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Effect of pruning on yield and Fruit Quality of Guava Trees

Ali, F. Sahar and A. A. Abdel-Hameed
Desert Research Center, Cairo, Egypt.

Abstract: *This investigation was done during two successive seasons (2009/2010 and 2010/2011) on 10 years old seedy guava (Psidium guajva, L) trees planted at 5x5 meters surface irrigationat Mariout Research Station of the Desert Research Center- Alexandria.*
This investigation aimed to study the effect of some pruning treatments:
1- Control (unpruned trees). 2- Apical ten cm of new shoots were pruned. 3- Apical twenty cm of new shoots were pruned, in three dates:May, June and July on yield and fruit quality of guava trees.
The obtained results showed that,number of fruits per tree, yield per tree and fruit weight was better with apical 10 cm of pruning shoots with May, while fruit set percentage and total sugars were better with apical 10 cm of pruning shoots at May and June.
In the other side, fruit weight and fruit volume gave the highest values with apical 20 cm of new pruned shoots at May and June, while TSS gave the highest values with apical 10 and twenty cm of new pruned shoots at May and June, but fruit dry weight percentage gave insignificant differences among treatments in first season, but gave highest results in second season with apical 10 cm of new pruned shoots at June, whereas maximum Vitamin C was found in control guava fruits at May
We can be recommended by apical 10 cm of pruning shoots at May to get the best results of yield, fruit growth and fruit quality.
Keywords: *fruit quality– guava – pruning – time- yield .*

I. Introduction

Guava is highly prolific and remunerative fruit which grows well under wide range of soil and agro climatic conditions. The fruit is nutritious being rich in vitamin C (200-300 mg/100g of pulp). It also contains a fair source of vitamin A, riboflavin, thiamine and minerals like calcium, phosphorus and iron. Furthermore, guava is processed commercially into jam, jellies and other products. Inspite of being a popular fruit, meager information is available on suitable planting density for guava. The pruning may be helpful in reducing the tree size and improving the fruit quality as well **Haropinder and Bal(2006)**. **Lal (1983)**indicated that the yield of guava cv. Sadar was improved by pruning. Pruning and hydrogen Cyanamid were found to modify the production curve of guava **Quijada et al.(1999)**. Also, **Salah (2005)** produced the highest bud emergence of guava by using severe and moderate pruning. **Haropinder and Bal(2006)** stated that pruning with (10 and 20 cm) and growth regulators (paclobutrazol and ethephon at 500 and 1000 ppm) treatments on guava cv. Allahabad Safeda trees during rainy season planted with four different spacing's (6 x 2 m, 6 x 3 m, 6 x 4 m and6 x 5 m). Maximum fruit size, palatability rating, TSS and vitamin C were noted in wider spacing (6 x 5 m). They found that maximum VitaminC was found in control in guava fruits. Physical characters like fruit weight was improved at 20 cm level of pruning. Whereas, fruit quality (chemical characters) were noted better at 10 cm level of pruning. The time and intensity of pruning affected guava cv. Paluma tree sprout and yield **(Serrano et al. 2008a)**. Moreover, (**Serrano et al. 2008b)** reported that the light pruning increased the number of productive branches and number of fruits per branch of guava cv. Paluma.

The present study was, carried out to find the effect of some pruning treatments at different time on fruit set, yield and fruit physical and chemical properties in guava.

II. Materials And Methods

This study was carried out during the two successive seasons (2010/- 2011) on 10 years old seedy guava (Psidium guajava L.) trees planted at 5x5 meters surface irrigation and subjected to the same agriculture practices apart at Mariout Research Station Desert Research Center- Alexandria. Fifty four trees, uniform in growth and in good physical condition were selected and grouped under three treatments.

Trees under investigation were subjected to the following treatments:
1-Control (unpruned trees).
2-Apical ten cm of new shoots were pruned.
3- Apical twenty cm of new shoots were pruned.
Pruning treatments were carried out at 15thof May,Juneand July for both seasons.

The experiment was design in split plot design where pruning in main plot and dates of pruning in sub plot (3 pruning treatments x 3 pruning date = 9 treatments) in a factorial experiment. Each treatment had three replicates and two trees for each. Data was statistically analyzed according to **Snedecor and Cochran(1980)**. The following measurements were recorded:

Fruit and Yield Indices:

a) Fruit set percentage: Four branches for each tree of three treatments were selected at random, then tagged and their flowers were counted during the full bloom. Fruitlets were also counted and recorded at the right time of fruit setting in mid-July. Fruit set was calculated as a percentage of the initial number of flowers as follows:

$$\text{Fruit set \%} = \frac{\text{No. of set fruits}}{\text{Total number of opened flowers}} \times 100$$

b) Yield (Kg), at harvest time, mature fruits were picked, tree yield in Kg was estimated by multiplying number of fruits per tree x average of fruit weight.

Fruit quality: Fifteen fruits of the same age were labeled at fruit maturity for each tree to study fruit physical and chemical properties at harvest date.

a)Fruitphysical properties: The following physical propertieswere determined and recorded i.e., fruit weight (g), fruit volume(cm^3) and fruit dry weight percentage.

b) Fruit chemical properties: The following chemical properties were determined: Total soluble solids (T.S.S) were determined with the help of Bausch and Lomb Refractometer in terms of degree Brix. The values of TSS were corrected at 20°C. Ascorbic acid (Vitamin C) was determined using 2,6- dichlorophenol indophenol solutions and oxalic acid as a substrate. Vitamin C content was calculated as mg / 100 ml juice and total sugars content were determined calorimetrically according to **A.O.A.C, (1980**).

The total sugar contents were determined colorimetrically by using picric acid **Thomas andDitcher (1924)**and expressed as g/100g fresh weight.

III. Results And Discussion

Data in table (1) Effect of pruning treatments, date and their interaction on fruit set%, number of fruits /tree and yield (Kg) in guava trees during (2010/2011) seasons.

Fruit set%: concerning to pruning treatments, pruning at 10 cm gave highest significant value in both seasons. Regarding to date, May and June gave highersignificant values than July in both seasons. The interaction between two studies factors, pruning at 20 cm with May and June gave highest significant values in first and second seasons.

No. of fruits /tree: concerning to pruning treatments, pruning at 10 cm gave highest significant valuein both seasons. Regarding to date, pruning at May gave highest significant valuein both seasons. The interaction between two studies factors, pruning at 10 cm with May pruning gave highest significant values in first and second seasons.

Yield (Kg) /tree:concerning to pruning treatments, pruning at 10 cm gave highest significant value in both seasons. Regarding to date, pruning at May gave highestsignificant value in both seasons. The interaction between two studies factors, pruning at 10 cm with May pruning gave highest significant value in first and second seasons.

These results agreement with Shaban and Haseeb (2009)they found that moderate pruning and treatments at 15th February on 25 years guava trees hybrid I apronounced andsignificant increase in initial fruit set, also pruning treatments with spraying chemicals substances improved tree yield.

Data in table (2) Effect of pruning treatments, date and their interaction on fruit weight (g), fruit volume (cm^3) and fruit dry weight percentage of guava trees during (2010/2011) seasons.

Fruit weight (g): concerning to pruning treatments, pruning at 20 cm gave highest significant value. Regarding to date, pruning at May gave highest significant value. The interaction between two studies factors, pruning at 10 cm with May and pruning at 20 cm with May and June gave highestsignificant values in first season. In second season, concerning to pruning treatments, pruning at 20 cm gave highest significant fruit weight. Regarding date of pruning both May and June pruning gave higher significant values than July. The interaction between two studies factors, pruning at 20 cm at May and June had highest significant values.

Fruit volume (cm³): concerning to pruning treatments, pruning at 20 cm gave highest significant value in both seasons. Regarding to date, pruning at May gave highest significant values in both seasons. The interaction between two studies factors, pruning at 20 cm with May and Junepruning gave highest significant values in first season, while pruning at 20 cm with May pruning gave highest significant value in second season.

Fruit dry weight (g): concerning to pruning treatments, there were insignificant differences among all treatments. Regarding to date, pruning at June gave highest significant value. The interaction between two studies factors, there are insignificant differences among treatments in first season, except pruning 10 cm with June showed higher significant value than pruning 10 cm with May.In the second season, concerning to pruning treatments, pruning at 20 cm gave highest significant value. Regarding to date, pruning at June gave highest significant value. The interaction between two studies factors, pruning at 10 cm with June gave highest significant value.

These results agreement with **Haropinder and Bal (2006)** they found that physical characters like fruit weight was improved at 20 cm level of pruning in guava fruits.

Table (1) Effect of pruning treatments, date and their interaction on fruit set percentage, number of fruits /tree and yield of guava trees during (2010/2011) seasons.

Treatments	Fruit set %				No. of fruits/tree				Yield (Kg) /tree			
	First season											
	May	June	July	Mean	May	June	July	Mean	May	June	July	Mean
Control	0.54b	0.53b	0.45b	**0.51B'**	247.6d	282.0e	97.0i	**208.88B'**	25.09d	26.55c	8.37j	**20.00B'**
Pruning10cm	0.73a	0.65a	0.45b	**0.61A'**	309.0a	276.0c	174.0e	**253.0A'**	33.83a	28.74b	17.98e	**26.85A'**
Pruning20cm	0.47b	0.46b	0.43b	**0.45C'**	168.0f	140.0h	151.0j	**153.0C'**	18.79e	15.54f	15.20f	**16.51C'**
Mean	**0.58A**	**0.54A**	**0.44B**		**241.5A**	**232.66B**	**140.66C**		**25.90A**	**23.61B**	**13.85C**	
Second season												
	May	**June**	**July**	**Mean**	**May**	**June**	**July**	**Mean**	**May**	**June**	**July**	**Mean**
Control	0.55b	0.58b	0.44b	**0.52B'**	282.0c	184.6e	99.0i	**188.5B'**	27.79c	20.20e	8.37j	**18.99C'**
Pruning10cm	0.75a	0.67a	|0.43b	**0.62A'**	312.3a	286.3b	157.0j	**251.8A'**	34.79a	29.60b	17.98e	**26.98A**
Pruning20cm	0.49b	0.47b	0.47b	**0.48B'**	225.3d	146.6h	173.3f	**181.7C'**	25.81d	16.65j	15.20f	**20.02B'**
Mean	**0.60A**	**0.57A**	**0.45B**		**273.2A**	**205.8B**	**143.1C**		**29.46A**	**22.15B**	**13.85C**	

Means having the same letter (s) in each row, column or interaction are insignificantly different at 5% level.

Table (2) Effect of pruning treatments, date and their interaction on: fruit weight (g), fruit volume (cm³) and fruit dry weight % in guava trees during (2010/2011) seasons.

Treatments	Fruit weight (g)				Fruit volume (g)				Fruit dry weight (%)			
	First season											
	May	June	July	Mean	May	June	July	Mean	May	June	July	Mean
Control	101.36b	94.17b	87.94c	**94.49C'**	102.0b	99.33b	82.33c	**94.55C'**	5.34ab	6.63ab	6.05ab	**6.00A'**
Pruning10cm	109.51a	104.14b	103.35b	**105.67B'**	103.33b	99.33b	100.0b	**100.88B'**	5.29b	7.58a	6.66ab	**6.04A'**
Pruning20cm	111.87a	111.08a	100.72b	**107.88A'**	115.66a	114.00a	99.66b	**109.77A'**	6.82ab	6.66ab	5.94ab	**6.47A'**
Mean	**107.58A**	**103.13B**	**97.34C**		**107.0A**	**104.22B**	**94.0C**		**5.81B**	**6.95A**	**5.75B**	
Second season												
	May	**June**	**July**	**Mean**	**May**	**June**	**July**	**Mean**	**May**	**June**	**July**	**Mean**
Control	98.59j	109.41c	90.88h	**99.63C'**	110.0d	98.0h	95.0i	**101.0C'**	5.14d	6.43b	5.75c	**5.77B'**
Pruning10cm	111.41b	103.40e	105.40 d	**106.74B'**	113.0c	107.0e	100.0j	**106.66B'**	5.05d	7.10a	5.19d	**5.78B'**
Pruning20cm	114.57a	113.56a	101.44f	**109.86A'**	117.0a	115.0b	102.0f	**111.33A'**	6.46b	6.34b	5.75c	**6.18A'**
Mean	**108.19A**	**108.19A**	**99.24B**		**113.33A'**	**106.66B**	**99.0C**		**5.55B**	**6.62A**	**5.56B**	

Means having the same letter (s) in each row, column or interaction are insignificantly different at 5% level.

Table (3) Effect of pruning treatments, date and their interaction onTSSpercentage, total sugars percentage and Vitamin C in guava trees during (2010/2011) seasons.

TSS%: concerning to pruning treatments, pruning at 10 cm gave highest significant value. Regarding to date, pruning at May and June recorded highest significant values. The interaction between two studies factors, pruning at 10 cm and 20 cm with May and June showed highest significant values in first season.

In second season, concerning to pruning treatments, pruning at 10 cm recorded highest significant value. Regarding to date, pruning at May showed highest significant TSS value. The interaction between two studied factors, all pruning treatments with May and pruning 10 cm with June had highest significant values

Total sugars%: concerning to pruning treatments, pruning at 10 cm gave highest significant value in both seasons. Regarding to date, pruning at May and June gave highest significant values in both seasons. The interaction between two studies factors, pruning at 10 cm with May and June pruning gave highest significant values in both seasons.

Vitamin C: concerning to pruning treatments, control gave highest significant value in both seasons. Regarding to date, pruning at May gave highest significant value in both seasons. The interaction between two studies factors, control with May recorded highest significant values in both seasons.

These results agreement with **Haropinder and Bal (2006)** they found that guava fruits which pruning at 10 and 20 cm and growth regulators (paclobutrazol and ethephon at 500 and 1000 ppm), maximum Vitamin C was found in control and fruit quality (chemical characters) were noted better at 10 cm level of pruning.

Table (3) Effect of pruning treatments, date and their interaction on TSS%, total sugars% and vitamin C mg/100ml in guava trees during (2010/2011) seasons.

Treatments	TSS%				Total sugars%				Vitamin C mg/100ml			
	First season											
	May	June	July	Mean	May	June	July	Mean	May	June	July	Mean
Control	7.00b	7.33b	7.33b	**7.22C'**	5.28c	5.44c	4.89c	**5.19C'**	89.65a	85.23b	80.89c	**85.25A'**
Pruning10cm	10.33a	9.66a	7.66b	**9.22A'**	7.06a	7.00a	4.58c	**6.21A'**	72.65d	70.47e	60.41h	**67.84B'**
Pruning20cm	9.00a	8.66a	6.00c	**7.88B'**	6.42b	6.37b	4.95c	**5.91B'**	66.78f	63.31j	65.40f	**65.16C'**
Mean	**8.77A**	**8.55A**	**7.00B**		**6.37A**	**6.27A**	**4.81B**		**76.36A**	**73.00B**	**68.90C**	
Second season												
	May	June	July	Mean	May	June	July	Mean	May	June	July	Mean
Control	8.33a	7.66b	8.00b	**8.00B'**	5.44c	5.33c	4.95d	**5.24C'**	90.32a	85.39b	86.25b	**87.32A**
Pruning10cm	1066a	9.33a	7.00b	**9.00A'**	7.21a	7.10a	4.84d	**6.38A'**	75.02c	69.00e	71.41d	**71.81B'**
Pruning20cm	10.00a	8.00b	8.00b	**8.66AB'**	6.58b	6.50b	4.96d	**6.01B'**	59.34j	56.73h	62.50f	**59.52C'**
Mean	**9.66A**	**8.33B**	**7.66B**		**6.41A**	**6.31A**	**4.92B**		**74.89A**	**70.37C**	**73.39B**	

Means having the same letter (s) in each row, column or interaction are insignificantly different at 5% level.

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