were not significant in the 1<sup>st</sup> one only. The highest values of brix% were obtained with G.2003-47 variety as 1.0 drill planted of seeds and harvest sugarcane at 12 months Table (5).

##### 5. Sucrose%:

The result in Table (6), showed that dates of sugarcane harvest differed significantly in both seasons, where the delay of harvest for 12 months led to an increase in sucrose%, compared to the harvest at 10 and/or 11 months in both seasons. Decreasing seed rate to 1.0 drill of cane cuttings (25200 buds/fed) for sugarcane planting seed rates significantly increased sucrose% compared to that planted with 1.5 or 2.0 drills of setts (37800 and 50400 buds/fed, respectively), in the 1<sup>st</sup> and 2<sup>nd</sup> seasons.

The results in Table (6), indicated that G.2003-47 new variety gave the highest sucrose% as compared with the other varieties. However, G.2004-27 variety recorded the lowest values of sucrose% in the 1<sup>st</sup> and 2<sup>nd</sup> season.

Sucrose% was significantly affected by all the interactions between the study factors in the 2<sup>nd</sup> season and interactions among harvest age x sugarcane varieties only in the 1<sup>st</sup> season Table (6). The highest sucrose% was recorded by planted of sugarcane variety G.2003-47 by using 1.0 drill of 3-budded cane setts for plant and harvest sugarcane at 12 months in both seasons.

**Table 6.** Effect of seed rates, sugarcane varieties, harvest age and their interactions on sucrose (%) in 2020/2021 and 2021/2022 seasons

Harvest age	Seed rate	2020/2021				2021/2022			
		Sugarcane varieties			Mean	Sugarcane varieties			Mean
		G.T. 54/9	G. 2003/47	G. 2004/27		G.T. 54/9	G. 2003/47	G. 2004/27	
10 months	1.0 drill (25200 buds)	14.90	17.06	13.83	15.26	14.77	17.04	13.52	15.11
	1.5 drills (37800 buds)	14.61	16.76	13.69	15.02	14.63	16.25	13.24	14.71
	2.0 drills (50400 buds)	14.44	16.31	13.52	14.76	14.53	15.97	13.13	14.51
Mean		14.65	16.71	13.68	15.01	14.64	16.42	13.30	14.79
11 months	1.0 drill (25200 buds)	17.15	19.10	14.89	17.04	16.37	17.98	14.23	16.19
	1.5 drills (37800 buds)	16.71	19.07	14.69	16.82	16.19	17.58	14.66	16.15
	2.0 drills (50400 buds)	16.52	18.57	14.39	16.50	15.85	17.46	14.23	15.85
Mean		16.79	18.91	14.66	16.79	16.14	17.67	14.37	16.06
12 months	1.0 drill (25200 buds)	18.10	20.00	16.71	18.27	17.75	18.97	16.16	17.63
	1.5 drills (37800 buds)	17.88	19.94	16.54	18.09	17.41	18.37	15.93	17.24
	2.0 drills (50400 buds)	17.88	19.70	16.16	17.92	17.02	18.17	15.75	16.98
Mean		17.95	19.88	16.44	18.09	17.40	18.50	15.95	17.28
Average of Seed rate	1.0 drill (25200 buds)	16.71	18.72	15.14	16.86	16.30	17.99	14.64	16.31
	1.5 drills (37800 buds)	16.40	18.59	14.94	16.64	16.08	17.40	14.61	16.03
	2.0 drills (50400 buds)	16.28	18.19	14.69	16.39	15.80	17.20	14.37	15.79
Mean of harvest age		16.47	18.50	14.93		16.06	17.53	14.54	
LSD 0.05:									
Harvest age		A	0.11	A x B	NS	A	0.07	A x B	0.16
Seed rates		B	0.08	A x C	0.14	B	0.09	A x C	0.15
Varieties		C	0.08	B x C	NS	C	0.09	B x C	0.15
				AxBxC	NS			AxBxC	0.27

#### 6. Sugar recovery %:

The result in Table (7), indicated that the dates of sugarcane harvest differed significantly in sugar recovery% in both seasons, where sugarcane harvest at 12 months of age gave an increase in sugar recovery% by (2.39 and 1.03%) in the 1<sup>st</sup> one, and (1.96 and 0.98%) in the 2<sup>nd</sup> one, respectively. compared to the harvest at 10 and 11 months of age in both seasons. Data in Table (7), revealed that decreasing seed rate to 1.0 drill of cane cuttings (25200 buds/fed) used in sugarcane planting significantly increased sugar recovery% as compared to that planted with 1.5 or 2.0 drills of setts (37800 and 50400 buds/fed) in the 1<sup>st</sup> and 2<sup>nd</sup> seasons, respectively.

Sugar recovery% was significantly differed by the tested sugarcane varieties; G.2003-47 new variety recorded the highest sugar recovery% value, in both seasons. However, sugarcane variety G.2004-27 gave the lowest value of this trait in both seasons.



**Table 7.** Effect of seed rates, sugarcane varieties, harvest age and their interactions on sugar recovery (%) in 2020/2021 and 2021/2022 seasons

Harvest age	Seed rate	2020/2021				2021/2022			
		Sugarcane varieties			Mean	Sugarcane varieties			Mean
		G.T. 54/9	G. 2003/47	G. 2004/27		G.T. 54/9	G. 2003/47	G. 2004/27	
10 Months	1.0 drill (25200 buds)	10.04	11.59	9.16	10.26	9.90	11.54	8.89	10.11
	1.5 drills (37800 buds)	9.80	11.30	9.06	10.06	9.83	10.96	8.73	9.84
	2.0 drills (50400 buds)	9.62	10.95	8.86	9.81	9.77	10.84	8.66	9.76
Mean		9.82	11.28	9.03	10.04	9.83	11.11	8.76	9.90
11 Months	1.0 drill (25200 buds)	11.78	13.19	9.90	11.62	11.05	12.32	9.53	10.97
	1.5 drills (37800 buds)	11.37	13.15	9.78	11.44	11.00	12.03	9.79	10.94
	2.0 drills (50400 buds)	11.22	12.70	9.52	11.15	10.71	11.98	9.52	10.74
Mean		11.46	13.01	9.73	11.40	10.92	12.11	9.61	10.88
12 Months	1.0 drill (25200 buds)	12.58	13.87	11.23	12.56	12.23	13.15	10.87	12.08
	1.5 drills (37800 buds)	12.36	13.88	11.07	12.44	12.07	12.73	10.71	11.84
	2.0 drills (50400 buds)	12.42	13.64	10.80	12.29	11.78	12.59	10.59	11.66
Mean		12.54	13.80	11.03	12.23	12.03	12.82	10.73	11.86
Average of Seed rate	1.0 drill (25200 buds)	11.47	12.88	10.10	11.48	11.06	12.33	9.76	11.05
	1.5 drills (37800 buds)	11.18	12.78	9.97	11.31	10.97	11.91	9.74	10.87
	2.0 drills (50400 buds)	11.09	12.43	9.73	11.08	10.75	11.80	9.59	10.72
Mean of harvest age		11.25	12.70	9.93		10.93	12.01	9.70	
LSD 0.05:									
Harvest age		A	0.81	A x B	NS	A	0.05	A x B	0.11
Seed rates		B	0.06	A x C	0.10	B	0.06	A x C	0.11
Varieties		C	0.06	B x C	0.10	C	0.07	B x C	0.11
				AxBxC	NS			AxBxC	NS

Sugar recovery% markedly affected by all binary interactions, except for the triple interactions in both seasons, and interactions among harvest age x seed rate in the 1<sup>st</sup> one, which were not significant. The highest sugar recovery% was recorded by planted sugarcane variety G.2003-47 by using 1.0 in drill and harvest sugarcane at 12 months age in both seasons.

### 7. Cane yield/fed:

Delaying harvesting age of sugarcane from 10 up to 11 and to 12 months after planting, positively and significantly increased cane yield ton/fed in both seasons [Table \(8\)](#). Cane yield increased by (5.050 and 2.297 ton/fed) in the 1<sup>st</sup> season, corresponding to (5.429 and 1.947 ton/fed), in the 2<sup>nd</sup> one, by delaying harvest age at 12 months of age compared to the harvest at age 10 and 11 months, in the 1<sup>st</sup> and 2<sup>nd</sup> seasons, respectively [Table \(8\)](#).

Data in [Table \(8\)](#), showed that the used seed rates had a significant effect on cane yield/fed, in both seasons. Planted sugarcane using 2.0 drills of cane cuttings (50400 buds/fed) increased cane yield by 6.071 and 1.368 ton/fed as compared to that planted with 1.0 and 1.5 drills of setts (25200 and 37800 buds/fed, successively), in the 1<sup>st</sup> season, corresponding to 5.893 and 1.959 tons of canes/fed, in the 2<sup>nd</sup> one.

The results also pointed out that the tested varieties differed significantly with respect to cane yield/fed. Two sugarcane varieties, the promising G. 2004-27 exhibited the superiority in cane yield/fed greater than G. 2003-47 variety in both seasons. In the 1<sup>st</sup> one, G. 2004-27 variety produced 2.232 tons/fed over than from G. 2003-47, compared to the variety G.T.54-9 produced 2.901 tons/fed over than from G. 2003-47, without a significant variance between G.T.54-9 and G. 2004-27 in cane yield/fed in both seasons. Interactions between all factors were significant affected in the 1<sup>st</sup> and 2<sup>nd</sup> seasons.

**Table 8.** Effect of seed rates, sugarcane varieties, harvest age and their interactions on cane yield (ton/fed) in 2020/2021 and 2021/2022 seasons

Harvest age	Seed rate	2020/2021				2021/2022			
		Sugarcane varieties			Mean	Sugarcane varieties			Mean
		G.T. 54/9	G. 2003/47	G. 2004/27		G.T. 54/9	G. 2003/47	G. 2004/27	
10 Months	1.0 drill (25200 buds)	45.648	44.003	46.960	45.537	43.692	43.705	45.437	44.278
	1.5 drills (37800 buds)	50.803	49.023	50.913	50.247	50.347	49.123	50.194	49.888
	2.0 drills (50400 buds)	52.404	50.887	52.277	51.856	51.917	50.980	51.030	51.309
Mean		49.619	47.971	50.050	49.123	48.652	47.936	48.887	48.492
11 Months	1.0 drill (25200 buds)	48.582	46.722	48.940	48.081	48.054	45.051	49.082	47.396
	1.5 drills (37800 buds)	54.010	51.822	53.807	53.213	53.787	50.853	52.378	52.337
	2.0 drills (50400 buds)	55.153	52.723	55.130	54.336	53.637	51.587	53.335	52.853
Mean		52.582	50.422	52.626	51.860	51.823	49.164	51.598	50.862
12 Months	1.0 drill (25200 buds)	51.173	49.610	51.933	50.906	50.014	48.892	49.745	49.550
	1.5 drills (37800 buds)	55.992	53.502	55.872	55.122	55.553	52.695	54.157	54.135
	2.0 drills (50400 buds)	57.570	54.682	57.223	56.492	55.490	53.488	55.252	54.743
Mean		54.912	52.598	55.010	54.228	53.686	51.692	53.051	52.809
Average of Seed rate	1.0 drill (25200 buds)	48.468	46.778	49.278	48.175	47.253	45.882	48.088	47.075
	1.5 drills (37800 buds)	35.602	51.449	53.531	52.860	53.226	50.891	52.243	52.120
	2.0 drills (50400 buds)	55.042	52.764	54.877	54.228	53.681	52.018	53.206	52.962
Mean of harvest age		52.371	50.330	52.562		51.387	49.597	51.179	
LSD 0.05:									
Harvest age		A	0.25	A x B	0.34	A	0.19	A x B	0.58
Seed rates		B	0.20	A x C	0.24	B	0.33	A x C	0.42
Varieties		C	0.14	B x C	0.24	C	0.24	B x C	0.42
				AxBxC	0.42			AxBxC	0.73

#### 8. Sugar yield/fed:

Delaying harvesting age of sugarcane from 10 up to 11 and to 12 months after planting, positively and significantly increased sugar yield ton/fed in both seasons [Table \(9\)](#). Sugar yield increased by (1.110- and 0.480-ton sugar/fed) in the 1<sup>st</sup>season, corresponding to (0.926- and 0.457-ton sugar/fed), in the 2<sup>nd</sup> one, when harvested sugarcane at 12 months compared to the harvest at age 10 and 11 months, in the 1<sup>st</sup> and 2<sup>nd</sup> seasons, respectively.

**Table 9.** Effect of seed rates, sugarcane varieties, harvest age and their interactions on sugar yield (ton/fed) in 2020/2021 and 2021/2022 seasons

Harvest age	Seed rate	2020/2021				2021/2022				
		Sugarcane varieties			Mean	Sugarcane varieties			Mean	
		G.T. 54/9	G. 2003/47	G. 2004/27		G.T. 54/9	G. 2003/47	G. 2004/27		
10 months	1.0 drill (25200 buds)	4.286	4.656	3.973	4.305	4.155	4.565	3.781	4.167	
	1.5 drills (37800 buds)	4.650	5.010	4.252	4.607	4.491	4.851	4.002	4.448	
	2.0 drills (50400 buds)	4.629	5.033	4.276	4.645	4.629	4.978	4.150	4.586	
Mean		4.492	4.900	4.166	4.519	4.425	4.798	3.978	4.400	
11 months	1.0 drill (25200 buds)	5.107	5.324	4.318	4.914	4.691	4.890	4.070	4.550	
	1.5 drills (37800 buds)	5.297	5.847	4.600	5.248	5.053	5.359	4.537	4.983	
	2.0 drills (50400 buds)	5.410	5.844	4.599	5.285	5.084	5.560	4.579	5.074	
Mean		5.271	5.672	4.504	5.149	4.943	5.270	4.395	4.869	
12 months	1.0 drill (25200 buds)	5.462	5.610	4.908	5.326	5.213	5.231	4.662	5.035	
	1.5 drills (37800 buds)	5.786	6.180	5.212	5.726	5.577	5.693	4.996	5.422	
	2.0 drills (50400 buds)	5.991	6.282	5.225	5.838	5.597	5.854	5.109	5.520	
Mean		5.746	6.026	5.115	5.629	5.463	5.593	4.922	5.326	
Average of Seed rate	1.0 drill (25200 buds)	4.952	5.196	4.897	4.849	4.686	4.895	4.717	4.584	
	1.5 drills (37800 buds)	5.214	5.679	4.688	5.194	5.040	5.301	4.511	4.951	
	2.0 drills (50400 buds)	5.343	5.722	4.699	5.225	5.103	5.464	4.613	5.060	
Mean of harvest age		5.170	5.532	4.595		4.943	5.220	4.432		
LSD 0.05:										
Harvest age		A	0.04	A x B	0.04	A	0.03	A x B	0.06	
Seed rates		B	0.02	A x C	0.04	B	0.04	A x C	0.06	
Varieties		C	0.03	B x C	0.04	C	0.03	B x C	0.06	
				AxBxC	0.07				AxBxC	0.10

Table (9), manifested that planted of sugarcane using 2.0 drills of cane cuttings (50400 buds/fed) significantly increased sugar yield/fed by 0.361 and 0.061 ton/fed as compared to that planted with 1.0 or 1.5 drills of setts (25200 and 37800 buds/fed, successively), in the 1<sup>st</sup> season, corresponding to 0.476 and 0.109 ton of sugar/fed, in the 2<sup>nd</sup> one.

Cultivated sugarcane variety G.2003/47 exhibited the superiority in sugar yield/fed, recording significant increases amounted to 0.362 and 0.937 tons/fed higher than those produced by G.2004-27 varieties respectively, in the 1<sup>st</sup> season, corresponding to 0.788 tons/fed in 2<sup>nd</sup> one Table (9).

Sugar yield was significantly affected by the interactions between the studied factors in both seasons. The highest sugar productivity/fed (6.288 and 5.854 ton sugar/fed) was obtained by planting sugarcane variety viz. G.2003-47 by using 2.0 drills of 3-budded cane seeds and their harvesting at age of 12 months in the 1<sup>st</sup> and 2<sup>nd</sup> seasons, respectively.

## DISCUSSION

### Effects of different harvest ages on yield and quality in sugarcane:

Harvest age (12 months) recorded the highest mean values of millable stalk length, millable stalk diameter and number of millable canes/fed Tables (2, 3, and 4). These results are in conformity with those of (Jadhav et al., 2000; Hagos et al., 2014; Abo-Elail et al., 2020), watch they found that stalk height and it's diameter were increased gradually as harvesting time was delayed. As well as brix%, sucrose% and sugar recovery% increased as harvesting time was delayed in both seasons Tables (5, 6 and 7). These results are in agreement with those obtained by (Jadhav et al., 2000; El-Geddawy et al., 2012; Hagos et al., 2014; Abo-Elail et al., 2020). The increase could be due to positive impact of harvest age on the quality juice which allows accumulation of additional brix% and/or sucrose by delaying the harvest age (Rostron, 1972).

Delaying harvesting age of sugarcane to 12 months after planting, increased cane and sugar yields ton/fed in both seasons Table (8 and 9). The increase in cane yield/fed accompanied the delay in plant age of harvesting may be due increasing millable length, diameter and number of millable canes/fed Tables (2,

3 and 4). The increase in sugar yield/fed may be referred to the increase in brix, sucrose and sugar recovery percentages Tables (5, 6 and 7) as well as the increase in cane yield Table (8). These results are in conformity with those of (Muchowb et al., 1998; El-Geddawy- Dalia et al., 2011; El-Geddawy et al., 2012; Terauchi et al., 2012; Endris et al., 2016; Abu-Elail et al., 2020).

#### **Effects of different seeds rate on yield and quality in sugarcane:**

The components of cane yield include stalk length, stalk diameter, and number of millable canes/fed in sugarcane. The millable cane/fed is mainly determined by the plant population at the early stage, while the growth of individuals depends on the competitiveness of plants to obtain utilized the available growth factors as space, sun light, water and nutrients. Therefore, seeds rate mainly affects numbers of millable cane/fed by affecting the tillering rate and then jointly determines the cane yield by affecting the stalk length, stalk diameter, and stalk weight of sugarcane at the later stage. In this study, with the increase of seeds rate, the stalk length, number of millable canes/fed increased. The increase in cane yield/fed associated with the increase stalk length and number of millable canes/fed, while, increase in sugar yields/fed was associated with the increase in cane yield/fed as well as sucrose and sugar recovery percentages, which is considered the main components of sugar yield. These results are consistent with those of previous studies (Ismail et al., 2008; Shalaby et al., 2011; El-Geddawy-Dalia et al., 2015; Bekheet and Abd-El-Aziz- Rania, 2016; Makhlof et al., 2016; Gadallah et al., 2020).. These results may be due to that increasing seed rate resulted in an increase in plants population density, causing mutual shading among plants, and hence directed plants to search for solar radiation, also, Solar radiation has an effect on brix% and sucrose% (Chang, 1974), which is consistent with the results of this study. On the other hand, reducing the used seeds rate to 1.0 drill of cane cuttings resulted in producing the thickest millable stalk, and quality juice characters (brix, sucrose and sugar recovery%), compared to planting with 1.5 and 2.0 drills of cane sets Table (3). These results may be attributed to the lower interactions er-plant competition among plants for light and nutrients, as well as little mutual shading in case of planting with the lowest seeding rate. These results are in harmony with those reported by (Shalaby et al., 2011; Makhlof et al., 2016; Gadallah et al., 2020).

#### **Effects of some sugarcane varieties on yield and quality in sugarcane:**

Promising G.2004-27 variety gave the length, diameter/stalk, No. of millable cane/fed and cane yield/fed, compared with the commercial variety G.T.54-9 in the 1<sup>st</sup> and 2<sup>nd</sup> season Tables (2, 3, 4 and 8). These results are in conformity with those of (El-Geddawy et al., 2012; Abo-Elail et al. 2020), they pointeractions ed out that the significant variance between the sugarcane varieties in stalk height diameter/stalk and No. of millable cane/fed as well as cane yield/fed in both seasons. The variance among cane varieties in these traits may be due to their gene make-up. These results are similar with those obtained by (Makhlof et al., 2016; Fahmy et al., 2017; El-Bakry, 2019; Gadallah and Abd-El-Aziz- Rania, 2019; Gadallah and El-Mehareb, 2020). While, Promising G.2003-47 variety gave the best value of brix, sucrose and sugar recovery percentages as well as sugar yield/fed Tables (5, 6, 7 and 9) compared with the commercial variety G.T.54-9 in both seasons. These results are in conformity with those of (El-Bakry, 2018; Galal et al., 2018; Gadallah and Abd-El-Aziz- Rania, 2019; Gadallah and El-Mehareb, 2020). The increase in cane yield/fed accompanied the delay in plant age of harvesting may be due increasing millable length, diameter and number of millable canes/fed Tables (2, 3 and 4). While, increase in sugar yield/fed may be referred to the increase in brix, sucrose and sugar recovery percentages Tables (5, 6 and 7) as well as the increase in cane yield Table (8).

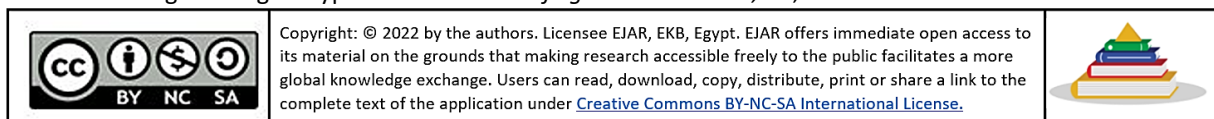
## **CONCLUSION**

Under conditions of this work, it is recommended to cultivate these sugarcane varieties studied at rates of 2.0 drills of cane setts (50400 buds/fed) and harvest age to 12 months to achieve a high cane and sugar yields/fed.

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## تأثير مواعيد الحصاد ومعدلات التقاوى على محصول وجودة بعض أصناف قصب السكر

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قسم بحوث المعاملات الزراعية - معهد بحوث المحاصيل السُّكرية ، مركز البحوث الزراعية ، مصر

أقيمت تجربة حقلية خلال موسمي 2021/2020 م و 2022/2021 م في محطة البحوث الزراعية بشندويل - محافظة سوهاج (دائرة عرض 26.33 شمالاً وخط طول 31.41 شرقاً) لدراسة تأثير ثلاث معدلات من التقاوي (صف واحد ، صف ونصف و صفين من عقل التقاوي) والحصاد بمواعيد حصاد (10 و 11 و 12 شهر من الزراعة)، على صفات المحصول والجودة لصنفين جديدين من قصب السكر هما (ج 2003-47 "جيزة 3" ) و (ج 2004-27 "جيزة 4") مقارنة مع الصنف التجاري (جيزة تابوان 9-54 "س 9"). تم استخدام تصميم قطع منشقة مرتين في ثلاث مكررات وقد أظهرت النتائج الأتي: سجل عمرالحصاد 12 شهراً أعلى القيم لصفات المحصول ومكوناته و صفات جودة العصير خلال الموسمين. حقق معدل التقاوي صفين زيادة ملحوظة في طول العود وعدد العيدان القابلة للعصر وحاصل العيدان والسكر/فدان، بينما حقق معدل التقاوي صف واحد زيادة معنوية في سمك العود والبركس% والسكروز% وناتج السكر%. تفوق الصنف المبشر (جيزة 3) في صفات جودة العصير وحاصل السكر/فدان في الموسمين، بينما تفوق الصنف الواعد (جيزة 4) في طول العود وسمكه وعدد للعيدان القابلة للعصر/فدان وحاصل العيدان/فدان في الموسمين مقارنة بالصنف التجاري س9. من نتائج هذه الدراسة يوصى بزراعة أصناف قصب السكر قيد الدراسة بمعدل تقاوي صفين والحصاد عند عمر 12 شهراً للحصول على أعلى حاصل للعيدان والسكر/فدان.

**الكلمات المفتاحية:** قصب السكر، مواعيد الحصاد، معدلات التقاوي، الأصناف