

Salahaddin University -Erbil

College of Agricultural Engineering Sciences

Department of Forestry

Student research project – Stage 4th



Tolerance of *Cupressus sempervirens* L. seedlings to biotic and environmental factors in different soil media.

By

Shawgar Ali Omar

Supervised by

Dr. Abdulbaset M. Amin

Mr. Rushdy R. Aziz

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APPROVAL SHEET

This undergraduate thesis entitled Tolerance of(*Cupressus sempervirens* L. seedlings to biotic and environmental factors in different soil media.) prepared and submitted to the department of Forestry by (Shawgar Ali Omar) in partial fulfillment of the requirement for the degree of Bachelor of Science in Agricultural Engineering Sciences, is recommended for acceptance and approval for evaluation

Abstract

The study will be conducted from the early November 2021 to the April 2022 inside and outside plastic house that belongs to department of Forestry, Agricultural Engineering Sciences, Salahaddin University-Erbil. In this experiment divers factors related to the growth of *Cupressus sempervirens* L. seedlings were examined.

The main objective of this study was to determine the effect of different soil media (Forest soil, Peatmoss, Forest soil with Peatmoss) and biotic, environmental factors (inside and outside plastic house) on the growth of *Cupressus sempervirens* L. seedlings.

At the beginning of the experiment, stem height (cm), stem diameter (mm). number of branches/plant were and recorded. Light traps, Bait traps, Collecting specimen of infested trees, Collect, fixing insect samples, Diagnosis and classification of insects samples, Determine the infestation percentage of infested trees with insects in studied areas.

At the end of the study the mentioned Parameters were re-measured to find out stem height increment (cm), stem diameter increment (mm), number of branches/plant as indicator of seedling growth.

The study applied by Factorial Completely Randomized Design (F-CRD) with four replications per treatment, biotic, and two factors (environmental condition and soil media), and data of studied parameters were analyzed using two-way analysis of variance (ANOVA); Duncan test was used to separate means that were significant at (5%) by using SPSS version 26.

Results showed that, the interaction among environmental condition (outdoor) and growth media (forest soil) led to a significant increase in stem height of *Cupressus sempervirens* seedlings.

On the other hand, the effects of environmental condition (outdoor and indoor) and growth media (forest soil , peatmoss, forest soil with peatmoss), were non significant on vegetative growth characteristics (stem height, stem diameter, number of branches) of *Cupressus sempervirens* seedlings.

According to the above results that the use of interaction between environmental condition (outdoor) with growth media (forest soil), it gave better results for growth of *Cupressus sempervirens* seedlings.

1.Introduction

Italian cypress (*Cupressus sempervirens* L.) which belongs to the cupressaceae family, evergreen, coniferous tree, up to (25 m) highy, native to the Mediterranean region. The mean annual temperature is over (10°C)and the minimum is (-15°C), it grows in a Mediterranean climate with (300-1.400 mm) annual rainfall, as it can tolerate poor, barren and superficial soils, and is strongly wind and drought-resistant (Goor and Barney,1976).

The common variety with spreading branches, *C. sempervirens* var. *horizontalis* is recommended for planting in mountainous areas with at least (400 mm) rainfall, this is the preferred variety for windbreaks. But the cultivated variety with fastigiated branches, *C. sempervirens* var. *pyramidalis* is an ornamental tree commonly planted in cemeteries, it is a characteristic tree of the Landscape in many Mediterranean countries (Goor and Barney, 1976).Flowering time is in February to April, depending of the locality, The seeds ripen in September/october , it produces good seed crops almost annually, with about (100,000 -160,000 seeds Per kg), Average germination is (30-40 Percent), Propagated by seed and pollination by winds (Roitzsch, 1969),

Seedling production with a high quality and healthy depend on biotic and a biotic factors, environmental factors is one of the most important factors that improves the plant growth (kozlowski and Pallardy, 1997). The tree is mainly used as an ornamental tree due to its conical crown shape, but it can also be used for timbers, cypress has proved to be very suitable as a good species for reforestation (Bagnoli *et al.*, 2009). The wood of cypress is soft, and its valuable wood, cypress wood is used

for carpentry, windows door frames, Poles and roofing rafters and cloches chests (Goor and Barney, 1976).

Therefore, the main objectives of this study are to determine the effect of different soil media and biotic, environmental factors on the growth of *Cupressus sempervirens* L. seedlings.

2. Materials and Methods

2.1. study location

The study will be conducted from the early November 2021 to the late April 2022 inside and outside plastic house that belongs to department of Forestry, Agricultural Engineering Sciences, Salahaddin University-Erbil

2.2. Source of seedlings

The source of *Cupressus sempervirens* seedlings were obtained and will be provided by director of engineering Parks, where the seeds of seedlings planted in the nursery seed bed during the January 2021 under plastic house conditions.

2.3. Experimental Design

This experiment was designed by the use of Factorial Completely Randomized Design (F-CRD) with two factors. The first factor is two environmental condition inside and outside plastic house. The second factor is three different soil media (Forest soil- Peatmoss - Forest soil with Peatmoss 1:1), and each treatment replicates four times, so the total experimental unit equal 24 and each experimental unit contains only one of *C.sempervirens* seedling.

2.4. Study parameters

2.4.1. Survival percentage

At the end of experiment survival percentage will be measured as following equation:

Survival percentage = Remained number of seedlings at the end / Totat number of seedlings at the begning x 100

2.4.2. Growth parameters

At the beginning of the experiment, plant height (cm), stem diameter (mm). number of branches/plant were and recorded. Light traps, Bait traps, Collecting specimen of infested trees, Collect, fixing insect samples, Diagnosis and classification of insects samples, Determine the infestation percentage of infested trees with insects in studied areas.

At the end of the study the mentioned Parameters were re-measured to find out plant height increment (cm), stem diameter increment(mm), number of branches/plant, Root length (cm) and number of root/plant as indicator of seedling growth.

2.4.3. Biomass parameters

At the end of experiment, the biomass Parameters the Shoot dry weight (g), Root dry weight (g)and total dry weight (g) were measured after separating the seedlings into their components and dried in a furnace at 80c until the constant weight obtained (Sherzad *et al.*, 2017).

2.5. Data Analysis

Data of studied parameters were analyzed using two-way analysis of variance (ANOVA); Duncan test was used to separate means that were significant at (5%) by using SPSS version 26

3. Results and Discussion

3.1. Effect of environmental conditions on vegetative growth (stem height) of *Cupressus sempervirens* seedlings.

Table (1) showed that no significant effects of environmental conditions on (stem height) of *Cupressus sempervirens* seedlings.

Table (1): Effect of environmental conditions on stem height.

Environmental conditions	Stem height (cm)
Outdoor	9.13 a
Indoor	8.75 a

The means with the same letters in each column indicates to non significant differences at (5 %) level of probability by Duncan's Multiple Range Test.

3.2. Effect of environmental conditions on vegetative growth (stem diameter) of *Cupressus sempervirens* seedlings.

Table (2) showed that no significant effects of environmental conditions on (stem diameter) of *Cupressus sempervirens* seedlings.

Table (2): Effect of environmental conditions on stem diameter.

Environmental conditions	Stem diameter (mm)
Outdoor	1.06 a
Indoor	2.06 a

The means with the same letters in each column indicates to non significant differences at (5 %) level of probability by Duncan's Multiple Range Test.

3.3. Effect of environmental conditions on vegetative growth (number of branches) of *Cupressus sempervirens* seedlings.

Table (3) showed that no significant effects of environmental conditions on (number of branches) of *Cupressus sempervirens* seedlings.

Table (3): Effect of environmental conditions on number of branches.

Environmental conditions	Number of branches /plant
Outdoor	8.15 a
Indoor	13.15 a

The means with the same letters in each column indicates to non significant differences at (5 %) level of probability by Duncan's Multiple Range Test.

3.4. Effect of growth media on vegetative growth (stem height)) of *Cupressus sempervirens* seedlings.

Table (4) showed that no significant effects of growth media on (stem height)) of *Cupressus sempervirens* seedlings.

Table (4): Effect of growth media on stem height.

Growth media	Stem height (cm)
Forest soil	11.94 a
Peatmoss`	7.25 a
Forest soil : Peatmoss	7.63 a

The means with the same letters in each column indicates to non significant differences at (5 %) level of probability by Duncan's Multiple Range Test.

3.5. Effect of growth media on vegetative growth (stem diameter)) of *Cupressus sempervirens* seedlings.

Table (5) showed that no significant effects of growth media on (stem diameter)) of *Cupressus sempervirens* seedlings.

Table (5): Effect of growth media on stem diameter.

Growth media	Stem diameter (mm)
Forest soil	1.56 a
Peatmoss`	1.15 a

Forest soil : Peatmoss	1.97 a
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The means with the same letters in each column indicates to non significant differences at (5 %) level of probability by Duncan's Multiple Range Test.

3.6. Effect of growth media on vegetative growth (number of branches) of *Cupressus sempervirens* seedlings.

Table (6) showed that no significant effects of growth media on (number of branches) of *Cupressus sempervirens* seedlings.

Table (6): Effect of growth media on number of branches.

Growth media	Number of branches /plant
Forest soil	11.5 a
Peatmoss`	12.5 a
Forest soil : Peatmoss	8.8 a

The means with the same letters in each column indicates to non significant differences at (5 %) level of probability by Duncan's Multiple Range Test.

3.7. Interaction effects of environmental conditions and growth media on vegetative growth (stem diameter) of *Cupressus sempervirens* seedlings.

The result in table (7) showed that the interaction of environmental conditions and growth media have no significant effects in (stem diameter) of *Cupressus sempervirens* seedlings.

Table (7): Interaction effects of environmental conditions and growth media on stem diameter.

Environmental conditions	Growth media	Stem diameter (mm)
Outdoor	Forest soil	1.18 a
	Peatmoss`	1..23 a
	Forest soil : Peatmoss	1.38 a
Indoor	Forest soil	1.94 a
	Peatmoss`	1.68 a
	Forest soil : Peatmoss	2.56 a

The means with the same letters in each column indicates to non significant differences at (5 %) level of probability by Duncan's Multiple Range Test.

3.8. Interaction effects of environmental conditions and growth media on vegetative growth (number of branches) of *Cupressus sempervirens* seedlings.

The result in **table (8)** showed that the interaction of environmental conditions and growth media have no significant effects in (number of branches) of *Cupressus sempervirens* seedlings.

Table (8): Interaction effects of environmental conditions and growth media on number of branches.

Environmental conditions	Growth media	Number of branches /plant
Outdoor	Forest soil	12 a
	Peatmoss`	7.5 a
	Forest soil : Peatmoss	5.8 a
Indoor	Forest soil	11 a
	Peatmoss`	17.5 a
	Forest soil : Peatmoss	11.75 a

The means with the same letters in each column indicates to non significant differences at (5 %) level of probability by Duncan's Multiple Range Test.

3.9. Interaction effects of environmental conditions and growth media on vegetative growth (stem height) of *Cupressus sempervirens* seedlings.

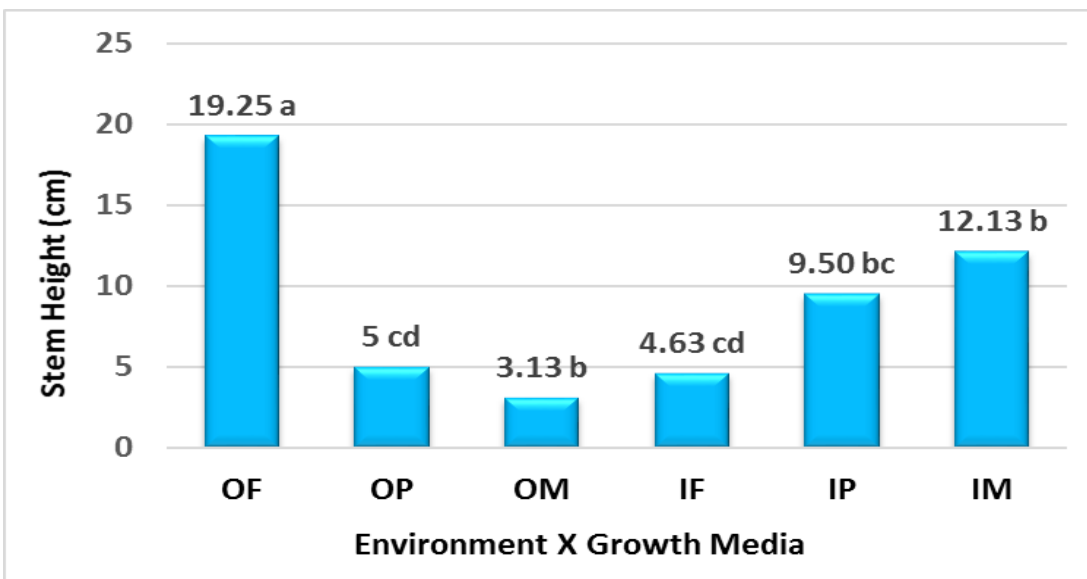
The result in **figure (1)** showed that the interaction environmental conditions and growth media have significant effects in (stem height) of *Cupressus sempervirens* seedlings.

The maximum value of stem height (**19.25 cm**) was observed from the interaction of environmental conditions (outdoor) and growth media (forest soil) is the best

interaction in experiment, while the minimum value of stem height (**3.13 cm**) was recorded from the interaction of environmental conditions (outdoor) and growth media (peatmoss).

The highest value of stem height (12.13 cm) was observed from the interaction of environmental conditions (indoor) and growth media (forest soil and peatmoss), while the lowest value of stem height (4.63 cm) was obtained from the interaction of environmental conditions (indoor) and growth media (forest soil).

Figure (1): Interaction effects of environmental conditions and growth media on stem height of *Cupressus sempervirens* seedlings.



OF: outdoor forest soil, OP: outdoor peatmoss, OM: outdoor forest soil with peatmoss, IF: indoor forest soil, IP: indoor peatmoss, IM: indoor forest soil with peatmoss

1. us better growth results for *Cupressus sempervirens* seedlings.

Effect of biotic factor on growth (*cupressus sempervirens*) seedlings.

Seirdium cardinale – canker of cypress

This disease commonly called cypress canker was reported for the first time in California in 1928 on cupressus macrocarpa

1- *Cinara cypress* (cypress aphid)

This is a bark aphid of the Lachnidae family which causes. And desiccation on the crowns of cypress tree following the sap sucking action performed by the whyless individual of the aphids responsible for the damages have a body that ranges from 2.7 to 3.2 mm in length, is a brownish in colour, and is endowed with numerous long bristles

Ones.

2- *Trisetacus junipers* (eriophydmite)

This pest has been reported on Cypress trees in world. The presence of this mite is associated with alternation such as swelling of the base of the leaf, the death of apical shoots due to drying out

3- *Caliciopsis nigra*

This reported for the first time in Italy in 1980.

It is Ascomycete fungus that is much more active on juniper, causes the Formation of cracked spherical shaped tumours have a diameter of only a few centimeters

Pseudo coccuses sp.

Lynraulria dispar (tussock moth or gypsmoth)

Longistigma caryae (giant bark aphid)

Asterolecanium putneanum (holly pitscale).

4. Conclusions and Recommendations

4.1. Conclusions

From the results of this study, the following conclusions could be drawn:

1. Effects of environmental condition (outdoor and indoor) was non significant on vegetative growth characteristics (stem height, stem diameter, number of branches) of *Cupressus sempervirens* seedlings.
2. Effects of growth media (forest soil , peatmoss, forest soil with peatmoss), was non significant on vegetative growth characteristics (stem height, stem diameter, number of branches) of *Cupressus sempervirens* seedlings.

3. The interaction among environmental condition (outdoor) and growth media (forest soil) led to a significant increase in stem height of *Cupressus sempervirens* seedlings.
4. Applications of interaction between environmental condition (outdoor) with growth media (forest soil), it gave better results for growth of *Cupressus sempervirens* seedlings.

4.2. Recommendations

Several recommendations could be made based on our study:

2. It is preferred to use the interactions between environmental condition with different growth media, to give better results for growth of *Cupressus sempervirens* seedlings.
3. Study of different soil media on growth of *Cupressus sempervirens* seedlings.
4. It is preferable that the date of the experiment be in the spring season.

5. If the end date of the experiment was at the end of April, It was giving us better growth results for *Cupressus sempervirens* seedlings.

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