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5. SUMMARY AND CONCLUSION

Title of thesis: Pre and post harvest studies on guava.

Guava fruits is one of the most common fruits in Egypt. It is popular for all people due to its low price than other fruits, norishing value and good taste. It is also a rich and cheap source for vitamin C and contains about 2 to 5 times higher than fresh orange juice , and as a good source of both calcium and phosphorus. It is also rich in pectins which has industrial uses for jelly production .

According to the latest statistics of Ministry of Agriculture in 2007 (Ministry of Agriculture, Giza, A.R.E.,2007), guava acreage attained a bout 39664 feddans with an annual production of about 330791 tons.

The objective of this study is:

- 1- Turn the summer crop of guava to late crop (winter crop) to obtain fruits of good quality and high shelf life that it suitable for marketability in local and export markets.
- 2- Help farmer in new land (desert) to obtain good income by high price of guava crop.

Two field trials were conducted at private orchard at EL Kefah village, Badr center, EL Behera Governate, Egypt.

Sixty three guava trees were planted at a spacing of 5 x 5m apart in sandy soil under drip irrigation system, the trees are 11 years old and received similar cultural practices commonly adopted in that area.

During two seasons, fifty four trees were selected at random for spraying with different concentrations of tested chemicals and other nine trees were sprayed with tap water as control. The experiment was designed as a complete randomized block with three trees for each replicate. Yet all treatments included control trees were represented in three replicates.

In this study the trees were prevented from irrigation for four months (First April until end July) for to help defoliation.

The treatments were applied as follows:

- 1- Urea 10 %
- 2- Urea 15 %
- 3- Naphtalene acetic acid 400 ppm
- 4- Ethephon 1200 ppm
- 5- $ZnSO_4 + NO_3NH_4$ $ZnSO_4$ 2 % NO_3NH_4 4 %
- 6- Hand defoliation
- 7- Control (untreated trees) Spray with tap water

All treatments were applied to plant as foliar sprays in time at the end of July in both seasons 2007 / 2008 and 2008 / 2009.

Concerning untreated fruit were control harvested mid September; the other treatments were harvested the beginning of March.

Samples of fruit were picked in open carton boxes and as soon as possible sent to the laboratory. The fruits were washed with tap water and air dried under fan.

The characters were determined at harvest and during storage, such as Fruit physical properties (Fruit weight (g.), Fruit size (cm³), Fruit dimension (cm.), Fruit firmness (lb/inch²), Flesh weight (g.) and Core weight (g.), and Fruit chemical properties Titratable Acidily (%), Vitamin C content (mg /100 ml Juice), Total sugar, reducing sugar and non reducing sugar contents (%), Soluble solids content (SSC %), Soluble solids content (SSC / acid ratio), Pectin content (%) and The total phenols (%) in pulp and core. One carton box for each treatment was taken at 3 days intervals to determine the loss in fruit weight, decayed fruits, total loss and changes in fruit quality during storage.

The results obtained were statically analyzed and could be summarized As follows:

1- Yield:-

Guava fruits yield were significantly decreased in all treatments in two seasons compared with control. Also, the chemical treatment by urea 10% gave high yield and least yield obtained by NAA 400 ppm.

2- Weight of fruits, flesh weight and core weight:-

There was significantly increased with defoliation by ZnSO₄ 2%+NH₄NO₃ 4% and other treatments compared with control.

3- Fruit length and diameter:-

Guava fruits length and diameter significantly increased by defoliation with $ZnSO_4+NH_4NO_3$.

4- Fruit volume:-

It was significantly increased by defoliation with $ZnSO_4+NH_4NO_3$, urea and ethephon than other treatments and control.

5- The Soluble solids content (SSC %) :-

Defoliation by ethephon 1200 ppm and $ZnSO_4+NH_4NO_3$ increased the SSC in guava fruits significantly compared with all other treatments.

6- The total titratable acidity:-

The total titratable acidity of guava fruits decreased significantly by treatments hand defoliation, ethephon and control compared with other treatments used.

7- The SSC/Acid ratio:-

The SSC/Acid ratio almost in a similar way in all practices applied. Also, defoliation by urea 10% gave generally the least values of SSC/Acid ratio while both $ZnSO_4+NH_4NO_3$, ethephon and control produced fruits with higher SSC/acid ratio.

8- Firmness:-

Firmness of guava fruits significantly increased by defoliation with $ZnSO_4+NH_4NO_3$ and NAA 400 ppm. Also, the least firmness was in control.

9- Vitamin C:-

Vitamin C was significantly increased by defoliation with $ZnSO_4+NH_4NO_3$ and ethephon.

10- Pectin in fruit pulp:-

Water soluble pectin at harvest significantly increased in control.

11- Reducing sugars, Non reducing sugar and total sugars :-

Reducing sugars was significantly increased in treatments by $ZnSO_4+NH_4NO_3$ and NAA. Also, non reducing sugars too nearly same trend in treatments $ZnSO_4+NH_4NO_3$, NAA and ethephon. According to total sugars in guava fruits too nearly same trend of that noticed with both reducing and non reducing sugars.

12- Total phenol compounds in fruit peel, pulp and core:-

Total phenol compounds in fruit peel significantly increased in the control, $ZnSO_4+NH_4NO_3$, NAA and ethephon. Also, it was significantly increased in total phenol compounds in fruit pulp in treatment by $ZnSO_4+NH_4NO_3$. Total phenol compounds in fruit core significantly increased in treatments by $ZnSO_4+NH_4NO_3$ and NAA.

A- Fruit quality at ambient room:-

1- Fruit weight (flesh-core),length, diameter and volume.

There was significant decrease in fruit weight (flesh and core) in case of the control fruits. Fruit length, diameter and volume during ambient room took the same trend of fruit weight.

2- **The Soluble solids content (SSC %):-**

The total soluble solids (SSC) was significantly increased with all treatments towards the end of storage. Also, control gave the least SSC values among all treatments at harvest and with prolonged storage. $ZnSO_4 + NH_4NO_3$ and ethephon in two seasons gave the highest values of SSC.

3- **The total titratable acidity:-**

There was significantly decreased in acid value during storage with two seasons as storage period advanced.

4- **The SSC/acid ratio:-**

The SSC/acid ratio during the two seasons of study was almost similar to that found with SSC here. Also, the SSC/acid ratio gradually increased with all treatments as the storage period advanced. Ethephon gave the highest value of SSC/acid ratio.

5- **Fruit firmness (lb/in²):-**

It was significant decrease in fruit firmness and hardness in all treatments with the progress of storage time. Also, firmness of guava fruits after 9 days of storage increased significant values with treatments by $ZnSO_4 + NH_4NO_3$ and NAA. Ethephon had lowest values for treatments.

6- Vitamin C :-

Vitamin C was significant decrease in all treatments with the progress of storage period. The lowest values of vitamin c were gained from control at the end of storage after 3 days in two seasons. The highest values of vitamin C content were gained from treatment with $ZnSO_4+NH_4NO_3$ at the end of storage after 9 days of storage in two seasons.

7- Pectin in fruit pulp %:-

It was gradually increased in water soluble pectin fruit with the progress of storage time.

8- Reducing surgars, Non reducing sugars and total sugars :-

The reducing sugars increased gradually in fruit of all treatments as the storage period. The highest value of reducing sugars after 9 days obtained from treatments of $ZnSO_4+NH_4NO_3$ and NAA. Also, non reducing sugars was significantly increased with treatments $ZnSO_4+NH_4NO_3$, NAA and ethephon after 9 days of storage. Total sugars took nearly the same trend of that noticed with both reducing and non reducing sugars.

9- Total phenol compounds:-

There was significantly decreasing in total phenol compounds in peel, pulp and core with all applications and control as the storage period advanced. The best values of total phenol compounds after 9 days at ambient room obtained by treatments $ZnSO_4+NH_4NO_3$, NAA and ethephon.

10- Fruit weight loss%:-

Fruit weight loss% was significantly increased during ambient room in all treatments. Also, fruit from treatments of NAA, hand defoliation and $\text{ZnSO}_4+\text{NH}_4\text{NO}_3$ gave the lowest physiological loss in weight after 9 days of ambient room.

11- Fruit Decay%:-

It was significantly increased in control. It reached 100% after 9 days in two seasons at ambient room. Also, there was significantly increased in decay by by ethephon treatment in two seasons after 9 days at ambient room.

12- Fruit total loss %:-

Fruit total loss% was significantly increased at the end of storage period.

Conclusion:

Finally, it could be concluded that remove leaves by hand or chemical treatments specially using $\text{ZnSO}_4+\text{NH}_4\text{NO}_3$ or NAA help farmer to obtained late yield of guava fruits (in winter). Also, these treatments decreased total loss percentage and improve storage of guava fruits.