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Evaluation of Mycelium Growth Rate and Yield of White Button Mushroom Isolates (*Agaricus bisporus*) in Iran

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Introduction: Among edible mushrooms, white button mushroom is the most cultivated one around the world. Mono-spores diversity in terms of growth rate, colony type, yield and etc. is used for intra strain genetic improvement. High yielding isolates with filamentous mycelium type are screened and used for spawn production (Farsi and Gordan, 2002). Success in mushroom production largely depends on the quality of spawn produced in sterile conditions (Sanchez, 2010). Farsi and Gordan, (2004) reported that colony shape and mycelium growth type are very important factors in screening isolates in terms of mycelium growth rate and yield. To screen isolates based on their mycelium growth, solid media are among the most suitable ones (Griffin, 1994). In a study conducted to evaluate mycelium growth rate of six *Morchella* species on different media, PDA and MEA were known as the best ones (Kalmis and Kalyoncu, 2008). The present study was conducted in order to evaluate mycelium growth rate and yield of white button mushroom isolates in solid medium, spawn and compost media.

Materials and Methods: Eighteen isolates of white button mushroom were compared on PDA (Potato Dextrose Agar), CYM (Complete Yeast Medium), spawn and compost media based on mycelium growth rate, type and class growth and yield at the mushroom research center of Faculty of Agriculture, Ferdowsi University of Mashhad, in 2014. A piece of mycelium of each isolate was placed in the center of each petri dish and was kept in $23\pm 1^\circ\text{C}$, and the radial growth rate of mycelium was measured as two perpendicular diameters in three consecutive weeks. Mycelium growth rate on spawn and compost media was measured based on the percentage of surface coverage during the 15 consecutive days. Yield of each isolate was measured by daily harvesting of mushrooms during 35 days of experiment. Analysis of variance and means comparison of the variables were carried out using SAS software. Means analysis was performed using LSD test at 5% significance level.

Results and Discussion: There were significant differences among isolates based on mycelium growth rate and yield. In PDA medium, 2200 isolate showed the fastest mycelium growth rate with $1.9 \text{ mm}\cdot\text{day}^{-1}$ and final colony diameter of 8.1 cm. were This isolate also showed the fastest mycelium growth rate on CYM medium and covering the spawn and compost media surfaces, and produced the highest yield along with A15a isolate (A15a and 2200 with 22.1 and $19.4 \text{ kg}\cdot\text{m}^{-2}$, respectively). Magnum d with mycelium growth rate of $0.7 \text{ mm}\cdot\text{day}^{-1}$ and final colony diameter of 3.1 cm showed the slowest mycelium growth rate. On average, 75% of isolates were grouped in slow mycelium growth rate class and 25% were placed in fast mycelium growth rate class. Isolates A15a, 2200, A15, M7219 and F64d showed fast mycelium growth rate. All of the isolates showed filamentous mycelium growth type and no abnormal mycelium growth type was observed. Isolate A15a with 50% coverage of compost surface during the first 5 days and 90% during the 15 days showed the fastest mycelium growth rate on this medium, followed by isolates F64d, 2200 and A15a. Normal mycelium growth rate on compost medium varied from 6-8 to sometimes 10-12 $\text{mm}\cdot\text{day}^{-1}$ (Farsi and Pooyanfar, 2011). There was a high positive correlation between mycelium growth rate and the yield component, so that isolates with faster mycelium growth rate produced higher yield. Farsi and Gordan, (2001) also reported significant positive correlation between filamentous mycelium type and yield, so that isolates with filamentous mycelium growth type and high mycelium growth rate produced higher yield. Faster mycelium growth rate is considered as a desire characteristic in mushroom cultivation due to the reduction of contamination risk of other micro-organisms (Oie, 2003).

Conclusion: There was a high significant difference among white button mushroom isolates in terms of mycelium growth rate and yield. Isolates with faster mycelium growth rate on solid medium produced higher yield. A high positive correlation was observed between mycelium growth rate on CYM and compost media, so

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it could be used as an appropriate medium for comparison of mycelium growth rate *in vitro*. As comparison of strain yield is time consuming and difficult, screening based on their growth rate on CYM is recommended.

Keywords: Colony diameter, Mycelium growth type, Mycelium growth class, Spawn

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