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Faculty of Education
University of Pahlawan Tuanku Tambusai
ISSN 2775-771X (Online)
ISSN 2962-570X **(Printed)**
5 (2) 2025, Page: 12906-12914

Anti-Fungal Activity Test Of Cardamom (*Amomum Cardamomum L.*) Leaf Ethyl Acetate Fraction Against *Candida Albicans* And *Pityrosporum Ovale*

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Published: July , 2025

ABSTRACT

Cardamom leaves (Amomum cardamomum (L.) Cardamom is a plant that is commonly used as a cooking spice and is also believed to have properties for treating various diseases, one of which is disease caused by fungi. The aim of this research is to determine the antifungal activity of ethanol extract of cardamom leaves against fungi Candida albicans and Pythyrovorum ovale to determine the effective inhibitory concentration of the ethanol extract of kitolod leaves in inhibiting it as an antifungal. The samples were extracted by the maceration method using 96% ethanol solvent. The antifungal activity test was carried out by the agar diffusion method using a paper backer. This experiment consisted of three times Mixtures with respective concentrations of 20%, 40%, 80%, DMSO 10% as a negative control and Ketoconazole as a positive control. The results of the antifungal activity test showed that the ethanol extract of cardamom leaves was against Candida albicans fungi with concentrations of 20%, 40%, 80%. % respectively had an inhibition zone of (16.67 mm), (16.77 mm), (18.09 mm), positive control ketoconazole (21.40 mm), negative control 10% DMSO (0 mm). Meanwhile, the fungus Pythyrovorum ovale with concentrations of 20%, 40%, 80% respectively had an inhibition zone of (13.78 mm), (14.35 mm), (16.18 mm), positive control ketoconazole (19.86 mm), 10% DMSO negative control (0 mm). The results of the study showed that the ethanol extract of cardamom leaves had antifungal activity against Candida albicans and Pythyrovorum ovale.

Keywords: *Candida albican, Pythyrovorum ovale, Antifungal,*

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INTRODUCTION

Noni is a tropical medicinal plant belonging to the Rubiaceae (coffee) family that has been used by humans since ancient times. The noni plant (Morinda citrifolia L.) can be utilized from its fruit, leaves, seeds, and roots. Empirically, noni leaves are used as compresses to heal skin wounds and reduce pain. In some areas, an infusion of the leaves is consumed as a treatment and analgesic (Zaky, 2023).

Traditionally, fresh noni leaves are used medicinally for broken bones, deep cuts, burns, and pain. Noni contains substances that can accelerate the wound healing process, including: proxeronine (cell regeneration and hormonal balance), scopoletin (antibacterial and anti-inflammatory), anthraquinones (antibacterial), phytonutrients and selenium (antioxidants), essential amino acids, vitamin C and vitamin A, flavonoids (flavonoid glycosides), terpenoids, xeronine, acubin, L-asperuloside, and alizarin (Parmadi, 2019).

Noni leaves contain compounds widely reported to have antibacterial activity. The compounds found in noni leaves that have antibacterial effects include alkaloids, saponins, tannins, steroids, flavonoids, polyphenols, and quinones. These compounds can inhibit the growth of bacteria in the body (Zahra, 2022).

Based on previous research conducted by Erina et al. (2009), it was reported that the antibacterial activity test of ethanol extract of noni leaves (Morinda citrifolia L.) provided an inhibition zone of 6.35 on Staphylococcus aureus bacteria. Meanwhile, research conducted by Claudya (2023) stated that the antibacterial activity of ethanol extract gel of noni leaves (Morinda citrifolia L.) provided an inhibition zone on Staphylococcus aureus bacteria. Staphylococcus epidermidis was 10.9 mm. Its growth inhibition against Staphylococcus epidermidis was moderate, and against Staphylococcus aureus it was weak.

Based on the above background, the researchers wanted to test the antibacterial activity of a patch preparation containing ethanol extract of Morinda citrifolia L. leaves using the inhibition zone against Staphylococcus aureus and Staphylococcus epidermidis.

MATERIALS AND METHODS

Population and Sample

The population of this study was all noni leaves obtained from Tanjungbalai City. The samples used in this study were noni leaves obtained from Tanjungbalai City.

The materials used in this study were distilled water, hydrochloric acid (HCL), Bouchardart, 1% iron (III) chloride (FeCl3), Dragendorff, 96% ethanol, glycerin, hydroxypropyl methylcellulose (HPMC), Meyer's Muller Hinton agar (MHA), nutrient agar (NA), sodium chloride (0.9% NaCl), polyvinylpyrrolidone (PVP), 10% povidone-iodine, propylene glycol, and magnesium powder.

Acyivity Test and Statistical analysis

Antibacterial activity testing was conducted using the Kirby Bauer disc diffusion technique. First, MHA media was placed in a petri dish and allowed to harden or solidify. Afterward, bacteria were evenly distributed over the MHA media using a 100-microliter micropipette. Patches containing three formulas of ethanol extract from Morinda citrifolia L. leaves, 10% povidone-iodine as a positive control, and a patch without ethanol extract from Morinda citrifolia L. leaves as a negative control were prepared. The patches were then molded with a 6 mm diameter mold and placed on agar media. Incubation was carried out at 37°C for 24 hours in an incubator. The diameter of the inhibition zone against Staphylococcus epidermidis bacteria was visually observed and measured using a vernier caliper (Rundengan, 2017). Data were analyzed using Analysis of Variance (ANOVA) using SPSS.

RESULTS

In the manufacture of a transdermal noni leaf patch (Morinda citrifolia L.), a formulation with HPMC (Hydroxypropyl methylcellulose) and PVP (Polyvylnyl pyrrolidone) is used. HPMC has better swelling characteristics than other polymers, allowing it to release the drug from the matrix relatively quickly, while PVP can enhance drug release due to pore formation and prevent crystallization in the drug matrix. Propylene glycol acts as a plasticizer and preservative and has a milder irritant effect. In addition, propylene glycol has antiseptic properties, glycerin acts as a penetration enhancer due to its ability to remove bound water from the stratum corneum or improve drug delivery, and distilled water acts as a solvent or carrier (Kalsum, 2023).

In the manufacture of this patch, noni leaf extract is used as the active ingredient. This patch preparation was made with four formulas, each with a different active ingredient concentration: F0 with no active ingredient concentration, F1 with a 5% active ingredient concentration, F2 with a 10% active ingredient concentration, and F3 with a 15% active ingredient concentration.

Testing the antibacterial activity of the noni leaf ethanol extract patch preparation against Staphylococcus aureus demonstrated that the preparation could inhibit the growth of the bacteria. This was evidenced by the formation of an inhibition zone around the paper disc. The inhibition zone formed was a clear area around the paper disc; this area was clear because it was not accessible to bacteria.

This study used an agar diffusion method using paper discs and test bacteria, Staphylococcus aureus, at extract concentrations of 5%, 10%, and 15%. The average inhibition zone was obtained at each concentration. At the 5% concentration, the inhibition zone was 2.58 mm, at the 10% concentration, it was 2.35 mm, and at the 15% concentration, it was 2.41 mm.

For Staphylococcus epidermidis bacteria tested at 5%, 10%, and 15% extract concentrations, an average inhibition zone was obtained at each concentration. At 5%, the inhibition zone was 1.46 mm, at 10%, it was 2.28 mm, and at 15%, it was 3.33 mm. The higher the concentration of noni leaf ethanol extract, the larger the inhibition zone diameter. This is due to the higher levels of active compounds (secondary metabolites) that can inhibit the antibacterial activity contained in the noni leaf ethanol extract.

The purpose of varying the extract concentrations in noni leaves was to compare the antibacterial activity of each extract concentration against Staphylococcus aureus and Staphylococcus epidermidis bacteria. Each treatment group was tested three times. This repetition was done to generate accurate data due to the treatment factor.

Based on previous research conducted by Erina (2019) on the Antibacterial Activity Test on Noni Leaves, it also showed antibacterial activity against the test bacteria. The

bacteria used in this study, Staphylococcus aureus, had inhibitory capacities of 6.35 mm, 6.73 mm, and 6.86 mm, categorized as having weak inhibitory capacity (Erina, 2019).

Furthermore, Claudya's (2023) study on the Antibacterial Activity Test on Staphylococcus epidermidis also showed antibacterial activity against Staphylococcus epidermidis, with inhibitory capacities of 8 mm and 10.9 mm, categorized as having weak inhibitory capacity (Claudya, 2023).

Based on the results of research conducted on the test bacteria Staphylococcus aureus and Staphylococcus epidermidis, it can be concluded that the preparation of noni leaf ethanol extract patch at a concentration of 5%, 10% and 15% has a weak category of inhibitory power, this can be seen from the average inhibition zone obtained ranging from 1.46 - 3.33 mm and the preparation of noni leaf ethanol extract patch has a smaller inhibition zone compared to 10% Povidone iodine which is used as a positive control while the preparation without extract used as a negative control does not have inhibitory power as an antibacterial. The results of the first ANOVA test table data on the diameter of the inhibition zone in Staphylococcus aureus and Staphylococcus epidermidis bacteria with the One Way Anova test showed a p value <0.05, so it can be concluded that the hypothesis is proven correct, that there is antibacterial activity of the ethanol extract patch preparation of noni leaves (Morinda citrifolia L.) in inhibiting Staphylococcus aureus and Staphylococcus epidermidis bacteria.

CONCLUSIONS

Based the research conducted, it can be concluded that:

1. The ethanol extract patch preparation of noni leaves (Morinda citrifolia L.) has antibacterial activity against Staphylococcus aureus and Staphylococcus epidermidis bacteria.
2. The antibacterial activity test results of the ethanol extract patch preparation of noni leaves, Formula 3, showed greater inhibitory activity against Staphylococcus epidermidis bacteria.
3. The secondary metabolites found in the ethanol extract of noni leaves are alkaloids, tannins, saponins, flavonoids, and steroids.

SUGGESTIONS

It is recommended that future researchers make patch preparations with different formulations.

REFERENCES

Abnaz, Z.Dzakirah, dan Levita, Jutti. (2018). Review: Buah Mnegkudu (Morinda citrifolia L.) dan Biji Jinten Hitam (Nigella sativa L.) dan Teori Uji Toksisitas. Bandung: *Jurnal Farmaka Suplemen*. Vol 16(1). Halaman: 297-298.

Ahmad, F.Fitriani. (2022). Formulasi dan Uji Aktivitas Antibakteri Sediaan Obat Kumur Ekstrak Etanol Daun Mengkudu (*Morinda Citrifolia L.*) Terhadap Bakteri *Streptococcus mutans*. Makasar: *PAPS JOURNALS*. Vol 1(2). Halaman: 62-63.

Airlangga, B.Gareda., Naela, F., Siti, N.C. (2021). Pengaruh Estrak *Morinda Citrifolia L*. Terhadap Penyembuhan Luka Insisi Penelitian Ditinjau Dari Kolagen Pada Tikus Jantan Galur Wistar. Semarang: *Medicomplementary Journal*. Vol 1(1). Halaman: 1.

Andriani, Rina., dkk. (2021). Pemanfaatan Etosom Sebagai Bentuk Sediaan Patch. Kendari: *Jurnal Farmasains*. Vol 8(1). Halaman: 45-46.

Asri, Halisa., Albertus, A.A., Naela, F. (2021). Efektivitas Pemberian Topikal Salep Ekstrak Buah Mengkudu Dengan Konsentrasi Bertingkat Terhadap Jumlah Fibroblas (Penelitian pada Tikus Putih Jantan Galur Wistar yang Dibuat Luka Sayat). Semarang: *Medicomplementary Journal*. Vol 1(1). Halaman: 7-8.

Asrizal., Wirda.F., Sri.W. (2022). *Buku Ajar Manajemen Perawatan Luka, Teori Dan Aplikasi*. Sleman: Budi Utama. Halaman: 1-44.

Awaluddin, dkk. (2022). Formulasi Sediaan Patch Ekstrak Etanol Belimbing Wuluh (*Averrhoa bilimbi*) Sebagai Antipiretik terhadap Tikus (*Rattus novergicus*). Makassar: *Jurnal Penelitian Kesehatan Suara Forikes*. Vol 13(1). Halaman: 156-157.

Claudya., R.Meutia., Yolanda, E.P.Lubisa. (2023). Aktivitas Gel Ekstrak Daun Mengkudu (*Morinda citrifolia*) Terhadap Pertumbuhan Bakteri Penyebab Jerawat *Staphylococcus epidermidis*. Medan: *Journal Of Pharmaceutical And Science*. Vol 6(4). Halaman: 1651-1652.

Dirjen RI. (2017). *Farmakope Herbal Indonesia Edisi II*. Jakarta: Kementrian Kesehatan RI.

Dalimartha, Setiawan. (2006). *Atlas Tumbuhan Obat Indonesia*. Jilid 4. Jakarta: Puspa Swara. Halaman: 57.

Dalimunthe, C.Indriani. (2017). Prospek Pemanfaatan Metabolit Sekunder Tumbuhan Sebagai Pestisida Nabati Untuk Pengendalian Patogen Pada Tanaman Karet. Medan: *Jurnal Warta Perkaretan*. Vol 36(1). Halaman: 17.

Erina, dkk. (2019). Uji Daya Hambat Ekstrak Etanol Daun Mengkudu (*Morinda Citrifolia L.*) Terhadap Pertumbuhan *Staphylococcus aureus*. Aceh: *JIMVET Journal*. Vol 3(3). Halaman: 166.

Ditjen POM. (1995). *Materia Medika Indonesia*, Jilid VI. Departemen Kesehatan Republik Inonesia. Jakarta. Halaman: 321-326, 333-337.

Dwijoseputro, D. (1990). *Dasar-Dasar Mikrobiologi*. Jakarta: Djambatan. Halaman: 22.

Fuziyanti, Nova., dkk. (2022). Pengaruh Kombinasi Polimer dan HPMC:EC Terhadap Sediaan Trandermal Pada Karakteristik Patch yang Baik : Review. Garut: *Pharmaceutical Journal Of Indonesia*. Vol 7(2). Halaman: 148.

Gaman, P.M., dan Sherrington, K.B. (1992). *Ilmu Pangan. Edisi Kedua*. Yogyakarta: Gadjah Mada University Press. Halaman: 232.

Hayati, L.Nur., dkk. (2019). Isolasi dan Identifikasi *Staphylococcus aureus* pada Susu Kambing Peranakan Etawah Penderita Masitis Subklinis di Kelurahan Kalipuro, Banyuwangi. Surabaya: *Jurnal Medik Veteriner*. Vol 2(2). Halaman: 79.

Herliana, Esri. (2013). *Penyakit Asam Urat Kandas Berkat*. Jakarta: FMedia: Halaman: 72.

Hadyprana, Selline. (2021). Uji Daya Hambat Ekstrak Jahe Putih (*Zingiber officinale var. Amarum*) terhadap Pertumbuhan *Pseudomonas aeruginosa* dan *Candida albicans* secara In Vitro. Jakarta: *Biological Science and Education Journal*. Vol 1(2). Halaman: 143.

Hidayat, R.S., dan Napitupulu, Rodame.M. (2015). *Kitab Tumbuhan Obat*. Jakarta: AgriFlo. Halaman: 272.

Hijriyati, F. (2017). Uji Cemaran Bakteriologis Pada Saus Jajanan Bakso Bakar di Lingkungan Sekolah Dasar (SD) Kecamatan Medan Belawan. Medan: Universitas Medan Area. Halaman: 12.

Imelia, W., dkk. (2018). Uji Perbandingan Antibakteri Antara Ekstrak Daun Mangkok (*Nothopanax scutellarium*) dengan Antibiotik Ciprofloxancin Terhadap *Staphylococcus aureus*. Medan: *Scientia Journal*. Vol 7(2): 178.

Iswanto, Hadi. (2016). *Mengebunkan Mengkudu Secara Intensif*. Bogor: AgroMedia. Halaman: 6.

Jawetz, E., Melnick, J. L. dan Adelberg, E. D. 2010. *Mikrobiologi Kedokteran Edisi 25*. Jakarta : EGC.

Kalsum, Umi., Susanti, E., Rina, N. (2023). Uji Efektivitas Sediaan Transdermal Patch Ekstrak Daun Beluntas (*Pluchea indica L.*) Terhadap Luka Sayat Pada Mencit Putih (*Mus musculus*). *Madiun: e-ISSN*: 2964-674X. Halaman: 185-186.

Lestari, H. Dwiya., dan Maharani, T.A. (2021). Aktivitas Antibakteri Ekstrak Buah Kakao (*Theobroma cacao L.*) Terhadap *Staphylococcus epidermidis*. Surabaya: Jurnal Lentera Bio. Vol 10(3). Halaman: 303.

Maddepungeng, N.Muhlisah, dkk. (2023). Formulasi dan Evaluasi Dermal Patch Ekstrak Metanol Rimpang Lempuyang Gajah (*Zingibe zerumbet L.*) Sebagai Antibakteri Terhadap Bakteri *Staphylococcus aureus* Secara In Vitro dan In Vivo. Makassar: *Journal Mandala Pharmacom Indonesia*. Vol 9(2). Halaman: 624-625.

Maulida, Helni. (2018). *Uji Efek Antibakteri Ekstrak Etanol Daun Kemangi (Ocimum Tenuiforum) Terhadap Pertumbuhan Baktteri Staphylococcus aureus*. Medan: Politeknik Kesehatan Medan. Halaman: 8-9.

Mayaserli, D.Putri, dan Shinta, D.Yudiana. (2021). Uji Daya Hambat Dan Daya Bunuh Ekstrak Buah Mengkudu (*Morinda Citrifolia Linn*) Terhadap Pertumbuhan Bakteri *Staphylococcus Aureus*. Padang: *Jurnal Kesehatan Perintis*. Vol 8(1). Halaman: 68-70.

Nurul, dkk. (2023). Uji Mikrobiologi. Sukoharjo: *Jurnal Farmasi*. Vol 12(2). Halaman: 32-34.

Namvar, A.E., Bastarahang, S., Abbasi, N., Ghehi, G.S., Farhadbakhtiarian, S., Arezi, P., Hosseini, M., Baravati, S.Z., Jokar, Z., Chermahin, S.G. 2014. Clinical characteristics of *Staphylococcus epidermidis*: a systematic review. GMS Hygiene and Infection Control 2014, Vol. 9(3).

Nitiariksa, Nia., Sukmawati. (2021). Pengembangan Dan Evaluasi Formula Sediaan Patch Ekstrak Daun Binahong (*Anredera cordifolia (Tenore) Steenis*). Kuningan: *Journal of Pharmacopolium*. Vol 4(2). Halaman: 83.

Parmadi, A., Rejeki, S., Hastuti, Siwi. (2019). Efektivitas dan Uji Evaluasi Sediaan Krim Ekstrak Etanol Daun Mengkudu (*Morinda citrifolia L*) Sebagai Obat Penyembuh Luka. Sukoharjo: *Indonesian Journal On Medical Science*. Vol 6(1). Halaman: 38-40.

Pertiwi, F. Desmak. (2022). Uji Aktivitas dan Formulasi Sediaan Liquid Body Wash Dari Ekstrak Etanol Bunga Telang (*Clitoria Ternatea L*) Sebagai Antibakteri *Staphylococcus epidermidis*. Banten: *Jurnal Ilmiah Kedokteran dan Kesehatan*. Vol 1(1). Halaman: 66.

Putri, E.M.Eka, dkk. (2023). Uji Aktivitas Antibakteri Ekstrak Etanol Daun Mengkudu (*Morida citrifolia L.*) Terhadap Pertumbuhan Bakteri *Pseudomonas aeruginosa*. Medan: *Sikontan Journal*. Vol 2(2). Halaman: 260.

Prasetyo, Entang.I. (2013). *Pengolaan Budidaya Tanaman Obat*. Bengkulu: Fakultas Pertanian UNIB. Halaman: 17-19.

Priamsari, M.Retno, dan Yuniawati, N.A. (2019). Skrining Fitokimia dan Aktivitas Penyembuhan Luka Bakar Ekstrak Etanolik *Morinda citrifolia L.* pada Kulit Kelinci (*Oryctolagus Cuniculus*). Semarang: *Journal of Pharmacy*. Vol 8(1). Halaman: 23-25.

Pringgandini, L.Ayu., dkk. (2018). Efektivitas spray nanokolagen limbah sisik ikan mas (*Cyprinus carpio*) untuk mempercepat proses penyembuhan luka insisi. Surakarta: *Jurnal Kedokteran Gigi Unpad*. Vol 30(2). Halaman: 114-116.

Rachmawaty, D.U. (2016). Uji Aktivitas Antibakteri Ekstrak Etanol, Etil Asetat dan Petroleum Eter Rambut Jagung Manis (*Zea mays ssacharta Sturt*) Terhadap Bakteri *Staphylococcus aureus* dan *Escherichia coli*. Malang: *Journal of Chemistry*. Vol 5(4). Halaman: 132-137.

Riadi, S., Roswandi, I., Kurnia, T.E., dan Ff, I.R. (2021). Analisa Pengaruh Penambahan Polydon Terhadap Ketahanan Fisik Dan Perbedaan Kualitas Supplier. Jakarta: *Jurnal Teknologi UMJ*, 13(2), 179–192.

Radji M. (2011). *Buku Ajar Mikrobiologi Panduan Mahasiswa Farmasi dan Kedokteran*. Jakarta, Buku Kedokteran EGC. 2011; 107, 118, 201-207, 295.

Rosmania, dan Yanti.F. (2022). Perhitungan Jumlah Bakteri di Laboratorium Mikrobiologi Menggunakan Pengembangan Metode Spektrofotometri. Palembang: *Jurnal Penelitian Sains*. Vol 22(2). Halaman: 77-79.

Rukmana, Rahmat, dan Yudirachman, Herdi. (2016). *Budi Daya dan Pascapanen Tanaman Obat Unggulan*. Yogyakarta: Lily Publisher. Halaman: 292.

Rundengan, Caesar.H., dkk. (2017). Uji Daya Hambat Ekstrak Etanol Biji Pinang Yaki (Areca vestiaria) Terhadap Bakteri *Staphylococcus aureus, Escherichia coli*, *Pseudomonas aeruginosa*. Manado: *Jurnal Ilmiah Farmasi*. Vol 6(1). Halaman: 39-40.

Sobari, Enceng. (2022). Menentukan Nilai Rendemen Pada Proses Ekstraksi Daun Murbei (Morus alba L.) Dengan Pelarut Berbeda. Subang: *Jurnal Ilmiah Ilmu dan Teknologi Rekayasa*. Vol 4(2). Halaman: 38.

Siregar, S. (2015). Metode penelitian kuantitatif: dilengkapi dengan perbandingan perhitungan manual & spss.

Simatupang, Olivia.C. (2017). Uji Daya Hambat Ekstrak Daun Mengkudu (Morinda citrifolia L.) Terhadap Pertumbuhan Candida Albicans secara in vitro. Manado: *Jurnal e-GiGi (eG)*. Vol 5(1). Halaman: 3.

Sabillah, Vany.S., Rini. D.A.Lubis. (2022). Pemberdayaan Masyarakat Melalui Demosntrasi Pembuatan Basreng Berbahan Dasar Ikan Tamban (Spratelloides Gracillis) Didesa Bogak Besar. Medan: MARTABE : *Jurnal Pengabdian Masyarakat*. Vol 5(6). Halaman: 2202.

Safaruddin, dkk. (2022). Uji Efektivitas Patch Transdermal Ekstrak Etanol Kulit Batang Kayu Jawa (*Lannea Coromandelica (Houtt.) Merr*) Terhadap Luka Sayat Pada Tikus Putih Jantan

(*Rattus Norvegicus*). Makassar: *Jurnal Multidisiplin Madani (MUDIMA)*. Vol 2(2). Halaman: 1003-1009.

Sudarwati, T.P.Sudarwati., M.A.Hanny.F.F. (2019). *Aplikasi Pemanfaatan Daun Pepaya (Carica papaya) Sebagai Biolarvasisa Terhadap Larva Aedes aegypti*. Kota Baru Driyorejo : Graniti. Halaman: 20-24.

Susanto, Awaluddin., dan Khanifah, F. (2023). Potensi Bawang Merah (*Allium cepa L*) Sebagai Daya Hambat Bakteri *Pseudomonas aeruginosa*. Jombang: *Jurnal Sintesis*. Vol 4(1). Halaman: 83.

Urip. (2022). Potensi Tepung Biji Kecipir (*Psophocarpus tetragonolobus*) Sebagai Bahan Alternatif Sumber Nitrogen Dalam Media Mannitol Salt Agar (MSA) Untuk Pertumbuhan *Staphylococcus aureus*. Mataram: *Jurnal Ilmiah Biologi*. Vol 10(2). Halaman: 1175.

Wardani, V.Kurnia. (2021). Formulasi Transdermal Patch Ekstrak Etanol Biji Pepaya (*Carica papaya L.*) Dengan Basis *Hydroxypropil Metilcellulose* (HPMC). Surakarta: *Smart Medical Journal*. Vol 4(1). Halaman: 39.

Warsiti. (2018). Uji Aktivitas Antibakteri Ekstrak Etanol Bawamg Dayak (*Eleutherine palmifolia (L.) Merr*) Terhadap Bakteri *Staphylococcus aureus*. Surakarta: *Jurnal Farmasi Indonesia*. Vol 15(2). Halaman: 75.

Yonanda, Rizky Cici. Wahyuni, Dwi. Murdiyah, Siti. 2016. Pengaruh Ekstrak Etanol Daun Belimbing wuluh (*Averrhoa blimbi Linn.*) Terhadap Daya Hambat *Staphylococcus epiderimidis*. Prosiding Seminar Nasional Biologi II. Jember: Universitas Jember.

Zahra, A.Izzatul. (2022). Daya Hambat Ekstrak Duan Mengkudu (*Morinda citrifolia L.*) Terhadap Pertumbuhan Bakteri *Bacillus cereus*. Aceh: *Jurnal Ilmiah Universitas Batanghari Jambi*. Vol 22(3). Halaman: 1460-1461.

Zaky, Mohammad., Junaidin., Yulyianti, R. (2023). Potensi Krim Ekstrak Etanol Daun Mengkudu (*Morinda citrifolia L.*) Terhadap *Staphylococcus aureus*. Tangerang: *Journal of Pharmacopolium*. Vol 6(1). Halaman: 1-5.