

Antibacterial Potential of Spondias pinnata (L.f) kurz Leaf Ethanol Extract against Streptococcus mutans Bacterial Growth

by I Gusti Agung Ayu Dharmawati, Nur Habibah I Gusti Agung Ayu Putu Swastini, Heri Setiyo

Submission date: 15-Mar-2023 09:22PM (UTC+0700)

Submission ID: 2037793703

File name: 4,ANTIBACTERIAL_POTENTIAL.pdf (300.32K)

Word count: 2632

Character count: 13776

Antibacterial Potential of *Spondias pinnata* (L.f) kurz Leaf Ethanol Extract against *Streptococcus mutans* Bacterial Growth

I Gusti Agung Ayu Dharmawati^{1,2}, Nur Habibah¹,
I Gusti Agung Ayu Putu Swastini¹ and Heri Setiyo Bekti^{1,2*}

¹Medical Laboratory Technologist, Polytechnic of Health Denpasar, Bali, Indonesia.

²Center of Excellence in Science and Technology, Polytechnic of Health Denpasar, Bali, Indonesia.

*Corresponding Author E-mail:herisetiyo7@gmail.com

<https://dx.doi.org/10.13005/bpj/2502>

(Received: 26 May 2022; accepted: 27 June 2022)

Wild mango (*Spondias pinnata* (L.f) kurz) or Cemcem or Kecemcem is one of the famous plants in Bali. It is widely used by Balinese as both food and traditional medicine. Several study has shown that *S. pinnata* leaf extract has antibacterial activity against several Gram-positive and Gram-negative bacteria. *S. mutans* is a Gram-positive bacteria that causes dental caries. In Indonesia, the prevalence of dental caries is 88.8% and most suffered by toddlers. The purpose of this study was to determine the effect of ethanol extract of *S. pinnata* leaves in inhibiting the growth of *S. mutans*. Inhibition zone test was carried out using the diffuse disc method with two extract concentrations of 60% and 80%, respectively. From the results, it was found that the inhibition zone of 60% concentration was 12.95 mm and 80% concentration was 15.77 mm. Both fall into the category of strong inhibition zones. Based on this, the ethanol extract of *S. pinnata* leaves can be used as a natural antibacterial agent.

Keywords: Antibacterial Activity; Ethanol Extract; *Spondias pinnata*; *Streptococcus mutans*.

Wild mango (*Spondias pinnata* (L.f) kurz) or Cemcem or Kecemcem is one of the famous plants in Bali. This plant has many benefit and it is widely used by Balinese as both food and traditional medicine for generations. "Loloh cemcem" is a traditional drink from Bali. It is made from cemcem (*S. pinnata*) leaves¹. Roots, bark, fruit, and leaves can be used in traditional medicine². *S. pinnata* is widely used by Balinese people as a medicine for fever and toothache. The pharmacological effects of *S. pinnata* are also used as food flavoring, antimicrobial, and anti-tuberculosis^{3,4}.

extract concentrations of 20%, 40%, and 60% to inhibit the growth of *S. aureus*, *E. coli*, and *S. typhi* showed significant differences in the average inhibition power ($p < 0.05$) in all treatment, as well as the positive and negative controls⁵. Research conducted by Sudirga (2020) states that the *S. pinnata* plant is one of the traditional medicinal plants that has been used for generations by the people of the Trunyan Village. This plant has efficacy as a medicine for fever and toothache by using the leaves and sap from the *S. pinnata* which contains alkaloids, citric acid, and Ca-oxalate⁶.

Dental and oral health is often neglected by Indonesian people. The low awareness of maintaining dental and oral health is one of the

causes of dental and oral disease in Indonesian society. The results of the 2018 Basic Health Study (Riskesdas) showed that 57.6% of the Indonesian population experienced dental and oral problems and only about 10.2% received medical services. The largest proportion of dental problems in Indonesia is dental caries at 88.8% with the most sufferers being children under five⁷.

Dental caries is an infection of the teeth caused by *Streptococcus mutans* bacteria which causes demineralization of the tissue, causing localized damage to the tissue. The main habitat of *S. mutans* is the mouth, pharynx, and intestines. Dental caries has several factors such as adhesion to the enamel surface, production of acidic metabolites, ability to build glycogen, and to synthesize extracellular polysaccharides⁸.

Seeing the phenomenon of dental caries caused by the influence of the proliferation of *S. mutans* contained in dental plaque, so the researcher wanted to examine the quality and antibacterial inhibition of the ethanol extract of *S. pinnata* leaves on the growth of bacteria that cause plaque formation. As well all known that dental plaque is the initial source of dental and oral disease.

MATERIAL AND METHODS

Preparation of *S. pinnata* Leaves

S. pinnata leaves are dried at 50°C for 15 hours, then ground with a blender machine to fine powder. The obtained *S. pinnata* leaf powder is then used in the extraction process.

S. pinnata Leaves Extraction Process

Extraction is performed by weighing 300 g of dried leaves, which are then dissolved in 96% ethanol up to 4500 ml. In addition, agitation and extraction were performed for 15 minutes using a microwave with a power of 450 watts. The obtained extract was filtered with Whatman Paper number 1. The obtained filtrate was concentrated in the rotary evaporator vacuum at 30°C.

In this study, the concentrations of the ethanol extract of *S. pinnata* leaves used were 60% and 80%, respectively. There are 4 treatments in this study. A negative control which is given treatment by giving ethanol solvent. A positive control that was treated with 2% chlorhexidine. Six times replication were conducted for high

accuracy. P1 was treated with ethanol extract of *S. pinnata* leaves with a concentration of 60%. P2 is a treatment with ethanol extract of *S. pinnata* leaves with a concentration of 80%.

Culture of *S. mutans*

Bacterial strains used were *S. mutans* ATCC. *S. mutans* were cultured into BHI-A with vitamin K. The agar media was made by 10 µl vitamin K, 50 µl hemin solution, BHI-A 37 g in 100 ml sterile distilled water and 500 µl yeast extract. One bacteria used from the ATCC bacterial stock and was inoculated, then incubated at 37°C for 24 h.

Preparing the *S. mutans* bacteria suspension

S. mutans suspension was made by incorporating one colony of *S. mutans* from BHI-A into liquid media with total volume of 10 ml containing 0.37 g BHI-B, 5 µl hemin, 1 µl vitamin K, and 50 µl yeast extract. Then the suspension was incubated for 24 h, and the concentration was measured to obtain turbidity equivalent to 1.5×10^6 CFU/ml.

Inhibition test of *S. mutans*

For antibacterial activity, the disc diffusion method was used. The *S. mutans* suspension was swabbed on the entire MH agar surface. The paper discs containing different concentrations of *S. pinnata* ethanol extract 60% and 80% respectively were placed on the agar surface. Then incubated at 37°C for 24 h.

The area without visible bacterial growth or clear zone around each disc was observed. The diameter of the clear zone was measured using a calliper.

Statistical analysis

The data obtained were analyzed for diversity with the One Way Anova test.

RESULTS AND DISCUSSION

The activity of *S. pinnata* leaves ethanol extract in inhibiting the growth of *S. mutans*, the One Way Anova test was used. The significance analysis are presented in Table 1.

Table 2 shows that the average inhibition of the control positive against *S. mutans* was 20.38 ± 0.12 . The inhibitory power of P2 was 15.77 ± 0.13 and the P1 was 12.95 ± 0.17 . Based on the results of the analysis using the One Way Anova test, it was shown that there was a significant

difference between the three groups ($p < 0.05$).

Graph 1 shows that there is a significant difference in the average inhibition zone between the three treatment groups.

The antibacterial test results of the ethanol extract of *S. pinnata* leaves against *S. mutans* showed a significantly different mean of inhibition zone ($p < 0.05$) between the ethanol extract of *S. pinnata* leaves 60%, 80%, and positive control (using chlorhexidine 2%). The diameter of inhibitory zone showed the increase in the average according to the increase in concentration. The average diameter of the inhibitory zone at concentration of 60% was 12.95 mm and a concentration of 80% was 15.77 mm. Pan et al (2009) claimed that the category of inhibition with an inhibitory diameter of 0 to 3 mm was classified as weak, while an inhibitory diameter of 3 to 6 mm was classified in the medium category, and an inhibition diameter greater than 6 mm was classified in the string category⁹.

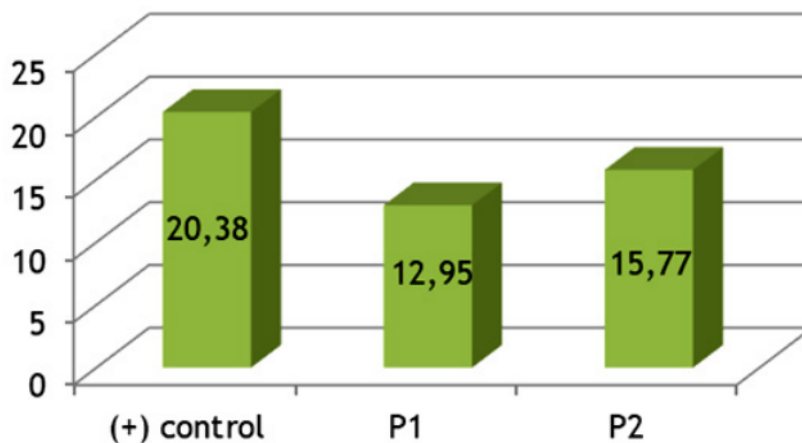
The results of this study are in line with research conducted by Wulansari et al., (2018)

on the effectiveness of *S. pinnata* leaves extract to inhibit the growth of *S. aureus*, *E. coli*, and *S. typhi* bacteria. From the results of this study it was proven that there was a significant inhibition of bacterial growth⁵. Asnani et al. (2017) suggested that the ethanol extract of *S. pinnata* leaves contains steroids, flavonoids, tannins, and saponins is able to inhibit the growth of *S. aureus*, *K. pneumonia*, *M. morgani*, and *P. aeruginosa*¹⁰.

The content of phenolic compounds, flavonoids, saponins, and tannins in *S. pinnata* leaves extract will form a complex on the bacterial cell wall which causes inhibition and death of bacterial cells^{5,11-13}. Flavonoids are responsible for the observed antimicrobial activity. Flavonoids are a group of promising bioactive substances with low systemic toxicity. The leaves and stems are rich in flavonoids. The study by Adamczak et al. (2020) demonstrated moderate antibacterial properties of flavonoids against clinical strains of *E. coli* and *P. aeruginosa*¹⁴. Some studies identified that the antibacterial mechanism of flavonoids are inhibiting nucleic acid synthesis,

Table 1. The Differences in Bacterial Inhibition Zone between Groups after Treatment

Variable	Groups	n	Average±SD	p
<i>S. mutans</i>	Positive control	6	20.38±0.12	<0.001
	P1	6	12.95±0.17	
	P2	6	15.77±0.13	



Graph 1. The Differences in Inhibitory Zone of *S. pinnata* Leaves Ethanol Extract against *S. mutans*

inhibiting cytoplasmic membrane function by affecting biofilm formation, porins permeability, and interaction with some key enzymes^{14,17}.

S. mutans is a Gram-positive spherical bacterium that typically pairs or forms chains during its growth and is a normal flora of the oral cavity. *S. mutans* is able to synthesize large polysaccharides such as dextran from sucrose which is a sticky polysaccharide, and plays an important role in caries formation. The prevention and control of dental caries have been a major challenge for decades^{18,19}.

To date, prevention and treatment of dental caries is not limited to traditional methods used such as regular dental visits, brushing teeth with fluoride toothpaste, and low-sugar diets. Sogandi and Nilasari (2019) reported on the use of some natural ingredients as problem-controlling agents in the oral cavity and they found that noni fruits extract could inhibit the growth of *S. mutans* bacteria that cause dental caries²⁰. Suhendar *et al.* (2019) showed that the methanol extract of Kasturi mango contains alkaloids, flavonoids, phenolics, terpenoids, and saponins has an inhibitory activity against *S. mutans*²¹.

From the results of this study, it was found that the diameter of the inhibition zone of the ethanol extract of *S. pinnata* leaves was quite strong and could be used as an alternative treatment for dental caries.

CONCLUSION

This study demonstrated that the ethanol extract of *S. pinnata* leaves (cemcem) has the potential to prevent the formation of dental caries caused by *S. mutans* bacteria. *S. pinnata* leaves extract with 80% concentration provides an inhibition zone greater than 60% concentration. It can be used as a natural antibacterial agent.

ACKNOWLEDGEMENT

None.

Conflict of Interest

The authors have no conflicts of interest to declare. All co-authors have seen and agree with the contents of the manuscript. We certify that the submission is original work and is not under review at any other publication

Funding Source

This study was supported by, Polytechnic of Health Denpasar, Board for Development and Empowerment Human Resources of Health - The Ministry of Health Republic Indonesia

Proofread (ETS)

REFERENCES

- Laksemi DAAS. Biological activity of *Spondias pinnata*: A review. *Indones J Biomed Sci.*; **13**(2):88–93 (2019).
- Badoni A, Bisht C. Importance and Problems in Natural Regeneration of *Spondias pinnata*. *Rep Opin.*; **1**(5):12–3 (2009).
- Hazra B, Biswas S, Mandal N. Antioxidant and free radical scavenging activity of *Spondias pinnata*. *BMC Complement Altern Med.*; **8**:1–10 (2008).
- Savitri, Ariantari, Dwija. Potensi Antituberkulosis Ekstrak. *J Farm Udayana* [Internet]. 2013;2(3). Available from: <http://ojs.unud.ac.id/index.php/jfu/article/view/7385/5639>
- Wulansari, N.T. & Armayanti LY. Efektivitas Ekstrak Daun Cem-cem (*Spondias pinnata* (L.f) Kurz) dalam Menghambat Pertumbuhan *Staphylococcus aureus*, *Escherichia coli* dan *Salmonella typhi*. *J Media Sains.*; **2**(2):59–63 (2018).
- Sudirga S. Pemanfaatan Tumbuhan sebagai Obat Tradisional di Desa Trunyan Kecamatan Kintamani kabupaten Bangli. *E J Bumi Lestari* [Internet]. ; **4**(2):7–18 (2012). Available from: <http://ojs.unud.ac.id/index.php/blje/article/view/2379>
- Kementerian Kesehatan RI. Profil Kesehatan Indonesia 2018. Jakarta; 2018. 111–112 p.
- Forssten SD, Björklund M, Ouwehand AC. *Streptococcus mutans*, caries and simulation models. *Nutrients.*; **2**(3):290–8 (2010).
- Pan X, Chen F, Wu T, Tang H, Zhao Z. The acid, bile tolerance and antimicrobial property of *Lactobacillus acidophilus* NIT. *Food Control*; **20**(6):598–602 (2009). Available from: <http://dx.doi.org/10.1016/j.foodcont.2008.08.019>
- Asnani A, Rahayu WP, Jenie BSL, Yuliana ND. Aktivitas Antibakteri Dan Sitotoksitas Ekstrak Daun Kedondong Hutan. *Jurnal Teknologi dan Industri Pangan.*; **28**; 169–79 (2017).
- Gupta VK, Roy A, Nigam VK, Mukherjee K. Antimicrobial activity of *spondias pinnata* resin. *J Med Plants Res.*; **4**(16):1656–61 (2010).
- Jain P. Antioxidant and Antibacterial Activities of *Spondias pinnata* Kurz. Leaves. *European J Med Plants.*; **4**(2):183–95 (2014).
- Das J, Mannan A, Rahman MM, Dinar MAM,

- Uddin ME, Khan IN, et al. Chloroform and ethanol extract of *Spondias pinnata* and its different pharmacological activity like-antioxidant, cytotoxic, antibacterial potential and phytochemical screening through in-vitro method. *Int J Res Pharm Biomed Sci*; **2**(4):1805–12 (2011). Available from: <http://www.ijrpbsonline.com/files/RC38.pdf> <https://www.cabdirect.org/cabdirect/abstract/20123074681>
14. Adameczak A, Ożarowski M, Karpiński TM. Antibacterial activity of some flavonoids and organic acids widely distributed in plants. *J Clin Med*; **9**(1): (2020).
 15. Górniak I, Bartoszewski R, Króliczewski J. Comprehensive review of antimicrobial activities of plant flavonoids. Vol. 18, *Phytochemistry Reviews*. 241–272 (2019).
 16. Barbieri R, Coppo E, Marchese A, Daglia M, Sobarzo-Sanchez E, Nabavi SF, et al. Phytochemicals for human disease: An update on plant-derived compounds antibacterial activity. *Microbiol Res.* (2016); Available from: <http://dx.doi.org/10.1016/j.micres.2016.12.003>
 17. Xie Y, Yang W, Tang F, Chen X, Ren L. Antibacterial Activities of Flavonoids: Structure-Activity Relationship and Mechanism. *Curr Med Chem*; **22**(1): 132–49 (2014).
 18. Dianawati N, Setyarini W, Widjiastuti I, Ridwan RD, Kuntaman K. The distribution of *Streptococcus mutans* and *Streptococcus sobrinus* in children with dental caries severity level. *Dent J (Majalah Kedokt Gigi)*; **53**(1):36 (2020).
 19. Friedman JY. The Role of *Streptococcus Mutans* in the Formation of Dental Caries: An Ecological Perspective. *Sci J Lander Coll Arts Sci*; **5**(1): 40–6 (2011).
 20. Sogandi S, Nilasari P. Identifikasi Senyawa Aktif Ekstrak Buah Mengkudu (*Morinda citrifolia* L.) dan Potensinya sebagai Inhibitor Karies Gigi. *J Kefarmasian Indones*; **9**(2): 73–81 (2019).
 21. Suhendar U, Fathurrahman M, Sogandi S. Antibacterial Activity and Mechanism of Action of Methanol Extract from Kasturi Mango Fruit (*Mangifera casturi*) on Caries-Causing Bacterium *Streptococcus mutans*. *J Kim Sains dan Apl*; **22**(6):235–41 (2019).

Antibacterial Potential of Spondias pinnata (L.f) kurz Leaf Ethanol Extract against Streptococcus mutans Bacterial Growth

ORIGINALITY REPORT

25%
SIMILARITY INDEX

%
INTERNET SOURCES

23%
PUBLICATIONS

10%
STUDENT PAPERS

PRIMARY SOURCES

- 1** Dewa Ayu Agus Sri Laksemi, I Gusti Kamasan Arijana, I Made Sudarmaja, Ni Luh Ariwati et al. "Ethanol Extract of Spondias pinnata Leaves Reduce Parasite Number and Increase Macrophage Phagocytosis Capacity of Mice Infected by Plasmodium berghei", The Indonesian Biomedical Journal, 2021
Publication **4%**
- 2** Submitted to Udayana University
Student Paper **3%**
- 3** Francesca Bosco, Vincenzo Musolino, Micaela Gliozzi, Saverio Nucera et al. "The muscle to bone axis (and viceversa): an encrypted language affecting tissues and organs and yet to be codified?", Pharmacological Research, 2021
Publication **2%**
- 4** Adamczak, Ożarowski, Karpiński.
"Antibacterial Activity of Some Flavonoids and **2%**

Organic Acids Widely Distributed in Plants",
Journal of Clinical Medicine, 2019

Publication

5

Dwi Raharjo, Muhammad Zukhrufuz Zaman,
Dinar Praseptiangga, Ahmad Yunus. "
Physicochemical and microbiological
characteristics of various stem bark extracts
of Burck potential as natural preservatives of
coconut sap ", Open Agriculture, 2023

Publication

6

Vlad Tiberiu Alexa, Atena Galuscan, Iuliana
Popescu, Emil Tirziu et al.
"Synergistic/Antagonistic Potential of Natural
Preparations Based on Essential Oils Against
Streptococcus mutans from the Oral Cavity",
Molecules, 2019

Publication

7

Herry Darsim Gaffar, Yuliono Trika Nur Hasan,
Nike Aprilia. "The Effectiveness of Rome
Beauty Apple Peel Extract (*Malus sylvestris*
Mill) on the Growth of *Salmonella Typhi*",
Open Access Macedonian Journal of Medical
Sciences, 2022

Publication

8

Ramona Barbieri, Erika Coppo, Anna
Marchese, Maria Daglia, Eduardo Sobarzo-
Sánchez, Seyed Fazel Nabavi, Seyed
Mohammad Nabavi. "Phytochemicals for

1 %

1 %

1 %

1 %

human disease: An update on plant-derived compounds antibacterial activity",
Microbiological Research, 2017

Publication

9

Supriatiningsih, Herlina, Lusia Asih Wulandari, Sri Nowo Retno, Mohammad Kanedi. "Effect of Pelvic Rocking Exercise Using the Birth Ball on Fetal Lie, Attitude, and Presentation", International Journal of Women's Health and Reproduction Sciences, 2019

Publication

1 %

10

T Rialita, H Radiani, D Alfiah. " Antimicrobial activity of the combination of red galangal (K. Schum) and cinnamon () essential oils on and bacteria ", Journal of Physics: Conference Series, 2019

Publication

1 %

11

"Natural Oral Care in Dental Therapy", Wiley, 2020

Publication

1 %

12

Aridhanyati Arifin, Rahadian Kurniawan, Sri Kusumadewi, Andri Panca Purnama, Kukuh Eka Nugraha. "Design of Dental Disease Knowledge Base Editor Dialog using ISR-Framework", Khazanah Informatika : Jurnal Ilmu Komputer dan Informatika, 2022

Publication

1 %

13

Arjuman Mohamed Aziz, Alice Edwar Rizian, Fayza Mohamed Tawfik, Jaidaa Farouk Mekky. "Determinants of the quality of life in Egyptian patients with cerebrovascular stroke by using the stroke specific QoL questionnaire", The Egyptian Journal of Neurology, Psychiatry and Neurosurgery, 2023

Publication

1 %

14

Ilil Maidatuz Zulfa, Widya Handayani. "The Effect of Calendarized Drug Package on Patients Compliance with Antibiotics", Open Access Macedonian Journal of Medical Sciences, 2021

Publication

1 %

15

Reni Diah Kusumawati, Teddy Oswari, Tristyanti Yusnitasari, Himanshu Dutt. "Consumer Perception of Agribusiness E-marketplace Opportunities in Indonesia", Majalah Ilmiah Bijak, 2022

Publication

1 %

16

Submitted to Universitas Islam Lamongan

Student Paper

1 %

17

"Bioactive Compounds in Underutilized Vegetables and Legumes", Springer Science and Business Media LLC, 2021

Publication

<1 %

18 Journal of Knowledge Management, Volume 18, Issue 3 (2014-09-16) <1 %
Publication

19 Kusum Sai, Sumit Bahadur Baruwal Chhetri, Shankar Raj Devkota, Deepa Khatri. <1 %
"Evaluation of the Hypoglycemic Potential of Leaves Extract of Spondias pinnata (L.f.) Kurz. from Nepal", The Scientific World Journal, 2021
Publication

20 S L Ramayani, R S Hastuti, G V Hapsari, B T Prabandaru, D Widiyarini. <1 %
"The Solvent Effect of Hand sanitizer Formulation from Pecut Kuda (Stachytarpheta jamaicensis [L] Vahl) extract", Journal of Physics: Conference Series, 2021
Publication

21 Widianingrum DC, H Khasanah, L Purnamasari, Krismaputri ME, Hwang SG. <1 %
"Antimicrobial activities of nano-emulsion of virgin coconut oil", Veterinární medicína, 2023
Publication

22 Xiaozhu Guo, Dengshi Huang, Xiafei Li, Chao Liang. <1 %
"Are categorical EPU indices predictable for carbon futures volatility? Evidence from the machine learning method", International Review of Economics & Finance, 2023

23

Cynthia E. Lizárraga-Velázquez, Nayely Leyva-López, Crisantema Hernández, Erick Paul Gutiérrez-Grijalva et al. "Antioxidant Molecules from Plant Waste: Extraction Techniques and Biological Properties", Processes, 2020

Publication

<1 %

24

Hasma Hasma, Erna Kadrianti. "Formulasi Sediaan Sabun Mandi Padat Dari Ekstrak Etanol Daun Kedondong (Spondias pinnata (L.f) Kurz)", Journal Syifa Sciences and Clinical Research, 2022

Publication

<1 %

25

Maria Mikłasińska-Majdanik, Małgorzata Kępa, Robert Wojtyczka, Danuta Idzik, Tomasz Wąsik. "Phenolic Compounds Diminish Antibiotic Resistance of Staphylococcus Aureus Clinical Strains", International Journal of Environmental Research and Public Health, 2018

Publication

<1 %

26

Tia Sabrina, MT Kamaluddin, Theodorus Theodorus, Salni Salni. "The Effectiveness of Karamunting Leaf's Fraction (Rhodomyrtus tomentosa (Aiton) Hassk) as Antimicrobials in Carbapenemase Resistant Klebsiella

<1 %

pneumonia", Sriwijaya Journal of Medicine,
2021

Publication

27

Badrut Tamam, Dahrul Syah, Maggy
Thenawidjaja Suhartono, Wisnu Ananta
Kusuma, Shinjiro Tachibana, Hanifah Nuryani
Lioe. "Proteomic study of bioactive peptides
from tempe", Journal of Bioscience and
Bioengineering, 2019

Publication

<1 %

28

Svetlana Ivanova, Alexander Prosekov. "Study
of the Antioxidant Potential of UV-Treated
Vegetables", Nutraceuticals, 2022

Publication

<1 %

29

Shivangi Parhi, Sreyasi Pal, Sujoy K Das,
Paulomi Ghosh. "STRATEGIES TOWARDS
DEVELOPMENT OF ANTIMICROBIAL
BIOMATERIALS FOR DENTAL HEALTHCARE
APPLICATIONS", Biotechnology and
Bioengineering, 2021

Publication

<1 %

Exclude quotes On

Exclude matches Off

Exclude bibliography On

Antibacterial Potential of Spondias pinnata (L.f) kurz Leaf Ethanol Extract against Streptococcus mutans Bacterial Growth

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Missing ", " Review the rules for using punctuation marks.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sentence Cap. Review the rules for capitalization.



P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Wrong Article You may have used the wrong article or pronoun. Proofread the sentence to make sure that the article or pronoun agrees with the word it describes.



S/V This subject and verb may not agree. Proofread the sentence to make sure the subject agrees with the verb.



Article Error You may need to use an article before this word.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Article Error You may need to use an article before this word.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sentence Cap. Review the rules for capitalization.



Wrong Article You may have used the wrong article or pronoun. Proofread the sentence to make sure that the article or pronoun agrees with the word it describes.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.



P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.



Article Error You may need to remove this article.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Wrong Article You may have used the wrong article or pronoun. Proofread the sentence to make sure that the article or pronoun agrees with the word it describes.

PAGE 2



Article Error You may need to use an article before this word.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Article Error You may need to use an article before this word.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Missing ", "



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Prep. You may be using the wrong preposition.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.



Wrong Article You may have used the wrong article or pronoun. Proofread the sentence to make sure that the article or pronoun agrees with the word it describes.



Article Error You may need to remove this article.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Article Error You may need to use an article before this word.



P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Article Error You may need to use an article before this word.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Prep. You may be using the wrong preposition.



Article Error You may need to remove this article.



P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



S/V This subject and verb may not agree. Proofread the sentence to make sure the subject agrees with the verb.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.



Article Error You may need to remove this article.



Possessive Review the rules for possessive nouns.

PAGE 3



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



S/V This subject and verb may not agree. Proofread the sentence to make sure the subject agrees with the verb.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Article Error You may need to use an article before this word. Consider using the article **the**.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Article Error You may need to use an article before this word. Consider using the article **the**.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Article Error You may need to use an article before this word. Consider using the article **the**.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Missing ", " Review the rules for using punctuation marks.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Proofread This part of the sentence contains an error or misspelling that makes your meaning unclear.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Missing ", " Review the rules for using punctuation marks.



Proofread This part of the sentence contains an error or misspelling that makes your meaning unclear.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.



Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.