Expanding WA-WA-WA: Periodic Environmental Changes Trigger Concentric Ring Colony Formation

Yamamoto, Miyu

Aspergillus oryzae is a filamentous fungus that grows well and forms large colonies on starch-rich Potato Dextrose Agar (PDA) plates. Light and temperature are recognized as major environmental factors that affect conidiation or growth of colonies of A. oryzae. Moreover, these short-term environmental variations are related to concentric ring colony formation. Two main studies that were carried out to investigate the induction of colony formation are described below. First, several conidia were cultured on a PDA plate to examine various patterns of hyphal elongation in A. oryzae RIB40. Microscopic observation showed that hyphae derived from independent conidia made contact with each other. When one hypha recognizes another, the elongation speed increases to expand outside of the other's territory. This phenomenon could be a trigger for circular large colony formation. Second, spot tests of strain RIB40 on PDA plates were performed to clarify the response of A. oryzae to environmental changes: either a white light was periodically turned off and on at fixed temperature (30 °C) or the temperature was periodically alternated between 25 and 30 °C with the light off. In the case of the former, a decrease in conidia occurrence was observed and hyphal elongation was clearly reduced during the light period. In the case of the latter, the growth rate of strain RIB40 rose at 30 °C, while it fell at 25 °C. These findings suggest that concentric patterns may arise due to environmental changes, especially in brightness and temperature.

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