Bioprospek Mikosin dari Khamir Indigenous Indonesia (Asal Kebun Raya Cibodas) sebagai Biokontrol Jamur Patogen pada Tanaman Pangan

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The consequential use or, overuse of harmful chemicals (synthetic fungicides) on crop plants and products to counter infestation by phytopathogens is a major health concern for the consumers and environmental destruction. One available alternative which is safer and environmental-friendly, is to use microorganisms with antifungal effects as biocontrol agents to reduce or inhibit the rate of propagation of destructive fungi on crop plants and products. Indigenous Indonesian yeasts have the potential of producing mycocin (yeast killer toxin) as biocontrol agents of fungal pathogens on crop plants. The objective of this research was to explore the inhibitory potential of yeast collection from Cibodas Botanic Garden, from University of Indonesia Culture Collection (UICC), against fungal pathogens on tomato fruits and plants. The research was focused on isolation of fungal pathogens from decayed tomato fruits and infected plants, identification of fungal pathogens, obtaining mycocin-potential yeasts for their ability to inhibit fungal postharvest decay on tomato fruit, and information on the mechanism of antagonistic yeasts on fungal pathogens. We obtained 41 mould pathogenic isolates (9 representative isolates) from infected leaves, and 12 mould isolates (3 representative isolates) from decayed fruits. We obtained 41 yeast pathogenic isolates (7 representative isolates) from decayed fruits, and 15 yeast isolates (6 representative isolates) from infected leaves. A total of 113 fungal pathogenic isolates were obtained, and 27 fungal isolates were selected for antagonism test. Antagonism test of mycocin-potential yeasts against mould pathogens resulted in grouping the mycocin-potential yeasts into 8 ranked-groups. The first to the third group were represented by *Debaryomyces nepalensis* UICC Y-328 which inhibit 8 mould pathogens, *Rhodotorula* sp. UICC Y-386 which inhibit 6 mould pathogens, *Rhodotorula* sp. UICC Y-384 which inhibit 5 mould pathogens, respectively. The fourth group was represented by *Metschnikowia reukaufii* UICC Y351, *Rhodotorula* sp. UICC Y-318, Y-325, Y-332, Y-381, *Cryptococcus* sp. UICC Y-385, which inhibit 4 mould pathogens. Antagonistic test of mycocin-potential yeasts against yeast pathogens resulted in grouping the mycocin-potential yeasts into 15 ranked-groups. The first group was represented by *Cryptococcus laurentii* UICC Y-319, *Rhodotorula* sp. UICC Y-381, and *Rhodotorula* UICC Y-384, all of which inhibit 15 yeast pathogens. The second group was represented by *Rhodotorula* sp. UICC Y-332, Y-377, Y-386, all of which inhibit 14 yeast pathogens. The third group was represented by *Rhodotorula* sp. UICC Y-318, Y-325, Y-330, *Cryptococcus aethanolamini* UICC Y-322, and *Cryptococcus laurentii* UICC Y-324 which inhibit 13 yeast pathogens. Identification of mould pathogens by conventional method resulted in 7 genera of moulds (*Aspergillus, Curvularia, Drechslera, Galactomyces, Moniliela, Penicillium,* and *Rhizopus*), and 11 species (*A. niger*, *A. ochraceus*, *A. oryzae*, *A. parasiticus*, *A. terreus*, *Cur. lunata, Drechslera* sp., *G. geotrichum*, *M. suaveolens*, *Pen. glabrum*, and *Rh. oryzae*). Identification of yeast pathogens by molecular method based on inter-transcribed spacer region (ITS region) resulted in 8 genera of yeasts (*Candida*, *Debaryomyces*, *Issatchenkia*, *Pseudozyma*, *Rhodotorula*, *Sporidiobolus*, *Trichosporon*, and *Ustilago*) and 7 species (*C. intermedia*, *D. hansenii*, *I. orientalis*, *Rhodotorula* sp., *R. glutinis*, *T. asahii* and *U. maydis*). Efectivity test of cell-suspension of mycocin-potential yeasts (10^8 cell/ml) on tomato leaves infected with mould pathogens showed that the filaments/hyphae of mould pathogens became shorter and slender, the diameter of conidial head became smaller and reduced up to 80%, and conidial head became infertile, compared to the mould pathogens control. Efectivity test of cell-suspension of mycocin-potential yeasts (10^8 cell/ml) for their ability to inhibit fungal postharvest decay on fresh tomato fruits, showed that the filaments/hyphae of mould pathogens were restricted, or showed no growth at all. Fresh tomato fruits sprayed with

cell-suspension of mycocin-potential yeasts (10^8 cell/ml) retained their freshness up to 3 weeks. Similar results were shown by fresh tomato fruits treated with 0.01% synthetic fungicide Dithane. Our results showed that mycocin-potential yeasts are potential as biocontrol agents and can be used as an alternative to synthetic fungicides.