

# The Impact of Forest Pest and Disease Control on Forestry Ecological Environment Construction

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**Abstract:** As an essential component of terrestrial ecosystems, forests, as natural resources, have significant impacts on climate regulation and human living environments. However, in reality, due to various factors, forest pests and diseases have become increasingly common, causing considerable damage to forest resources and greatly affecting the ecological environment of forestry. Therefore, effective forest pest and disease control play a crucial role in promoting sustainable development of the environment. Based on this, this paper first provides a brief overview of forest pest and disease control, followed by an introduction to its significance for the ecological environment of forestry. Subsequently, the existing issues in forest pest and disease control are thoroughly analyzed, and several control suggestions are proposed based on these findings, aiming to better mitigate forest pests and diseases and provide reference for forestry ecological environment construction and conservation.

**Keywords:** forest pests and diseases; control; forestry ecological environment; impact

In modern society, forests, as natural resources, play a vital role not only in aspects such as water conservation, climate regulation, windbreak, and soil protection but also as natural barriers with close connections to national economic development and ecological security, possessing high economic and social value. However, in recent years, due to human activities and climate-related factors, forest pests and diseases have become more prevalent, emerging as high-risk factors confronting the ecological environment of forestry, seriously threatening the ecological balance of forests. Therefore, one of the primary tasks in forestry ecological environment construction is to effectively control forest pests and diseases. Under the call of President's concept of "Lucid waters and lush mountains are invaluable assets," China's attention to forest pest and disease control has been increasing, and a series of measures have been implemented. However, there are still many issues in forest pest and disease control during the current forestry ecological environment construction, which should be addressed through rational measures. Hence, this paper focuses on exploring the impact of forest pest and disease control on forestry ecological environment construction, aiming to understand the importance of forest pest and disease control and promote the development of forestry ecological environment construction more effectively.

## 1. Overview of Forest Pest and Disease Control

### 1.1 Overview of Forest Pests and Diseases

In the present world, forest pest and disease control has become a critical measure for forestry ecological environment construction and forest resource conservation. Over the past few years, forest pests and diseases have not only become more common but also expanded their occurrence range and increased in severity. They exhibit characteristics of persistence, spatiality, dynamics, complexity, and diversity, making control efforts more challenging, requiring long-term and systematic measures. To date, there have been over 8000 recorded forest pests and diseases, with more than 200 of them being particularly common, such as tussock moths, boxwood powdery mildew, crape myrtle powdery mildew, boxwood webworm, cottonwood leaf beetle, and cherry scale insect<sup>[1]</sup>. Factors leading to forest pest and disease outbreaks mainly include the following two points:

a) Natural factors: Some pest and disease occurrences are natural results of forest ecosystem regulation. The complex interactions among various organisms in the forest create mutual constraints and interdependence, ensuring the stability of the ecosystem. Under mutual suppression in the ecosystem, some pest and disease damages remain relatively minor and can even promote forest ecosystem renewal<sup>[2]</sup>. Therefore, natural factors are not the primary cause of forest pest and disease

outbreaks; it is the influence of human factors that triggers severe pest and disease occurrences.

b) Human factors: Human activities are the primary causes of forest pest and disease outbreaks, particularly severe outbreaks. Human activities constantly affect and alter the natural environment throughout the process of survival and development. While some activities benefit the sustainable development of the ecological environment, most activities cause certain degrees of environmental damage<sup>[3]</sup>. For instance, during a long period in China's past, for the sake of economic development, there was a lack of environmental protection, resulting in extensive deforestation and serious damage to the forest ecological environment. This provided an environment conducive to various pests and diseases, leading to severe forest pest and disease outbreaks. Additionally, in artificial afforestation processes, inadequate planning and seedling cultivation methods, low-quality seedlings, and large-scale planting of monoculture forests can lead to low survival rates and weaker resistance of the planted trees, making them more susceptible to pests and diseases. Furthermore, many foresters have been using toxic and high-residue pesticides indiscriminately, leading to increased pest resistance and reduced effectiveness of traditional control methods, exacerbating pest and disease problems.

### ***1.2 Principles of Forest Pest and Disease Control***

During the process of forest pest and disease control, several principles should be followed:

a) Multi-dimensional control principle: As the types of forest pests and diseases become more diverse and complex, employing a single measure is unlikely to effectively control them. Therefore, a multi-dimensional control principle is necessary in the forest pest and disease control process, involving comprehensive exploration and the rational use of various control measures.

b) Ecological principle: The ecological principle emphasizes the application of appropriate biological control measures in line with the biological chain of the forest ecological environment. It emphasizes ecological adaptability and aims to find more reasonable ecological control measures based on the causes and mechanisms of pest and disease occurrences. By adjusting and optimizing the forest's ecological structure and utilizing interrelationships between organisms, pest and disease control can be achieved<sup>[4]</sup>.

c) Economic principle: The economic principle entails conducting empirical research by employing economic theories and models to analyze the economic effectiveness of relevant control measures. Based on considerations of forest economic benefits, the most cost-effective pest and disease control measures are chosen, achieving comprehensive control of pests and diseases.

d) Green and environmental protection principle: While chemical methods can achieve certain effects in forest pest and disease control, they also come with obvious drawbacks, such as further damaging the forest's ecological environment. Adhering to the green and environmental protection principle means applying biological methods for pest and disease control, minimizing the impacts of drug application on the forest's ecological environment, and achieving the goal of pest and disease control in tandem with protecting the forest's ecological environment.

## **2. The Significance of Forest Pest and Disease Control for Forestry Ecological Environment**

### ***2.1 Protecting Forestry Biodiversity***

In the process of forestry ecological environment construction, effective forest pest and disease control can reduce disturbances in afforestation, improve the quality of afforestation work, promote the development of forestry resources, and provide ample protection for forestry biodiversity. Currently, one of the main issues in the development of forestry resources is the continuous increase in the types of forest pests and diseases, with their frequency rising<sup>[5]</sup>. This has had significant negative impacts on the forestry ecological environment, even leading to the loss of some biological species. Therefore, implementing scientific forest pest and disease control can not only promptly manage the pests and diseases, reducing their potential harm to the forestry ecological environment but also eliminate them at the root, providing better protection for forestry organisms to prevent their diversity from being affected. Moreover, reasonable prevention and control of various forest pests and diseases, the formulation, and observation of corresponding control systems can provide a favorable environment for the survival and development of organisms in the forestry ecosystem, creating a better living space for various biological resources to grow healthily. This helps effectively break the deadlock in China's forestry ecological environment construction and better ensure forestry ecological diversity, providing

stronger guarantees for forestry ecological environment construction and optimization<sup>[6]</sup>.

## ***2.2 Improving Afforestation Quality and Efficiency***

Currently, in the process of forestry ecological environment construction, one of the main problems is that the efficiency and quality of afforestation are relatively low due to factors such as pests and diseases. Forest pests and diseases can cause considerable harm to the functioning of the forestry ecosystem, and if effective prevention and control measures are not taken, it can lead to a decline in the quality of afforestation work and a significant reduction in the quantity of forest resources. In this context, implementing scientific and rational measures for pest and disease control can not only ensure the sustainable development of forestry resources but also improve the quality of afforestation work. Moreover, enhancing the efficiency and quality of pest and disease control can also improve the efficiency of afforestation work, leading to effective improvement of the forestry ecological environment<sup>[7]</sup>. Therefore, effectively carrying out pest and disease prevention and control can clear obstacles in forestry ecological environment construction, promote the improvement of afforestation efficiency and quality, achieve good development results, and provide stronger support and guarantees for the sustainable development of the forestry ecological environment.

## ***2.3 Promoting the Healthy Development of Forestry Industry***

During the process of forest pest and disease control, relevant departments and personnel will recognize the importance of their work. While implementing pest and disease control measures, they will develop a correct awareness of afforestation and forest protection, which will be translated into subsequent work. This can provide stronger support for the efficient development of forestry and forestry ecological environment construction, promote continuous optimization and improvement of the forestry industry, and facilitate diversified development of the forestry industry. Additionally, in recent years, the central government has attached increasing importance to ecological and environmental protection, with General Secretary emphasizing the concept of "Lucid waters and lush mountains are invaluable assets" multiple times since the 18th National Congress. From various perspectives, forestry resources are renewable resources, and their rational development and utilization can not only drive regional economic development but also promote the renewal and replacement of the forestry ecological system. By balancing resource development, economic development, and environmental protection, it can promote the coordinated development of ecological, social, and economic benefits. However, to achieve these goals, it is necessary to promptly eliminate various adverse factors that may affect the stability of the forestry ecological system. Implementing effective forest pest and disease control is an important measure in this regard and has a significant impact on forestry ecological construction and the stability of the ecological system. In summary, effective forest pest and disease control can promote the healthy development of the forestry industry.

## **3. Analysis of Problems in Forest Pest and Disease Control**

### ***3.1 Outdated Concepts in Pest and Disease Control***

In the process of forest pest and disease control, to enhance the effectiveness of control efforts, it is essential not to overly focus on post-control measures but to emphasize both prevention and post-control. Adopting reasonable preventive measures can minimize the damage caused by pests and diseases to the forestry ecological environment and reduce the losses in both ecological and economic domains. However, up until now, the concept of forest pest and disease control among many forestry personnel remains relatively outdated. There is a lack of emphasis on preventive measures, and much of the knowledge comes into play only after the occurrence or exacerbation of pests and diseases, leading to the adoption of simplistic measures for prevention and control that do not meet the principles of economics, ecology, and diversified prevention. As a result, the forestry ecological environment has suffered significant negative impacts, making it difficult to achieve timely pest and disease control and resolution and failing to effectively control the losses, thus seriously threatening the stability of the forestry ecological system. Therefore, to effectively carry out forest pest and disease control, the primary task is to guide personnel in establishing the correct concept of prevention and control.

### ***3.2 Inadequate Pest and Disease Control System***

Although the importance of forest pest and disease control in the process of forestry ecological environment construction has been increasingly recognized, the pest and disease control system is still not sufficiently comprehensive. Consequently, forestry personnel find it challenging to take appropriate measures for prevention and control at the early stage of hazards, leading to inadequate timing and ineffective measures for prevention and control. Many personnel only take corresponding measures after forest pests and diseases have widely spread and caused severe impacts. However, at this point, the difficulty of prevention and control increases, and the effectiveness of many control measures decreases. Additionally, many forestry personnel cannot accurately assess and judge the classification, scope, and procedures of pest and disease control during the later stages of a large-scale outbreak. As a result, the measures taken are not reasonable, making it difficult to achieve effective control of pests and diseases and causing significant ecological and economic losses, thereby affecting the sustainable development of the forestry ecological environment and forestry industry. Hence, China should further improve the forest pest and disease control system to provide strong support for the construction of the forestry ecological environment.

### ***3.3 Insufficiently Scientific Pest and Disease Control Techniques***

With rapid technological development, there are increasingly diverse ways of forest pest and disease control. However, many forestry personnel still primarily rely on chemical pesticides for pest and disease control. While spraying chemical pesticides can effectively kill pests and diseases, the surviving pests and diseases develop resistance and evolve rapidly, enhancing their destructive ability, which poses a more severe and challenging threat to the forestry ecological environment and disrupts the balance of the forestry ecological system. Furthermore, spraying chemical pesticides can also harm the original ecosystem of forestry, poisoning the native organisms in the forest and failing to eliminate the root cause of pest and disease occurrence. Therefore, to effectively carry out forest pest and disease control, maximize its positive impact on the forestry ecological environment, and provide robust guarantees, it is essential to adopt scientifically based pest and disease control techniques.

## **4. Optimization Suggestions for Forest Pest and Disease Control**

### ***4.1 Establishing the Correct Concept of Pest and Disease Control***

Firstly, increase attention to forest pest and disease prevention and control. In the process of forestry ecological environment construction, forestry departments should recognize the importance of pest and disease prevention and control, break down the prevention and control tasks for forest pests and diseases in specific regions, assign responsibilities, and thereby stimulate forestry personnel's attention and emphasis on pest and disease prevention work. Forestry authorities encourage and reinforce the learning of forest pest and disease knowledge within the organization, particularly emphasizing the significance of prevention. This guidance aims to help forestry personnel realize that forest pests and diseases can be prevented and controlled as biological disasters. It is essential to take proactive measures for prevention and post-control to eliminate pests and diseases at the source, laying a more solid foundation for pest and disease control. Secondly, forestry departments should strengthen the importance of learning and encourage personnel to actively learn about forest pest and disease knowledge. As an illustrative example, individuals can engage in online searches and study domestic and international cases of forest pest and disease control. By doing so, they can absorb excellent experiences and conduct in-depth research at the grassroots level, aiming to comprehensively understand the causes, hazards, and control measures associated with various forest pests and diseases. This way, when encountering pests and diseases, appropriate preventive and control measures can be taken promptly, minimizing the impact of pests and diseases and better protecting the forestry ecological environment.

### ***4.2 Further Improve the Pest and Disease Control System***

To achieve the eradication of pests and diseases and effectively optimize and improve the forestry ecological environment, forestry departments should continuously improve the pest and disease control system during practical implementation. This will provide stronger support for the conduct of pest and disease control work. Specifically, forestry departments should continuously summarize the experience of pest and disease control, and relevant personnel should establish a sense of responsibility, actively

monitor the pest and disease prevention and control situation in different regions, analyze the deficiencies in the pest and disease control system, and actively contribute suggestions for the construction of the pest and disease control system to enhance its comprehensiveness and comprehensiveness. For example, they can establish an evaluation system for pest and disease control effectiveness and conduct quantitative comparisons with other regions to promptly develop and master more advanced control methods and improve the effectiveness of local pest and disease control. Additionally, they can establish quantitative assessment standards for pest and disease control, based on which responsibility mechanisms and accountability systems can be determined to better constrain and motivate forestry personnel, ensuring the implementation of pest and disease control systems, forming a more scientific control system, and promoting the efficiency and quality of pest and disease control, thereby guaranteeing the sustainable development of the forestry ecological environment.

#### **4.3 Selecting Scientific Pest and Disease Control Techniques**

Currently, in forest pest and disease control, the main methods used by forestry personnel are biological control and chemical control. To effectively carry out pest and disease control and provide stronger support for the construction of the forestry ecological environment, personnel should choose scientifically-based control techniques based on the specific pests and diseases. With the continuous progress of science and technology, various new pesticides have emerged. Compared to traditional pesticides, these new pesticides have stronger targeted effects and better pest-killing effects, are less polluting, and pose less threat to the forestry ecological environment, avoiding the harm to other organisms' normal growth. Therefore, in the process of pest and disease control, if chemical pesticides must be used, it is essential to avoid selecting traditional pesticides with high residues and toxicity. Instead, choose new types of pesticides such as microbial pesticides, botanical pesticides, and biomimetic pesticides based on the actual situation to effectively reduce the impact on the forestry ecological environment. At the same time, forestry personnel should consider biological control techniques as the primary means of control. Compared to chemical pesticides, biological control techniques have lower costs and operational thresholds and can avoid harm to the forestry ecological environment. Therefore, when conducting pest and disease control, forestry personnel can adopt biological control techniques such as using natural enemies to control pests and using fungi to control insects, depending on the specific circumstances.

#### **5. Conclusion**

Forest pest and disease control is closely related to the construction of the forestry ecological environment. Proper forest pest and disease control can better protect the biodiversity of the forestry, promote the long-term and healthy development of the forestry industry and the ecological environment. However, there are still several issues with forest pest and disease control, such as outdated concepts, incomplete control systems, and insufficiently scientific control techniques, resulting in average control effectiveness. Therefore, forestry departments should guide forestry personnel to establish the correct concept of forest pest and disease control, continuously improve the forest pest and disease control system, and select control techniques based on principles such as economics and ecology, in order to minimize the harm caused by pests and diseases and better safeguard the health of the forestry ecological environment.

#### **References**

- [1] Meng, X. (2023) *The role of forest pest and disease control in the construction of forestry ecological environment*. *New Agriculture*, 7, 27-29.
- [2] Ma, Y. (2023) *The impact of forest pest and disease control on forestry ecological environment*. *New Agriculture*, 5, 40-42.
- [3] Guo, W. (2023) *The impact of forest pest and disease control on forestry ecological environment*. *Research on Agricultural Disasters*, 13(1), 4-6.
- [4] Mao, C. (2023) *Strengthening forest pest and disease control to support the construction of forestry ecological environment*. *Research on Agricultural Disasters*, 13(1), 13-15.
- [5] Ma, Z. (2023) *Exploring the impact of forest pest and disease control on forestry ecological environment*. *Research on Agricultural Disasters*, 13(1), 46-48.
- [6] Ma, K. (2022) *The role of forest pest and disease control in the construction of forestry ecological environment*. *Agricultural Advisor*, 21, 141-143.
- [7] Li, C. (2022) *Research on the impact of forest pest and disease control on forestry ecological environment*. *Modern Rural Technology*, 8, 36-37.