

Biotic and Abiotic Factors that Affecting Forest Ecosystem

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EDITORIAL

Forest pathology is the study of biotic and abiotic diseases, especially fungal pathogens and their insect vectors that impair the health of a forest ecosystem. It is a forestry and plant pathology subfield.

Forest pathology is a component of a larger forest protection strategy. In 2015, insects, diseases, and severe weather events destroyed over 40 million hectares of forest, primarily in the temperate and boreal zones.

Abiotic factors

Moisture challenges including drought, winter drying, and waterlogging caused by excess or lack of precipitation such as hail, snow, and rain are only a few of the abiotic factors that impact the health of a forest. Wind throw (the uprooting or breaking of trees owing to heavy winds) produces an obvious and direct loss of stability to a forest or its trees, making it an essential abiotic component. A forest is frequently affected by both abiotic and biotic forces at the same time. When the wind speed reaches 80 km/h, many trees with root rot (caused by a pathogen) are likely to be thrown. To avoid causing damage to healthy trees, higher wind speeds are required.

Forest health is also impacted by fire, whether caused by humans or lightning, and many other abiotic elements.

Man's actions often influence a forest's susceptibility to both abiotic and biotic damage. Heavy machinery, for example, can affect soil composition.

- Deficiencies, chemicals, and nutrient imbalances (toxic salts, herbicides, air pollutants).
- Stem flow can concentrate dry deposits, which can damage nearby plants due to soil acidity.
- Temperature.

Biotic factors

Plants, animals, and microorganisms are examples of biotic factors in the environment. Once living parts, such as dead leaves on the forest floor, are also biotic elements. Abiotic

variables, such as sunshine, temperature, and water, are nonliving characteristics of the environment. Soil is a key abiotic factor.

Mammals, nematodes, and insects, especially bark beetles, may browse. Browsing can be avoided with the use of tree shelters. Humans and other creatures prey on trees, and this is clearly pathological to the forest on unsustainable, especially industrial dimensions. However, due to limited biodiversity and a reduced potential for community resilience, poorly planned yet conventionally replanted (post-cut) forest plantations are often monocropped and very susceptible to subsequent insect or fungus infection.

Forest entomology is a subset of forest pathology. Forest entomology is the study of all insects and arthropods that live in and interact with forest ecosystems, such as mites, centipedes, and millipedes. Forest entomology also includes the control of insect pests that cause tree degeneration, defoliation, crown die back, or death.

There is a section dedicated to fungal tree pathogens and illnesses.

- Phytophthora
- Bacteria
- Phytoplasmas
- Viruses
- The economic losses caused by tree diseases are projected to be greater than the combined losses caused by insects and fire.
- Plant community's composition, structure, and dynamics are frequently influenced by diseases.
- Some illnesses aid in the creation of wildlife friendly habitats and nesting places.
- Forest diseases are intricately linked to issues like forest decline and forest health.

Pathology detection

This can be done by machinery or dogs sniffing the trees, similar to how truffles are detected. It can also be done by monitoring and identification, which can be done through tree clinics, arborists, or even non-experts through citizen science.

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Received: 07-Jun-2022, Manuscript No. JFOR-22-17817; **Editor assigned:** 10-Jun-2022, PreQC No. JFOR-22-17817 (PQ); **Reviewed:** 24-Jun-2022, QC No. JFOR-22-17817; **Revised:** 12-Sep-2022, Manuscript No. JFOR-22-17817 (R); **Published:** 19-Sep-2022, DOI: 10.35248/2168-9776.22.11.325

Citation: Arnold H (2022) Biotic and Abiotic Factors that Affecting Forest Ecosystem. J For Res. 11:325.

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When assessing pathologies, it's crucial to keep the illness triangle in mind. Confirmation of Koch's postulates can be used to demonstrate the presence of suspected active agents.

Hazard trees

The likelihood of physical injury or property loss as a result of tree failure. Hazard includes not only the state of the tree, but

also the possible target. For decision making, rating systems, methods, and standards have been established, but knowledge, judgment, and experience are crucial.