



## Disease of forest tree seedlings (Article Review)

Muhannad Hamid Younis Al-Obaidi<sup>1</sup>  
[Muhannad.Hamid@uomosul.edu.iq](mailto:Muhannad.Hamid@uomosul.edu.iq)

Mohammed Sameer Idrees Alsawaf<sup>2</sup>  
[mohamed.alsawaf@uomosul.edu.iq](mailto:mohamed.alsawaf@uomosul.edu.iq)

Faiza Ali Rashid<sup>3</sup>  
[faiza\\_ali@uomosul.edu.iq](mailto:faiza_ali@uomosul.edu.iq)

Anwer Noori Mohammed<sup>4</sup>  
[anwer\\_noori@uomosul.edu.iq](mailto:anwer_noori@uomosul.edu.iq)

<sup>1,2,3,4</sup> Department of Forest Science, College of Agriculture and Forestry, University of Mosul, Mosul, Iraq.

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### Abstract

Nursery are one of the most important reasons for the success and progress of the agricultural renaissance, as it depends on the application of various advanced scientific methods and the use of Nursery of various types in the propagation and production of forest seedlings and others. A greenhouse is a place where small plants are produced to plant them in gardens, fields, and trees. The plants produced by the greenhouse vary between ornamental plants and flowers, fruit plants, vegetables, and forest trees, and Nursery are often held for commercial purposes. The incidence of Nursery diseases increases from what happens in the forests through the increase in service operations and attention to irrigation and fertilization and not sterilizing the soil and seeds, as this appears on the resulting seedlings, and the seedlings resulting from Nursery can be a source of transmission of infection when artificial afforestation is performed. Therefore, we must monitor and ensure the safety of the productive seedlings. The disease of Root rot and seedling disease Damping-off are one of the most critical diseases found in forest Nursery and the most widespread throughout the hot and cold world. As these diseases affect many forest plants, it is preferable to study them to avoid infecting forest species through the correct management of these Nursery by sterilizing the soil and seeds, as well as regular irrigation and correct fertilization.

**Keywords:** Nursery, Forest diseases, Fungus, Root rot, Damping-off, seedlings

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**Correspondence Author:** Muhannad Hamid Younis Al-Obaidi - [Muhannad.Hamid@uomosul.edu.iq](mailto:Muhannad.Hamid@uomosul.edu.iq)

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## Introduction

Forests are one of the most critical, complex, and most connected to human life-developed ecosystems due to their enormous genetic savings [1]. In addition to the several economic products they offer, such as wood, aromatic, medical, fodder, and foodstuffs, and to their benefits in tourism and recreation as well as their environmental benefits such as stabilizing carbon dioxide, releasing oxygen, and raising the relative humidity that softens the climate by mitigating the severity of heat, breaking the intensity of the winds, and it also contributes to the formation of soils and preserving them from erosion, and improving their properties by increasing the organic matter in them, as well as contributing to reducing air pollution and noise in cities, and are habitats for many living organisms represented by plants, animals, and microorganisms up to humans [2] ; [3]. Forests cover approximately 30% of the Earth's surface and are a reservoir of about 45% of the Earth's carbon, i.e., a close link between forests and the global climate [4].

Forest tree seedlings are exposed to many diseases resulting from various biological or abiotic pathogens, the most important of which are fungi that lead to root rot. Seedling falls, such as *Fusarium sp.*, *R. solani*, and *M. phaseolina*, *Cylindrocarpon tenue*, *F. oxysporum*, *Fusarium sp.*, *M. phaseolina*, *Microdochium bolleyi*, *Mucor sp.*, *Pestilopsis funera*, *Phoma pomorum*, and *Pythium sp.* *Rhizoctonia sp* cause significant economic losses. [5]; [6]; [7].

Although the types of pathogens can reach for each plant type, we find that these diseases are limited in prevalence in some Arab countries due to the lack of appropriate environmental conditions for the occurrence of infection, especially temperature, air humidity, soil moisture, and other environmental factors. These environmental factors are of great importance in the occurrence of infection and the development of the pathogen .

Therefore, we must closely monitor and ensure the safety of the productive seedlings, as we will focus in this article on fungal greenhouse diseases, the most important of

which are root rot disease and Damping-off seedlings and their causes.

## Plant pathogenic fungi

Fungi are widespread organisms that are eukaryotic and without of chlorophyll, and their bodies are made up of a single cell or are multicellular and form branched, divided, fungal filaments called mycelium. These fungal filaments grow to be mycelium [8]. Fungi feed by absorption and by one of the methods, saprophytism, parasitism, or symbiosis with other organisms, resulting from a multiplicity of ways called heterotrophic Plant-associated fungi consist of a large group that forms two types of relationships with plants: positive relationships, as in mutually beneficial relationships in lichens (Lichins) and mycorrhiza, or negative relationships through which fungi attack the plant, causing multiple damages and leading to losses in the quality and quantity of production as well as causing the death of plants [9].

[10] pointed out that the pathogenic fungi of the plant It caused many of infections, and these fungi are either found inside the seeds or on their surface and in the air and water and the fungi are static reproductive structures resistant to environmental conditions such as chlamydo spores as well as the formation of sclerotia.

## The importance of seedling damping-off and root rot diseases

Root rot diseases and the Damping off are among the most prominent diseases that cause significant economic losses in Nursery and the widest spread Wide spread in the world, and their causes attack hundreds of plant species, including field crops, vegetables, fruits, ornamentals and forests [11]. The damage is not limited to Damping off only, but the causes may continue to the post-transfer stages until the late stages of the life of trees [12]; [13].

Most of the pathogens of root rot and Damping off are fungal pathogens called soil-born fungi [14]. and soil fungi are one of the most dangerous and most harmful fungi, as they are found far from human perspective and usually show their pathological symptoms

on the root system completely [12] and what increases their danger is that many of them have a wide family range, and they can remain in the soil and the remnants of infected plants for a long time [12] ; [13] Their ability to take jungles and other Alternative host hosts shelter them in the absence of the primary host, as well as ability to form static reproductive structures that have the ability to survive in the soil for a number of years resistant to inappropriate environmental conditions, as well as their high ability to produce reproductive units in large numbers within a short period of time, and it is also a multicyclic pathogen (Multi cyclic diseases), meaning that it produces more than one generation during a season Injury The risk of the disease increases when planting soils infested with sensitive plants because it leads to an increase in the potential of inoculum of these pathogens, as well as the fact that the pathogens of this disease affect plants in different stages of growth, as the source of fungal infection is soil [15] .

Globally, the importance of root rot disease and Damping off is highlighted through the abundance of studies that dealt with it, as it is one of the most studies compared to the rest of the studies that dealt with other diseases and at the level of most of the studied crops, whether they are field [16]; [17] or vegetables [18]; [19] and in the field of forestry [20].

Locally, several studies have emerged on root rot disease and Damping off, including field [21] or vegetables [22] fruit and ornamental [23] In the field of forestry, studies have dealt with root rot disease of *Pinus brutia* seedlings, Cupressus and casuarina [5] rotting of the roots of Thuja [23], and root rot and Damping off of Pinus brutia and Thuja Orientalis and Cupressus, and Cupressus arizonician. [24]; [25].

### Symptoms of root rot

Symptoms of root rot appear in the root hairs, and sometimes the injury extends to the crown area or the sub-roots and the main in the form of sores or bronze spots Lession, surrounding the ulcers in the entire crown area sometimes, as well as the symptoms are yellowing of the leaves of plants, especially the old ones, wilting and stiffness, some of them Figure (1), root rot and stem bases and brown color. [26]. The symptoms of root and stem rot disease also appear at the beginning of the infection in the form of a slight red discoloration that later becomes dark red to brown to cover the root and stem below the soil surface, or symptoms of the disease appear in the form of longitudinal cracks along the primary root with the death of small lateral roots and cracking of the stem [27]; [28]



Figure (1) Symptoms of root rot on pine spp. shoots

### **Root rot pathogens**

There are many common fungi that cause root rot, the most important of which are: Pythium, Fusarium, R. Solani and Boyce [29]; [30]; [31]. The disease is sometimes caused by other groups of fungi: Cylindrocladium, Botrytis, Sphaeropsis [32] Boyce Sclerotium, Sclerotina, Cylindrocarpon, Macrophomina Phoma spp. [31], F. solani [33]; [19]. Moreover, Cladosporium cladosporioides and these fungi are found in soil and organic matter or are carried by seeds Soilborne [30]; [14]. Evaporated soils can be re-contaminated by these causes by contaminated water [34].

### **Dissemination of root rot pathogens**

Periodic isolation of root rot pathogens has shown global prevalence, with several pine seedling species associated with Fusarium spp as a pathogen in Brazil ([35] and Finland [36]. On Cupressus seedlings, Fusarium has been recorded as a root rot cause of Cupressus arizonica seedlings [37]. F. equiseti is a fungus recorded on Pinus and Cupressus seedlings [38]. F. solani is a widespread pathogen, as it has been recorded on several Pinus species, causing black rot [39]. F. solani is also isolated from root rot pathogens in Pakistan [33].

M. phaseolina is a dangerous cause of Pinales greenhouse in the USA, such as California [40], Florida [41], and Sardinia [42]. and Australia [43]. R. solani is also a dangerous cause in forest Nursery, where it has been recorded on Pinus nuts in Australia [34], Florida [41], the island of Hawaii [44] and Canada [45]. Fusarium, R. solani, sp. Alternaria and others are associated with the branches and roots of Juniperus trees in the

forests of the Asir region [46]. Moreover, in India, isolated fungi. F. oxysporum, R. solani, and M. phaseolina from blue pine root [20].

### **Symptoms of seedling Damping-off**

The causes of seedling death diseases show varying symptoms depending on the age of the plant and the first type of seed rot (seed decay), where damage occurs to the seeds after planting. Before germination, where the causes attack the embryo and the stored parts of the seeds, causing its death and damage, and before they appear above the surface of the soil, the causes attack the embryonic peduncle and then rot and die under the surface of the soil, where it is called pre - emergence damping off, Symptoms appear during these two stages in the shrines in the form of seedling-free spots Figure (2).

The third type of symptom is the death of seedlings after appearing above the soil surface post -emergence damping off Post-Figure (3) where the seedlings are infected in the area of the fetal peduncle at the surface of the soil. Hence, the area of injury becomes juicy and unable to carry the Damping off [47], and this is the name of the disease Damping off and moves from one peduncle to another above the surface of the soil adjacent to or irrigation water if the conditions of humidity and temperature are suitable for the growth of the fungus [27] The root system may be damaged entirely. However, the vegetative system of the plant does not show any apparent symptoms at first, and the area of infection may sometimes appear tapering due to drying out of the juice cells by fungal enzymes. [48].



Figure (2) It represents the death of seedlings above the soil surface Figure



(3) Spots free of seedlings

### Pathogenesis of Damping off

These diseases are caused by several fungi, the most important of which are:

- *Fusarium* sp. From fungi Deuteromycota
- *Rhizoctonia* sp. From fungi Deuteromycota
- *Pythium* sp. From the fungus Oomycota
- *Phytophthora* sp. From the fungus Oomycota

The periodic isolation of the causes of seedling death showed the extent of the global spread, as the seedlings of black pine *Pinus nigra* were isolated from three species of the genus *Fusarium* and three species of the genus *Pythium*, as well as the fungus *Rhizoctonia solani* and the fungus *Botrytis cinerea*. It also isolates three fungi genera - *Fusarium*, *Pythium*, and *Alternaria* - from the seedlings of *Pinus resinosa* pine infected with seedling fall disease. He isolated the fungi *Rhizoctonia solani*, *Fusarium oxysporum*, *Pythium* spp, and *Cylindrocarpon* sp from pine and thorn seedlings.

*Fusarium solani* was isolated from the roots of *Pistacia vera* seedlings ([49]. *Fusarium solani*, *Rhizoctonia solani*, *Macrophomina phaseolina*, and *Pythium butleri* were isolated from *Eucalyptus* seedlings, *Fusarium acuminatum*, *Fusarium oxysporum* and *Fusarium solani* from the seedlings. [19]; [48]. All these genera are water-loving soil fungi; therefore, the

prevalence of seedling death disease increases when planting in heavy soil or when the amounts of irrigation water increase.

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## أمراض شتلات أشجار الغابات

محمد سمير أدریس الصواف<sup>2</sup>

[mohamed.alsawaf@uomosul.edu.iq](mailto:mohamed.alsawaf@uomosul.edu.iq)

أنور نوري محمد<sup>4</sup>

[anwer\\_noori@uomosul.edu.iq](mailto:anwer_noori@uomosul.edu.iq)

مهند حامد یونس العبيدي<sup>1</sup>

[Muhannad.Hamid@uomosul.edu.iq](mailto:Muhannad.Hamid@uomosul.edu.iq)

فانزة علي رشيد<sup>3</sup>

[faiza\\_ali@uomosul.edu.iq](mailto:faiza_ali@uomosul.edu.iq)

1، 2، 3، 4 قسم الغابات، كلية الزراعة والغابات، جامعة الموصل، الموصل، العراق.

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### الملخص

تعد المشاتل من أهم أسباب نجاح وتقدم النهضة الزراعية، إذ تعتمد على تطبيق الأساليب العلمية المتطورة المختلفة، واستخدام البيوت المحمية بأنواعها المختلفة في مجال إكثار وإنتاج شتلات الغابات وغيرها، والمشتل هو المكان الذي ينتج فيه نباتات صغيرة بقصد غرسها في الحدائق والحقول والمشاجر، وتتنوع النباتات التي ينتجها المشتل ما بين نباتات زينة وأزهار، ونباتات فاكهة وخضروات وأشجار الغابات، وغالباً ما تقام المشاتل لأغراض تجارية. تزداد الإصابة بأمراض المشاتل عما يحدث في الغابات من خلال زيادة عمليات الخدمة والاهتمام بالري والتسميد وعدم تعقيم التربة والبذور، إذ يظهر ذلك على الشتلات الناتجة، ويمكن أن تكون الشتلات الناتجة من المشاتل مصدراً لنقل العدوى عند إجراء التشجير الاصطناعي، ولذلك يستوجب علينا المراقبة والتأكد من سلامة الشتلات المنتجة ويعتبر مرض تعفن الجذور (Root rot) ومرض رقود البادرات (Damping-off) من أهم الأمراض المتواجدة في مشاتل الغابات ووسعها انتشاراً في جميع أنحاء العالم الحارة والباردة. إذ تصيب هذه الأمراض عدداً كبيراً من النباتات الغابية ولذلك يفضل دراستها لتفادي إصابة الأنواع الغابية بها من خلال الإدارة الصحيحة لهذه المشاتل بتعقيم التربة والبذور وكذلك الري المنتظم والتسميد الصحيح.

**الكلمات المفتاحية:** مشاتل، أمراض غابات، فطريات، تعفن جذور، سقوط بادرات.