

## **BAB 5**

### **SIMPULAN**

#### **5.1. Simpulan**

Berdasarkan hasil analisa dan interpretasi penemuan, maka dapat disimpulkan bahwa:

- Senyawa uji asam 4-fenilsinamat tidak mempunyai daya antimikroba, tetapi dapat mencegah pertumbuhan optimum *Aspergillus niger* dan *Candida albicans*.
- Senyawa uji asam 4-fenilsinamat hanya mencegah pertumbuhan optimum, sedangkan senyawa induk asam sinamat mempunyai daya antimikroba, baik terhadap *Aspergillus niger* dan *Candida albicans* dengan KHM sebesar 1160 dan 270 ppm.

#### **5.2. Alur Penelitian Selanjutnya**

Perlu dilakukan modifikasi pada penambahan gugus lainnya pada senyawa asam sinamat agar diperoleh senyawa turunan baru yang efektif dan mempunyai daya antimikroba.

## DAFTAR PUSTAKA

- Aldrich, 2003. **Handbook of Fine Chemicals Laboratory Equipment**, Singapura, pp. 331.
- Adnan, M., 1997. **Teknik Kromatografi untuk Analisis Bahan Makanan**. Penerbit ANDI, Yogyakarta, hal. 4-5, 8.
- Akram, R.A. [2008, Mei 03]. **Dimethyl sulfoxide (DMSO) inhibits the germination of Candida albicans and the arthrospores of Trichophyton mentagrophytes**. [Online]. <http://www.ncbi.nlm.nih.gov/pubmed/18451594?dopt=Abstract>. [2008, Juni 13].
- Alexopoulos, C.J., Mims, C.M., 1979. **Introductory Mycology**, 3th edition. John and Sons, Inc., New York, pp. 291-293, 555-556
- Anggraeni, S., 2006. **Perbandingan Rendemen Hasil Sintesis Asam 4-Butoksinsinamat dari 4-Butoksibenzaldehyda dan Asam Sinamat dari Benzaldehyda dengan Reaksi Knoevenagel**. Skripsi Sarjana Farmasi. Fakultas Farmasi Universitas Katolik Widya Mandala, Surabaya.
- Bailey, W.R., & Scott, E.G., 2002. **Diagnostic Microbiology**, 4th edition. The C. V. Mosby Saint Louis, pp. 400-401, 271.
- Baroni, A., De Rosa, R., De Rosa, A., Donnarumma, G., Catalanotti, P. [2006, January 27]. **New Strategies in Dandruff Treatment Growth Control of Malassezia ovalis**. [Online]. [http://www.geocities.com/mall\\_lago/html/abstracts.html](http://www.geocities.com/mall_lago/html/abstracts.html). [2008, Mei 01].
- Barry, A.L., 1991. **Procedures and Theoretical Consideration for Testing Antimicrobial Agents in Agar Media and Antibiotics in Laboratory Third Edition**. The Williams and Wilkins Company, Baltimore, pp. 120.
- Beneke, E.S., & Rogers, A.L., 1980. **Medical Mycology Manual**. 4<sup>th</sup> edition. Burgess Publishing Company, Michigan, pp. 13, 44.
- Benett. J.W.,& Klich, M.A., 1992. **Aspergillus Biology and Industrial Applications**. Butterworth-Heinemann, USA, pp. 97, 314, 403.

Boyd, R.F., 1995. **Basic Medical Microbiology**, 5 th edition. Little Brown and Company, New York, pp. 485-487.

Carey, F.A., 1992. **Organic Chemistry**, 2<sup>nd</sup> ed. McGraw-Hill, Inc., USA, pp. 529-536.

Chambel, A., Viegas, C. A., SA-Correia, I. [No Date]. **Effects of Cinnamic Acid on The Growth and On Plasma membrane H[+]-ATPase Activity of *Saccharomyces cerevisiae***. [Online]. <http://cat.inist.fr/?aModele=afficheN&cpsidt=1975128>. [2008, Mei 01].

Clayden, J., Greeves, N., Warren, S., Wothers, P., 2000. **Organic Chemistry**. Oxford University Press, New York, pp. 703.

Collins, C.H., Lyne, P.M., Grange, J.M., 1989. **Microbiological Methods**, 6<sup>th</sup> ed. Butter Worths, London, pp. 115-117, 164-166, 376-377.

Djajaiswanto, I., 2006. **Perbandingan antara sintesis asam 4-fenil sinamat dari 4-fenil benzaldehida dengan asam sinamat dari benzaldehida melalui reaksi Knoevenagel**, Skripsi Sarjana Farmasi, Fakultas Farmasi Universitas Widya Mandala Surabaya, Surabaya.

Doyle, M.P., Mungall, W.S., 1980. **Experimental of Organic Chemistry**. John Wiley & Sons, New York, pp. 24, 30, 91.

Duke, J. A., 2004. **Dr. Duke's Phytochemical and Ethnobotanical Databases**, <http://www.ars-grin.gov/duke>. [2005, Maret 25].

Dwidjoseputro, D., 1978. **Pengantar Mikologi**. Penerbit Alumni, Bandung, hal. 148-150,530.

**Farmakope Indonesia III**, 1979. Departemen Kesehatan Republik Indonesia, Jakarta, hal 102.

Fessenden, R. J. & Fessenden, J. S., 1999. **Kimia Organik**, edisi III jilid 1. (Pudjaatmaka, A. H., penerjemah). Penerbit Erlangga, Jakarta, hal. 179-184, 436-440, 454-460.

Finar, I. L., 1973. **Organic Chemistry Volume I : The Fundamental Principles**, 6<sup>th</sup> ed. The English Language Book Society & Longman Group Ltd, London, pp 773-775.

Furniss, B.S., Hannaford, A.J., Rogers, V., Smith, P.W.G., Tatchell, A.R., 1978. **Vogel's Textbook of Practical Organic Chemistry**, 4<sup>th</sup> ed. English Language Book Society/Longman, London, pp. 105-110, 226-710, 803.

Ganiswara, S.G., 1995. **Farmakologi dan Terapi**, edisi IV. FK UI, Aksara, Jakarta, hal. 562, 563, 571-573.

Gritter, R.T., Robbit, J.M., Schwarting, A.E., 1991. **Pengantar Kromatografi, edisi II**. (Padmawinata, F., Penerjemah), ITB, Bandung, hal. 107, 109.

Hamburger, M.O., and Cordell, G.A., 1987. Bioautographic Assay for Antibacterial Compound. **Journal Natural Product**, 19, pp. 50-53.

Hartanti, L., Rudyanto, M., 2008. Synthesis of Some Cinnamic Acid Derivatives. Effect of Group Attached on Aromatic Ring to the Reactivity of Benzaldehyde. **Indonesian Journal of Chemistry**. Vol. 8 no. 2 pp 226-230.

Holzshu, D.L., Presley, H.L., Miranda, N.P., 1979. Identification of *Candida Lusitoniae* as an Opportunistic Yeast in Human , **Journal Clinical Microbiology**, pp. 110, 202.

Hugo, B.W., and Russel, A.D., 1987. **Pharmaceutical Mycrobiology** 4<sup>th</sup>ed. Blackwell scientific Publication, London, pp. 267-268.

Jawetz, E., Melnick, J.L., Adelberg, E.A., 2001. **Mikrobiologi untuk Profesi Kesehatan**.edisi XVI. Penerbit Buku Kedokteran EGC, Jakarta, hal. 368-372,382-384.

Jawetz, E., Melnick, J.L., Adelberg, E.A., 2005. **Mikrobiologi Kedokteran**, 2<sup>nd</sup> edition. (Widorini, N. penerjemah). Salemba Medika, Jakarta, hal. 348-349, 355-358.

Johnston, I. R., 1965. The Composition of the Cell Wall of *Aspergillus niger*. **Biochemistry journal**, 96, 651-659.

Ketchum, P.A, 1988. **Microbiology Concept and Applications**, John Wiley and Sons, New York, pp. 381,383,570,578.

- Lehman, J.W., 2004. **Microscale Operational Organic Chemistry**. Prentice hall upper Saddle River, New Jersey, pp. 634.
- Lewis, R.E., Kontoyannis, D.P., 2001. Rationale for combination antifungal therapy. **Pharmacotherapy**. Vol. 28 no. 8, pp. 149-164.
- Linstomberg, W.W. & Baumgarten, H.E., 1970. **Organics Experiments for a Brief Course**, 3<sup>rd</sup> ed. D.C. Heathand Company Lexington, London, pp. 1-7.
- Lopez, R, J, L., Cassanova, M., Murgus, A., Martinez, J, P., 2004. Antibody response to *Candida albicans* cell wall endogen. **FEMS Immunology and Medical Microbiology**, 11, 187-196
- Lorian. V., 1991. **Antibiotics in Laboratory Medicine**, the Williams and Wilkins company, Baltimore, pp. 11-14.
- Mann, F.G. & Saunders BC., 1973. **Practical Organic Chemistry**, fourth edition. The English Book Society and Longman Group Limited, Cambridge, pp. 279.
- Mulja, M., dan Suharman, 1995. **Analisis Instrumental**. Airlangga University Press, Surabaya, hal. 115, 123-124, 127.
- Nester, W.E., Robert, E.C., McCarthy, J.B & Pearsall, N.N. 1973. **Microbiology. Molecule, Microbes and Man**. Holt, Rinehart and Wilson Inc, New York, pp. 285.
- Pelczar M.J., Chan, E.C.S., 2007. **Dasar-dasar mikrobiologi** . I.(Hadioetomo, R.S., penerjemah). Penerbit Universitas Indonesia, Jakarta, hal. 81, 188, 198, 202-205, 207-210.
- Rahalison, L., Hamburger, M., Hostettman, K., 1991. **A Bioautographic Agar Overlay Method for Antifungal Coumpounds for Higher Plants** Volume II, Lausanne-Dorigny, Switzerland, pp. 199-203.
- Reynold, J.E.F., 1993. **Martindale the Extra Pharmacopeia**. 33 th ed. The Pharmaceutical Press, London, pp. 1089-1091, 1136-1138.

Sadono., 2001. **Bioavailabilitas Etil p-metoksisinamat dari Perasan Rimpang Kencur pada Hewan Coba Kelinci.** Tesis, Pasca Sarjana Universitas Airlangga.

Said, S., Neves, F.M., Griffiths, A.J.F. [ 2004, Januari 31]. **Cinnamic Acid Inhibits The Growth of The Fungus *Neurospora crassa*, But is Eliminated as Acetophenone.** [Online]. <http://www.sciencedirect.com/science.htm>. [2008, Mei 01].

Salvo, A, D, 2008. **Introduction to Mycology,** [Online]. <http://pathmicro.med.se.edu/mycology/mycology-1.htm>. [2008, June 12]

Santoso, S., 2006. **Perbandingan hasil sintesis asam 4-t-butilsinamat dari 4-t-butilbenzaldehida dan asam sinamat dari benzaldehida dengan reaksi Knoevenagel.** Skripsi Sarjana Farmasi, Fakultas Farmasi Universitas Widya Mandala Surabaya, Surabaya.

Suriati, M.W., 2006. **Pengaruh gugus 4-butil pada reaksi antara 4-butilbenzaldehida dengan asam malonat dengan katalis piridinapiperidina.** Skripsi Sarjana Farmasi. Fakultas Farmasi Universitas Katolik Widya Mandala, Surabaya.

Silverstein, R.M., Bassler, G.C., Morill, T.C., 1986. **Penyidikan Spektrometrik Senyawa Organik**, edisi IV. (Hartomo, AJ & Purba, A.V., penerjemah).penerbit Erlangga, Jakarta, hal. 105-210, 305-310.

Siswandono & Soekardjo, B., 2000. **Kimia Medisinal**, edisi 2. Airlangga University Press, Surabaya, hal 6, 40, 121.

Situmorang, H., 2008. **Perbandingan Daya Antifungi Beberapa Derivat Benzoiltiourea Terhadap *Aspergillus Niger* Dan *Candida Albicans*.** Skripsi Sarjana Farmasi. Fakultas Farmasi Universitas Katolik Widya Mandala, Surabaya.

**The Merck Index** 13<sup>th</sup> ed., 2001. Merck & Co, Inc.,New Jersey, p. 181, 400, 1021, 1338, 1426.

Vogel, 1978. **Practical Organic Chemistry**, 5<sup>nd</sup> ed. John Wiley & Sons, Inc., New York, pp. 578.

Zhang, C., Song, K., Chen, X., Zhang, L., Lin, M., Chen, Q. [No Date]. **The Antibacterial and Antifungal Activity Studies of Cinnamic Acid and Its Derivates.** [Online].  
<http://www.xmu.edu.cn/xmupaper/xdbran/mlzy/2006sup/yz2006sup.htm>. [2008, Mei 01].

