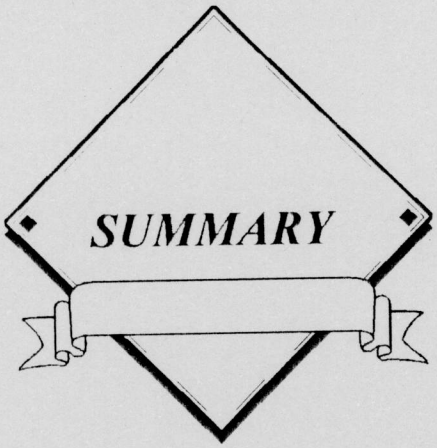

SUMMARY

SUMMARY AND CONCLUSIONS

The present study was conducted at the nursery of Timber Trees Department of the Experimental Horticulture Research Station at El-Qanater El- Khairia to investigate the effect of different water resources irrigation and soil moisture content in different two soils on seedlings growth and some chemical constituents of two species of timber trees grown in Egypt namely, *Cupressus Sempervirens* Var Horizontalis and *Albizzia lebbeck* for two successive seasons of 1998- 1999 and 1999 –2000.

There were two experiments designed and the plastic bags were distributed randomly to ensure that all replicates are subjected to the same conditions.

The split- split plot design was used, with three replicates for each species-Each experiment includes 18 treatments by soil types (loamy and sandy soil), different water resources (municipal wastewater , drainage and Nile water) and soil moisture content (40,60,80% of field capacity) in first and second seasons.

The obtained data dealt with vegetative growth, survival percentage, some physiological aspects, chemical constituents of plants and physical and chemical properties of both soils. The results might be summarized as follows:

Vegetative growth

A . ***Cupressus sempervirens***

1- The seedling height and stem diameter were significantly increased to maximum values in the

seedlings irrigated with municipal or drainage water at level of 60 or 80% soil moisture content and planted in loamy or sandy soil more over than of those irrigated by Nile water at the same levels of soil moisture content.

2- The irrigation with municipal wastewater produced significantly the tallest roots at level of 40% soil moisture content in both soil compared to those irrigated with drainage water which gave the shortest root at similar conditions.

3- The seedlings irrigated with municipal wastewater effluent performed the highest branch number /plant in loamy or sandy soil at 80% soil moisture content followed by those irrigated with drainage water while the lowest one was observed in the seedlings irrigated with Nile water.

4- The highest significant values of fresh and dry weight of leaves and stems were obtained from seedlings irrigated with municipal wastewater and planted in loamy or sandy soil at level of 60 or 80% soil moisture content followed by drainage water. on the other hand the lowest values were recorded from seedlings treated with Nile water at level of 40%.

5- The survival percentages of seedlings were insignificant decreased due to municipal or drainage water irrigation specially at level of 40% soil moisture content in both soils. Compared to those irrigated with Nile water.

B- ***Albizzia lebbeck***

1- The highest significant values of seedling height, stem diameter and leaf area were observed in seedlings irrigated with municipal wastewater and cultivated in loamy or sandy soil at level of 60% or 80% soil moisture content followed by drainage water. While the lowest values were recorded from seedlings treated with Nile water at level of 40%.

2- Root length was significantly increased in sandy soil as a result to municipal waste water specially at low level of soil moisture content.

3- The irrigation with municipal wastewater gave significantly the highest values of number of leaves in seedlings planted in loamy soil under 80% soil moisture content comparing with those irrigated with drainage or Nile water in particular at low soil moisture content.

4- Fresh weight of leaves and stems were significantly increased when seedlings irrigated with municipal wastewater compared to those irrigated with drainage or Nile water in loamy or sandy soil.

5- The irrigation with municipal wastewater effluent recorded the highest dry weight of leaves, stems and roots followed by drainage water in two soil types while Nile water produced the least one.

The fresh and dry weight affected by the different soil moisture content. Generally the deficiency in

moisture of soil was associated in the decrease of fresh and dry weights leaves, stems and roots.

6- The survival percentage of seedlings slightly decreased owing to municipal or drainage water irrigation in particular at low soil moisture content in both soils.

physiological aspects

1- The obtained results indicated that the transpiration rate in *cupressus sempervirens* seedlings did not affect by different water resource while it was more influenced by different soil moisture content since it increased at high levels of 80% in loamy or sandy soil. Meanwhile transpiration rate in *Albizzia lebbeck* seedlings were affected by different water resources where the irrigation with Nile water produced significantly the highest values of transpiration rate compared to those irrigated with drainage water which gave the lowest

As soil moisture content was declined the rate of transpiration was markedly decreased. A similar trend in *Albizzia lebbeck* was observed to those obtained by *cupressus sempervirens* but the amounts of transpiration rate were highly in *Albizzia lebbeck* leaves.

2 – Results cleard that, the different water recourses did not affect leaf water relative turgidity while it was more influenced by soil moisture content since it increased at high levels of 80% in loamy or sandy soil and the opposite occurred under drought conditions.

chemical constituents

1- chlorophyll (a, b) and carotenoides in both *cupressus sempervirens* and *Albizzia lebbeck* raised up in seedlings irrigated with municipal or drainage water and cultivated in loamy soil compared with those of Nile water. Chlorophylls and carotenoides values were decreased owing to increase water supply.

2- The highest total carbohydrate content in stems of both plants irrigated with municipal or drainage water in loamy or sandy soil were recorded as compared with those irrigated with Nile water. Total carbohydrates values in *cupressus sempervirens* seedlings were increased due to decreasing water supply while the converse effect occurred in *Albzzia lebbeck* seedlings.

3- Total indoles compounds in leaves of seedlings irrigated with municipal wastewater at level of 60 or 80% soil moisture content were higher than those irrigated with drainage or Nile water in both soils,

while the adverse effect occurred in total phenolic compounds in *cupressus sempervirens* and *Albizzia lebbeck* seedlings.

4- Macro elements % (N,P,K,Ca and Mg) in leaves ,stems and roots of *cupressus sempervirens* and *Albizzia lebbeck* exceeded in the seedlings irrigated with municipal or drainage water in loamy or sandy soil more than that of Nile water .Moreover all the plants portions planted in sandy soil and irrigated with municipal wastewater had a great values more than the

plants cultivated in loamy soil but irrigated with Nile water, meaning that sandy soil traits were enhanced and amended due to irrigation with municipal wastewater effluent.

Leaves, stems and roots had the superior values of N, P, K, Ca and Mg due to irrigating the plants at level of 80% soil moisture content followed by that of 60 % while 40% resulted in the least one irrespective the differences in water resources. On the other hand Na content increased in seedlings of *cupressus sempervirens* or Albizzia *lebbeck* irrigated with drainage water more than municipal or Nile water .

5- Micro and heavy metals i.e Zn,Mn,Fe and Pb in all plant portions of *cupressus sempervirens* and *Albizzia lebbeck* increased to maximize values in seedlings irrigated with municipal wastewater or drainage water in loamy or sandy soil more than that of Nile water at high level of soil moisture content 80% of field capacity moreover seedlings planted in sandy soil and irrigated with municipal waste water had a great values more than the plants cultivated in loamy soil but irrigated with Nile water, this fact exhibited that, using municipal wastewater in irrigation ameliorated the properties and increased some micro elements in sandy soil.

Copper (Cu) and Cobalt (Co) content in tissues of plants i.e roots ,stems and leaves were found as traces

specially in the roots accompanied with municipal wastewater irrigation.

Generally, it can be observed that the values of Zn, Mn, Fe and Pb in roots and stems content as micro and heavy metals were the highest in the seedlings irrigated by municipal wastewater or drainage water ,thus it can be used the trees as filtrates to overcome heavy metals from soils that being irrigated with municipal or drainage water.

Effect of different water resources irrigation and soil moisture content on physical and chemical properties of two used soil types cultivated with *cupressus sempervirens* or *Albizzia lebbeck* seedlings for one year at the end of experiment.

1-Physical properties

Organic matter and field capacity% increased in loamy or sandy soil owing to the frequency irrigation with municipal wastewater compared to those irrigated with drainage or Nile water ,while $CaCO_3$% increased in drainage water specially at 80% soil moisture content

2- chemical properties

1- soil reaction (P^H) increased in both soils as a result to irrigation with drainage water and it decreased with municipal wastewater in particular at high soil moisture content and it is beneficial in nutrients uptake.

2- The salinity (E C) in two soils decreased with Nile water irrigation while it raised up in drainage water .The municipal wastewater was in between specially at 80% of field capacity.

3- Ca^{++} and Na increased in two soil types irrigated with drainage water at high level of soil moisture content (80% of field capacity) more than that irrigated with Nile or municipal wastewater while Mg^{++} and K increased with municipal wastewater .

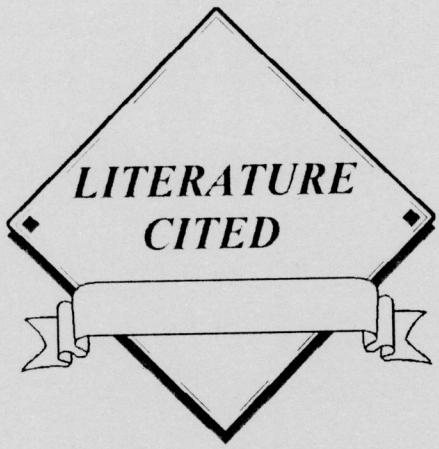
4- $Hco3^{-}$,Cl^{-} and So_4 increased in loamy or sandy soil in response to irrigation with drainage or municipal wastewater at 60 or 80% soil moisture content comparing with Nile water under the same conditions.

5- Total soluble N and P % exceeded in loamy or sandy soil irrigated with municipal or drainage water at 80 or 60% soil moisture content more than Nile water .

6- Micro and heavy metals i.e Fe, Zn, Mn, Cu,Co and Pp exceeded in both soils irrigated with municipal or drainage water more than Nile water .However those concentrations are n -201- red as toxicity for plants.

RECOMONDATION

The results of this study may draw the attention of sizable benefits to using municipal and drainage water in irrigation the forest trees to save the fresh water for the edible crops.


LITERATURE
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