SUMMARY AND CONCLUSION

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The present study was conducted during two consecutive seasons 1987 and 1988 at the nursery of the Faculty of Agriculture , Moshtohor , Kalubia Governorate. This investigation aimed to study the following :-

1- The possibility of reducing the dominant habit and downward direction of tap root of pecan seedlings in favor of increasing root branching and better root distribution in the soil.

2- Enhancing the rate of vegetative growth in the nursery to shorten the period required to produce a nursery tree.

3- Encouraging the branching of tree top in favor of forming a more compact tree form.

Therefore , the following five experiments were included in the study :

Experiment I: Effect of growth regulator sprays on growth of pecan seedlings.

Two - year - old pecan seedlings were transplanted in early February of both seasons. These seedlings were sprayed three times

i.e. May , June and July. The growth regulators used were 50 ppm TIBA , 500 ppm 6-furfuryl amino purine , 1000 and 2000 ppm SADH in both seasons. Beside , 1000 and 2000 ppm CCC were used in the first season only. Meanwhile , 50 ppm 6- benzyle amino purine , 100 and 200 ppm PP$_{333}$ treatments were applied in the second season only. These treatments were arranged in complete randomized design. The vegetative growth measurements were done from the beginning of growth and repeated at monthly intervals till September. Other growth parameters were done in mid - January.

The obtained results revealed that :-

a - 50 ppm TIBA treatment increased the number of lateral shoots per seedling , shoot branching angle , number of leaves per seedling , number of lateral roots , total seedling dry weight , shoot and root dry weights as well as root : shoot ratio. Such treatment caused significant reduction in shoot length without any effect on root length.

b - 1000 and 2000 ppm SADH treatments relatively increased number of lateral shoots and roots per seedling , total seedling dry weight , shoot and root dry weight as well as root : shoot ratio. Meanwhile , SADH treatment decreased shoot length , shoot branching angles and number of leaves per seedling (especially low concentration).

c - 500 ppm 6- furfuryle amino purine increased number of lateral shoots per seedling , total seedling dry weight , shoot and root dry weights as well as root : shoot ratio. Meanwhile , this treatment reduced shoot length.

d - 1000 and 2000 ppm CCC treatments increased number of lateral shoot per seedling , number of leaves per seedling (especially at high concentration) , and number of lateral roots per seedling .

e - 100 and 200 ppm PP_{333} treatments (applied in the second season only) increased number of lateral shoots per seedling , (mainly 200 ppm) , shoot branching angle , number of lateral roots per seedling . total seedling dry weight . root and shoot dry weights as well as root : shoot ratio. Meanwhile , both concentrations of PP_{333} highly reduced shoot length especially at high concentration. Other growth parameters did not show any response to PP_{333} treatments.

f - 50 ppm 6- benzyle amino purine improved shoot branching angles , and root dry weight. Meanwhile , this treatment failed to affect other growth parameters , when it was applied in the second season.

Generally , it is safe to conclude that spraying pecan seedlings with 50 ppm TIBA was the most promising treatment in enhancing better distribution of pecan seedling growth.

Experiment II: Effect of nutritional sprays on growth of pecan seedlings.

In early February 1987 , 2 - year - old pecan seedlings were transplanted at nursery rows at 50 cm. apart. These seedlings were

sprayed three times in May , June and July with one of the following nutritional sprays :-

a - Tap water spray (control)

b - 500 ppm Zinc sulphate

c - 5000 ppm urea

d - 5000 ppm potassium sulphate

These treatments were arranged in complete randomized design with three replicates and each replicate included three seedlings. The same growth measurements of experiment (I) were done.

The obtained results could be summarized as follows :-

1 - Seedling growth :

a - Both potassium sulphate and urea sprays were superior in enhancing most of the growth parameters of pecan seedlings i.e. number of lateral shoots per seedling , total seedling dry weight , root and shoot dry weights as well as root : shoot ratio.

Meanwhile , potassium sulphate and urea sprays effect in reducing shoot length increase could probably be due to the increase in number of lateral shoots.

b - Potassium sulphate sprays surpassed urea sprays in improving the branching angles while urea sprays surpassed potassium sulphate treatment in improving stem girth. However , the remaining growth parameters were not statistically affected.

c - 500 ppm zinc sulphate sprays increased number of lateral shoots per seedling , shoot branching angle , total seedling dry weight, root dry weight and root : shoot ratio. Other growth parameters were not affected by this treatment.

2 - Leaf nutrient content :

a - Potassium sulphate sprays improved leaf K , Mg and Zn contents.

b - Zinc sulphate sprays increased leaf zinc content only.

c - Urea sprays increased leaf N , K , Mg and Zn contents.

By analysing the results of Experiment (II) , one can generalize that 5000 ppm potassium sulphate and 5000 ppm urea were the most effective nutritional sprays in enhancing growth parameters of pecan seedlings under the experimental conditions.

Experiment III: Effect of mycorrhizae fungi on growth of pecan seedlings.

In February 1987 , wooden boxes were filled with a mixture of sand and clay at the ratio of 1 : 1. The soil was disinfected with 2 % formalin solution. The soil of the first group of boxes was inoculated in mid - January with *Glomus macrocarpus* fungi , while the second one was inoculated with *Glomus australe* fungi. Meanwhile , the third group of boxes was left without inoculation as control. Moreover , the fourth group of boxes was filled with unsterilized soil as a general control. Seedlings with pruned roots at 15 cm. below the crown were planted in the previously prepared boxes. The treatments were arranged in complete randomized design.

The obtained results revealed that :-

a - *Glomus australe* fungi proved to be more effective in improving seedling growth parameters as it greatly increased lateral shoots per seedling, number of leaves per seedling , root length , number of feeder roots per seedling , total seedling dry weight , shoot and root dry weights. Meanwhile , it reduced the ratio of root : shoot dry weight.

b - *Glomus macrocarpus* fungi showed to be less effective in improving seedling growth. However , it increased shoot length , root length , number of feeder roots per seedling , total seedling dry weight , shoot and root dry weights. Other growth parameters did not show any response to mycorrhizae inoculation.

c - Soil sterilization failed to improve any growth parameters of pecan seedlings.

It could be concluded from Experiment (III) , that growth of pecan seedlings respond well to soil inoculation by mycorrhizae *Glomus australe* fungi proved to be more effective than *Glomus macrocarpus* in improving growth of pecan seedlings in the nursery.

Experiment IV: Response of pecan seedlings to soil treatment with some chemicals.

In February 1987 , wooden boxes , 100 X 75 X 50 cm. (length / width / height) were filled with a mixture of sand and clay at the ratio of 1 : 1. The soil was subjected to the following treatments :-

a - Silver nitrate was applied at the rate of 0.07 moles / m^2 surface area , above the base of the box by 5 cm. , then the boxes were completed with the soil.

b - Zinc sulphate was applied at the rate of 2.0 moles / m^2 surface area , above the base of the box by 5 cm. , then the boxes were completed with the soil.

c - Soil left without any chemical treatment as a control.

1 - year - old pecan seedlings with pruned roots at 15 cm. below the crown were transplanted in the previously prepared boxes.

The treatments were arranged in complete randomized design. The obtained results revealed that :

Silver nitrate and zinc sulphate treatments at the concentrations used in this experiment failed to exert a root pruning effect on pecan seedlings. However they affected seedling growth parameters as they increased number of leaves per seedling and total seedling dry weight only. Moreover , zinc sulphate treatment increased root length and root dry weight.

Evaluating results of experiment (IV) , it is easy to say that silver nitrate and zinc sulphate treatments improved some growth parameters of pecan seedlings. However , these treatments failed , at the concentrations applied , to exert the expected root pruning effect by killing the root tip at a certain depth.

Experiment V: Response of pecan seedlings to some root treatments.

In both 1987 and 1988 seasons , 1 - year - old pecan seedlings were root pruned at 15 cm. below the crown , then , they received one of the following treatments :-

a - Planting directly without treatment (control).

b - Wounding the base of the seedling roots by applying two opposite cuts (2 cm length).

c - Wounding and dipping seedling roots in 1000 and 2000 ppm Indole butyric acid (IBA).

d - Wounding and dipping seedling roots in 500 and 1000 ppm Naphthalene Acetic Acid (NAA).

e - Wounding and dipping seedling roots in 600 ppm Benomyle.

f - Wounding and dipping seedling roots in 1000 ppm IBA + 600 ppm Benomyl.

g - Wounding and dipping seedling roots in 500 ppm NAA + 600 ppm Benomyl.

h - Wounding and dipping seedling roots in 1000 ppm IBA + 500 ppm NAA + 600 ppm Benomyl.

These treatments were arranged in complete randomized design. The obtained results could be summarized as follows :-

a - Root shortening + wounding increased number of leaves and number of lateral roots per seedling and total seedling dry weight. Meanwhile , it reduced root length and root : shoot ratio.

b - Root shortening + wounding + 1000 or 2000 ppm IBA treatments were more effective as they increased number of leaves and number of lateral roots per seedling , root length , total seedling dry weight , shoot and root dry weights. Meanwhile , shoot length was reduced when 1000 ppm IBA was used. Anyhow , the high the IBA concentration , the more was improving effect on seedling growth.

c - (Root shortening + wounding + 600 ppm Benomyl + 1000 ppm IBA) , (root shortening + wounding + 600 ppm Benomyl + 500 ppm NAA) , and (root shortening + wounding + 600 Benomyl + 1000 IBA + 500 ppm NAA) treatments increased number of leaves and number of lateral roots per seedling , total seedling dry weight , shoot and root dry weights. The last mentioned treatment exerted more effect than the others.

From Experiment (V) , one can conclude that root shortening + wounding + dipping in 2000 ppm IBA solution is the most promising root treatment in improving growth of one - year- old pecan seedlings.