

DAFTAR PUSTAKA

1. Nelwan RHH. *Pemakaian Antimikrobia Secara Rasional di Klinik, Buku Ajar Ilmu Penyakit Dalam.* Jakarta : Pusat Penerbitan Departemen Ilmu Penyakit Dalam FKUI. 2006.
2. Priyanto. *Farmakoterapi dan Terminologi Medis.* Jakarta : Binarupa Aksara. 2009. hal. 41-42, 51-52.
3. Utami ER. Antibiotika, Resistensi, dan Rasionalitas Terapi. di dalam *Saintis Vol. 1 No. 1.* 2012. hal.124-138.
4. Carte BK. Biomedical Potential of Marine Natural Products : Marine organisms are yielding novel molecules for use in basic research and medical application. di dalam *BioScience Vol. 46 No. 4.* 1996. hal. 271-286.
5. Del Val AG, Platas G, Basilio A, Cabello A, Gorrochategui J and Suay I. Screening of Antimicrobial Activities in Red, Green, and Brown Macroalgae from Gran Canaria Spain. *Journal of International Microbiology.* 2001. 4. hal. 35 - 40.
6. Osman MEH, Abushady AM and Elshobary ME. In Vitro Screening of Antimicrobial Activity of Extracts of some Macroalgae Collected from Abu-Qir bay Alexandria, Egypt. *African Journal of Biotechnology Vol. 9(12).* 2010. hal. 7203-7208.
7. Izzati M. Skreening Potensi Anti Bakteri pada Beberapa Spesies Rumput Laut terhadap Bakteri Patogen pada Udang Windu. *Jurnal Bioma.* Vol. 9. No. 2. 2007.
8. Djide MN, Gobel RB dan Sartini. Screening for Antibacterial Compounds of Caulerpa racemosa from Lae-lae Coastal in Makassar, Poster Presenter. The 5th International Symposium Microbiology, Manado. 2012.
9. Suryadi, Afni N, Sari AP dan Sartini. Potensi Bakteri Simbion dari beberapa Ganggang Hijau sebagai Penghasil Senyawa Antimikroba. di dalam *Laporan Hasil Penelitian Program Kreatifitas Mahasiswa bidang Penelitian.* Makassar : Fakultas Farmasi Universitas Hasanuddin. 2012.
10. Anah L, Hariyadi HR dan Tanuwidjaja L. Penelitian Pendahuluan Produksi Oksitetrasiklin Skala Fermentor 4 Liter dengan Menggunakan Media Optimum yang Ekonomis. di dalam *Teknologi Indonesia Jilid*

- XIV No.2. Bandung : Staf Peneliti Puslitbang Kimia Terapan-LIPI. 1991.
11. Jack RW, Tagg JR and Ray B. Bacteriosin of Gram-positive Bacteria. *Microbiol Rev.* 59(2). 1995. hal. 171-200.
 12. Enshasy HAE, Baz AFE and Ammar EM. *Simultaneous production and decomposition of different rifamycins during Amycolatopsis mediterranei growth in shake flask and in stirred tank bioreactor.* Communicating Current Research and Educational Topics and Trends in Applied Microbiology. 2007.
 13. Todorov SD and Dicks LMT. *Bacteriocin production by Lactobacillus pentosus ST712BZ isolated from boza.* Brazilian Journal of Microbiology vol. 38 no.1. 2007.
 14. Singkoh MFO. Aktivitas Antibakteri Ekstrak Alga Laut *Caulerpa racemosa* dari Perairan Pulau Nain. *Jurnal Perikanan dan Kelautan Tropis.* Vol.VII-3. 2011.
 15. Van den Hoek C, Mann DG and Jahns HM. *Algae. An Introduction to Phycology.* Australia : Cambridge University Press. 1995. hal. 16, 301, 391-392, 401, 406. Available from : <http://books.google.co.id>
 16. Waluyo L. *Mikrobiologi Umum.* Penerbit UMM Press. Malang. 2004. hal.98-99, 109-112, 279.
 17. Agardh JG. Till algeners systematic. Nya bidrag. (Tredje afdelingen). *Lunds Universitets Ars-Skrift, Afdelingen for Mathematik och Naturvetenskap* 19(2): 1-177, 4 plates. 1883. Available from <http://algaebase.org>
 18. Saptasari M. Variasi Ciri Morfologi dan Potensi Makrolaga Jenis *Caulerpa* di Pantai Kondang Merak Kabupaten Malang. *El-Hayah* vol.1 No.2. 2010. hal.19-22.
 19. Balai Besar Riset Pengolahan produk dan Bioteknologi Kelautan dan perikanan (BBRP2BKP). *Manfaat dan Kandungan Kimia Caulerpa.* 2010.
 20. Bakhuni DS and Rawat DS. *Bioactive marine natural product.* Anamaya Spring. New Delhi. 2005. hal. 2-19, 26-30.

21. Tjitrosoepomo G. *Taksonomi Tumbuhan Schyzophyta, Thallophyta, Pteridophyta*. Cetakan keenam. Gadjah Mada University Press. Yogyakarta. 2003.
22. Kee JL dan Hayes ER. *Farmakologi: Proses Pendekatan Keperawatan*. EGC. Jakarta. 1996. hal.324.
23. Djide MN dan Sartini. Dasar-Dasar Mikrobiologi Farmasi. Lembaga Penerbitan Universitas Hasanuddin. Makassar. 2008. hal.75-76, 206-210, 339-342, 206.
24. Ganiswarna GS. Farmakologi dan Terapi Edisi 4. Fakultas Kedokteran Universitas Indonesia. Jakarta. 1995. hal.571-573.
25. Reskika A. Evaluasi potensi rumput laut coklat (Phaeophyceae) dan rumput laut hijau (Chlorophyceae) asal Perairan Takalar sebagai antibakteri Vibrio spp. *Skripsi*. Fakultas Ilmu Kelautan dan Perikanan Universitas Hasanuddin. Makassar. 2011. hal.1-32.
26. Vallinayagam K, Arumugam R, Raja Kannan RR, Thirumaran G and Anantharaman P. Antibacterial activity of some selected seaweeds from Purumadam Coastal Regions. *Global Journal of Pharmacology*. 2009. 3(1). hal.50-52.
27. Taskin E, Ozturk M, Taskin E and Kurt O. Antibacterial activities of some marine algae from the Aegean Sea (Turkey). *African Journaol of Biotechnology*. 17 Desember 2007. Vol (6). 24. Hal.2746-2751. Available from : <http://www.academicjournals.org/AJB>
28. Bordenstein S. Microbial Life Educational Resources. [accessed 30 April 2013]. Available from <http://serc.carleton.edu/microbelife/topics/marinesymbiosis/index.html>
29. Dolan MF. Speciation of termite gut protists: the role of bacterial symbionts. *Int Microbiol*. Amherst USA. Departement of Geosciences, University of Massachusetts. 2001. 4(4) hal.203-208.
30. Hentschel U, Schmid M, Wagner M, Fieseler L, Gernert C and Hacker J. Isolation and phylogenetic analysis of bacteria with antimicrobial activities from the Mediterranean sponges *Aplysina aerophoba* and *Aplysina cavernicola*. *FEMS Microbiol Ecol*. 2001. 35. hal.305-312.
31. Proksch P, Edrada RA and Ebel R. Drugs from the seas – current status and microbiological implications. *Appl Environ Microbiol* 59. 2002. hal.125-134.

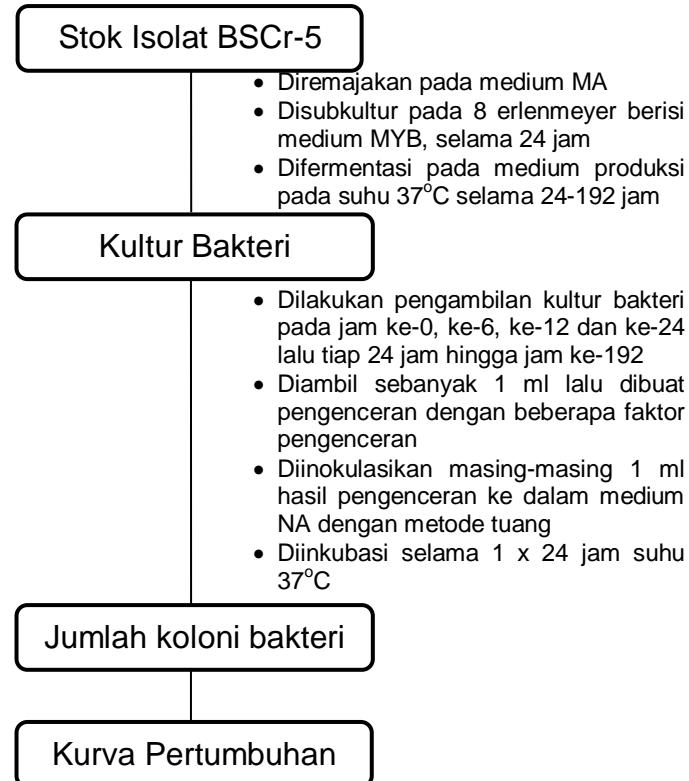
32. Zheng L, Han X, Chen H, Lin W and Yan X. Antimicrobial Screening Active Compound Isolation wth the Sponge *Hymeniacidon parleve*. *Journal Microbial Biotech.* 21. 2005. hal. 201-206.
33. Lay BW. Analisis Mikroba di Laboratorium. PT.Raja Grafindo Persada. Jakarta. 2007. hal.37-42.
34. Labela PD. *Isolation of biotechnological organism from nature*. Mc. Graw-Hill Publishing Company. New York. 1990. hal.26-29, 260.
35. Pelczar MJ dan Chan ECS. *Dasar-Dasar Mikrobiologi*, Jilid 2, diterjemahkan oleh Hadioetomo R.S. Universitas Indonesia Press. Jakarta. 1988.
36. Muchtadi dan Ayustaningwarno F. *Teknologi Proses Pengolahan Pangan*. Alfabeta. Bandung. 2010.
37. Fardiaz S. *Fisiologi Fermentasi*. Lembaga Sumber Daya Informasi IPB. Bogor. 1988. hal.105-107.
38. Dwidjoseputro D. *Dasar-Dasar Mikrobiologi*. Djambatan. Jakarta. 2005. hal.60-62, 126, 169, 188.
39. Buckle KA, Edward RA, Fleet GH, and Wooton M. 1985. *Ilmu Pangan* (diterjemahkan oleh Purnomo, H dan Adiono). UI Press. Jakarta.
40. Rachman A. *Pengantar Teknologi Fermentasi*. Pusat Antar Universitas Pangan dan Gizi. Institut Pertanian Bogor. 1989. Hal. 88
41. Kunaepah U. *Pengaruh Lama Fermentasi Dan Konsentrasi Glucosa Terhadap Aktivitas Antibakteri, Polifenol Total Dan Mutu Kimia Kefir Susu Kacang Merah*. Tesis Magister Gizi Masyarakat UNDIP Semarang. 2008.
42. Choma I. The Use of Thin-Layer Chromatography with Direct Bioautography for Antimicrobial Analysis. [serial on the internet] 1 September 2005. 2012 [dikutip 5 November 2012]; LCGC Europe Vol. 18, Issue 9. [7 screen] Available from: <http://www.chromatographyonline.com>
43. Breed RS, Murray EGD and Smith NR. *Bergey's Manual of Determinative Bacteriology*. 7th ed. The Williams and Wilkins Company. Baltimore. 1957. hal.99, 335-337, 372, 464-465, 620-621.

44. Davis WW and Stout TR. Disc Plate Method of Microbiological Antibiotic Assay; Factors Influencing Variability and Error. *Applied Microbiology*. 22(4).1971. Hal.659-665.
45. Ibtissam C, Hassane R, Jose ML, Fransisco DSJ, Antonio GVJ, Hassan B and Mohamed K. Screening of antibacterial activity in marine green and brown macroalgae from the coast of morocco. *African Journal of Biotechnology*. 2009. Apr 6. 8(7). hal.1258-1262.

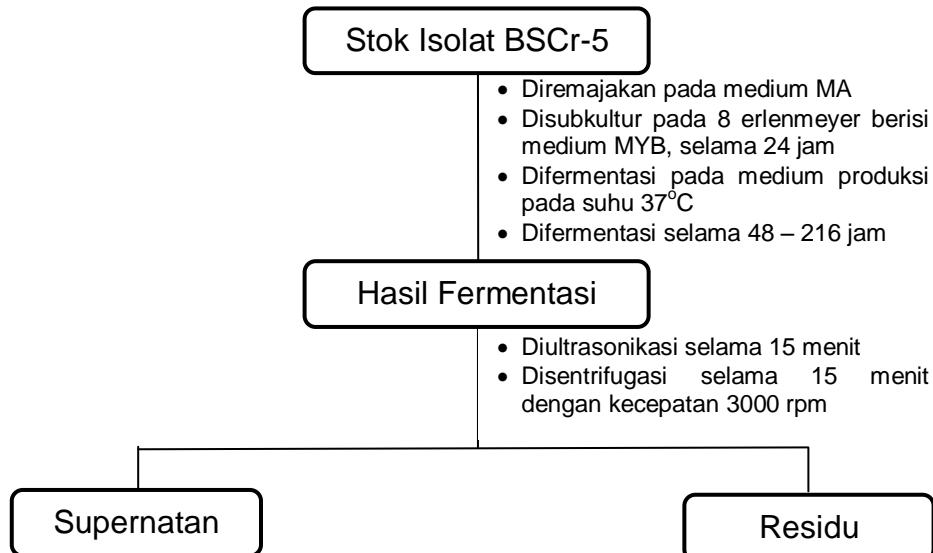
LAMPIRAN

Lampiran 1. Skema Skerja

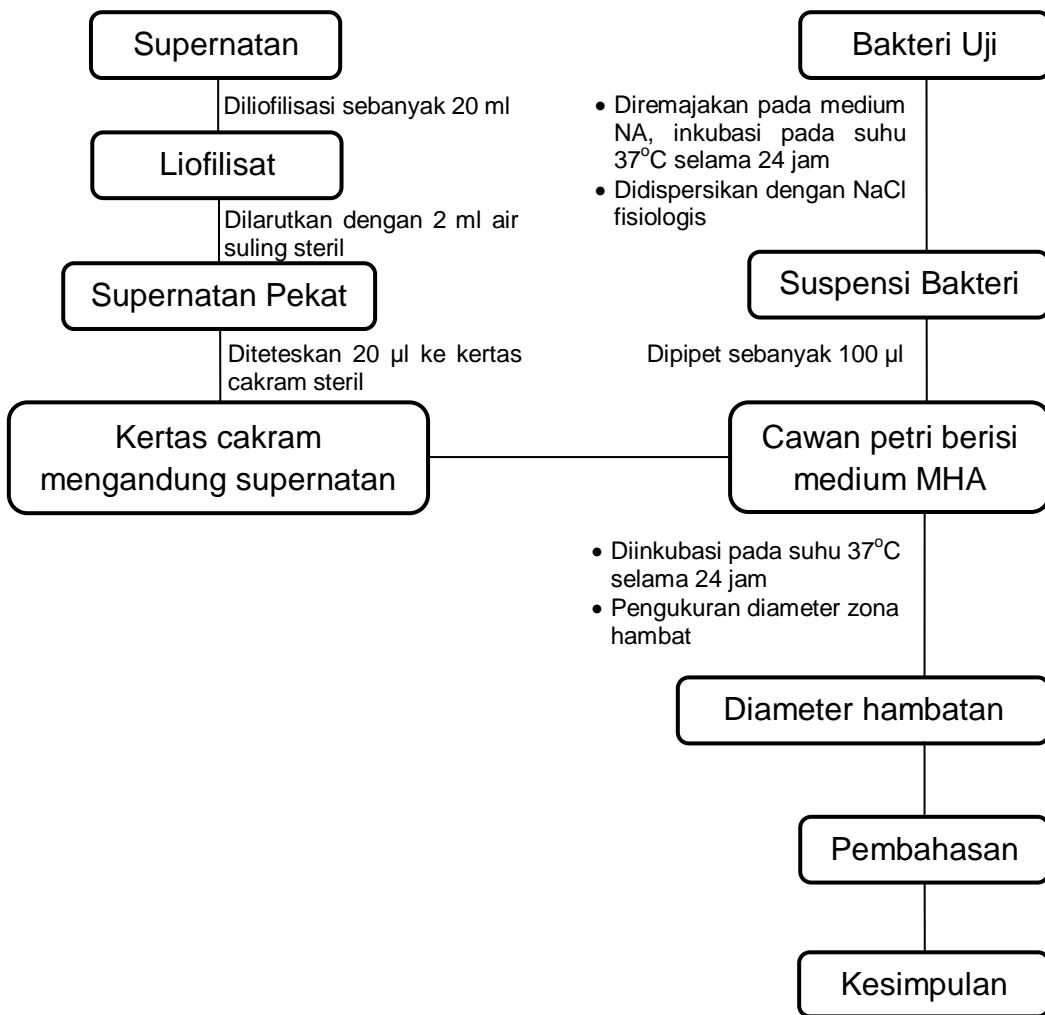
a. Penentuan Kurva Pertumbuhan Isolat



b. Produksi Senyawa Isolat BSCr-5 dengan Variasi Waktu Fermentasi

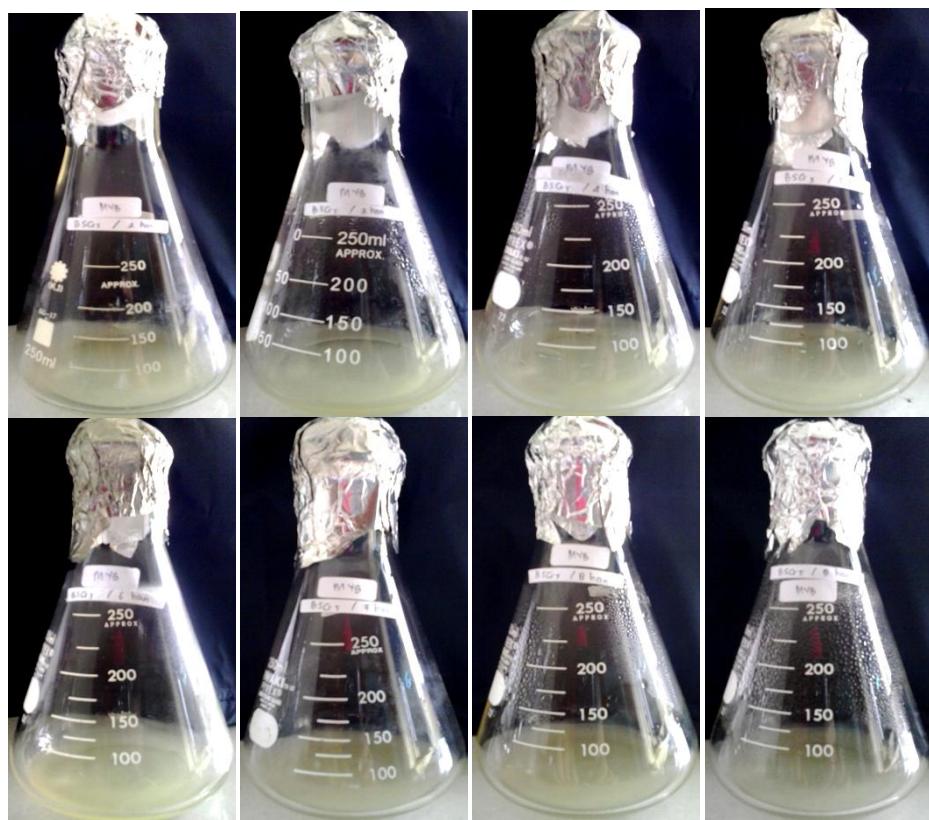


c. Uji Aktivitas Antimikroba Hasil Fermentasi



Lampiran 2. Gambar Hasil Penelitian

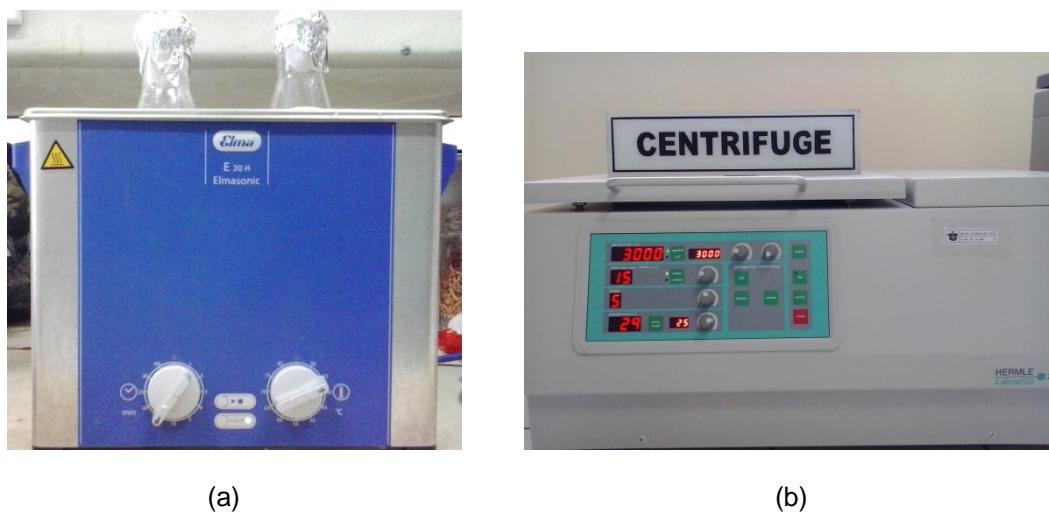
Gambar 10. Koloni yang tumbuh pada metode perhitungan ALT



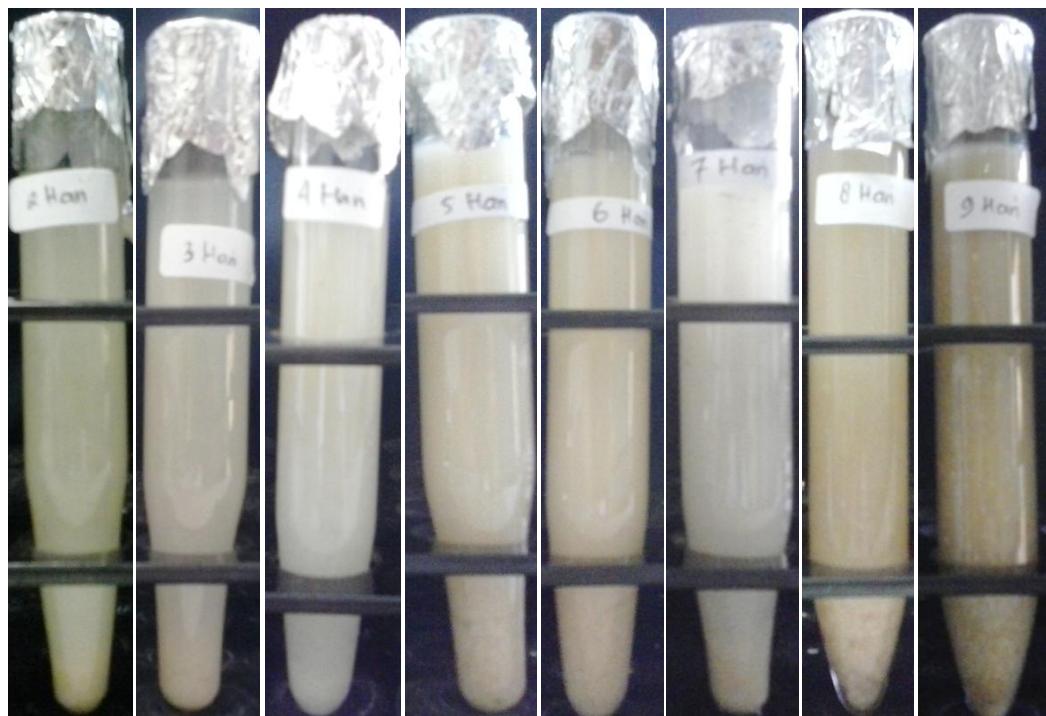
Gambar 11. Penyiapan subkultur isolat BSCr-5 dengan medium MYB diinkubasi pada suhu 37°C selama 24 jam



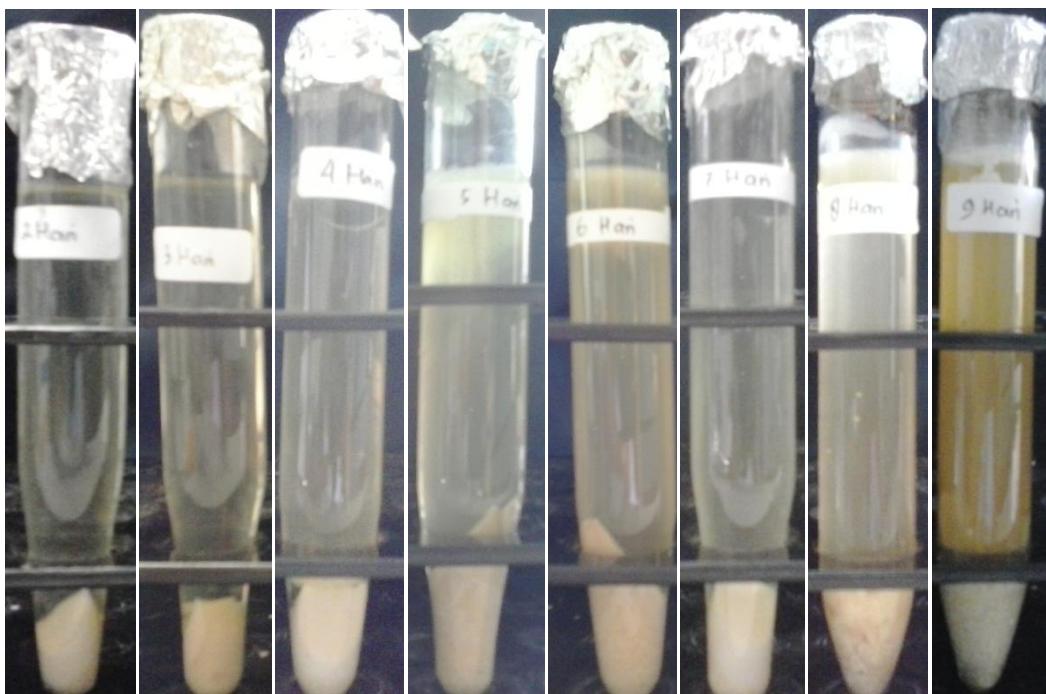
Gambar 12. Fermentasi isolat BSCr-5 dengan medium produksi diinkubasi pada suhu 37°C selama 48 – 216 jam



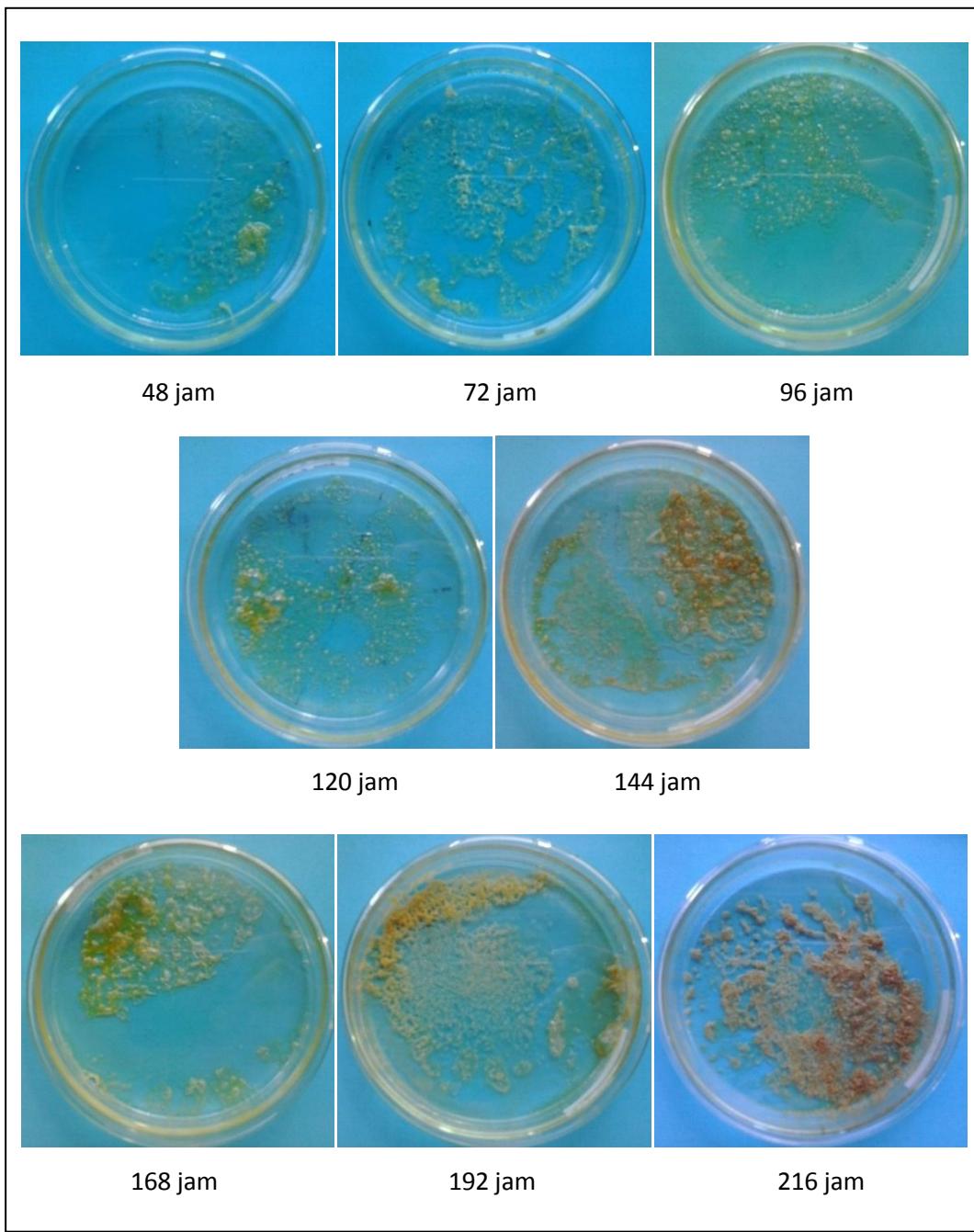
Gambar 13. (a) Proses sonikasi hasil fermentasi isolat; (b) Proses sentrifugasi hasil fermentasi isolat



Gambar 14. Hasil fermentasi isolat BSCr-5 sebelum disentrifugasi



Gambar 15. Hasil fermentasi isolat BSCr-5 setelah disentrifugasi



Gambar 16. Liofilisat supernatan hasil fermentasi isolat BSCr-5 tiap lama fermentasi

Lampiran 3. Hasil pengukuran pertumbuhan isolat dengan metode Angka Lempeng Total

| Waktu (Jam) | Jumlah Koloni tiap Faktor pengenceran | | | Jumlah Sel (kol/ml) | \log_{10} Jumlah Sel |
|----------------|---------------------------------------|-----------|-----------|---------------------|------------------------|
| 6 | 10^{-2} | 10^{-3} | 10^{-4} | $2,4 \times 10^5$ | 5,380 |
| | TBUD | 240 | 264 | | |
| 12 | 10^{-4} | 10^{-5} | 10^{-6} | $7,9 \times 10^5$ | 5,898 |
| | 79 | 35 | 5 | | |
| 48 | 10^{-6} | 10^{-7} | 10^{-8} | $2,1 \times 10^8$ | 8,322 |
| | 213 | 121 | 17 | | |
| 72 | 10^{-7} | 10^{-8} | 10^{-9} | $1,8 \times 10^9$ | 9,255 |
| | 178 | 145 | 25 | | |
| 96 | 10^{-7} | 10^{-2} | 10^{-9} | $1,2 \times 10^9$ | 9,079 |
| | 119 | 7 | 5 | | |
| 120 | 10^{-6} | 10^{-7} | 10^{-8} | $1,2 \times 10^9$ | 9,079 |
| | 512 | 117 | 27 | | |
| 144 | 10^{-6} | 10^{-7} | 10^{-8} | $4,5 \times 10^8$ | 8,176 |
| | 560 | 45 | 0 | | |
| 168 | 10^{-5} | 10^{-6} | 10^{-7} | $3,0 \times 10^7$ | 7,477 |
| | 296 | 65 | 14 | | |
| 192 | 10^{-4} | 10^{-5} | 10^{-6} | $2,6 \times 10^7$ | 7,415 |
| | TBUD | 264 | 53 | | |

Lampiran 4. Data Pengukuran Diameter Hambatan

| Lama Fermentasi | Diameter Hambatan (mm) | | | | | | | | | |
|-----------------|---------------------------|-----------|-------------------------------|-----------|-------------------------|-----------|--------------------------|-----------|------------------------------|-----------|
| | <i>Salmonella thyposa</i> | | <i>Pseudomonas aeruginosa</i> | | <i>Escherichia coli</i> | | <i>Bacillus subtilis</i> | | <i>Staphylococcus aureus</i> | |
| | Nilai | Rata-rata | Nilai | Rata-rata | Nilai | Rata-rata | Nilai | Rata-rata | Nilai | Rata-rata |
| 48 jam | 9,40 | 9,93 | 8,40 | 8,60 | 8,35 | 8,28 | 8,45 | 8,95 | 11,00 | 10,48 |
| | 10,30 | | 9,00 | | 8,20 | | 9,00 | | 10,40 | |
| | 10,10 | | 8,40 | | 8,30 | | 9,40 | | 10,05 | |
| 72 jam | 10,20 | 10,15 | 17,15 | 13,17 | 11,15 | 11,23 | 9,10 | 9,12 | 10,20 | 9,88 |
| | 10,20 | | 11,20 | | 11,20 | | 9,20 | | 9,35 | |
| | 10,05 | | 11,15 | | 11,35 | | 9,05 | | 10,10 | |
| 96 jam | 12,10 | 12,08 | 10,00 | 9,80 | 12,35 | 11,75 | 11,15 | 10,62 | 11,40 | 11,23 |
| | 12,10 | | 9,40 | | 11,45 | | 11,25 | | 11,20 | |
| | 12,05 | | 10,00 | | 11,45 | | 9,45 | | 11,10 | |
| 120 jam | 16,30 | 16,15 | 17,10 | 16,83 | 14,00 | 14,07 | 14,10 | 15,85 | 16,45 | 16,62 |
| | 16,10 | | 16,40 | | 14,20 | | 19,00 | | 17,00 | |
| | 16,05 | | 17,00 | | 14,00 | | 14,45 | | 16,40 | |
| 144 jam | 16,15 | 13,23 | 9,05 | 9,22 | 13,15 | 13,15 | 12,00 | 11,78 | 11,35 | 11,30 |
| | 12,10 | | 9,20 | | 13,00 | | 11,30 | | 11,25 | |
| | 11,45 | | 9,40 | | 13,30 | | 12,05 | | 11,30 | |
| 168 jam | 13,00 | 13,22 | 12,40 | 13,05 | 13,00 | 12,78 | 14,05 | 14,13 | 16,20 | 16,10 |
| | 13,45 | | 13,30 | | 12,25 | | 14,20 | | 16,05 | |
| | 13,20 | | 13,45 | | 13,10 | | 14,15 | | 16,05 | |
| 192 jam | 10,10 | 10,07 | 14,10 | 13,50 | 12,10 | 11,40 | 14,10 | 12,95 | 13,35 | 12,68 |
| | 10,10 | | 13,35 | | 11,10 | | 12,30 | | 12,35 | |
| | 10,00 | | 13,05 | | 11,00 | | 12,45 | | 12,35 | |
| 216 jam | 15,00 | 15,07 | 15,10 | 15,07 | 16,05 | 15,40 | 17,15 | 16,87 | 16,20 | 17,25 |
| | 15,20 | | 15,05 | | 15,00 | | 17,35 | | 17,20 | |
| | 15,00 | | 15,05 | | 15,15 | | 16,10 | | 18,35 | |
| Kontrol + | 8,00 | 7,85 | 0 | 0 | 0 | 0 | 9,05 | 9,18 | 8,20 | 8,15 |
| | 7,45 | | 0 | | 0 | | 9,20 | | 8,25 | |
| | 8,10 | | 0 | | 0 | | 9,30 | | 8,00 | |