

COMPARATIVE GROWTH CHARACTERISTIC OF DIFFERENT PARENT MONOCULTURE AND NEW HYBRID CULTURES OF *PLEUROTUS* SPECIES

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Abstract: In present investigation the growth characteristics of different parent monospore of *Pleurotus* species were recorded i.e. appearance of colony, colour of mycelium, shape of mycelium, zonation, type of margin, sectoring formation and development of pigment and exudates. Further total of 78 new hybrid strains of different *Pleurotus* species were tested for mycelial growth characteristics, 17 strains shows Intermediate growth, 20 appressed growths, 21 thin growth and 20 hybrid strain gave fluffy growth of mycelium. 45 hybrid strains had given white colour, 22 milky and 11 hybrid strains were given snow white colour of mycelium. It was also recorded that 30 hybrid strains gave irregular shape and 48 hybrid strains gave almost circular shape of mycelium. 39 hybrid strains gave zonate at periphery, 27 strains faintly zonate and 9 hybrid strains gave inconspicuous zonation. Uneven margin were observed in 33 hybrid strains whereas even margin were observed in 40 strains and sectoring formation were recorded in 23 hybrid strains out of 78 hybrid strains.

Keywords: *Pleurotus* spp., Colony character, Monoculture, Mycelial growth, Hybrid cultures

INTRODUCTION

Pleurotus spp. is commercially important edible mushrooms commonly known as the oyster mushroom. Cultivation of oyster mushroom has recently increased tremendously throughout the world because of their abilities to grow at a wide range of agro-based residues. These white-rot fungi are useful decomposers of various agricultural wastes (Kurt and Buyukalaca, 2010). *Pleurotus* spp. are the most talented group among the cultivated mushrooms, which have ability to degrade many lignocellulosic substrates and are capable to colonize successfully on these substrates (Patrabansh and Madan, 1997). Monokaryotic isolates of *P. sajor-caju*, like those of *P. sapidus* were generally slow and mycelium in different monokaryons varied form appressed, thin, and fluffy to intermediate types. (Thakur and Bhandal, 1993). Growth characteristics of hybrid *Pleurotus* species were categorized on phenotype basis into two categories. In first group, hybrid obtained was similar in appearance, yield and colour etc. with either of their parents. The second group hybrids had blending of characters of their parents and possessing the yield potential more or less similar to them. A specific hybrid (hybrid no. 3) obtained with mating between *P. sajor-caju* and *P. cornucopiae* in which the shape and size of the mycelium was similar to *P. sajor-caju* and white colour resembled with *P. cornucopiae*, Bahukhandi and Sharma, 2002).

MATERIAL AND METHOD

Selection of pure cultures of oyster mushrooms

Selection of pure culture of oyster mushroom will be done by keeping in mind that culture should be fast growing, temperature tolerant, white in colour, moderate size fruit bodies, resistance to diseases and insect pests and high yielding the culture having above characters will be selected.

Cultures

Different cultural of *Pleurotus* species i.e. *Pleurotus citrinopileatus* (P₂), *Pleurotus florida* (s) (P₃), *Pleurotus sajor-caju* 503 (P₅), *Pleurotus sajor-caju* (B) (P₆), *Pleurotus salmeno straminus* (P₇), *Pleurotus florida* (P) (P₈), *Pleurotus winter* (P₁₀), *Pleurotus W-9* (P₁₁), *Pleurotus* (H) (P₁₂), *Pleurotus W-10*(P₁₄), *Pleurotus* (W)-1(P₁₆), and *Pleurotus B white* (P₂₁), were obtained from All India Coordinated Mushroom Improvement Project ICAR of Rajasthan College of Agriculture, MPUAT, Udaipur.

Growth characteristic of parent/ hybrid cultures

Pleurotus strains were characterized for colony morphology viz. Appearance, colour of mycelium, shape, zonation margin, sectoring and formation of pigment of exudates. Cultures of *Pleurotus* were raised on Malt Extract Agar (MEA) for mycelial growth studies. Differences in the mycelial characteristics of different strains of *Pleurotus* species were observed.

Growth characteristics of parents/hybrids cultures will be observed on the following basis

Colony	Characteristics
Appearance	Intermediate, appressed, thin, fluffy
Colour	Gray, white, milky, snow white
Shape	Almost circular, irregular
Zonation	Zonate at periphery faintly, inconspicuous
Margin	Uneven, even, submerged
Sectoring	±
Pigment formation	±
Exudate formation	±

RESULT AND DISCUSSION

Growth characteristics of different parent mono cultures of *Pleurotus* species

In present investigation the growth characteristics of different parent monospore isolate of *Pleurotus* species were tested for mycelial growth characteristics presented Table 1. The parent cultures viz., P₁, P₂, P₃, P₅, P₁₀ and P₁₄ gave fluffy growth whereas thin growth of mycelium were observed in P₆, P₇, P₁₁, P₁₂ and P₂₀. Further appressed growths of mycelium were recorded in P₈, P₁₆ and P₂₁ cultures. Regarding the colour, most of parents cultures were produced white colour viz., P₁, P₂, P₃, P₅, P₆, P₇, P₈, P₁₁, P₁₂, P₁₆ and P₂₁ whereas milky colour was observed in P₁₀, P₁₄ and P₂₀ cultures. Most of parent cultures were produced irregular shape of mycelium i.e., P₃, P₆, P₇, P₈, P₁₁, P₁₂, P₁₄, P₂₀ and P₂₁ whereas almost circular shape of mycelium were recorded in P₁, P₂, P₅, P₁₀ and P₁₆ parent cultures. The zonate at periphery were found in P₁, P₂, P₃, P₅, P₆, P₇, P₈, P₁₀, P₁₄, P₁₆ and P₂₁ parent cultures but faintly zonate were observed in P₁₁, P₁₂ and P₂₀ cultures. The margin of the parent cultures were found even in P₂, P₅, P₆, P₇, P₈, P₁₁, P₁₄, P₁₆ and P₂₀. Further uneven margin were observed in P₁, P₃, P₁₀, P₁₂ and P₂₁ parent cultures. Sectoring was found in P₁, P₃, P₆, P₇, P₈, P₁₁, P₁₄ and P₂₁ cultures. Moreover, no pigment formation and exudates formation were observed in any parent cultures. These results are in agreement with the result of Bahukhandi and Bahl (1991) who reported that colony morphology of 14 *A. bitorquis*

germplasm strains was characterized on medium containing malt extract, yeast extract and potato agar. They recorded three types of mycelial growth viz., fluffy, appressed and intermediate types in these strains.

Comparative colony characteristics of different hybrid cultures of *Pleurotus* species

Colony characters of new developed hybrid strains were observed such as appearance of colony, colour of mycelium, shape of mycelium, zonation, type of margin, sectoring formation and development of pigment and exudates. It was seen that out of 78 new hybrid strains, 17 intermediate growths, 20 appressed growths, 21 thin growths and 20 fluffy growth of mycelium were observed. Colour of mycelium that is 45 hybrid strains had given white colour, 22 milky, and 11 hybrid strain had given snow white colour of mycelium. It was also observed that 30 hybrid strains gave irregular shape and 48 hybrid strains gave almost circular shape of mycelium out of 78 strains. It was recorded that 39 hybrid strains gave zonate at periphery, 27 strains gave faintly zonate and 9 hybrid strains gave inconspicuous zonation out of 78 hybrid strains. Uneven margin were observed in 33 hybrid strains and even margin were observed in 40 new hybrid strains. Other growth character that is sectoring formation was recorded only 23 hybrid strains out of 78 strains. These results are in agreement with the result of Thakur and Bhandal (1993) and Bahukhandi and Sharma (2002).

Table 1 Growth characteristic of different parent monoculture of *Pleurotus* species

S no.	Strain	Appearane	Colour	Shape	Zonation	Margin	Sectoring	Pigment formation	Exudates formation
1.	P1	Fluffy	White	Almost circular	Zonate at periphery	Uneven	+	-	-
2.	P2	Fluffy	White	Almost circular	Zonate at periphery	Even	-	-	-
3.	P3	Fluffy	White	Irregular	Zonate at periphery	Uneven	+	-	-
4.	P5	Fluffy	White	Almost circular	Zonate at periphery	Even	-	-	-
5.	P6	Thin	White	Irregular	Zonate at periphery	Even	+	-	-
6.	P7	Thin	White	Irregular	Zonati at periphery	Even	+	-	-
7.	P8	Appressed	White	Irregular	Zonate at periphery	Even	+	-	-
8.	P10	Fluffy	Milky	Almost circular	Zonati at periphery	Uneven	-	-	-
9.	P11	Thin	White	Irregular	Faintly zonate	Even	+	-	-
10.	P12	Thin	White	Irregular	Faintly zonate	Uneven	-	-	-
11.	P14	Fluffy	Milky	Irregular	Zonate at periphery	Even	+	-	-

12.	P16	Appressed	White	Almost circular	Zonate at periphery	Even	-	-	-
13.	P20	Thin	Milky	Irregular	Zonate at periphery	Even	-	-	-
14.	P21	Appressed	White	Almost circular	Faintly zonate	Uneven	+	-	-

+ = Present

- = Absent

Table 2 Comparative colony characteristic of hybrid cultures of P₁ and P₂

S no.	Hybrid cultures	Appearance	Colour	Shape	Zonation	Margin	Sectoring	Pigment formation	Exudates formation
1.	P ₁ x P ₂	Intermediate	White	Almost circular	Zonate at periphery	Uneven	-	+	-
2.	P ₁ x P ₃	Appressed	Milky	Almost circular	Zonate at periphery	Even	+	-	-
3.	P ₁ x P ₅	Thin	White	Irregular	Zonate at periphery	Submerged	-	-	-
4.	P ₁ x P ₆	Appressed	White	Almost circular	Inconspicuous	Uneven	-	-	-
5.	P ₁ x P ₇	Thin	Milky	Irregular	Faintly zonate	Even	-	-	-
6.	P ₁ x P ₈	Thin	Milky	Irregular	Faintly zonate	Even	-	-	-
7.	P ₁ x P ₁₀	Appressed	White	Almost circular	Inconspicuous	Uneven	-	-	-
8.	P ₁ x P ₁₁	Thin	White	Irregular	Zonate at periphery	Submerged	-	-	-
9.	P ₁ x P ₁₂	Fluffy	White	Almost circular	Inconspicuous	Submerged	-	-	-
10.	P ₁ x P ₁₄	Fluffy	White	Almost circular	Zonate at periphery	Uneven	-	-	-
11.	P ₁ x P ₁₆	Intermediate	White	Almost circular	Zonate at periphery	Uneven	-	+	-
12.	P ₁ x P ₂₀	Intermediate	White	Almost circular	Zonate at periphery	Uneven	-	+	-
13.	P ₁ x P ₂₁	Intermediate	White	Almost circular	Zonate at periphery	Uneven	-	+	-
14.	P ₂ x P ₃	Intermediate	White	Almost circular	Faintly zonate	Even	-	-	-
15.	P ₂ x P ₅	Intermediate	White	Almost circular	Faintly zonate	Even	-	-	-
16.	P ₂ x P ₆	Appressed	Milky	Almost circular	Zonate at periphery	Even	+	-	-
17.	P ₂ x P ₇	Appressed	Milky	Almost circular	Zonate at periphery	Even	+	-	-
18.	P ₂ x P ₁₁	Thin	Snow white	Irregular	Inconspicuous	Even	-	-	-
19.	P ₂ x P ₁₄	Appressed	White	Almost circular	Inconspicuous	Uneven	-	-	-
20.	P ₂ x P ₂₀	Thin	White	Irregular	Zonate at periphery	Submerged	-	-	-

+ = Present

- = Absent

Table 3 Comparative colony characteristic of hybrid cultures of P₃, P₅ and P₆

S no.	Hybrid cultures	Appearance	Colour	Shape	Zonation	Margin	Sectoring	Pigment formation	Exudates formation
1.	P ₃ x P ₆	Appressed	Milky	Almost circular	Faintly zonate	Even	+	-	-
2.	P ₃ x P ₈	Fluffy	White	Irregular	Inconspicuous	Uneven	-	+	-
3.	P ₃ x P ₁₀	Appressed	Milky	Almost circular	Zonate at periphery	Even	-	-	-
4.	P ₃ x P ₁₁	Thin	White	Irregular	Zonate at periphery	Uneven	+	-	-
5.	P ₃ x P ₁₂	Appressed	Milky	Almost circular	Faintly zonate	Even	+	-	-
6.	P ₃ x P ₁₄	Fluffy	White	Irregular	Zonate at periphery	Even	-	-	-
7.	P ₃ x P ₁₆	Thin	Snow white	Irregular	-	Uneven	-	-	-
8.	P ₃ x P ₂₀	Appressed	Milky	Almost circular	Inconspicuous	Uneven	-	-	-
9.	P ₃ x P ₂₁	Fluffy	White	Irregular	Faintly zonate	Even	-	-	-
10.	P ₅ x P ₇	Fluffy	White	Almost circular	Inconspicuous	Submerged	-	+	-
11.	P ₅ x P ₁₂	Thin	Milky	Irregular	Faintly zonate	Even	+	-	-
12.	P ₅ x P ₁₆	Thin	Snow white	Irregular	Faintly zonate	Even	+	-	-
13.	P ₅ x P ₂₀	Appressed	White	Almost circular	Zonate at periphery	Uneven	-	+	-
14.	P ₅ x P ₂₁	Intermediate	White	Almost circular	Zonate at periphery	Uneven	+	-	-
15.	P ₆ x P ₇	Thin	Milky	Irregular	Zonate at periphery	Even	-	-	-
16.	P ₆ x P ₈	Fluffy	White	Almost circular	Faintly zonate	Even	+	+	-
17.	P ₆ x P ₁₁	Thin	Snow white	Almost circular	Zonate at periphery	Uneven	-	-	-
18.	P ₆ x P ₁₂	Fluffy	White	Almost circular	Zonate at periphery	Even	-	-	+
19.	P ₆ x P ₁₄	Appressed	White	Irregular	Faintly zonate	Uneven	-	+	-
20.	P ₆ x P ₁₆	Fluffy	White	Almost circular	Zonate at periphery	Even	+	-	-
21.	P ₆ x P ₂₀	Appressed	White	Almost circular	Faintly zonate	Even	-	-	+
22.	P ₆ x P ₂₁	Thin	Snow white	Almost circular	Zonate at periphery	Uneven	+	-	-

+ = Present

- = Absent

Table 4 Comparative colony characteristic of hybrid cultures of P₇, P₈ and P₁₀

S no.	Hybrid cultures	Appearance	Colour	Shape	Zonation	Margin	Sectoring	Pigment formation	Exudates formation
1.	P ₇ x P ₈	Intermediate	White	Almost circular	Zonate at periphery	Uneven	+	-	-
2.	P ₇ x P ₁₀	Fluffy	Milky	Irregular	Faintly zonate	Even	-	-	-
3.	P ₇ x P ₁₁	Thin	Snow white	Almost circular	Conspicuous	Even	+	+	-
4.	P ₇ x P ₁₂	Appressed	White	Almost circular	Conspicuous	Uneven	-	-	-
5.	P ₇ x P ₁₄	Fluffy	Milky	Irregular	Faintly zonate	Even	-	-	-
6.	P ₇ x P ₁₆	Thin	White	Irregular	Zonate at periphery	Uneven	-	-	-
7.	P ₇ x P ₂₀	Intermediate	White	Almost circular	Zonate at periphery	Uneven	-	-	-
8.	P ₇ x P ₂₁	Intermediate	White	Almost circular	Zonate at periphery	Uneven	-	-	-
9.	P ₈ x P ₁₁	Thin	Snow white	Irregular	Inconspicuous	Uneven	-	-	-
10.	P ₈ x P ₁₂	Fluffy	White	Irregular	Faintly zonate	Even	-	+	-
11.	P ₈ x P ₁₄	Thin	Snow white	Irregular	Inconspicuous	Uneven	+	-	-
12.	P ₈ x P ₁₆	Intermediate	White	Almost circular	Zonate at periphery	Even	-	-	-
13.	P ₈ x P ₂₀	Intermediate	White	Almost circular	Zonate at periphery	Even	-	-	-
14.	P ₈ x P ₂₁	Appressed	Milky	Almost circular	Zonate at periphery	Even	+	+	-
15.	P ₁₀ x P ₁₁	Intermediate	White	Almost circular	Zonate at periphery	Even	-	-	-
16.	P ₁₀ x P ₁₂	Thin	Milky	Irregular	Faintly zonate	Uneven	-	-	-
17.	P ₁₀ x P ₁₄	Fluffy	White	Irregular	Faintly zonate	Even	+	-	-
18.	P ₁₀ x P ₁₆	Appressed	Milky	Almost circular	Zonate at periphery	Even	+	-	-
19.	P ₁₀ x P ₂₀	Thin	Snow white	Irregular	Inconspicuous	Uneven	-	+	-
20.	P ₁₀ x P ₂₁	Appressed	Milky	Almost circular	Zonate at periphery	Even	-	-	-

+ = Present

- = Absent

Table 5 Comparative colony characteristic of hybrid cultures of P₁₁, P₁₂, P₁₄, P₁₆, P₂₀ and P₂₁

S no.	Hybrid cultures	Appearance	Colour	Shape	Zonation	Margin	Sectoring	Pigment formation	Exudates formation
1.	P ₁₁ x P ₁₂	Fluffy	White	Almost circular	Zonate at periphery	Uneven	+	-	-
2.	P ₁₁ x P ₁₄	Intermediate	White	Irregular	Zonate at periphery	Uneven	-	+	-
3.	P ₁₁ x P ₁₆	Fluffy	Milky	Almost circular	Faintly zonate	Even	-	-	-
4.	P ₁₁ x P ₂₀	Appressed	Milky	Irregular	-	Even	-	-	-
5.	P ₁₁ x P ₂₁	Fluffy	Milky	Almost circular	Faintly zonate	Even	-	+	-
6.	P ₁₂ x P ₁₄	Fluffy	White	Almost circular	Zonate at periphery	Uneven	+	-	-
7.	P ₁₂ x P ₁₆	Intermediate	Snow white	Almost circular	Zonate at periphery	Uneven	-	-	-
8.	P ₁₂ x P ₂₀	Intermediate	Snow white	Almost circular	Zonate at periphery	Uneven	-	-	-
9.	P ₁₂ x P ₂₁	Appressed	Milky	Irregular	-	Even	-	-	-
10.	P ₁₄ x P ₁₆	Thin	White	Irregular	Faintly zonate	Even	+	-	-
11.	P ₁₄ x P ₂₀	Thin	White	Irregular	Faintly zonate	Even	-	+	-
12.	P ₁₄ x P ₂₁	Fluffy	White	Almost circular	Zonate at periphery	Uneven	-	-	-
13.	P ₁₆ x P ₂₀	Thin	White	Irregular	Faintly zonate	Even	+	-	-
14.	P ₁₆ x P ₂₁	Fluffy	White	Almost circular	Zonate at periphery	Even	-	-	-
15.	P ₂₀ x P ₂₁	Fluffy	White	Almost circular	Zonate at periphery	Uneven	+	-	-

+ = Present

- = Absent

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REFERENCES

- Bahukhandi, D. and Bahal, N.** (1991). Colony morphology of *A. bitorquis* germplasm strains. *Mushroom Science*. **13** (1): 111-114.
- Bahukhandi, D. and Sharma, R.K.** (2002). Interspecific hybridization in *Pleurotus* species. *Indian Phytopathology*. **55** (1): 61-66.

Kurt, S. and Buyukalaca, S. (2010). Yield Performances changes in enzyme activities of *Pleurotus* spp. (*P. ostreatus* and *P. sajor-caju*) cultivated on different agricultural wastes. **101**:3164-3169.

Patrabansh, S, Madan, M. (1997). Studies on cultivation, biological efficiency and chemical analysis of *Pleurotus sajor-caju* (Fr.) Singer on different bio-wastes. *Acta Biotechnol.*, **17**(2):107-122.

Thakur, K. and M.S. Bhandal. (1993). Monosporous isolates and their intermating in *Pleurotus sapidus* and *P. sajor-caju*. *Mushroom Res.* **2** (1): 41-44.