

THE PROCESSING AND CONCENTRATION OF NEEM LEAF (*Azadirachta indica L.*) ESSENTIAL OILS AGAINST *Pseudomonas aeruginosa* ISOLATED FROM PHILIPPINE NATIVE CHICKEN

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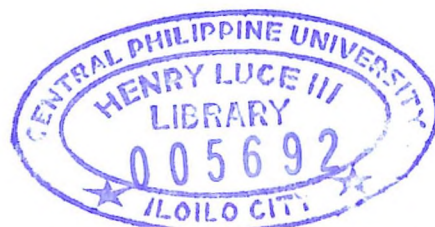
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BACHELOR OF SCIENCE IN AGRICULTURE

By:

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**THE PROCESSING AND CONCENTRATION OF NEEM LEAF (*Azadirachta indica L.*)
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ABSTRACT

Pseudomonas aeruginosa resistance to antibiotics results in high risks of infection in both humans and poultry. Neem leaf (*Azadirachta indica L.*) poses different active compounds that have antimicrobial properties. This study determines the antimicrobial processing of NLEO using the 60°C water bath temperature of the vacuum-rotary evaporator, the minimum inhibition concentration (MIC), zone of inhibition (ZOI), and level of concentration according to potency. The results of the study showed that the production of NLEO is at an appropriate temperature. The produced NLEO assessed through MIC after 24 hours of post-exposure revealed that 100% NLEO concentration has the highest mean percentage (86.08%). In addition to this, establishing the appraisal level of concentration of NLEO revealed that upon 72 hours post-exposure, treatments with 85% to 100% NLEO concentration had a wider ZOI. Furthermore, after 72 hours of post-exposure, the antimicrobial potency of NLEO against *Pseudomonas aeruginosa* showed potency and was in an acceptable range of 60% to 150%. Thus, NLEO can act as an alternative to controlling *Pseudomonas aeruginosa* isolated from Philippine native chicken.

REFERENCES

- Adaszyńska-Skwirzyńska, M., & Szczerbińska, D. (2017). Use of essential oils in broiler chicken production-a review. *Annals of Animal Science*, 17(2), 317.
- Ahmad, Sharique & Maqbool, Amina & Srivastava, Anshika & Gogoi, Sudarshana. (2019). BIOLOGICAL DETAIL AND THERAPEUTIC EFFECT OF AZADIRACHTA INDICA (NEEM TREE) PRODUCTS-A REVIEW. *Journal of Evidence Based Medicine and Healthcare*. 6. 10.18410/jebmh/2019/324.
- Agarwal, P., Mehrishi, P., Broor, S., & Sharma, A. (2022a). Antibacterial and antibiofilm properties of *Azadirachta indica* (Neem), *Aloe vera* (Aloe vera), and *Mentha piperita* (Peppermint) against multidrug-resistant clinical isolates. *Biomedical and Biotechnology Research Journal*, 6(1), 98.
https://doi.org/10.4103/bbrj.bbrj_178_21
- Amorati, R., Foti, M. C., & Valgimigli, L. (2013). Antioxidant activity of essential oils. *Journal of Agricultural and Food Chemistry*, 61(46), 10835–10847.
<https://doi.org/10.1021/jf403496k>
- Azam, M., & Khan, A. U. (2019). Updates on the pathogenicity status of *Pseudomonas aeruginosa*. *Drug Discovery Today*, 24(1), 350–359.
<https://doi.org/10.1016/j.drudis.2018.07.003>
- Bandies, M.A. (2023). Standardization of the Processing and Concentration of Betel Leaf (*Piper betel* L) Essential Oil against *Pseudomonas aeruginosa* of Philippine Native Chicken

- Chen, L., Zou, Y., She, P., & Wu, Y. (2015). Composition, function, and regulation of T6SS in *Pseudomonas aeruginosa*. *Microbiological Research*, 172, 19–25.
<https://doi.org/10.1016/j.micres.2015.01.004>
- Chevalier, S., Bouffartigues, E., Bodilis, J., Maillot, O., Lesouhaitier, O., Feuilloley, M., Orange, N., Dufour, A., & Cornelis, P. (2017). Structure, function and regulation of *Pseudomonas aeruginosa* porins. *Fems Microbiology Reviews*, 41(5), 698–722. <https://doi.org/10.1093/femsre/fux020>
- Chicken Situation Report, April to June 2023 | Philippine Statistics Authority | Republic of the Philippines*. (2023, August 22). <https://psa.gov.ph/content/chicken-situation-report-april-june-2023>
- El-Ghany, W. a. A. (2021). *Pseudomonas aeruginosa* infection of avian origin: Zoonosis and one health implications. *Veterinary World*, 2155–2159.
<https://doi.org/10.14202/vetworld.2021.2155-2159>
- Ghosh, V., Sugumar, S., Mukherjee, A., & Chandrasekaran, N. (2016). Neem (*Azadirachta indica*) Oils. In *Elsevier eBooks* (pp. 593–599).
<https://doi.org/10.1016/b978-0-12-416641-7.00067-5>
- Hala, A., & Sovasia, N. (2012). Microbial Assay of antibiotics. Pharma Tutor.<https://www.pharmatutor.org/articles/microbial-assay-antiotics>Hla, K. K.,
- Hashmat, I., Azad, H., & Ahmed, A. (2012). Neem (*Azadirachta indica* A. Juss)-A nature's drugstore: an overview. *Int Res J Biol Sci*, 1(6), 76-9.

- Jagdish. (2022, November 24). Poultry farming in the Philippines: How to start, breeds, subsidy, loans, and profits. *Agri Farming*. <https://www.agrifarming.in/poultry-farming-in-the-philippines-how-to-start-breeds-subsidy-loans-and-profits>
- Kebede, F. (2010). *Pseudomonas* infection in chickens. *Journal of Veterinary Medicine and Animal Health Vol. 2(4)*, Pp. 55-58.
<https://academicjournals.org/journal/JVMAH/article-full-text-pdf/663013539683>
- Kowalska–Krochmal, B., & Dudek-Wicher, R. (2021). The Minimum Inhibitory concentration of antibiotics: Methods, interpretation, clinical relevance. *Pathogens*, 10(2), 165. <https://doi.org/10.3390/pathogens10020165>
- Kuravadi NA, Yenagi V, Rangiah K, Mahesh H, Rajamani A, Shirke MD, Russiachand H, Loganathan RM, Shankara Lingu C, Siddappa S, Ramamurthy A, Sathyanarayana B, Gowda M. 2015. Comprehensive analyses of genomes, transcriptomes and metabolites of neem tree. *PeerJ* 3:e1066
<https://doi.org/10.7717/peerj.1066>
- Native Chicken – Industry Strategic Science and Technology Plans (ISPs) platform*. (2021). <https://ispweb.pcaarrd.dost.gov.ph/native-chicken/>
- Nhung, N. T., Chansiripornchai, N., & Carrique-Mas, J. (2017). Antimicrobial resistance in Bacterial poultry pathogens: a review. *Frontiers in Veterinary Science*, 4.
<https://doi.org/10.3389/fvets.2017.00126>
- Raut, J. S., & Karuppayil, S. M. (2014). A status review on the medicinal properties of essential oils. *Industrial Crops and Products*, 62, 250–264.
<https://doi.org/10.1016/j.indcrop.2014.05.055>

Sarah, R., Tabassum, B., Idrees, N., & Hajela, K. (2019). Bio-active Compounds Isolated from Neem Tree and Their Applications. In *Springer eBooks* (pp. 509–528).
https://doi.org/10.1007/978-981-13-7154-7_17

Septiyani, R., & Wibowo, C. (2019). Identification of active compounds and testing the antioxidant properties of neem leaf extract. *AIP Conference Proceedings*.
<https://doi.org/10.1063/1.5097503> Thi, M. T. T.,

Sultana, S., Shova, N. A., Ahmed, A., & Hossain, M. M. (2019). Comparative Study on the Antibacterial Activities of Neem Oil, Mustard oil and Black Seed Oil Against Pathogenic *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Salmonella Typhi* and *Pseudomonas Aeruginosa*. *Eur J Sci Res*, 154(1), 58-67.

Thi, M. T. T., Wibowo, D., & Rehm, B. H. A. (2020). *Pseudomonas aeruginosa* Biofilms. *International Journal of Molecular Sciences*, 21(22), 8671.
<https://doi.org/10.3390/ijms21228671>

Wu, W., Jin, Y., Bai, F., & Jin, S. (2015). *Pseudomonas aeruginosa*. In *Elsevier eBooks* (pp. 753–767). <https://doi.org/10.1016/b978-0-12-397169-2.00041-x>

Wylie, M. R., & Merrell, D. S. (2022). The Antimicrobial Potential of the Neem Tree *Azadirachta indica* (Vol. 13). *Frontiers Media*.
<https://doi.org/10.3389/fphar.2022.891535>