



SPECIAL ARTICLE

Diseases and pests noxious to *Pleurotus* spp. mushroom crops

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KEYWORDS

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Abstract The *Pleurotus* genus is one of most extensively studied white-rot fungi due to its exceptional ligninolytic properties. It is an edible mushroom that possesses biological effects, as it contains important bioactive molecules. It is a rich source of nutrients, particularly proteins, minerals as well as vitamins B, C and D. In basidiomycete fungi, intensive cultivations of edible mushrooms can often be affected by some bacterial, mold and virus diseases that rather frequently cause dramatic production loss. These infections are facilitated by the particular conditions under which mushroom cultivation is commonly carried out such as warm temperatures, humidity, carbon dioxide (CO₂) levels and presence of pests. There is not much bibliographic information related to pests of mushrooms and their substrates. The updated review presents a practical checklist of diseases and pests of the *Pleurotus* genus, providing useful information that may help different users.

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PALABRAS CLAVE

Hongo ostra;
Bacteriosis;
Micosis;
Micovirus;

Enfermedades y plagas nocivas en el cultivo del hongo *Pleurotus*

Resumen El *Pleurotus* es uno de los hongos de la podredumbre blanca más extensamente estudiados debido a sus excepcionales propiedades lignocelulolíticas. Es un hongo comestible y también tiene varios efectos biológicos, ya que contiene importantes moléculas bioactivas. Es una fuente rica de nutrientes, particularmente de proteínas y minerales, así como de vitaminas

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Nematodos;
Moscas

B, C y D. Los cultivos intensivos de hongos comestibles del tipo basidiomicetos a menudo son afectados por enfermedades bacterianas, fúngicas y virales, lo que con frecuencia produce pérdidas significativas en la producción. Estas infecciones son facilitadas por las condiciones particulares bajo las cuales comúnmente se cultivan los hongos, tales como temperaturas cálidas y elevada humedad. Esta revisión presenta una lista práctica y actualizada de enfermedades y plagas frecuentes durante el cultivo del hongo comestible *Pleurotus*, y proporciona información que puede ser de utilidad para los productores.

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Introduction

Mushrooms are a rich source of nutrients, particularly proteins, mineral vitamins as well as bioactive constituents, such as phenolic compounds, terpenes, steroids and polysaccharides^{39,61,62}. The *Pleurotus* spp. of *basidiomycetes* class belongs to a group known as “white rot fungi” as they produce a white mycelium and are generally cultivated on non-composted lignocellulosic substrates^{15,69}. This genus requires little growth time, compared to other mushrooms¹.

Mushroom survival and multiplication are associated to a number of factors, which may act individually or have interactive effects among them^{4,36}. Intensive cultivations of edible mushrooms can often be affected by some fungal and bacterial diseases that rather frequently cause dramatic production loss⁷. These infections are facilitated by the particular conditions under which the mushroom cultivation is commonly carried out, such as warm temperatures, humidity, carbon dioxide (CO₂) levels and presence of pests^{3,4}. Due to these reasons, mushroom growers are frequently challenged by mushroom disease of bacterial and fungal origin. While an increasing number of commercial farms cultivate mushrooms, growers have faced serious challenges caused by various viral infections⁵⁷. Fungal viruses, namely mycoviruses, persistently infect fungal taxonomic groups, including plant pathogenic fungi and mushrooms. The infection has been known to cause few significant phenotypic effects on mushrooms. Although careful farm management and extreme hygiene may prevent major attacks, some diseases are very difficult to control. Moreover, shelf life quality is severely affected by diseases that are still asymptomatic at the time of harvest. The use of disinfectants such as chlorine (household bleach) and the application of selected fungicides is generally practiced in the cultivation of mushrooms, which involve significant costs. Moreover, the use of chemicals in cultivation leaves undesired residues, several of which have been banned from use. Most chemicals that are still allowed have failed to adequately control major mushroom diseases as resistance is easily induced²⁵. Therefore, good alternatives have to be found.

Diseases

Bacterial and fungal diseases are a major problem in mushroom cultivation (Table 1); a high percentage of products

are lost due to lower productivity, decrease in quality and shortened shelf life.

Bacterial diseases

Bacteriosis is an unpredictable disease that can occur during the first or second sporophore flush, causing great yield loss. Destructive disease levels are induced by environmental conditions occurring at high relative humidity levels in growing chambers. Favorable to bacterial blotch outbreaks are the excess of water in the casing layer and a low aeration rate in the growing-house. These conditions can induce the occurrence of morphological variants or aggressive pathogens of *Pseudomonas reactans* and *Pseudomonas tolaasii*⁴⁸.

According to Lo Cantore and Iacobellis⁴⁵, the etiology of lesions on cultivated *Pleurotus ostreatus* involves a complex composed by interactions between *Pseudomonas* spp., *P. tolaasii* and *P. reactans*; however individually these bacteria cause different symptoms. *P. tolaasii* is consistently associated with brown-reddish blotches on *P. ostreatus* pseudo-tissues. *Pseudomonas* spp. and *P. reactans* are mostly associated with superficial yellow lesions on *P. ostreatus* sporocarps, which in pathogenicity assays have caused yellow discoloration of the sporocarps.

Environmental controls, including low relative humidity, temperature, carbon dioxide level, as well as cleaning cultivation rooms play important roles in diminishing the spread of the disease³. Nair and Bradley⁵¹ emphasized the importance of keeping mushroom caps dry by regulating temperature, relative humidity, and ventilation to prevent bacterial propagation.

Bacterial yellowing

Among the diseases observable during the cultivation of *Pleurotus eryngii*, whatever the growing procedure is, it is yellowing that can cause the most severe damage¹⁹. The disease is characterized by a yellow discoloration of the pileus and hydropic, often elongated and coalescing areas on the entire stem. Symptomatic basidiomata then stop growing, turn a reddish-brown color and are affected by rotting. Diseased sporophores exhale an odor, which is almost alcohol-like and pleasant at first, but rapidly becomes offensive and nauseating⁸.

Pseudomonas agarici and *P. reactans* are reported as the most likely causal agents of yellowing in both *P. eryngii* and *P. ostreatus* (Jacq.) P. Kumm³³. *P. reactans*

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