EVALUATION OF SOME SELECTED GUAVA GENOTYPES

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Abstract

This study was carried out during three growing seasons (2014, 2015 and 2016) to investigate some morphological and productivity characteristics of 16 genotypes of seedy guava trees with ten years old، selected from 80 seeded guava trees were selected according to growth, yield and fruit quality attributes, grown in Horticultural Station Orchard, situated at Shandaweel region, Sohag Governorate, Egypt. The considered guava trees were raised by seeds. The trees are about 10- years old when this study started, grown in a silt clay loam soil 5x5m apart. Morphological characteristics, flowering, yield and fruit quality. The genotypes were analyzed to select promising guava genotypes for fresh consumption and processing to take part in improvement and propagation programs. The best number of leaf area was found in G. $_{12}$,G$_{11}$. Whereas, maximum yield (kg/tree) was in G $_{10}$(65 kg). The highest fruit weight was recorded in G.$_{13}$ (151.97), meanwhile it was The lowest in G.$_{5}$ (78.39),the seeds number per fruit was significantly higher in guava G.$_{9}$ (392.30), meanwhile it was the lowest in G.$_{5}$ (112.00) , The low seeds(%) was the best character for fruit quality and associated with genotype No9 (0.90%).The highest values of TSS/acid ratio was obtained by G $_{15}$ and G $_{3}$(24.74 and 24.03) and the highest values of V.C were in guava G.$_{3}$ (97.35) followed by G.$_{4}$ (91.01). The highest total sugars contents (%) was in guava G.$_{12}$ (11.37) followed by G.$_{10}$ and G.$_{15}$ (9.78 and9.72), respectively, it could be recommended with genotypes No. 11,10, 9, 13, 15 &12 the best one was G.10 since it gave the highest fruit production.

INTRODUCTION

Guava (*Psidium guajava* L.) is one of the most common and important commercial fruit crops cultivated in both tropical and sub-tropical regions of the world. Guava tree normally produces as many as two crops in a year; which is a unique phenomenon of the tropical and sub-tropical regions. It is a hardy plant, it can

with stand adverse climatic conditions and grows under a wide range of soil types from sandy loam to clay loam with a pH of 4.5 to 8.2

(Dhaliwal and Singla, 2002 and Dhaliwal and Dhillon, 2003).

Guava is delicious and used as fresh as well as for making jam, jelly, nectar, paste etc. It is rich source of vitamin C (contains three to four times more vitamin C as compared to fresh orange juice), pectin and minerals like calcium, iron and phosphorous with pleasant aroma and flavor **(Dhaliwal and Dhillon, 2003; Patra *et al.*, 2004; Ashaye *et al,* 2005 and Lakade *et al.*, 2010).**

Guava generally propagates from seeds and trees raised from seedlings, which are known to be variable in plant and fruit characteristics **(Yadava, 1996).** Each tree considers a separate strain; there are several varieties with differences in shape, size and flesh color, white, yellow or pink in Egypt, most of guava trees are cultivated from seeds causing genetic variability **(Elsisy, 2013)** .It has several different accessions so we need some activities to characterize them. Guava diversity needs to be studied and evaluated in order to determine the next steps in the guava breeding. Information about description and genetic distance are needed to get new hybrid. Species diversity and genetic resources are very important to get new varieties **(Nasution and Hadiati, 2014**).

Hence, The present study aimed to evaluation some selected guava strains genotypes raised from seedlings and assess genetic variation among them, which show great differences from others searching for superior genotypes using the SDS-PAGE protein patterns in order to select promising guava genotypes for fresh consumption and processing to take part in improvement and propagation programs. The evaluation of guava genotypes was based on the variation between the vegetative growth, blooming periods, fruit ripening, fruiting (fruit set, fruit drop, fruit retention and fruit yield), fruit quality and correlate them to their SDS-PAGE characteristics.

MATERIALS AND METHODS

This study was carried out during three successive seasons 2014, 2015 and 2016 on sixteen guava genotypes selected from 80 seeded guava trees according to growth, yield and fruit quality attributes grown in Horticultural Station Orchard, situated at Shandaweel region, Sohag Governorate, Egypt. The considered guava trees were raised by seeds. The trees are about 10- years old when this study started, grown in a silt clay loam soil 5x5m apart.

All the selected guava trees received regular horticultural practices that were carried out in

the guava orchards, and irrigated by flood system. These common practices included pruning, hoeing, pest and fungi control management. Fertilization with farmyard manure, ammonium sulphate (20.6% N), calcium superphosphate (15.5% P2 O5) and potassium sulphate (48% K2O) were added as recommended doses by Ministry of Agricultural.

Experimental Design:

Selected guava trees (16 bearing trees) were set as a randomized complete block design (RCBD) with sixteen treatments, and three replicates (one season per replicate).

The following variables were evaluated

Vegetative growth parameters:Leaf area (cm^2)

In each study season, samples of approximately 30 adult leaves per tree were taken from the mid shoot growth (one year-old sprout) from the most representative shoot of the four sides of the tree and divided into three replicates to determine average leaf surface area ($cm.^2$) according to the equation described by **(Ahmed and Morsy 1999).**

Leaf area (cm^2) =0 .72 (leaf length x leaf width) + 2.46

yield(kg/tree).

The total yield per tree (kg) was obtained at the normal time and ripening stage for the area (August month) in the three seasons through the number of fruit retained by the trees and weighting the fruits by electronic balanced.

Fruit quality:

On August month during the three seasons, 30 fruits from each selected tree were chosen randomly and divided into three replicates to determine the following physical and chemical traits which included fruit weight (g), seeds/fruit weight ratio, fruit TSS/ acid ratio, fruit total sugar (%),fruit Vitamin C content (Mg/100g Juice).

Statistical Analysis:

All data of the present investigation were subjected to analysis of variance and significant difference among means was determined according to (Snedecor and Cochran, 1972). In addition significant difference among means were distinguished according to the Duncans, multiple test range (Duncan, 1955).

RESULTS AND DISCUSSION

Vegetative Growth Parameters:

Leaf Area (cm2): Data presented in figure (1) showed that, in the pooled mean 2014, 2015 and 2016 seasons of investigation, differences between guava genotypes were significant. Leaf area was significantly highest in guava G.12 and G.11 (65.75 and 62.50), respectively, while it was lowest in G.6 (32.27) and the other guava

genotypes came in between. These results are in consistent with those reported by **El-Sharkawy and Othman (2009), Ulemale and Tambe (2015), Dubey *et al*., (2016)** and **Singh *et al*., (2016)** revealed that a significant variation in leaf area was observed among different guava varieties.

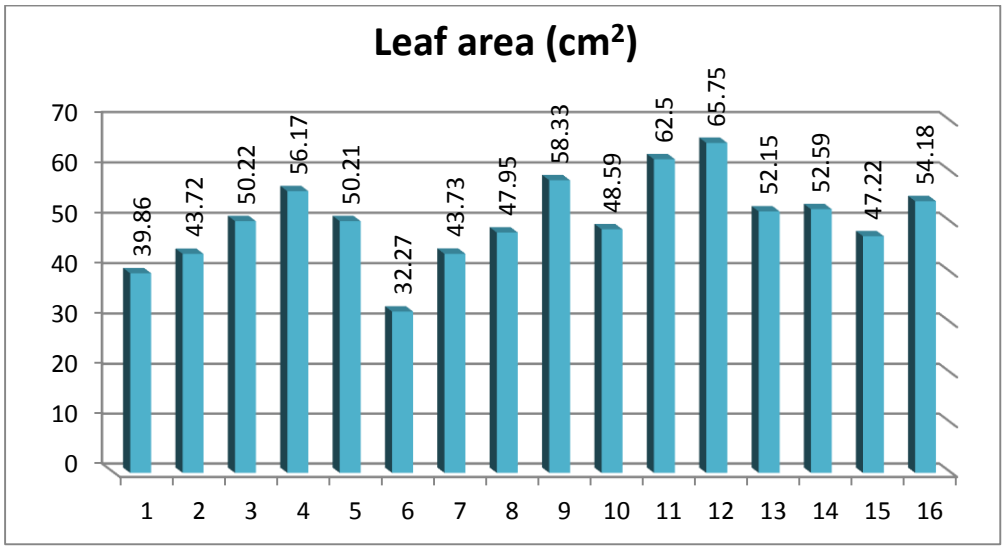

Figure (1): Leaf area (cm^2) of some selected guava genotypes (Pooled mean 2014, 2015 and 2016 seasons).

yield(kg/tree).

As for the fruit yield (kg/tree) data revealed that, in the pooled mean 2014, 2015 and 2016 seasons of investigation, differences between guava genotypes were significant figure (2). Fruit yield was significantly highest in guava $G._{10}$ followed by $G._{11}$ (65.00 and 50.00), respectively, while it was lowest in $G._3$ (15.00) and the other guava genotypes came in between. These results were in agreement with those obtained by **El-Sisy (2013), Ghosh *et al*., (2013), Dolkar *et al*., (2014)** and **Ulemale and Tambe (2015)** they found that significant differences in fruit yield were detected among accessions and years.

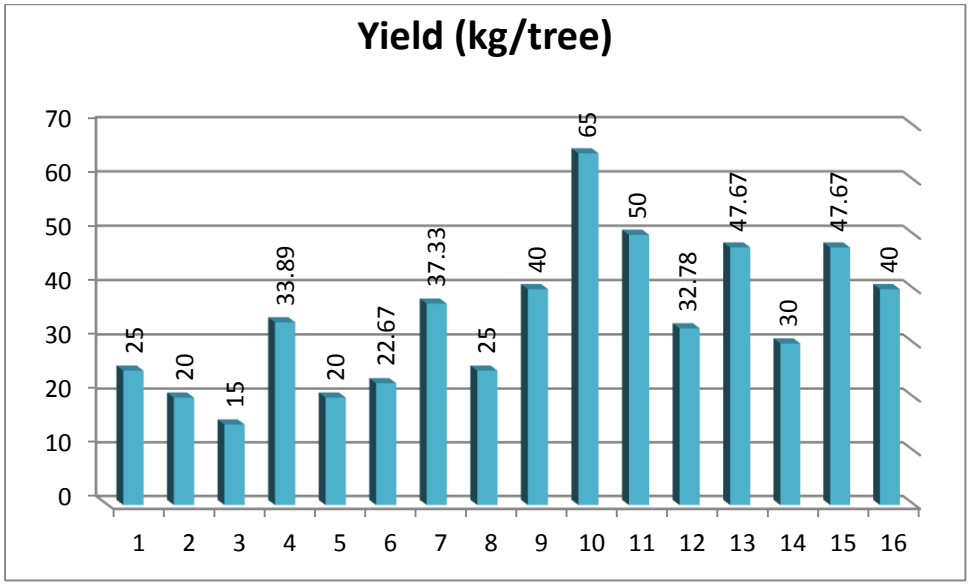

Figure (2): Fruit yield (kg/tree) of some selected guava genotypes (Pooled mean 2014, 2015 and 2016 seasons).

Fruit Characteristics:

Physical Characteristics:

Fruit weight (g)

Concerning the fruit weight (g) data preformed that, in the pooled mean 2014, 2015 and 2016 seasons of investigation, differences between guava genotypes were significant figure (3). Fruit weight was significantly highest in guava $G._{13}$ (151.97), meanwhile it was lowest in $G._{5}$ (78.39) and the other guava genotypes came in between. These results are in consistent with those reported by **Deshmukh *et al.*, (2013), El-Sisy (2013), Ghosh *et al.*, (2013), Ali *et al.* (2014), Dolkar *et al.*, (2014), Mahmoud and Peter (2014), Sahar (2014), Ulemale and Tambe (2015)** and **Mehta *et al.*, (2016)** revealed that physical fruit characters of guava fruits varies significantly among different guava genotypes. **Sahar (2014)** added that guava fruit weight was higher in the spring summer fruit than those of autumn winter fruit.

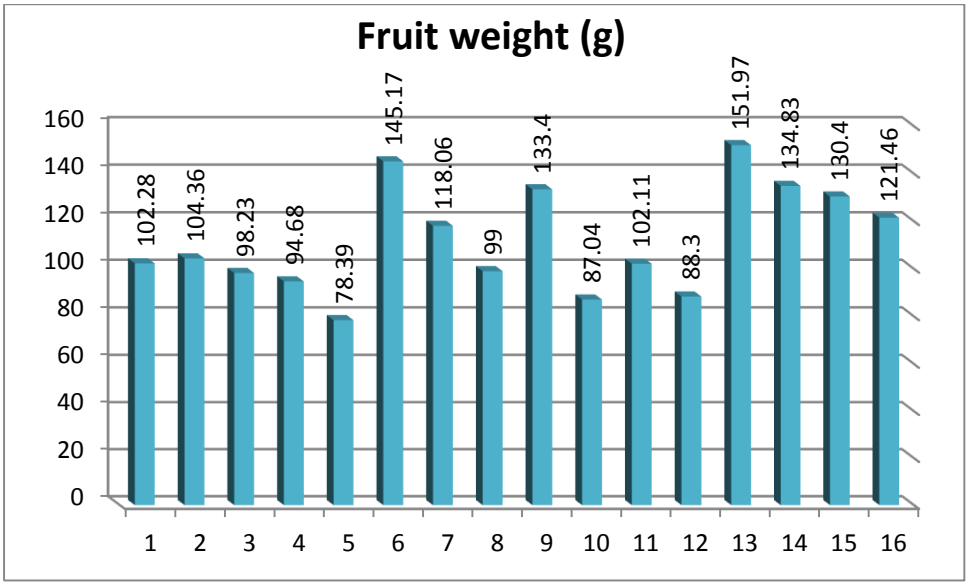

Figure (3): Fruit weight (g) of some selected guava genotypes (Pooled mean 2014, 2015 and 2016 seasons).

Seeds number/fruit

In regard to the seeds number/ fruit data revealed that, in the pooled mean 2014, 2015 and 2016 seasons of investigation, differences between guava genotypes were significant figure (4). Seeds number/ fruit was significantly highest in guava $G._9$ (392.30), meanwhile it was lowest in $G._5$ (112.00) and the other guava genotypes came in between. These results are in accordance with those reported by **Dolkar *et al.*, (2014), Mahmoud and Peter (2014)** and **Ulemale and Tambe (2015)** revealed that physical fruit characters of guava fruits varies significantly among different guava genotypes. **Rajan *et al.*, (2005)** added that number of seeds fruit character had additive gene effect and therefore effective selections can be made for these character.

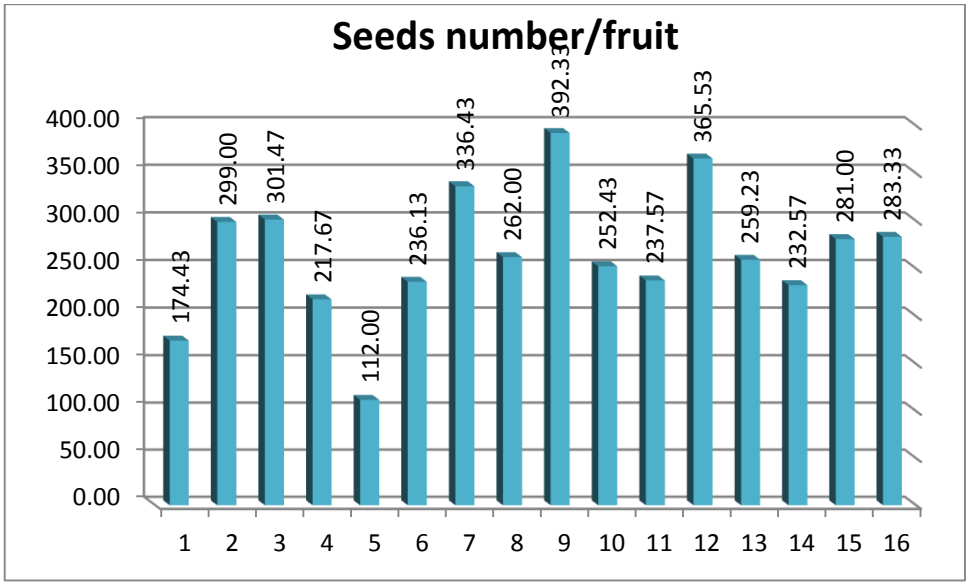

Figure (4): Seeds number per fruit of some selected guava genotypes (Pooled mean 2014, 2015 and 2016 seasons).

Seeds/fruit weight ratio

As related to the seeds/fruit weight ratio data showed that, in the pooled mean 2014, 2015 and 2016 seasons of investigation, differences between guava genotypes were significant figure (5). Seeds/fruit weight was significantly highest in guava $G._{13}$ followed by $G._{15}$ (4.26 and 3.96), respectively, while it was lowest in $G._{9}$ (0.90) and the other guava genotypes came in between. These data are in harmony with those reported by **Patel *et al.*, (2011)، Mahmoud and Peter (2014)** and **Ulemale and Tambe (2015)** they revealed that physical fruit characters of guava fruits varies significantly among different guava genotypes. **Rajan *et al.*, (2005)** added that pulp: seed weight ratio character had additive gene effect and therefore effective selections

can be made for these characters.

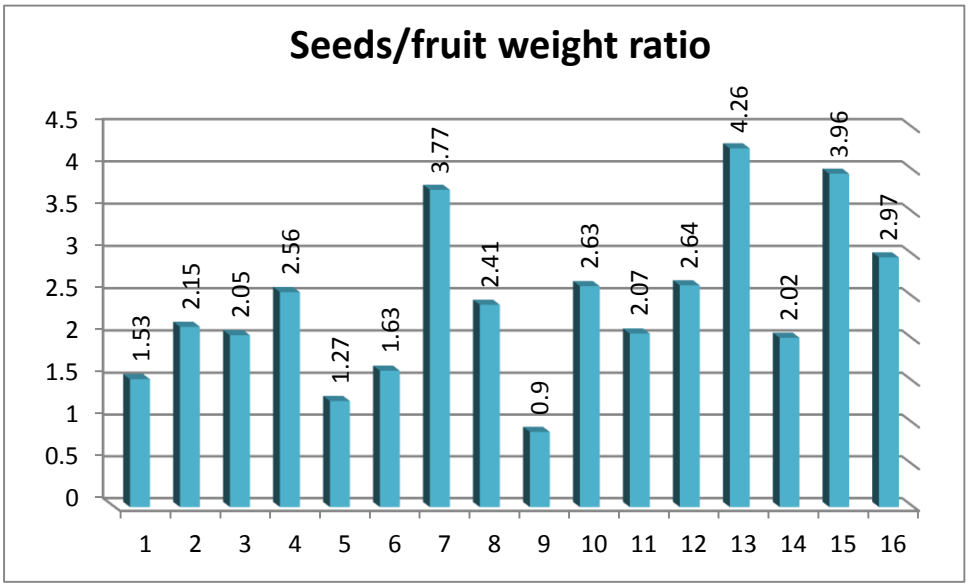

Figure (5): Seeds/fruit weight ratio of some selected guava genotypes (Pooled mean 2014, 2015 and 2016 seasons).

Fruit Chemical Composition:

Fruit total soluble solids (TSS) /acid ratio

As related to the fruit total soluble solids (TSS) /acid ratio data revealed that, in the pooled mean 2014, 2015 and 2016 seasons of investigation, differences between guava genotypes were significant figure (6). Fruit total soluble solids /acid ratio was significantly highest in guava $G._{15}$ and $G._3$ (24.74 and 24.03) followed by $G._5$ and $G._6$ (21.47 and 21.06), respectively, while it was lowest in $G._9$ (16.65) and the other guava genotypes came in between. These results were in agreement with those obtained by **Ghosh *et al.*, (2013)** and **Mehta *et al.*, (2016).**

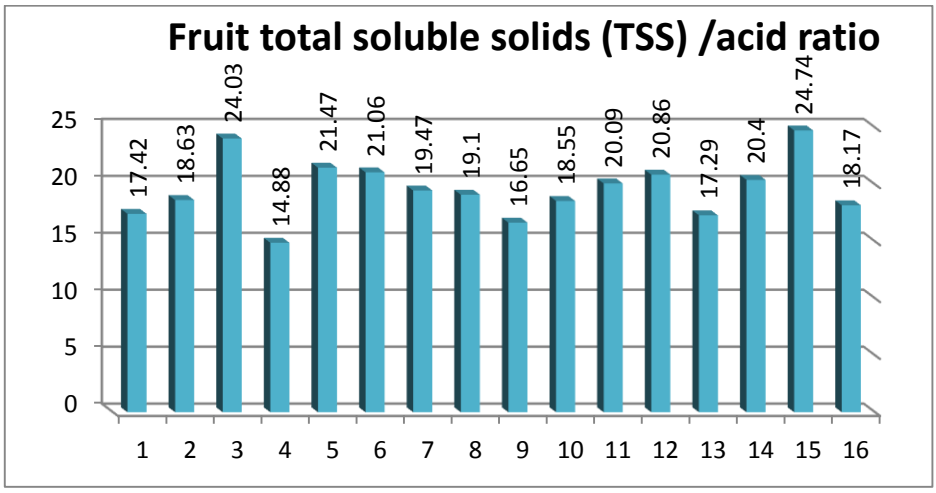

Figure (6): Fruit total soluble solids (TSS) /acid ratio of some selected guava genotypes (Pooled mean 2014, 2015 and 2016 seasons).

Total Sugar content (%):

Concerning the fruit total sugar percentage data preformed that, in the pooled mean 2014, 2015 and 2016 seasons of investigation, differences between guava genotypes were significant figure (7). Fruit total sugar was significantly highest in guava G.$_{12}$ (11.37) followed by G.$_{10}$ and G.$_{15}$ (9.78 and9.72), respectively, whereas it was lowest in G.$_{13,}$ G.$_{6,}$ G.$_{2,}$ G.$_{14,}$ G.$_{9}$ and G.$_{3}$ (7.86, 7.85, 7.83, 7.70, 7.68 and 7.60), respectively and the other guava genotypes came in between. These data are in harmony with those reported by **El-Sisy (2013), Meena *et al.*, (2013)**, **Ali *et al.*, (2014), Mehta *et al.*, (2016)** and **El Bulk *et al.*, (1997)** they showed that total sugar contents were significantly increased with fruit growth and development.

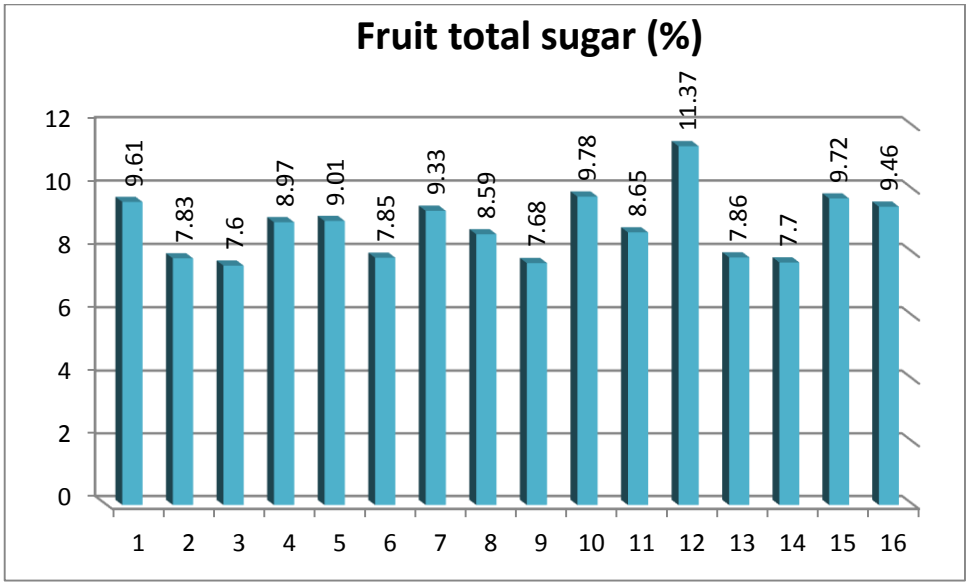

Figure (7): Fruit total sugar percentage of some selected guava genotypes (Pooled mean 2014, 2015 and 2016 seasons).

Vitamin C mg/100 ml Juice:

In regard to the fruit Vitamin C content (Mg/100g Juice) data preformed that, in the pooled mean 2014, 2015 and 2016 seasons of investigation, differences between Guava genotypes were significant figure (8). Fruit Vitamin C content was significantly highest in guava G.$_{3}$ (97.35) followed by G.$_{4}$ (91.01), meanwhile it was lowest in G.$_{5,}$ G.$_{11,}$ G.$_{12}$ and G.$_{9}$ (64.36, 64.19, 61.02 and 59.47) and the other guava genotypes came in between. Similar results were proved by **Deshmukh *et al.*, (2013), El-Sisy (2013), Ghosh *et al.*, (2013), Meena *et al.*, (2013,)**

Ali *et al.* (2014), Rani (2015) and **Mehta *et al.*, (2016)** revealed that ascorbic acid content in different guava genotypes ranged from 51.90 to 189.73 mg/100g of fruit pulp. **El Bulk *et al.*, (1997)** added that ascorbic acid was significantly increased with fruit growth and development.

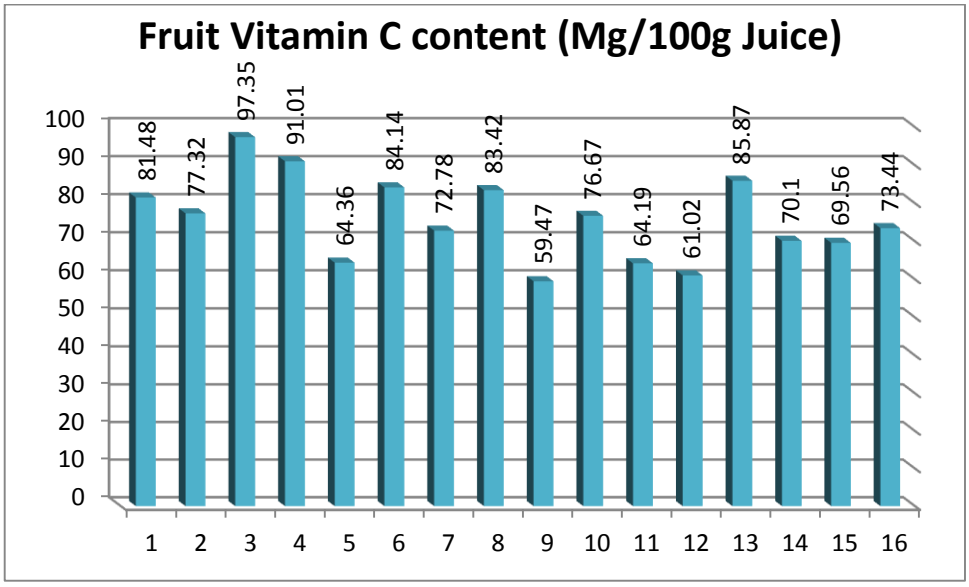

Figure (8): Fruit Vitamin C content (Mg/100g Juice) of some selected guava genotypes (Pooled mean 2014, 2015 and 2016 seasons).

General evaluation of the studied some guava genotypes:

(a) Leaf area, fruit yield and fruit physical properties.

Characters Genotypes (G) No.	Leaf area (cm2)	Fruit yield (kg/tree)	Fruit physical properties			
			Fruit weight (g)	Seed No.	Seed/fruit weight (%)	Total
Score units	20	20	10	10	10	70
G.1	12.12	7.69	6.73	6.42	5.88	38.85
G.2	13.30	6.15	6.87	3.75	4.19	34.25
G.3	15.28	4.62	6.46	3.71	4.39	34.46
G.4	17.10	10.43	6.23	5.14	3.52	42.40

G.5	15.27	6.15	5.16	10.00	7.09	43.67
G.6	9.82	6.98	9.55	4.74	5.52	36.61
G.7	13.30	11.47	7.77	4.74	2.39	39.69
G.8	14.59	7.69	6.51	3.33	3.73	35.86
G.9	17.74	12.31	8.78	2.85	10.00	51.68
G.10	14.84	20	5.73	4.44	3.42	48.37
G.11	19.01	16.67	6.72	4.71	4.35	50.18
G.12	20	10.09	5.81	3.06	3.41	42.37
G.13	15.86	14.67	10	4.32	2.11	46.96
G.14	16.00	9.23	8.87	4.82	4.46	43.37
G.15	14.36	14.67	8.58	3.99	2.27	43.87
G.16	16.48	12.31	7.99	3.95	3.03	43.76

(b) Fruit chemical properties.

Characters Genotypes (G) No.	Fruit chemical properties				Grand total
	Fruit TSS/acid ratio	Fruit total sugars (%)	Fruit Vitamin C Content (Mg/100g Juice)	Total	
Score units	10	10	10	30	100
G.1	7.04	8.45	8.37	23.86	62.71
G.2	7.53	6.89	7.94	22.36	56.61
G.3	9.71	6.68	10	26.39	60.85
G.4	6.01	7.89	9.35	23.25	65.65
G.5	6.68	7.92	6.61	21.21	64.88
G.6	8.51	6.90	8.64	24.05	60.66
G.7	7.87	8.21	7.48	23.56	63.25
G.8	7.72	7.55	8.57	23.84	59.70
G.9	6.73	6.75	6.11	19.59	71.27
G.10	7.50	8.60	7.88	23.98	72.35
G.11	8.12	7.61	6.59	22.32	72.50
G.12	8.43	10	6.27	24.70	67.07
G.13	6.99	6.91	8.82	22.72	69.68
G.14	8.25	6.77	7.20	22.22	65.59
G.15	10	8.55	7.15	25.70	69.57
G.16	7.34	8.32	7.54	23.20	66.96

CONCLUSION

This study suggested that, guava genotypes (G.11, G.10, G.9, G.13, G. 15 and G.12) are considered promising to be new genotypes which obtained from seeded guava grown under Sohag conditions. Furthermore, the best one was G.10 since it gave the highest fruit production.

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