FINAL REPORT

Project

ISOLATION AND IDENTIFICATION OF YEASTS FOR BIORESOURCE SCREENING PROGRAM

การคัดแยก และการจัดจำแนกชนิดยีสต์สำหรับโปรแกรมการตรวจหาสารออกฤทธิ์ทางชีวภาพ

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ข้อมูลทั่วไป

ชื่อโครงการวิจัย : การคัดแยก และการจัดจำแนกชนิดยีสต์สำหรับโปรแกรมการตรวจหาสารออกฤทธิ์ทางชีวภาพ

: Isolation and Identification of Yeasts for Bioresource Screening Program

ชื่อหัวหน้าโครงการ : นางวันเชิญ โพธาเจริญ

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สำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ
หน่วยปฏิบัติการวิจัยกลางไบโอเทค อุทยานวิทยาศาสตร์ประเทศไทย
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กิตติกรรมประกาศ

งานวิจัยนี้ได้รับการสนับสนุนโดย โครงการสนับสนุนโดยโครงการพัฒนาองค์ความรู้และศึกษานโยบายการจัดการทรัพยากรชีวภาพในประเทศไทย (โครงการ BRT) ศูนย์พันธุวิศวกรรมและเทคโนโลยีชีวภาพแห่งประเทศไทย และ Japan Society for the Promotion of Science (JSPS) และขอขอบคุณนักวิจัยจากสถาบันวิจัยวิทยาศาสตร์และเทคโนโลยีแห่งชาติ ภาควิชาจุลชีววิทยา มหาวิทยาลัยเกษตรศาสตร์ Osaka University (Japan) และ NITE Biological Resource Center (NBRC) ที่ให้การสนับสนุนอุปกรณ์ และเครื่องมือ ตลอดจนให้ความร่วมมือเป็นอย่างดี

บทคัดย่อ

จากการเก็บตัวอย่างจากแหล่งต่างๆ ในประเทศไทย สามารถคัดแยกยีสต์บริสุทธิ์ได้ทั้งหมด จำนวน 730 สายพันธุ์ ซึ่งคัดแยกได้จากขุยแมลง (213 สายพันธุ์) ดอกไม้ (108 สายพันธุ์) ใบไม้ (141 สายพันธุ์) เห็ด (57 สายพันธุ์) มอส (76 สายพันธุ์) และตัวอย่างอื่นๆ (135 สายพันธุ์) เช่น ส่วนต่างๆ ของต้นไม้ ยางไม้ อาหารหมัก ดิน ปลวก และ *Thermitomyces* sp. ในจำนวนยีสต์ที่คัดแยกได้ทั้งหมดนี้มียีสต์ที่มีความสามารถในการใช้เมทธทนอลได้ (methanol-utilizing yeasts) 32 สายพันธุ์ และยีสต์ที่ใช้เมทธทนอลได้จำนวน 13 สายพันธุ์เป็นยีสต์ทนร้อน ยีสต์ที่คัดแยกได้จำนวน 307 สายพันธุ์ ถูกนำมาจัดจำแนกและศึกษาความสัมพันธุ์ทางวิวัฒนาการ โดยอาศัยลักษณะทางสัณฐานวิทยา สรีรวิทยาและชีวเคมี ลักษณะทางเคมี และการหาลำดับนิวคลีโอไทด์ พบว่าเป็นยีสต์ในกลุ่ม ascomycetous yeasts 215 สายพันธุ์ และ basidiomycetous yeasts 92 สายพันธุ์ จากการศึกษาลำดับนิวคลีโอไทด์ของยีสต์ที่บริเวณ D1/D2 บน 26S rDNA พบว่าเป็นยีสต์ที่ทราบชื่อแล้ว 138 สายพันธุ์ (45 เปอร์เซ็นต์) ซึ่งจำแนกได้เป็น 58 สปีชีส์ 117 สายพันธุ์ เป็นสายพันธุ์ใหม่ (39 เปอร์เซ็นต์) จำแนกเป็น 90 สปีชีส์ ที่เหลืออีก 35 สายพันธุ์ (12 เปอร์เซ็นต์) เป็นยีสต์ที่มีความใกล้เคียงกับยีสต์ที่ทราบชื่อแล้ว และอีก 17 สายพันธุ์ (5 เปอร์เซ็นต์) ซึ่งคัดแยกจากปลวก และ *Thermitomyces* sp. ยังไม่สามารถจัดจำแนกได้ในระดับสปีชีส์

เมื่อพิจารณาตามชนิดตัวอย่างยีสต์ที่คัดแยกได้จากขุยแมลง (insect frass) จำนวน 144 สายพันธุ์ จำแนกเป็นสายพันธุ์ที่ทราบชื่อแล้ว 36 species (76 สายพันธุ์) เป็นสายพันธุ์ใหม่ 50 สปีชีส์ (57 สายพันธุ์) และยังไม่สามารถจัดจำแนกได้จำนวน 11 สายพันธุ์ ยีสต์ที่คัดแยกได้จากดอกไม้ เห็ด และมอส รวมจำนวน 85 สายพันธุ์ จำแนกเป็นยีสต์ที่ทราบชื่อแล้ว 26 สปีชีส์ (41 สายพันธุ์) เป็นสายพันธุ์ใหม่ 27 สปีชีส์ (32 สายพันธุ์) และยังไม่สามารถจัดจำแนกได้จำนวน 12 สายพันธุ์ ส่วนยีสต์ที่คัดแยกจากใบไม้ จำนวน 54 สายพันธุ์ จัดจำแนกเป็นสายพันธุ์ที่ทราบชื่อแล้ว 6 species (14 สายพันธุ์) เป็นสายพันธุ์ใหม่ 20 สปีชีส์ (28 สายพันธุ์) และยังไม่สามารถจัดจำแนกได้จำนวน 12 สายพันธุ์ และยีสต์ที่มีความสามารถในการใช้เมทธานอลและทนอุณหภูมิสูงจำนวน 7 สายพันธุ์ จำแนกเป็นยีสต์ที่ทราบชื่อแล้ว คือ *Pichia capsulata* (5 สายพันธุ์) และ *Candida cariosilignicola* (2 สายพันธุ์)

จากผลการศึกษาแสดงให้เห็นว่ายีสต์ในแหล่งธรรมชาติของประเทศไทยมีความหลากหลาย และยังมียีสต์สายพันธุ์ใหม่อีกจำนวนมากที่ยังไม่ได้รับการเสนอเป็นสายพันธุ์ใหม่ ยีสต์สายพันธุ์ใหม่จำนวน 8 สายพันธุ์ ที่รายงานเป็นสายพันธุ์ใหม่แล้วได้แก่ *Candida khaoyaiensis* sp. nov. และ *Candida thailandica* sp. nov., (Jindamorakot, 2002a), *Candida flosculi* (Jindamorakot, 2002b), *Candida korachensis* และ *Candida lignicola* (Jindamorakot, 2003), *Candida easanensis* sp. nov., *Candida pattaniensis* sp. nov. และ *Candida nakhonratchasimensis* sp. nov. (Jindamorakot, 2004).

Abstract

Seven hundred and thirty strains of yeasts were collected in the natural environment of Thailand. They were isolated from insect frass (213 strains), flowers (108 strains), leaves (141 strains), mushroom (57 strains), moss (76 strains) and miscellaneous ones (135 strains); such as plant materials, exudates, fruits, fermented foods, soils, termite and *Thermitomyces* sp.. Thirty-two methanol-utilizing yeasts, were isolated from soils and plant materials, 13 of them are thermotolerlant yeasts. Taxonomic and phylogenetic studies were carried out on 307 yeast strains. Among them, 215 strains belong to ascomycetous yeasts and 92 strains belong to basidiomycetous yeasts. Based on the sequence analysis of D1/D2 domain of 26S rDNA, 138 strains (45%) belong to 58 known species, 117 strains (38%) were identified as new species, 35 strains are sister species (12%) and 17 strains (5%) from termite and *Thermitomyces* sp., were not yet identified.

Yeasts from insect frass (144 strains) were identified as 36 known species (76 strains), 50 new species (57 strains), and the remaining 11 are not yet identified. In the case of 85 yeasts isolated from flowers, mushrooms and moss were identified as 26 known species (41 strains), 27 new species (32 strains), and the remaining 12 are not yet identified. Fifty-four strains from leave were classified as 6 known species (14 strains), 20 new species (28 strains), and 12 not yet identified. Seven thermotolerlant yeasts were belong to 2 known species, namely *Pichia capsulata* (5) and *Candida cariosilignicola* (2).

These results clearly showed that the species diversity of yeasts is extremely rich in the natural environment of Thailand and many undescribed species were found. Eight new species were described as *Candida khaoyaiensis* sp. nov. and *Candida thailandica* sp. nov., (Jindamorakot, 2002a), *Candida flosculi* (Jindamorakot, 2002b), *Candida korachensis and Candida lignicola*(Jindamorakot, 2003), *Candida easanensis* sp. nov., *Candida pattaniensis* sp. nov. and *Candida nakhonratchasimensis* sp. nov. (Jindamorakot, 2004).

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บทสรุปโครงการ

ยีสต์เป็นรากลุ่มหนึ่งที่มีความหลากหลาย สำหรับในธรรมชาตินั้นยังมียีสต์อีกหลายชนิดที่ยังไม่รู้จัก โดยสามารถพบยีสต์ได้ในดอกไม้ ผลไม้ ขุยแมลง ดิน น้ำทิ้งจากโรงงานอุตสาหกรรม และนอกจากนั้นยังพบยีสต์ในน้ำทะเลอีกด้วยโดยได้มีการนำยีสต์มาใช้ใน อุตสาหกรรมหลายชนิด เช่น ใช้ในการผลิตเครื่องดื่มอัลกอฮอล์ เอนไซม์ วิตามิน และใช้เป็นอาหารสัตว์ สำหรับการศึกษาครั้งนี้มีวัตถุประสงค์ คือ เก็บรวบรวมยีสต์ในธรรมชาติของประเทศไทย โดยเฉพาะยีสต์ที่มีความสัมพันธ์กับแมลง เห็ด พืช ดอกไม้ และต้นไม้ เพื่อจำแนกชนิดของยีสต์ รวมทั้งจัดทำข้อมูล และสร้างแหล่งรวบรวมสายพันธุ์ยีสต์ในประเทศไทย นอกเหนือจากนี้ยังมีเป้าหมายในการศึกษาสารออกฤทธิ์ทางชีวภาพ และสารช่วยย่อยที่อาจพบในยีสต์ โดยมีระยะเวลาดำเนินการเป็นเวลา 3 ปี คือ ตั้งแต่ เดือนพฤศจิกายน 2543 –ตุลาคม 2546

สำหรับขั้นตอนในการแยกยีสต์นั้นใช้วิธี direct streak และ enrichment ในอาหารเลี้ยงเชื้อ Yeast extract malt extract (YM) ที่เติม chloramphenical และ sodium propionate และเก็บยีสต์บริสุทธิ์ที่แยกได้ไว้เพื่อใช้ในการศึกษาต่อไปโดยการแช่แข็งที่อุณหภูมิ –80 องศาเซลเซียส สำหรับการจำแนกชนิดของยีสต์นั้นทำได้โดยการศึกษาลักษณะทางสัณฐานวิทยา สรีรวิทยา และชีวเคมีของยีสต์ และจะได้ทำการจัดเตรียมยีสต์สำหรับโปรแกรมการตรวจหาสารออกฤทธิ์ทางชีวภาพ และสารช่วยย่อยต่อไป

Project Summary

Yeasts are a group of higher fungi with diverse phylogenetic organisms. The yeasts are more abundant in nature and many are still unknown. Yeasts can be found in flowers, fruits, plant leaves, insect frasses, soil, industrial waste water, marine habitat and so on. Yeasts are used in many industrial process such as the production of alcoholic beverages, enzyme, vitamins and animal feed. The project aimed to collect yeasts from natural habitat of Thailand emphasizing on those associated with insect, mushroom, plants, flowers and trees. These isolates will be used as a biomaterials for further study on taxonomy, bioactive compounds and enzyme screening program. The yeasts database is also created as to establish Yeast Collection in Thailand. This is a three years project starting from November 2000 to October 2003.

The direct streaking techniques and enrichment technique were used for yeasts isolation. Yeast extract malt extract agar (YM) supplemented with chlorampehenical and sodium propionate was used as isolation medium. The yeasts were purified and storage at –80^{o}C freezer for further study. The identification of the isolates includes the characteristics morphology, physiology, and biochemistry. The pure cultures will be supplied to the screening program for enzyme producing strains.

Expected achievement of the project:

1. Yeasts collection established at BIOTEC
2. Yeasts cultures approximately 150 isolates
3. New species at least 5 strains
4. Publications at least 2 papers
5. Yeast data base and catalogue
6. Cooperation among BIOTEC and Kasetsart University

บทสรุปรายงาน

จากการเก็บตัวอย่างจากแหล่งต่างๆ ในประเทศไทย สามารถคัดแยกยีสต์บริสุทธิ์ได้ทั้งหมด จำนวน 730 สายพันธุ์ ซึ่งคัดแยกได้จากขุยแมลง (213 สายพันธุ์) ดอกไม้ (108 สายพันธุ์) ใบไม้ (141 สายพันธุ์) เห็ด (57 สายพันธุ์) มอส (76 สายพันธุ์) และตัวอย่างอื่นๆ (135 สายพันธุ์) เช่น ส่วนต่างๆ ของต้นไม้ ยางไม้ อาหารหมัก ดิน ปลวก และ *Thermitomyces* sp. ในจำนวนยีสต์ที่คัดแยกได้ทั้งหมดนี้มียีสต์ที่มีความสามารถในการใช้เมทธทนอลได้ (methanol-utilizing yeasts) 32 สายพันธุ์ และยีสต์ที่ใช้เมทธทนอลได้จำนวน 13 สายพันธุ์เป็นยีสต์ทนร้อน ยีสต์ที่คัดแยกได้จำนวน 307 สายพันธุ์ ถูกนำมาจัดจำแนกและศึกษาความสัมพันธุ์ทางวิวัฒนาการ โดยอาศัยลักษณะทางสัณฐานวิทยา สรีรวิทยาและชีวเคมี ลักษณะทางเคมี และการหาลำดับนิวคลีโอไทด์ พบว่าเป็นยีสต์ในกลุ่ม ascomycetous yeasts 215 สายพันธุ์ และ basidiomycetous yeasts 92 สายพันธุ์ จากการศึกษาลำดับนิวคลีโอไทด์ของยีสต์ที่บริเวณ D1/D2 บน 26S rDNA พบว่าเป็นยีสต์ที่ทราบชื่อแล้ว 138 สายพันธุ์ (45 เปอร์เซ็นต์) ซึ่งจำแนกได้เป็น 58 สปีชีส์ 117 สายพันธุ์ เป็นสายพันธุ์ใหม่ (39 เปอร์เซ็นต์) จำแนกเป็น 90 สปีชีส์ ที่เหลืออีก 35 สายพันธุ์ (12 เปอร์เซ็นต์) เป็นยีสต์ที่มีความใกล้เคียงกับยีสต์ที่ทราบชื่อแล้ว และอีก 17 สายพันธุ์ (5 เปอร์เซ็นต์) ซึ่งคัดแยกจากปลวก และ *Thermitomyces* sp. ยังไม่สามารถจัดจำแนกได้ในระดับสปีชีส์

เมื่อพิจารณาตามชนิดตัวอย่างยีสต์ที่คัดแยกได้จากขุยแมลง (insect frass) จำนวน 144 สายพันธุ์ จำแนกเป็นสายพันธุ์ที่ทราบชื่อแล้ว 36 species (76 สายพันธุ์) เป็นสายพันธุ์ใหม่ 50 สปีชีส์ (57 สายพันธุ์) และยังไม่สามารถจัดจำแนกได้จำนวน 11 สายพันธุ์ ยีสต์ที่คัดแยกได้จากดอกไม้ เห็ด และมอส รวมจำนวน 85 สายพันธุ์ จำแนกเป็นยีสต์ที่ทราบชื่อแล้ว 26 สปีชีส์ (41 สายพันธุ์) เป็นสายพันธุ์ใหม่ 27 สปีชีส์ (32 สายพันธุ์) และยังไม่สามารถจัดจำแนกได้จำนวน 12 สายพันธุ์ ส่วนยีสต์ที่คัดแยกจากใบไม้ จำนวน 54 สายพันธุ์ จัดจำแนกเป็นสายพันธุ์ที่ทราบชื่อแล้ว 6 species (14 สายพันธุ์) เป็นสายพันธุ์ใหม่ 20 สปีชีส์ (28 สายพันธุ์) และยังไม่สามารถจัดจำแนกได้จำนวน 12 สายพันธุ์ และยีสต์ที่มีความสามารถในการใช้เมทธานอลและทนอุณหภูมิสูงจำนวน 7 สายพันธุ์ จำแนกเป็นยีสต์ที่ทราบชื่อแล้ว คือ *Pichia capsulata* (5 สายพันธุ์) และ *Candida cariosilignicola* (2 สายพันธุ์)

จากผลการศึกษาแสดงให้เห็นว่ายีสต์ในแหล่งธรรมชาติของประเทศไทยมีความหลากหลาย และยังมียีสต์สายพันธุ์ใหม่อีกจำนวนมากที่ยังไม่ได้รับการเสนอเป็นสายพันธุ์ใหม่ ยีสต์สายพันธุ์ใหม่จำนวน 8 สายพันธุ์ ที่รายงานเป็นสายพันธุ์ใหม่แล้วได้แก่ *Candida khaoyaiensis* sp. nov. และ *Candida thailandica* sp. nov., (Jindamorakot, 2002a), *Candida flosculi* (Jindamorakot, 2002b), ***Candida korachensis*** และ ***Candida lignicola*** (Jindamorakot, 2003), *Candida easanensis* sp. nov., *Candida pattaniensis* sp. nov. และ *Candida nakhonratchasimensis* sp. nov. (Jindamorakot, 2004).

Executive Summary

Seven hundred and thirty strains of yeasts were collected in the natural environment of Thailand. They were isolated from insect frass (213 strains), flowers (108 strains), leaves (141 strains), mushroom (57 strains), moss (76 strains) and miscellaneous ones (135 strains); such as plant materials, exudates, fruits, fermented foods, soils, termite and *Thermitomyces* sp.. Thirty-two methanol-utilizing yeasts, were isolated from soils and plant materials, 13 of them are thermotolerlant yeasts. Taxonomic and phylogenetic studies were carried out on 307 yeast strains. Among them, 215 strains belong to ascomycetous yeasts and 92 strains belong to basidiomycetous yeasts. Based on the sequence analysis of D1/D2 domain of 26S rDNA, 138 strains (45%) belong to 58 known species, 117 strains (38%) were identified as new species, 35 strains are sister species (12%) and 17 strains (5%) from termite and *Thermitomyces* sp., were not yet identified.

Yeasts from insect frass (144 strains) were identified as 36 known species (76 strains), 50 new species (57 strains), and the remaining 11 are not yet identified. In the case of 85 yeasts isolated from flowers, mushrooms and moss were identified as 26 known species (41 strains), 27 new species (32 strains), and the remaining 12 are not yet identified. Fifty-four strains from leave were classified as 6 known species (14 strains), 20 new species (28 strains), and 12 not yet identified. Seven thermotolerlant yeasts were belong to 2 known species, namely *Pichia capsulata* (5) and *Candida cariosilignicola* (2).

These results clearly showed that the species diversity of yeasts is extremely rich in the natural environment of Thailand and many undescribed species were found. Eight new species were described as *Candida khaoyaiensis* sp. nov. and *Candida thailandica* sp. nov., (Jindamorakot, 2002a), *Candida flosculi* (Jindamorakot, 2002b), ***Candida korachensis and Candida lignicola***(Jindamorakot, 2003), *Candida easanensis* sp. nov., *Candida pattaniensis* sp. nov. and *Candida nakhonratchasimensis* sp. nov. (Jindamorakot at al., 2004).

Introduction

The yeasts are one of the most important microorganisms for human life. Human beings have been employed yeasts since more than 4000 years ago for the production of fermented products such as alcoholic beverages and bread (Phaff et al., 1966). They were also used in the modern industries for the production of fine chemicals such as enzymes, vitamins and organic acids, and animal feed as summarized by Domain et al. (1998). Yeast industries are now very big and yeasts are essential for human life. However, the yeast species used for these industries are limited. On the other hand, it is estimated that a vast number of yeasts are living in the substrates of the natural environment and many of them belong to not yet described species. The study of such yeasts will contribute much not only to the basic sciences including the taxonomy, physiology, biochemistry and biodiversity of yeasts but also to the industrial, agricultural and environmental applications.

In Thailand, many kinds of fermented food products have been produced for long years. These fermented products are produced by yeasts as well as lactic acid bacteria and molds. Yeasts associated with fermented foods and related substrates were studied in recent two decades. Most of species found in these substrates belong to already known species that are common to other regions of the world (Saito et al, 1983; Suzuki et al., 1987, 1994; Jindamorakot, 2000; Nagatsuka et al., 2002).

In recent 10 years, basidiomycetous yeasts, mainly ballistoconidium-forming ones, living in plants of Thailand were extensively studied. Thirteen new species were found so far (Nakase et al., 1991; Takashima and Nakase, 1998, 2000,2001; Takashima et al., 1995; Prillinger et al., 1997). These studies clearly indicate that so many undescribed yeasts are living in the natural environment of Thailand. Based on this information, we started the isolation study of yeasts living in the natural environment of Thailand. This paper reports the taxonomic and phylogenetic study of yeasts isolated from insect frass, moss, flowers, leaves, wild mushrooms and some other substrates. Yeast strains isolated are maintained at BIOTEC Yeast Collection (BYC) established through this study.

Objectives:

1. To study the yeasts in natural environment of Thailand.
2. To develop a technology of yeasts systematic at BIOTEC
3. To develop yeast taxonomists.
4. To create Yeasts database of Thailand.
5. To initiate Yeasts Collection at BIOTEC

Target sources:

1. Insect and related materials: termite, beetle, insect frass
2. Plants materials: wild mushroom, moss, leaves, flowers, fruits, exudates and soils

Duration:

Three years (1 January 2001 – 31 December 2003)

Materials and Methods

Sample collection

Samples were collected from various places in the national environment of Thailand during January 2001 to February 2003.

Isolation and purification

Yeasts were isolated by the direct streaking and enrichment techniques with yeast extract-malt extract (YM) medium supplemented with chloramphenical (100 ppm) and sodium propionate (0.2%). The yeast strains were purified by conventional streaking technique and preserved at -80°C.

In the case of ballistoconidium-forming yeasts, they were isolated by improved ballistoconidium-fall method described by Nakase and Takashima (1993). One strain was selected if several strains from the same sample showed the same appearance. The strains were purified by the conventional streaking technique on agar media.

Enrichment isolation of methanol-utilizing yeasts was carried out by triple enrichment in 1 % v/v methanol-YNB broth (0.67% Difco-yeast nitrogen base 1 % v/v methanol was added before using) with incubation on rotary shaker at 30°C. Selection of thermotolerant methanol-utilizing yeast by incubated at 37°C.

Identification

The standard methods in The Yeasts (Kurztman and Fell, 1998) are followed to identify the strains. Characterization of the strains is carrying in the following terms:

1. Investigation of taxonomic characteristics

The strain was characterized morphologically and physiologically by the standard methods described by Yarrow (1998). The assimilation of nitrogen compounds was investigated on solid media using starved inoculums. The characteristics studied were as follows:

- Colony morphology
- budding and cell shape
- growth in liquid and solid medium

- ascospore formation
- sugar fermentation (6 carbon compounds)
- carbon assimilation (36 carbon compounds)
- nitrogen assimilation (4 nitrogenous compounds)
- urease test
- DBB test
- cycloheximide resistance
- starch formation
- liquefaction of gelatin
- growth on vitamin free medium
- growth at various temperature
- growth on medium containing 50% glucose, 60% glucose and 10% sodium chloride

2. Chemotaxonomic characteristic

2.1 Ubiquinone analysis

Ubiquinone system is carried out following the method of Nakase and Suzuki, 1986a). Cells cultivated in 400 ml/l of YPD medium (1% yeast extract, 2% peptone, 2% glucose) for 16-30 h at 25°C and harvested by centrifugation at 6,000 rpm for 5 min. Harvested cells are washed with distilled water and freeze-dried. Dried cells (3 g) are suspended in 50 ml chloroform/methanol (2:1) and kept for one night. Cells are removed by paper filtration. Filtrate is evaporated to dryness using a rotary evaporator and the residue dissolved with 0.5 ml of acetone. Purification of ubiquinone is carried out by preparative thin-layer chromatography (0.5 mm silica gel, 60F254 layers on 20x20 cm glass plate, Merck), with hexane:diethyl ether (85:15) as developer. Development takes about 30 min. A yellow band, corresponding to a yellow spot of the reference standard that also visualize as a dark band under short wave UV light, is scrapped off. The silica gel powder is transferred to a tube and extracted with 1 ml of acetone. The solution is filtered with a 0.2 μm membrane filter and concentrated by N_2 gas. This sample could be stored at -20°C until use. Ubiquinone homologues are separated and identified by HPLC, using Cosmosil column (Waters, 5C18, 4.6 mm x 250 mm), methanol:isopropyl alcohol (2:1) as mobile phase at the

flow rate of 1 ml/min. Ubiquinones is detected at 275 nm, and with known ubiquinones as standards.

2.2 Determination of DNA base composition

Genomic DNA isolation: Genomic DNA is isolated by Marmur's method (1961) with slight modification. Cells are grown in 500 ml Erlenmeyer flask containing 250 ml of YM broth on a rotary shaker, 150 rpm at 25°C and are harvested in the logarithmic growth phase. The cells (5-10 g) are washed twice with 1/15M phosphate buffer with 0.1 M EDTA (pH 7.5), and then suspended in 1.5 vol. of 1/15M phosphate buffer with 0.1 M EDTA and lysed by incubation with 5 mg of 100T Zymolyase and 0.2 ml of mercaptoethanol for 30 min under gentle shaking. SDS (0.5%) is added and the mixture is further incubated at 35°C for 15 min. The reaction mixture is vigorously shaking with equal volume of chloroform:isoamyl alcohol (24:1) and 5% of sodium perchlorate. After centrifugation, the supernatant is collected and DNA is precipitated by addition of 2 vol. of chilled ethanol, and then spooled around glass rod. Crude DNA is dissolved in 4.5 ml of 0.1X SSC, then 0.5 ml of 10X SSC is added. Protein is removed with Proteinase K treatment at 37°C for 30 min and repeated treatment with chloroform:isoamyl alcohol (24:1). RNA is removed by incubation with 0.2 mg of RNase A at 37°C for 2 h, and treated with chloroform:isoamyl alcohol (24:1). After centrifugation, DNA is precipitated with cold ethanol, and then spooled around glass rod. DNA is dissolved in 4.5 ml 0.1 X SSC and 0.5 ml of 10 X SSC is added. After addition of 0.5 ml of acetate-EDTA, 0.54 vol. of chilled isopropyl alcohol is added and DNA is spooled around glass rod. Purified DNA is washed stepwise with 70%, 80%, 90% and 99.5% ethyl alcohol. Purified DNA is kept in 99.5% ethyl alcohol until used.

DNA base composition analysis: DNA base composition is analyzed according to the method of Nakase and Suzuki (1986b). A total of 20 µl of DNA solution (300-500 mg) in 0.1X SSC is boiled for 10 min and rapidly cooled in ice water. After that 20 µl of 2 unit/ml Nuclease P1 was added to DNA solution and the mixture is incubated at 50°C for 60 min. Then 20 µl of alkaline phosphatase (2.4 U/ml) was added and the mixture is further incubated at 37°C for 60 min. The DNA base composition is determined by HPLC using Cosmosil column (Waters, 5C18, 4.6 mm x 250 mm) with 0.02 M $NH_4H_2PO_4$:

acetonitrile (20:1 v/v) at the flow rate 1 ml/min as elution system. Spectrophotometric detection is measured at 270 nm and DNA-GC Kit (Yamasa Co., Tokyo) is used as the quantitative standard.

Molecular characteristics

1. **Isolation of DNA for Polymerase Chan Reaction (PCR):** Isolation of DNA is carried out by the methods of Manitis et al. (1982) with slight modification. A loop full of yeast cells is transferred to 1.5 ml eppendrof tube, add 100 µl of lysis buffer, which composed of 100 mM Tris (pH 8.0), 30 mM EDTA (pH 8.0) and 0.5% sodium dodecyl sulfate (SDS) is added and the mixture is boiled in water bath or metal block bath for 15 min. After boiling, 100 µl of 2.5 M potassium acetate (pH 7.5) is added, placed on ice for 1 h, and centrifuged at 14,000 rpm for 5 min. Supernatant is extracted twice with 100 µl of chlorofrom:isoamyl alcohol (24:1 v/v). DNA is precipitated with isopropanol, place at 20°C for 10 min and centrifuge at 15,000 rpm for 15 min. DNA pellet is rinsed with 70% and 90% ethanol and then dried up (15-30 min at room temperature). The dried DNA is dissolved in 30 µl milli Q water.

2. **Polymerase Chan Reaction:** Polymerase Chan Reaction of rDNA is preformed following the method of Kurtzman and Robnett (1998) with slight modification.

- **Amplification of D1/D2 domain of 26S rDNA:** The divergent D1/D2 domain of 26S rDNA is amplified with primers NL-1 (5'- GCA TAT CAA TAA GCG GAG GAA AAG-3') and NL4 (5'-GGT CCG TGT TTC AAG ACG G-3') (Kurtzman and Robnett, 1998). Amplification is carried out in 100 µl of reaction mixture containing 100 ng of genomic DNA, 2.5 U of Taq polymerase, 20 mM of each dNTP, 10 pM of each primer, 10 mM Tris-HCl and 1.5 mM $MgCl_2$. The reaction is performed for 30 PCR cycles with denaturation at 94°C for 5 min, annealing at 55°C for 1 min and extension at 72°C for 2 min 30 sec and then follow by the final extension at 72°C for 10 min. The amplified DNA is purified with QIAquick PCR Purification Kit according to the manufacturer's instruction. Visualization of the purified of amplified DNA is performed by electrophoresis using 0.8% agarose in 1X TBE buffer (0.09M Tris-borate, 0.001M EDTA; pH 8.0) and strained with ethidium bromide ($8x10^{-5}$ µg/ml) and observedunder UV Transilluminator.

- **Amplification of 18S rDNA:** The 18S rDNA is amplified by the same conditions as use for D1/D2 amplification but with primer P1 (5'-ATC TGG TTG ATC CTG CCA GT-3') and ITS4 (5'-TCC TCC GCT TAT TGA TAT GC-3') (White et al., 1990).

3. DNA sequencing

- **D1/D2 domain of 26S rDNA sequencing:** The nucleotide sequences of D1/D2 domain of 26S rDNA are directly determined using PCR products according to the method of Kurtzman and Robnett (1998) with slight modification. Cycle sequencing of the D1/D2 domain is employed with forward primer, NL1 (5' –GCA TAT CAA TAA GCG GAG GAA AAG-3'), and reverse primer, NL4 (5'-GGT CCG TGT TTC AAG ACG G-3') by ABI Prism™ BigDye™ Terminator Cycle Sequence Ready Reaction Kit (Applied Biosystems, Stafford, USA) according to the manufacturer's instruction.

- **18S rDNA sequence:** The sequence of 18S rDNA and the two internal transcribe spacer regions (ITS1 and ITS2) including the 5.8S rDNA are directly determined using PCR products according to Sugita and Nakase (1999). Ten primers are used for 18S rDNA sequencing (White et al., 1990) and shown in Table 1. Sequencing is performing by using ABI Prism™ BigDye™ Terminator Cycle Sequence Ready Reaction Kit (Applied Biosystems, Stafford, USA) according to the manufactuter's instruction.

Phylogenetic analysis

The sequences are pairwisely compared by BLAST Homology Search (http://www.ncbi.nlm.nih.gov). Generated sequences are aligned with related species by using the CLUSTAL X ver. 1.8 computer program (Thompson *et al.*, 1994). The phylogenetic trees are constructed from the evolutionary distance data according to Kimura (1980) by the neighbor-joining method (Saitou and Nei, 1987). Sites where gaps existed in any sequences are excluded. Bootstrap analysis (Felsenstien, 1985) is performed from 1,000 random re-samplings.

Table 1. Primers for sequencing of 18S rDNA and ITS regions.

Primer (Position in *S. cerevisiae*)	Sequence of Primer
Forward primers	
2F (2-21)	5'-ATC TGG TTG ATC CTG CCA GT-3'
404F (404-423)	5'-GCT ACC ACA TCC AAG GAA GG-3'
934F (934-954)	5'-CTG CGA AAG CAT TTG CCA AAG G-3'
IJ (1449-1473)	5'-TCT GGG CCG CAC GCG CGC TAC ACT G-3'
ITS1 (1755-1778)	5'-GTC GTA ACA AGG TTT CCG TAG GTG-3'
Reverse primers	
U1 (586-563)	5'-TGG AAT TAC CGC GGC TGC TGG CAC C-3'
U2 (1148-1124)	5'-CCG TCA ATT CCT TTA AGT TTC AGC C-3'
U3 (1643-1619)	5'-GAC GGG CGG TGT GTA CAA AGG GCA G-3'
1794R (1794-1775)	5'-GAT CCT TCC GCA GGT TCA CC-3'
pITS6 (173-154)	5'-TCC TCC GCT TAT TGA TAT GC-3'

Source: White et al. (1990)

Results and Discussion

Isolation of yeasts from natural substrates

Seven hundred and thirty strains of yeasts were isolated from insect frass, flower leaves, mushroom, moss and some other substrates; such as exudates, lichens, fruits fermented foods (Table 2.) They were collected from various places in the natural environment of Thailand (Table I., Appendix A). The yeast strains were purified and storage at $-80^{\circ}C$ at BIOTEC Culture Collection.

Table 2. Type of samples and number of yeast isolated.

Year	Samples						Total
	Flowers	Insect frass	Leaves	Moss	Mushroom	Others	
2001	49	138	141	14	43	43	**428**
2002	16	14	-	22	5	35	**92**
2003	60	61	-	40	9	40	**210**
Total	**125**	**213**	**141**	**76**	**57**	**118**	**730**

Thirty-Three strains are methanol-utilizing yeasts, which were collected from Nam Nao National Park, Petchabun province. A total of 13 samples of soil were collected. From the same place 25 samples of plant materials (flowers and fruits) were obtained. The result revealed that among 13 soil samples only 7 samples (53.85%) contained methanol-utilizing yeast and 8 strains were obtained (Table II., Appendix A). From 25 plant materials (flowers and fruits) samples, 15 samples (60.0%) yielded 24 strains of methanol-utilizing yeast (Table II., Appendix A).

Growth at $37^{\circ}C$ on 1% v/v methanol-YNB agar of 8 and 24 strains obtained form soil and plant materials were determined. The result showed that only 1 strains obtained form soil grew well (+4) at this high temperature while 12 strains obtained from plant materials revealed a good growth (+3 to +4). These 13 strains were subjected for identification.

Identification of yeasts from natural substrates

Three hundred and seven strains of yeasts isolated were identified based on the sequence analysis of D1/D2 domain of 26S rDNA and the morphological, physiological and biochemical characteristics. Among them, 215 strains belong to ascomycetous yeasts and 92 strains belong to basidiomycetous yeasts. Based on the morphological characteristics and sequence analysis of D1/D2 domain of 26S rDNA, 138 strains (45%) belong to 58 known species (Table III., Appendix A). They were classified into 39 species (15 genera) of ascomycetous yeasts and 19 species (10 genera) were basidiomycetous yeasts. One hundred and seven strains (38%) demonstrated the nucleotide differences more than 1% from respective nearest species in the D1/D2 domain of 26S rDNA sequences (Table IV., Appendix A). These strains are considered to represent new species as discussed by Kurtzman and Robnett (1998). They were classified into 97 species. Thirty-five strains (12%) maybe known or new species, 2-3 nucleotides were different from respective nearest species (Table V., Appendix A). According to a guideline by Kurtzman and Robnett (1998), nucleotide differences of 2-3 in the D1/D2 domain indicate that these two yeasts are conspecific or sister species from each other. DNA-DNA reassociation experiment is required to identify these strains. The remaining 17 strains (5%) are identified in Genus level (Table VI., Appendix A). The morphological, physiological and biochemical properties of ascomycetous and basidiomycetous yeasts used in this study were shown in (Table VII. and Table VIII., Appendix A).

Phylogenetics analysis

The phylogenetics tree based on the D1/D2 sequences of the representative strains of ascomycetous and basidiomycetous were analized and constructed from the evolutionary distance data according to Kimura (1980) by the neighbor-joining method (Saitou and Nei, 1987) as shown in Figure 1. and 2.

Identification and phylogenetics analysis of yeasts from insect frass

One hundred and forty-four strains from insect frass were identified as 36 known species (76 strains), 50 new species (57 strains), and the remaining 11 are not yet identified. The remaining strains were considered to belong to known species or sister species of known species. Probably, some of them represent new species closely related to respective known species. Therefore, it is considered that about a half of yeasts isolated from insect frass represent new species. From the results of D1/D2 domain sequences of represent new species, some of them had the same sequence (Table IV., Appendix A). Six strains closely related to *Candida friedrichii* and considered to represent 4 new species by ST-300, ST-328, ST-329 and ST-333 had identical sequences and position and wo strains, ST-249 and ST-337 were located at the same position on the phylogenetic tree by differed in 37 nucleotides from *Candida musae* (Figure 3.). Also these two strains, ST-309 and ST-310 had the same sequence and nearest with *Debareomyces vanrijiae* var. *yarrowii* (Figure 4.). Three strains, ST-225, ST-228 and ST-229 had identical sequences that were closed to *Pichia japonica* by 6 nucleotides difference. Two strains were located at the same position and close to *Pichia heimii*, 23 nucleotides were substituted in this case (Figure 5.). These three new species were described as *Candida easanensis* sp. nov., *Candida pattaniensis* sp. nov. and *Candida nakhonratchasimensis* sp. nov. (Jindamorakot, 2004).

In addition to these new species from insect frass, only three strains represent by ST-71, ST-73 and ST-318 belong to basidiomycetous yeasts and nucleotide differences more than 1% from respective nearest species (Figure 2.).

Among new species discussed above, ST-15, ST-17 were named *Candida khaoyaiensis* sp. nov., *Candida thailandica*, respectively (Jindamorakot et al., 2002a). These two species will be validly described soon.

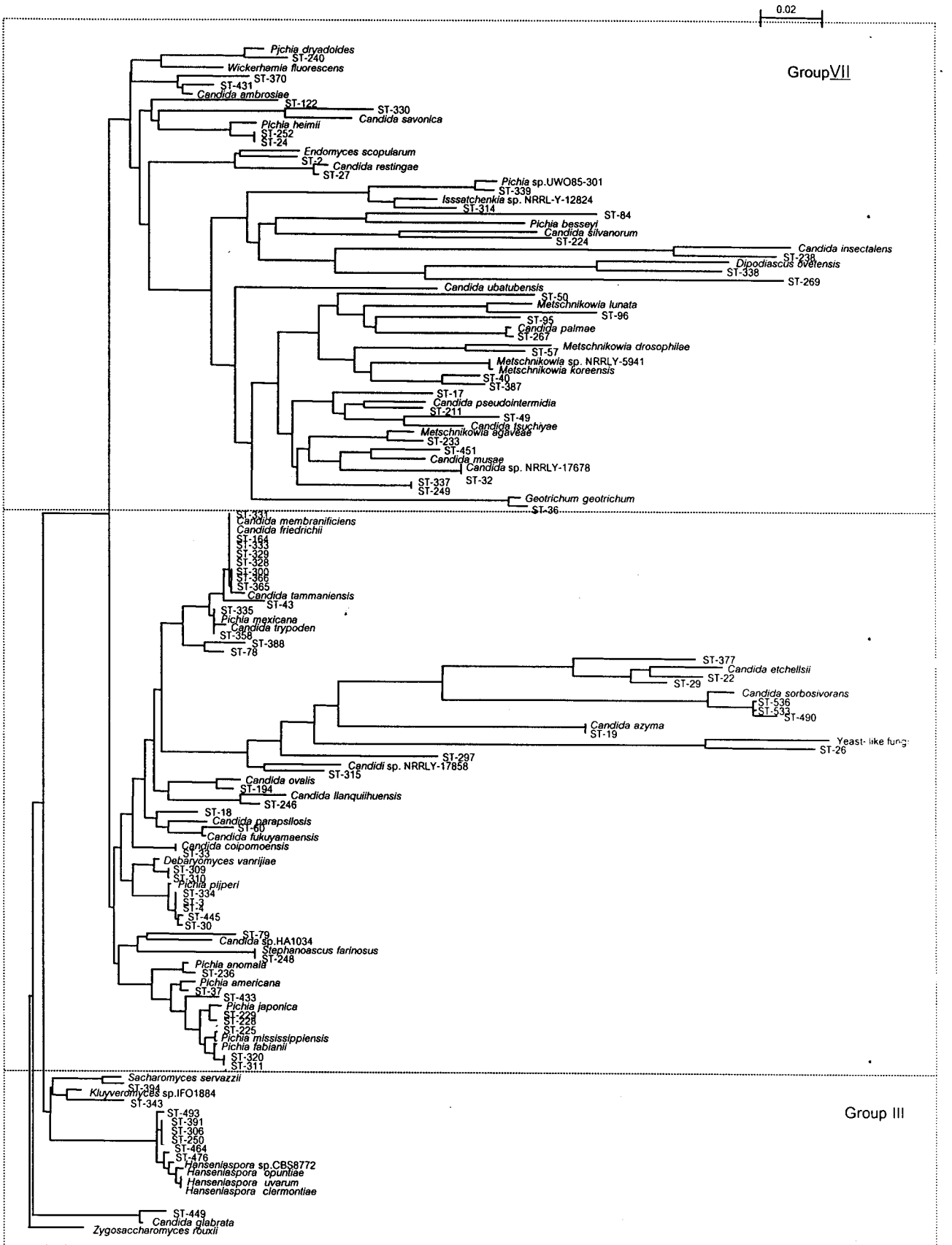

Figure 1. The phylogenetics tree of the representative strains of ascomycetous yeasts based on the D1/D2 domain sequences of 26S rDNA.

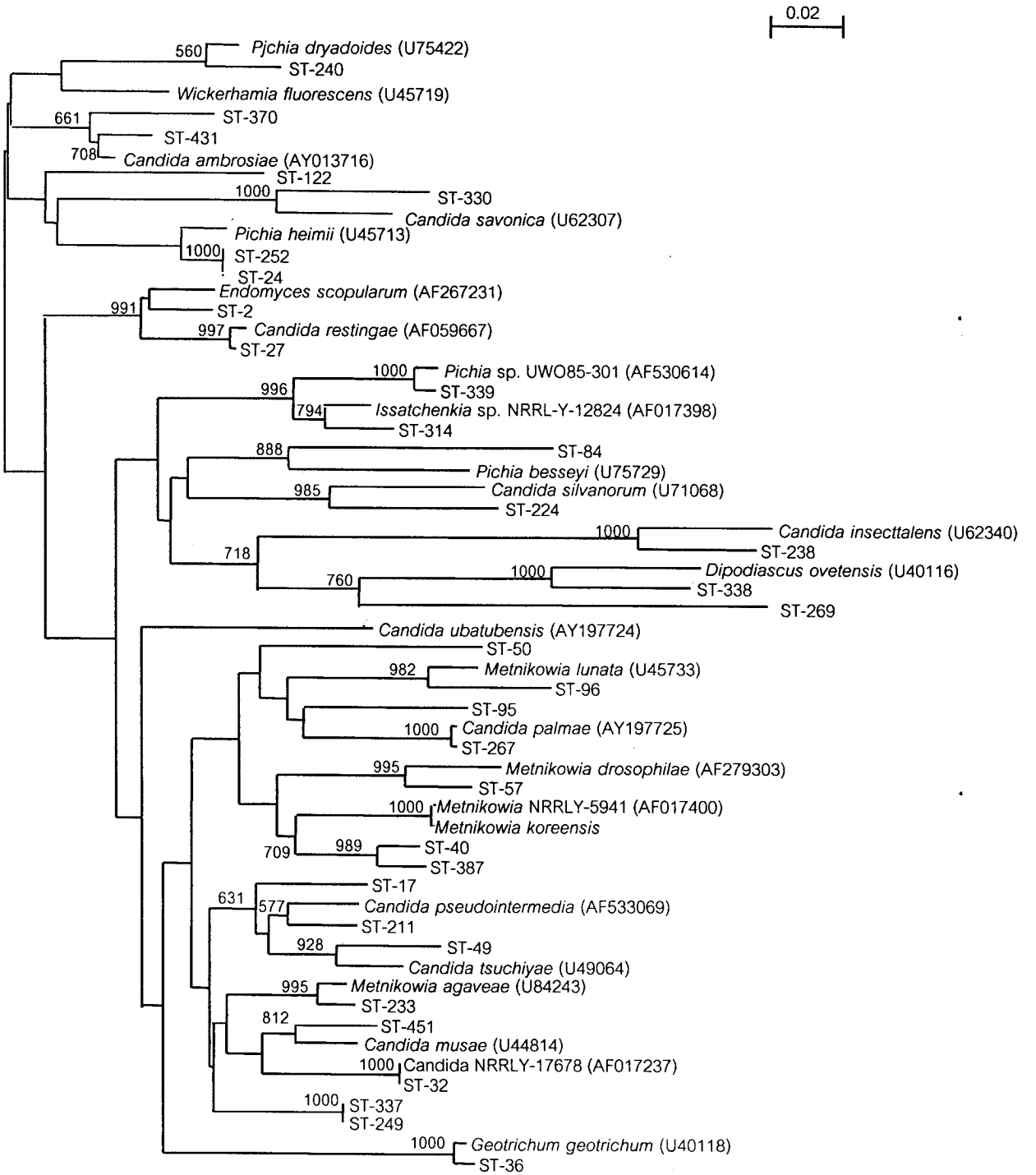

Figure 1a. The phylogenetics tree of the representative strains of ascomycetous yeasts Group I based on the D1/D2 domain sequences of 26S rDNA with bootstrap values by 1000 re-sampling (< 50% is not shown).

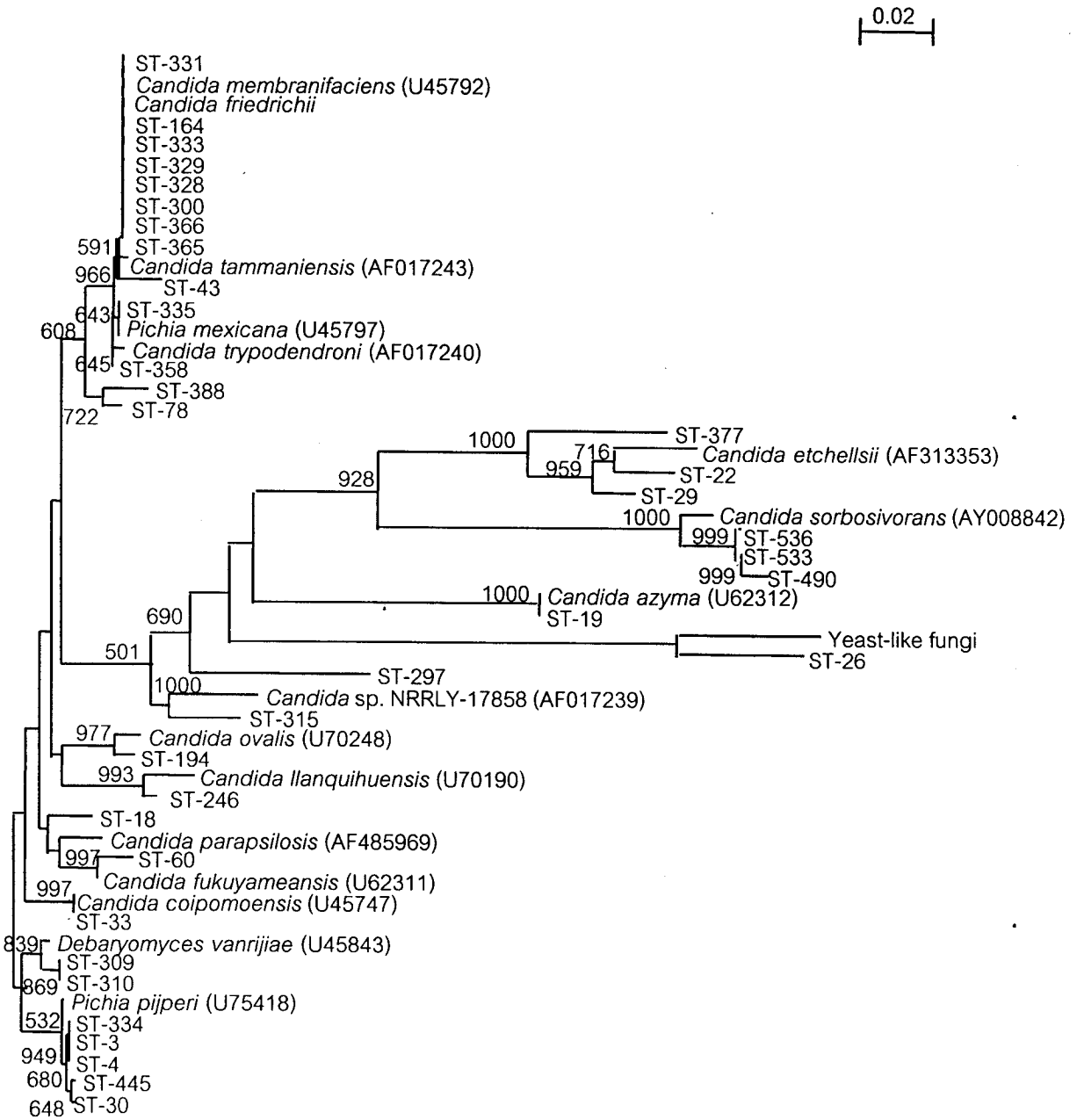

Figure 1b. The phylogenetics tree of the representative strains of ascomycetous yeasts Group II based on the D1/D2 domain sequences of 26S rDNA with bootstrap values by 1000 re-sampling (< 50% is not shown).

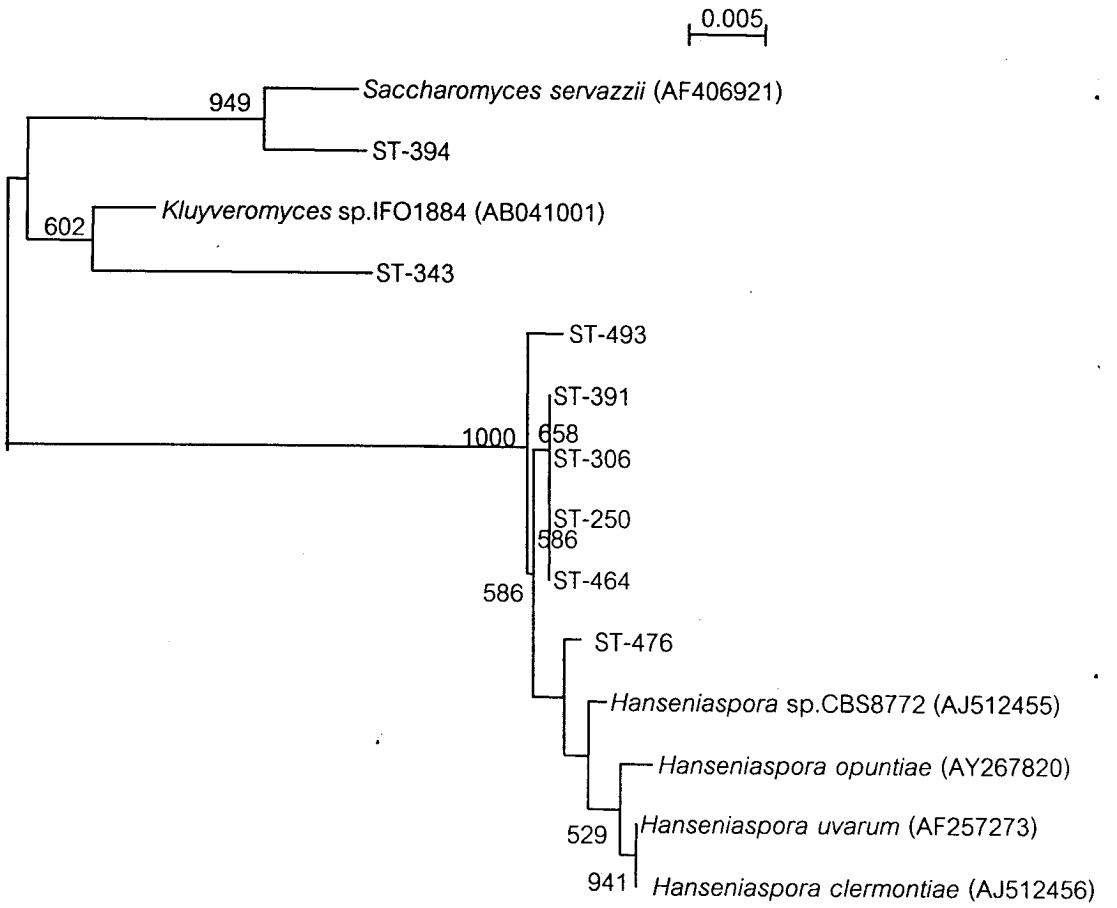

Figure 1c. The phylogenetics tree of the representative strains of ascomycetous yeasts Group III based on the D1/D2 domain sequences of 26S rDNA with bootstrap values by 1000 re-sampling (< 50% is not shown).

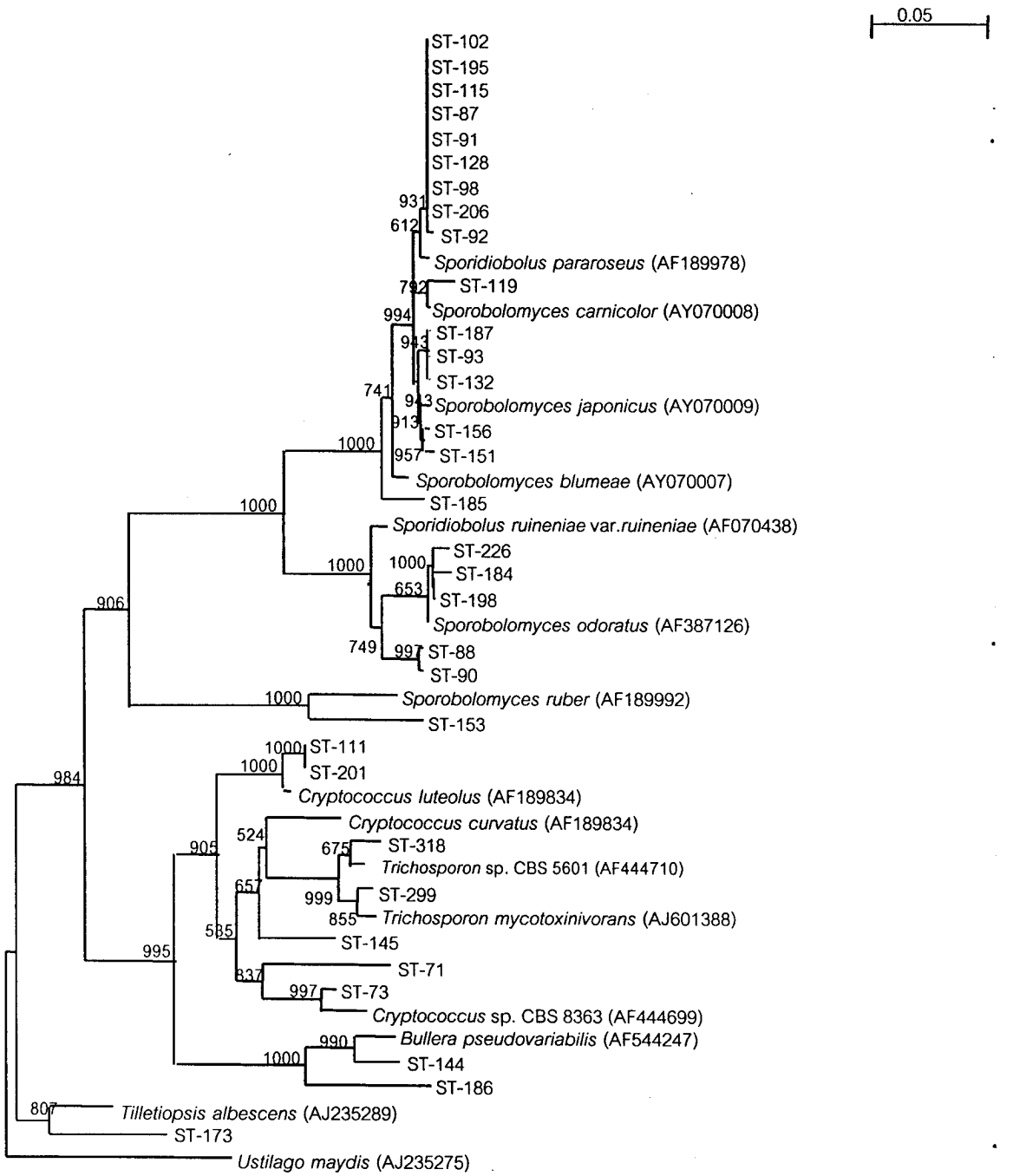

Figure 2. The phylogenetics tree of the representative strains of basidiomycetous yeasts based on the D1/D2 domain sequences of 26S rDNA with bootstrap values by 1000 re-sampling (< 50% is not shown).

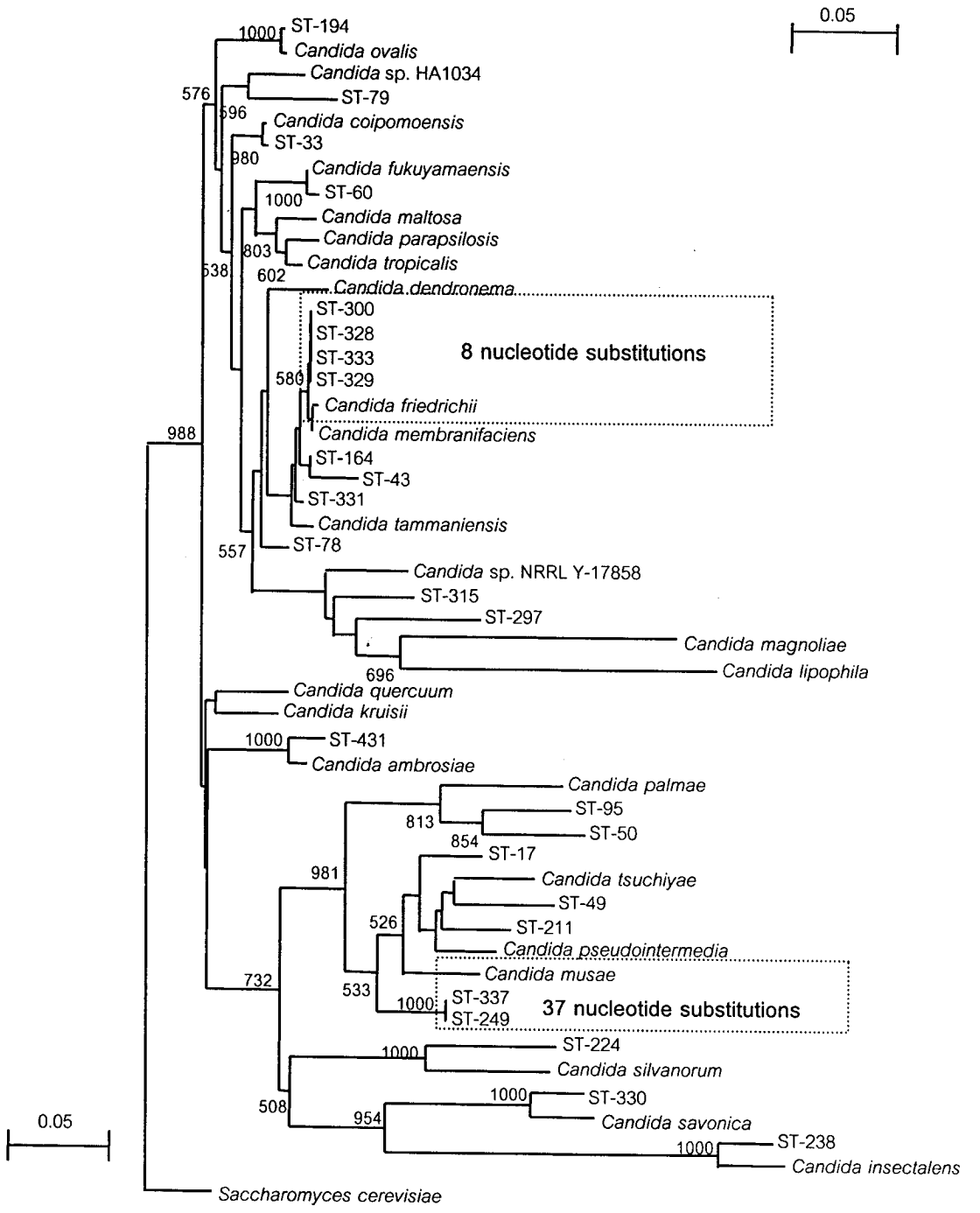

Figure 3. Phylogenetic tree showing the position of the new *Candida* species isolated from insect frass based on the sequence of the D1/D2 domain of 26S rDNA with bootstrap values by 1000 re-sampling (< 50% is not shown).

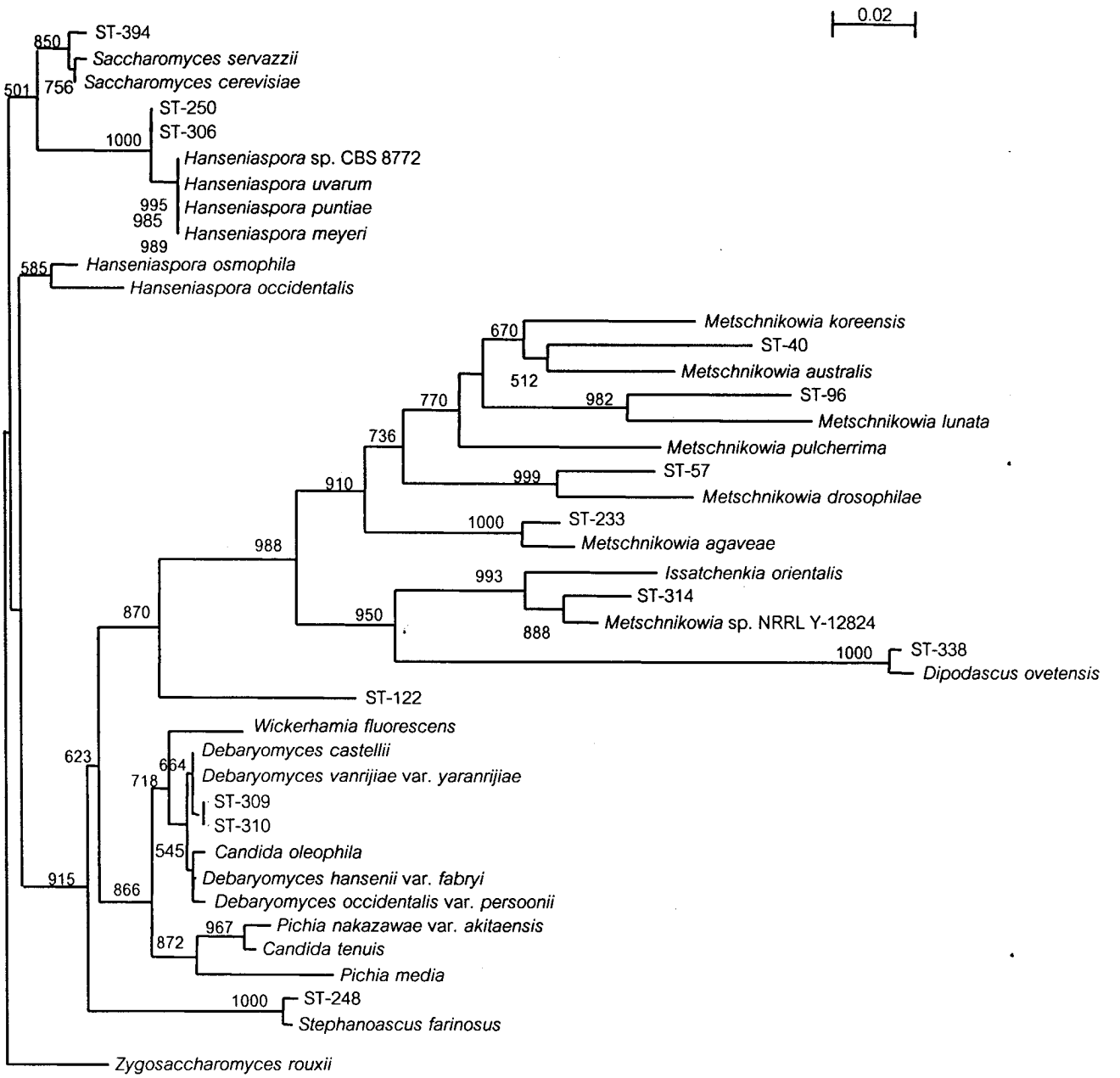

Figure 4. Phylogenetic tree showing the position of the new ascomycetous yeast species (other than *Candida* and *Pichia*) from insect frass based on the sequences of the D1/D2 domain of 26S rDNA with bootstrap values by 1000 re-sampling (< 50% is not shown).

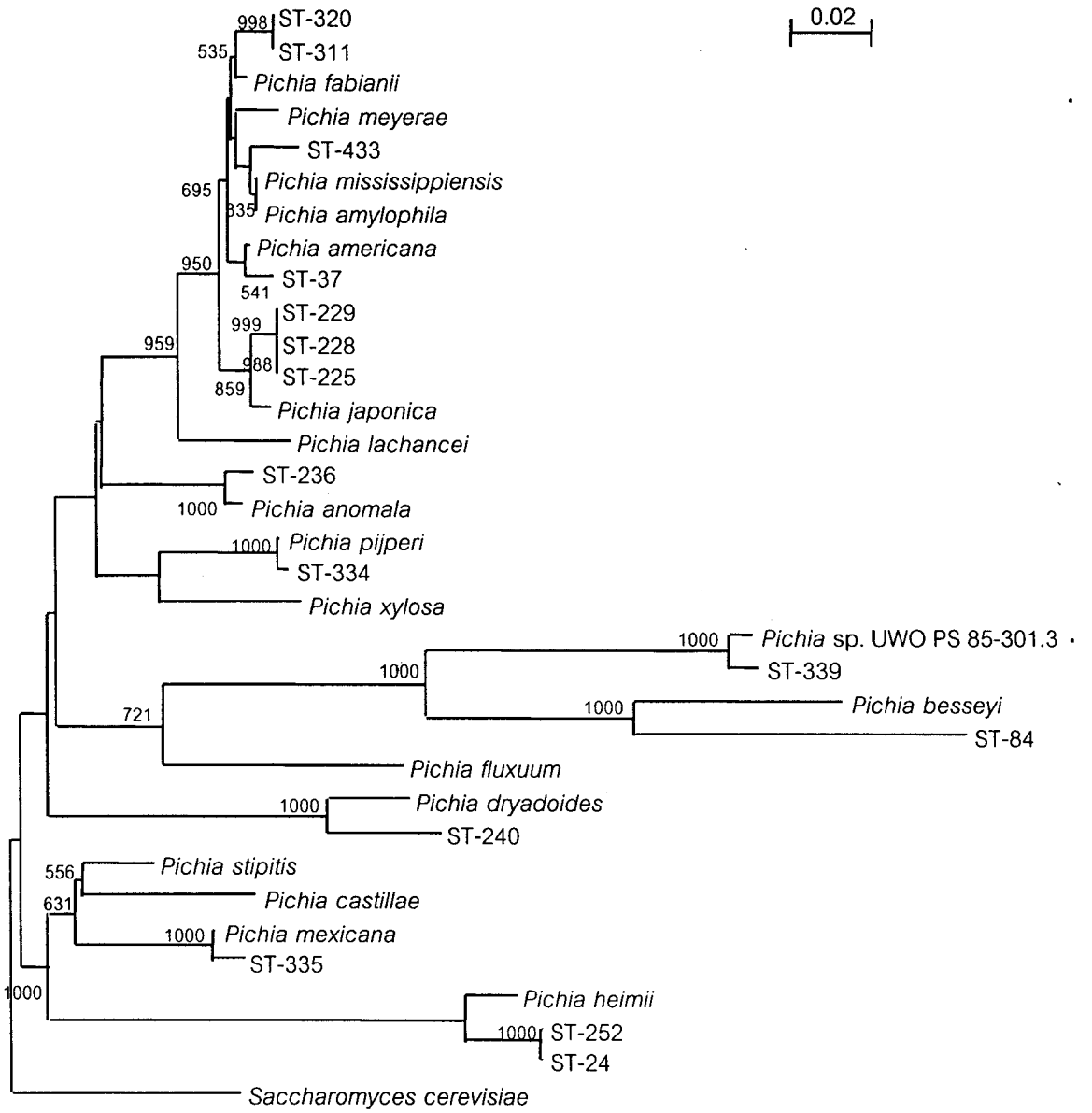

Figure 5. Phylogenetic tree showing the position of the new *Pichia* species isolated from insect frass based on the sequence of the D1/D2 domain of 26S rDNA with bootstrap values by 1000 re-sampling (<50% is not show).

Identification and phylogenetics analysis of yeasts from flowers, moss, mushrooms

Eighty-five yeast strains isolated from flowers (25), moss (27), mushrooms (28) and other (5) were identified as 26 known species (41 strains), 27 new species (32 strains), and the remaining 12 are not yet identified.

Twenty-five strains of yeasts isolated from flowers were identified as 13 known species, 10 new species and a remaining strain are not yet identified. ST-46 has identical sequence as *Debayomyces* sp. NRRL Y-7804 that is considered a new species but not yet described. ST-533, ST-536 and ST-490 closed to *Candida sorbosivorans* by 11 and 13 nucleotide differences but these strains have not identical sequences. ST-22 and ST-29 were located at the position near *Candida etschellsii,* their closest species, by big difference between them. ST-26 differs more than 5% of nucleotides in this domain from a yeast-like fungus whose sequences was registered at DNA data bank. However, the data base of D1/D2 domain of yeast-like fungi is not good at present so that it is difficult to judge whether ST-26 represent a new species. Among new species discussed above, ST-22 isolated from a flower was proposed to name *Candida flosculi* sp. nov. (Jindamorakot et al., 2002b). This species will be validly described soon. The phylogenetic tree of the representative strains from flowers and mosses is show in Figure 6.

Fourteen strains from moss belong to 10 known species, 7 strains represented to 7 new species and 6 isolated are not yet identified. The representative strains belong to *Candida* (4 strains), *Pichia* (2 strains) and *Galactomyces* (1 isolate). ST-30 and ST-445 were located near *Pichia pijperi,* (Figure 7.) their closest species, but they had not identical sequence by 2-3 nucleotide substitutions.

Twenty-eight strains from mushrooms were identified as 10 known species (13 strains), 9 new species (11 strains) and 4 strains are not yet identified. Four strains, ST-2, ST-18, ST-246 and ST-370 differed in more 3% than their closest species. Some of representative strains had identical D1/D2 sequences, ST-365 and ST-366 closed to *Candida friedrichii* (6 nucleotide substitutions), ST-3 and ST-4 differed from *Pichia pijperi* in 7 nucleotides. Their positions on the phylogenetic tree are show in Figure 8.

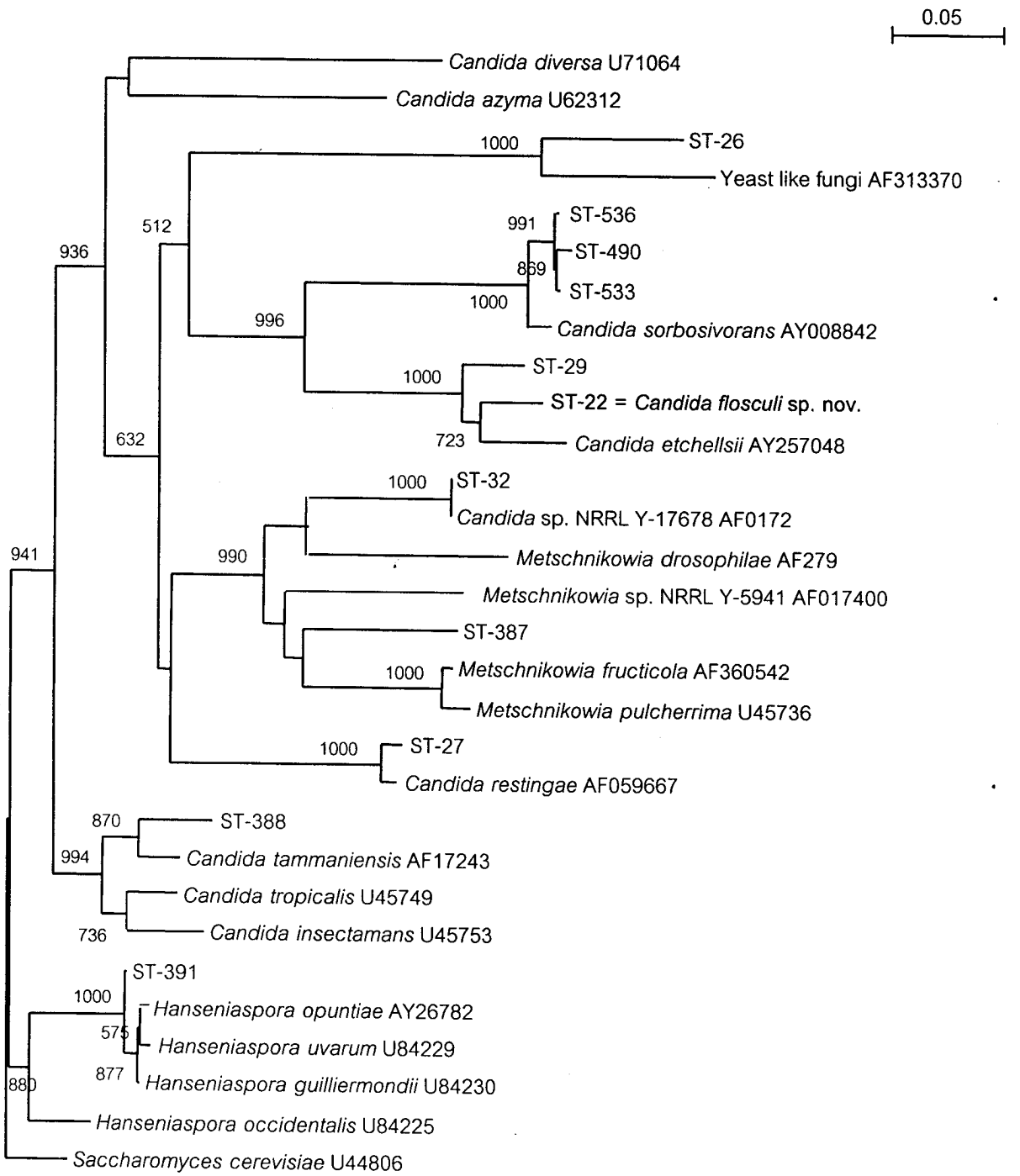

Figure 6. Phylogenetic tree of representative strains from flowers and their related species based on D1/D2 domain of 26S rDNA sequences. The numerals represent the frequency based on 1000 replicate bootstrap samplings.

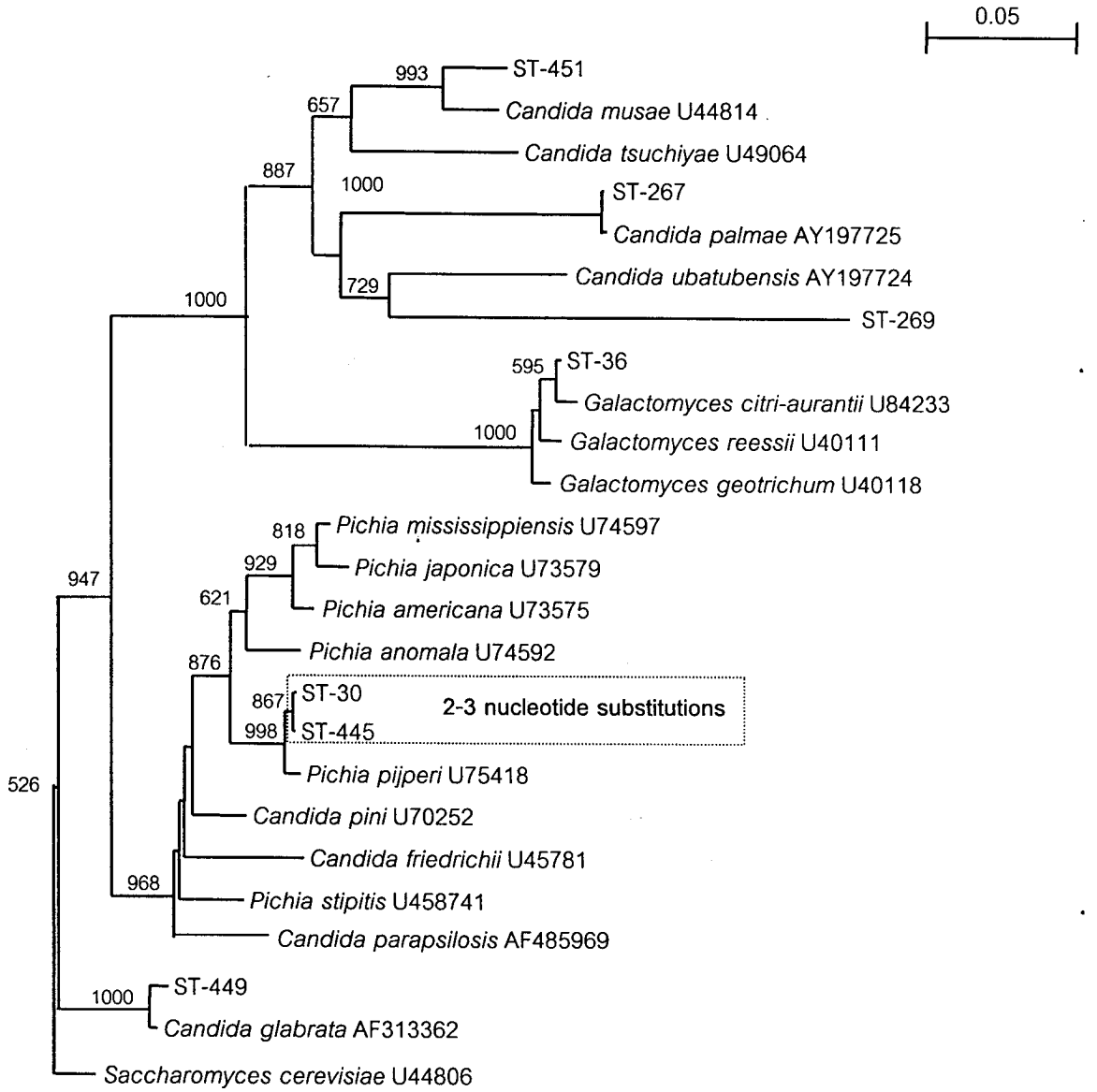

Figure 7. Phylogenetic tree of representative strains from mosses and their related species based on D1/D2 domain of 26S rDNA sequences. The numerals represent the frequency based on 1000 replicate bootstrap samplings.

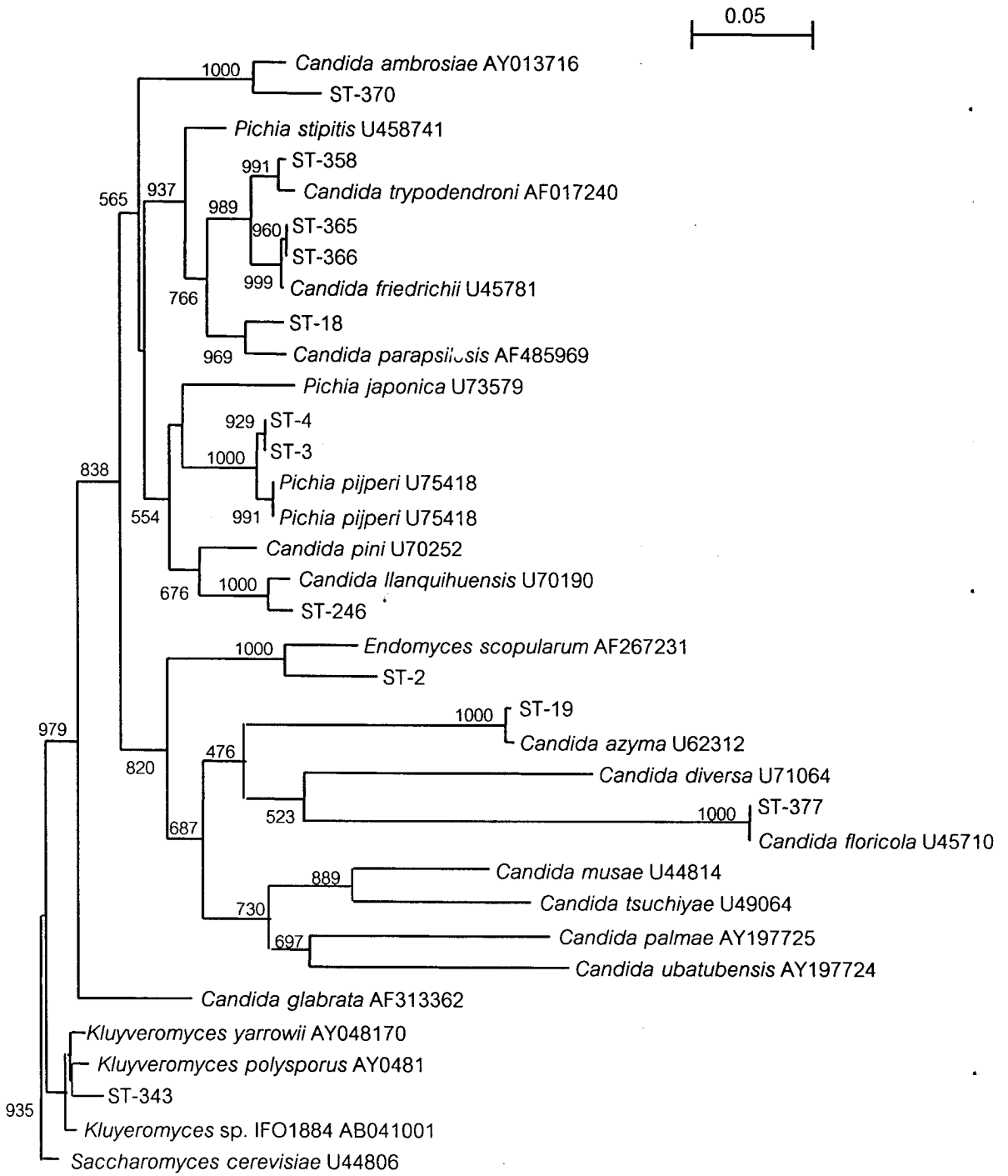

Figure 8. Phylogenetic tree of representative strains from mushrooms and their related species based on D1/D2 domain of 26S rDNA sequences. The numerals represent the frequency based on 1000 replicate bootstrap samplings.

Identification and phylogenetics analysis of yeasts from leaves

Fifty-four strains from leave were classified as 6 known species (14 strains), at least 16 new species (28 strains), and 12 not yet identified From these results, it is conclude that about a half of yeasts isolated from leave represent new species. The representative strains were studied on the phylogenetic analysis based on the D1/D2 domain sequences of 26S rDNA. Among strains assigned to the genus *Sporidiobolus*, 9 strains had identical sequences and closed to *Sporidiobolus pararoseus* by 4 nucleotide substitutions and the remaining strains, ST-88 and ST-90 closed to *Sporidiobolus ruineniae* by 16 nucleotide substitutions but differed in 2 nucleotide substitutions between them. Ten strains represent 7 new species in the genus *Sporobolomyces*. Among them, 5 strains closed to *Sporobolomyces japonicus*, ST-93, ST-132 and ST-187 had the same sequences but differed in 5 nucleotides from their closest species and the remaining 2 strains ST-151 and ST-156 differed in 4 and 5 nucleotides, respectively. The positions on the phylogenetic tree of the strains closed to *S. japonicus* represent to 3 new species (Figure 9.). Among not yet identified species, they were assigned to 5 species in the genera *Bullera* (1 species, 2 strains), *Sporobolomyces* (3 species, 8 strains) and *Tilletiopsis* (1 species, 2 strains).

In the past decade, however, extensive studies have been carried out on the ballistoconidium-forming yeasts living in the phyllosphere of plants in Thailand (Fungsin et al., 2001, 2002ab, 2003ab; Nakase et al, 1991; Takashima and Nakase, 1998, 2000, 2001; Takashima et al., 1995). From these studied, 17 new species of ballistoconidium-forming yeasts form the phylosphere and a new ascomycetous yeasts form fermented foods were described. It is suggested that species diversity of yeasts is richer in the natural environment than in fermented foods and related materials.

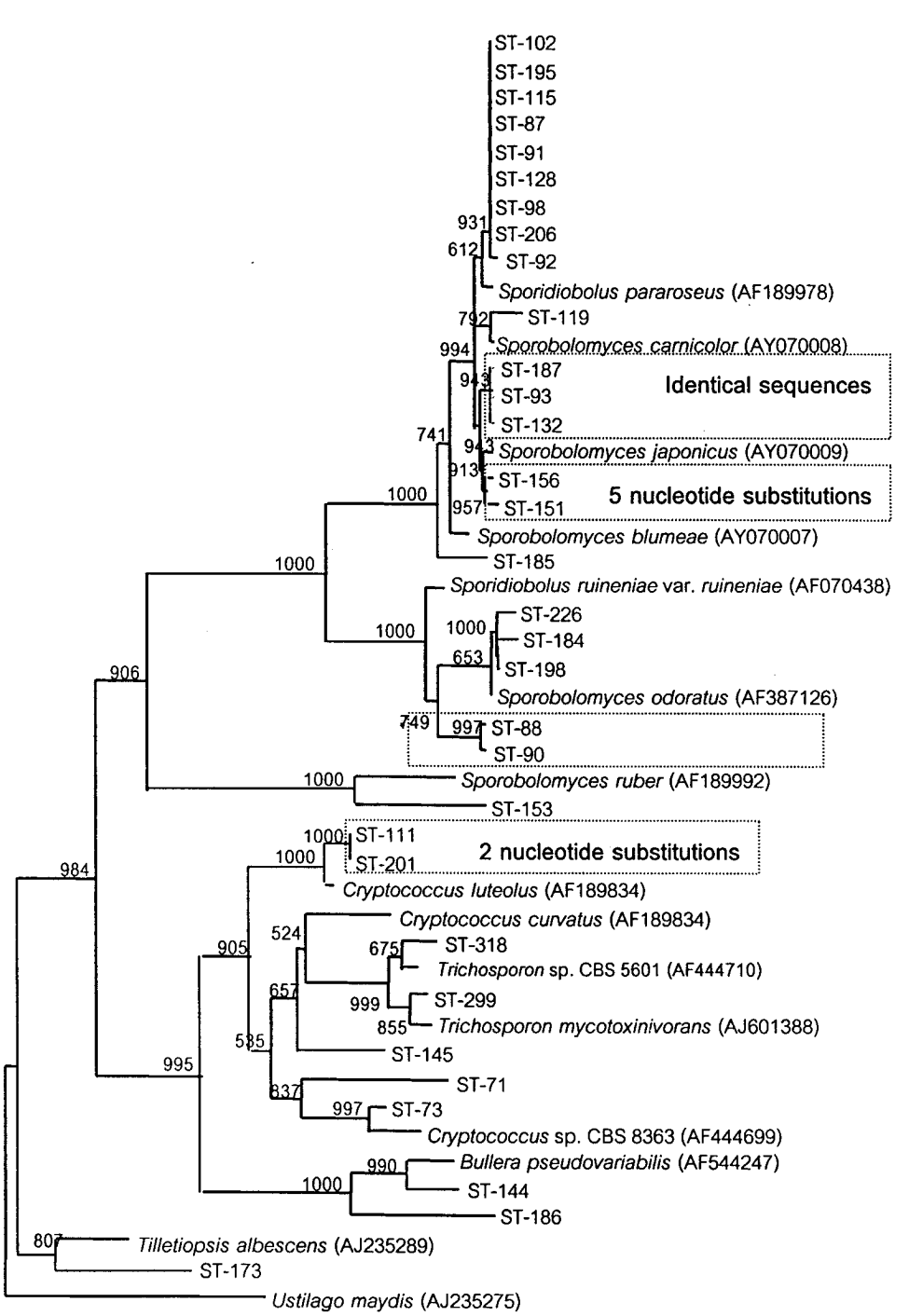

Figure 9. Phylogenetic tree of representative basidiomycetous yeasts from leaves, insect frass and their related species based on D1/D2 domain of 26S rDNA sequences. The numerals represent the frequency based on 1000 replicate bootstrap samplings.

Identification of thermotolerant methanol utilizing yeasts

Seven strains of thermotolerant methanol utilizing yeasts were subjected to identification by molecular technique using the similarity of nucleotide sequence of D1/D2 domain of 26S rDNA. The result of identification by the similarity of nucleotide sequences of D1/D2 domain of 26S rDNA revealed that all of 7 strains identified were belong to 2 know species (Table VIIII., Appendix A.) namely *Pichia capsulata* (5) and *Candida cariosilignicola* (2). Taxonomic characteristics are shown in Table X. and XI. (Appendix A.).

Identification of yeasts from termite and *Thermitomyces* sp.

The yeast strains were identified according to the methods of Yarrow (1998). Due to the reaction of DBB, 14 out of 17 were ascomycetous yeasts and only 3 strains from *Termitomyces* spp. were basidiomycetous yeasts. According to 89 characteristics of biochemical and physiological tests; yeasts isolated from termites were identified as genera *Williopsis*, *Pichia* and *Candida* whereas yeasts isolated from *Termitomyces* spp. were identified using 67 biochemical and physiological characteristics (Appendix XII. and XIII., Appendix A.) as genera *Kluyveromyces*, *Debaryomyces*, *Torulaspora*, *Rhodotorula*, *Candida* and *Cryptococcus*. Identification at species level by conventional techniques showed that most of the strains were different from the closest species (Appendix XIIII., Appendix A.). Although 2 strains had the identity to *Pichia membranifaciens* and *Torulaspora delbrueckii*, respectively, the identification by using other characteristics and molecular technique should be further carried out to clarify the identity or the relatedness of the strains.

Conclusion

Seven hundred and thirty strains of yeasts were collected in the natural environment of Thailand. They were isolated from insect frass (213 strains), flowers (108 strains), leaves (141 strains), mushroom (57 strains), moss (76 strains) and miscellaneous ones (135 strains); such as plant materials, exudates, fruits, fermented foods, soils, termite and *Thermitomyces* sp.. Thirty-two methanol-utilizing yeasts, were isolated from soils and plant materials, 13 of them are thermotolerlant yeasts. Taxonomic and phylogenetic studies were carried out on 307 yeast strains. Among them, 215 strains belong to ascomycetous yeasts and 92 strains belong to basidiomycetous yeasts. Based on the sequence analysis of D1/D2 domain of 26S rDNA, 138 strains (45%) belong to 58 known species, 117 strains (38%) were identified as new species, 35 strains are sister species (12%) and 17 strains (5%) from termite and *Thermitomyces* sp., were not yet identified.

These results clearly showed that the species diversity of yeasts is extremely rich in the natural environment of Thailand. There are many undescribed species were found and nor yet described. Eight new species were described as *Candida khaoyaiensis* sp. nov. and *Candida thailandica* sp. nov., (Jindamorakot, 2002a), *Candida flosculi* (Jindamorakot, 2002b), ***Candida korachensis and Candida lignicola***(Jindamorakot, 2003), *Candida easanensis* sp. nov., *Candida pattaniensis* sp. nov. and *Candida nakhonratchasimensis* sp. nov. (Jindamorakot, 2004).

Achievements of project

1. Collection of 730 strains preserved at BIOTEC Culture Collection.
2. New species: at least 90 new species (117 strains).
3. Yeast Data base: at BIOTEC Culture Collection.
4. Plublications: 3 Titles (Appendix B).
5. Presentations: 9 Titles; Oral (3) and Poster (6) (Appendix B).
6. One yeasts Taxonomist.
7. Identification facilities at BIOTEC (90%).
8. Identification service established at BIOTEC.
9. Five Thai training students (Isolation and identification on yeasts).
10. Training course of isolation and identification on yeasts: Four foreign trainee from Mainmar (1), Laos(1) and Vietnam(2).
11. Workshop on: Yeasts: Classification, Identification, Preservation and Applications, Department of Microbiology, Faculty of Science, Kasetsart University (9 - 13 July 2001).
12. Network of yeasts taxonomists (Kasetsart University (Thailand), TISTR (Thailand), Osaka University (Japan), JCM (Japan) and NITE-NBRC (Japan)).
13. Good collaboration with foreign organization (NITE-NBRC, Japan).

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Appendix A

Related Tables

Table I. Source and place of yeasts isolation.

No.	Original code	BCC No.	Source	Locality
1	ST-1	BCC 7701	Mushroom (unidentified)	Sakaerat (Chachoengsao)
2	ST-2	BCC 7702	Mushroom (unidentified)	Sakaerat (Chachoengsao)
3	ST-3	BCC 7703	Mushroom (unidentified)	Sakaerat (Chachoengsao)
4	ST-4	BCC 7704	Mushroom (unidentified)	Sakaerat (Chachoengsao)
5	ST-5	BCC 7705	Mushroom (unidentified)	Sakaerat (Chachoengsao)
6	ST-6	BCC 7706	Mushroom (unidentified)	Sakaerat (Chachoengsao)
7	ST-7	BCC 7707	Mushroom (unidentified)	Sakaerat (Chachoengsao)
8	ST-8	BCC 7708	Mushroom (unidentified)	Sakaerat (Chachoengsao)
9	ST-9	BCC 7709	Moss	Sakaerat (Chachoengsao)
10	ST-10	BCC 7710	Moss	Phu-Hin Rongkula (Pissanuloke)
11	ST-11	BCC 7711	Flower (*Ixora robbii* Loud)	Nakase's house garden (Bangkok)
12	ST-12	BCC 7712	Flower (*Cassia suratensis*)	Nakase's house garden (Bangkok)
13	ST-13	BCC 7713	Flower (Coconut)	Nakase's house garden (Bangkok)
14	ST-14	BCC 7714	Moss	Khao-Yai (Nakhonratchasima)
15	ST-15	BCC 7715	Insect frass	Khao-Yai (Nakhonratchasima)
16	ST-16	BCC 7716	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
17	ST-17	BCC 7717	Insect frass	Khao-Yai (Nakhonratchasima)
18	ST-18	BCC 7718	Mushroom (unidentified)	Khao-Yai (Nakhonratchasima)
19	ST-19	BCC 7719	Mushroom (unidentified)	Khao-Yai (Nakhonratchasima)
20	ST-20	BCC 7720	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
21	ST-21	BCC 7721	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
22	ST-22	BCC 7722	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
23	ST-23	BCC 7723	Insect frass	Khao-Yai (Nakhonratchasima)
24	ST-24	BCC 7724	Insect frass	Khao-Yai (Nakhonratchasima)
25	ST-25	BCC 7725	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
26	ST-26	BCC 7726	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
27	ST-27	BCC 7727	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
28	ST-28	BCC 7728	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
29	ST-29	BCC 7729	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
30	ST-30	BCC 7730	Moss	Khao-Yai (Nakhonratchasima)
31	ST-31	BCC 7731	Moss	Khao-Yai (Nakhonratchasima)
32	ST-32	BCC 7732	Flower (unidentified)	Khao-Yai (Nakhonratchasima)
33	ST-33	BCC 7733	Insect frass	Khao-Yai (Nakhonratchasima)
34	ST-34	BCC 7734	Insect frass	Khao-Yai (Nakhonratchasima)
35	ST-35	BCC 7735	Moss	Khao-Yai (Nakhonratchasima)
36	ST-36	BCC 7736	Moss	Khao-Yai (Nakhonratchasima)
37	ST-37	BCC 7737	Insect frass	Khao-Yai (Nakhonratchasima)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
38	ST-38	BCC 7738	Insect frass	Khao-Yai (Nakhonratchasima)
39	ST-39	BCC 7739	Insect frass	Khao-Yai (Nakhonratchasima)
40	ST-40	BCC 7740	Insect frass	Khao-Yai (Nakhonratchasima)
41	ST-41	BCC 7741	Insect frass	Khao-Yai (Nakhonratchasima)
42	ST-42	BCC 7742	Insect frass	Khao-Yai (Nakhonratchasima)
43	ST-43	BCC 7743	Insect frass	Khao-Yai (Nakhonratchasima)
44	ST-44	BCC 7744	Flower (Coconut)	Nakase's house garden (Bangkok)
45	ST-45	BCC 7745	Flower (Coconut)	Nakase's house garden (Bangkok)
46	ST-46	BCC 7746	Flower (Coconut)	Nakase's house garden (Bangkok)
47	ST-47	BCC 7747	Insect frass	Putthamontol (Nakhonpathom)
48	ST-48	BCC 7748	Insect frass	Putthamontol (Nakhonpathom)
49	ST-49	BCC 7749	Insect frass	Putthamontol (Nakhonpathom)
50	ST-50	BCC 7750	Insect frass	Putthamontol (Nakhonpathom)
51	ST-51	BCC 7751	Insect frass	Putthamontol (Nakhonpathom)
52	ST-52	BCC 7752	Insect frass	Putthamontol (Nakhonpathom)
53	ST-53	BCC 7753	Insect frass	Putthamontol (Nakhonpathom)
54	ST-54	BCC 7754	Insect frass	Putthamontol (Nakhonpathom)
55	ST-55	BCC 7755	Insect frass	Putthamontol (Nakhonpathom)
56	ST-56	BCC 7756	Insect frass	Putthamontol (Nakhonpathom)
57	ST-57	BCC 7757	Insect frass	Putthamontol (Nakhonpathom)
58	ST-58	BCC 7758	Insect frass	Putthamontol (Nakhonpathom)
59	ST-59	BCC 7759	Insect frass	Putthamontol (Nakhonpathom)
60	ST-60	BCC 7760	Insect frass	Putthamontol (Nakhonpathom)
61	ST-61	BCC 7761	Insect frass	Putthamontol (Nakhonpathom)
62	ST-62	BCC 7762	Insect frass	Putthamontol (Nakhonpathom)
63	ST-63	BCC 7763	Insect frass	Putthamontol (Nakhonpathom)
64	ST-64	BCC 7764	Insect frass	Putthamontol (Nakhonpathom)
65	ST-65	BCC 8301	Microcero nest	KURDI/Biorecycle
66	ST-66	BCC 8302	Microcero nest	KURDI/Biorecycle
67	ST-67	BCC 8303	Microcero nest	KURDI/Biorecycle
68	ST-68	BCC 8304	Mushroom (unidentified)	Nakase's house garden (Bangkok)
69	ST-69	BCC 8305	Insect frass	Khuan U-Bolratana (Khon Kaen)
70	ST-70	BCC 8306	Insect frass	Khuan U-Bolratana (Khon Kaen)
71	ST-71	BCC 8307	Insect frass	Khuan U-Bolratana (Khon Kaen)
72	ST-72	BCC 8308	Insect frass	Khuan U-Bolratana (Khon Kaen)
73	ST-73	BCC 8309	Insect frass	Khuan U-Bolratana (Khon Kaen)
74	ST-74	BCC 8310	Insect frass	Khuan U-Bolratana (Khon Kaen)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
75	ST-75	BCC 8311	Insect frass	Khuan U-Bolratana (Khon Kaen)
76	ST-76	BCC 8312	Insect frass	Khuan U-Bolratana (Khon Kaen)
77	ST-77	BCC 8313	Insect frass	Khuan Haui-Laung (Udon Thani)
78	ST-78	BCC 8314	Insect frass	Khuan Haui-Laung (Udon Thani)
79	ST-79	BCC 8315	Insect frass	Khuan Haui-Laung (Udon Thani)
80	ST-80	BCC 8316	Insect frass	Khuan Haui-Laung (Udon Thani)
81	ST-81	BCC 8317	Insect frass	Khuan Haui-Laung (Udon Thani)
82	ST-82	BCC 8318	Insect frass	Khuan Haui-Laung (Udon Thani)
83	ST-83	BCC 8319	Insect frass	Khuan Haui-Laung (Udon Thani)
84	ST-84	BCC 8320	Insect frass	Khuan Haui-Laung (Udon Thani)
85	ST-85	BCC 8321	Insect frass	Khuan Haui-Laung (Udon Thani)
86	ST-86	BCC 8322	Leave (*Eugenia* sp.)	Nam Tok Than-Tong (Nong Khai)
87	ST-87	BCC 8323	Leave (*Eugenia* sp.)	Nam Tok Than-Tong (Nong Khai)
88	ST-88	BCC 8324	Leave (*Eugenia* sp.)	Nam Tok Than-Tong (Nong Khai)
89	ST-89	BCC 8325	Leave (*Eugenia* sp.)	Nam Tok Than-Tong (Nong Khai)
90	ST-90	BCC 8326	Leave (*Eugenia* sp.)	Nam Tok Than-Tong (Nong Khai)
91	ST-91	BCC 8327	Leave (*Eugenia* sp.)	Nam Tok Than-Tong (Nong Khai)
92	ST-92	BCC 8328	Leave (*Triumfetta sp.*)	Nam Tok Than-Tong (Nong Khai)
93	ST-93	BCC 8329	Leave (*Triumfetta sp.*)	Nam Tok Than-Tong (Nong Khai)
94	ST-94	BCC 8330	Leave (*Triumfetta sp.*)	Nam Tok Than-Tong (Nong Khai)
95	ST-95	BCC 8331	Insect frass	Nam Tok Than-Tong (Nong Khai)
96	ST-96	BCC 8332	Insect frass	Nam Tok Than-Tong (Nong Khai)
97	ST-97	BCC 8333	Leave (*Bambusa*sp.)	Nam Tok Than-Tong (Nong Khai)
98	ST-98	BCC 8334	Leave (*Bambusa*sp.)	Nam Tok Than-Tong (Nong Khai)
99	ST-99	BCC 8335	Leave (*Pharagmites*sp.)	Wat Hin Mak Peang (Nong Khai)
100	ST-100	BCC 8336	Leave (*Pharagmites*sp.)	Wat Hin Mak Peang (Nong Khai)
101	ST-101	BCC 8337	Leave (*Pharagmites*sp.)	Wat Hin Mak Peang (Nong Khai)
102	ST-102	BCC 8338	Leave (*Pharagmites*sp.)	Wat Hin Mak Peang (Nong Khai)
103	ST-103	BCC 8339	Leave (*Pharagmites*sp.)	Wat Hin Mak Peang (Nong Khai)
104	ST-104	BCC 8340	Leave (*Pharagmites*sp.)	Wat Hin Mak Peang (Nong Khai)
105	ST-105	BCC 8341	Leave (*Pharagmites*sp.)	Wat Hin Mak Peang (Nong Khai)
106	ST-106	BCC 8342	Leave (unidentified)	Wat Hin Mak Peang (Nong Khai)
107	ST-107	BCC 8343	Leave (unidentified)	Wat Hin Mak Peang (Nong Khai)
108	ST-108	BCC 8344	Insect frass	Wat Hin Mak Peang (Nong Khai)
109	ST-109	BCC 8345	Leave (*Merremia*sp.)	Nam Tok Than-Tong (Nong Khai)
110	ST-110	BCC 8346	Leave (*Merremia*sp.)	Nam Tok Than-Tong (Nong Khai)
111	ST-111	BCC 8347	Leave (*Merremia*sp.)	Nam Tok Than-Tong (Nong Khai)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
112	ST-112	BCC 8348	Leave (*Merremia*sp.)	Nam Tok Than-Tong (Nong Khai)
113	ST-113	BCC 8349	Leave (*Merremia*sp.)	Nam Tok Than-Tong (Nong Khai)
114	ST-114	BCC 8350	Leave (*Merremia*sp.)	Nam Tok Than-Tong (Nong Khai)
115	ST-115	BCC 8351	Leave (*Merremia*sp.)	Nam Tok Than-Tong (Nong Khai)
116	ST-116	BCC 8352	Insect frass	Nam Tok Than-Tong (Nong Khai)
117	ST-117	BCC 8353	Insect frass	Nong Bo Kok (Nong Khai)
118	ST-118	BCC 8354	Leave (*Eucaliptus* sp.)	Nong Bo Kok (Nong Khai)
119	ST-119	BCC 8355	Leave (*Eucaliptus* sp.)	Nong Bo Kok (Nong Khai)
120	ST-120	BCC 8356	Insect frass	Pu Wao (Nong-Khai)
121	ST-121	BCC 8357	Insect frass	Pu Wao (Nong-Khai)
122	ST-122	BCC 8358	Insect frass	Pu Wao (Nong-Khai)
123	ST-123	BCC 8359	Leave (unidentified)	Pu Wao (Nong-Khai)
124	ST-124	BCC 8360	Insect frass	Pu Wao (Nong-Khai)
125	ST-125	BCC 8361	Insect frass	Pu Wao (Nong-Khai)
126	ST-126	BCC 8362	Insect frass	Pu Wao (Nong-Khai)
127	ST-127	BCC 8363	Insect frass	Pu Wao (Nong-Khai)
128	ST-128	BCC 8364	Leave (*Stepblus* sp.).	Pu Wao (Nong-Khai)
129	ST-129	BCC 8365	Leave	Pu Wao (Nong-Khai)
130	ST-130	BCC 8366	Leave (*Memycylon* sp.)	Pu Wao (Nong-Khai)
131	ST-131	BCC 8367	Leave (*Memycylon* sp.)	Pu Wao (Nong-Khai)
132	ST-132	BCC 8368	Leave (*Memycylon* sp.)	Pu Wao (Nong-Khai)
133	ST-133	BCC 8369	Leave (*Memycylon* sp.)	Pu Wao (Nong-Khai)
134	ST-134	BCC 8370	Leave (*Memycylon* sp.)	Pu Wao (Nong-Khai)
135	ST-135	BCC 8371	Leave (*Bauhinia* sp.)	Pu Wao (Nong-Khai)
136	ST-136	BCC 8372	Insect frass	Pu Wao (Nong-Khai)
137	ST-137	BCC 8373	Leave (unidentified)	Pu Wao (Nong-Khai)
138	ST-138	BCC 8374	Leave (unidentified)	Pu Wao (Nong-Khai)
139	ST-139	BCC 8375	Leave (*Hymenoperamis* sp.)	Pu Wao (Nong-Khai)
140	ST-140	BCC 8376	Leave (*Hymenoperamis* sp.)	Pu Wao (Nong-Khai)
141	ST-141	BCC 8377	Leave (*Thelypteris parasitica*)	Pu Wao (Nong-Khai)
142	ST-142	BCC 8378	Leave (*Thelypteris parasitica*)	Pu Wao (Nong-Khai)
143	ST-143	BCC 8379	Leave (*Thelypteris parasitica*)	Pu Wao (Nong-Khai)
144	ST-144	BCC 8380	Leave (*Thelypteris parasitica*)	Pu Wao (Nong-Khai)
145	ST-145	BCC 8381	Leave (*Thelypteris parasitica*)	Pu Wao (Nong-Khai)
146	ST-146	BCC 8382	Insect frass	Ban Paeng (Nakhon Phanom)
147	ST-147	BCC 8383	Insect frass	Ban Paeng (Nakhon Phanom)
148	ST-148	BCC 8384	Insect frass	Ban Paeng (Nakhon Phanom)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
149	ST-149	BCC 8385	Insect frass	Ban Paeng (Nakhon Phanom)
150	ST-150	BCC 8386	Leave (unidentified)	Ban Paeng (Nakhon Phanom)
151	ST-151	BCC 8387	Leave (unidentified)	Ban Paeng (Nakhon Phanom)
152	ST-152	BCC 8388	Leave (unidentified)	Ban Paeng (Nakhon Phanom)
153	ST-153	BCC 8389	Leave (unidentified)	Ban Paeng (Nakhon Phanom)
154	ST-154	BCC 8390	Leave (unidentified)	Ban Paeng (Nakhon Phanom)
155	ST-155	BCC 8391	Leave (*Thelypteris interrupta*)	Ban Paeng (Nakhon Phanom)
156	ST-156	BCC 8392	Leave (*Thelypteris interrupta*)	Ban Paeng (Nakhon Phanom)
157	ST-157	BCC 8393	Leave (*Thelypteris interrupta*)	Ban Paeng (Nakhon Phanom)
158	ST-158	BCC 8394	Leave (*Thelypteris interrupta*)	Ban Paeng (Nakhon Phanom)
159	ST-159	BCC 8395	Leave (*Thelypteris interrupta*)	Ban Paeng (Nakhon Phanom)
160	ST-160	BCC 8396	Insect frass	Ban Paeng (Nakhon Phanom)
161	ST-161	BCC 8397	Insect frass	Ban Paeng (Nakhon Phanom)
162	ST-162	BCC 8398	Insect frass	Ban Paeng (Nakhon Phanom)
163	ST-163	BCC 8399	Flower (unidentified)	Phu-Wao (Nong Khai)
164	ST-164	BCC 8400	Insect frass	Huai-Deag (Sakon-Nakhon)
165	ST-165	BCC 11751	Insect frass	Huai-Deag (Sakon-Nakhon)
166	ST-166	BCC 14948	Leave (*Artocarpus*sp.)	Phuphan (Sakon-Nakhon)
167	ST-167	BCC 14949	Leave (*Artocarpus*sp.)	Phuphan (Sakon-Nakhon)
168	ST-168	BCC 14950	Mushroom	Khuan Num Pung (Sakon Nakhon)
169	ST-169	BCC 14951	Leave (*Imperata cylindrica*)	Khuan Num Pung (Sakon Nakhon)
170	ST-170	BCC 14952	Leave (*Imperata cylindrica*)	Khuan Num Pung (Sakon Nakhon)
171	ST-171	BCC 14953	Leave (*Imperata cylindrica*)	Khuan Num Pung (Sakon Nakhon)
172	ST-172	BCC 14954	Leave (*Imperata cylindrica*)	Khuan Num Pung (Sakon Nakhon)
173	ST-173	BCC 14955	Leave (*Imperata cylindrica*)	Khuan Num Pung (Sakon Nakhon)
174	ST-174	BCC 14956	Leave (*Eragrostis* sp.)	Khuan Num Pung (Sakon Nakhon)
175	ST-175	BCC 14957	Leave (*Eragrostis* sp.)	Khuan Num Pung (Sakon Nakhon)
176	ST-176	BCC 14958	Leave (*Eragrostis* sp.)	Khuan Num Pung (Sakon Nakhon)
177	ST-177	BCC 14959	Leave (*Pennisetum* sp.)	Khuan Num Pung (Sakon Nakhon)
178	ST-178	BCC 14960	Leave (*Pennisetum* sp.)	Khuan Num Pung (Sakon Nakhon)
179	ST-179	BCC 14961	Leave (*Pennisetum* sp.)	Khuan Num Pung (Sakon Nakhon)
180	ST-180	BCC 14962	Leave (*Pennisetum* sp.)	Khuan Num Pung (Sakon Nakhon)
181	ST-181	BCC 14963	Leave (*Pennisetum* sp.)	Khuan Num Pung (Sakon Nakhon)
182	ST-182	BCC 14964	Leave (*Ageratum*sp.)	Khuan Num Pung (Sakon Nakhon)
183	ST-183	BCC 14965	Leave (*Ageratum*sp.)	Khuan Num Pung (Sakon Nakhon)
184	ST-184	BCC 14945	Leave (*Ageratum*sp.)	Khuan Num Pung (Sakon Nakhon)
185	ST-185	BCC 14966	Leave (*Ageratum*sp.)	Khuan Num Pung (Sakon Nakhon)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
186	ST-186	BCC 14947	Leave (*Ageratum*sp.)	Khuan Num Pung (Sakon Nakhon)
187	ST-187	BCC 14967	Leave (*Ageratum*sp.)	Khuan Num Pung (Sakon Nakhon)
188	ST-188	BCC 14968	Leave (unidentified)	Khuan Num Pung (Sakon Nakhon)
189	ST-189	BCC 14969	Insect frass	Song Dao (Sakon Nakhon)
190	ST-190	BCC 14970	Leave (*Commelina*sp.)	Song Dao (Sakon Nakhon)
191	ST-191	BCC 14971	Leave (*Commelina*sp.)	Song Dao (Sakon Nakhon)
192	ST-192	BCC 14972	Leave (*Commelina*sp.)	Song Dao (Sakon Nakhon)
193	ST-193	BCC 14973	Leave (*Commelina*sp.)	Song Dao (Sakon Nakhon)
194	ST-194	BCC 11752	Insect frass	Kut Bak (Sakon Nakhon)
195	ST-195	BCC 14974	Leave (*Manihot esculenta*)	Ban Tai (Sakon Nakhon)
196	ST-196	BCC 14975	Leave (*Manihot esculenta*)	Ban Tai (Sakon Nakhon)
197	ST-197	BCC 14976	Leave (*Manihot esculenta*)	Ban Tai (Sakon Nakhon)
198	ST-198	BCC 14946	Leave (*Manihot esculenta*)	Ban Tai (Sakon Nakhon)
199	ST-199	BCC 14977	Leave (*Manihot esculenta*)	Ban Tai (Sakon Nakhon)
200	ST-200	BCC 14978	Leave (*Manihot esculenta*)	Ban Tai (Sakon Nakhon)
201	ST-201	BCC 14979	Leave (*Manihot esculenta*)	Ban Tai (Sakon Nakhon)
202	ST-202	BCC 14980	Leave (*Manihot esculenta*)	Ban Tai (Sakon Nakhon)
203	ST-203	BCC 14981	Leave (*Pederia* sp.)	Ban Tai (Sakon Nakhon)
204	ST-204	BCC 14982	Leave (*Pederia* sp.)	Ban Tai (Sakon Nakhon)
205	ST-205	BCC 14983	Leave (*Pederia* sp.)	Ban Tai (Sakon Nakhon)
206	ST-206	BCC 14984	Leave (*Erechtites*sp.)	Ban Tai (Sakon Nakhon)
207	ST-207	BCC 14985	Leave (*Erechtites*sp.)	Ban Tai (Sakon Nakhon)
208	ST-208	BCC 14986	Leave (*Erechtites*sp.)	Ban Tai (Sakon Nakhon)
209	ST-209	BCC 11753	Insect frass	Waritchaphum (Sakhon Nakhon)
210	ST-210	BCC 11754	Insect frass	Ban Chiang (Udon Thani)
211	ST-211	BCC 11755	Insect frass	Ban Chiong (Udon Thani)
212	ST-212	BCC 14987	Leave (Banana)	Nong Meg (Udon Thani)
213	ST-213	BCC 14988	Leave (Banana)	Nong Meg (Udon Thani)
214	ST-214	BCC 11756	Insect frass	Khuan Lum Pao (Kalasin)
215	ST-215	BCC 14989	Leave (*Bauhinia*sp.)	Huai-Prong (Kalasin)
216	ST-216	BCC 14990	Leave (*Bauhinia*sp.)	Huai-Prong (Kalasin)
217	ST-217	BCC 14991	Leave (*Bauhinia*sp.)	Huai-Prong (Kalasin)
218	ST-218	BCC 14992	Leave (*Bauhinia*sp.)	Huai-Prong (Kalasin)
219	ST-219	BCC 14993	Leave (*Cyperus* sp.)	Inside of the Road (Roiet)
220	ST-220	BCC 14994	Leave (*Cyperus* sp.)	Inside of the Road (Roiet)
221	ST-221	BCC 14995	Leave (*Cyperus* sp.)	Inside of the Road (Roiet)
222	ST-222	BCC 14996	Leave (*Cyperus* sp.)	Inside of the Road (Roiet)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
223	ST-223	BCC 11757	Insect frass	Nong Laung (Amnat charoen)
224	ST-224	BCC 11758	Insect frass	Nong Laung (Amnat charoen)
225	ST-225	BCC 11759	Insect frass	Nong Laung (Amnat charoen)
226	ST-226	BCC 14997	Leave (unidentified)	Nong Bo Mhu (Yasothon)
227	ST-227	BCC 14998	Leave (unidentified)	Nong Bo Mhu (Yasothon)
228	ST-228	BCC 11760	Insect frass	Nong Bo Mhu (Yasothon)
229	ST-229	BCC 11761	Insect frass	Nong Bo Mhu (Yasothon)
230	ST-230	BCC 11762	Insect frass	Inside of the Road (Yasothon)
231	ST-231	BCC 11763	Insect frass	Nong Kratone (Nakhon Ratchasima)
232	ST-232	BCC 11764	Insect frass	Nong Kratone (Nakhon Ratchasima)
233	ST-233	BCC 11765	Insect frass	Nong Kratone (Nakhon Ratchasima)
234	ST-234	BCC 11766	Insect frass	Nong Kratone (Nakhon Ratchasima)
235	ST-235	BCC 11767	Insect frass	Nong Kratone (Nakhon Ratchasima)
236	ST-236	BCC 11768	Insect frass	Nong Kratone (Nakhon Ratchasima)
237	ST-237	BCC 11769	Insect frass	Nong Kratone (Nakhon Ratchasima)
238	ST-238	BCC 11770	Insect frass	Nong Kratone (Nakhon Ratchasima)
239	ST-239	BCC 11771	Insect frass	Nong Kratone (Nakhon Ratchasima)
240	ST-240	BCC 11772	Insect frass	Nong Kratone (Nakhon Ratchasima)
241	ST-241	BCC 11773	Insect frass	Nong Kratone (Nakhon Ratchasima)
242	ST-242	BCC 14999	Flower (ดอกกระท้อน)	Dr.Malee's house (Bangkok)
243	ST-243	BCC 15000	Flower (ดอกมะไฟ)	Hala-Bala (Narathiwat)
244	ST-244	BCC 15001	Flower (ดอกจุกดินใบใหญ่)	Hala-Bala (Narathiwat)
245	ST-245	BCC 15002	Mushroom (unidentified)	Hala-Bala (Narathiwat)
246	ST-246	BCC 15003	Mushroom (unidentified)	Hala-Bala (Narathiwat)
247	ST-247	BCC 15004	Moss	Hala-Bala (Narathiwat)
248	ST-248	BCC 11774	Insect frass	Hala-Bala (Narathiwat)
249	ST-249	BCC 11775	Insect frass	Hala-Bala (Narathiwat)
250	ST-250	BCC 11776	Insect frass	Hala-Bala (Narathiwat)
251	ST-251	BCC 11777	Insect frass	Hala-Bala (Narathiwat)
252	ST-252	BCC 11778	Insect frass	Hala-Bala (Narathiwat)
253	ST-253	BCC 15005	Mushroom (unidentified)	Hala-Bala (Narathiwat)
254	ST-254	BCC 15006	Mushroom (unidentified)	Hala-Bala (Narathiwat)
255	ST-255	BCC 15007	Flower (unidentified)	Tak-Bi (Narathiwat)
256	ST-256	BCC 15008	Flower (unidentified)	Tak-Bi (Narathiwat)
257	ST-257	BCC 15009	Flower (ลั่นทม)	Tak-Bi (Narathiwat)
258	ST-258	BCC 15010	Flower (ลั่นทม)	Tak-Bi (Narathiwat)
259	ST-259	BCC 15011	Flower (ลั่นทม)	Tak-Bi (Narathiwat)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
260	ST-260	BCC 15012	Flower (ลั่นทม)	Tak-Bi (Narathiwat)
261	ST-261	BCC 15013	Flower (ลั่นทม)	Tak-Bi (Narathiwat)
262	ST-262	BCC 15014	Flower (ลั่นทม)	Tak-Bi (Narathiwat)
263	ST-263	BCC 15015	Flower (ลั่นทม)	Tak-Bi (Narathiwat)
264	ST-264	BCC 15016	Flower (ลั่นทม)	Tak-Bi (Narathiwat)
265	ST-265	BCC 15017	Flower (ดอกเข็ม) (*Ixora* sp.)	Hala-Bala (Narathiwat)
266	ST-266	BCC 15018	Moss	Hala-Bala (Narathiwat)
267	ST-267	BCC 15019	Moss	Hala-Bala (Narathiwat)
268	ST-268	BCC 15020	Moss	Hala-Bala (Narathiwat)
269	ST-269	BCC 15021	Moss	Hala-Bala (Narathiwat)
270	ST-270	BCC 15022	Leave (unidentified)	Hala-Bala (Narathiwat)
271	ST-271	BCC 15023	Leave (unidentified)	Hala-Bala (Narathiwat)
272	ST-272	BCC 15024	Leave (unidentified)	Hala-Bala (Narathiwat)
273	ST-273	BCC 15025	Leave (unidentified)	Hala-Bala (Narathiwat)
274	ST-274	BCC 15026	Leave (unidentified)	Hala-Bala (Narathiwat)
275	ST-275	BCC 15027	Leave (unidentified)	Hala-Bala (Narathiwat)
276	ST-276	BCC 15028	Leave (unidentified)	Hala-Bala (Narathiwat)
277	ST-277	BCC 15029	Leave (unidentified)	Hala-Bala (Narathiwat)
278	ST-278	BCC 15030	Leave (unidentified)	Hala-Bala (Narathiwat)
279	ST-279	BCC 15031	Leave (unidentified)	Hala-Bala (Narathiwat)
280	ST-280	BCC 15032	Leave (unidentified)	Hala-Bala (Narathiwat)
281	ST-282	BCC 15033	Flower (ดอกปุด)	Hala-Bala (Narathiwat)
282	ST-283	BCC 15034	Flower (ดอกม้าวิ่ง)	Hala-Bala (Narathiwat)
283	ST-284	BCC 15035	Flower (unidentified)	Hala-Bala (Narathiwat)
284	ST-285	BCC 15036	Leave (Fern)	Hala-Bala (Narathiwat)
285	ST-286	BCC 15037	Leave (Fern)	Pa-Pru-Toa-Dang (Narathiwat)
286	ST-287	BCC 15038	Leave (Fern)	Pa-Pru-Toa-Dang (Narathiwat)
287	ST-288	BCC 15039	Leave (Fern)	Pa-Pru-Toa-Dang (Narathiwat)
288	ST-289	BCC 15040	Leave (Fern)	Pa-Pru-Toa-Dang (Narathiwat)
289	ST-290	BCC 15041	Leave (กระพ้อแดง)	Pa-Pru-Toa-Dang (Narathiwat)
290	ST-291	BCC 15042	Leave (กระพ้อแดง)	Pa-Pru-Toa-Dang (Narathiwat)
291	ST-292	BCC 15043	Leave (ใบจาก)	Kao-Yaow (Pattani)
292	ST-293	BCC 15044	Leave (ใบจาก)	Kao-Yaow (Pattani)
293	ST-294	BCC 15045	Leave (ใบจาก)	Kao-Yaow (Pattani)
294	ST-295	BCC 15046	Leave (unidentified)	Kao-Yaow (Pattani)
295	ST-296	BCC 11779	Insect frass	Kao-Yaow (Pattani)
296	ST-297	BCC 11780	Insect frass	Kao-Yaow (Pattani)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
297	ST-298	BCC 11781	Insect frass	Kao-Yaow (Pattani)
298	ST-299	BCC 11782	Insect frass	Kao-Yaow (Pattani)
299	ST-300	BCC 11783	Insect frass	Kao-Yaow (Pattani)
300	ST-301	BCC 15047	Moss	Kao-Yaow (Pattani)
301	ST-302	BCC 15048	Moss	Kao-Yaow (Pattani)
302	ST-303	BCC 15049	Mushroom (unidentified)	Kao-Yaow (Pattani)
303	ST-304	BCC 15050	Mushroom (unidentified)	Kao-Yaow (Pattani)
304	ST-305	BCC 11784	Insect frass	Kao-Yaow (Pattani)
305	ST-306	BCC 11785	Insect frass	Kao-Yaow (Pattani)
306	ST-307	BCC 11786	Insect frass	Kao-Yaow (Pattani)
307	ST-308	BCC 11787	Insect frass	Kao-Yaow (Pattani)
308	ST-309	BCC 11788	Insect frass	Kao-Yaow (Pattani)
309	ST-310	BCC 11789	Insect frass	Kao-Yaow (Pattani)
310	ST-311	BCC 11790	Insect frass	Kao-Yaow (Pattani)
311	ST-312	BCC 11791	Insect frass	Kao-Yaow (Pattani)
312	ST-313	BCC 11792	Insect frass	Kao-Yaow (Pattani)
313	ST-314	BCC 11793	Insect frass	Kao-Yaow (Pattani)
314	ST-315	BCC 11794	Insect frass	Kao-Yaow (Pattani)
315	ST-316	BCC 11795	Insect frass	Kao-Yaow (Pattani)
316	ST-317	BCC 11796	Insect frass	Kao-Yaow (Pattani)
317	ST-318	BCC 11797	Insect frass	Kao-Yaow (Pattani)
318	ST-319	BCC 11798	Insect frass	Kao-Yaow (Pattani)
319	ST-320	BCC 11799	Insect frass	Kao-Yaow (Pattani)
320	ST-321	BCC 11800	Insect frass	Kao-Yaow (Pattani)
321	ST-322	BCC 11801	Insect frass	Kao-Yaow (Pattani)
322	ST-323	BCC 15051	Mushroom (unidentified)	Hala-Bala (Narathiwat)
323	ST-324	BCC 15052	Leave (unidentified)	Nam Tok Tone-Nga-Chang (Surat Thani)
324	ST-325	BCC 15053	Leave (unidentified)	Nam Tok Tone-Nga-Chang (Surat Thani)
325	ST-326	BCC 11802	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
326	ST-327	BCC 11803	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
327	ST-328	BCC 11804	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
328	ST-329	BCC 11805	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
329	ST-330	BCC 11806	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
330	ST-331	BCC 11807	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
331	ST-332	BCC 11808	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
332	ST-333	BCC 11809	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
333	ST-334	BCC 11810	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
334	ST-335	BCC 11811	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
335	ST-336	BCC 11812	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
336	ST-337	BCC 11813	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
337	ST-338	BCC 11814	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
338	ST-339	BCC 11815	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
339	ST-340	BCC 11816	Insect frass	Nam Tok Tone-Nga-Chang (Surat Thani)
340	ST-341	BCC 15054	Leave (unidentified)	Nam Tok Prom Lok (Surat Thani)
341	ST-342	BCC 15055	Leave (unidentified)	Nam Tok Prom Lok (Surat Thani)
342	ST-343	BCC 15056	Mushroom	Nam Tok Prom Lok (Surat Thani)
343	ST-344	BCC 11817	Insect frass	Nam Tok Prom Lok (Surat Thani)
344	ST-345	BCC 15057	Look pang	Chiang Rai
345	ST-346	BCC 15058	Look pang	Chiang Rai
346	ST-347	BCC 15059	Look pang	Udon Thani
347	ST-348	BCC 15060	Look pang	Udon Thani
348	ST-349	BCC 15061	Look pang	Udon Thani
349	ST-350	BCC 15062	Look pang PM1	Chiang Mai
350	ST-351	BCC 15063	Look pang PT1	Chiang Mai
351	ST-352	BCC 15064	Look pang PT2	Chiang Mai
352	ST-353	BCC 15065	Look pang PWC1	Chiang Mai
353	ST-354	BCC 15066	Flower (unidentified)	Dr. Malee's House (Bangkok)
354	ST-355	BCC 15067	Flower (unidentified)	Dr. Malee's House (Bangkok)
355	ST-356	BCC 15068	Insect frass	Dr. Malee's House (Bangkok)
356	ST-357	BCC 15069	Flower (unidentified)	Puket
357	ST-358	BCC 15070	Mushroom (unidentified)	Nam Tok Tone Nga Chang (Surat Thani)
358	ST-359	BCC 15071	Mushroom (unidentified)	Nam Tok Tone Nga Chang (Surat Thani)
359	ST-360	BCC 15072	Mushroom (unidentified)	Nam Tok Tone Nga Chang (Surat Thani)
360	ST-361	BCC 15073	Mushroom (unidentified)	Nam Tok Tone Nga Chang (Surat Thani)
361	ST-362	BCC 15074	Mushroom (unidentified)	Nam Tok Tone Nga Chang (Surat Thani)
362	ST-363	BCC 15075	Mushroom (unidentified)	Nam Tok Tone Nga Chang (Surat Thani)
363	ST-364	BCC 15076	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
364	ST-365	BCC 15077	Mushroom (*Maraumius* sp.)	Nam Tok Krung Ching (Nakhon Si Thammarat)
365	ST-366	BCC 15078	Mushroom (*Maraumius* sp.)	Nam Tok Krung Ching (Nakhon Si Thammarat)
366	ST-367	BCC 15079	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
367	ST-368	BCC 15080	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
368	ST-369	BCC 15081	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
369	ST-370	BCC 15082	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
370	ST-371	BCC 15083	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
371	ST-372	BCC 15084	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
372	ST-373	BCC 15085	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
373	ST-374	BCC 15086	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
374	ST-375	BCC 15087	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
375	ST-376	BCC 15088	Mushroom (unidentified)	Nam Tok Krung Ching (Nakhon Si Thammarat)
376	ST-377	BCC 15089	Mushroom (unidentified)	Nam Nao (Petchabun)
377	ST-378	BCC 15090	Mushroom (*Agaricus*sp.)	Bo Ploy (Kanchanaburi)
378	ST-380	BCC 15091	Mushroom (unidentified)	Sai Yok (Kanchanaburi)
379	ST-381	BCC 15092	Mushroom (unidentified)	Kao Dang (Kanchanaburi)
380	ST-382	BCC 15093	Insect frass	Nam Nao National Park (Petchaboon)
381	ST-383	BCC 15094	Moss	Mae Hong Soun
382	ST-384	BCC 15095	Moss	Mae Hong Soun
383	ST-385	BCC 15096	Moss	Mae Hong Soun
384	ST-386	BCC 15097	Flower (ดอกโกงกางใบใหญ่)	Mangrove forest :เวฬุ (Trad)
385	ST-387	BCC 15098	Flower (ดอกกะสัก)	Mangrove forest :เวฬุ (Trad)
386	ST-388	BCC 15099	Flower (ดอกกะสัก)	Mangrove forest :เวฬุ (Trad)
387	ST-389	BCC 15100	Flower (ดอกโกงกางใบเล็ก)	Mangrove forest :เวฬุ (Trad)
388	ST-390	BCC 15101	Flower (ดอกโกงกางใบเล็ก)	Mangrove forest :เวฬุ (Trad)
389	ST-391	BCC 14935	Flower (ดอกลำพู)	Mangrove forest :เวฬุ (Trad)
390	ST-392	BCC 15102	Flower (ดอกลำพู)	Mangrove forest :เวฬุ (Trad)
391	ST-393	BCC 15103	Insect frass	บ. ปู (Trad)
392	ST-394	BCC 15104	Insect frass	บ. ปู (Trad)
393	ST-395	BCC 15105	Insect frass	บ. ปู (Trad)
394	ST-396	BCC 15106	Insect frass	บ. ปู (Trad)
395	ST-398	BCC 14936	Flower (Durian)	บ. เปร็ดใน (Trad)
396	ST-399	BCC 15107	Flower (Durian)	บ. เปร็ดใน (Trad)
397	ST-400	BCC 15108	Mosses	บ. เปร็ดใน (Trad)
398	ST-401	BCC 15109	Mosses	บ. เปร็ดใน (Trad)
399	ST-402	BCC 15110	Insect frass	Mangrove forest : ห้วยน้ำขาว (Trad)
400	ST-403	BCC 15111	Insect frass	Mangrove forest : ห้วยน้ำขาว (Trad)
401	ST-404	BCC 15112	Insect frass	Mangrove forest : ห้วยน้ำขาว (Trad)
402	ST-405	BCC 15113	Mosses	Mangrove forest : ห้วยน้ำขาว (Trad)
403	ST-406	BCC 15114	Mosses	Mangrove forest : ห้วยน้ำขาว (Trad)
404	ST-407	BCC 15115	Mosses	Mangrove forest : ห้วยน้ำขาว (Trad)
405	ST-409	BCC 15116	Flower (unknown)	Mangrove forest : ห้วยน้ำขาว (Trad)
406	ST-410	BCC 15117	Flowers (Lumnitzera recemosa)	Mangrove forest : ห้วยน้ำขาว (Trad)
407	ST-419	BCC 15118	Insect frass	ต. ปรายโพรงพราง (Samuthsongkram)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
408	ST-420	BCC 15119	Flower (ส้มโอ)	ต. ปรายโพรงพราง (Samuthsongkram)
409	ST-421	BCC 15120	Coconut juice	ต. ปรายโพรงพราง (Samuthsongkram)
410	ST-422	BCC 15121	Coconut juice	ต. ปรายโพรงพราง (Samuthsongkram)
411	ST-423	BCC 15122	Coconut juice	ต. ปรายโพรงพราง (Samuthsongkram)
412	ST-424	BCC 15123	Mushroom	ต. ปรายโพรงพราง (Samuthsongkram)
413	ST-425	BCC 15124	Flower	ต. ปรายโพรงพราง (Samuthsongkram)
414	ST-426	BCC 15125	Flower	ต. ปรายโพรงพราง (Samuthsongkram)
415	ST-427	BCC 15126	Flower	ต. ปรายโพรงพราง (Samuthsongkram)
416	ST-430	BCC 15127	Flower	ต. ปรายโพรงพราง (Samuthsongkram)
417	ST-431	BCC 15128	Insect frass	ป่าดิบแล้ง, Sakaerat (Chachoengsao)
418	ST-432	BCC 15129	Insect frass	ป่าดิบแล้ง, Sakaerat (Chachoengsao)
419	ST-433	BCC 15130	Insect frass	ป่าดิบแล้ง, Sakaerat (Chachoengsao)
420	ST-434	BCC 15131	Mosses	ป่าเต็งรัง, Sakaerat (Chachoengsao)
421	ST-435	BCC 15132	Exudate	ป่าเต็งรัง, Sakaerat (Chachoengsao)
422	ST-436	BCC 15133	Exudate	ป่าเต็งรัง, Sakaerat (Chachoengsao)
423	ST-437	BCC 15134	Exudate	ป่าเต็งรัง, Sakaerat (Chachoengsao)
424	ST-438	BCC 15135	Exudate	ป่าเต็งรัง, Sakaerat (Chachoengsao)
425	ST-440	BCC 15136	Insect frass	ป่าเบ็ญจพรรณ, Sakaerat (Chachoengsao)
426	ST-441	BCC 15137	Mosses	Ranong Mangrove Biosphere (Ranong)
427	ST-445	BCC 15138	Mosses	Ngaow water fall (Ranong)
428	ST-446	BCC 15139	Mosses	Ngaow water fall (Ranong)
429	ST-448	BCC 14937	Mosses	Ngaow water fall (Ranong)
430	ST-449	BCC 15140	Mosses	Ngaow water fall (Ranong)
431	ST-450	BCC 15141	Mosses	Ngaow water fall (Ranong)
432	ST-451	BCC 15142	Mosses	Ngaow water fall (Ranong)
433	ST-452	BCC 15143	Mosses	Tone Nga Change (Songkhla)
434	ST-453	BCC 15144	Mosses	Tone Nga Change (Songkhla)
435	ST-454	BCC 15145	Mosses	Tone Nga Change (Songkhla)
436	ST-455	BCC 15146	Mosses	Tone Nga Change (Songkhla)
437	ST-456	BCC 15147	Mosses	Tone Nga Change (Songkhla)
438	ST-457	BCC 15148	Mosses	Tone Nga Change (Songkhla)
439	ST-458	BCC 15149	Mosses	Tone Nga Change (Songkhla)
440	ST-459	BCC 15150	Mosses	Tone Nga Change (Songkhla)
441	ST-460	BCC 15151	Mosses	Tone Nga Change (Songkhla)
442	ST-461	BCC 15152	Mosses	Tone Nga Change (Songkhla)
443	ST-462	BCC 15153	Mosses	Tone Nga Change (Songkhla)
444	ST-464	BCC14938	Lichen	Tone Nga Change (Songkhla)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
445	ST-465	BCC 15154	Lichen	Tone Nga Change (Songkhla)
446	ST-466	BCC 15155	Lichen	Tone Nga Change (Songkhla)
447	ST-467	BCC 15156	Insect frass	Tone Nga Change (Songkhla)
448	ST-468	BCC 15157	Insect frass	Tone Nga Change (Songkhla)
449	ST-469	BCC 15158	Insect frass	Tone Nga Change (Songkhla)
450	ST-470	BCC 15159	Insect frass	Tone Nga Change (Songkhla)
451	ST-471	BCC 15160	Insect frass	Tone Nga Change (Songkhla)
452	ST-472	BCC 15161	Insect frass	Tone Nga Change (Songkhla)
453	ST-473	BCC 15162	Rotted wood	Tone Nga Change (Songkhla)
454	ST-474	BCC 15163	Rotted wood	Tone Nga Change (Songkhla)
455	ST-475	BCC 15164	Rotted wood	Tone Nga Change (Songkhla)
456	ST-476	BCC 14939	Mushroom (Hygrophorus sp.)	Tone Nga Change (Songkhla)
457	ST-477	BCC 15165	Mushroom (Hygrophorus sp.)	Tone Nga Change (Songkhla)
458	ST-478	BCC 15166	Mushroom (Hygrophorus sp.)	Tone Nga Change (Songkhla)
459	ST-479	BCC 15167	Mushroom (Hygrophorus sp.)	Tone Nga Change (Songkhla)
460	ST-480	BCC 15168	Mushroom (Hygrophorus sp.)	Tone Nga Change (Songkhla)
461	ST-481	BCC 14940	Mushroom (Hygrophorus sp.)	Tone Nga Change (Songkhla)
462	ST-482	BCC 15169	Mushroom (Hygrophorus sp.)	Tone Nga Change (Songkhla)
463	ST-483	BCC 15170	Exudate of Ficus sp.	Tone Nga Change (Songkhla)
464	ST-484	BCC 14941	Exudate of Ficus sp.	Tone Nga Change (Songkhla)
465	ST-485	BCC 15171	Flower	Tone Nga Change (Songkhla)
466	ST-486	BCC 15172	Fruit of Ficus sp.	Tone Nga Change (Songkhla)
467	ST-487	BCC 15173	Insect frass	Bangkok
468	ST-488	BCC 15174	Insect frass	Bangkok
469	ST-489	BCC 15175	Insect frass	Bangkok
470	ST-490	BCC 15176	Flower	Bangkok
471	ST-491	BCC 15177	Insect walk around	Bangkok
472	ST-492	BCC 15178	Insect frass	Tong Pha Phum (Kanjanaburi)
473	ST-493	BCC 14942	Insect frass	Tong Pha Phum (Kanjanaburi)
474	ST-494	BCC 15179	Insect frass	Tong Pha Phum (Kanjanaburi)
475	ST-495	BCC 15180	Moss on coconut	Tong Pha Phum (Kanjanaburi)
476	ST-496	BCC 15181	Moss on coconut	Tong Pha Phum (Kanjanaburi)
477	ST-497	BCC 15182	Lichen	Tong Pha Phum (Kanjanaburi)
478	ST-498	BCC 15183	Lichen	Tong Pha Phum (Kanjanaburi)
479	ST-499	BCC 15184	Moss	Tong Pha Phum (Kanjanaburi)
480	ST-500	BCC 15185	Moss	Tong Pha Phum (Kanjanaburi)
481	ST-501	BCC 15186	Moss	Tong Pha Phum (Kanjanaburi)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
482	ST-502	BCC 15187	Fruit (Banana)	Tong Pha Phum (Kanjanaburi)
483	ST-503	BCC 15188	Fruit (Banana)	Tong Pha Phum (Kanjanaburi)
484	ST-504	BCC 15189	Fruit (Banana)	Tong Pha Phum (Kanjanaburi)
485	ST-505	BCC 15190	Insect frass	Tong Pha Phum (Kanjanaburi)
486	ST-506	BCC 15191	Insect frass	Tong Pha Phum (Kanjanaburi)
487	ST-507	BCC 15192	Insect frass	Tong Pha Phum (Kanjanaburi)
488	ST-508	BCC 15193	Moss	Tong Pha Phum (Kanjanaburi)
489	ST-509	BCC 15194	Moss	Tong Pha Phum (Kanjanaburi)
490	ST-510	BCC 15195	Moss	Tong Pha Phum (Kanjanaburi)
491	ST-511	BCC 15196	Moss	Tong Pha Phum (Kanjanaburi)
492	ST-512	BCC 15197	Moss	Tong Pha Phum (Kanjanaburi)
493	ST-513	BCC 15198	Moss	Tong Pha Phum (Kanjanaburi)
494	ST-514	BCC 15199	Moss	Tong Pha Phum (Kanjanaburi)
495	ST-515	BCC 14943	Moss	Tong Pha Phum (Kanjanaburi)
496	ST-516	BCC 15200	Insect frass	Tong Pha Phum (Kanjanaburi)
497	ST-517	BCC 15201	Insect frass and bark	Tong Pha Phum (Kanjanaburi)
498	ST-518	BCC 15202	Dung of insect	Tong Pha Phum (Kanjanaburi)
499	ST-519	BCC 15203	Ficus sp.	Tong Pha Phum (Kanjanaburi)
500	ST-520	BCC 15204	Ficus sp.	Tong Pha Phum (Kanjanaburi)
501	ST-521	BCC 15205	Ficus sp.	Tong Pha Phum (Kanjanaburi)
502	ST-522	BCC 15206	Insect frass	Tong Pha Phum (Kanjanaburi)
503	ST-523	BCC 15207	Insect frass	Tong Pha Phum (Kanjanaburi)
504	ST-524	BCC 15208	Lichen	Tong Pha Phum (Kanjanaburi)
505	ST-525	BCC 15209	Flower	Tong Pha Phum (Kanjanaburi)
506	ST-526	BCC 15210	Flower	Tong Pha Phum (Kanjanaburi)
507	ST-527	BCC 15211	Flower	Tong Pha Phum (Kanjanaburi)
508	ST-528	BCC 15212	Flower	Tong Pha Phum (Kanjanaburi)
509	ST-529	BCC 15213	Insect frass	Tong Pha Phum (Kanjanaburi)
510	ST-530	BCC 15214	Insect frass	Tong Pha Phum (Kanjanaburi)
511	ST-531	BCC 15215	Insect frass	Tong Pha Phum (Kanjanaburi)
512	ST-532	BCC 15216	Lichen	Tong Pha Phum (Kanjanaburi)
513	ST-533	BCC 15217	Flower of Eugenia jumbos	Tong Pha Phum (Kanjanaburi)
514	ST-534	BCC 15218	Flower of Eugenia jumbos	Tong Pha Phum (Kanjanaburi)
515	ST-535	BCC 15219	Flower	Tong Pha Phum (Kanjanaburi)
516	ST-536	BCC 15220	Flower	Tong Pha Phum (Kanjanaburi)
517	ST-537	BCC 15221	Flower	Tong Pha Phum (Kanjanaburi)
518	ST-538	BCC 15222	Insect frass	Tong Pha Phum (Kanjanaburi)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
519	ST-539	BCC 15223	Insect frass	Tong Pha Phum (Kanjanaburi)
520	ST-540	BCC 15224	Insect frass	Tong Pha Phum (Kanjanaburi)
521	ST-541	BCC 15225	Insect frass	Tong Pha Phum (Kanjanaburi)
522	ST-542	BCC 15226	Insect frass	Tong Pha Phum (Kanjanaburi)
523	ST-543	BCC 15227	Moss	Tong Pha Phum (Kanjanaburi)
524	ST-544	BCC 15228	Insect frass	Tong Pha Phum (Kanjanaburi)
525	ST-545	BCC 15229	Insect frass	Tong Pha Phum (Kanjanaburi)
526	ST-546	BCC 15230	Insect frass	Tong Pha Phum (Kanjanaburi)
527	ST-547	BCC 15231	Insect frass	Tong Pha Phum (Kanjanaburi)
528	ST-548	BCC 15232	Insect frass	Tong Pha Phum (Kanjanaburi)
529	ST-549	BCC 15233	Insect frass	Tong Pha Phum (Kanjanaburi)
530	ST-550	BCC 15234	Insect frass	Tong Pha Phum (Kanjanaburi)
531	ST-551	BCC 15235	Insect frass	Tong Pha Phum (Kanjanaburi)
532	ST-552	BCC 15236	Insect frass	Tong Pha Phum (Kanjanaburi)
533	ST-553	BCC 15237	Insect frass	Tong Pha Phum (Kanjanaburi)
534	ST-554	BCC 15238	Insect frass	Tong Pha Phum (Kanjanaburi)
535	ST-555	BCC 15239	Insect frass	Tong Pha Phum (Kanjanaburi)
536	ST-556	BCC 15240	Insect frass	Tong Pha Phum (Kanjanaburi)
537	ST-557	BCC 15241	Insect frass	Tong Pha Phum (Kanjanaburi)
538	ST-558	BCC 15242	Insect frass	Tong Pha Phum (Kanjanaburi)
539	ST-559	BCC 15243	Insect frass	Tong Pha Phum (Kanjanaburi)
540	ST-560	BCC 15244	Insect frass	Tong Pha Phum (Kanjanaburi)
541	ST-561	BCC 15245	Insect frass	Tong Pha Phum (Kanjanaburi)
542	ST-562	BCC 15246	Insect frass	Tong Pha Phum (Kanjanaburi)
543	ST-563	BCC 15247	Insect frass	Tong Pha Phum (Kanjanaburi)
544	ST-564	BCC 15248	Insect frass	Tong Pha Phum (Kanjanaburi)
545	ST-565	BCC 15249	Moss	Tong Pha Phum (Kanjanaburi)
546	ST-566	BCC 15250	Moss	Tong Pha Phum (Kanjanaburi)
547	ST-567	BCC 15251	Moss	Tong Pha Phum (Kanjanaburi)
548	ST-568	BCC 15252	Moss	Tong Pha Phum (Kanjanaburi)
549	ST-569	BCC 15253	Moss	Tong Pha Phum (Kanjanaburi)
550	ST-570	BCC 15254	Moss	Tong Pha Phum (Kanjanaburi)
551	ST-571	BCC 15255	Moss	Tong Pha Phum (Kanjanaburi)
552	ST-572	BCC 15256	Moss	Tong Pha Phum (Kanjanaburi)
553	ST-573	BCC 15257	Moss	Tong Pha Phum (Kanjanaburi)
554	ST-574	BCC 15258	Moss	Tong Pha Phum (Kanjanaburi)
555	ST-575	BCC 15259	Dung of elephant	Tong Pha Phum (Kanjanaburi)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
556	ST-576	BCC 15260	Insect frass	Tong Pha Phum (Kanjanaburi)
557	ST-577	BCC 15261	Insect frass	Tong Pha Phum (Kanjanaburi)
558	ST-578	BCC 15262	Rotted wood	Tong Pha Phum (Kanjanaburi)
559	ST-579	BCC 15263	Rotted wood	Tong Pha Phum (Kanjanaburi)
560	ST-580	BCC 15264	Rotted wood	Tong Pha Phum (Kanjanaburi)
561	ST-581	BCC 15265	Moss	Tong Pha Phum (Kanjanaburi)
562	ST-582	BCC 15266	Moss	Tong Pha Phum (Kanjanaburi)
563	ST-583	BCC 15267	Moss	Tong Pha Phum (Kanjanaburi)
564	ST-584	BCC 15268	Insect frass	Tong Pha Phum (Kanjanaburi)
565	ST-585	BCC 15269	Insect frass	Tong Pha Phum (Kanjanaburi)
566	ST-586	BCC 15270	Moss	Tong Pha Phum (Kanjanaburi)
567	ST-587	BCC 15271	Insect frass	Tong Pha Phum (Kanjanaburi)
568	ST-588	BCC 15272	Insect frass	Tong Pha Phum (Kanjanaburi)
569	ST-589	BCC 15273	Insect frass	Tong Pha Phum (Kanjanaburi)
570	ST-590	BCC 15274	Insect frass	Tong Pha Phum (Kanjanaburi)
571	ST-591	BCC 15275	Insect frass	Tong Pha Phum (Kanjanaburi)
572	ST-592	BCC 15276	Flower	Tong Pha Phum (Kanjanaburi)
573	ST-593	BCC 15277	Flower (ดอกไมยราพ)	Tong Pha Phum (Kanjanaburi)
574	ST-594	BCC 15278	Flower (ดอกไมยราพ)	Tong Pha Phum (Kanjanaburi)
575	ST-595	BCC 15279	Flower	Tong Pha Phum (Kanjanaburi)
576	ST-596	BCC 15280	Flower (ดอกสามสิบ)	Tong Pha Phum (Kanjanaburi)
577	ST-597	BCC 15281	Flower (ดอกสามสิบ)	Tong Pha Phum (Kanjanaburi)
578	ST-598	BCC 15282	Flower (ดอกสามสิบ)	Tong Pha Phum (Kanjanaburi)
579	ST-599	BCC 15283	Flower (ดอกสามสิบ)	Tong Pha Phum (Kanjanaburi)
580	ST-600	BCC 15284	Flower (ดอกสามสิบ)	Tong Pha Phum (Kanjanaburi)
581	ST-601	BCC 15285	Flower (ดอกบานไม่รู้โรย)	Tong Pha Phum (Kanjanaburi)
582	ST-602	BCC 15286	Flower	Tong Pha Phum (Kanjanaburi)
583	ST-603	BCC 15287	Flower	Tong Pha Phum (Kanjanaburi)
584	ST-604	BCC 15288	Flower (ดอกหงอนไก่)	Tong Pha Phum (Kanjanaburi)
585	ST-605	BCC 15289	Insect frass	Tong Pha Phum (Kanjanaburi)
586	ST-606	BCC 15290	Fruit	Tong Pha Phum (Kanjanaburi)
587	ST-607	BCC 15291	Flower	Tong Pha Phum (Kanjanaburi)
588	ST-608	BCC 15292	Plant material (กาบกล้วย)	Tong Pha Phum (Kanjanaburi)
589	ST-609	BCC 15293	Fruit (ขนุนเน่า)	Tong Pha Phum (Kanjanaburi)
590	ST-610	BCC 15294	Flower	Tong Pha Phum (Kanjanaburi)
591	ST-611	BCC 15295	Flower	Tong Pha Phum (Kanjanaburi)
592	ST-612	BCC 15296	Flower	Tong Pha Phum (Kanjanaburi)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
593	ST-613	BCC 14944	Fruit (ฝรั่งเน่า)	Tong Pha Phum (Kanjanaburi)
594	ST-614	BCC 15297	Fruite (ฝรั่งเน่า)	Tong Pha Phum (Kanjanaburi)
595	ST-615	BCC 15298	Flower	Tong Pha Phum (Kanjanaburi)
596	ST-616	BCC 15299	Flower	Tong Pha Phum (Kanjanaburi)
597	ST-617	BCC 15300	Flower	Tong Pha Phum (Kanjanaburi)
598	ST-618	BCC 15301	Flower	Tong Pha Phum (Kanjanaburi)
599	ST-619	BCC 15302	Flower	Tong Pha Phum (Kanjanaburi)
600	ST-620	BCC 15303	Exudate of Jackfruit	Tong Pha Phum (Kanjanaburi)
601	ST-621	BCC 15304	Flower	Tong Pha Phum (Kanjanaburi)
602	ST-622	BCC 15305	Flower	Tong Pha Phum (Kanjanaburi)
603	ST-623	BCC 15306	Flower	Tong Pha Phum (Kanjanaburi)
604	ST-624	BCC 15307	Exudate of Jackfruit	Tong Pha Phum (Kanjanaburi)
605	ST-625	BCC 15308	Insect frass	Tong Pha Phum (Kanjanaburi)
606	ST-626	BCC 15309	Flower	Tong Pha Phum (Kanjanaburi)
607	ST-627	BCC 15310	Flower	Tong Pha Phum (Kanjanaburi)
608	ST-628	BCC 15311	Insect frass	Tong Pha Phum (Kanjanaburi)
609	ST-629	BCC 15312	Exudate of Jackfruit	Tong Pha Phum (Kanjanaburi)
610	ST-630	BCC 15313	Flower of Tacca chantrieri Andre	Tong Pha Phum (Kanjanaburi)
611	ST-631	BCC 15314	Exudate of Ficus racemosa Linn	Tong Pha Phum (Kanjanaburi)
612	ST-632	BCC 15315	Mushroom (corpinus)	Tong Pha Phum (Kanjanaburi)
613	ST-633	BCC 15316	Mushroom (corpinus)	Tong Pha Phum (Kanjanaburi)
614	ST-634	BCC 15317	Mushroom (corpinus)	Tong Pha Phum (Kanjanaburi)
615	ST-635	BCC 15318	Fruit	Tong Pha Phum (Kanjanaburi)
616	ST-636	BCC 15319	Fruit	Tong Pha Phum (Kanjanaburi)
617	ST-637	BCC 15320	Flower	Tong Pha Phum (Kanjanaburi)
618	ST-638	BCC 15321	Flower	Tong Pha Phum (Kanjanaburi)
619	ST-639	BCC 15322	Mushroom (เห็ดถ้วย)	Tong Pha Phum (Kanjanaburi)
620	ST-640	BCC 15323	Flower	Tong Pha Phum (Kanjanaburi)
621	ST-641	BCC 15324	Flower	Tong Pha Phum (Kanjanaburi)
622	ST-642	BCC 15325	Flower	Tong Pha Phum (Kanjanaburi)
623	ST-643	BCC 15326	Flower	Tong Pha Phum (Kanjanaburi)
624	ST-644	BCC 15327	Flower of Orthosiphon aristatus Mig.	Tong Pha Phum (Kanjanaburi)
625	ST-645	BCC 15328	Flower	Tong Pha Phum (Kanjanaburi)
626	ST-646	BCC 15329	Flower	Tong Pha Phum (Kanjanaburi)
627	ST-647	BCC 15330	Flower	Tong Pha Phum (Kanjanaburi)
628	ST-648	BCC 15331	Flower	Tong Pha Phum (Kanjanaburi)
629	ST-649	BCC 15332	Flower (พู่ชมพู)	Tong Pha Phum (Kanjanaburi)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
630	ST-650	BCC 15333	Flower (พู่ชมพู)	Tong Pha Phum (Kanjanaburi)
631	ST-651	BCC 15334	Fruit	Tong Pha Phum (Kanjanaburi)
632	ST-652	BCC 15335	Flower	Tong Pha Phum (Kanjanaburi)
633	ST-653	BCC 15336	Flower	Tong Pha Phum (Kanjanaburi)
634	ST-654	BCC 15337	Flower	Tong Pha Phum (Kanjanaburi)
635	ST-655	BCC 15338	Flower	Tong Pha Phum (Kanjanaburi)
636	ST-656	BCC 15339	Flower	Tong Pha Phum (Kanjanaburi)
637	ST-657	BCC 15340	Flower	Tong Pha Phum (Kanjanaburi)
638	ST-658	BCC 15341	Flower	Tong Pha Phum (Kanjanaburi)
639	ST-659	BCC 15342	Flower of Comos spp.	Tong Pha Phum (Kanjanaburi)
640	ST-660	BCC 15343	Flower (ฝ้าย)	Tong Pha Phum (Kanjanaburi)
641	ST-661	BCC 15344	Fruit (มุก)	Tong Pha Phum (Kanjanaburi)
642	ST-662	BCC 15345	Fruit (มุก)	Tong Pha Phum (Kanjanaburi)
643	ST-663	BCC 15346	Fruit (มุก)	Tong Pha Phum (Kanjanaburi)
644	ST-664	BCC 15347	Insect frass	Tong Pha Phum (Kanjanaburi)
645	ST-665	BCC 15348	Flower (พุทธรักษา)	Tong Pha Phum (Kanjanaburi)
646	ST-666	BCC 15349	Fruit	Tong Pha Phum (Kanjanaburi)
647	ST-667	BCC 15350	Fruit	Tong Pha Phum (Kanjanaburi)
648	ST-668	BCC 16765	Mushroom	Khon-Khaen
649	ST-669	BCC 16766	Mushroom	Khon-Khaen
650	ST-670	BCC 16767	Mushroom	Khon-Khaen
651	ST-671	BCC 16768	Mushroom	Khon-Khaen
652	ST-672	BCC 16769	Ferment fish 1	Khon-Khaen
653	ST-673	BCC 16770	Water bug	Khon-Khaen
654	ST-674	BCC 16771	Water bug	Khon-Khaen
655	ST-675	BCC 16772	Water bug	Khon-Khaen
656	ST-676	BCC 16773	Ferment fish 2	Khon-Khaen
657	ST-677	BCC 16774	Ferment fish 3	Khon-Khaen
658	ST-678	BCC 16775	Ferment fish 3	Khon-Khaen
659	ST-679	BCC 16776	Ferment fish 4	Khon-Khaen
660	ST-680	BCC 16777	Ferment fish 5	Khon-Khaen
661	ST-681	BCC 16778	Ferment fish 5	Khon-Khaen
662	ST-682	BCC 16779	Ferment fish 6	Khon-Khaen
663	ST-683	BCC 16780	Ferment fish 7	Khon-Khaen
664	ST-684	BCC 16781	Ferment fish 8	Khon-Khaen
665	ST-685	BCC 16782	Ferment fish 9	Khon-Khaen
666	ST-686	BCC 16783	Ferment fish 9	Khon-Khaen

Table I. Source and place of yeasts isolation (cont.).

No.	Original code	BCC No.	Source	Locality
667	ST-687	BCC 16784	Ferment fish 10	Khon-Khaen
668	ST-688	BCC 16785	Shrimp paste	Khon-Khaen
669	ST-689	BCC 16786	Ferment fish 11	Khon-Khaen
670	ST-690	BCC 16787	Water bug	Khon-Khaen
671	ST-691	BCC 16788	Water bug	Khon-Khaen
672	ST-692	BCC 16789	Ferment fish 1	Khon-Khaen
673	ST-693	BCC 16790	Look pang Number 1	Nakhornratchasima
674	ST-694	BCC 16791	Look pang Number 1	Nakhornratchasima
675	ST-695	BCC 16792	Look pang Number 1	Nakhornratchasima
676	ST-696	BCC 16793	Look pang Number 1	Nakhornratchasima
677	ST-697	BCC 16794	Look pang Number 2	Nakhornratchasima
678	ST-698	BCC 16795	Look pang Number 2	Nakhornratchasima
679	ST-699	BCC 16796	Look pang Number 3	Nakhornratchasima
680	ST-700	BCC 16797	Look pang Number 3	Nakhornratchasima
681	S025		Soil	Nam Nao (Petchaboon)
682	S026		Soil	Nam Nao (Petchaboon)
683	S041		Soil from ant hill	Nam Nao (Petchaboon)
684	S042		Tree bark	Nam Nao (Petchaboon)
685	S043		Tree bark	Nam Nao (Petchaboon)
686	S044		Soil and decayed tree branches and leaves	Nam Nao (Petchaboon)
687	S045		Soil and decayed tree branches and leaves	Nam Nao (Petchaboon)
688	S046		Soil and decayed tree branches and leaves	Nam Nao (Petchaboon)
689	FS61		Flower	Nam Nao (Petchaboon)
690	FS62		Flower	Nam Nao (Petchaboon)
691	FS64		Flower	Nam Nao (Petchaboon)
692	FS65		Flower	Nam Nao (Petchaboon)
693	FS66		Flower	Nam Nao (Petchaboon)
694	FS67		Flower	Nam Nao (Petchaboon)
695	FS68		Furit (ลูกหงอนไก่)	Nam Nao (Petchaboon)
696	FS69		Furit (ลูกหงอนไก่)	Nam Nao (Petchaboon)
697	FS70		Flower	Nam Nao (Petchaboon)
698	FS71		Flower	Nam Nao (Petchaboon)
699	FS72		Flower	Nam Nao (Petchaboon)
700	FS73		Flower	Nam Nao (Petchaboon)
701	FS74		Flower	Nam Nao (Petchaboon)
702	FS75		Flower	Nam Nao (Petchaboon)
703	FS76		Flower	Nam Nao (Petchaboon)

Table I. Source and place of yeasts isolation (cont.).

No.	Original code BCC No.	Source	Locality
704	FS77	Flower	Nam Nao (Petchaboon)
705	FS78	Flower	Nam Nao (Petchaboon)
706	FS79	Flower	Nam Nao (Petchaboon)
707	FS80	Flower	Nam Nao (Petchaboon)
708	FS82	Fruit	Nam Nao (Petchaboon)
709	FS83	Fruit	Nam Nao (Petchaboon)
710	FS84	Fruit	Nam Nao (Petchaboon)
711	FS85	Fruit	Nam Nao (Petchaboon)
712	FS86	Flower	Nam Nao (Petchaboon)
713	FS87	Flower	Nam Nao (Petchaboon)
714	TM 26	Thermite	Kanjanaburi
715	TM 35	Thermite	Kanjanaburi
716	TM 37	Thermite	Kanjanaburi
717	TM 39	Thermite	Kanjanaburi
718	TM 40	Thermite	Kanjanaburi
719	TK 1	*Termitomyces* spp.	Kanjanaburi
720	TK 2-1	*Termitomyces* spp.	Kanjanaburi
721	TK 2-2	*Termitomyces* spp.	Kanjanaburi
722	TK 3	*Termitomyces* spp.	Kanjanaburi
723	TK 5	*Termitomyces* spp.	Kanjanaburi
724	TK 6	*Termitomyces* spp.	Kanjanaburi
725	TK 8	*Termitomyces* spp.	Kanjanaburi
726	TK 9	*Termitomyces* spp.	Kanjanaburi
727	TK 10	*Termitomyces* spp.	Kanjanaburi
728	TK 12	*Termitomyces* spp.	Kanjanaburi
729	TK 13	*Termitomyces* spp.	Kanjanaburi
730	TK 18	*Termitomyces* spp.	Kanjanaburi

Table II. Isolation of methanol-utilizing yeasts from soil, flower and other material by three-time enrichment in 1% methanol -YNB broth.

Sample	Place of Sample Collection		No. of sample	No. of methanol utilizing yeast	Isolate code	Growth on 1%MtOH-YNB agar	
						30°C 5 days	37°C 5 days
Soil	Petchabun	Nam Nao	1	1	S025	+	-
Soil	Petchabun	Nam Nao	1	1	S026	+	-
Soil	Petchabun	Nam Nao	3	-	-		
Soil	Petchabun	Nam Nao	1	-	-		
Soil from ant hill	Petchabun	Nam Nao	1	1	S041	+4	-
Soil and decayed tree branches and leaves	Petchabun	Nam Nao	1	-	-		
Tree bark	Petchabun	Nam Nao	1	2	S042	+4	-
					S043	+4	-
Soil and decayed tree branches and leaves	Petchabun	Nam Nao	1	1	S044	+4	-
Decayed fallen tree	Petchabun	Nam Nao	1	-	-		
Soil and decayed tree branches and leaves	Petchabun	Nam Nao	1	1	S045	+3	-
Soil and decayed tree branches and leaves	Petchabun	Nam Nao	1	1	S046	+4	+4
ดอกว่านน้ำ	Petchabun	Nam Nao	1	-	-		
ดอกสีเหลือง คล้ายดอกถั่ว	Petchabun	Nam Nao	1	2	FS61	+4	+4
					FS62	+4	+4
ดอกเป็นช่อสีม่วง	Petchabun	Nam Nao	1	1	FS64	+4	-
ดอกสีม่วง คล้ายดอกผักบุ้ง	Petchabun	Nam Nao	1	1	FS65	+4	+2
ดอกเป็นพุ่มเหลือง ขนาดใหญ่	Petchabun	Nam Nao	1	-	-		
ดอกเป็นพุ่มเหลือง ขนาดเล็ก	Petchabun	Nam Nao	1	1	FS66	+4	+3
	Petchabun	Nam Nao	1	-	FS67	+4	-
ลูกกระตังใบ	Petchabun	Nam Nao	1	-	-		

Sample	Place of Sample Collection		No. of sample	No. of methanol utilizing yeast	Isolate code	Growth on 1%MtOH-YNB agar	
						30°C 5 days	37°C 5 days
ลูกไม้สีแดง (เล็ก)	Petchabun	Nam Nao	1	-	-		
ลูกไม้สีแดง	Petchabun	Nam Nao	1	-	-		
ลูกหงอนไก่	Petchabun	Nam Nao	1	2	FS68	+4	-
					FS69	+4	-
ช่อดอกสีเหลือง	Petchabun	Nam Nao	1	1	FS70	+4	-
ดอกปทุมมา	Petchabun	Nam Nao	1	-	-		
ดอกเป็นช่อสีแดง	Petchabun	Nam Nao	1	4	FS71	+4	-
					FS72	+4	+3
					FS73	+4	+1
					FS74	+2	+4
ดอกสาบเสือ(ม่วง)	Petchabun	Nam Nao	1	2	FS75	+4	-
					FS76	+4	+3
ดอกเหลืองเล็ก	Petchabun	Nam Nao	1	1	FS77	+3	+2
ดอกไม้	Petchabun	Nam Nao	1	1	FS78	+4	-
ดอกเป็นช่อสีม่วง	Petchabun	Nam Nao	1	2	FS79	+4	+3
					FS80	+4	-
ผล	Petchabun	Nam Nao	1	3	FS82	+4	+3
					FS83	+4	+3
					FS84	+4	+4
ดอกไม้คล้ายว่าน	Petchabun	Nam Nao	1	-	-	-	-
ผลกระดังใบ	Petchabun	Nam Nao	1	1	FS85	+4	+1
ผลหงอนไก่	Petchabun	Nam Nao	1	-	-	-	-

Sample	Place of Sample Collection		No. of sample	No. of methanol utilizing yeast	Isolate code	Growth on 1%MtOH-YNB agar	
						30°C 5 days	37°C 5 days
ดอกแล้วนกต่อ	Petchabun	Nam Nao	1	1	FS86	+4	-
ผลกลมสีแดง เป็นสองซีก ข้างในมีเม็ดแดง	Petchabun	Nam Nao	1	-	-	-	-
ดอกหญ้า	Petchabun	Nam Nao	1	1	FS87	+4	+3

Table III. Known yeasts found in the natural environment of Thailand.

Species identified	No. of strains	Species identified	No. of strains
Ascomycetous yeasts		Basidiomycetous yeasts	
Ambrosiozyma monospora	2	*Blastobotrys capitulata*	1
Aureobasidium pullulans	2	*Bullera dendrophila*	1
Candida berthetii	1	*Bullera sinensis*	2
Candida cariosilignicola	2	*Cryptococcus heveanensis*	8
Candida dendronema	1	*Cryptococcus humicola*	2
Candida diversa	4	*Cryptococcus laurentii*	3
Candida fukuyamaensis	3	*Cryptococcus* sp. CBS 8372	1
Candida maltosa	1	*Exobasidium vexans*	5
Candida natalensis	1	*Rhodosporidium paludigenum*	1
Candida parapsilosis	2	*Rhodosporidium toruloides*	1
Candida sp. NRRL Y-17456	4	*Rhodotorula nothofagi*	1
Candida sp. UWO(PS)00-147.3	1	*Sporidiobolus ruineniae*	3
Candida tropicalis	9	*Sporobolomyces bannaensis*	1
Debaryomyces polymorphus	4	*Sporobolomyces odoratus*	3
Debaryomyces nepalensis	4	*Sporobolomyces poonsookiae*	1
Debaryomyces sp. NRRL Y-7804	1	*Sporobolomyces* sp. TY-241	2
Debaryomyces vanrijiae	3	*Telletiopsis* sp. TY 235	1
Geotrichum fragrans	2	*Trichosporon asahii*	4
Hanseniaspora guilliermondii	1	*Trichosporon mycotoxinivorans*	1
Hanseniaspora opuntiae	3		
Hanseniaspora sp. CBS 8772	1	19 species (10 genera)	42
Hanseniaspora vineae	1		
Kloeckera lindneri	1		
Kluyveromyces lactis	2		
Kodamaea ohmeri	2		
Metschnikowia koreensis	5		
Pichia capsulata	5		
Pichia nakazawae	2		
Pichia ohmeri	1		
Pichia sp. UWO(PS)99-305.1	1		
Pichia stipitis	2		
Saccharomyces cerevisiae	5		
Saccharomyces kluyveri	8		
Saccharomyces unisporus	2		
Stephanoascus smithiae	3		
Torulaspora delbrueckii	1		
Torulaspora sp. IFO 11061	1		
Williopsis saturnus	2		
Zygosaccharomyces sp. IFO 11070	1		
Total 37 species (15 genera)	96		

Table IV. The list of strains consider to represent new species.

No.	Representative strains	Nearest species	% Similarity (No. of nucleotides difference)	Sourace
Ascomycetous yeasts				
1.	ST-431	*Candida ambrosiae* AY013716	95.24 (26/546)	Insect frass
2.	ST-33	*Candida coipomoensis* U45747	98.40 (9/562)	Insect frass
3.	ST-43	*Candida friedrichii* U45781	94.21 (21/535)	Insect frass
4.	ST-300	*Candida friedrichii* U45781	98.90 (6/547)	Insect frass
5.	ST-328	*Candida friedrichii* U45781	98.54 (8/547)	Insect frass
6.	ST-329	*Candida friedrichii* U45781	98.54 (8/547)	Insect frass
7.	ST-331	*Candida friedrichii* U45781	97.60 (13/547)	Insect frass
8.	ST-333	*Candida friedrichii* U48751	98.54 (8/547)	Insect frass
9.	ST-60	*Candida fukuyamaensis* U62311	99.10 (5/556)	Insect frass
10.	ST-238	*Candida insectalens* U62304	93.54 (29/449)	Insect frass
11.	ST-164	*Candida membranifaciens* U45792	97.60 (13/542)	Insect frass
12.	ST-249	*Candida musae* U44814	92.51 (37/494)	Insect frass
13.	ST-337	*Candida musae* U44814	92.52 (37/495)	Insect frass
14.	ST-194	*Candida ovalis* U70248	99.82 (11/566)	Insect frass
15.	ST-95	*Candida palmae* AY197725	88.94 (51/463)	Insect frass
16.	ST-211	*Candida pseudointermedia* AF533069	94.21 (29/501)	Insect frass
17.	ST-330	*Candida savonica* U62307	94.35 (27/478)	Insect frass
18.	ST-224	*Candida silvanorum* U71068	93.00 (33/473)	Insect frass
19.	ST-79	*Candida* sp. HA1034 AF272396	92.83 (40/558)	Insect frass
20.	ST-297	*Candida* sp. NRRL Y-17858 AF017239	89.98 (53/529)	Insect frass
21.	ST-315	*Candida* sp. NRRL Y-17858 AF017239	92.25 (30/387)	Insect frass
22.	ST-78	*Candida tammaniensis* AF017243	96.11 (21/540)	Insect frass
23.	ST-17	*Candida tsuchiyae* U49064	94.85 (23/447)	Insect frass
24.	ST-49	*Candida tsuchiyae* U49064	92.83 (33/460)	Insect frass
25.	ST-50	*Candida tsuchiyae* U49064	91.48 (39/456)	Insect frass
26.	ST-310	*Debaryomyces vanrijiae* var. *yarrowii* U45843	99.30 (4/570)	Insect frass
27.	ST-309	*Debaryomyces vanrijiae* var. *yarrowii* U45843	99.30 (4/570)	Insect frass
28.	ST-338	*Dipodascus ovetensis* U40116	98.51 (6/405)	Insect frass
29.	ST-306	*Hanseniaspora* sp. CBS 8772 AJ512455	95.97 (23/571)	Insect frass
30.	ST-250	*Hanseniaspora uvarum* AF257273	96.30 (21/568)	Insect frass
31.	ST-493	*Hanseniaspora uvarum* AY305681	95.45 (9/572)	Insect frass
32.	ST-314	*Issatchenkia* sp. NRRL Y-12824 AF017398	92.43 (42/555)	Insect frass
33.	ST-233	*Metschnikowia agaveae* U84243	95.24 (26/546)	Insect frass
34.	ST-57	*Metschnikowia drosophilae* AF279303	93.26 (35/519)	Insect frass
35.	ST-40	*Metschnikowia koreensis* AF296438	93.60 (30/484)	Insect frass
36.	ST-96	*Metschnikowia lunata* U45733	94.93 (23/454)	Insect frass
37.	ST-37	*Pichia americana* U73575	98.95 (6/569)	Insect frass
38.	ST-236	*Pichia anomala* AF330115	98.95 (4/573)	Insect frass
39.	ST-84	*Pichia besseyi* U75729	90.23 (51/522)	Insect frass

Table IV. The list of strains consider to represent new species (cont.)

No.	Representative strains	Nearest species	% Similarity (No. of nucleotides difference)	Sourace
40.	ST-240	*Pichia dryadoides* U75422	95.18 (23/477)	Insect frass
41.	ST-311	*Pichia fabianii* AF335971	98.42 (9/570)	Insect frass
42.	ST-24	*Pichia heimii* U45713	95.65 (23/529)	Insect frass
43.	ST-252	*Pichia heimii* U45713	95.64 (23/528)	Insect frass
44.	ST-225	*Pichia japonica* U73579	98.95 (6/570)	Insect frass
45.	ST-228	*Pichia japonica* U73579	98.95 (6/570)	Insect frass
46.	ST-229	*Pichia japonica* U73579	98.95 (6/570)	Insect frass
47.	ST-335	*Pichia mexicana* U45797	98.49 (8/530)	Insect frass
48.	ST-433	*Pichia mississippiensis* U74597	98.14 (10/537)	Insect frass
49.	ST-334	*Pichia pijperi* U75418	98.94 (6/568)	Insect frass
50.	ST-339	*Pichia* sp. UWO(PS)85-301.3 AF530614	98.03 (11/558)	Insect frass
51.	ST-320	*Pichia veronae* U73576	98.42 (9/570)	Insect frass
52.	ST-394	*Saccharomyces servazzii* AF406921	97.38 (15/572)	Insect frass
53.	ST-248	*Stephanoascus farinosus* U40132	98.43 (9/572)	Insect frass
54.	ST-122	*Wickerhamia fluorescens* U45719	90.93 (46/507)	Insect frass
55.	ST-26	A yeast-like fungus AF313370	94.06 (19/320)	Flower
56.	ST-29	*Candida* cf. *etchellsii* AY257048	93.76 (30/481)	Flower
57.	ST-22	*Candida etschellsii* AF313353	94.40 (28/500)	Flower
58.	ST-27	*Candida restingae* AF059667	97.96 (10/491)	Flower
59.	ST-490	*Candida sorbosivorans* AY008842	97.11 (13/450)	Flower
60.	ST-533	*Candida sorbosivorans* AY008842	97.62 (11/462)	Flower
61.	ST-536	*Candida sorbosivorans* AY008842	97.54 (11/447)	Flower
62.	ST-32	*Candida* sp. NRRL Y-17678 AF017237	98.65 (7/518)	Flower
63.	ST-388	*Candida tammaniensis* AF017243	93.15 (35/511)	Flower
64.	ST-391	*Hanseniaspora opuntiae* AY267820	95.95 (23/568)	Flower
65.	ST-387	*Metchnikowia* sp. NRRL Y-5941 AF017400	91.70 (40/482)	Flower
66.	ST-449	*Candida* cf. *glabrata* AF313362	97.98 (11/593)	Moss
67.	ST-451	*Candida musae* U44814	94.84 (27/523)	Moss
68.	ST-267	*Candida palmae* AY197725	98.31 (8/473)	Moss
69.	ST-269	*Candida ubatubensis* AY197724	90.67 (28/300)	Moss
70.	ST-36	*Galactomyces geotrichum* U40118	97.99 (11/548)	Moss
71.	ST-30	*Pichia pijperi* U75418	98.77 (7/568)	Moss
72.	ST-445	*Pichia pijperi* U75418	98.37 (9/551)	Moss
73.	ST-370	*Candida ambrosiae* AY013716	94.94 (28/558)	Mushroom
74.	ST-19	*Candida azyma* U62312	99.28 (4/553)	Mushroom
75.	ST-365	*Candida friedrichii* U45781	98.72 (6/547)	Mushroom
76.	ST-366	*Candida friedrichii* U45781	98.72 (6/547)	Mushroom
77.	ST-246	*Candida llanquihuensis* U70190	96.39 (20/556)	Mushroom
78.	ST-18	*Candida parapsilosis* AF485969	93.49 (37/568)	Mushroom
79.	ST-358	*Candida trypodendroni* AF017240	98.87 (6/531)	Mushroom

Table IV. The list of strains consider to represent new species (cont.)

No.	Representative strains	Nearest species	% Similarity (No. of nucleotides difference)	Sourace
80.	ST-2	*Endomyces scopularum* AF267231	90.69 (46/494)	Mushroom
81.	ST-343	*Kluyveromyces* sp. IFO 1884 AB041001	97.08 (15/514)	Mushroom
82.	ST-3	*Pichia pijperi* U75418	98.77 (7/568)	Mushroom
83.	ST-4	*Pichia pijperi* U75418	98.77 (7/568)	Mushroom
84.	ST-464	*Hanseniaspora* sp. CBS 8772 AJ512455	96.15 (22/572)	Lichen
85.	ST-476	*Hanseniaspora clermontiae* AJ512456	98.62 (8/579)	Rotted wood
Basidiomycetous yeasts				
1.	ST-73	*Cryptococcus* sp. CBS 8363 AF444699	97.48 (15/597)	Insect frass
2.	ST-71	*Cryptococcus* sp. CBS 8507 AF444742	98.67 (8/600)	Insect frass
3.	ST-318	*Trichosporon* sp. CBS 5601 AF444710	97.96 (13/591)	Insect frass
4.	ST-144	*Bullera pseudovariabilis* AF544247	95.22 (24/565)	Leave
5.	ST-186	*Bullera pseudovariabilis* AF544247	86.22 (49/624)	Leave
6.	ST-145	*Cryptococcus curvatus* AF189834	93.73 (38/606)	Leave
7.	ST-111	*Cryptococcus luteolus* AJ555466	99.01 (6/610)	Leave
8.	ST-201	*Cryptococcus luteolus* AJ555466	98.98 (6/591)	Leave
9.	ST-206	*Sporidiobolus pararoseus* AF189978	93.32 (4/586)	Leave
10.	ST-87	*Sporidiobolus pararoseus* AF189978	99.25 (4/534)	Leave
11.	ST-128	*Sporidiobolus pararoseus AF189978*	99.31 (4/580)	Leave
12.	ST-115	*Sporidiobolus pararoseus* AF189978	99.81 (7/586)	Leave
13.	ST-92	*Sporidiobolus pararoseus* AF189978	98.97 (6/580)	Leave
14.	ST-98	*Sporidiobolus pararoseus* AF189978	99.31 (4/586)	Leave
15.	ST-102	*Sporidiobolus pararoseus* AF189978	99.25 (4/532)	Leave
16.	ST-91	*Sporidiobolus pararoseus* AF189978	99.11 (6/563)	Leave
17.	ST-195	*Sporidiobolus pararoseus* AF189978	99.30 (4/577)	Leave
18.	ST-90	*Sporidiobolus ruineniae* AF387128	97.21 (16/575)	Leave
19.	ST-88	*Sporidiobolus ruineniae* var. *ruineni*	97.28 (16/588)	Leave
20.	ST-185	*Sporobolomyces blumeae* AY070007	97.00 (17/567)	Leave
21.	ST-119	*Sporobolomyces carnicolor* AY070008	98.92 (6/555)	Leave
22.	ST-132	*Sporobolomyces japonicus* AY070009	99.14 (5/580)	Leave
23.	ST-187	*Sporobolomyces japonicus* AY070009	99.15 (5/586)	Leave
24.	ST-93	*Sporobolomyces japonicus* AY070009	99.14 (5/580)	Leave
25.	ST-151	*Sporobolomyces japonicus* AY070009	99.11 (5/564)	Leave
26.	ST-156	*Sporobolomyces japonicus* AY070009	99.82 (4/570)	Leave
27.	ST-184	*Sporobolomyces odoratus* AF387126	98.59 (8/566)	Leave
28.	ST-198	*Sporobolomyces odoratus* AF387126	98.91 (6/552)	Leave
29.	ST-153	*Sporobolomyces ruber* AF189992	89.14 (36/626)	Leave
30.	ST-226	*Sporobolomyces* sp. TY-241 AY313053	99.22 (4/518)	Leave
31.	ST-173	*Tilletiopsis albescens* AJ235289	91.89 (43/530)	Leave

Table V. The list of not yet identified species.

No.	Representative strains	Nearest species	% Similarity (No. of nucleotides difference)	Sourace
Ascomycetous yeasts				
1.	ST-422	*Saccharomyces cerevisiae* AY048154	99.66 (2/590)	Coconut
2.	ST-390	*Candida floricola U45710*	99.60 (2/483)	Flower
3.	ST-234	*Candida pseudointermedia* AF533069	99.42 (3/517)	Insect frass
4.	ST-39	*Candida rancensis* AJ508580	99.61 (2/509)	Insect frass
5.	ST-125	*Candida* sp. NRRL Y-17456 U45775	99.65 (2/570)	Insect frass
6.	ST-116	*Debaryomyces* sp. NRRL Y-7804 U45771	99.46 (2/556)	Insect frass
7.	ST-235	*Pichia acaciae* U45767	99.64 (2/564)	Insect frass
8.	ST-237	*Pichia acaciae* U45767	98.95 (3/569)	Insect frass
9.	ST-41	*Pichia lynferdii* U74595	99.47 (3/570)	Insect frass
10.	ST-38	*Pichia stipitis* U45741	99.65 (2/568)	Insect frass
11.	ST-446	*Candida albicans* AF156536	99.67 (2/587)	Moss
12.	ST-385	*Candida floricola* U45710	99.59 (2/483)	Moss
13.	ST-441	*Candida quercitrusa* U45831	99.65 (2/565)	Moss
14.	ST-448	*Hanseniaspora meyeri* AJ512461	99.49 (2/584)	Moss
15.	ST-247	*Pichia lynferdii* U74595	99.44 (3/536)	Moss
16.	ST-14	*Torulaspora globosa* AB087395	99.65 (2/573)	Moss
17.	ST-377	*Candida floricola* U45710	99.59 (2/483)	Mushroom
18.	ST-253	*Candida fukuyamaensis U62311*	99.46 (3/555)	Mushroom
19.	ST-380	*Candida natalensis* U45818	99.47 (3/566)	Mushroom
20.	ST-8	*Hanseniaspora opuntiae* AY267820	98.93 (2/562)	Mushroom
Basidiomycetous yeasts				
1.	ST-52	*Cryptococcus heveanensis* AFO75467	99.67 (2/607)	Insect frass
2.	ST-59	*Trichosporon faecale AF105395*	99.65 (2/575)	Insect frass
3.	ST-121	*Trichosporon multisporum* AF139984	99.66 (2/595)	Insect frass
4.	ST-181	*Bullera sinensis* AF189884	99.46 (3/560)	Leave
5.	ST-172	*Bullera sinensis* AF459658	99.48 (3/574)	Leave
6.	ST-170	*Sporobolomyces japonicus* AY070009	99.49 (3/586)	Leave
7.	ST-175	*Sporobolomyces japonicus* AY070009	99.48 (3/572)	Leave
8.	ST-178	*Sporobolomyces japonicus* AY070009	99.49 (3/586)	Leave
9.	ST-183	*Sporobolomyces japonicus* AY070009	99.44 (3/539)	Leave
10.	ST-100	*Sporobolomyces odoratus* AF387126	99.44 (3/543)	Leave
11.	ST-123	*Sporobolomyces odoratus* AF387126	99.44 (3/571)	Leave
12.	ST-192	*Sporobolomyces* sp. TY-241 AY313053	99.44 (3/560)	Leave
13.	ST-159	*Sporobolomyces* sp. TY-257 AY313054	99.44 (3/574)	Leave
14.	ST-105	*Tilletiopsis* sp. TY-363 AY313023	99.65 (2/581)	Leave
15.	ST-197	*Tilletiopsis* sp. TY-363 AY313023	99.66 (2/595)	Leave
16.	ST-323	*Cryptococcus humicola AF189836*	99.67 (2/605)	Mushroom

Table VI. The list of yeasts strains were identified at the genus level, results from conventional identification method.

Strains No.	Identification at Genus level
TM26	*Williopsis sp.*
TM35	*Pichia sp.*
TM37	*Candida sp.*
TM39	*Pichia sp.*
TM40	*Candida sp.*
TK1	*Candida sp.*
TK2-1	*Candida sp.*
TK2-2	*Candida sp.*
TK3	*Kluyveromtces sp.*
TK5	*Rhodotorula sp.*
TK6	*Rhodotorula sp.*
TK8	*Candida sp.*
TK9	*Debaryomyces sp.*
TK10	*Crytococcus sp.*
TK12	*Torulaspora sp.*
TK13	*Debaryomyces sp.*
TK18	*Torulaspora sp.*

Table VII. The morphological, physiological and biochemical properties of ascomycetous yeasts

Strain No.	Fermentation: Glucose	Galactose	Sucrose	Maltose	Lactose	Melibiose	Raffinose	Carbon and nitrogen assimilation: Glucose	Galactose	L-Sorbose	Sucrose	Maltose	Cellobiose	Trehalose	Lactose	Melibiose	Raffinose	Melezitose	Inulin	Sol.starch	D-Xylose	L-Arabinose	D-Arabinose	D-Ribose	L-Rhamnose	Ethanol	Glycerol
ST-1	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	w	+	+	+	+	+	+	w	+
ST-2	-	-	-	-	-	-	-	+	-	-	+	+	+	+	-	-	-	+	-	+	w	-	-	+	-	-	+
ST-3	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+
ST-4	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+
ST-5	+	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ST-6	+	-	-	-	-	-	-	+	-	-	-	-	+	w	-	-	-	-	-	-	-	-	-	-	-	-	-
ST-7	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	-	+	+	w	+	+	+	w	+
ST-8	+	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ST-9	+	-	-	-	-	-	-	+	-	-	-	-	+	w	-	-	-	-	-	-	-	-	-	-	-	-	-
ST-10	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+
ST-13	+	+	+	-	-	-	+	+	+	+	+	+	+	+	-	-	+	-	+	-	-	-	-	+	-	-	+
ST-14	+	+	+	+	-	+	+	+	+	-	+	+	-	+	-	+	+	-	+	-	-	-	-	-	-	-	+
ST-15	-	-	-	-	-	-	-	+	-	-	+	+	+	+	-	-	-	+	-	-	+	-	-	-	+	-	+
ST-16	+	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	+	-	w	+	-	-	+	-	-	+
ST-17	+	w	-	-	-	-	-	+	+	+	+	+	+	+	+	-	-	+	-	w	+	-	+	-	-	-	-
ST-18	+	+	-	+	-	-	-	+	+	+	+	+	+	+	-	-	-	+	-	w	+	+	-	+	-	-	+
ST-19	-	-	-	-	-	-	-	+	+	+	+	+	-	+	-	-	-	+	-	w	+	+	+	-	-	-	+
ST-20	+	+	-	-	-	-	-	+	+	+	+	+	-	+	-	-	-	+	-	w	+	+	-	+	-	-	+
ST-21	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	-	+
ST-22	-	-	-	-	-	-	-	+	-	+	+	-	-	-	-	-	+	-	-	-	-	-	-	+	-	-	+
ST-23	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ST-24	+	+	+	-	-	-	-	+	+	-	+	+	+	+	-	-	+	+	-	+	+	+	+	+	+	-	+
ST-25	+	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	+	-	w	+	-	-	+	w	-	+
ST-26	-	-	-	-	-	-	-	+	w	-	+	-	+	-	-	-	+	-	+	-	-	-	-	+	-	-	+
ST-27	+	+	+	-	-	-	+	+	+	+	+	+	+	+	-	-	+	-	+	w	+	-	-	+	-	-	+

Strain No.	Erythritol	Ribitol	Galactitol	D-Mannitol	D-Glucitol	α-Methyl-D-glucoside	Salicin	Glucono-δ-lactone	2-Ketogluconic acid	5-Ketogluconic acid	DL-lactic acid	Succinic acid	Citric acid	Inositol	Glucuronic acid	Galacturonic acid	Nitrate	Nitrite	Ethylamine	L-Lysine	Cadaverine
ST-1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+
ST-2	-	+	-	+	+	+	+	+	-	-	-	+	+	-	-	-	-	-	+	+	+
ST-3	-	-	-	+	+	-	+	+	-	-	+	+	+	-	-	-	-	-	+	+	+
ST-4	-	-	-	+	+	-	+	+	-	-	+	+	+	-	-	-	-	-	+	+	+
ST-5	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+	+	+
ST-6	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+	+	+
ST-7	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+
ST-8	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+	+	+
ST-9	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+	+	+
ST-10	-	-	-	+	+	-	+	+	-	-	+	+	+	-	-	-	-	-	+	+	+
ST-13	-	+	-	+	+	+	+	+	+	-	+	+	+	-	-	-	-	-	+	+	+
ST-14	-	-	-	+	+	+	-	+	+	-	+	-	-	-	-	-	-	-	-	+	-
ST-15	-	-	-	+	+	+	+	+	-	-	+	+	+	-	-	-	+	+	+	+	+
ST-16	-	+	-	+	+	+	+	+	+	-	-	+	-	-	-	-	-	-	+	+	+
ST-17	-	+	+	+	+	+	+	+	+	-	w	+	+	-	-	-	-	-	+	+	+
ST-18	-	+	-	+	+	+	+	+	+	+	-	+	+	-	-	-	-	-	+	+	+
ST-19	-	+	+	+	+	+	-	+	+	-	-	+	-	-	-	-	-	-	+	+	+
ST-20	-	+	-	+	+	+	-	+	+	+	-	+	+	-	-	-	-	-	+	+	+
ST-21	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ST-22	-	-	-	+	+	-	-	+	+	-	-	+	+	-	-	-	+	+	+	w	+
ST-23	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	+	+
ST-24	+	+	+	+	+	+	+	+	+	-	+	+	+	-	-	-	-	-	+	+	+
ST-25	-	+	-	+	+	+	+	+	+	-	-	+	+	-	-	-	-	-	+	+	+
ST-26	+	-	-	-	-	-	-	+	-	-	-	+	w	-	-	-	+	+	-	-	+
ST-27	-	+	-	+	+	+	+	+	+	-	w	+	+	-	-	-	-	-	+	+	+

Strain No.	Other characteristics: Vitamin-free	50% Glucose	60% Glucose	Starch formation	Gelatin liquefaction	0.01% Cycloheximide	0.1% Cycloheximide	Urease	Lipase	Acid formation	Growth at 25°C	Growth at 30°C	Growth at 35°C	Growth at 37°C	Growth at 40°C	Growth at 42°C	DBB	Pseudomycelium	True mycelium	Co-Q (Main component)
ST-1	+	-	-	-	-	+	+	-	-	-	+	+	+	-	-	-	-	+	-	nd
ST-2	w	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+	+	nd
ST-3	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	-	7
ST-4	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	-	nd
ST-5	-	-	-	-	-	+	+	-	-	-	+	+	+	+	-	-	-	-	-	6
ST-6	-	-	-	-	-	+	+	-	-	-	+	+	+	+	-	-	-	-	-	nd
ST-7	+	-	-	-	w	+	+	-	-	+	+	+	-	-	-	-	-	+	-	nd
ST-8	-	-	-	-	-	+	+	-	-	-	+	+	+	+	-	-	-	-	-	nd
ST-9	-	-	-	-	-	+	+	-	-	-	+	+	+	+	-	-	-	-	-	nd
ST-10	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	-	nd
ST-13	+	+	+	-	-	-	-	-	-	-	+	+	+	+	+	-	-	+	-	nd
ST-14	+	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	6
ST-15	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	nd
ST-16	w	+	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	-	9
ST-17	-	-	-	-	-	+	-	-	-	-	+	+	-	-	-	-	-	+	-	9
ST-18	-	+	-	-	-	+	-	-	-	+	+	+	-	-	-	-	-	+	-	9
ST-19	-	+	-	-	+	+	+	-	-	-	+	+	-	-	-	-	-	-	-	9
ST-20	+	+	-	-	-	-	-	-	-	-	+	+	+	+	±	-	-	+	-	9
ST-21	+	w	-	-	+	-	-	-	-	-	+	+	-	-	-	-	-	+	-	9
ST-22	+	-	-	-	-	+	+	-	-	+	+	+	-	-	-	-	-	-	-	nd
ST-23	+	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	nd
ST-24	+	w	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+	-	nd
ST-25	+	+	-	-	+	-	-	-	-	+	+	+	-	-	-	-	-	+	-	nd
ST-26	+	+	-	-	+	+	-	-	-	+	+	+	-	-	-	-	-	+	-	9
ST-27	-	w	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	+	nd

Table VII. The morphological, physiological and biochemical properties of ascomycetous yeasts

Strain No.	Fermentation: Glucose	Galactose	Sucrose	Maltose	Lactose	Melibiose	Raffinose	Carbon and nitrogen assimilation: Glucose	Galactose	L-Sorbose	Sucrose	Maltose	Cellobiose	Trehalose	Lactose	Melibiose	Raffinose	Melezitose	Inulin	Sol.starch	D-Xylose	L-Arabinose	D-Arabinose	D-Ribose	L-Rhamnose	Ethanol	Glycerol
ST-28	+	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	+	-	w	+	-	-	+	-	-	+
ST-29	+	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	w	-	-	+
ST-30	+	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+
ST-31	+	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+
ST-32	+	-	+	+	-	-	-	+	-	+	+	+	-	+	-	-	-	+	-	-	+	-	-	-	-	-	+
ST-33	+	+	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	+	-	-	+	+	+	+	w	-	+
ST-34	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	-	w	+	+	+	+	+	-	+
ST-35	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+
ST-36	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+
ST-37	+	-	+	-	-	-	+	+	-	-	+	+	+	+	-	-	+	+	w	w	+	-	-	-	+	-	+
ST-38	+	+	-	+	-	-	-	+	+	+	+	+	+	+	-	-	-	+	-	+	+	+	+	+	-	-	-
ST-39	+	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	+	-	w	+	-	w	+	w	-	+
ST-40	+	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	+	w	w	+	-	-	+	-	+	+
ST-41	+	+	+	-	-	-	-	+	+	+	+	+	w	+	-	+	+	+	+	+	+	+	w	+	+	+	+
ST-42	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	w	+	w	+	+	+	+	+	+	+	+
ST-43	w	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	+	-	w	+	+	+	+	+	-	+
ST-44	-	-	-	-	-	-	-	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	-	+	+
ST-45	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ST-46	-	-	-	-	-	-	-	+	+	+	+	+	-	+	-	-	-	+	w	w	+	-	-	+	-	+	+
ST-47	+	+	+	+	-	-	-	+	+	+	+	+	+	+	-	-	-	+	w	+	+	-	w	+	-	+	+
ST-48	+	+	+	+	-	-	-	+	+	+	+	+	+	+	-	-	-	+	w	+	+	-	w	w	-	+	+
ST-49	+	-	+	-	-	-	-	+	+	+	+	+	-	+	-	-	+	+	+	+	+	-	-	+	-	+	+
ST-50	+	+	-	-	-	-	-	+	+	+	+	+	-	+	-	-	-	+	+	w	+	+	+	+	-	+	+
ST-51•	+	+	-	-	-	-	-	+	+	+	+	+	-	+	-	-	-	+	w	+	+	+	+	+	-	+	+
ST-52	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-	+	+	w	+	+	+	+	+	+	+	+

Strain No.	Erythritol	Ribitol	Galactitol	D-Mannitol	D-Glucitol	α-Methyl-D-glucoside	Salicin	Glucono-δ-lactone	2-Ketogluconic acid	5-Ketogluconic acid	DL-lactic acid	Succinic acid	Citric acid	Inositol	Glucuronic acid	Galacturonic acid	Nitrate	Nitrite	Ethylamine	L-Lysine	Cadaverine
ST-28	-	+	-	+	+	+	+	+	+	-	-	+	-	-	-	-	-	-	+	+	+
ST-29	-	-	-	+	+	-	-	+	+	-	-	+	+	-	-	-	+	+	+	-	+
ST-30	-	-	-	+	+	-	+	+	-	-	+	+	+	-	-	-	-	-	+	+	+
ST-31	-	-	-	+	+	+	+	+	-	-	+	+	-	-	-	-	+	+	+	+	+
ST-32	-	+	-	+	+	+	-	+	+	-	-	+	+	-	-	-	-	-	+	+	+
ST-33	+	+	-	+	+	+	+	+	-	-	-	+	+	-	-	-	-	-	+	+	+
ST-34	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	w	+	+
ST-35	-	+	-	+	+	-	-	+	-	-	-	+	+	-	-	-	-	-	+	+	+
ST-36	-	-	-	+	+	-	-	-	-	-	+	+	-	-	-	-	-	-	+	+	+
ST-37	-	-	-	+	+	+	+	+	-	-	+	+	+	-	-	-	+	+	+	+	+
ST-38	+	+	-	+	+	+	+	+	+	-	w	+	+	-	-	-	-	-	+	+	+
ST-39	-	+	-	+	+	-	+	+	+	-	-	+	-	-	-	-	-	-	+	+	+
ST-40	-	+	-	+	+	-	+	+	+	-	-	+	-	-	-	-	-	-	+	+	+
ST-41	+	+	-	+	+	+	+	+	w	-	+	+	+	-	-	-	+	+	+	+	+
ST-42	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+
ST-43	-	+	-	+	+	+	-	+	-	w	+	+	-	-	-	-	-	-	w	+	+
ST-44	+	+	+	+	+	+	+	+	w	-	+	+	+	-	+	+	+	+	#	-	-
ST-45	+	+	+	+	+	+	+	+	+	+	w	+	+	+	+	+	+	+	+	+	+
ST-46	+	+	-	+	+	+	-	+	+	-	-	-	+	-	-	-	-	-	+	-	+
ST-47	-	+	-	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	+	+	+
ST-48	-	+	-	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	+	+	+
ST-49	-	+	+	+	+	+	+	+	+	-	-	+	+	-	-	-	-	-	+	+	+
ST-50	-	+	-	+	+	+	-	+	+	-	-	+	+	-	-	+	-	-	+	+	+
ST-51•	-	+	-	+	+	+	-	+	+	-	-	+	+	-	-	-	-	-	+	+	+
ST-52	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	w	+	w

Strain No.	Other characteristics: Vitamin-free	50% Glucose	60% Glucose	Starch formation	Gelatin liquefaction	0.01% Cycloheximide	0.1% Cycloheximide	Urease	Lipase	Acid formation	Growth at 25°C	Growth at 30°C	Growth at 35°C	Growth at 37°C	Growth at 40°C	Growth at 42°C	DBB	Pseudomycelium	True mycelium	Co-Q (Main component)
ST-28	+	+	-	-	+	-	-	-	-	+	+	+	-	-	-	-	-	+	-	nd
ST-29	-	-	-	-	-	+	+	-	-	+	+	+	-	-	-	-	-	-	-	nd
ST-30	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	-	nd
ST-31	+	-	-	-	+	-	-	-	-	-	+	+	-	-	-	-	-	+	-	nd
ST-32	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	nd
ST-33	+	-	-	-	-	+	+	-	-	+	+	+	+	-	-	-	-	+	-	9
ST-34	+	-	-	-	-	+	+	-	-	-	+	+	+	±	-	-	-	+	-	nd
ST-35	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	nd
ST-36	+	-	-	-	-	+	+	-	-	-	+	+	+	-	-	-	-	+	+	9
ST-37	w	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	-	nd
ST-38	w	-	-	-	-	+	+	-	-	-	+	+	-	-	-	-	-	+	-	nd
ST-39	w	+	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	-	nd
ST-40	-	+	-	-	+	-	-	-	-	+	+	+	-	-	-	-	-	+	-	nd
ST-41	+	+	-	-	w	-	-	-	-	+	+	+	-	-	-	-	-	+	nd	nd
ST-42	+	+	-	-	+	+	-	-	-	+	+	+	-	-	-	-	-	+	nd	nd
ST-43	-	-	-	-	-	-	-	-	-	-	+	+		-	-	-	-	+	nd	nd
ST-44	-	w	-	-	w	-	-	w	-	-	+	+	-	-	-	-	-	-	nd	nd
ST-45	+	w	-	-	+	-	-	-	+	-	+	+	-	-	-	-	-	+	nd	nd
ST-46	-	+	+	-	-	+	-	-	-	w	+	+	+	-	-	-	-	+	nd	nd
ST-47	+	-	-	-	-	+	+	-	-	w	+	+	+	+	nd	nd	-	+	nd	nd
ST-48	+	-	-	-	-	+	+	-	-	w	+	+	+	+	nd	nd	-	+	nd	nd
ST-49	+	-	-	-	-	+	+	-	-	-	+	+	nd	-	-	-	-	-	nd	nd
ST-50	+	-	-	-	-	+	-	-	-	w	+	+	nd	-	-	-	-	-	nd	nd
ST-51•	w	-	-	-	-	+	-	-	-	w	+	+	nd	-	-	-	-	-	nd	nd
ST-52	+	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	nd	nd

Table VII. The morphological, physiological and biochemical properties of ascomycetous yeasts

Fermentation

Strain No.	Glucose	Galactose	Sucrose	Maltose	Lactose	Melibiose	Raffinose
ST-53	+	+	-	-	-	-	-
ST-54	+	+	-	-	-	-	-
ST-55	+	+	+	+	-	-	-
ST-56	-	-	-	-	-	-	-
ST-57	+	-	-	-	-	-	-
ST-58	+	-	s	s	-	-	-
ST-59	-	-	-	-	-	-	-
ST-60	+	w	+	-	-	-	-
ST-61	+	w	+	s	-	-	-
ST-253	+	+	+	-	-	-	-
ST-266	+	+	-	+	-	-	w
ST-267	+	-	+	w	-	-	-
ST-268	+	+	-	-	-	-	-
ST-360	+	-	-	-	-	-	-
ST-384	+	+	-	+	-	-	w
ST-400	+	+	-	-	-	-	-
ST-441	+	-	-	-	-	-	-
ST-445	+	-	-	-	-	-	-

Carbon and nitrogen assimilation

Strain No.	Glucose	Galactose	L-Sorbose	Sucrose	Maltose	Cellobiose	Trehalose	Lactose	Melibiose	Raffinose	Melezitose	Inulin	Sol.starch	D-Xylose	L-Arabinose	D-Arabinose	D-Ribose	L-Rhamnose	Ethanol	Glycerol	Erythritol
ST-53	+	+	+	-	-	-	-	-	-	-	-	w	w	-	-	-	-	-	+	+	-
ST-54	+	+	+	-	-	-	-	-	-	-	-	w	w	-	-	-	-	-	+	+	-
ST-55	+	+	+	+	+	+	+	-	-	-	+	w	+	+	+	+	+	w	+	+	-
ST-56	+	+	+	-	-	-	-	-	-	-	-	w	+	+	-	-	-	-	+	+	+
ST-57	+	+	+	-	-	-	-	-	-	-	-	+	w	+	-	-	-	-	+	+	-
ST-58	+	+	+	+	+	+	+	-	-	+	-	-	+	+	+	w	+	-	+	+	+
ST-59	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+	w	+	-	+	+	+
ST-60	+	+	+	+	+	+	+	-	+	+	+	+	w	+	+	+	+	+	+	+	-
ST-61	+	+	+	+	+	+	+	-	-	-	-	w	+	+	-	w	w	-	+	+	-
ST-253	+	+	+	+	+	+	+	-	+	+	+	+	w	+	+	+	+	+	+	+	-
ST-266	+	-	-	+	+	-	+	-	-	+	+	+	-	-	-	-	-	-	+	+	-
ST-267	+	+	+	+	+	-	+	-	-	-	+	-	-	+	-	lw	l	-	+	w	-
ST-268	+	-	-	+	-	-	+	-	-	+	-	+	-	-	-	-	-	-	w	+	-
ST-360	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+
ST-384	+	-	+	+	+	-	+	-	-	+	-	+	lw	lw	-	-	-	lw	+	+	-
ST-400	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	l	-	-	-	-
ST-441	+	+	+	+	+	-	+	-	-	-	+	-	l	+	-	-	w	-	+	+	-
ST-445	+	-	+	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	+	+	-

Strain No.	Ribitol	Galactitol	D-Mannitol	D-Glucitol	α-Methyl-D-glucoside	Salicin	Glucono-δ-lactone	2-Ketogluconic acid	5-Ketogluconic acid	DL-lactic acid	Succinic acid	Citric acid	Inositol	Glucuronic acid	Galacturonic acid	Nitrate	Nitrite	Ethylamine	L-Lysine	Cadaverine
ST-53	-	-	+	+	-	-	+	-	-	+	+	-	-	-	-	-	-	+	+	+
ST-54	-	-	+	+	-	-	+	-	-	+	+	-	-	-	-	-	-	+	+	+
ST-55	+	-	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	+	+	+
ST-56	-	-	+	+	-	-	w	-	-	+	+	-	-	-	-	-	-	+	+	+
ST-57	+	-	+	+	-	+	+	+	-	+	+	+	-	-	-	-	-	+	+	+
ST-58	+	-	+	+	+	+	+	+	-	w	+	+	-	-	-	-	-	+	+	+
ST-59	+	+	+	w	+	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+
ST-60	+	+	+	+	+	+	+	+	-	+	+	+	-	-	-	-	-	+	+	+
ST-61	+	-	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	+	+	+
ST-253	+	+	+	+	+	+	+	+	-	+	+	+	-	-	-	-	-	+	+	?
ST-266	-	-	+	+	+	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-
ST-267	+	-	+	+	+	-	+	+	-	+	+	+	-	-	-	-	-	+	+	+
ST-268	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
ST-360	+	-	+	+	+	+	+	-	-	l	+	+	-	-	-	-	-	+	+	+
ST-384	-	-	+	+	+	-	+	+	-	+	-	-	-	-	-	-	-	-	+	-
ST-400	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	w	-	-
ST-441	+	-	+	+	+	-	+	+	+	+	+	+	-	-	-	-	-	+	+	+
ST-445	-	-	+	+	-	+	+	-	-	+	+	+	-	-	-	-	-	+	+	+

Other characteristics

Strain No.	Vitamin-free	50% Glucose	60% Glucose	Starch formation	Gelatin liquefaction	0.01% Cycloheximide	0.1% Cycloheximide	Urease	Lipase	Acid formation	Growth at 25°C	Growth at 30°C	Growth at 35°C	Growth at 37°C	Growth at 40°C	Growth at 42°C	DBB	Pseudomycelium	True mycelium	Co-Q (Main component)
ST-53	-	-	-	-	-	+	+	-	-	-	+	+	+	+	nd	nd	-	+	nd	nd
ST-54	-	-	-	-	-	+	+	-	-	-	+	+	+	+	nd	nd	-	-	nd	nd
ST-55	+	-	-	-	-	+	+	-	-	w	+	+	+	+	nd	nd	-	+	nd	nd
ST-56	+	-	-	-	-	+	+	-	-	-	+	+	-	-	-	-	-	+	nd	nd
ST-57	-	+	-	-	-	-	-	-	-	w	+	+	nd	nd	nd	nd	-	-	nd	nd
ST-58	+	+	+	-	w	-	-	-	-	-	+	+	nd	nd	nd	nd	-	+	nd	nd
ST-59	-	-	+	-	+	+	+	w	-	-	+	+	+	+	nd	nd	+	-	nd	nd
ST-60	+	+	-	-	-	+	+	-	-	w	+	+	+	+	nd	nd	-	+	nd	nd
ST-61	+	+	-	-	-	+	nd	-	nd		nd	nd	nd	nd	nd	nd	-	nd	nd	nd
ST-253	+	+	nd	-	-	nd	nd	-	nd	-	nd	nd	nd	nd	nd	nd	-	nd	nd	nd
ST-266	+	+	nd	-	-	nd	nd	-	nd	-	nd	nd	nd	nd	nd	nd	-	nd	nd	nd
ST-267	+	+	nd	-	-	nd	nd	-	nd	-	nd	nd	nd	nd	nd	nd	-	nd	nd	nd
ST-268	+	w	nd	-	-	nd	nd	-	nd	w	nd	nd	nd	nd	nd	nd	-	nd	nd	nd
ST-360	+	+	nd	-	-	nd	nd	-	nd	-	nd	nd	nd	nd	nd	nd	-	nd	nd	nd
ST-384	+	+	nd	-	-	nd	nd	-	nd	-	nd	nd	nd	nd	nd	nd	-	nd	nd	nd
ST-400	-	-	nd	-	nd	nd	nd	-	nd	-	nd	nd	nd	nd	nd	nd	-	nd	nd	nd
ST-441	+	+	nd	-	nd	nd	nd	-	nd	-	nd	nd	nd	nd	nd	nd	-	nd	nd	nd
ST-445	-	-	nd	-	nd	nd	nd	-	nd	-	nd	nd	nd	nd	nd	nd	-	nd	nd	nd

Table VIII. The morphological, physiological and biochemical properties of basidiomycetous yeasts

Strain No.	Carbon and nitrogen assimilation																																							Vitamin requirement										
	Glucose	Galactose	L-Sorbose	Sucrose	Maltose	Cellobiose	Trehalose	Lactose	Melibiose	Raffinose	Melezitose	Inulin	Sol.starch	D-Xylose	L-Arabinose	D-Arabinose	D-Ribose	L-Rhamnose	Ethanol	Glycerol	Erythritol	Ribitol	Galactitol	D-Mannitol	D-Glucitol	α—Methyl-D-glucoside	Salicin	Glucono-δ-lactone	2-Ketogluconic acid	5-Ketogluconic acid	DL-lactic acid	Succinic acid	Citric acid	Inositol	Glucuronic acid	Galacturonic	Nitrate	Nitrite	Ethylamine	L-Lysine	Cadaverine	Basal medium	Biotin	Pant.	Folic acid	Inositol	Niacin	Paba	Pyrid	Riboflavin	Thiamine	All Vitamins
ST-11	+	+	+	+	+	+	+	-	-	+	-	-	w	+	+	+	+	+	-	+	-	+	+	+	+	+	+	w	-	-	w	+	+	-	-	-	+	+	+	+	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ST-12	+	+	+	+	-	+	+	-	-	+	-	-	w	+	+	+	+	+	-	+	-	+	+	+	+	-	+	+	-	-	w	+	+	-	-	-	+	+	+	+	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ST-87	+	+	+	+	+	+	+	-	-	+	+	I	+	+	w	I	I	-	+	+	-	+	-	+	+	+	+	+	-	-	I	+	+	-	-	-	+	+	+	I	w	+	+	+	-	+	+	+	+	+	+
ST-88	I	-	-	-	-	-	+	-	-	-	-	-	-	I	-	-	-	-	-	w	-	-	-	I	-	-	-	w	-	-	-	I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	w	-	-	-	-
ST-90	+	+	+	w	-	-	+	-	-	-	-	-	-	+	w	w	w	-	+	+	-	+	-	+	+	-	-	w	-	-	-	w	w	-	-	-	-	-	-	-	-	-	W	-	W	-	-	-	-	+
ST-91	+	-	+	+	-	-	+	-	-	+	-	-	w	-	-	-	-	-	+	+	-	+	-	+	+	-	-	-	-	-	-	I	-	-	-	-	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+
ST-92	+	+	+	+	+	+	+	-	-	+	+	w	+	I	-	+	+	-	+	+	-	+	-	+	+	+	+	+	-	-	w	+	+	-	-	-	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+
ST-93	+	+	-	+	+	-	+	-	-	+	+	I	+	+	-	w	-	-	+	+	-	+	-	+	+	-	+	+	-	-	-	+	+	-	-	-	-	-	+	w	-	+	+	+	+	+	+	+	+	+	+
ST-94	+	-	+	+	-	-	-	-	-	+	-	-	w	+	-	-	-	-	+	+	-	+	-	+	+	-	-	-	-	-	-	I	-	-	-	-	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+
ST-98	+	+	+	+	+	+	+	-	-	+	+	I	+	+	-	-	I	-	+	+	-	+	-	+	+	I	+	+	-	-	w	+	+	-	-	-	+	+	I	w	w	+	-	+	+	+	+	+	+	+	+
ST-99	+	w	-	+	+	+	+	-	-	+	+	w	+	+	+	+	-	-	-	+	-	-	-	+	+	I	-	I	-	-	w	w	+	-	+	-	+	+	-	I	-	-	+	+	+	+	+	+	+	+	+
ST-100	+	-	+	+	-	-	+	-	-	+	+	I	I	+	-	-	-	-	+	+	-	+	-	+	+	-	-	-	-	-	+	+	-	-	-	+	w	-	-	-	+	+	+	+	+	+	+	+	+	+
ST-101	+	-	-	+	+	+	+	-	-	+	+	w	+	+	+	+	-	-	-	I	-	w	-	+	+	+	-	-	-	-	w	+	+	-	+	-	-	w	w	w	-	-	+	+	+	+	+	+	+	+	+
ST-102	+	+	+	+	+	+	+	-	-	+	+	I	+	+	-	+	+	-	+	+	-	+	-	+	+	+	+	+	-	-	I	+	+	-	-	-	+	+	+	I	-	+	+	+	+	+	+	+	+	+	+
ST-103	+	w	-	+	+	I	+	w	-	+	+	I	+	I	+	+	-	-	-	w	-	-	-	+	+	+	-	+	-	-	w	+	+	-	+	-	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+
ST-105	+	-	-	+	+	+	+	-	-	+	+	-	+	+	+	+	-	-	-	+	-	+	-	+	+	I	-	+	-	-	+	+	+	-	w	-	-	+	w	-	-	-	+	+	+	+	+	+	+	+	+
ST-106	+	+	+	+	+	+	+	-	-	+	+	w	+	w	-	+	I	-	+	+	-	+	-	+	+	+	+	+	-	-	+	+	+	-	-	-	-	-	w	w	-	+	+	+	+	+	+	+	+	+	+
ST-107	+	-	+	+	-	-	+	-	-	+	-	-	w	+	-	-	w	-	+	+	-	+	-	+	+	-	-	-	-	-	+	+	-	-	-	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+	+
ST-110	+	-	+	+	-	-	+	-	-	+	-	-	-	+	-	-	-	-	+	+	-	+	-	+	+	-	-	w	-	-	-	I	-	-	-	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+	+
ST-111	+	+	+	+	+	+	+	-	+	+	+	w	+	+	+	+	+	+	+	+	+	w	+	+	I	+	+	+	+	+	w	+	+	+	+	-	+	+	+	+	+	I	+	+	+	+	+	+	w	+	+

Table VIII. The morphological, physiological and biochemical properties of basidiomycetous yeasts (continued)

Strain No.	Carbon and nitrogen assimilation																																								Vitamin requirement										
	Glucose	Galactose	L-Sorbose	Sucrose	Maltose	Cellobiose	Trehalose	Lactose	Melibiose	Raffinose	Melezitose	Inulin	Sol.starch	D-Xylose	L-Arabinose	D-Arabinose	D-Ribose	L-Rhamnose	Ethanol	Glycerol	Erythritol	Ribitol	Galactitol	D-Mannitol	D-Glucitol	α—Methyl-D-glucoside	Salicin	Glucono-δ-lactone	2-Ketogluconic acid	5-Ketogluconic acid	DL-lactic acid	Succinic acid	Citric acid	Inositol	Glucuronic acid	Galacturonic	Nitrate	Nitrite	Ethylamine	L-Lysine	Cadaverine	Basal medium	Biotin	Pant.	Folic acid	Inositol	Niacin	Paba	Pyrid	Riboflavin	Thiamine	All Vitamins
ST-112	+	-	+	+	-	-	-	-	-	+	-	-	—	+	-	-	-	-	—	+	-	+	-	+	+	-	-	-	-	-	-	+	-	-	-	+	+	-	-	-	+	+	+	+	+	+	+	+	+
ST-115	+	+	+	+	+	w	+	-	-	+	+	l	-	l	-	w	-	-	+	+	-	+	-	+	+	-	+	+	-	w	+	+	-	-	-	+	+	+	w	-	+	+	+	+	+	+	+	+	+
ST-119	+	+	+	+	+	+	+	-	-	+	+	+	+	l	-	l	+	-	+	l	-	l	+	+	+	+	+	+	-	-	l	+	w	-	-	-	w	-	+	+	w	w	+	+	+	+	-	+	+
ST-123	+	-	+	+	-	-	+	-	-	w	-	-	-	l	-	-	-	-	l	+	-	+	-	+	+	-	-	-	-	-	-	w	-	-	-	+	+	-	w	-	+	+	+	+	+	+	+	+	+
ST-128	+	+	+	+	+	+	+	-	-	+	+	+	+	+	-	l	+	-	+	+	-	+	-	+	+	+	+	+	-	-	w	+	+	-	-	-	+	+	+	-	-	+	+	+	+	+	+	+	+
ST-131	+	l	+	+	+	+	+	-	-	+	+	w	+	-	-	-	-	-	+	+	-	l	-	+	+	+	+	+	-	-	w	+	+	+	-	-	+	+	+	l	-	+	+	+	+	+	+	+	+
ST-132	+	+	+	+	+	-	+	-	-	+	+	-	+	l	-	+	w	-	+	+	-	w	-	+	+	-	+	+	-	-	-	+	+	-	-	-	w	+	w	l	l	+	+	+	+	+	+	+	+
ST-137	+	-	-	+	+	w	+	-	l	l	l	-	w	-	w	-	-	-	-	w	-	-	-	w	l	w	-	-	-	-	w	w	w	-	w	-	+	+	-	w	-	-	+	+	+	+	-	+	+
ST-138	+	-	-	+	+	w	+	-	-	+	+	-	w	w	l	w	-	-	-	w	-	-	-	+	w	w	-	-	-	-	w	+	+	-	w	-	+	+	-	w	w	-	+	+	+	+	-	+	+
ST-139	+	+	+	+	+	l	+	-	-	+	-	l	+	+	-	l	+	-	+	+	-	+	-	+	+	-	+	+	-	-	-	+	w	-	-	-	+	+	+	+	l	+	+	+	+	+	+	+	+
ST-140	+	w	-	l	-	l	l	l	l	l	l	l	l	l	l	l	l	-	-	l	l	w	-	l	w	-	-	-	-	w	-	w	w	-	+	l	+	l	-	-	-	-	+	+	+	+	+	-	+
ST-141	+	+	+	+	+	-	+	-	-	+	+	l	+	l	-	l	w	-	+	+	-	+	-	+	+	+	-	+	-	-	w	+	+	-	-	-	+	+	+	w	w	+	+	+	+	+	+	+	+
ST-144	+	+	+	+	+	+	+	-	+	+	+	-	+	+	+	+	l	+	-	-	-	-	+	+	-	+	w	l	+	+	l	+	-	+	+	+	+	w	w	w	w	-	+	+	+	+	+	-	+
ST-145	+	+	+	+	+	+	+	-	-	-	+	-	+	+	+	+	+	+	-	-	-	+	l	+	+	+	+	+	l	+	-	+	l	+	+	+	+	-	+	w	+	-	+	+	+	+	+	w	+
ST-150	+	+	w	+	+	+	+	-	+	+	+	w	+	+	+	+	+	+	+	+	+	l	+	+	+	+	+	+	+	+	w	+	+	+	+	+	+	w	+	+	+	l	+	+	+	+	+	l	+
ST-151	+	l	l	+	+	+	-	-	-	+	+	l	+	l	-	+	-	-	+	+	-	l	-	+	+	l	+	+	-	-	-	+	+	-	-	-	+	w	-	+	+	+	+	+	+	+	+	+	+	+
ST-153	+	-	-	+	l	+	+	-	+	+	+	l	-	w	w	-	-	-	-	-	-	+	-	+	+	-	-	w	-	-	-	l	-	-	-	-	+	-	-	-	-	-	+	+	+	+	+	-	+
ST-156	+	l	+	+	+	+	+	-	-	+	+	w	+	-	-	+	w	-	+	+	-	+	-	+	+	+	+	+	-	-	-	+	+	-	-	-	+	-	w	+	w	+	+	+	+	+	+	+	+
ST-158	+	l	+	+	+	+	+	-	-	+	+	w	+	-	-	-	l	-	+	+	-	l	-	+	+	+	+	+	-	-	-	+	+	-	-	-	+	+	+	+	w	+	+	+	+	+	+	+	+
ST-159	+	+	+	+	+	-	+	-	-	+	+	-	+	+	-	+	w	-	+	+	-	+	-	+	+	+	+	+	-	-	l	+	+	-	-	-	+	w	+	+	+	+	+	+	+	+	+	+	+

Table VIII. The morphological, physiological and biochemical properties of basidiomycetous yeasts (continued)

Strain No.	Carbon and nitrogen assimilation																																								Vitamin requirement										
	Glucose	Galactose	L-Sorbose	Sucrose	Maltose	Cellobiose	Trehalose	Lactose	Melibiose	Raffinose	Melezitose	Inulin	Sol.starch	D-Xylose	L-Arabinose	D-Arabinose	D-Ribose	L-Rhamnose	Ethanol	Glycerol	Erythritol	Ribitol	Galactitol	D-Mannitol	D-Glucitol	α—Methyl-D-glucoside	Salicin	Glucono-δ-lactone	2-Ketogluconic acid	5-Ketogluconic acid	DL-lactic acid	Succinic acid	Citric acid	Inositol	Glucuronic acid	Galacturonic	Nitrate	Nitrite	Ethylamine	L-Lysine	Cadaverine	Basal medium	Biotin	Pant.	Folic acid	Inositol	Niacin	Paba	Pyrid	Riboflavin	Thiamine	All Vitamins
ST-166	+	-	-	+	+	+	+	l	+	+	+	w	l	+	+	+	+	-	-	+	l	-	-	-	+	+	-	-	-	-	+	+	-	+	+	+	+	-	+	-	w	+	+	+	+	+	+	+	w	+
ST-170	+	+	l	+	+	+	+	-	-	+	+	-	+	-	-	l	w	-	+	l	-	l	-	+	+	l	+	+	-	-	+	w	-	-	-	-	-	+	+	w	+	+	+	+	+	+	+	+	+
ST-172	+	+	w	+	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+	l	+	+	+	+	+	+	+	+	w	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
ST-174	+	-	l	+	-	-	-	-	-	w	-	-	-	+	-	w	-	-	+	+	-	+	-	+	+	-	-	l	-	-	-	w	-	-	-	-	+	+	-	w	-	+	+	+	+	+	+	+	+	+
ST-175	+	l	w	+	+	+	+	-	-	+	+	-	+	-	-	l	-	-	+	l	-	w	-	+	+	+	+	+	-	-	-	+	+	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+
ST-176	+	+	w	+	+	+	+	-	+	+	+	-	l	+	+	+	l	+	+	-	+	w	+	+	+	+	l	+	+	+	w	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
ST-178	+	+	l	+	+	+	+	-	-	+	+	-	+	w	-	l	w	-	+	+	-	l	-	+	+	+	+	+	-	-	-	+	w	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+
ST-180	+	+	+	+	+	-	+	-	-	+	+	-	+	w	-	w	w	-	+	+	-	l	-	+	+	-	w	+	-	-	-	+	+	-	-	-	-	-	+	+	w	+	+	+	+	+	+	+	+
ST-181	+	+	w	+	+	+	+	-	+	+	+	-	l	+	+	+	w	+	+	+	+	w	+	+	+	+	l	+	+	+	-	+	+	+	+	+	-	-	+	+	+	-	+	+	+	+	+	-	+
ST-182	+	-	-	+	w	l	+	w	l	+	+	w	w	+	+	+	l	-	-	w	l	w	-	l	l	-	-	w	-	w	-	+	l	-	l	l	+	+	-	-	-	w	+	+	+	+	+	+	w	+
ST-183	+	+	+	+	+	+	+	-	-	+	+	-	+	w	-	l	-	-	+	l	-	l	-	+	+	+	+	+	-	-	-	+	l	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+
ST-184	+	-	+	+	-	-	-	-	-	l	-	-	-	l	-	-	-	-	l	+	-	+	-	+	+	-	-	l	-	-	-	w	-	-	-	-	+	+	-	w	-	+	+	+	+	+	+	+	+	+
ST-185	+	l	+	+	+	+	+	-	-	l	+	-	+	-	-	w	l	-	+	+	-	w	-	+	+	+	+	+	-	-	-	+	w	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+
ST-186	+	+	-	w	l	l	+	l	+	+	+	-	+	+	l	l	-	w	-	-	-	w	l	l	l	l	w	-	w	+	-	+	-	+	+	+	-	w	-	+	-	-	+	+	+	+	+	-	+
ST-187	+	l	+	+	+	-	+	-	-	+	+	-	+	w	-	l	-	-	+	+	-	l	-	+	+	w	w	+	-	-	w	+	+	-	-	-	+	-	+	+	+	+	+	+	+	+	+	+	+
ST-192	+	-	+	+	-	-	-	-	-	w	-	-	-	+	-	-	-	-	+	+	-	+	-	+	+	-	-	-	-	-	-	w	-	-	-	-	+	+	-	+	-	+	+	+	+	+	+	+	+	+
ST-195	+	l	+	+	+	w	+	-	-	+	+	-	+	+	-	w	w	-	+	+	-	+	-	+	+	-	w	+	-	-	w	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ST-197	+	w	-	+	+	w	w	-	-	+	+	-	w	w	l	w	-	-	-	+	-	-	-	+	+	w	l	-	-	-	w	+	w	-	w	-	+	+	-	+	-	-	+	+	+	+	+	-	+
ST-198	+	-	+	+	-	-	l	-	-	w	-	-	-	+	-	-	-	-	+	+	-	+	-	-	+	-	w	-	-	-	-	w	-	-	-	-	+	+	-	w	-	+	+	+	+	+	+	+	+	+
ST-201	+	+	+	+	+	+	+	-	+	+	+	-	w	+	+	+	w	+	+	+	+	w	+	+	l	+	+	+	+	+	-	+	l	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+

Table VIII. The morphological, physiological and biochemical properties of basidiomycetous yeasts (continued)

Strain No.	Carbon and nitrogen assimilation																																							Vitamin requirement										
	Glucose	Galactose	L-Sorbose	Sucrose	Maltose	Cellobiose	Trehalose	Lactose	Melibiose	Raffinose	Melezitose	Inulin	Sol.starch	D-Xylose	L-Arabinose	D-Arabinose	D-Ribose	L-Rhamnose	Ethanol	Glycerol	Erythritol	Ribitol	Galactitol	D-Mannitol	D-Glucitol	α—Methyl-D-glucoside	Salicin	Glucono-δ-lactone	2-Ketogluconic acid	5-Ketogluconic acid	DL-lactic acid	Succinic acid	Citric acid	Inositol	Glucuronic acid	Galacturonic	Nitrate	Nitrite	Ethylamine	L-Lysine	Cadaverine	Basal medium	Biotin	Pant.	Folic acid	Inositol	Niacin	Paba	Pyrid	Riboflavin	Thiamine	All Vitamins
ST-202	+	+	+	+	+	+	+	-	-	+	+	w	+	-	-	—	—	-	+	+	-	—	-	+	+	+	+	-	-	+	w	-	-	-	+	+	+	+	w	-	+	+	+	+	+	+	+	+	+
ST-204	+	-	+	+	-	-	+	-	-	+	-	-	-	+	-	w	-	-	+	+	-	+	-	+	+	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+
ST-206	+	w	+	+	+	l	+	-	-	+	+	w	+	l	-	w	+	-	+	+	-	—	-	+	+	—	+	+	-	-	w	+	+	-	-	+	+	+	w	-	+	+	+	+	+	+	+	+	+
ST-208	+	-	+	+	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	+	-	+	-	+	+	-	-	w	-	-	-	l	-	-	-	+	+	-	-	-	+	+	+	+	+	+	+	+	+
ST-213	+	w	-	+	l	l	+	w	w	+	+	w	l	+	l	l	l	-	-	l	l	w	-	+	l	-	-	w	-	w	-	l	w	-	+	l	+	-	-	-	-	+	+	+	+	+	+	-	+
ST-216	+	l	-	+	+	+	l	l	-	+	l	-	l	l	+	w	w	+	w	l	+	+	-	+	l	-	-	-	l	+	-	w	-	-	w	-	w	+	-	-	-	-	+	+	+	+	+	+	-	+
ST-217	+	l	-	+	-	l	l	w	w	l	l	l	w	l	l	l	l	-	-	l	l	w	-	+	l	-	-	w	-	w	-	+	w	-	w	w	+	+	-	-	-	-	+	+	+	+	+	+	-	+
ST-219	+	w	w	+	+	+	+	w	-	l	+	-	+	l	l	+	l	+	-	l	+	+	-	+	l	-	-	-	+	+	-	l	-	-	l	-	+	-	-	-	-	-	+	+	+	+	+	+	-	+
ST-221	+	-	-	+	+	+	+	-	-	-	+	-	w	l	+	-	-	w	+	w	+	+	-	+	l	+	w	w	-	-	-	—	+	-	-	-	-	+	+	+	+	-	+	+	+	+	+	+	-	+
ST-226	+	-	+	+	-	-	+	-	-	+	-	-	-	+	-	w	-	-	+	+	-	+	-	+	+	-	-	w	-	-	-	w	-	-	-	-	+	+	-	w	-	+	+	+	+	+	+	+	+	+

Table VIIII. Results of D1/D2 domain of 26S rDNA sequences of methyloutilizing yeast

Isolate no.	Species identified by the similarity of the sequence of D1/D2 domain of 26S DNA.		
	Species	% similarity	Nucleotide substitution
S046	*Pichia capsulata*	100	561/561
FS61	*Pichia capsulata*	100	544/544
FS66	*Candida cariosilignicola*	100	564/564
FS72	*Pichia capsulata*	100	561/561
FS79	*Candida cariosilignicola*	99.8	563/564
FS82	*Pichia capsulata*	99.8	563/564
FS83	*Pichia capsulata*	100	561/561

Table X. Cell shape and Budding, ascospore formation, DBB and urease test of the selected methanol-utilizing yeasts.

NO	Isolate no.	budding	ascospore	DBB test	urease test	Genus
1	S046	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia
2	FS61	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia
3	FS62	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia
4	FS66	Multilateral budding	-	-	-	Candida
5	FS72	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia
6	FS74	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia
7	FS76	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia
8	FS77	Multilateral budding	-	-	-	Candida
9	FS79	Multilateral budding	-	-	-	Candida
10	FS82	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia
11	FS83	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia
12	FS84	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia
13	FS87	Multilateral budding	2-4 hat shaped, ascus deliquescent	-	-	Pichia

Table XI. Physiological, biochemical and physiological characteristics

Characteristics	S046	FS61	FS62	FS66	FS72	FS74	FS76	FS77	FS79	FS82	FS83	FS84	FS87
Fermenatation of Carbons													
F1: Glucose	+	+	+	+	+	+	+	+	+	+	+	+	+
F2: Galactose	-	-	-	-	-	-	-	-	-	-	-	-	-
F3: Maltose	-	-	-	-	-	-	-	-	-	-	-	-	-
F5: Sucrose	-	-	-	-	-	-	-	-	-	-	-	-	-
F6: Trehalose	D	+	+	+	D	+	D	+	D	+	+	+	
F7: Lactose	-	-	-	-	-	-	-	-	-	-	-	-	-
F11: Raffinose	-	-	-	-	-	-	-	-	-	-	-	-	-
Assimilation of Carbons													
C1: D-Glucose	+	+	+	+	+	+	+	+	+	+	+	+	+
C2: D-Galactose	-	-	-	W	-	-	-	-	-	-	-	-	-
C3: L-Sorbose	-	-	-	W	-	-	W	-	D	-	-	-	W
C5: D-Ribose	+	+	+	+	+	+	+	+	+	+	+	+	+
C6: D-Xylose	+	+	+	+	+	+	+	+	+	+	S	+	+
C7: L-Arabinose	+	+	+	+	+	+	+	+	+	+	+	+	+
C8: D-Arabinose	D	D	+	D	D	D	D	D	D	D	D	D	+
C9: L-Rhamnose	S	S	W	+	W	W	W	+	+	D	W	W	W
C10: Sucrose	-	+	+	+	-	-	-	+	+	-	-	-	-
C11: Maltose	+	S	+	-	+	+	+	D	-	+	+	+	+
C12: α-α-Trehalose	+	+	+	+	+	+	+	+	+	+	+	+	+
C13: Methyl-α-D-glucoside	S	+	+	W	+	+	+	-	-		S	W	D
C14: Cellobiose	+	+	+	-	+	+	+	W	-	+	+	+	+
C15: Salicin	NT	+	+	W	+	+	+	W	-	+	+	+	+
C17: Melibiose	-	-	-	-	-	-	-	-	-	-	-	-	-
C18: Lactose	-	-	-	-	-	-	-	-	-	-	-	-	-
C19: Raffinose	-	-	-	+	-	-	-	+	+	-	-	-	-
C20: Melezitose	D	+	D	-	+	D	+	-	-	D	+	D	+
C21: Inulin	-	-	-	-	-	-	-	-	-	-	-	-	-
C22: Soluble starch	-	+	+	-	-	+	+	-	-	+	+	+	+
C23: Glycerol	+	+	+	+	+	+	+	+	+	+	+	+	+

Characteristics	S046	FS61	FS62	FS66	FS72	FS74	FS76	FS77	FS79	FS82	FS83	FS84	FS87
C24: Erythritol	+	+	+	+	+	+	+	+	+	+	+	+	+
C25: Ribitol	+	+	+	+	+	+	+	+	+	+	NT	+	+
C28: D-Glucitol	+	+	+	+	+	+	+	+	+	+	+	+	+
C29: D-Mannitol	+	+	+	+	+	+	+	+	+	+	S	S	+
C30: Galactitol	-	-	-	-	-	-	-	-	-	-	-	-	-
C31: Myo- Inositol	-	-	-	-	-	-	-	-	-	-	-	-	-
C32: D-Glucono-1,5-lactone	+	+	+	+	+	+	+	+	+	S	S	S	S
C33: 2-Ketogluconic acid	-	-	-	-	-	-	-	-	-	-	-	-	-
C34: 5- Ketogluconic acid	-	-	-	-	-	-	-	-	-	-	-	-	-
C35: D-Gluconate	S	W	W	W	W	W	W	W	-	D	-	-	-
C37: D-Galacturonic acid	-	-	-	+	-	-	-	NT	+	-	-	-	-
C38: DL-Lactate	-	W	W	D	W	W	W	W	W	-	-	-	W
C39: Succinate	D	+	+	+	S	S	D	D	+	D	D	D	-
C40: Citrate	+	+	+	+	-	-	-	+	+	+	-	-	W
C41: Methanol	+	+	+	+	+	+	+	+	+	+	+	+	+
C42: Ethanol	+	+	+	W	+	+	+	+	+	+	+	+	+
Assimilation of Nitrogens													
N1: Potassium nitrate	+	+	+	+	+	+	+	+	+	+	+	+	+
N2:: Sodium nitrite	+	+	+	+	+	+	+	+	+	+	+	+	+
N3: Ethylamine HCl	+	+	+	+	+	+	+	+	+	+	+	+	+
N4: L-Lysine HCl	+	+	+	+	+	+	+	+	+	+	+	+	+
N5: Cadaverine	+	+	+	+	+	+	+	+	+	+	+	+	+
Others													
T1: Growth at 25C	+	+	+	+	+	+	+	+	+	+	+	+	+
T2: Growth at 30C	+	+	+	+	+	+	+	+	+	+	+	+	+
T3: Growth at 35C	+	+	+	+	+	+	+	+	+	+	+	+	+
T4: Growth at 37C	+	+	+	+	+	+	+	+	+	+	+	+	+
T5: Growth at 40C	+	+	+	+	+	+	+	+	+	+	+	+	+
T6: Growth at 42C		+	+		+		+	+		+	+	+	
T7: Growth at 45C	-	+	+	-	+	-	+	+		+	+	+	
O1: 0.01%Cycloheximide	-	-	-	+	-	-	-	+	+	-	-	-	+
O2: 0.1% Cycloheximide	-	-	-	+	-	-	-	+	+	-	-	-	+
O4: 50% glucose growth	+	+	+	-	+	+	+	+	-	+	+	+	+

Characteristics	S046	FS61	FS62	FS66	FS72	FS74	FS76	FS77	FS79	FS82	FS83	FS84	FS87
O5: 60% glucose growth	-	-	-	-	-	-	-	-	-	-	-	-	-
O6: 10% NaCl growth	-	+	+	-	+	+	+	-	-	+	+	-	+
M1: Starch formation	-	-	-	-	-	-	-	-	-	-	-	-	-
M3: Urease	-	-	-	-	-	-	-	-	-	-	-	-	-
M4: DBB color reaction	-	-	-	-	-	-	-	-	-	-	-	-	-
E1: Pink colony	-	-	-	-	-	-	-	-	-	-	-	-	-
E2: Budding cells	+	+	+	+	+	+	+	+	+	+	+	+	+
E3: Lemon-shaped cell	-	-	-	-	-	-	-	-	-	-	-	-	-
E4: Buds on stalk	-	-	-	-	-	-	-	-	-	-	-	-	-
E5: Splitting	-	-	-	-	-	-	-	-	-	-	-	-	-
E6: Filamentous	-	-	-	-	-	-	-	-	-	-	-	-	-
E7: Pseudohyph	-	-	-	-	-	-	-	-	-	-	-	-	-
E8: Septate hypha	-	-	-	-	-	-	-	-	-	-	-	-	-
E9: arthoconidia	-	-	-	-	-	-	-	-	-	-	-	-	-
E10: Ballistoconidia	-	-	-	-	-	-	-	-	-	-	-	-	-
E11: Sytematic ballistoconidia	-	-	-	-	-	-	-	-	-	-	-	-	-
A1: Ascosporogenous	+	+	+	-	+	+	+	-	-	+	+	+	+
A2: Ascospores round, oval, conical or reniform	-	-	-	-	-	-	-	-	-	-	-	-	-
A3: Ascospores cap-, hat-,saturn-, or walnut- shaped	2 hat	4 hat	4 hat	-	2 hat	2 hat	2 hat	-	-	2 hat	2 hat	2 hat	2 hat
A4: Ascospores needle-shaped or whip-like	-	-	-	-	-	-	-	-	-	-	-	-	-
A5: Club-shaped asci	-	-	-	-	-	-	-	-	-	-	-	-	-
Liquefaction of gelatin	+	+	+	-	+	+	+	NT	-	+	+	+	+

Table XII. Biochemical and physiological characteristics of yeast isolated from termites.

Characteristics	TM26	TM35	TM37	TM39	TM40
Fermentation of Carbons					
F1: Glucose	+	-	+	-	+
F2: Galactose	-	-	-	-	-
F3: Maltose	-	-	-	-	+
F5: Sucrose	-	-	-	-	-
F6: Trehalose	-	-	+	-	-
F7: Melibiose	-	-	-	-	-
F8: Lactose	-	-	-	-	-
F9: Cellubiose	-	-	-	-	-
F10: Melizitose	-	-	-	-	-
F11: Raffinose	-	-	-	-	+
F12: Inulin	-	-	-	-	-
F13: Starch	-	-	-	-	-
F14: Xylose	-	-	-	-	-
Assimilation of Carbons					
C1: D-Glucose	+	+	+	+	+
C2: D-Galactose	-	+	-	-	+
C3: L-Sorbose	+	+	-	-	-
C5: D-Ribose	-	+	-	-	+
C6: D-Xylose	+	+	-	-	+
C7: L-Arabinose	-	+	-	-	-
C8: D-Arabinose	-	+	-	-	-
C9: L-Rhamnose	+	+	-	-	-
C10: Sucrose	+	+	-	-	+
C11: Maltose	-	+	-	-	+
C12: α-α-Trehalose	+	+	+	-	+
C13: Methyl-α-D-glucoside	+	+	-	-	+
C14: Cellobiose	+	+	-	-	+
C15: Salicin	+	+	-	-	+
C17: Melibiose	-	+	-	-	-

Characteristics	TM26	TM35	TM37	TM39	TM40
C18: Lactose	-	+	-	-	-
C19: Raffinose	-	+	-	-	+
C20: Melezitose	-	+	-	-	+
C21: Inulin	-	+	-	-	-
C22: Starch	-	+	-	-	+
C23: Glycerol	+	+	+	+	+
C24: Erythritol	-	+	-	-	+
C25: Ribitol	-	+	-	-	+
C28: D-Glucitol	+	+	-	-	+
C29: D-Mannitol	+	+	-	-	+
C30: Galactitol	-	-	-	-	-
C31: Myo- Inositol	-	+	-	-	-
C32: D-Glucono-1,5-lactone	+	+	-	-	-
C33: 2-Ketogluconic acid	-	+	-	-	-
C34: 5- Ketogluconic acid	-	-	-	-	-
C35: D-Gluconate	-	+	-	-	-
C37: D-Galacturonic acid	-	+	-	-	-
C38: DL-Lactate	+	+	+	+	+
C39: Succinate	+	+	-	+	+
C40: Citrate	+	+	-	-	+
C42: Ethanol	-	-	-	-	-
Assimilation of Nitrogens					
N1: Potassium nitrate	+	-	-	-	-
N2: Sodium nitrite	+	-	-	-	-
N3: Ethylamine HCl	+	+	-	-	-
N4: L-Lysine HCl	+	+	-	-	-
Vitamin Requirement					
V1: Growth w/o vitamins	-	+	-	+	-
V2: Growth w/o myo-inositol	-	+	-	+	+
V3: Growth w/o pantothenate	+	+	-	+	-
V4: Growth w/o biotin	+	+	-	+	-
V5: Growth w/o thiamine	+	+	-	+	-

Characteristics	TM26	TM35	TM37	TM39	TM40
V7: Growth w/o pyidoxine	-	+	-	+	-
V9: Growth w/o niacin	+	+	-	+	-
V10: Growth w/o PABA	+	+	-	+	+
Others					
T1: Growth at 25C	+	+	+	+	+
T2: Growth at 30C	+	+	+	+	+
T3: Growth at 35C	+	+	+	+	+
T4: Growth at 37C	-	+	+	+	+
T5: Growth at 40C	-	-	+	+	-
T6: Growth at 42C	-	-	+	-	-
T7: Growth at 45C	-	-	ND	-	-
O4: 50% glucose growth	-	+	+	+	+
O5: 60% glucose growth	-	-	+	-	-
M1: Starch formation	-	-	-	-	-
M3: Urease	-	-	-	-	-
M4: DBB color reaction	-	-	-	-	-
E1: Pink colony	-	-	-	-	-
E2: Budding cells	+	+	+	+	+
E3: Lemon-shaped cell	-	-	-	-	-
E4: Buds on stalk	-	-	-	-	-
E5: Splitting	-	-	-	-	-
E6: Filamentous	-	-	-	-	-
E7: Pseudohyphae	-	-	-	-	-
E8: Septate hypha	-	-	-	-	-
E9: arthoconidia	-	-	-	-	-
E10: Ballistoconidia	-	-	-	-	-
E11: Sytematic ballistoconidia	-	-	-	-	-
A1: Ascosporogenous	+	+	-	+	-
A2: Ascospores round, oval, conical or reniform	-	-	-	-	-
A3: Ascospores cap-, hat-,saturn-, or walnut-shaped	+	+	-	+	-
A4: Ascospores needle-shaped or whip-like	-	-	-	-	-
A5: Club-shaped asci	-	-	-	-	-

Table XIII. Biochemical and physiological characteristics of yeast isolated from *Termitomyces* spp.

Characteristics	TK1	TK2-1	TK2-2	TK3	TK5	TK6	TK8	TK9	TK10	TK12	TK13	TK18
Fermenatation of Carbons												
F1: Glucose	+	+	+	+	-	-	-	-	-	+	-	+
F2: Galactose	-	-	-	-	-	-	-	-	-	+	-	-
F3: Maltose	-	-	-	+	-	-	-	-	-	-	-	-
F4: Methyl-□-D-glucoside	-	-	-	-	-	-	-	-	-	-	-	-
F5: Sucrose	-	+	-	+	-	-	-	-	-	+	-	-
F6: Trehalose	+	-	+	-	-	-	+	-	-	+	-	-
F7: Melibiose	-	-	-	-	-	-	-	-	-	-	-	-
F8: Lactose	-	-	-	-	-	-	-	-	-	-	-	-
F9: Cellubiose	-	-	-	+	-	-	-	-	-	-	-	-
F10: Melizitose	-	-	-	+	-	-	-	-	-	-	-	-
F11: Raffinose	-	-	-	-	-	-	-	-	-	-	-	-
F12: Inulin	-	-	-	-	-	-	-	-	-	+	-	-
F13: Starch	-	-	-	-	-	-	-	-	-	-	-	-
F14: Xylose	-	-	-	-	-	-	-	-	-	-	-	-
Assimilation of Carbons												
C1: D-Glucose	+	+	+	+	+	+	+	+	+	+	+	+
C2: D-Galactose	+	-	+	-	-	-	+	+	+	+	+	+
C6: D-Xylose	-	+	-	-	-	-	-	-	-	-	-	-
C10: Sucrose	-	+	-	+	-	-	-	-	+	+	+	+
C11: Maltose	-	+	-	+	+	+	-	-	+	+	+	+
C12: α-α-Trehalose	+	+	+	-	-	+	+	+	+	+	-	-
C13: Methyl-α-D-glucoside	-	-	-	+	-	-	-	-	+	-	-	-
C14: Cellobiose	+	-	+	+	+	+	+	-	-	+	-	-
C17: Melibiose	-	-	-	-	-	+	-	-	-	+	+	+
C18: Lactose	-	-	-	-	+	+	-	-	+	-	-	-
C19: Raffinose	-	-	-	-	-	-	-	-	+	+	+	+
C20: Melezitose	-	+	-	+	-	-	-	-	+	+	+	+
C21: Inulin	-	+	-	+	-	-	-	-	-	-	+	+

Characteristics	TK1	TK2-1	TK2-2	TK3	TK5	TK6	TK8	TK9	TK10	TK12	TK13	TK18
C22: Starch	-	-	-	-	-	-	-	-	-	-	-	-
Assimilation of Nitrogens												
N1: Potassium nitrate	-	-	-	-	-	-	+	+	+	-	-	-
N2:: Sodium nitrite	-	-	-	-	+	+	-	+	-	-	-	-
N3: Ethylamine HCl	+	+	+	+	+	+	+	+	+	+	+	+
N4: L-Lysine HCl	+	+	+	+	+	+	+	+	+	+	+	+
Vitamin Requirement												
V1: Growth w/o vitamins	-	-	-	+	-	-	-	+	-	+	+	+
V2: Growth w/o myo-inositol	+	+	+	+	+	-	+	+	-	+	+	+
V3: Growth w/o pantothenate	+	+	+	+	-	-	+	+	-	+	+	+
V4: Growth w/o biotin	+	+	+	+	+	-	+	+	-	+	+	+
V5: Growth w/o thiamine	+	+	-	+	+	+	-	+	+	+	+	+
V7: Growth w/o pyidoxine	-	-	-	+	+	-	-	+	-	+	+	+
V9: Growth w/o niacin	+	+	-	+	-	-	--	+	-	+	+	+
V10: Growth w/o PABA	+	+	+	+	-	-	+	+	-	+	+	+
Others												
T1: Growth at 25C	+	+	+	+	+	+	+	+	+	+	+	+
T2: Growth at 30C	+	+	+	+	+	+	+	+	+	+	+	+
T3: Growth at 35C	+	+	+	+	+	+	+	+	+	+	+	+
T4: Growth at 37C	+	+	+	-	-	-	+	+	+	+	+	+
T5: Growth at 40C	-	-	+	-	-	-	-	-	-	+	-	-
T6: Growth at 42C	-	-	-	-	-	-	-	-	-	-	-	-
T7: Growth at 45C	-	-	-	-	-	-	-	-	-	-	-	-
O4: 50% glucose growth	+	+	+	-	+	+	+	-	+	+	+	+
O5: 60% glucose growth	+	-	-	-	-	-	-	-	-	+	+	+
M3: Urease	-	-	-	-	+	+	-	-	+	-	-	-
M4: DBB color reaction	-	-	-	-	+	+	-	-	+	-	-	-
E1: Pink colony	-	-	-	-	-	-	-	-	-	-	-	-
E2: Budding cells	+	+	+	+	+	+	+	+	+	+	+	+
E3: Lemon-shaped cell	-	-	-	-	-	-	-	-	-	-	-	-
E4: Buds on stalk	-	-	-	-	-	-	-	-	-	-	-	-
E5: Splitting	-	-	-	-	-	-	-	-	-	-	-	-
E6: Filamentous	-	-	-	-	-	-	-	-	-	-	-	-
E7: Pseudohyphae	-	-	+	+	+	+	-	+	-	-	-	-

Characteristics	TK1	TK2-1	TK2-2	TK3	TK5	TK6	TK8	TK9	TK10	TK12	TK13	TK18
E8: Septate hypha	-	-	-	-	-	-	-	-	-	-	-	-
E9: arthoconidia	-	-	-	-	-	-	-	-	-	-	-	-
E10: Ballistoconidia	-	-	-	-	-	-	-	-	-	-	-	-
E11: Sytematic ballistoconidia	-	-	-	-	-	-	-	-	-	-	-	-
A1: Ascosporogenous	-	-	-	+	-	-	-	+	-	+	+	+
A2: Ascospores round, oval, conical or reniform	-	-	-	+	-	-	-	+	-	+	+	+
A3: Ascospores cap-, hat-,saturn-, or walnut- shaped	-	-	-	-	-	-	-	-	-	-	-	-
A4: Ascospores needle-shaped or whip-like	-	-	-	-	-	-	-	-	-	-	-	-
A5: Club-shaped asci	-	-	-	-	-	-	-	-	-	-	-	-

Appendix B

Publications, Presentations and Proceeding

Publications, Presentations and Proceeding

I. International Publications

1. Jindamorakot, S., S. Am-in, T. T. Tran, D. D. Ngo, H. Kawasaki, W. Potacharoen, S. Limtong, M.Tanticharoen and T. Nakase. 2004. *Candida easanensis* sp. nov., *Candida pattaniensis* sp. nov. and *Candida nakhonratchasimensis* sp. nov., three new species of yeasts isolated from insect frass in Thailand. J. Gen. Appl. Microbial., 50, 261-269.
2. Nakase, T., S. Jindamorakot, T. Sugita, S. Am-in, H. Kawasaki, W. Potacharoen and M. Tanticharoen. 2005. *Trichosporon siamense* sp. nov., isolated from insect frass in Thailand. J. Gen. Appl. Microbiol., submitted.
3. Nakase, T., S. Jindamorakot, S. Am-In, H. Kawasaki, W. Potacharoen and M. Tunticharoen. 2005. *Pichia nongkratonensis* sp. nov. , a new species of ascomycetous yeast isolated from insect frass collected in Thailand. **Mycoscience., submitted.**
4. Nakase, T. 2004. Yeasts. In: *Thai fu*ngal diversity. 87-94.

II. Presentations: 9 Titles; Oral (3) and Poster (6) (Abstract-Appendix B)

International Meeting (5)

➢ Oral presentation (3)

1. Jindamorakot, S., M. Sakisaka, H. Kawasaki, W. Potacharoen, M. Tuntirungkit, W. Yongmanitchai, S. Limtong, M. Tunticharoen and T. Nakase. Species Diversity of Yeasts in the Natural Environment of Thailand. 23rd International Specialised Symposium on Yeasts " Interactions between yeasts and organisms" (26-29 August 2003), Hungary.
2. Jindamorakot, S., M. Sakisaka, H. Kawasaki, W. Potacharoen, M. Tuntirungkit, W. Yongmanitchai, S. Limtong, M. Tunticharoen and T. Nakase. Species Diversity of Yeasts in the Natural Environment of Thailand, The 15th Annual Meeting of the Thai Society for Biotechnology (3-6 Febuary 2004), Chaing-Mai.
3. Sagisaka, M., H. Kawasaki, S. Jindamorakot, Morakot Tanticharoen, T. Nakase and T. Seki. 2004. Yeast diversity in natural habitat in Thailand: Polyphasic taxonomy of novel species belongs to fimily Mestschnikowiaceae. The 15th Ann. Meeting of TSB, Chiang Mai, 3-6 February, 2004.

➢ Poster presentation (2)

1. Jindamorakot, S., M. Sakisaka, H. Kawasaki, W. Potacharoen, M. Tuntirungkit, W. Yongmanitchai, S. Limtong, M. Tunticharoen and T. Nakase. Species Diversity of Yeasts Isolated From Wild Mushrooms in Thailand, The 10th International Congress for Culture Collections (10-15 October 2004), Japan.

2. T. Nakase, S. Am-in, Jindamorakot, S., T. T. Tran, D. D. Ngo, H. Kawasaki, W. Potacharoen, S. Limtong, and M.Tanticharoen. *Candida easanensis* sp. nov., *Candida pattaniensis* sp. nov. and *Candida nakhonratchasimensis* sp. nov., three new species of yeasts isolated from insect frass in Thailand., The 10th International Congress for Culture Collections (10-15 October 2004), Japan.

Thailand Meeting (4)

➢ **Poster presentation**

1. Jindamorakot, S., S. Limtong, W. Potacharoen, H. Kawasaki, T. Seki, Tanticharoen, M. T. Nakase. 2002. Isolation and identification of yeasts for bioresource screening program. The 5th BRT Annual Conference (9-12 October 2001), Udonthanee.
2. Jindamorakot, S., S. Limtong, W. Yongmanitchai, M. Tuntirungkit, W. Potacharoen, H. Kawasaki and T. Nakase. 2002. Two New Anamorphic Yeasts, *Candida khaoyaiensis* sp. nov. and *Candida thailandica* sp. nov. Isolated form Insect Frasses in Thailand. The 6th BRT Annual Conference (8-11 October 2002), Nakhorn-Srithamarat.
3. Jindamorakot, S., S. Limtong, W. Yongmanitchai, M. Tuntirungkit, W. Potacharoen, H. Kawasaki and T. Nakase. 2002. *Candida flosculi* sp. nov., a Novel Anamorphic Yeast Species Isolated from a Flower in Thailand. The 14th Annual Meeting of the Thai Society for Biotechnology (12-15 November 2002), Khon-Khen.
4. Jindamorakot, S., M. Sakisaka, H. Kawasaki, W. Potacharoen, M. Tuntirungkit, W. Yongmanitchai, S. Limtong, M. Tunticharoen and T. Nakase. *Candida korachensis* and *Candida lignicola*, Two New Anamorphic Yeasts Isolated from Khao-Yai National Park. The 7th BRT Annual Conference (12-16 October 2003), Cheing-Mai.