Pengujian kemampuan antagonistik khamir rhodotorula spp. asal kebun raya Cibodas dan potensi rhodotorula sp. UICC Y-381 sebagai agen biokontrol aspergillus ochraceus pada tomat pascapanen = Study on the antagonistic ability of Rhodotorula spp. of Cibodas botanical Garden and the potential of Rhodotorula spp. UICC Y-381 as a biocontrol agent of Aspergillus ochraceus on postharvest tomatoes

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Abstrak

ABSTRACT
Biological control of postharvest diseases of fruits and vegetables by antagonistic microorganism seems increasingly promising to replace the use of synthetic fungicides which are subjected to some limitation due to development of fungicides-resistant strain of the pathogens and risk for consumers and the environment (Lima et al, 1999). Several species of yeast have been reported to reduce postharvest fungal decay on fruits. One of the antagonistic yeast that has been use as commercial biocontrol is Metchnikowia fructicola in Shemerm product (Vero et al., 2002) Yeast Rhodotomla has been studied for the postharvest biological control various mould pathogens on various fruit (Castoria et al., 1997).
University of Indonesia Culture Collection (UICC) have Rhodotorula spp. strains from plants of Cibodas Botanical Garden, and moulds from postharvest decayed-tomatoes and plants. The ability of these yeast strains as biocontrol agents against has not been reported.
This thesis consists of two parts. Part 1 is entitled The antagonistic Activity of Rhodotorula spp. from Cibodas Botanical Garden Against Tomato Plant Infected-Causing Moulds. Part 2 is entitled The Potential of Rhodotorula sp. UICC Y-381 as Biocontrol Agent of Aspergillus ochraoeus on Postharvest Tomatoes. The objectives of this research are to obtain a potential Rhodotorula sp. with antagonistic activity against tomato infected-causing moulds, and to obtain infoimation on the ability of Rhodotorula sp. UICC Y- 381 as a biocontrol agent in reducing the severity of decay by Aspergillus ochraceus. The research was carried out in Laboratory of Microbiology, Department of Biology, and Center of Excellence Indigenous Biological Resources-Genome Studies (CoE IBR-GS), Faculty of Mathematics and Natural Sciences, from July 2008-July 2009.
Yeast Malt Agar (YMA) was used for yeast growth medium, and Potato Dextrose Agar (PDA) was used for maintenance of fungi. The media PDA and Potato Dextrose Agar (PDB) were used for antagonistic test.
Six strains of Rhodotorula spp. (Rhodotorula sp. UICC Y-318, Rhodotorula sp. UICC Y-325, Rhodotorula sp. UICC Y-332, Rhodotorula sp. UICC Y-381, Rhodotomla sp. UICC Y-384, and Rhodotorula sp. UICC Y-386) were investigated as antagonistic yeasts against Aspergillus ochraceus D1.2.2.SSM3, A. terreus D2.2.MC, and Drechslera sp. D1.3.MC. The yeasts were obtained from plants of Cibodas Botanical Garden, and the moulds were obtained from decayed tomatoes and infected plants, belonging to the University of Indonesia Culture Collection (UICC). Antagonistic test

by strip method was carried out by using
concentration of yeast cells at (1 .2-5.2) x 10° CFU/ml, and A. ochraceus
D1.2.2.SSM3 at 4.7 x 10? CFU/ml, A. terreus D2.2.Mc at 3.2 x 10° CFU/ml,
and Drechslera sp. D1.3.MC at 5.2 x 10? CFU/ml. Inoculation of the yeast
cells on PDA was carried out 4 hours earlier before inoculation of mould
spores on petri dishes. Results showed that highest percentage reduction of mould colonies was shown by Rhodotorula sp. UICC Y- 325 against
Drechslera sp. (28.12%-72.14%), followed by Rhodotorufa sp. UlCC Y-381 against A. ochraoeus (54.28%-72.46%), and Rhodotoruta sp. Y-318 against A. terreus (21.76% - 58.10%) during 6-day incubation.
Antagonistic test by co-culture method was carried out by using
concentration of yeast cells at (1 .58-5.59) x 10° CFU/ml, and Aspergillus ochraceus D1.2.2.SSM3 at 7 x 10? cFU/ml, A. terreus D2.2.MC at 1.5 x 10? CFU/ml. Inoculation of the yeast cells on PDB was carried out 8 hours earlier before inoculation of mould spores on broth medium. Results showed that highest percentage reduction of conidial heads and hyphal width was shown by Rhodotorula sp. UICC Y-381 against A. ochraceus (9.45% and 12.43%; 7.10% and 7.51 %, after 2- and 3-day incubation, respectively). Rhodotorula sp. UICC Y-332 reduced conidial heads of A. terreus (10.17% and 9.60% after 2- and 3-day incubation) but, was not able to reduce hyphal width of A. terreus. Microscopic observation by slide culture method on PDA showed that there was attachment of Rhodotorula spp. cells to the hyphae of Drechslera sp., however, Rhodotorula spp. UICC Y-386 attached more intensively and colonized the hyphae.

The ability of Rhodotorula sp. UICC Y-381, which was isolated from
plant leaves, as a biocontrol agent against postharvest tomato fruit decay- causing mould Aspergillus ochraceus D1 .2.2.SSM3 was evaluated. Observation was carried out for 15 days at 25°C - 27°C. Results showed that Rhodotorula sp. UICC Y-381 was able to reduce the severity of decay by A.ochraceus with 100% reduction until day-12, when compared to control. The synthetic fungicide Dithane M-45 at a concentration of 0.08% reduced the severity of decay to 100% until 15-day incubation.