

# Identification of Endophyte in Figs Fruit (*Ficus carica* L.) Potentially as Antibacterial with 16s rRNA Marking Gene

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**Abstract:** Infectious diseases are still one of the causes of morbidity and mortality in the world. Infectious diseases are usually treated with antibiotics, but their irrational application and consumption can be dangerous. Bacteria will be resistant to these antibiotics. Utilization of endophyte bacteria can be used as an antibiotic. Endophytic bacteria are bacterial colonies that live in various plant tissues without causing various disease symptoms for the host plant. Several studies have shown that endophytic bacteria are able to produce the same bioactive compounds as their host plants due to coevolution or genetic transfer from the host plant to endophytic bacteria. "Tin" or Figs plants are one of the plants that can be used as a source of endophytic bacteria. Many people use Figs to treat asthma, bronchitis, dry cough, diabetes, cancer, coronary heart disease, gout, and osteoporosis. This study aims to isolate and identify species of endophytic bacteria from Figs (*Ficus carica* L.) which have the potential as antibacterial. Isolation of endophytic bacteria from *Ficus carica* fruit was carried out by growing bacterial colonies on starch agar and then selecting those colonies that had clear zones. Bacteria that produced clear zones were then characterized and identified through gram staining and 16S rRNA molecular test. The results showed that there were 6 endophytic isolates that were successfully isolated, 2 isolates with high inhibition were then identified using BLAST analysis and phylogenetic tree analysis using the Neighbor-Joining method in the MEGA 11 application. The identification results showed that isolate E1 had 100% similarity with *Kodamaea ohmeri* and isolate E6 have 99% similarity with *Bacillus cereus*.

**Keywords:** 16S rRNA Analysis; Endophytic; *Ficus carica*; Antibacterial; Phylogenetic Tree; Molecular Identification.

## Introduction

Infectious diseases are still the biggest cause of morbidity and mortality in the world, one of which is acute respiratory infection (ARI). WHO (2019) has noted that the death rate due to ISPA reaches 4.25 million each year. Based on the 2018 Basic Health Research (Risksedas), the national prevalence of ISPA is 9.3% and East Nusa Tenggara is the province with the highest cases, namely 15.4%. Infectious diseases are generally treated with antibiotics, but their irrational application and consumption will lead to antibiotic resistance. Another option for antibiotic ingredients is obtained from natural resources, one of which is endophytic from Figs. Endophytes are colonies of microorganisms that live in plant tissues and cause disease symptoms for their host

plants (Bacon and Hinton, 2007). Endophytes can be isolated from plant parts such as roots, stems, leaves, and fruit (Strobel and Daisy, 2003). Endophytes are capable of producing the same secondary metabolites as their host plants due to coevolution or genetic transfer from the host plant (Tan and Zou, 2001). Based on the report of Aryani et al., (2020), 4 isolates of endophytic bacteria from Imperata leaves were able to produce total phenols, flavonoids, alkaloids, saponins, and tannins.

Tin or Ara plants can be used as a source of endophytes. Figs contain phenols, benzaldehyde, terpenoids, flavonoids, alkaloids, fiber and polyphenols (Joseph and Raj, 2011). Many people use this fruit to treat asthma, bronchitis, dry cough, diabetes, cancer, coronary heart disease, gout, and osteoporosis (Aswandi and Kholibrina, 2020;

Paarakh, 2009). The use of endophytes was chosen to reduce exploitation of nutritious plants such as Figs. The many benefits of Figs make the need for these plants increase and the price is expensive, making this fruit rare in Indonesia.

The potential of endophytes in producing bioactive compounds and shorter life cycles can be used as an alternative to the use of efficacious plant extracts which require large amounts of raw materials so that the availability of plants will be maintained. This ability is a great opportunity to explore various types of endophytes in plant tissues. Findings related to the discovery and utilization of potential endophytes have also not been widely carried out. Therefore it is necessary to explore the endophytes contained in plants, especially Figs, and identify them to determine their nature and type. Today, the technique of identifying microorganisms is growing. Identification of bacteria can be done by molecularly analyzing the bacteria using the 16s rRNA gene (Rau et al., 2018). Molecular analysis is considered more precise and accurate than other common microbiological procedures.

Studies related to the identification of endophytes in Fig plants have been reported. Abid et al., 2022 succeeded in isolating 9 bacterial strains of the genus *Bacillus* from dried Figs (*Ficus carica* L.). Linelejan et al., (2018) stated that there were 2 endophytic bacteria in typical Sulawesi fig leaves (*Ficus minahasse*), namely *Branchibacterium muris* and *Pseudacidovorax intermedius*. Thus this study was conducted to determine endophytic isolates contained in Figs and their potential as antibacterial against Multi-drug Resistant Organisms (MDRO).

### Materials and Methods

This research was conducted at the Microbiology Laboratory of the Faculty of Mathematics and Natural Sciences, Medan State University from June to October 2022. The experimental research covered the isolation and testing of the antibacterial activity of endophytic isolates against the MDRO test bacteria and their identification with 16s rRNA.

**Sterilization of Figs.** Samples of Figs that have been taken aseptically are washed under running water until clean. The sample was then surface sterilized. Initially the sample was immersed in 96% ethanol for 1 minute, then put in 5.25% sodium hypochlorite solution for 5 minutes, and finally rinsed again using 96% ethanol for three repetitions (Leonita et al., 2015).

**Isolation and purification of endophytic bacteria.** Sterile samples were planted in Nutrient Agar (NA) media containing chloramphenicol in each petri dish, then incubated for 48 hours. If colony growth was seen, the bacterial colonies were then purified by transferring 1 ose of endophytic colonies to fresh NA medium. The pure culture obtained was then re-inoculated onto NA slanted agar (modified by Leonita et al., 2015).

**Observation of macroscopic characteristics.** Macroscopic observation of bacterial colonies was carried out by looking at the inoculum morphology of endophytic bacterial isolates. The morphological features observed included shape, color, edges, elevation of the bacterial isolates which could be observed from the top of the petri dish (Ismail et al., 2018).

**Observation of microscopic characteristics.** Microscopic observation was carried out using gram staining and spore staining techniques. Gram staining was carried out by adding 1 ose of pure culture to a sterile object glass and then fixing it over a Bunsen flame and dropping 1-3 drops of crystal violet for 1 minute. The object glass is washed under running water and dried, then 1-3 drops of Lugol's solution are dripped for 1 minute. The object glass is then rinsed and dried. The object glass is dripped with about 1-3 drops of 96% alcohol for 30 seconds, after which the object glass is washed and dried. The glass object was added with a safranin solution of about 1-3 drops for 30 seconds. Finally, the object glass is rinsed and dried. The object glass was observed with a microscope with a magnification of 100X (Nuraini et al., 2020). If the endophytic isolate is purple, the endophyte is a gram-positive bacteria, meanwhile,

if the endophytic isolate is red, the endophyte is a gram-negative bacteria (Fitri and Yasmin, 2011).

Spore staining was carried out on endophytic isolate E1 due to an indication at the molecular identification stage that the isolate came from the yeast/fungi group. This procedure is carried out by adding 1 ose of pure culture to a sterile glass object then fixing it over a Bunsen flame and adding 1-3 drops of malachite green dye with heating and allowing it to dry for 2 minutes. The heated green dye is kept from bubbling or boiling. The glass slide is rinsed with distilled water and 1-3 drops of safranin solution are dripped for 30 seconds. The slides are rinsed again and observed with a microscope. If the cells absorb green color, it can be said that the endophytic cells have spores, but if the green color fades and the endophytic cells absorb red (safranin), then it can be said that the endophytic cells do not have spores (Bahri, et al., 2021)..

#### **Rejuvenation of endophytic bacteria.**

Rejuvenation of endophytic bacteria and test bacteria for Multi Drug Resistant Organisms (MDRO) uses the method of Simarmata et al., (2007) with modifications. Each endophyte and test bacteria were inoculated into NA medium and incubated for 24 hours at 28-30°C. The test bacterial isolates that had been rejuvenated were then suspended as much as 1 ose into a sterile 0.9% physiological NaCl solution (which is equivalent to 0.5 McFarland solution), then homogenized.

#### **Antibacterial activity testing of Fig endophytic bacteria against multi drug resistant organisms (MDRO).**

Testing the antibacterial activity of endophytic bacteria against Multi Drug Resistant Organisms (MDRO) test bacteria was carried out by inoculating 100 µL of the MDRO test bacterial culture using a cotton swab into a petri dish containing MHA media. The petri dish containing the MDRO test bacteria is divided into several test fields. The positive control used 20 µL of ciprofloxacin solution and the negative control used 20 µL of sterile distilled water. Oxoid paper discs were immersed in 20 µL of endophytic bacterial culture and placed in the middle of the test area. The petri dishes were incubated for 24

hours at 37°C (modification by Nugraheni et al., 2021). When the incubation period ends, the clear zone formed is observed and the diameter is measured. Samples that have the potential to produce antibacterial compounds are marked by the formation of clear zones (Oktavia and Pujiyanto, 2018).

#### **Molecular Identification of Selected Endophytic Bacterial Isolates.**

Endophytic molecular identification is based on PT. Indonesian Genetics. Extraction of genomic DNA from endophytes was performed using the Fast-DNA Bacterial Miniprep Kit (Zymo Research, D6005). Then it was amplified using primers 27F (5' – AGAGTTTGGATCMTGGCTCAG– 3'), and 1492R (5' –GGTTACCTTGTACGACTT– 3'). A total of 1 µL of DNA sample was mixed with 9.5 µL of dd H<sub>2</sub>O (Double Distillated Water), 12.5 µL of My Taq HS Red Mix, forward and reverse primers.

The PCR reaction was carried out in a thermocycler (pre-denaturation: 95°C 3 minutes, denaturation: 95°C 15 seconds, annealing: 52°C 30 seconds, extension: 72°C 45 seconds, final extension: 72°C 3 minutes ). The amplification process was carried out for 35 cycles. The PCR results were examined using gel electrophoresis technique, followed by a sequencing process. Sequence results were analyzed using the Basic Local Alignment Search Tool (BLAST) on the website <http://www.ncbi.nlm.nih.gov>, phylogenetic analysis was performed using the Molecular Evolutionary Genetic Analysis (MEGA) X program.

**Inhibition zone measurement.** Inhibition zone measurements were carried out after 24 hours of incubation. The clear zone is a marker of bacterial sensitivity to the antibacterial agent used as the test material. Measurement of the inhibition zone is carried out using a caliper and is measured by the formula:

$$\frac{(DV - DC) + (DH - DC)}{2}$$

Information:

DV : Diameter Vertical

DC : Disc Diameter

DH : Horizontal Diameter

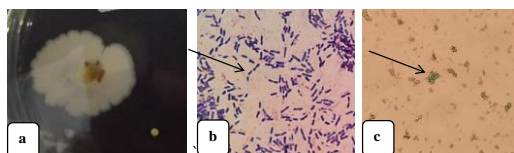
The measurement results are then classified based on table 1.

Diameter	Inhibitory Strength
≤5 mm	Weak
6-10 mm	Currently
11-20 mm	Strong
≥21 mm	Very strong

**Data analysis.** The data obtained were the diversity of endophytic bacterial isolates of Fig and types of endophytes that have the potential as antibacterial against Multi Drug Resistant Organisms (MDRO) bacteria. The data were analyzed descriptively experimentally by looking at the results of isolation, testing of antibacterial activity, and molecular identification of bacteria by the PCR method using the 16s rRNA marker gene in the form of tables, figures, and graphs.

## Results and Discussion

Macroscopic and microscopic characteristics of Fig endophytic isolates. Based on the results of the isolation that has been done, 6 endophytic colonies were obtained from Figs. The endophytic isolates were observed macroscopically and microscopically to see the differences between each isolate. Observations of the macroscopic and microscopic characteristics of the six Fig endophytic isolates are presented in tabel down below. Based on Table 4.1, macroscopic characteristics of Fig endophytic isolates were obtained, namely 2 isolates with the same macroscopic characteristics, namely rounded shape, smooth edges, and raised, 3 isolates with irregular shapes, smooth edges, and raised elevations, and 1 isolate with rounded shapes, edges curved, and flat elevation. The color of the endophytic colonies for all isolates was white (as shown in **Figure 1a**). The different characteristics of each endophytic isolate are due to the expression of genes originating from different types of microorganism (Fakruddin et al., 2013).



**Figure 1.** Endophytic colony isolate E6 (a. macroscopic character; b. gram staining; c. spora staining).

**Table 4.1** Colony Morphological Characteristics of Endophytic Bacterial Isolates.

Isolate Code	Form	Edge	Elevation	Color
E1	Round	Smooth	Raised	White
E2	Irregular	Smooth	Raised	White
E3	Irregular	Smooth	Raised	White
E4	Irregular	Smooth	Raised	White
E5	Bulat	Smooth	Raised	White
E6	Irregular	Lobate	Flat	White

**Table 4.2** Microscopic characteristics of endophytic bacterial isolates on Figs.

Isolate Coe	Cell Shape	Cell Color	Gram
E2	Coccus	Purple	(+)
E3	Coccus	Purple	(+)
E4	Coccus	Purple	(+)
E5	Coccus	Purple	(+)
E6	Bacil	Purple	(+)

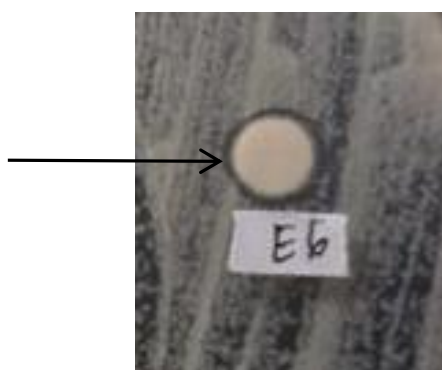
**Table 4.3** Spore characteristics of endophytic bacterial isolates on Figs.

Isolate Coe	Cell Shape	Cell Color	Spore
E1	Coccus	Green	(+)

The Fig endophytic isolates were then observed microscopically. Microscopic observation was carried out using gram staining and spore staining methods. Based on **Table 4.2**, it is known that the endophytic isolates E2 to E5 are spherical in shape and isolate E6 is rod-shaped. The five isolates of endophytic bacteria that were successfully isolated were gram-positive bacteria. **Figure 1b**, shows a purple rod-shaped bacterial cell. The results of the gram stain depend on the reaction of the bacterial cell wall to the given dye. Table 4.3 shows that the endophytic isolate E1 has spores which are marked in green. In **Figure 1c**, it can be seen that the endophytic cells are round and green in color. Microorganisms are said to have spores if the microorganism's cells absorb or bind strongly to the green dye even though it is rinsed and added with another dye (safranin) (Purwaningsih and Wulandari, 2021). Spores have a thick cell wall composed of dupliconic acid, so certain dyes are needed to penetrate the wall, one of which is malachite green (Bahri et al., 2021).

**Antibacterial activity testing of Fig endophytes against multi drug resistant organisms (MDRO).** Antibacterial testing was carried out by observing the clear zone formed as shown in **Figure 2**. The size of the clear zone will indicate the strength of the antibacterial activity of the endophytic bacterial isolates. The results of testing the antibacterial

activity of endophytic Fig against MDRO can be seen in Table 4.4.



**Figure 2.** The clear zone in testing the antibacterial activity of endophytic bacterial isolates of Figs against MDRO bacteria.

The antibacterial activity of the six endophytic isolates was categorized as weak. Based on Table 4.4, it is known that the highest inhibition zones for inhibiting MDRO bacteria were endophytic isolates E1 and E6 with average diameters of inhibition zones of 0.98 mm and 1.43 mm.

**Table 4.4** Results of testing the antibacterial activity of endophytic bacterial isolates of Figs against multi-drug resistant organisms.

Kode Isolat	Diameter Zona Hambat Terhadap Bakteri MDRO (mm)			Kategori Daya Hambat
	PA	KP	SL	
E1	2,25	0,70	0,00	Lemah
E2	0,90	1,50	0,40	Lemah
E3	1,25	0,55	0,50	Lemah
E4	0,50	0,70	0,20	Lemah
E5	0,00	0,00	0,00	Lemah
E6	2,45	0,65	1,20	Lemah
K+	14,3	15,2	3,35	Sedang

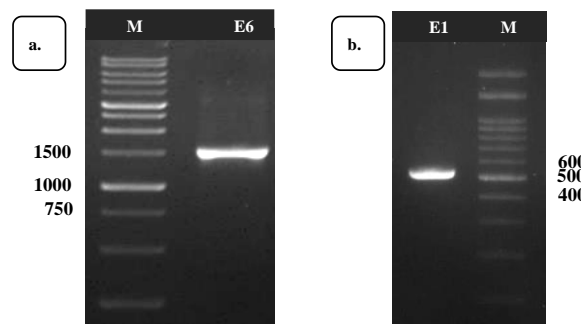
Kode Isolat	Diameter Zona Hambat Terhadap Bakteri MDRO (mm)			Kategori Daya Hambat
	PA	KP	SL	
K-	0,00	0,00	0,00	Lemah

**Information.** PA : *Pseudomonas aeruginosa*; KP : *Klebsiella pneumoniae*; SL: *Staphylococcus ludgunensis*.

**Molecular Analysis of Endophytic Isolates in Figs with Antibacterial Potential.** Molecular identification was carried out on Fig endophytic isolates that had high inhibition against MDRO, namely endophytic isolates E1 and E6. Based on Figure 3, it is known that the endophytic isolates E1 and E6 produced single bands with a size of about 523 bp and 1458 bp, respectively. The magnitude of this size corresponds to the nucleotide sequence length of the z26S rRNA and 16S rRNA gene sequences, which are about 600 bp and 1500 bp, respectively (Sumerta and Kanti, 2017; Pangestuti, 2006). The number of sequences of endophytic isolates E1 and E6 can be used for

identification analysis because their numbers are almost close to the magnitudes of the markers. (Lim et al., 2012). This arrangement is used to identify bacterial isolates based on the level of DNA sequence homology because it is specific to prokaryotic organisms (Perceka, 2014).

The sequencing results were then analyzed for homology using BLAST analysis. Analyzes were performed online on the NCBI website (<http://www.ncbi.nlm.nih.gov>) to compare the results obtained with DNA bank gene sequences. The results of zBLAST analysis of isolates E1 and E6 showed that the endophytic isolates E1 and E6 had similarities to the *Kodamaea ohmeri* strain CBS 5367 and *Bacillus cereus* strain D21, respectively.



**Figure 3.** Electrophoretic results of 16S rRNA gene amplification products.

According to Stackebrandt and Goebel (1994), in samples of microorganisms using 16S rRNA markers, they are said to be identical (similar) at the species level if the identity percentage value is above 97.5%, and at the genus level if the identity percentage value is above 95%. This indicates that the 16S rRNA gene marker used is considered capable of identifying endophytic Fig isolates up to the species level. This indicates that the 16S rRNA gene marker used is considered capable of identifying Fig endophytic isolates down to the species level. Phylogenetic trees for endophytic isolates E1 and E6 were made separately because they did not come from the same class of microorganisms, so they had different gene sizes. The phylogenetic tree of endophytic isolates E1 and E6 can be seen in **Figures 5.** and **Figure 6.**

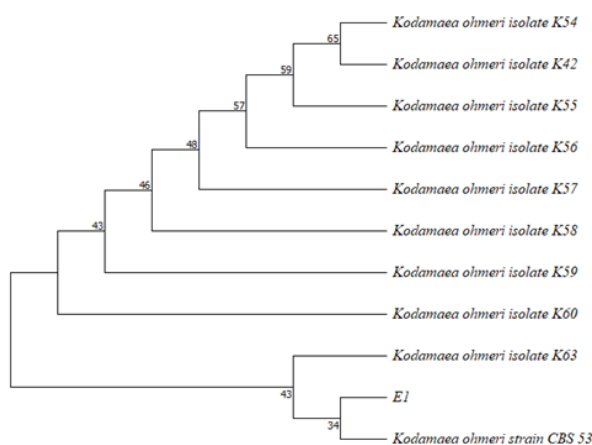


Figure 4. The phylogenetic tree of isolate E6.

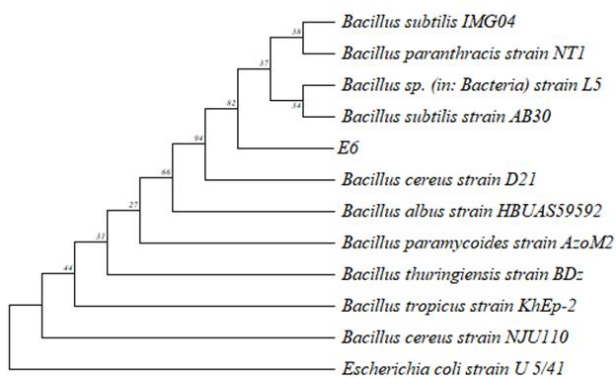


Figure 5. The phylogenetic tree of isolate E6

The phylogenetic tree of endophytic isolate E1 in Figure 4 shows that endophytic isolate E1 is closely related to *Kodamaea ohmeri* strain CBS 5367 and *Kodamaea ohmeri* isolate K63 which are characterized by repeated branches. Based on Figure 5 it is known that the endophytic isolate E6 has a kinship with the genus *Bacillus*. The construction of the phylogenetic tree shows that the endophytic isolate E6 has the closest kinship with *Bacillus cereus* strain D21 and *Bacillus albus* HBUAS59592.

## Discussion

From the isolation results obtained 6 colonies of endophytic bacteria on Figs. The number of colonies obtained was different from previous studies. Abid et al., (2022) succeeded in isolating 9 strains of endophytic bacteria from dried Figs (*Ficus carica*). Based on the results of macroscopic and microscopic characterization of endophytic isolates, it was found that there were differences in each endophytic isolate in Figs. The various characteristics of endophytic isolates may be due to

the growth media used. The agar media used for isolation in this study was NA (nutrient agar) media which is rich in yeast extract, peptone, NaCl, and agar. Endophytes are able to live in NA media because the composition of the media is similar or similar to the conditions in plants (Purwanto, et al., 2014).

Bhore and Satisha (2010) stated that the endophytes in one host plant are divided into several genera and species. The differences shown by each endophytic isolate were also influenced by plant growth conditions. Some cases mention that plants of the same type do not always have the same endophytes. Certain plants actually contain specific and distinctive endophytic bacteria in them.

Based on the results of the study, the 2 most potent isolates were isolates E1 and E6 with an average diameter of the inhibition zone for the three MDRO bacteria of 0.98 mm and 1.43 mm. The identified endophytic isolate E1 has similarities with the yeast *Kodamaea ohmeri*. This type of yeast is able to produce compounds 3-methyl-1butyl,  $\beta$ -1,3-glucanase, and chitinase which are able to inhibit the growth of *F. moniliforme* (a rice bakane agent) with low inhibition (Into et al., 2020; Khunnamwong et al., 2020). Through identification results it is known that the endophytic isolate E6 has similarities with *Bacillus cereus*. This is in accordance with the research of Suryadi et al., (2015) which stated that *Bacillus cereus* produces 3 main compounds, namely cyclolanostan, cyclohexyliden, and stigmast. These compounds can inhibit the growth of the fungi *R. solani* and *P. oryzae*. *B. cereus* isolated from turmeric (*Curcuma longa* L.) is capable of producing saponin, terpenoid, and flavonoid compounds. These compounds work by reducing cell permeability, denaturing bacterial cell proteins and damaging cell membranes beyond repair (Baraga et al., 2022).

The magnitude of endophytic inhibition is probably caused by bioactive compounds or secondary metabolites produced by endophytic bacteria. According to Aryani, et al. (2020) the more secondary metabolites an isolate produces, the greater the inhibition zone it produces. Metabolite compounds are able to inhibit the growth of pathogenic bacteria by interfering with bacterial

metabolism, inhibiting bacterial cell wall synthesis, inhibiting bacterial cell wall synthesis, interfering with bacterial permeability and damaging the synthesis of nucleic acid in test bacteria or pathogens (Sepriana et al., 2020). Another reason is that endophytes are only able to produce antibacterial compounds if they interact plantaly with their host plants (Desriani, 2014). In other words, the potential of endophytes to produce antibacterial compounds will decrease if they are separated from their host plants. Several environmental factors that can affect the differences in the ability of each isolate include the ability of endophytic bacteria to produce bioactive compounds, the age of the microbial culture, the amount of active compounds produced, the composition of the media and the incubation time. Potential endophytic isolates were then analyzed using molecular techniques to obtain the species.

Based on PCR results, sequencing analysis and phylogenetic analysis, it is known that endophytic isolates E1 and E6 are *Kodamaea ohmeri* and *Bacillus cereus*, respectively. Through the electrophoresis process, it was obtained  $\pm 600$  bp for E1 and  $\pm 1500$  bp for E6 which were then aligned respectively to obtain a kinship relationship between these isolates with *Kodamaea ohmeri* and *Bacillus cereus* with a similarity percentage of almost 100%. Both types of microorganisms are described as follows.

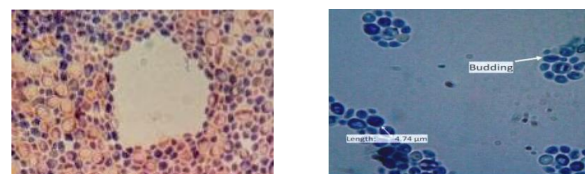
#### a. Isolate E1

*Kodamaea ohmeri* is a yeast group that is generally isolated from several types of fermented fruits and fruit juices, such as bananas, fermented citrus fruits, sugar cane, and cocoa. This isolate has several morphological characteristics that almost resemble bacterial colonies. This can be seen in **Table 4.5** and **Figure 6**. Gana et al., (2014) argue that one of the yeasts isolated on the surface of banana fruit is *Kodamaea ohmeri*. This opinion is supported by the statement of Obasi et al., (2014) and Koffi et al., (2017) which stated that *Kodamaea ohmeri* is a type of yeast isolated from orange juice fermentation and chocolate fermentation. This type of yeast is able to produce compounds 3-methyl-1butyl,  $\beta$ -1,3-glucanase, and chitinase which are able to inhibit the growth of *F. moniliforme* (a rice

bakane agent) with low inhibition (Khunnamwong et al., 2020). Anggraini et al., (2019) stated that this species was also found in fermented sugar cane isolation. *Kodamaea ohmeri* is classified as a fermentative yeast because it can ferment glucose and sucrose.

**Table 4.5** Comparison of macroscopic characteristics of isolate E1 with *Kodamaea ohmeri*.

Karakter	Isolat E1	Kemiripan dengan <i>Kodamaea ohmeri</i>
Bentuk koloni	Bulat	Bulat (Sharma et al., 2018)
Warna koloni	Putih	Putih (Kurtzman dan Fell, 1998)
Elevasi koloni	Timbul	Timbul (Sharma et al., 2018)
Permukaan koloni	Mengkilat	Buram (Sharma et al., 2018)
Tepian koloni	Rata	Regular (Sharma et al., 2018)
Bentuk sel	Bulat	Bulat (Sharma et al., 2018)



**Figure 6**. Comparison of E1 cell shapes by gram staining and methylene blue staining for *Kodamaea ohmeri* (Anggraini et al., (2019)).

#### b. Isolate E6

*B. cereus* is a gram-positive bacterium in the form of a bacillus (rod) with a size of 0.3-2.2 x 1.2-7.0  $\mu$ m. *Bacillus cereus* is a member of the phylum Firmicutes. This bacterium grows in a facultative anaerobic manner (can use oxygen but is also able to produce energy anaerobically) and can form endospores (Madigan et al., 2012). *B. cereus* is a bacterial species that is generally isolated from soil, plants, and others. Certain strains are also reported to be able to support plant growth and suppress disease in plants (Ehling-Schulz et al., 2019). *B. cereus* will test positive for the catalase enzyme when oxygen is used (Madigan et al., 2012). Several species of *Bacillus* are known to produce certain antibiotic compounds as secondary metabolites produced by each species. One of them is *Bacillus cereus* which is known to produce *cerexin*, *zwittermicin*, *cyclolanostan*, *cyclohexyliden*, and *stigmas* (Baraga et al., 2022; Suryadi et al., 2015).

Based on the Number of Accession on the NCBI website, information about isolate E6 which has similarities to *Bacillus cereus* strain D21, this strain was first isolated from Ruh (a fermented/alcoholic drink in China). *Bacillus cereus* strain D21 has the ability to produce  $\alpha$ -amylase and glucoamylase.

## Conclusions

Endophytes obtained from figs totaled 6 isolates. 5 isolates have weak inhibitory ability. Isolates E1 and E6 were the most potent isolates and were identified molecularly. Based on the results of 16S rRNA molecular analysis, it is known that the potential endophytic species has a 99% similarity with *Kodamaea ohmeri* strain CBS 5367 and *Bacillus cereus* strain D21.

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