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Production of Pinostrobin in University of Mataram

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***Abstract*— The problem of scarcity of secondary metabolites is an obstacle experienced by researchers from various scientific disciplines such as chemistry, pharmacy, and medicine both from universities (lecturers and students) or from health research and development institutions in Indonesia. The need for secondary metabolites has been purchased from abroad at a very expensive price. Some secondary metabolites are also difficult to find in foreign markets because of the peculiarities of compounds contained by species native to Indonesia. Aiming to overcome the problem of scarcity of standard compounds, the Secondary Metabolite Compound Production Center (SM-*CPC*) of the University of Mataram provides secondary metabolites of various *Indonesian medicinal plants. One of the secondary metabolite compounds is a pinostrobin.* The secondary metabolite compounds produced by SM-CPC were obtained through a secondary metabolite isolation procedure consisting of extraction, fractionation, purification, and elucidation of the structure.**

Keywords: secondary metabolite compounds, pinostrobine, medicinal plants, isolation

I. INTRODUCTION

Secondary metabolites are very difficult to find in the Indonesian market. Until now, consumers of secondary metabolites in Indonesia usually buy standard compounds online from abroad, such as from Sigma-Aldrich (www.sigmaaldrich.com). The scarcity of secondary metabolites in the domestic market causes researchers in universities (lecturers and students) or in health research and development institutions to have to buy standard compounds from abroad at very expensive prices.

Natural product chemistry is a specialized field of study on secondary metabolites [1-3]. The chemical education study program, FKIP, University of Mataram carries out chemical recovery of natural materials supported by practical activities (3 (1) credits). The practicum was compiled based on the results of research on how to isolate secondary metabolites from various plant species. Some of the research conducted by the Team Leader (Dr. Aliefman Hakim, M.Sc) funded by the Directorate of Higher Education concerning procedures for isolating secondary metabolites has made many modifications and innovations related to isolating secondary metabolites from various plant species [4-15]. Modifications and innovations in the isolation procedures of secondary metabolites have succeeded in simplifying and reducing the costs required for each stage of isolation of secondary metabolites from various plant species. From these modifications, one of the compounds that can be produced is the pinostrobin compound from the Fingerroot (*Kaemferia pandurata*).

II. METHOD

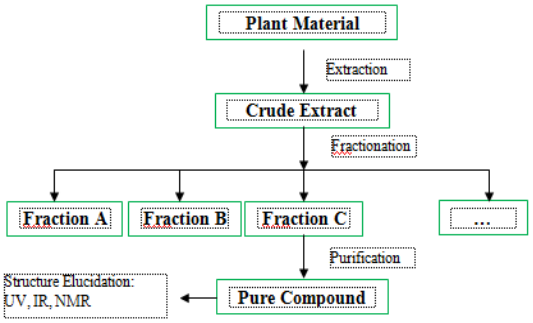

Figure 1. Procedure for isolation of secondary metabolites [1]

Secondary metabolite compounds including pinostrobin are obtained through isolation steps which consist of extraction, fractionation, purification and elucidation stages. However, each secondary metabolite has different isolation and identification steps. Based on this, modification to obtain secondary metabolites from a plant species is very possible. These modifications can be made in solvents, eluents, extraction, fractionation, and purification methods. In

general the standard compound isolation method can be seen in Figure 1.

III. RESULTS AND DISCUSSION

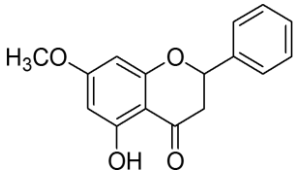

Figure 2. Structure of Pinostrobin

One of the secondary metabolites produced by SM-CPC is the pinostrobin compound from the Fingerroot (*Kaemferia pandurata*). The structure of the pinostrobin compound is shown in Figure 2. Pinostrobin is produced by SM-CPC which is based in Building A FKIP Universitas Mataram Jl. Majapahit No. 62 Mataram (NTB). SM-CPC already has FB "Indonesian Standard Compounds", Twitter "Indonesian Standard Compounds", and WA by each SM-CPC employee. Secondary metabolite compounds produced by SM-CPC can be used for research, final assignments (thesis, thesis, or dissertation), or other needs. Alternatives to the use of secondary metabolites can be described as follows.

1. Bioactivity (antibacterial, antifungal, antimalarial, cytotoxic and others)

- Compare standard compound bioactivity with total plant extracts (study of literature on bioactivity, class, and standard compound biogenesis pathways, study of literature on standard compound producing plants, standard antibacterial or antifungal test compounds and total plant extracts)
- Compare the bioactivity of a standard compound with other standard compounds (study of literature on bioactivity, groups, and biogenesis pathways of two or more standard compounds, antibacterial or antifungal tests two or more standard compounds)

2. Chemical synthesis raw materials

- Transforming the functional groups of a standard compound (Study the synthesis plan of target molecules from standard compound raw materials, retrosynthesis, mechanism for target molecular reactions, transformation of target molecules in the laboratory, identification of target molecules produced)
- Compare the bioactivity of a standard compound before transformation of functional groups and after transformation of functional groups

3. Chemotaxonomy

- Assessing the presence of standard compounds in plant species incorporated in one genus and different species of plant genus. (Standard compounds are used as markers in certain plant species based on Rf values in TLC).

IV. CONCLUSION

SM-CPC University of Mataram has produced the pinostrobin compound from the key meeting (Kaemferia pandurata). These compounds can be used for research activities, final assignments (thesis, thesis, or dissertation), or other needs such as bioactivity tests, chemical synthesis raw materials, chemotaxonomic studies.

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REFERENCES

[1] A. Hakim, Liliasari, A. Kadarohman, Y.M. Syah, "Making a Natural Product Chemistry Course Meaningful with a Mini Project Laboratory," Journal of Chemical Education, Vol 93, pp 193–196, Januari 2016.

[2] A. Hakim, Liliasari, A. Kadarohman, Y.M, Syah, "Effects of the Natural Product Mini Project Laboratory on the Students Conceptual Understanding," Journal of Turkish Science Education. Vol 13, pp 27-36, April 2016.

[3] A. Hakim, Liliasari, A. Kadarohman, "Student understanding of Natural Product Concept of Primary and Secondary Metabolites Using CRI Modified," International Online Journal of Educational Sciences. Vol 4, 544-553, August 2012.

[4] A. Hakim, "Kudraflavon C dari kayu batang *Artocarpus scortehinii* King,". Prociding Seminar Nasional PMIPA FKIP Universitas Mataram. Mei 2008.

[5] A. Hakim,. "Asam 5-metoksi salisilat dari kayu batang *Artocarpus scortehinii* King.," Jurnal Pijar MIPA, Vol 3, pp 34-39. April 2008

[6] A. Hakim, "A Prenylated Flavone from The Heartwood of *Artocarpus Scortechinii* King *(Moraceae)"*. Indonesian Journal of Chemistry, vol 9, pp. 146-150, Januari 2009.

[7] A. Hakim, "Scrining Phytochemistry on The Heartwood and The Root Bark of The *Artocarpus camasi* (Moraceae)" Proceeding of The Third International Seminar on Science Education, October 2009.

[8] A. Hakim, E. Junaidi, & Y.A. Sani,. "Antimalarial Activity and Chemical Analysis of A Secondary Metabolite from Heartwood and Root Bark of *Artocarpus camansi* Blanco. (Moraceae)," Jurnal Ilmu Farmasi Indonesia, vol 8, pp 135-137, April 2010.

[9] A. Hakim, "Diversity of secondary metabolites from Genus *Artocarpus* (Moraceae)," Nusantara Bioscince, Vol. 2, pp. 146-156, August 2010.

[10] A. Hakim, & A. W. Jufri, "Aktivitas Antimalaria dan Analisis Metabolit Sekunder Kayu dan Kulit Batang *Artocarpus odoratissimus* Blanco. (Moraceae)," Jurnal Bahan Alam Indonesia, Vol 7, 302-305. December 2011.

[11] A. Hakim & A.W. Jufri, "*Applications of Isolation and Structure Elucidation of Secondary Metabolites in Natural Product Chemistry Laboratory*", in *Advances in Chemistry Research*, edited by J.C. Taylor (NOVA Publisher, New York, 2017), pp. 171-181.

[12] A. Hakim, Y. Andayani, B.D. Rahayuan, "Isolation of Ethyl P-Methoxy Cinnamate from *Kaemferia galanga* L.," in *The 6th International Conference of the Indonesian Chemical Society 17–18 October 2017, Palembang, South Sumatra, Indonesia*, IOP Conf. Series: Journal of Physics: Conf. Series **1095** 012039, edited by S. Gill *et al*. (IOP Publishing Ltd, England, 2018), pp. 1-3.

[13] A. Hakim & A.W. Jufri, "Natural Products Laboratory Project: Isolation and Structure Elucidation of Piperin from *Piper nigrum* and Andrographolide from *Andrographis paniculata,"* Journal of Turkish Science Education, Vol 15, pp. 15-28, December 2018.

[14] Hakim, Liliasari, A. Kadarohman, Y.M. Syah, "Improvement of student critical thinking skills with the natural product mini project laboratory learning," Indonesian Journal of Chemistry, Vol 16, pp.315-321, August 2016.

[15] Wildan, A. Hakim, J. Siahaan, Y.A.S. Anwar, "A stepwise inquiry approach to improving communication skills and scientific attitudes on a biochemistry course," International Journal of Instruction, Vol 12, pp. 407-422, October 2019.