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QUALITATIVE CHANGES IN JUICE OF SUGAR CANE ATTACKED BY PURPLE-LINED BORER(STALK BORER) *Chilo agamemmnon* BLEZ.(LIPIDPTERA:CRAMBIDE)

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ABSTRACT

This study was carried out to evaluate the qualitative changes in sugar cane juice attacked by purple-lined borer (stalk borer), *Chilo agamemnon* Blez. in three intensity levels i.e. >5%, 5-10% and <10%bored joints at three locations i.e. Mallawi Experimental Station (El-Minia governorate) Shandaweel E.S (Sohag governorate and El-Mattana E.S (Quena governorate).

Examined cane samples of GT54-9 (C9) variety were obtained from propagation plots during two crushing seasons 2004 and 2005 as plant cane and 1st ratoon. Analysis of variance for each trait in each season revealed all juice quality traits were significantly differed among the three governorates in both plant cane and the 1st ratoon. Quena governorate exhibited better results.

Over and within the three locations and in both plant cane and the 1st ratoon bored joints less than 5% slightly reduced (statistically-insgnificant) juice extraction percentage, brix, sugar% cane (Richness), Sugar% juice (Pol%), extracted% sugar (Recovery), purity. However, acidity (pH), reducing sugars, dextran and ash showed vice versa trend. Thereafter, the increase in bored joints more than 5% and 10% significantly reduced the same quality traits as mentioned before or increased the other ones.

The three governorates showed various degrees of resistance or susceptibility in each quality trait to the injure caused by stalk borer.

Most traits in plant cane suffered less damage (more tolerant) caused by stalk borer than the 1st ratoon.

This study recommended that integrated pest management must take into consideration if stalk borer intensity infestation increased than 5%.

INTRODUCTION

Sugar cane (*Saccharium* spp.) is the main source for white sugar production in Egypt and about 69 countries in tropical and subtropical regions of the world. Sugar cane grow successfully in about 310 thousand feddan in both middle and upper Egypt. About 69.4 %of the total area is cultivated in El-Minia,

Sohage and Quena governorates: Purple-lined borer (stalk or internode borer) *Chilo agamemnon* Belzynsk. Lepidopterous is the most destructive and potentially chronic spices that severely attacks sugar cane fields (Abu-Dooh, 1988 and Maarage *et al.*, 1993).

Borer infestation causes reduction in cane weight and juice quality due to internodes damage and borer feeding. Beside larval tunnels in cane stalks cause stalk breakage and lodging. Moreover, the larval interance and moth holes offer entery point for red rot (Silva and Moraes, 1977; Mansour and Allam, 1982, Soliman and Mihm, 1997 and Schexnayder *et al.*, 2001). Therefore, borer infestation and accompanied diseases complex cause serious deterioration in the quality and quantity of extracted juice and hence, drastic threat to sugar production (Irvine, 1977; legendre and Richard, 1988; Chang and Wang, 1995; Gupta and Singh, 1977; Ali *et al.*, 2001 and Yakoub, 2005).

For many years entomologists have realized that insect infestation have a tendency to be heterogeneously distributed (Macedo *et al.*, 1977). In Egypt, Issa and Awadallah (1972) and Abu-Dooh (1988) reported that the degree of infestation by Chilo differed greatly from field to field in the same district and sometimes in the same area. Meantime, production and quality potentials of cane shows great variation among locations (Abo El-Ghait, 2000 and El-Taib, 2004). Therefore, the present study was initiated to assess the changes in chemical juice quality associated with three intensites level of Chilo infestation in three main sugar cane production governorates.

MATERIAL AND METHODS

Aiming to investigate the damage caused by sugar cane stalk borer infestation *Chilo agamemnon* Blez (Lep:carambidae) purple lined borer (PLB) in three intensity percentage levels i.e. >5%, 5-10% and <10% bored joints beside sound cane as control on juice quality of the main sugar cane variety named G.T54 / 9 (occupied about 95 % of the total cane area) in three locations Mallawi Expermintal Research station (El-Minia governorate), Shandaweel Experimental Research station (Sohag governorate) and EL-Mattana Experimental Research Station (Quena governorate).

Cane samples were obtained from cane propagation plots used as a source for new commercial cane plantation from the above mentioned stations and were highly comparable as to age and growing conditions.

Cane harvest was carried out during March 2004 and 2005 for plant cane and 1st ratoon, respectively. The stripped stalks in each location was carefully examined for estamiting infestation intensity percentage using the following formula according to Mendes *et al.* (1980). Intensity % =bored internodes x 100 /total internodes. Then cane samples classified to three infestation intensity levels i.e. >5%, 5-10%, and <10%bored joints. Infested and non infested stalks replicated three times each contained 40 cane stalk as

described by Singla and Dubra (1991) who stated that 30-40cane stalk were sufficient for estimating damage caused by internod borer.

Cane samples were crushed through 3roller lab mill. The row juice was filtered and weighted. Juice extraction percentage (JEP) was calculated as follows:

JEP=Juice weight x 100 / stripped stalk weight.

Juice quality was chemically analyzed according to Meade and Chen (1977) and A.O.A.C. (1990). Furthermore, all data within each season were subjected to statistical analysis. Treatment means were compared using L. S. D. at 5% level of probability.

RESULTS AND DISCUSSION

Juice Exteration Percentage (JEP)

Average data Table (1) indicated that JEP significantly differed among the three governorates in both plant cane and 1st ratoon. Quena exhibited the highest JEP (61.96 and 62.91%) for plant cane and 1st ratoon, respectively) followed by El-Minia and Sohag in descending order.

Inverse and significant relationship between the quantity of extracted juice (expressed as juice extraction percentage) and bored joints level had been detected in plant cane and 1st ratoon (Table1). Infested cane less than 5% bored joints was slightly reduced JEP especially in plant cane as compared with sound cane. Therefore, the increase in infestation intensity levels was accompanied with a significant reduction in JEP, recording 1.46% and 2.47% for the infested cane of 5-10%and <10 bored joints, respectively. in plant cane compared with the corresponds values of 3.01% and 3.80% in the 1st ratoon .The same trend was also attained within the three governorates (Table 1), where, Quena exhibited the lowest reduction in JEP corresponding to stalk borer intensity more than 10% recording 1.73%(from 62.42 to 61.34% for plant cane and 2.33% (from 63.65 to 62.17%), for the 1st ratoon. On the other hand, the highest reduction in JEP in the plant cane was in Sohage, while, it was of EL-Minia in the 1st ratoon (Table 1). The obtained results are in line with those of Ali *et al.* (2001) and Yakoub (2005) who noticed a reduction in juice extraction % from damaged cane. Such effect may be due to borer feeding on the juice and tissues of cane stalks (Schexnayder *et al.*, 2001).

Based on, the 1st ratoon suffered more with respect to this trait than the plant cane, likewise, El-Minia in the 1st ratoon and Sohag in plant cane suffered more than the other governorates.

Juice pH:

Juice pH differed significantly among the three governorates in both plant cane and 1st ratoon (Table 1). The highest juice acidity (the lowest pH values) was of EL-Minia in both crops followed by Quena and Sohag respectively.

Table (1): Effect of stalk borer intensity levels on some quality traits of sugar cane grown at three governorates.

Factor		Juice Extraction Percentage (JEP)		PH		Brix (100 cm juice) (TSS)	
Locations (L)	Infest intensity (I)	Plant cane	1st ratoon	Plant cane	1st ratoon	Plant cane	1st ratoon
El-Minia	Sound cane	62.53	61.78	5.18	5.29	19.28	19.18
	>5%	62.31	60.90	5.12	5.21	19.06	19.11
	5-10%	61.55	59.16	5.10	5.18	18.72	18.63
	<10%	60.98	58.82	5.07	5.07	18.55	18.47
Average		61.84a	60.17b	5.12c	5.19b	18.90b	18.85c
Sohag	Sound cane	62.17	61.07	5.38	5.47	19.03	19.27
	>5%	62.08	60.19	5.54	5.38	19.08	19.22
	5-10%	60.96	59.03	5.52	5.41	18.82	19.30
	<10%	60.17	58.44	5.44	5.34	18.63	19.08
Average		61.35b	59.68c	5.47a	5.40a	18.89b	19.22b
Quena	Sound cane	62.42	63.65	5.40	5.30	19.99	20.52
	>5%	62.18	63.09	5.40	5.31	20.37	20.68
	5-10%	61.88	62.72	5.28	5.14	19.32	20.01
	<10%	61.34	62.17	5.27	5.13	19.23	20.16
Average		61.96a	62.91a	5.34b	5.22b	19.64a	20.34a
Average over infest intensity	Sound cane	62.37a	62.17a	5.32a	5.35a	19.43a	19.66a
	>5%	62.19a	61.39b	5.35a	5.30a	19.39a	19.67a
	5-10%	61.46b	60.30c	5.30a	5.24b	18.95b	19.31b
	<10%	60.83c	59.81d	5.26a	5.18c	18.08c	19.24b
Average		61.71	60.92	5.31	5.27	19.15	19.47
Interaction LxI L.S.D 0.05		N.S	0.58	N.S	N.S	N.S	0.25

Means designated by the some letter one not significantly different at 0.05 level of probability.

Juice pH reading tends to decrease (increase in juice acidity) significantly in the 1st ratoon as bored joints increased, while in plant cane, the increase in juice acidity was too small to reach the level of significant (Table 1). Meantime, the 1st ratoon was more sensitive to borer damage than plant cane where, the percent of increase juice acidity corresponding to infestation intensity more than 10%bored joints as compared with sound cane recorded 1.13 (from 5.32 to 5.26) and 3.18 (from 5.35 to 5.18) for both plant cane and 1st ratoon, respectively.

The data in the same table also cleared that the interaction between the two variables (sites and infestation intensity) did not significantly affected juice pH, but pH tends to decrease in each site with the increase in bored joints infestation. Meantime, in both crops, Sohage was less sensitive to borer damage (<10% bored joints) than the two other governorates. Similar results were concluded by Ali *et al.* (2001) and Yakoob (2005). Such effect may be due to that the increase in juice acidity and corresponding low pH values associated with sucrose conversion to reducing sugars and organic acids causing many problems during sugar processing (Allam, 1997 and Ali *et al.* 2001) and/or to the action of borer rot complex (Silva and Moraes, 1977 and Soliman and Mihm, 1997).

Brix :-

Brix degree significantly varied among the three sites recording 18.90, 18.89 and 19.64 at El-Minia, Sohag and Quena, governorates, respectively in plant cane (Table 1) compared with the corresponding values of 18.85, 19.22 and 20.34 at the 1st ratoon (Table 2).

Over and within the three governorates insignificant differences in brix degrees in both seasons have been detected with borer joints less than 5% as compared with sound cane (Table 1). On the other side, the increase in borer joints more than 5% and 10% were accompanied with substantial reduction in brix value over and within the three sides (Table 1). Such effect may be due to the influence of the borer feeding and /or the borer rot desease complex (Sliva and Moraes, 1977).

Furthermore, in plant cane the mgnitude of reduction in brix% degrees as compared with sound cane due to borer infestation intensity more than 10% recoroed 3 .79%, 2.10 and 3.80 for El-Minia, Sohage and Quena, respectively, corresponding to 3.70, 0.99 and 1.75% in the 1st ratoon, indicating that plant cane cane suffered more damage (more brix reduction) than the 1st ratoon (3.24% and 2.14%).

In general, the obtained results are in accordance with those of Abo-Dooh (1988), Chang and Wang (1995), Gupta and Singh (1997) and Yakoub (2005) who stated that brix reduction caused by borer was differed among location and the infestation levels.

Sugar% cane (Richness), Sugar% juice (Pol) and extracted% sugar (recovery):

Significant differences in richness, Pol and recovery% among the three governorates in both plant cane and 1st rations have been recorded as shown in Table (2). In both seasons, Quena governorate ranked the first with respest to the three traits followed by El-Minia in plant cane (Table 2) while, in the first ratoon Sohag ranked the second especially for richness (sugar% cane) and Pol (sugar% juice) (Table 2). Such effect may be due to that Quena weather conditions was more suitable to sugar accumulation than the other two governorates and /or the high fertile soil of both Sohag and El-Minia which associated with cane vegetative growth. The obtained results are partly in line with those of Abo El-Ghait (2000) and El-Taib (2004).

Table (2): Effect of stalk borer intensity levels on some quality traits of sugar cane grown at three governorates.

Factor		Sugar % Cane Richeness		Sugar % Juice (Pol %)		Extracted % Sugar (Recovery)	
Locations (L)	Infest intensity (I)	Plant cane	1st ratoon	Plant cane	1st ratoon	Plant cane	1st ratoon
El-Minia	Sound cane	12.79	12.71	15.98	15.89	10.60	10.54
	>5%	12.68	12.69	15.85	15.87	10.52	10.54
	5-10%	12.09	11.67	15.11	14.59	9.76	9.84
	<10%	11.89	11.77	14.87	14.71	9.54	9.57
Average		12.36b	12.21c	15.45b	15.27c	10.11b	10.12b
Sohag	Sound cane	12.59	12.76	15.73	15.97	10.41	10.57
	>5%	12.49	12.60	15.62	15.75	10.22	10.33
	5-10%	12.02	12.23	15.03	15.29	9.60	9.67
	<10%	11.80	11.98	14.75	14.98	9.34	9.43
Average		12.23b	12.39b	15.28c	15.50b	9.89c	10.00c
Quena	Sound cane	13.48	13.17	16.85	17.02	11.37	11.85
	>5%	13.34	13.03	16.68	16.74	11.11	11.73
	5-10%	12.64	12.36	15.80	15.97	10.33	10.86
	<10%	12.42	12.22	15.53	15.61	9.98	10.31
Average		12.97a	12.70a	16.22a	16.34a	10.70a	11.19a
Average over infest intensity	Sound cane	12.95a	12.88a	16.19a	16.29a	10.79a	10.99a
	>5%	12.84a	12.77a	16.05a	16.12b	10.62b	10.87b
	5-10%	12.25b	12.09	15.31b	15.28c	9.90c	10.12c
	<10%	12.04c	11.99b	15.05c	15.10d	9.62d	9.77d
Average		12.52	12.43	15.65	15.70	10.23	10.44
Interaction LxI L.S.D 0.05		N.S	.025	N.S	0.21	N.S	0.13

Average data over and within the three governorates declared inverse relationship between PLB investation levels and the three mentioned traits in both plant cane and 1st ratoon (Table 2), whereas, bored joints less than 5%

For explanation see Table (1).

Slightly reduced the three trait as compared with sound cane. The percent of reduction over the three sites recorded 0.85, 0.87and 1.58 for Richness, Pol and sugar recovery in plant cane corresponding to 0.85, 1.04 and 1.09 in 1st ratoon . Otherwise, the increase in borer infestation intensity more that 5% and 10% increased gradually the magnituded of reduction in the three traits (Table 2).

Meantime, sugar recovery trait was more sensitive to borer damage, where, the percent of reduction (for bored joints more than 10 %) recorded 10.85 and

14.10%in plant cane and 1st ratoon respectively, corresponding to 7.03, 6.91 for Richness and 7.04 and 7.31 for Pol% (Table 2). The same trend was also detected within the three sites in both plant cane1st ratoon (Table 2). But, the mangnitude of reduction in the three traits in both plant cane and the 1st ratoon corresponding to bored joints more than 10% was the highest for Quena governorate. On the other hand, El-Minia exhibited the lowest reduction in sugar recovery and Sohage in richness and pol in both seasons. The reduction in the three traits may be due to the borer larvaes feeding and/or borer rot disease complex (Silva and Moreas, 1977; Mansour and Allam, 1982 and Soliman and Mihm, 1997).

Worthe to mention that, the reduction in extracted % sugar (sugar recovery) negatively affected sugar yield per area unit, where sugar yield is multiple product of extrated % sugar and cane yield. Therefore, minimize or control borer infestion is greatly appreciated.

In genearal, the obtained results are full agreement with those of Abu-Dooh (1988), Gupta and Singh (1997), Ali *et al.* (2001) and Yakoub (2005) who reported that cane richness, Pol and sugar recovery in borer attacked stalks were lower than that of sound cane. They added that the rate of quality injure was direct proportional with infestation level.

Purity percentage:

Juice purity in plant cane significantly varied among the three sites (Table3). However, these differences in the 1st ratoon were too small to reach the level of significance. The calculated juice purities averaged 81.57, 80.90 and 82.53 for El-Minia, Sohag and Quena governorates, respectively in plant cane compared with the corresponding values of 80.97, 80.83 and 80.78 in the 1st ratoon. Similar findings are reviewed by Mohmoud (2000) El-Taib (2004) and Yakoub (2005) who indicated that juice purity of the first ratoon was more higher than that of plant cane.

Averaged over the three sites Table (3) showed insignificant reduction in juice purity in plant cane only concomitant to bored joints than 5%. Further increase in bored joints was accompanied with gradual and significant reduction in juice purity in both plant cane and the 1st ratoon (Table3).

For explanation see Table (1).

The same trend was also detected within each site. But the 1st ratoon suffered more reduction in juice purity (statistically significant) compared with plant cane. Meantime, Quena showed the highest sensitivity to borer damage. Where, the percent of reduction in juice purity for more than 10% bored joints as compared with sound cane recorded 4.18 (from 84.29 to 80.77) and 6.66 (from 82.95 to 77.43), followed by Sohage 4.21% and 5.26% and El-Minia (2.49% and 3.87%) in descending order for both plant cane and the 1st ratoon, respectively. Such effect may be due to the apparent reduction in brix and sugar% juice (both used in purity calculation) as mentioned before. These findings are in accordance with those of Chang and Wong (1995) who stated that juice purity was significantly lower for heavily, intermediately and lightly damaged internodes

than healthy ones and recently Yakoub (2005) who noticed similar findings and added that the frist ratoon was more susceptible to borer damage than plant cane.

Reducing sugar and polysaccaride (Dexran):

Reducing sugar/100 cm^3 juice and dextran(ppm) differed significantly among the three sites in both plant cane and 1st ratoon (Table 3). Quena governorate exhibited the lowest level for both traits in plant cane and 1st ratoon, respectively. The increase in juice contents of reducing sugars and dextran are undesirable quality criteria due to its negative effect through various step of cane processing (Silva and Moraes, 1977 and Legendre and Richard, 1988).

Table (3): Effect of stalk borer intensity levels on some quality traits of sugar cane grown at three governorates.

Factor		Purity %		Reducing Sugars (100 cm Juice)		Polysaccharide (Dextran ppm)		Non Sugar Component (Ash /100 cm^3 Juice)	
Locations (L)	Infest intensity (I)S	Plant cane	1st ratoon	Plant cane	1st ratoon	Plant cane	1st ratoon	Plant cane	1st ratoon
El-Minia	Sound cane	82.22	82.85	0.40	0.32	250	220	1.30	1.31
	>5%	83.16	83.05	0.43	0.39	315	311	1.34	1.36
	5-10%	80.72	78.35	0.57	0.49	5.35	474	1.48	1.47
	<10%	80.17	79.64	0.85	0.79	631	592	1.57	1.58
Average		81.57b	80.97	0.56a	0.50a	433b	399b	1.42a	1.34b
Sohag	Sound cane	80.67	82.88	0.52	0.34	282	250	1.28	0.93
	>5%	81.87	81.90	0.51	0.44	392	378	1.28	0.96
	5-10%	79.87	79.22	0.59	0.56	561	521	1.34	1.02
	<10%	79.19	78.52	0.71	0.66	699	617	1.47	1.10.
Average		80.90b	80.63	0.58a	0.50a	484a	442a	1.34b	1.00c
Quena	Sound cane	84.29	82.95	0.35	0.30	229	202	1.11	1.38
	>5%	83.27	80.95	0.39	0.37	345	366	1.15	1.31
	5-10%	81.79	81.81	0.50	0.43	503	284	1.23	1.56
	<10%	80.77	77.43	0.70	0.63	550	549	1.31	1.97
Average		82.53a	80.78	0.49b	0.43b	407c	400b	1.20c	1.48a
Average over infest intensity	Sound cane	83.06a	82.89	0.42c	0.32d	254d	224d	1.23c	1.21c
	>5%	82.77a	81.97	0.44c	0.40c	351c	352c	1.26c	1.21c
	5-10%	80.79b	79.80	0.55b	0.49b	533b	493b	1.35b	1.35b
	<10%	80.04b	78.53	0.75a	0.69a	627d	586a	1.45a	1.45a
Average		81.67	80.80	0.54	0.48	441	414	1.32	1.30
Interaction LxI L.S.D 0.05		N.S	2.34	0.06	0.07	23.0	22.0	N.S	0.08

Significant and gradual increase in both reducing sugars and dextran over and within the three governorate have been detected as borer infestation intensity increased more than 5% in both plant cane and 1st ratoon (Table 3). But, the first ratoon was more sensitive to borer damge than plant cane where the magnitude of the increase due to borer infestation more than 10% as compared with the sound cane recorded 78.6% and 115.6% for reducing sugars and 146.9% and 161.6% for dextran (Table 3).

Furthermore, Sohag governorate was more tolerance to borer damge especially under the highest bored joints level, which recorded the lowest increase in reducing sugars and dextran in both plant cane and 1st ratoon followed by Quena and El-Minia, respectively (Table 3).
The obtained results are in line with those of Ali *et al.* (2001) and Yakoub (2005) showed that the rate of increase in both reducing sugars and dextran depends on bored joints infestation level.

In general, the increase in reducing sugars and dextran accompanied PLB infestation may be due to the enzyme enversion of sucrose to reducing sugars, and the effect of fungi, bacteria and yeasts which enter cane internodes through borer tunnels and mainly responsible for dextran formation (Silva and Moraes, 1977, Mansour and Allam,1982 and Soliman and Mihm, 1997).

Ash /100 cm^3 juice:

Averaged data in Table (3) shows significant differences in juice ash content among the three governorates. In plant cane Quena exhibited the lowest juice ash content (1.20%) followed by Sohag (1.34%) and El-Minia (1.42%), respectively. However, in the first ratoon, the lowest juice ash content was of Sohag (1.00%) followed by El-Minia 1.43%) and Quena (1.48%), respectively. In sugar production Fort and Mckaig (1939) and Irvine (1977) illustrated that high juice ash content negatively influences sugar extraction and the quality of final product such as, sugars, molasses or syrups.

Over and within the three sites in both plant cane and 1st ratoon juice ash content was equal or slightly increased belongs to bored joints less5%. Thereafter, further increased in bored joints (5-10% and more than 10%) were accompanied with significant increase in ash content (Table 3). El-Minia governorate seemed to be the most susceptible to borer infestiation in both plant cane and the 1st ratoon, recording the highest increase in juice ash content (in comparison with the highest bored joints level and sound cane were 20.77% (from 1.30 to 1.57) and 20.61 (from 1.31 to 1.58), respectively. Sohag and Quena recorded the same trend in the 1st ratoon only 18.28% (from 0.96 to 1.10) and 21.01% (from 1.38 to 1. 67). While, both governorate in plant cane were more tolerant to borer infestation recording 14.84% (from 1.28 to 1.47) and 18.02% (from 1.11 to 1.31).

Data over both sites and infestation intensity (Table 3) cleared that the 1st ratoon was more sensitive to chilo damge than plant cane. Where, the perecent of increase in ash content corresponding to <10 bored joints as compared with

sound cane were 17.89% (from 1.23 to 1.45) and 19.83 (from 1.21 to 1.45) for plant cane and the 1st ratoon, respectively. Similar findings are reviewed by Ali *et al.*, (2001) and Yakoub (2005).

In general, the increase in ash content due to borer infestation may be due to the wastes secreted by borer larve and/or the pathogen infection.

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التغيرات النوعية فى عصير قصب السكر المصاب بثاقبة القصب الصغيرة

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أجرى هذا البحث لدراسة تأثيرالأصابة بثلاث مستويات للاصابة بثاقبة القصب الصغيرة *Chilo agamemnon* هى اقل من ٥% و ٥-١٠% واكثر من ١٠% اضافة الى القصب الخالى من الاصابة)كمقارنة(على التغيرات النوعية فى صفات جودة عصير صنف القصب جيزة تايوان ٩/٥٤ المنزرع كغرس (موسم ٢٠٠٤) وخلفة اولى (موسم ٢٠٠٥) فى ثلاثة مواقع هى محطة بحوث ملوى (محافظة المنيا) ومحطة بحوث شندويل (محافظة سوهاج) ومحطة بحوث المطاعنة (محافظة قنا).

وقد اوضحت النتائج مايلى:-

اختلافات معنوية فى صفات جودة العصير بين الثلاث محافظات وكذلك بين الغرس والخلفة الاولى واظهرت محافظة قنا أعلى صفات جودة للعصير

أدت شدة الاصابة بثاقبة القصب الصغيرة اقل من ٥% سواء فى الغرس او الخلفة الاولى داخل كل محافظة وكمتوسط عام للمحافظات الثلاثة معا الى حدوث

انخفاض طفيف (احصائيا غير معنوى) فى صفات النسبة المئوية لاستخلاص العصير – البركس – نسبة السكر% قصب (الحلاوة) – نسبة السكر % عصير (البول)– النسبة المئوية لناتج السكر ونقاوة العصير وعلى العكس من ذلك فقد حدثت زيادة طفيفة فى الحموضة والسكريات المختزلة – والسكريات العديدة (دكستران) والرماد. بينما ادت زيادة شدة الاصابة اكثر من ٥% واكثر من ١٠% الى انخفاض معنوى فى بعض الصفات المشار اليها سابقا او زيادة معنوية فى الصفات الاخرى.

أوضحت الثلاث محافظات درجات متباينة من المقاومة او الحساسية للضرر الناتج من شدة الاصابة فى كل صفة من صفات الجودة تحت الدراسة. كما أشارت الدراسة الى ان التغيرات فى معظم صفات الجودة فى القصب الغرس (زراعات اول موسم) اقل من الخلفة الاولى (زراعات الموسم الثانى). وهذا يعطى دليلا على إرتفاع مقاومة القصب الغرس للضرر الناشىء من الإصابات بالثاقبات.

وتتضح هذه الدراسة الى ضرورة الالتجاء الى المقاومة المتكاملة فى حالة زيادة شدة الاصابة بثاقبة القصب الصغيرة عن ٥%..