

DAFTAR PUSTAKA

- Adegoke, A.S., Jerry, O. V, Ademola, O.G., 2019. GC-MS Analysis of Phytochemical Constituents in Methanol Extract of Wood Bark from *Durio zibethinus* Murr. Int. J. Med. Plants Nat. Prod. 5.
- Adu, J.K., Amengor, C.D.K., Kabiri, N., Orman, E., Patamia, S.A.G., Okrah, B.K., 2019. *Validation of a Simple and Robust Liebermann-Burchard Colorimetric Method for the Assay of Cholesterol in Selected Milk Products in Ghana*. Int. J. Food Sci.
- Ahmed, F., 2018. *Antioxidant activity of Ricinus Communis*. Org. Med. Chem. Int. J. 5, 3–8.
- Al-Shamahy, H.A., 2019. *Efficacy of some Antibiotics against Streptococcus mutans Associated with Tooth decay in Children and their Mothers*. Online J. Dent. Oral Heal. 2, 0–3.
- Apostică, A.G., Ichim, T., Radu, V.M., Bulgariu, L., 2018. *Simple and Rapid Spectrophotometric Method for Phenol Determination in Aqueous Media*. Bull. Polytech. Inst. Jassy 64, 9–18.
- Astrilia, D., Endah, A.F., 2012. *Pemungutan Minyak Atsiri Mawar (Rose Oil) Dengan Metode Maserasi*. J. Bahan Alam Terbarukan 1, 14–20.
- Ayu, S.I., Pratiwi, L., Nurbaeti, S.N., 2019. *Uji kualitatif senyawa fenol dan flavonoid dalam ekstrak n-heksan daun senggani (*Melastoma malabathricum L.*) Menggunakan Metode Kromatografi Lapis Tipis 1–6*.
- Aziz, N.A.A., Jalil, A.M.M., 2019. *Bioactive compounds, nutritional value, and potential health benefits of indigenous durian (*Durio zibethinus* Murr.): A review*. Foods 8.
- Balouiri, M., Sadiki, M., Ibsouda, S.K., 2016. *Methods for in vitro evaluating antimicrobial activity: A review*. J. Pharm. Anal. 6, 71–79.
- Caron, F., 2012. *Antimicrobial susceptibility testing : a four facets tool for the clinician*. J. Des. Anti-Infect 186–174.
- Chanioti, S., Liadakis, G., Tzia, C., 2014. *Solid–Liquid Extraction* 253–286.
- Chatterjee, R., Slentz, C., Davenport, C.A., Johnson, J., Lin, P.H., Muehlbauer, M., D'Alessio, D., Svetkey, L.P., Edelman, D., 2017. *Effects of potassium supplements on glucose metabolism in African*

- Americans with prediabetes: A pilot trial.* Am. J. Clin. Nutr. 106, 1431–1438.
- Chigurupati, S., Mohammad, J.I., Vijayabalan, S., Vaipuri, N.D., Selvarajan, K.K., Nemala, A.R., 2017. *Quantitative estimation and antimicrobial potential of ethanol extract of Durio zibethinus Murr. Leaves.* Asian J. Pharm. Clin. Res. 10, 251–254.
- De Silva, G.O., Abeysundara, A.T., Aponso, M.M.W., 2017. *Extraction methods, qualitative and quantitative techniques for screening of phytochemicals from plants.* Am. J. Essent. Oils Nat. Prod. 5, 29–32.
- European Bioinformatics Institute, 2014. *Streptococcus mutans* [WWW Document]. URL http://www.ebi.ac.uk/2can/genomes/bacteria/Streptococcus_mutans.html (accessed 3.21.21).
- Factor, R., 1991. *Thin Layer Chromatography.* Wiley Blackwell.
- Fischetti, V.A., Novick, R.P., Ferretti, J.J., Portnoy, D.A., Rood, J.I., 2006. *Gram-Positive Pathogens, 2nd Editio.* ed. American Society for Microbiology Press, Washington.
- Gan, R.Y., Chan, C.L., Yang, Q.Q., Li, H. Bin, Zhang, D., Ge, Y.Y., Gunaratne, A., Ge, J., Corke, H., 2018. *Bioactive compounds and beneficial functions of sprouted grains,* Sprouted Grains: Nutritional Value, Production, and Applications. Elsevier Inc.
- Golus, J., Sawicki, R., Widelski, J., Ginalska, G., 2016. *The agar microdilution method – a new method for antimicrobial susceptibility testing for essential oils and plant extracts.* J. Appl. Microbiol. 121, 1291–1299.
- Gorinstein, S., Haruenkit, R., Poovarodom, S., Vearasilp, S., Ruamsuke, P., Namiesnik, J., Leontowicz, M., Leontowicz, H., Suhaj, M., Sheng, G.P., 2010. *Some analytical assays for the determination of bioactivity of exotic fruits.* Phytochem. Anal. 21, 355–362.
- Gorinstein, S., Poovarodom, S., Leontowicz, H., Leontowicz, M., Namiesnik, J., Vearasilp, S., Haruenkit, R., Ruamsuke, P., Katrich, E., Tashma, Z., 2011. *Antioxidant properties and bioactive constituents of some rare exotic Thai fruits and comparison with conventional fruits. In vitro and in vivo studies.* Food Res. Int. 44, 2222–2232.
- Grey, W.T., Curtiss, R., Hudson, M.C., 1997. *Expression of the Streptococcus mutans fructosyltransferase gene within a mammalian host.* Infect. Immun. 65, 2488–2490.

- Haruenkit, R., Poovarodom, S., Leontowicz, H., Leontowicz, M., Sajewicz, M., Kowalska, T., Delgado-Licon, E., Rocha-Guzmán, N.E., Gallegos-Infante, J.A., Trakhtenberg, S., Gorinstein, S., 2007. *Comparative study of health properties and nutritional value of durian, mangosteen, and snake fruit: Experiments in vitro and in vivo*. J. Agric. Food Chem. 55, 5842–5849.
- Heatley, N., 1943. *A Method for the Assay of Penicillin*. Can. J. Res. 25, 5–8.
- Hu, F.B., Van Dam, R.M., Liu, S., 2001. *Diet and risk of Type II diabetes: The role of types of fat and carbohydrate*. Diabetologia 44, 805–817.
- Hu, H.C., Chai, X.S., Barnes, D., 2014. *Determination of solid-liquid partition coefficient of volatile compounds by solid phase ratio variation based headspace analysis*. Fluid Phase Equilib. 380, 76–81.
- Iloki-Assanga, S.B., Lewis-Luján, L.M., Lara-Espinoza, C.L., Gil-Salido, A.A., Fernandez-Angulo, D., Rubio-Pino, J.L., Haines, D.D., 2015. *Solvent effects on phytochemical constituent profiles and antioxidant activities, using four different extraction formulations for analysis of Bucida buceras L. and Phoradendron californicum Complementary and Alternative Medicine*. BMC Res. Notes 8.
- Integrated Taxonomic Information System, 2021. *Streptococcus mutans* Clarke, 1924 [WWW Document]. URL https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=966483#null (accessed 3.21.21).
- Jamal, K.P., 2019. *Antibacterial Activities of Ethanol Extracts of Durian Fruit Skin (Durio zibethinus Murr.) On Salmonella Bacteria In ATCC 14028 And Bacillus cereus ATCC 11778 Cause Of Diarrhea*. Indones. J. Pharma Sci. 1, 1–6.
- Jayakumar, R., Kanthimathi, M.S., 2011. *Inhibitory effects of fruit extracts on nitric oxide-induced proliferation in MCF-7 cells*. Food Chem. 126, 956–960.
- Jorgensen, J.H., Ferraro, M.J., 2009. *Antimicrobial susceptibility testing: A review of general principles and contemporary practices*. Clin. Infect. Dis. 49, 1749–1755.
- Kalemba, D., Kunicka, A., 2005. *Antibacterial and Antifungal Properties of Essential Oils*. Curr. Med. Chem. 10, 813–829.
- Kojima, A., Nakano, K., Wada, K., Takahashi, H., Katayama, K., Yoneda, M., Higurashi, T., Nomura, R., Hokamura, K., Muranaka, Y.,

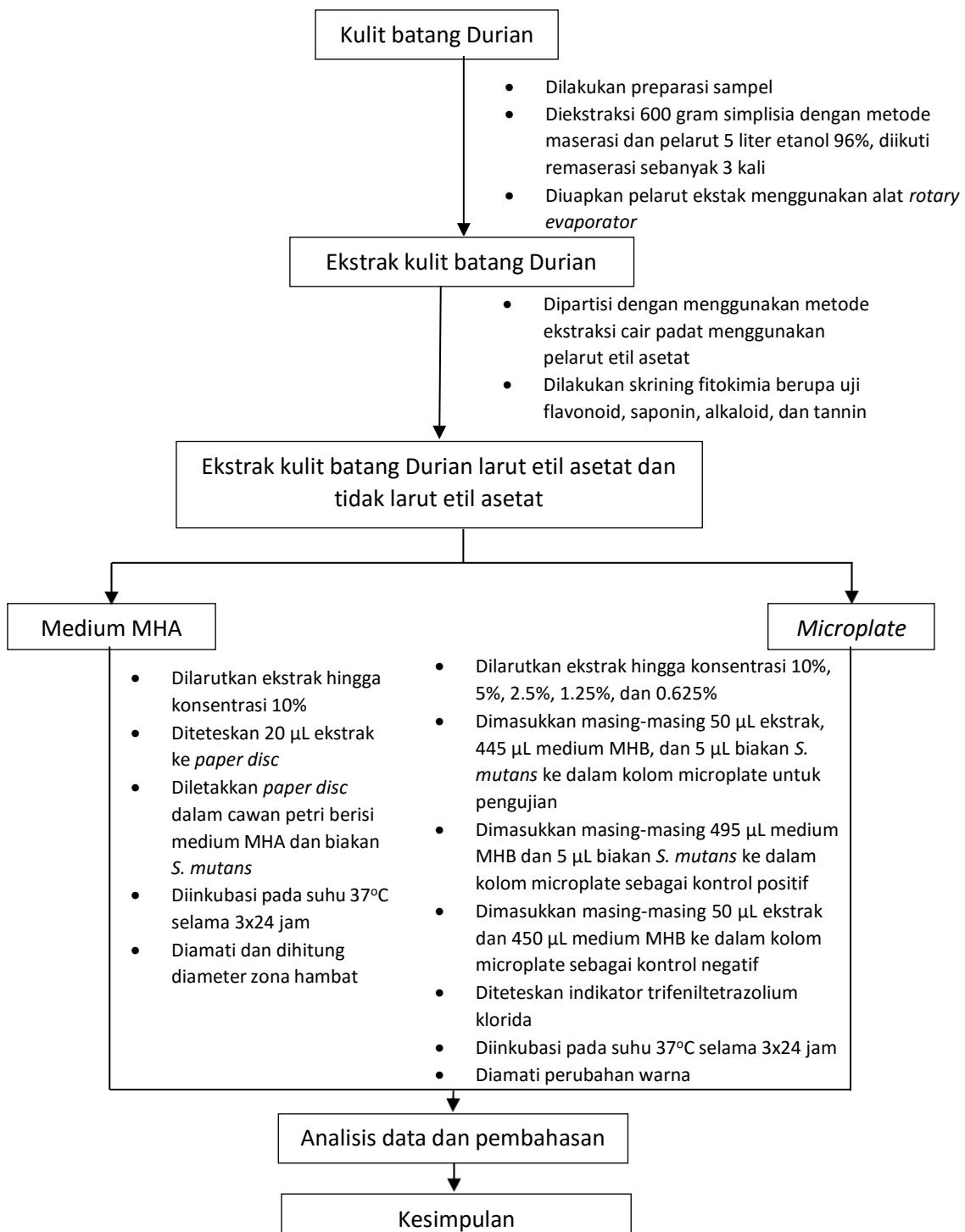
- Matsuhashi, N., Umemura, K., Kamisaki, Y., Nakajima, A., Ooshima, T., 2012. *Infection of specific strains of Streptococcus mutans, oral bacteria, confers a risk of ulcerative colitis*. Sci. Rep. 2, 1–11.
- Kowalska-Krochmal, B., Dudek-Wicher, R., 2021. *The minimum inhibitory concentration of antibiotics: Methods, interpretation, clinical relevance*. Pathogens 10, 1–21.
- Kreger, B.E., Craven, D.E., McCabe, W.R., 1980. *Gram-negative bacteremia. IV. Re-evaluation of clinical features and treatment in 612 patients*. Am. J. Med. 68, 344–355.
- Kurmukov, A.G., 2013. *Phytochemistry of medicinal plants*. Med. Plants Cent. Asia Uzb. Kyrg. 1, 13–14.
- Lim, T., 2012. *Durio zibethinus. Edible medicinal and non medicinal plant*. In: *Durio zibethinus. Edible Medicinal and Non Medicinal Plant*. pp. 569–583.
- Mann, C.M., Markham, J.L., 1998. *A new method for determining the minimum inhibitory concentration of essential oils*. J. Appl. Microbiol. 84, 538–544.
- Microbewiki, 2014. *Streptococcus mutans* [WWW Document]. URL https://microbewiki.kenyon.edu/index.php/Streptococcus_mutans (accessed 3.23.21).
- Nurzaman, M., Abadi, S.A., Setiawati, T., Mutaqin, A.Z., 2018. *Characterization of the phytochemical and chlorophyll content as well as the morphology and anatomy of the Rhizophoraceae family in the mangrove forest in Bulaksetra, Pangandaran*. AIP Conf. Proc. 2021.
- Parbuntari, H., Prestica, Y., Gunawan, R., Nurman, M.N., Adella, F., 2018. *Preliminary Phytochemical Screening (Qualitative Analysis) of Cacao Leaves (*Theobroma cacao L.*)*. EKSAKTA Berk. Ilm. Bid. MIPA 19, 40–45.
- Polprasid, 1983. *Artocarpus and Durio*. In: *Southeast Asia Regional Training Course on Characterization and Preliminary Evaluation of Plant Germplasm*. National Corn and Sorghum Research Center.
- Poovarodom, S., Haruenkit, R., Vearasilp, S., Ruamsuke, P., Gorinstein, S., Leontowicz, H., Leontowicz, M., Namiesnik, J., Trakhtenberg, S., 2013. *Nutritional and pharmaceutical applications of bioactive compounds in tropical fruits*. Acta Hortic. 984, 77–86.
- Pratiwi, M., Kawuri, R., Ardhana, I.P., 2019. *Potensi antibakteri limbah kulit durian (*Durio zibethinus Murr.*) terhadap *Propionibacterium acnes**

- penyebab jerawat Antibacterial potency from the waste of durian rind (Durio zibethinus Murr.) against Propionibacterium acnes that causing acne. J. Biol. Udayana 23, 8–15.*
- Rasul, M.G., 2018. *Conventional Extraction Methods Use in Medicinal Plants, their Advantages and Disadvantages*. Int. J. Basic Sci. Appl. Comput. 10–14.
- Rudiyansyah, Panthong, K., Garson, M.J., 2015. *Chemistry and pharmacognosy of the Genus Durio*. Nat. Prod. Commun. 10, 1853–1860.
- Safitri, A.T., Adiratna, N., S., D., Ismail, 2020. *Uji Aktivitas Ekstrak Etanol Kulit Durian (Durio zibethinus Murr.) Terhadap Bakteri Propionibacterium acnes dan Staphylococcus aureus*. J. Farm. Udayana 9, 66.
- Sani, R.N., Nisa, F.C., Andriani, R.D., Maligan, J.M., 2014. *Analisis Rendemen dan Skrining Fitokimia Ekstrak Etanol Mikroalga Laut Tetraselmis chuii*. J. Pangan dan Agroindustri 2, 121–126.
- Siadi, K., 2016. *Ekstrak Bungkil Biji Jarak Pagar Jatropha curcas Sebagai Biopestisida Yang Efektif Dengan Penambahan Larutan NaCl* 39, 98–106.
- Simaremare, E.S., 2014. *Skrining Fitokimia Ekstrak Etanol Daun Gatal (Laportea decumana (Roxb.) Wedd)*. Pharmacy 11, 98–107.
- Sivananthan, M., Elamaran, M., 2013. *In vitro evaluation of antibacterial activity of chloroform extract Andrographis paniculata leaves and roots, Durio zibethinus wood bark and Psidium guajava leaves against selected bacterial strains* Department of Biomedical Science , Faculty of Biomedici 3, 12–19.
- Soegeng-Reksodihardjo, W., 1962. *The species of Durio with edible fruits*. Econ. Bot. 16, 270–282.
- Stahl, E. (Ed.), 2013. *Thin-layer Chromatography: A Laboratory Handbook*. Springer.
- Stoddard, J.M., Nguyen, L., Mata-Chavez, H., Nguyen, K., 2007. *TLC plates as a convenient platform for solvent-free reactions*. Chem. Commun. 3, 1240–1241.
- Syah, A., Ruwanda, R.A., Basid, A., 2019. *Faktor-Faktor Yang Berhubungan Dengan Status Karies Gigi Pada Anak Sekolah Min 1 Kota Banjarmasin*. J. Kesehat. Indones. 9, 149.

- Tan, J.B.L., Lim, Y.Y., 2015. *Critical analysis of current methods for assessing the in vitro antioxidant and antibacterial activity of plant extracts*. Food Chem. 172, 814–822.
- United States Department of Agriculture, 2019. *Dried Durian Monthong* [WWW Document]. Agric. Res. Serv. URL <https://fdc.nal.usda.gov/fdc-app.html#/food-details/453999/nutrients>
- Wiegand, I., Hilpert, K., Hancock, R.E.W., 2008. *Agar and broth dilution methods to determine the minimal inhibitory concentration (MIC) of antimicrobial substances*. Nat. Protoc. 3, 163–175.
- Yoshida, A., Kuramitsu, H.K., 2002. *Multiple Streptococcus mutans genes are involved in biofilm formation*. Appl. Environ. Microbiol. 68, 6283–6291.
- Zainab, S., Abidin, Z., 2008. *Durian (Durio zibethinus)*. Breed. Hortic. Crop.

LAMPIRAN

Lampiran 1. Skema Kerja



Lampiran 2. Komposisi Media

1. Medium Mueller Hinton Broth

<i>Beef infusion</i>	2 g
<i>Acid hydrolysate of casein</i>	17,5 g
<i>Starch</i>	1,5 g
<i>Aquadest</i>	ad 1 L

2. Medium Mueller Hinton Agar

<i>Beef infusion</i>	2 g
<i>Acid hydrolysate of casein</i>	17,5 g
<i>Starch</i>	1,5 g
<i>Agar</i>	17 g
<i>Aquadest</i>	1 L

Lampiran 3. Perhitungan Ekstrak Total Etanol

Bobot Ekstrak – Bobot berat cawan porselen (capor) kosong

$$\begin{aligned}\text{Cawan porselen 1} &= 134,92 \text{ g} - 123,50 \text{ g} \\ &= 11,42 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{Cawan porselen 2} &= 132,27 \text{ g} - 123,50 \text{ g} \\ &= 8,77 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{Cawan porselen 3} &= 131,54 \text{ g} - 123,50 \text{ g} \\ &= 8,04 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{Cawan porselen 4} &= 125,88 \text{ g} - 122,85 \text{ g} \\ &= 3,03 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{Cawan porselen 5} &= 132,12 \text{ g} - 124,40 \text{ g} \\ &= 7,22 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{Cawan porselen 6} &= 128,87 \text{ g} - 125,69 \text{ g} \\ &= 3,18 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{Cawan porselen 7} &= 64,35 \text{ g} - 62,08 \text{ g} \\ &= 2,27 \text{ g}\end{aligned}$$

$$\text{Jumlah ekstrak total} = 43,93 \text{ g}$$

$$\begin{aligned}\% \text{Rendamen} &= \frac{43,93}{600 \text{ g}} \times 100 \% \\ &= 7,321 \%\end{aligned}$$

Lampiran 4. Tabel Hasil Penelitian

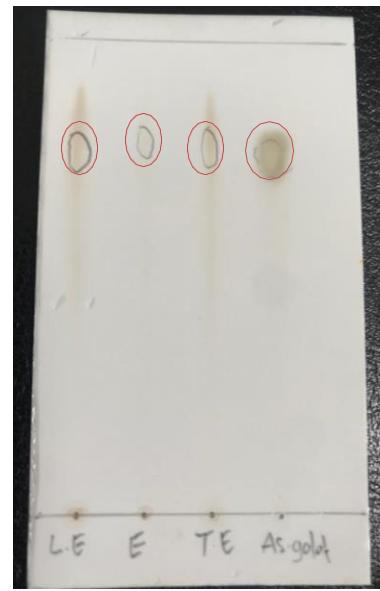
Tabel 4. Hasil penentuan diameter hambat ekstrak etanol, ekstrak etil asetat dan ekstrak tidak larut etil asetat kulit batang durian dengan menggunakan metode difusi padat

Senyawa uji	Diameter Zona Hambat Rata-Rata ± SD Terhadap <i>S. mutans</i> (mm)			
	Cawan	Cawan	Cawan	Rata-Rata ±
	Petri I	Petri II	Petri III	SD
Ekstrak Etanol 10%	11.87	12.57	13.36	12.60 ± 0.74
Fraksi Etil Asetat 10%	7.71	5.53	6.70	6.65 ± 1.08
Fraksi Tidak Larut Etil Asetat 10%	10.4	10.13	10.42	10.31 ± 0.16
Eritromisin	23.32	24.20	25.71	24.41 ± 1.05
DMSO	0	0	0	0

Lampiran 5. Gambar Penelitian



(a)



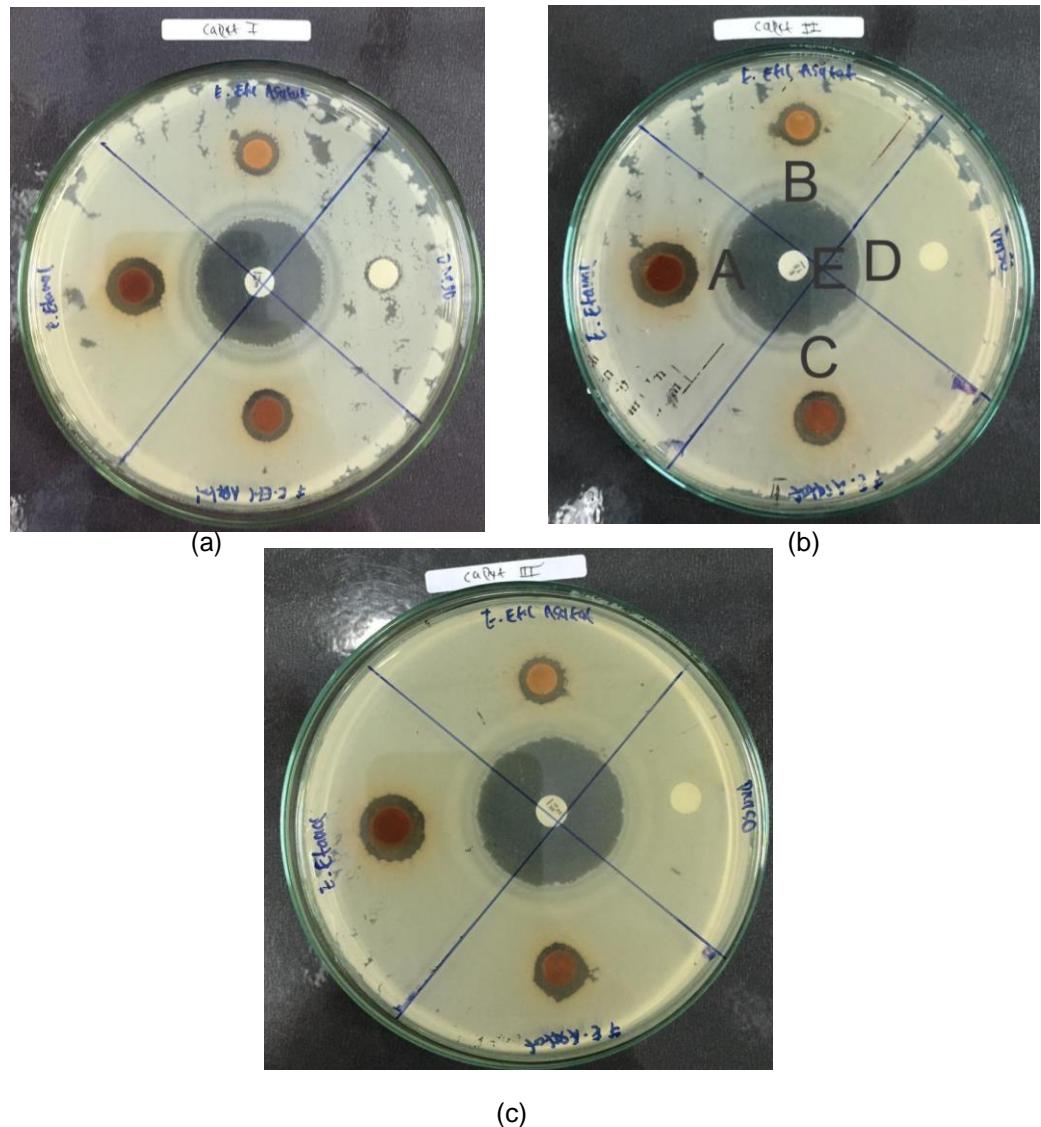
(b)

Gambar 3. Hasil skrining fitokimia (a) flavonoid menggunakan Sitoborat (b) fenolik menggunakan FeCl_3

Keterangan

A = Penampakan bercak dengan pereaksi Sitoborat

B = Penampakan bercak dengan pereaksi FeCl_3



Gambar 4. Hasil uji antibakteri esktrak etanol, ekstrak etil asetat, ekstrak tidak larut etil asetat kulit batang durian menggunakan metode difusi agar terhadap *Streptococcus mutans* (a) replikasi 1 (b) replikasi 2 (c) replikasi 3

Keterangan:

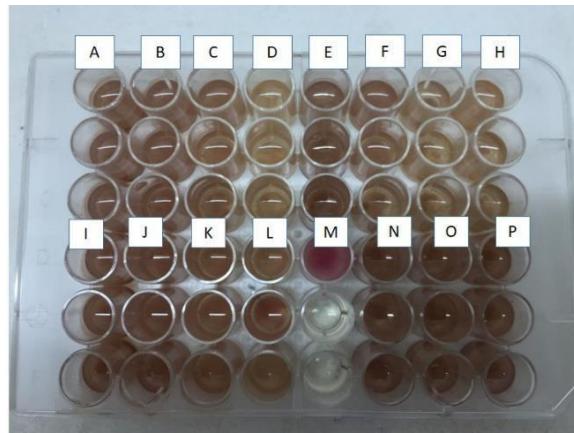
A = Ekstrak Etanol 10%

B = Ekstrak Etil Asetat 10%

C = Ekstrak Tidak Larut Etil Asetat 10%

D = Kontrol Positif (DMSO)

E = Kontrol Negatif (Eritromisin Disk)



Gambar 5 . Hasil uji antibakteri esktrak etanol, ekstrak etil asetat, ekstrak tidak larut etil asetat kulit batang durian menggunakan metode dilusi cair terhadap *Streptococcus mutans*

Keterangan:

- A = Konsentrasi 10% ekstrak etanol
- B = Konsentrasi 5% ekstrak etanol
- C = Konsentrasi 2,5% ekstrak etanol
- D = Konsentrasi 1,25% ekstrak etanol
- E = Konsentrasi 10% ekstrak etil asetat
- F = Konsentrasi 5% ekstrak etil asetat
- G = Konsentrasi 2,5% ekstrak etil asetat
- H = Konsentrasi 1,25% ekstrak etil asetat
- I = Konsentrasi 10% ekstrak tidak larut etil asetat
- J = Konsentrasi 5% ekstrak tidak larut etil asetat
- K = Konsentrasi 2,5% ekstrak tidak larut etil asetat
- L = Konsentrasi 1,25% ekstrak tidak larut etil asetat
- M = Kontrol medium
- N = Kontrol ekstrak etanol (ekstrak 10% + medium)
- O = Kontrol ekstrak etil asetat (ekstrak 10% + medium)
- P = Kontrol ekstrak tidak larut etil asetat (ekstrak 10% + medium)



Gambar 6. Proses pengambilan sampel



Gambar 7. Proses pemotongan sampel



Gambar 8. Proses pencucian sampel



Gambar 9. Simplisia kulit batang durian



Gambar 10. Proses maserasi



Gambar 11. Penguapan pelarut menggunakan rotary evaporator



Gambar 12. Ekstrak pekat



Gambar 13. Ekstrak etanol



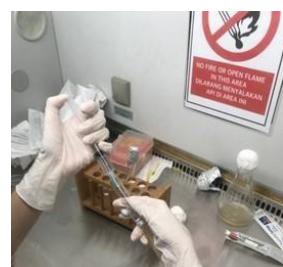
Gambar 14. Ekstrak larut etil asetat



Gambar 15. Ekstrak tidak larut etil asetat



Gambar 16. Proses penggerjaan metode difusi agar



Gambar 17. Proses penggerjaan metode mikrodilusi