

Effect of Nutritive Media and pH on Mycelial Growth of some *Pleurotus eryngii* Strains *in vitro*

Valentin ZĂGREAN*, Gicuța SBÎRCIOG, Mihaela-Alina BUZATU, Iuliana MÂNDRU

Research Institute for Vegetable and Flower Growing Vidra, Ilfov County, Romania

*Corresponding author, e-mail: valentinzagrean@yahoo.com

BulletinUASVM Horticulture 73(2) / 2016

Print ISSN 1843-5254, Electronic ISSN 1843-5394

DOI:10.15835/buasvmcn-hort:12352

Abstract

The mycelial growth rate of 4 strains of *Pleurotus eryngii* was first studied on different culture media - MEA, PDA and WEA (wheat extract agar). In the next experiment, we checked the mycelial growth on the same medium but at 3 different pHs. MEA medium ensured the highest growth rates for all the strains under test, followed by PDA. Pery-G strain showed the fastest growing rate on MEA (5.79 mm day⁻¹) and PDA (3.04 mm day⁻¹), respectively. Test concerning the mycelium growth on PDA at different initial pH values (5.5, 6.0, 6.5) showed the preference of our *P. eryngii* strains for media with a weak acid to the neutral reaction, the optimal values being 6.0. There were no big differences among mycelium growing rates of the same strain for the three pH variants.

Keywords: king oyster mushroom, mycelium, nutritive media, *Pleurotus eryngii*, pH

Introduction

Pleurotus eryngii, king oyster mushroom, originated from Mediterranean Sea shores, but it is also found in Asia, where this mushroom is traditionally cultivated. It grows in close association with umbellifers and produces highly priced edible mushrooms. Many countries have undertaken to grow it commercially. Besides its major nutritive qualities, *P. eryngii* is a mushroom of biomedical importance, containing a number of bioactive components which activate the immune system for a multitude of defensive functions (Valverde *et al.*, 2015). *P. eryngii* represents a new species for Romanian growers. Production of spawn necessary for spawning and knowing its behavior during the growing phase represents a first step towards the introduction of this species in culture. In order to evaluate the best growing conditions for *P. eryngii* mycelium we have tested 3 nutritive media at 3 different pHs.

Aims and objectives

The aim of the investigation was to determine the best nutritive medium and the optimal pH value

for the *in vitro* cultivation of each of the four strains under test.

Materials and methods

First, 4 different strains of *P. eryngii* were inoculated and grown on PDA, MEA and WEA media in tubes/Petri dishes at 24°C, pH 6.5, in the dark. Strains Pery-G, Pery-R and Pery-26 were obtained from Center of Applied Biochemistry and Biotechnology, BIOTEHNOL, Bucharest and Pery-K from RIVFG Vidra. In the next experiment, we checked the mycelial growth on the same medium but at 3 different pHs. Mycelium extension rates were evaluated after 7 and 10 days. The experiments were arranged in a randomized complete design with four replications per treatment. The results were statistically processed and interpreted on the basis of calculated limit differences: LSD 5%, LSD 1%, LSD 0.1%.

Results and Discussion

All our experimental strains showed higher growth rates in MEA medium, followed by PDA and WEA media (fig.1 and tab. 1). Pery-G strain showed

Table 1. Influence of nutritive media on mycelial growth of four *Peryngii* strains

Nutritive medium	Mycelium growth rate (mm day ⁻¹) - pH 6.5, 24°C			
	Pery-G	Pery-K	Pery-R	Pery-26
MEA	5.79 ^a	5.61 ^a	4.96 ^a	5.32 ^a
PDA	3.04	2.54	1.68	2.29
WEA	2.75 ^{-d}	2.68 ^d	1.54 ^{-d}	2.71 ^d

Table 2. Influence of pH value on mycelial growth of four *Peryngii* strains

pH	Mycelium growth rate (mm day ⁻¹) - PDA, 30°C			
	Pery-G	Pery-K	Pery-R	Pery-26
5.5	4.53	4.13	3.90	4.13
6.0	5.13 ^b	4.25 ^d	3.83 ^{-d}	4.20 ^d
6.5	4.83 ^c	4.15 ^d	3.53 ^{-c}	4.08 ^{-d}

Note: Letters are the statistical interpretation of Fisher's test in which a- very significant, b- distinct significant, c- significant, d- nonsignificant

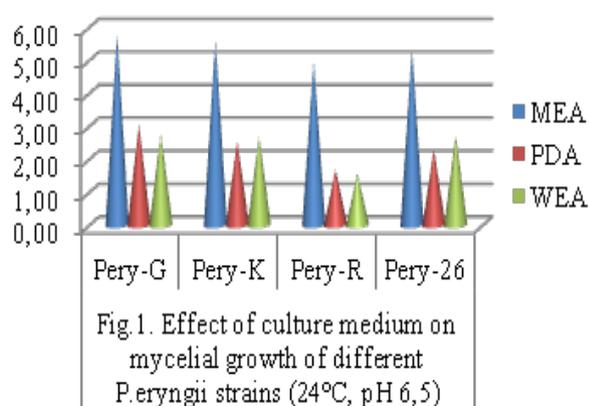


Fig. 1. Effect of culture medium on mycelial growth of different *P. eryngii* strains (24°C, pH 6.5)

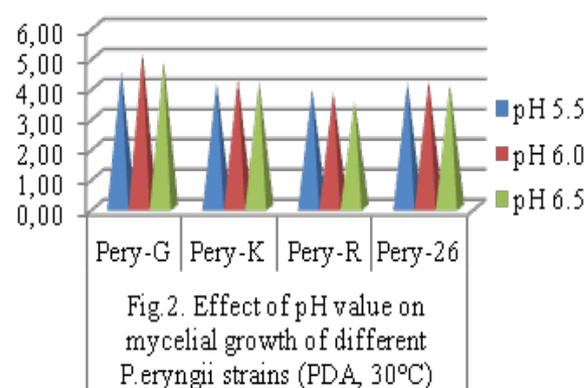


Fig. 2. Effect of pH value on mycelial growth of different *P. eryngii* strains (PDA, 30°C)

the fastest growing rate on MEA medium (5.79 mm day⁻¹), followed by Pery-K (5.61 mm day⁻¹), Pery-26 (5.32 mm day⁻¹) and Pery-R (4.96 mm day⁻¹) on the same medium, in descending order because of the genetic variances among strains (Kashangura, 2008). The same order was preserved on PDA medium. On WEA medium, the fastest was Pery-G (2.75 mm day⁻¹) that is useful to check type of agro-substrate *in vitro* for the application in cultivation of king oyster mushroom in field (Owaid et al., 2016). Statistical interpretation (one way ANOVA/LSD) shows that MEA medium exhibited a very significantly positive influence on the mycelium growth in all strains under study (tab. 1). In order to determine the most favorable pH for our strains, we have checked the growth on the same medium - PDA, but with different initial pH values: 5.5, 6.0, and 6.5. (fig. 2 and tab.2). According to the average calculated growth rate values, the Pery-G strain was the fastest grower in

all three pH variants, with a maximum rate at pH 6.0 (5.13 mm day⁻¹). The next is Pery-K for all tested pH variants, the maximum value (4.25 mm day⁻¹) being recorded also for the pH 6.0 medium. The Pery-R strain showed the lowest growth rates in all pH tested variants. Growth rates values of the tested mycelia were higher at pH 6.0, with one exception (Pery-R at pH 5.5), these positive results being significantly distinct only for Pery-G. It should be noted that there are no big differences among mycelium growing rates of the same strain for the three pH variants. Our results are consistent with data obtained by other researchers (Alam et al., 2009; Khandakar et al., 2008).

Conclusions

Analysis of the obtained data shows that the growth rate of *Peryngii* mycelium cultivated *in vitro* is determined by genotype (strain) and is

influenced by the nature of the culture medium and its pH value. MEA medium ensured the highest growth rates for all the strains under test, followed by PDA medium. Pery-G strain showed the fastest growing rate on MEA and PDA media, followed by Pery-K and Pery-26. Test concerning the mycelium growth on PDA at different initial pH values (5.5, 6.0, 6.5) showed the preference of our *Peryngii* strains for media with a weak acid to the neutral reaction, the optimal values being 6.0. There were no big differences among mycelium growing rates of the same strain for the three pH variants.

Acknowledgments: This work was made with the support of the Ministry of Agriculture and Rural Development – ROMANIA, through the Rural Development Programme - ADER 2015-2018.

REFERENCES

1. Alam, N., Shim, M.J., Lee, M.W., Shin, P., Yoo, B.Y., Lee, T.S. (2009): Vegetative Growth and Phylogenetic Relationship of Commercially Cultivated Strains of *Pleurotus eryngii* based on ITS sequence and RAPD. *Mycobiology*. 2009 Dec; 37(4) : 258-266. <http://dx.doi.org/10.4489/MYCO.2009.37.4.258>
2. Kashangura, C. (2008). Optimisation of the Growth Conditions and Genetic Characterisation of *Pleurotus* Species. Ph.D. Thesis. Department of Biological Sciences, Faculty of Science, University of Zimbabwe. pp. 152.
3. Khandakar J., Yesmin S., Sarker N.C., Amin S.M.R. (2008): Effect of media on the mycelial growth of edible mushrooms. *Bangladesh J. Mushroom*, 2(1): 53–56.
4. Owaid, M. N., Abed, I. A. and Al-Saeedi. S. S. S. (2016). Mycelial growth observation of *Pleurotus eryngii* (Higher Basidiomycota) in vitro. *International Journal of Environment*, 5(3): 1-10. <http://dx.doi.org/10.3126/ije.v5i3.15700>.
5. Valverde, M.E., Hernández-Pérez, T., Paredes-López, O. (2015): Edible Mushrooms: Improving Human Health and Promoting Quality Life. *Int. J. of Microbiology*, ID376387, 14 pg. <http://dx.doi.org/10.1155/2015/376387>.