



DATA BUKTI LULUSAN S3 BERBASIS RISET PUSAT STUDI BIOFARMAKA LPPM-IPB

Kissinger

BIOPROSPEKSI HUTAN KERANGAS:
ANALISIS *NEPENTHES GRACILIS* KORTH. SEBAGAI
SPESIES KUNCI YANG MENJADI STIMULUS KONSERVASI

KISSINGER



SEKOLAH PASCASARJANA
INSTITUT PERTANIAN BOGOR
BOGOR
2013



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1 Diversity of Endophytic Fungi Derived from Indonesian Medicinal Plant Red Ginger (*Zingiber*
2 *officinale*) and Their Inhibitory Effect to *Fusarium oxysporum* Pathogenic Fungi

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14 Indonesia has high medicinal plant diversity, however there was limited study of endophytic
15 fungi associated with them. Red ginger (*Zingiber officinale*) is a very important Indonesian
16 medicinal plant to cure human diseases. The objectives of this research were to study the diversity
17 of endophytic fungi of red ginger (*Zingiber officinale*) and their potency as source of antifungal
18 agent. Fungal isolation was carried out from all parts of plant organs such as leaf, rhizome, root, and
19 stem. Fungal identification was done by morphological and molecular analysis using rDNA. Thirty
20 endophytic fungi were successfully isolated from leaf, rhizome, root, and stem of red ginger plant.
21 Antifungal activity was tested against *Fusarium oxysporum* pathogenic fungi. Based on
22 morphological and molecular analysis, all 30 isolates belonged to 13 species and 2 mycelia sterilia.
23 The fungi were *Acremonium macroclavatum*, *Cochliobolus geniculatus*, *Colletotrichum*
24 *gloeosporoides*, *Curvularia affinis*, *Fusarium solani*, *Glomerella cingulata*, *Lecanicillium*
25 *kalimantanese*, *Leiosphaerella sp.*, *Myrothecium verrucaria*, *Neonectria punicea*, *Periconia*

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Atit Kanti

Species Diversity of Yeast Inhabiting Leaf Surfaces and Leaf Litter in South East Sulawesi, Indonesia¹ (Keanekaragaman Khamir yang di isolasi dari Sulawesi Tenggara, Indonesia)

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ABSTRACT

In the present study, we investigated the occurrence of yeast inhabiting leaf surfaces and leaf litter in South East Sulawesi, Indonesia, to evaluate species richness of yeast in Indonesian ecosystems. A total of 140 strains were isolated from 12 samples including, 6 leaves and 6 leaf litter samples collected in Papalia Protected Forest, and 16 samples including 6 leaves and 10 leaf litter collected from Mekongga Protected Forest. Yeasts were cultivated using dilution, direct inoculation, membrane filtration, or ballistospore falling methods. Analysis of 26SrDNA D1/D2 domain and internal transcribed spacer (ITS) region sequences analysis showed that the strains belong to thirteen genera within the phyla *Ascomycota* and *Basidiomycota*, in the subphyla *Saccaromycotina*, *Agaricomycotina* and *Pucciniomycotyna*. The genus *Candida* was the most dominant genus, a total of 67 yeast strains isolated from the Papalia and Mekongga sites. From a total of 28 samples, leaf litter samples where yeast could be isolated most of the 97 isolates. Genera *Candida*, *Cryptococcus* and *Sporodiobolus* were the dominant yeast genera in South East Sulawesi and were isolated from all types of habitats sampled. Based on genetic distances and physiological profiles, thirty-four strains classified into five groups are potentially novel yeast species.

Keywords: Indonesia; novel yeast species; Sulawesi; yeast

INTRODUCTION

Yeast has been a focus of various bioprospecting research to discover many important substances as a raw material for cosmetic, biosurfactant, biochelators, and enzymes industries. Indonesia as one of the mega biodiversity countries should be of interest to verify the important of genetic resources of the country for the benefit of Indonesian peoples.

The taxonomic studies on yeast from natural habitat have been mainly carried out in temperate regions, such as Europe, North America, China and Japan (Wang & Bai 2004; Butinaret *et al.* 2005; Takashima *et al.* 2011). Only few reports are from tropical region. The study on yeast biodiversity in Asia just started and further extensive studies are required (Nakase *et al.* 2010, Takashima *et al.* 2012). Indonesia is a tropical biological diversity rich area and have a unique flora, fauna and microbes. Rifai (1995) estimated that Indonesia has more than 200.000 species of fungi, but only few information on species diversity of Indonesia indigenous yeast and yeast-like fungi. Information about yeast in Indonesia mostly related to their role in fermented foods (Abe *et al.* 2004, Kuriyama *et al.* 1997). The information on the presence of yeasts in natural environments is not widely available. The study of yeast from natural environment in Indonesia was started 40 decades ago when Deinema in 1961 found *Candida bogoriensis* from the surface of leaves of the flowering shrubs *Randia melleifera* (Rubiaceae) in Bogor. Exploration on the richness of yeast diversity in Indonesia was reported further between 2000 and 2010 (Sudiana & Rahmansyah, 2002; Sjamsuridzal *et al.* 2010). Sulawesi is one of the islands in Indonesia, which has high biodiversity uniqueness. Report is mainly focus on flora and fauna. Microbial diversity of Sulawesi need to be verified. For this reason, the richness of yeast in two areas (Mekongga and Papalia) in Sulawesi which has different vegetation was studied. Leaf surface and leaf litter which are reported as a common habitat for yeast (Lee *et al.* 2009; Chang *et al.* 2012) was used as a source of yeast. To gain unique and novel yeast species,

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