BAB V
PENUTUP

A. Kesimpulan

Berdasarkan hasil penelitian yang telah dilakukan dapat disimpulkan :

1. Hasil fermentasi bakteri endofit *Bacillus siamensis* dan *Bacillus subtilis* memiliki aktivitas antijamur terhadap *Candida albicans* ATCC 10231.
2. Hasil fermentasi bakteri endofit *Bacillus siamensis* memilki waktu optimum fermentasi pada hari ke -3 dengan diameter zona hambat 8,53 mm dan *Bacillus subtilis* memilki waktu optimum fermentasi pada hari ke -3 dengan diameter zona hambat 11,69 mm.
3. Hasil fermentasi bakteri endofit *Bacillus subtilis* memiliki potensi aktivitas antijamur lebih besar dari *Bacillus siamensis* terhadap *Candida albicans* ATCC 10231.

B. Saran

1. Perlu dilakukan penelitian lebih lanjut terhadap bakteri pathogen dan jamur pathogen lain yang dapat dihambat oleh bakteri endofit *Bacillus siamensis* dan *Bacillus subtilis.*
2. Perlu dilakukan penelitian untuk mengetahui senyawa bioaktif yang terkandung didalam bakteri endofit sebagai antijamur dan antibakteri lebih rinci dengan metode lain.
3. Perlu dilakukan penelitian dengan metode fermentasi yang lain sehingga hasil dapat dibandingkan dengan penelitian terdahulu.

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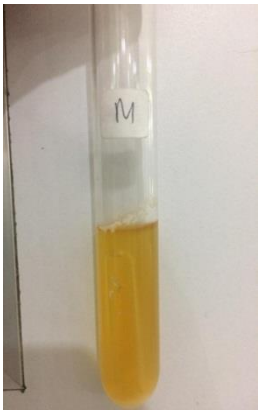
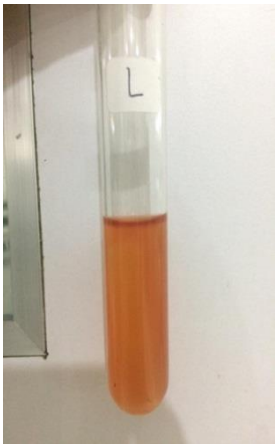
LAMPIRAN

Lampiran 1. Identifikasi Biokimia *Candida albicans* ATCC 10231

Glukosa



Maltosa

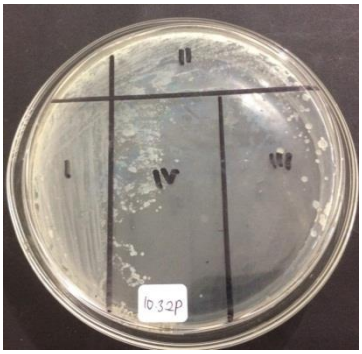


Laktosa

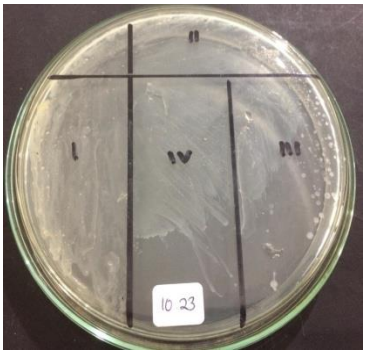
Sukrosa

Lampiran 2. Suspensi jamur *Candida albicans* ATCC 10231

Lampiran 3. Uji Morfologi Bakteri Endofit

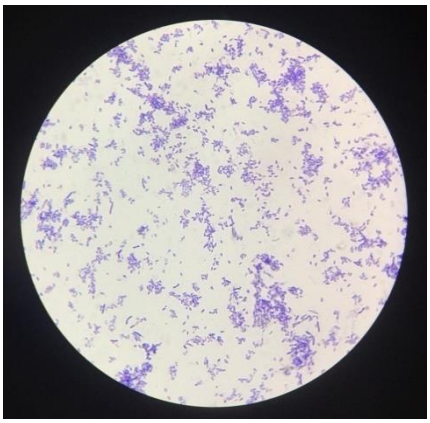


Bacillus subtilis

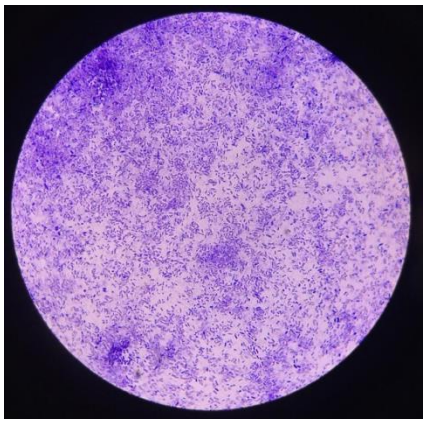


Bacillus siamensis

Lampiran 4. Pewarnaan Gram Bakteri Endofit

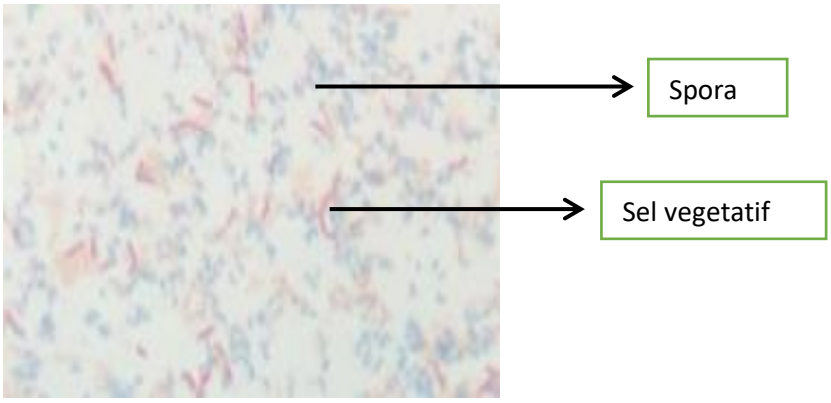


Bacillus subtilis

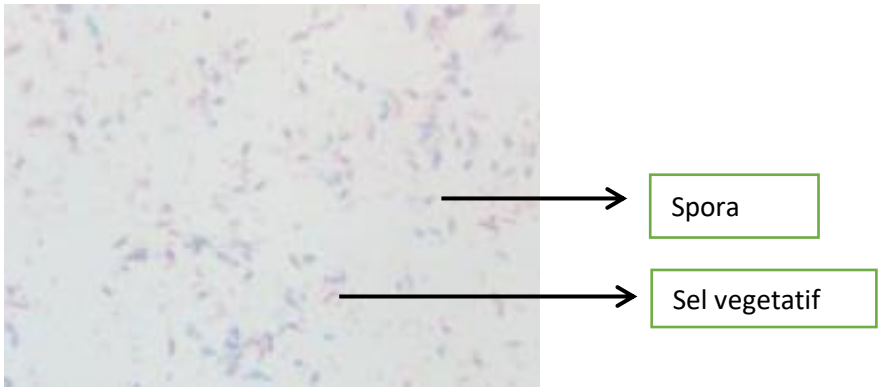


Bacillus siamensis

Lampiran 5. Pewarnaan Spora Bakteri Endofit



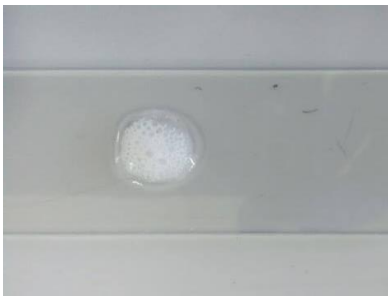
Bacillus subtilis



Bacillus siamensis

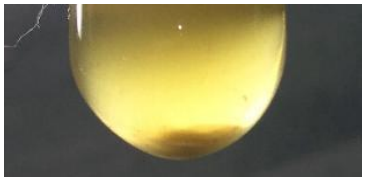
Lampiran 6. Uji Koagulase Bakteri Endofit

Bacillus subtilis



Bacillus siamensis

Lampiran 7. Uji Katalase Bakteri Endofit



Bacillus subtilis

Bacillus siamensis

Lampiran 8. Hasil Fermentasi Isolat bakteri endofit



Bacillus subtilis



Bacillus siamensis

Lampiran 9. Analisis SPSS Bakteri endofit *Bacillus siamensis* dan *Bacillus subtilis*

Normalitas

One-Sample Kolmogorov-Smirnov Test

		Zona Hambat	Perlakuan	Waktu Fermentasi
N		40	40	40
Normal Parameters[a,b]	Mean	6.5285	3.90	2.50
	Std. Deviation	3.62940	1.722	1.132
Most Extreme Differences	Absolute	.275	.199	.171
	Positive	.164	.199	.171
	Negative	-.275	-.189	-.171
Kolmogorov-Smirnov Z		1.739	1.261	1.079
Asymp. Sig. (2-tailed)		.005	.083	.195

a. Test distribution is Normal.

b. Calculated from data.

Zona Hambat vs Perlakuan

Test of Homogeneity of Variances

Zona Hambat

Levene Statistic	df1	df2	Sig.
2.318	5	34	.065

Zona Hambat vs Waktu Fermentasi

Test of Homogeneity of Variances

Zona Hambat

Levene Statistic	df1	df2	Sig.
.285	3	36	.836

One Way ANOVA
Zona Hambat vs Perlakuan

ANOVA

Zona Hambat

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	433.860	5	86.772	36.939	.000
Within Groups	79.869	34	2.349		
Total	513.729	39			

Probabilitas < 0,05 dilakukan uji lanjutan atau Post Hoc

Multiple Comparisons

Dependent Variable: Zona Hambat

Tukey HSD

(I) Perlakuan	(J) Perlakuan	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Kontrol Positif B. subtilis	Kontrol Negatif B. subtilis	7.91000*	1.08376	.000	4.6389	11.1811
	B. subtilis	-.87333	.88489	.919	-3.5441	1.7975
	Kontrol Positif B. siamensis	.00000	1.08376	1.000	-3.2711	3.2711
	Kontrol Negatif B. siamensis	7.91000*	1.08376	.000	4.6389	11.1811
	B. siamensis	.20500	.88489	1.000	-2.4658	2.8758
Kontrol Negatif B. subtilis	Kontrol Positif B. subtilis	-7.91000*	1.08376	.000	-11.1811	-4.6389
	B. subtilis	-8.78333*	.88489	.000	-11.4541	-6.1125
	Kontrol Positif B. siamensis	-7.91000*	1.08376	.000	-11.1811	-4.6389
	Kontrol Negatif B. siamensis	.00000	1.08376	1.000	-3.2711	3.2711
	B. siamensis	-7.70500*	.88489	.000	-10.3758	-5.0342
B. subtilis	Kontrol Positif B. subtilis	.87333	.88489	.919	-1.7975	3.5441
	Kontrol Negatif B. subtilis	8.78333*	.88489	.000	6.1125	11.4541
	Kontrol Positif B. siamensis	.87333	.88489	.919	-1.7975	3.5441
	Kontrol Negatif B. siamensis	8.78333*	.88489	.000	6.1125	11.4541
	B. siamensis	1.07833	.62571	.527	-.8102	2.9669
Kontrol Positif B. siamensis	Kontrol Positif B. subtilis	.00000	1.08376	1.000	-3.2711	3.2711
	Kontrol Negatif B. subtilis	7.91000*	1.08376	.000	4.6389	11.1811
	B. subtilis	-.87333	.88489	.919	-3.5441	1.7975
	Kontrol Negatif B. siamensis	7.91000*	1.08376	.000	4.6389	11.1811
	B. siamensis	.20500	.88489	1.000	-2.4658	2.8758
Kontrol Negatif B. siamensis	Kontrol Positif B. subtilis	-7.91000*	1.08376	.000	-11.1811	-4.6389
	Kontrol Negatif B. subtilis	.00000	1.08376	1.000	-3.2711	3.2711
	B. subtilis	-8.78333*	.88489	.000	-11.4541	-6.1125
	Kontrol Positif B. siamensis	-7.91000*	1.08376	.000	-11.1811	-4.6389
	B. siamensis	-7.70500*	.88489	.000	-10.3758	-5.0342
B. siamensis	Kontrol Positif B. subtilis	-.20500	.88489	1.000	-2.8758	2.4658
	Kontrol Negatif B. subtilis	7.70500*	.88489	.000	5.0342	10.3758
	B. subtilis	-1.07833	.62571	.527	-2.9669	.8102
	Kontrol Positif B. siamensis	-.20500	.88489	1.000	-2.8758	2.4658
	Kontrol Negatif B. siamensis	7.70500*	.88489	.000	5.0342	10.3758

*. The mean difference is significant at the 0.05 level.

Zona Hambat

Tukey HSD[a,b]

Perlakuan	N	Subset for alpha = 0.05	
		1	2
Kontrol Negatif B. Subtilis	4	.0000	
Kontrol Negatif B. Siamensis	4	.0000	
B. siamensis	12		7.7050
Kontrol Positif B. Subtilis	4		7.9100
Kontrol Positif B. Siamensis	4		7.9100
B. subtilis	12		8.7833
Sig.		1.000	.866

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5.143.
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Zona Hambat vs Waktu Fermentasi

ANOVA

Zona Hambat

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	30.547	3	10.182	.759	.525
Within Groups	483.181	36	13.422		
Total	513.729	39			

Two way ANOVA

Tests of Between-Subjects Effects

Dependent Variable: Zona Hambat

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	482.364[a]	23	20.972	10.699	.000
Intercept	894.710	1	894.710	456.418	.000
Perlakuan	433.860	5	86.772	44.265	.000
Waktu	12.849	3	4.283	2.185	.130
Perlakuan * Waktu	17.956	15	1.197	.611	.827
Error	31.365	16	1.960		
Total	2218.581	40			
Corrected Total	513.729	39			

a. R Squared = .939 (Adjusted R Squared = .851)