Pengujian kemampuan antagonistik Khamir Epifit asal Kebun Raya Cibodas dan potensi Candida sp. Berkhout UICC Y-328 sebagai agen Biokontrol Aspergillus ochraceus Wilhelm pada tomat pascapanen

Handarini, author

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Abstrak

Microbial communities usually have mixed populations, only in unique

environmental situations do microorganisms live entirely alone. Thus many types of interactions are possible among the members of an ecosystem?s community. In general, the constant association of different organisms in an ecosystem is referred to as symbiosis, with the associates being called symbionts. One type of a symbiosis is antagonism. Antagonism is a symbiotic relationship in which

one population of microorganisms has a harmful effect on the growth of another microbial population (Batzing 2002: 696). A number of microorganisms (bacteria, yeasts, fungi) which effectively control postharvest pathogens have been identified as antagonists (Mari and Guizzardi 1998:60). A variety of microbial antagonists were reported to control several different pathogens on various fruits. The organism that suppresses the pest or pathogen is referred to as the biological control agent (BCA) (Pal & Mcspadden Gardener 2006: 1). Biological control may in simple terms be defined as the use of one living organism to control another (Druvefors 2004: 4).

Often antagonists are isolated on the surface of plants; this natural presence makes them more likely to succeed because of their colonization ability and environmental adaptation (Mari and Guizzardi 1998:60). The use of yeasts as antagonists appears to be quite promising, although the mechanism has not yet been fully elucidated. Some antagonist yeasts have been reported as biocontrol agent of fungal pathogen on fruits. Zhao et al. (2008: 115--116) reported that tomato fruit treated with Pichia guillermondii had an infection rate of 25% which was caused by Rhizopus nigricans, which was

significantly lower than the control (41.67%). Kalogiannis et al. (2006: 72) reported that Rhodotorula glutinis Y-44 significantly reduced disease incidence caused by Botrytis cinerea on tomato by 52%, compared to the untreated control. Zhang et al. (2004: 84) reported that the application of Cryptococcus laurentii resulted in low average decay incidence caused by B. cinerea in fruit by 7.1%, compared with 40% in the water-treated control fruit. University of Indonesia Culture Collection (UICC) collected epiphytic yeasts from plant samples of Cibodas Botanical Garden, and moulds from decayed tomatoes and infected plants. The ability of the epiphytic yeasts as biocontrol agents against tomato spoilage-causing moulds has not been

reported. This study consists of two parts. Part 1 is The Antagonistic Ability of Epiphytic Yeasts of Cibodas Botanical Garden on Tomato Plant Infected-Causing Moulds. Part 2 is The Potential of Candida sp. UICC Y-328 as a Biocontrol Agent of Aspergillus ochraceus on Postharvest Tomatoes. The purposes of this study were to investigate the ability of six species of epiphytic yeasts in inhibiting the growth of tomato plant infected-causing moulds, and the potential of Candida sp. UICC Y-328 as a biocontrol agent in reducing postharvest tomato spoilage caused by Asp. ochraceus. The media used for growing the yeasts was Yeast Malt Agar (YMA), and maintenance for fungi was Potato Dextose Agar (PDA). The media used for antagonistic test were PDA and Potato Dextrose Broth (PDB). Antagonistic test by strip method was carried out by using the concentrations of yeast cells at (0.7--4.45) x 108 CFU/ml, and Asp. ochraceus at (7.0--8.1) x 107 CFU/ml, Asp. terreus Thom at (7.7--8.6) x 107 CFU/ml and

Drechslera sp. at (0.45--3.5) x 105 CFU/ml. The yeast cells were inoculated 4 hours earlier before inoculation of mould spores on PDA in Petri dishes. Results showed that Candida sp. UICC Y-328 has highest percentage of colony reduction of Asp. ochraceus (56.45%), followed by Metschnikowia reukaufii UICC Y-351 on reducing colonies of Asp. terreus and Drechslera sp. (25.42% and 51.28%, respectively) during 6-day incubation. Antagonistic test by co-culture method was carried out by using the concentrations of yeast cells at (0.7--4.45) x 108 CFU/ml, and Asp. ochraceus at (6.0--8.6) x 107 CFU/ml, Asp. terreus at (4.6--9.5) x 107 CFU/ml. The yeast cells were inoculated 8 hours earlier before inoculation of mould spores on PDB. Results showed that Candida sp. UICC Y-328 reduced the size of conidial heads (5.52%) and hyphae (8.29%) of Asp. ochraceus, at 3-day incubation.

Cryptococcus laurentii UICC Y-379 reduced the size of conidial heads and hyphae of Asp. ochraceus (15.07% and 11.60% respectively) and Asp.terreus (12.35% and 24.47% respectively) at 3-day incubation. Antagonistic test by slide culture method showed that the yeast cells of four strains (Candida rancensis UICC Y-326, Cr. laurentii UICC Y-319, Cr. laurentii UICC Y-379,and M. reukaufii UICC Y-351) attached to hyphae of Drechslera sp. after 3- and 4-day incubation.

Cells of Candida sp. UICC Y-328 attached to hyphae of Drechslera sp. after 4-day incubation. Cells of Cr. laurentii UICC Y-385 was not able to attach to hyphae of Drechslera sp. Candida sp. UICC Y-328 was potential in reducing the growth of Asp. ochraceus, and was investigated further for its potential as a biocontrol agent. Wounds on postharvest tomatoes were inoculated with 25 μ l of yeast cell suspension and 25 μ l of mould spore suspension. The yeast cells were

inoculated 24 hours earlier before inoculation of mould spores on wounds of tomatoes. Biocontrol study showed that incidence of spoilage in postharvest tomatoes which were wounded and inoculated with Candida sp. UICC Y-328 and Asp. ochraceus, were reduced by 20% after 15-day incubation at room temperature. All postharvest tomatoes which were wounded and inoculated with Asp. ochraceus as control, were spoiled (100%). Synthetic fungicide Dithane M-45 at a concentration of 0.08% reduced spoilage incidence by 70%. Candida sp.

UICC Y-328 was not effective as biofungicide in reducing spoilage incidence.