SUMMARY

V- SUMMARY AND CONCLUSIONS

This investigation was carried out for studying propagation ability of two fruit species by two independent parts, the first one with stem cuttings in a greenhouse which is belonging to Horticultural Research Institute, Ministry of Agriculture, Giza Governorate. The second part which *in vitro* multiplication through tissue culture technique at tissue culture laboratory of Horticulture Department, Faculty of Agriculture, Moshtohor, Zagazig University, Benha Branch during the successive seasons of 1995 - 96 and 1996 - 97 for both Taymour mango and Curtis pecan species.

Part I - stem cuttings :

Possibility of producing standard nursery plants (survived rooted cuttings) through enhancing rooting ability in cuttings of such important fruit species by applying some preplanting treatments and collection time were the main purpose of Taymour mango and Curtis pecan cuttings under mist conditions during 1995 - 96 and 1996 - 97 seasons was studied. Hence, the wounding and dipping in various concentrations of IBA and vitamin mixture either combined with date of cutting preparation was the investigated factors in this concern. Moreover, changes in some chemical components namely : phenols and indoles in cuttings were also determined to find out the relationship between their level as affected by collection dates from one hand and possibility or difficulty to root from the other.

In addition anatomical studies were also carried out for the basal portion cuttings of both species to through some lights on the initiation of root promidia and difficults may reflected negatively either on their

initiation or penetration through tissues of cuttings. The following treatments were carried out in mother trees as follows :

1- Sprayings mango and pecan trees with ethrel at 250 ppm a week prior to cutting preparation.
2- Etiolation the main branches for mango and pecan trees with black polyethelene plastic a month prior to cutting preparation.
3- Spraying mango and pecan trees with pp333 at 1000 p.p.m in a previous summer (June) to cuttings preparation.
4- Some trees from mango and pecan left without any treatment as a general control.

Leafy cuttings (2 leaves /each) with 20.0 cm. Length and 5.0 mm diameter were prepared from semihardwood shoots collected at four dates (March, May, June and October) and three dates (May, June and July) for Taymour mango and Curtis pecan species, respectively. A factorial experiment was conducted including 56 and 42 treatments for mango and pecan, respectively i.e. combinations between 4 or 3 collecting dates from one hand and 14 preplanting applications of dipping the wounded or un-wounded cuttings in (water, IBA at 1000, 2500, 5000, 7500 and 10000 ppm as well as vitamin mixture)from the other . The treated cuttings devoted for investigating growth parameters response were planted separately in plastic boxes contained sand and peatmoss at 2 : 1 by volume. The different treatments "combinations" were arranged in a randomized complet block design as each treatment was replicatd three times and every replicate was represented by 10 cuttings and planted under mist propagation. Meanwhile, other smaller box was devoted for planting treated cuttings needed for anatomical studies. Data of some rooting measurements viz. 1 - percentage of rooted cuttings, 2- Number of

roots / cutting, 3 - Average root length (cm), 4 - Number of shoots / cutting; 5 - Average shoot length (cm). 6 - Number of leaves / cutting were recorded 14 weeks later from planting date. Since, all planted cuttings in boxes were carefully taken off and the oforesaid six parameters were immediately determined. Moreover, all succeeded rooted cuttings were counted and transplanted individually each in polyethylene bag filled with a mixture of peatmoss and sand at equal proportions (v : v). Such rooted cuttings were allowed to grow for 12 weeks from transplanting in order to carrying out the other growth measurement (servival percentage).

The obtained results in this work could be summarized as follows :

Mango :

I - Changes in chemical constituent of Taymour mango cuttings as affected by collecting date and treatment of mother tree :

a- Total phenols content.

1- Concerning the specific effect of collecting date on total phenol content, May and June collected cuttings contained significantly the lowest level when compared with other collection times during the two seasons of study.

2- With respect to the specific effect of treatment of mother tree, the obtained data showed that both etiolation and ethrel treatments greately decreased total phenols content while pp_{333} increased it when compared with control during the study.

3- A significant interaction between collected dates and treatments of mother tree, where, treated mother tree with PP333 and October collected cuttings showed the highest value of total phenols. Meanwhile, treated mother tree with etiolaton and May collected cuttings contained

significantly the lowest level of total phenols during the two seasons of study.

b- Total indoles content :

1- As for the specific effect of collecting date on total indoles content, it is clear that May and June collected cuttings contained significantly the highest value while October collected cuttings showed the lowest value during the two season of study.

2- Concerning the specific effect of treatment of mother tree, the obtained results showed that ethrel treatment significantly increased total indole content while sprayed mother tree with PP_{333} treatment had the lowest value in this respect during the two seasons of study.

3- A significant interaction was found between collecting dates and mother tree treatments, where, treated mother tree with ethrel and collected cuttings in May gave the highest value of total indoles while the reverse was true when cuttings were collected from treated mother tree with PP_{333} in October during the study.

II - Vegetative growth measurements :

In this respect, growth parameters is response to both investigated factors namely treated mother tree, collecting date of cuttings and some preplanting treatments of wounding and dipping in water and IBA or vitamin mixture as well as their conbinations were measured twice i.e. 14 weeks from planting (rooting aspects) and 12 weeks from transplanting (survival percentage).

Rooting aspects (14 weeks from planting):

a- Rooting percentage and number of roots per cuttings :

(1) As for specific effect of investigated factors, it was quite evident that treated mother tree with ethrel or etiolation treatments were more suitable than PP_{333} or control treatments. (2) In addition, May collection followed by October were more suitable than both June or March, (3) while dipping in IBA at 10.000 ppm and wounded cuttings were the most effective preplanting treatments. (4) On the other hand, combinations of (etiolation x March, May or October - collected cuttings x wounding preceeding dipping in IBA at 10.000 ppm) and those between (ethrel x May or October -collected cutting x wounding application +dipping in IBA at 10000 ppm) resulted in the highest rooting percentage. While the reverse was true with those treated mother trees with water or PP_{333} x wounded or unwounded cutting x dipping in IBA at 1000 ppm or vitamin mixture.

b- Average root and shoot length :

1- Regarding the specific effect of treated mother trees, collecting date and preplanting treatment, data obtained revealed that etiolated mother plant treatment gave the highest average root and shoot length as compared with control during the study. (2) In addition, both March and October collected cuttings exhibited the greatest value of root length while May and June collected cuttings exhibited the maximum average shoot length. (3) On the other hand, wounding application and dipping in IBA at 10000 ppm were the superior preplanting treatments in this respect. (4) As for the interaction effect, obtained results showed that combinations of etiolated or sprayed mother tree with ethrel, dipping the wounded - March collected cuttings in IBA at 10.000 ppm were the superior ones in

comparison with others as the average length of initiated roots and shoots per cutting was concerned.

C- Number of shoots and leaves :

(1) Concerning the specific effect of treatment of mother tree, collecting date and preplanting treatments on number of shoots and leaves 1 cutting, data obtained declared that spryaed mother tree with ethrel exhibited the greatest number of both shoots and leaves / cutting from one hand, (2) while June and May collection gave the greatest number of leaves and shoots / cutting, respectively. (3) On the other hand, dipping in IBA at 10.000 was the superior preplanting treatment from the other in this respect. (4) Moreover, the combination between sprayed mother trees with PP333 and June collected cuttings as well as preplanting treatment of dipping in IBA at 7500 or 10000 ppm with wounding showed the most pronounced interaction effect as induced the greatest number of shoots during the two seasons of study. In addition treated mother tree with ethrel and both May and June collected cuttings as well as preplanting treatment of dipping in IBA at 7500 and 10000 or vitamin mixture with wounding produced the greatest number of leaves / cutting during the study.

Growth parameters of survived rooted cuttings (12 weeks from transplanting).

Second growth measuring was done 12 weeks from transplanting the rooted cuttings i.e., followed the aforesaid measurement of rooting aspect included survival percentage.

d- Survival percentage :

1- Regarding specific effect of both investigated factors i.e., mother tree treatment, collecting date and preplanting treatments, data obtained revealed that the highest survival percentage of Taymour mango rooted cuttings was closely related to ethrel mother tree treatment, followed by PP333 sprayed trees. (2) Moreover, June and October collected cuttings showed the highest value of survival percentage. (3) In addition, dipping in IBA either at 10000 ppm or 7500 ppm was the most desirable preplanting treatments as resulted statitically in the highest survival percentage of Taymour mango rooted cutting, however, higher IBA concentration was more effective in this regard.

(4)As for the interaction effect, it was so clear that the combinations between etiolated or sprayed mother tree with PP333 and collected cutting in March or May from one hand and dipping in IBA at 7500 or 10000 ppm with wounding the bases cutting from the other were the superior treatments as resulted in higher survival percentages .

III- Anatomical studies :

Adeventitious roots in the stem cuttings of mango initiated from the outer layers of pith parenchyma. The development of root primordia was more observed between 4 to 8 weeks after planting. The lignified cells at the inner layer of the cortex surrounding the tips of root primordia constituted an anatomical barrier to rooting. By the time, xylem and phleom tissues were still distinguished in the developing roots.

Pecan :

I - Changes in chemical constituents of Curtis pecan cuttings as affected by both mother tree treatment and collection date :

a- Total phenols content :

1- Concerning the specific effect of collecting date on total phenols content, May collected cuttings contained significantly the lowest values when compared with two other collecting dates during the two seasons of study.

2- With respect to the specific effect of treated mother tree, the obtained data showed that etiolated mother tree treatment greately decreased total phenols content while sprayed the trees with PP_{333} increased it when compared with the control during the study.

3- A significant interaction between collected dates and treated mother trees, where, etiolated trees and both May and July collected cuttings showed the lowest value of total phenols. Meanwhile, treated mother trees with PP_{333} and July - Collected cuttings contained significantly the highest value of total phenoles during the two seasons of study.

b- Total indoles content :

1- As for the specific effect of collecting date on total indoles content, it is clear that May collected cuttings contained significantly the highest value while July collecting date showed the lowest value during the two seasons of study.

2- Concerning the specific effect of treated mother trees, the obtained results showed that etiolated mother trees or sprayed with ethrel significantly increased total indole content while sprayed mother tree with PP_{333} had the lowest value in this concern during first and second season.

3- A significant interaction was found between collecting dates and mother tree treatments, where etiolated mother tree and collected cuttings in May gave the highest value of total indoles while the reverse was true

when treated mother tree with PP_{333} and June collected cuttings during the study.

II - Vegetative growth measurements :

Rooting percentage, average root and shoot length, number of roots, shoots, and leaves /cutting were the growth parameters involved in this regard . While,Curtis pecan rooted cuttings failed to survive.

a- Rooting percentage and number of roots per cutting :

(1) Concerning the specific effect of investigated factors, it is clear that treated mother trees with both ethrel and PP333 treatments significantly increased rooting % and number of roots per cutting, respectively during the two seasons of study. (2) Moreover, the specific effect of planting date, it is obvious that, May collection and planted cuttings gave higher rooting % and number of roots / cutting, followed indecending order by June followed by July during the study. (3) On the other hand, dipping in IBA at 5000, 7500 and 10000 ppm and wounded cutting were the most effective preplanting treatments. (4) In addition, combinations of sprayed mother tree with ethrel x may, or June or July collected cutting x wounding preceeding dipping in IBA at 5000, 7500 or 10000 ppm resulted the highest value of rooting % during the two season of study. On the other hand, combinations between sprayed mother tree with PP333 x collected cutting in both May and June x wounded and dipping in IBA at 2500, 5000, 7500 and 10000 ppm were the superior on number of roots per cutting.

b- Average root and shoot length per cutting :

(1) Regarding the specific effect mother tree treatments on average root and shoot length, it is clear that treated mothe tree with both etiolation and ethrel treatments significantly increased it during the study. (2) In addition, the specific effect of planting date, it was quite evident that, June and May were more suitable for increasing root and shoot length, respectively during the two seasons of study.

(3) Concerning the specific effect of preplanting treatments on average root and shoot length, data obtained cleared that dipping of wounded pecan cuttings in different concentrations of IBA (1000, 2500, 5000, 7500 and 10000 ppm) were effective than control, while the concentration of IBA at 5000 ppm was more beneficial in this respect.

(4) As for the interaction effect obtained results showed that combinations of etiolated or sprayed mother trees with ethephon x wounded cuttings and collected in both June or July, as well as dipping in IBA at 5000, 7500 and 10000 ppm were the superior ones in comparison with others as the average of root and shoot length.

C - Number of shoots and leaves :

1- Regarding the specific effect of treated mother trees on number of shoots and leaves, data obtained revealed that the highest values of Curtis pecan cuttings were closely related to treated mother trees with ethrel.

2- Concerning the specific effect of collecting date on number of shoots and leaves / rooted cutting, data obtained during two seasons of study showed that, May was more suitable than June or July in this concern.

well as vitamin mixture on average number of shoots and leaves / shoot per rooted cutting, data obtained during both seasons of study showed that dipping wounded cuttings in higher concentratons of IBA at 5000, 7500 and 10000 ppm were the superior in this respect.

4- As for the interaction effect of both investigated factors, data obtained declared obviously that the combination between treated mother trees with etiolation or ethephon x wounding x dipping in IBA at 5000, 7500 and 10000 ppm from one hand and collected cuttings in any of May, June or July were the superior treatments during two seasons of study.

III - Anatomical studies :

1- Adevntitious roots were initiated from the pith parenchyma. The development of root primordia was more observed between 3 to 6 weeks after planting.

2- In addition failure of pecan cuttings to root satistfactory is mainly due to lignified layer(s) in the periderm, surrounding the tips of root primordia by phellodenn or cells full of resins, differentation of the vascular cylinder in the developing roots did not clearly evident.

Part II : In vitro propagation experiments :

1-Initiation and establishment of both mango and pecan shoot tip and nodal cultures :

a- The lowest contamination and necrosis percentage was achieved through the use of 50% clorax NaOCl for 30 min + 95% ethyl alcohol for 10 sec. for both explants of Mango and 30% NaOCl for 30 min. + 95% ethyl alcohol for 10 sec. for pecan. Shoot tip explants more sensitive to NaOCl + ethyle Alchohole than nodal explants.

b- M. S. medium gave the highest value of survival for mango while, W.P.M. gave the highest value of survival for pecan, with two types of explants.

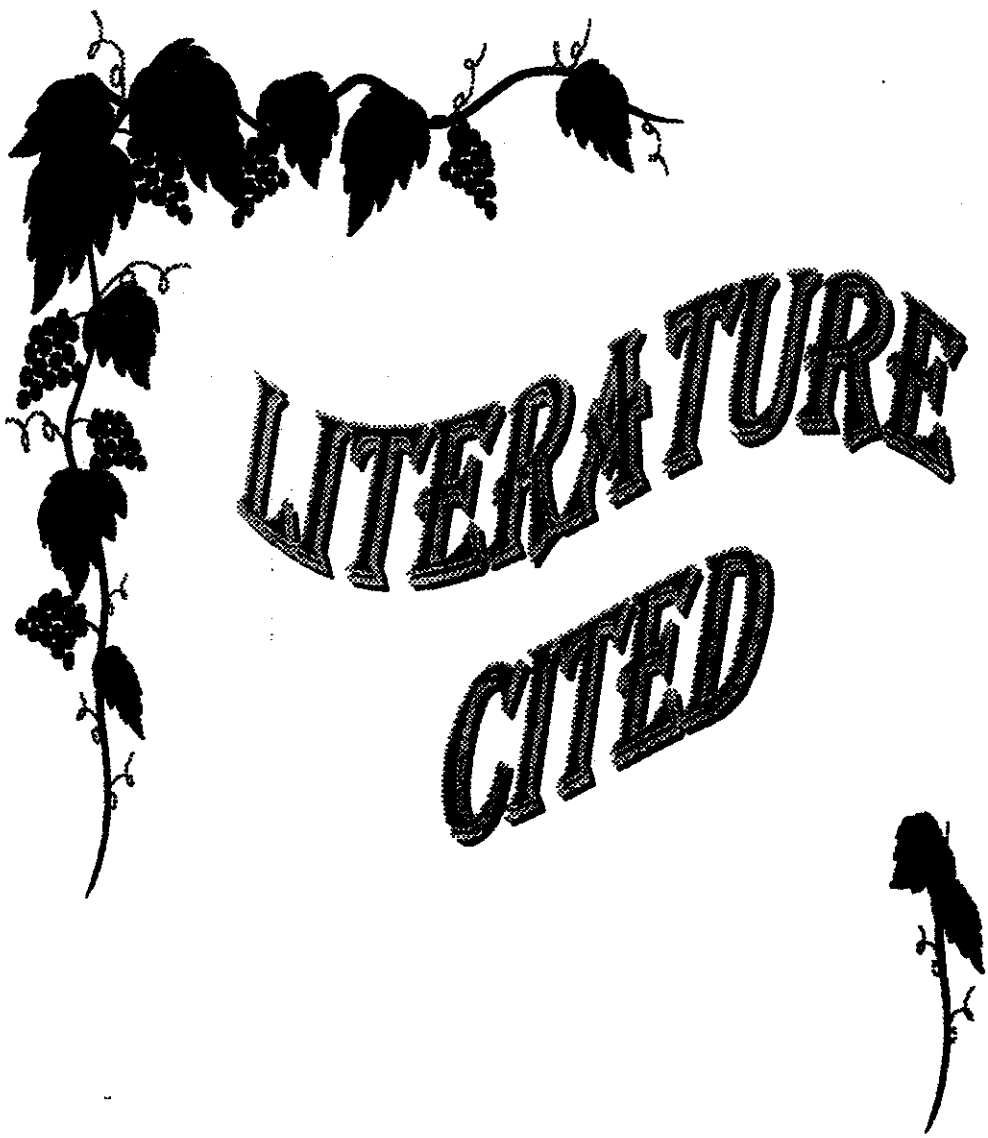
2- Multiplication of Mango and Pecan shoots : -

Effect of Benzyle amino purine (BAP) and indole butyric acid (IBA) concentration on the prolifiration of mango and pecan culture :

a- The highest multiplication rate of both mango and pecan explants could be achieved with BAP at 4.0 mg/L and addition IBA at 1.0 mg/L.

b- IBA at 1.0 mg/L + BA at 4 mg/L gave the highest values of average number of shoots and shoot length. In addition, shoot tip gave the highest value as compared to single node cuttings.

c- The interaction between concentration of BAP and type of explant used, revealed that the highest number of shoot and length were obtained when shoot tipt was cultured on WPM media supplemented with 4 mg./L.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