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Study on Mycelial Growth Pattern of Five Wild *Pleurotus* Species from North West India

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Abstract: In the present paper five wild *Pleurotus* species *viz., P. floridanus* (Sing.)., *P. pulmonarius* (Fr.) Quél., *P. sapidus* Quél., *P. cystidiosus* O.K.Mill. and *P. sajor-caju* (Fr.) Sing., collected, identified and isolated from different regions of North West India to study the behavior of culture on solid medium (Potato Dextrose Agar). On the daily basis observations, all the species exhibited different growth characteristics with respect to growth rate, odor and colour. It was observed that among the five cultures the fastest growth was observed in *Pleurotus cystidiosus* (1.3 cm/day) on an average daily basis followed by *Pleurotus pulmonarius* (1.23 cm/day), *P. sajor - caju* (1.2 cm/day), *P. sapidus* (1.1 cm/day) and *P. floridanus* (0.8 cm/day) which has the slowest growth rate observed among all the species on an average daily basis. During the entire growth stage the colour of the mycelium remained white. A specialized feature among all the species was observed in *P. cystidiosus* with the formation of specialized black headed structure called coremia. Coremia formation started in the form of small protuberances on the entire tissue simultaneously. Initially tiny watery droplets having blackish color appeared on the white stalk which after 3 days of protuberance. Mycelial mat was observed to thin at initial stages but later on changing to thick. In all the species the hyphal construction was found to be monomitic having generative hyphae with prominent clamps. All the studied species emitted scented smell.

Key words: Fungi *Pleurotus* · Basidiomycetes · Culture behavior

INTRODUCTION

About 14,000 species of mushrooms are now known in the world. Recently, macrofungi have become attractive as functional foods and a source of physiologically beneficial medicine. Mushrooms are the valuable source of food used by the human being from ancient time. Wild edible and medicinal properties of mushrooms were known to many ancient civilizations. Some mushrooms have been reported as therapeutic foods, useful in preventing diseases such as hypertension, hypercholesterolemia, atherosclerosis and cancer [1-4]. Edible mushrooms have been recognized from time immemorial. These have been widely used as food or food ingredients in many food products for a long time. Some edible mushrooms which have antitumour, antifungal and reducing hypercholesterolemia activities are widely used in modern time. These functional characteristics are mainly due to their chemical composition [5]. Genus *Pleurotus* belongs to fungal amily Pleurotaceae and order Agaricales in which 2 genera and 54 species are included. It is represented by 20 species the world over [6]. All the studied species are edible and important because of their culinary credentials [7]. Some mushrooms, such as truffles and morels are Ascomycetes, but most of others are Basidiomycetes [8]. Study of mycelial behavior is also important in studying the life cycle and other cultivation aspects of medicinally important mushrooms. There are several reports on such kind of work on morels has lead to understand the cultivation aspects of these important mushrooms [9-16] which play a direct role in understanding the life cycle of these [17-19]. It becomes quite important to study the culture behavior of mushrooms as it is directly linked with the cultivation as well as pharmaceutical aspects. Present paper deals with the study of the mycelial behavior on the Potato Dextrose Agar medium so as to notice the different phases during the growth of mycelium.

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MATERIALS AND METHODS

Collection: All the species were collected from the different localities of North West India varying in altitude and host (Table 1 and Figure 1).

Isolation: Pure culture of collected wild species was raised from the pileus portion of the mushroom where the lamellae join the stipe. For raising the culture a small piece of mushroom tissue was cut and removed with the help of sterilized scalpel under aseptic conditions and subsequently sterilized by dipping in 0.02% mercuric chloride solution and inoculated into the pre-prepared sterilized PDA slants. The inoculated PDA slants were stoppered with the cotton plugs and incubated at 27 ± 1°C temperature. The total operation of culturing was done aseptically under laminar flow. After 3-4 days (depending upon species), white mycelium started emerging and spreading on the PDA slants. Purification of the culture for further maintenance and utilization in experiments was done through repeated sub-culturing. Then the equal bits of the mycelium were put in petriplates and the growth was measured on daily basis in triplicates.

Observations: Observations were taken on daily basis till the maturity of the culture. Observations related to mycelial growth rate, color, odor and hyphal constructions were taken from day one to maturity of the culture in petriplates.

Table 1: Showing associated natural host and location with altitude and forest type

Species	Host	Location	Altitude (m)	Type of forest
Pleurotus floridanus	*Ficus benghalensis*	Patiala (Punjab)	250	Plains
Pleurotus pulmonarius	*Albizia chinensis*	Palampur (Himachal Pradesh)	1200	Mixed
Pleurotus sapidus	*Grevillea robusta*	Palampur (Himachal Pradesh.)	950	Plains
Pleurotus cystidiosus	*Mangifera indica*	Patiala (Punjab)	250	Plains
Pleurotus sajor- caju	*Albizia chinensis*	Palampur (Himachal Pradesh.)	1200	Plains

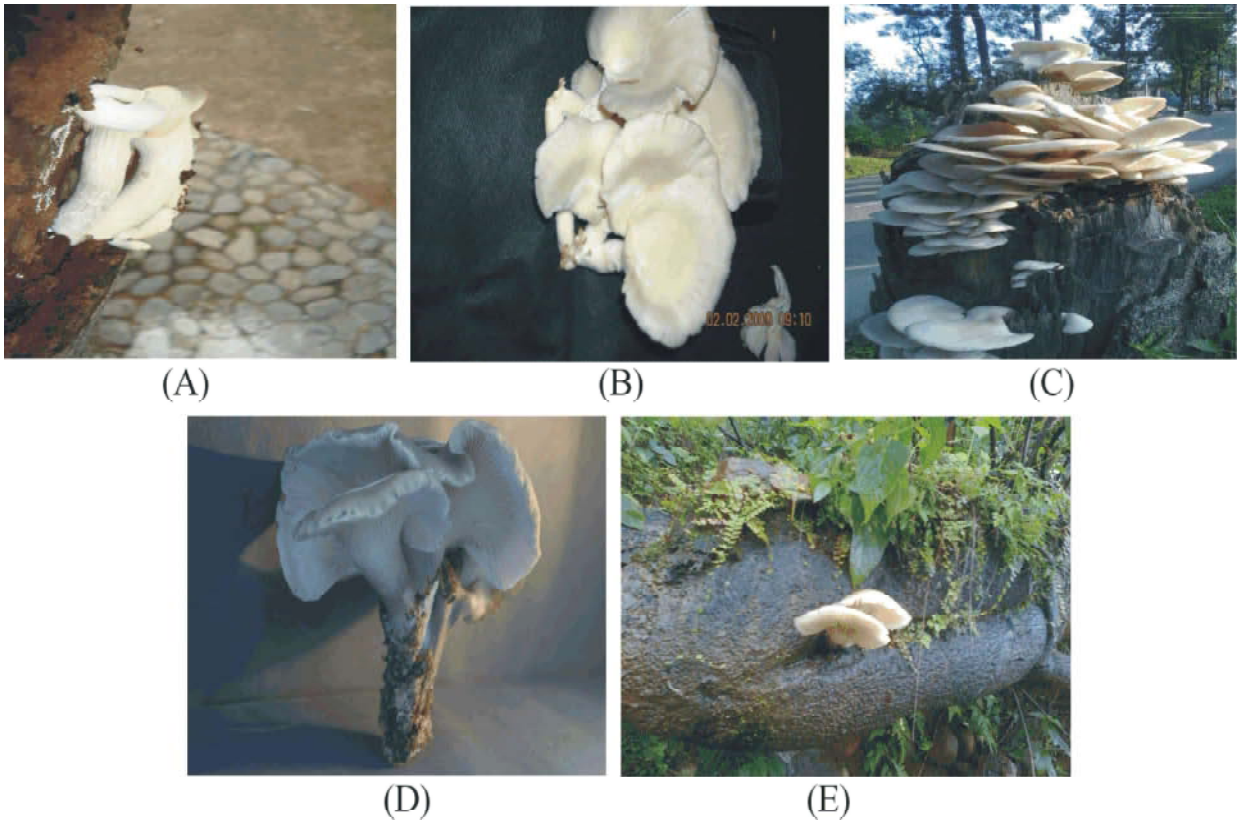

Fig. 1: A. Pleurotus floridanus B. Pleurotus pulmonarius C. Pleurotus sapidus D. Pleurotus cystidiosus E. Pleurotus sajor - caju.

RESULTS AND DISCUSSION

It was observed that among the five species the fastest growth was observed in *Pleurotus cystidiosus* (1.3 cm/day) on an average daily basis followed by *Pleurotus pulmonarius* (1.23 cm/day), *P. sajor - caju* (1.2 cm/day), *P. sapidus* (1.1 cm/day) and *P. floridanus* (0.8 cm/day). After 4 days of inoculation of the fresh tissue at 25°C, irregular mycelial growth started on the entire inoculated tissue. At first, a large amount of hyaline, aerial mycelium was observed which in due course become whitish. Coremia formation started in the form of small protuberances on the entire tissue simultaneously. Initially tiny watery droplets having blackish color appeared on the white stalk which after 3 days of protuberance appearance terminated into distinct capitate structure called toxocyst, which is a characteristic feature of *P. cystidiosus* subsp. *abalonus*. In the hyphae prominent clamp connections were observed. Growth of mycelium was cottony and irregular. Coremial spores measured from 7.77-10.81 µm. Optimum temperature for mycelial growth was recorded at 25 ±1°C. There was no coremia formation below 15°C. With maturity in the fourth week emergence of disagreeable putrid odour from culture plate become quite prominent from the culture plate. To begin with mycelium color white and grows in concentric manner with irregular margins forming a thin mat. The growth rate of mycelium depends upon the species [20]. Coremia formation was observed only in *Pleurotus cystidiosus* among all the species. No colour change was observed during the mycelial growth stages of all the species. All the species emitted scented smell. The mycelial growth rate was found more than some morels [21] (Table 2 and Figure 2).

Table 2: Culture characteristics of five wild *Pleurotus* species from North west India

Species	Growth Rate(cm/day)	Color	Odor
Pleurotus cystidiosus	1.3	White	Scented
Pleurotus floridanus	0.8	White	Scented
Pleurotus sapidus	1.1	White	Scented
Pleurotus pulmonarius	1.23	White	Scented
Pleurotus sajor - caju	1.20	White	Scented

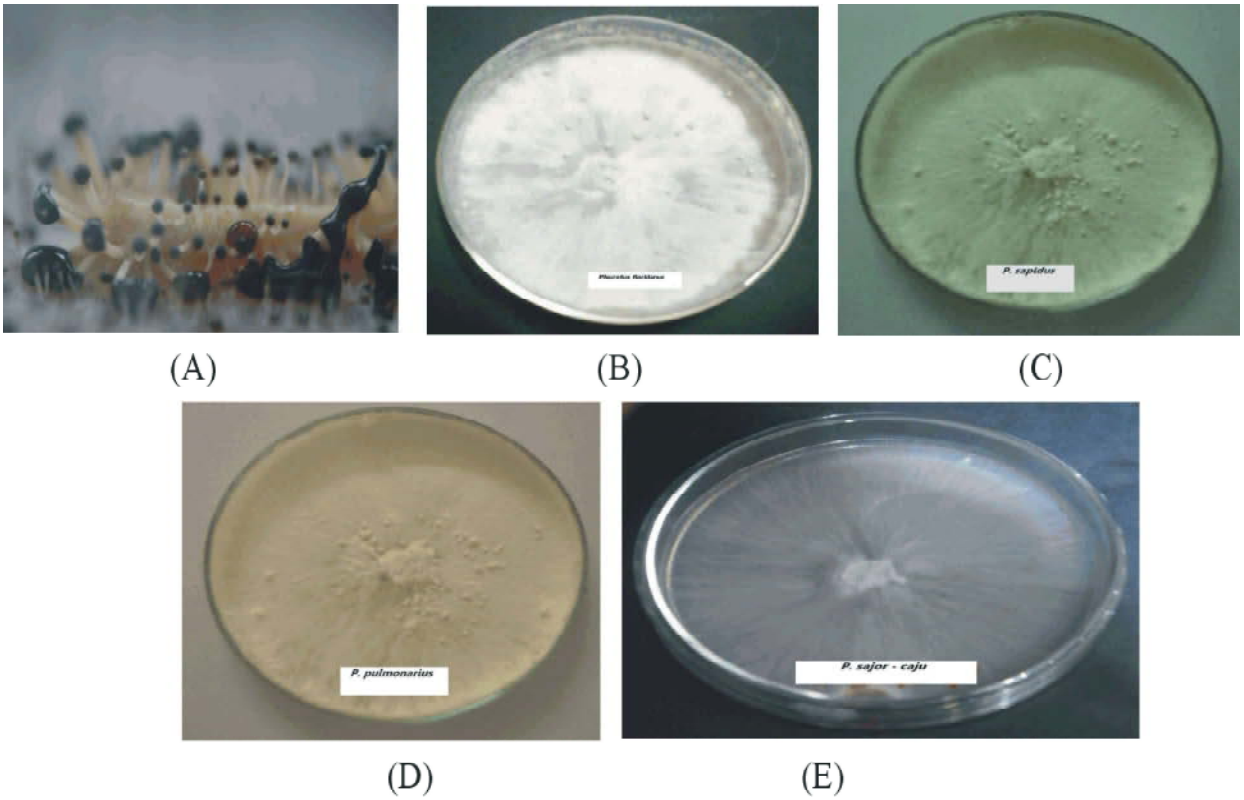

Fig. 2: A. Coremeoid tissue of Pleurotus cystidiosus B. Mature culture of Pleurotus floridanus C. Mature culture of Pleurotus sapidus D. Mature culture of Pleurotus pulmonarius E. Mature culture of Pleurotus sajor - caju.

CONCLUSION

Among all the species the growth rate varied from 0.8-1.3 cm/day. No color change was observed during the entire growth stages of the cultures of all the species. It is quite evident from the results that species differ in their growth rates in spite of the same conditions.

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