

REFERENCES

- Actis-Goretta, L., Ottaviani, J.I. and Fraga, C.G. 2006. Inhibition of angiotensin converting enzyme activity by flavanol-rich foods. Journal of Agricultural and Food Chemistry. **54**(1): 229-234.
- Adjobimey, T., Edayè, I., Lagnika, L., Gbenou, J., Moudachirou, M. and Sanni, A. 2004. Activités antiplasmodiales *in vitro* de quelques plantes antipaludiques de la pharmacopée béninoise. Comptes Rendus Chimie. **7**(10): 1023-1027.
- Ahmad, B. and Alam, T. 2003. Components from whole plant of *Phyllanthus amarus* Linn. Indian Journal of Chemistry Section B. **42**(7): 1786-1790.
- Ahmed, B., Al-Howiriny, T.A. and Mossa, J.S. 2006. Crotalic and emarginelic acids: Two triterpenes from *Crotalaria emarginella* and anti-inflammatory and anti-hepatotoxic activity of crotalic acid. Phytochemistry. **67**(10): 956-964.
- Ajala, T.O., Igwilo, C.I., Oreagba, I.A. and Odeku, O.A. 2011. The antiplasmodial effect of the extracts and formulated capsules of *Phyllanthus amarus* on *Plasmodium yoelii* infection in mice. Asian Pacific Journal of Tropical Medicine. **4**(4): 283-287.
- Ali, H., Houghton, P.J. and Soumyanath, A. 2006. alpha-Amylase inhibitory activity of some Malaysian plants used to treat diabetes; with particular reference to *Phyllanthus amarus*. Journal of Ethnopharmacology. **107**(3): 449-455.
- Alvari, A., Ohadi Rafsanjani, M.S., Ahmed, F.J., Hejazi, M.S. and Abdin, M.Z. 2011. Rapid RP-HPLC technique for the determination of phyllanthin as bulk and its quantification in *Phyllanthus amarus* extract. International Journal of Phytomedicine. **3**(1): 115-119.
- Annamalai, A. and Lakshmi, P. 2009. HPTLC and HPLC analysis of bioactive phyllanthin from different organs of *Phyllanthus amarus*. Asian Journal of Biotechnology. **1**(4): 154-162.
- Aritajat, S., Wutteerapol, S. and Saenphet, K. 2004. Anti-diabetic effect of *Thunbergia laurifolia* Linn. aqueous extract. The Southeast Asian Journal of Tropical Medicine and Public Health. **35**(2): 53-58.
- Backer, C.A. and Bakhuizen van Den Brink, R. 1965. Flora of Java (Spermatophytes only). Vol. 2. Angiospermae, families 111-160.
- Bhullar, K.S., Lassalle-Claux, G., Touaibia, M. and Rupasinghe, H. 2014. Antihypertensive effect of caffeic acid and its analogs through dual renin-angiotensin-aldosterone system inhibition. European Journal of Pharmacology. **730**: 125-132.



- Cederbaum, A.I., Wu, D., Mari, M. and Bai, J. 2001. CYP2E1-dependent toxicity and oxidative stress in HepG2 cells. Free Radical Biology Medicine. **31**(12): 1539-1543.
- Chan, E.W.C., Eng, S.Y., Tan, Y.P. and Wong, Z.C. 2011. Phytochemistry and Pharmacological Properties of *Thunbergia laurifolia*: A Review. Pharmacognosy Journal. **3**(24): 1-6.
- Chanawirat, A. 2000. The protective effect of Thunbergia laurifolia extract on ethanol-induced hepatotoxicity in mice. Master's Thesis, Mahidol University.
- Charumane, S., Vejabhikul, S., Taesotikul, T., Netsingha, W., Sirisaad, P. and Leelapornpisit, P. 1998. Development of topical anti-inflammatory preparations from Thunbergia laurifolia Linn. Phase 1 Research Report.
- Chattaviriya, P., Morkmek, N., Lertprasertsuke, N. and Ruangyuttikarn, W. 2010. Drinking *Thunbergia laurifolia* Lindl. leaf extract helps prevent renal toxicity induced by cadmium in rats. Thai Journal of Toxicology. **25**(2): 124-132.
- Chaudhary, G., Kamboj, P., Singh, I. and Kalia, A. 2010. Herbs as liver savers-A review. Indian Journal of Natural Products Resources **1**(4): 397-408.
- Chirdchupunseree, H. and Pramyothin, P. 2010. Protective activity of phyllanthin in ethanol-treated primary culture of rat hepatocytes. Journal of Ethnopharmacology. **128**(1): 172-176.
- Chouhan, H.S. and Singh, S.K. 2011. Phytochemical analysis, antioxidant and anti-inflammatory activities of *Phyllanthus simplex*. Journal of Ethnopharmacology. **137**(3): 1337-1344.
- Dhalwal, K., Biradar, Y.S. and Rajani, M. 2006. High-performance thin-layer chromatography densitometric method for simultaneous quantitation of phyllanthin, hypophyllanthin, gallic acid, and ellagic acid in *Phyllanthus amarus*. Journal of AOAC International. **89**(3): 619-623.
- Domitrovic, R., Skoda, M., Vasiljev Marchesi, V., Cvijanovic, O., Pernjak Pugel, E. and Stefan, M.B. 2013. Rosmarinic acid ameliorates acute liver damage and fibrogenesis in carbon tetrachloride-intoxicated mice. Food and Chemical Toxicology. **51**: 370-378.
- Fang, S.H., Rao, Y.K. and Tzeng, Y.M. 2008. Anti-oxidant and inflammatory mediator's growth inhibitory effects of compounds isolated from *Phyllanthus urinaria*. Journal of Ethnopharmacology. **116**(2): 333-340.
- Faremi, T.Y., Suru, S.M., Fafunso, M.A. and Obioha, U.E. 2008. Hepatoprotective potentials of *Phyllanthus amarus* against ethanol-induced oxidative stress in rats. Food and Chemical Toxicology. **46**(8): 2658-2664.



- Finkelstein, N. 1978. Phytochemical Studies on Certain South African Species of the Rutaceous Genera Agathosma Willd. and Zanthoxylum L. Ph.D.'s Thesis, Rhodes University.
- Foo, L.Y. 1993. Amariin, a di-dehydrohexahydroxydiphenoyl hydrolysable tannin from *Phyllanthus amarus*. Phytochemistry. **33**(2): 487-491.
- Foo, L.Y. 1995. Amariinic acid and related ellagitannins from *Phyllanthus amarus*. Phytochemistry. **39**(1): 217-224.
- Foo, L.Y. and Wong, H. 1992. Phyllanthusiin D, an unusual hydrolysable tannin from *Phyllanthus amarus*. Phytochemistry. **31**(2): 711-713.
- Garcia-Niño, W.R. and Pedraza-Chaverri, J. 2014. Protective effect of curcumin against heavy metals-induced liver damage. Food and Chemical Toxicology. **69**: 182-201.
- Gomes, C.A., Girão da Cruz, T., Andrade, J.L., Milhazes, N., Borges, F. and Marques M.P.M. 2003. Anticancer activity of phenolic acids of natural or synthetic origin: a structure-activity study. Journal of Medicinal Chemistry. **46**(25): 5395-5401.
- Gujrati, V., Patel, N., Rao, V.N., Nandakumar, K., Gouda, T. and Shalam, M. 2007. Hepatoprotective activity of alcoholic and aqueous extracts of leaves of *Tylophora indica* (Linn.) in rats. Indian Journal of Pharmacology. **39**(1): 43.
- Habib, A.A.M. 1980. False-positive alkaloid reactions. Journal of Pharmaceutical Sciences. **69**(1): 37-43.
- Houghton, P.J., Woldemariam, T.Z., O'Shea, S. and Thyagarajan, S.P. 1996. Two securinega-type alkaloids from *Phyllanthus amarus*. Phytochemistry **43**(3): 715-717.
- Huang, R.L., Huang, Y.L., Ou, J.C., Chen, C.C., Hsu, F.L. and Chang, C. 2003. Screening of 25 compounds isolated from *Phyllanthus* species for anti-human hepatitis B virus in vitro. Phytotherapy Research. **17**(5): 449-453.
- Iranloye, B., Owoyele, V., Kelani, O. and Olaleye, S. 2011. Analgesic activity of aqueous leaf extract of *Phyllanthus amarus*. African Journal of Medicine and Medical Sciences **40**(1): 47-50.
- Iyoda, K., Sasaki, Y., Horimoto, M., Toyama, T., Yakushijin, T., Sakakibara, M., Takehara, T., Fujimoto, J., Hori, M., Wands, J.R. and Hayashi, N. 2003. Involvement of the p38 mitogen-activated protein kinase cascade in hepatocellular carcinoma. Cancer. **97**(12): 3017-3026.
- Jafri, M.A., Jalis Subhani, M., Javed, K. and Singh, S. 1999. Hepatoprotective activity of leaves of *Cassia occidentalis* against paracetamol and ethyl alcohol intoxication in rats. Journal of Ethnopharmacology. **66**(3): 355-361.



- Kanchanapoom, T., Kasai, R. and Yamasaki, K. 2002. Iridoid glucosides from *Thunbergia laurifolia*. Phytochemistry 60(8): 769-771.
- Kassuya, C.A.L., Silvestre, A., Menezes-de-Lima, Jr.O., Marotta, D.M., Rehder, V.L.G. and Calixto, J.B. 2006. Antiinflammatory and antiallodynic actions of the lignan niranthin isolated from *Phyllanthus amarus*: Evidence for interaction with platelet activating factor receptor. European Journal of Pharmacology. 546(1-3): 182-188.
- Kassuya, C.A.L., Silvestre, A.A., Rehder, V.L.G. and Calixto, J.B. 2003. Anti-allodynic and anti-oedematogenic properties of the extract and lignans from *Phyllanthus amarus* in models of persistent inflammatory and neuropathic pain. European Journal of Pharmacology. 478(2-3): 145-153.
- Kim, J.A., Kang, Y.S. and Lee, Y.S. 2003. Role of Ca²⁺-activated Cl⁻ channels in the mechanism of apoptosis induced by cyclosporin A in a human hepatoma cell line. Biochemical and Biophysical Research Communications. 309(2): 291-297.
- Kiran, D., Rohilla, A., Rohilla, S. and Khan, M. 2011. Pleiotropic multifaceted therapeutic potential of *Phyllanthus amarus*. International Journal of Pharmaceutical and Biological Archive. 2: 610-614.
- Knasmuller, S., Parzefall, W., Sanyal, R., Ecker, S., Schwab, C., Uhl, M., Mersch-Sundermann, V., Williamson, G., Hietsch, G., Langer, T., Darroudi, F. and Natarajan, A.T. 1998. Use of metabolically competent human hepatoma cells for the detection of mutagens and antimutagens. Mutation Research. 402(1-2): 185-202.
- Krithika, R., Mohankumar, R., Verma, R.J., Shrivastav, P.S., Mohamad, I.L., Gunasekaran, P. and Narasimhan, S. 2009. Isolation, characterization and antioxidative effect of phyllanthin against CCl₄-induced toxicity in HepG2 cell line. Chemico-Biological Interactions. 181(3): 351-358.
- Krithika, R., Verma, R.J., Shrivastav, P.S. and Suguna, L. 2011. Phyllanthin of standardized *Phyllanthus amarus* extract attenuates liver oxidative stress in mice and exerts cytoprotective activity on human hepatoma cell line. Journal of Clinical and Experimental Hepatology. 1(2): 57-67.
- Kunle, O.F., Egharevba, H.O. and Ahmadu, P.O. 2012. Standardization of herbal medicines-A review. International Journal of Biodiversity and Conservation. 4(3): 101-112.
- Lee, E.J., Kim, J.S., Kim, H.P., Lee, J.H. and Kang, S.S. 2010. Phenolic constituents from the flower buds of *Lonicera japonica* and their 5-lipoxygenase inhibitory activities. Food Chemistry. 120(1): 134-139.



- Lee, S.H., Jaganath, I.B., Wang, S.M. and Sekaran, S.D. 2011. Antimetastatic effects of *Phyllanthus* on human lung (A549) and breast (MCF-7) cancer cell lines. PLoS one **6(6)**: e20994.
- Li, P.G., Xu, J.W., Ikeda, K., Kobayakawa, A., Kayano, Y., Mitani, T., Ikami, T. and Yamori, Y. 2005. Caffeic acid inhibits vascular smooth muscle cell proliferation induced by angiotensin II in stroke-prone spontaneously hypertensive rats. Hypertension Research **28(4)**: 369-377.
- Lima, C.F., Fernandes-Ferreira, M. and Pereira-Wilson, C. 2006. Phenolic compounds protect HepG2 cells from oxidative damage: relevance of glutathione levels. Life Sciences. **79(21)**: 2056-2068.
- Londhe, J.S., Devasagayam, T.P., Foo, L.Y. and Ghaskadbi, S.S. 2008. Antioxidant activity of some polyphenol constituents of the medicinal plant *Phyllanthus amarus* Linn. Redox Report. **13(5)**: 199-207.
- Maciel, M., Cunha, A., Dantas, N. and Kaiser, C. 2007. NMR characterization of bioactive lignans from *Phyllanthus amarus* Schum and Thonn. Journal of Magnetic Resonance Imaging. **6(3)**: 76-82.
- Mahat, M. and Patil, B. 2007. Evaluation of antiinflammatory activity of methanol extract of *Phyllanthus amarus* in experimental animal models. Indian Journal of Pharmaceutical Sciences **69(1)**: 33.
- Mathuria, N. and Verma, R.J. 2007. Curcumin ameliorates aflatoxin-induced lipid peroxidation in liver, kidney and testis of mice-an in vitro study. Acta Poloniae Pharmaceutica. **64(5)**: 413-416.
- Mersch-Sundermann, V., Knasmüller, S., Wu, X.J., Darroudi, F. and Kassie, F. 2004. Use of a human-derived liver cell line for the detection of cytoprotective, antigenotoxic and cogenotoxic agents. Toxicology. **198(1-3)**: 329-340.
- Moronkola, D.O., Ogunwande, I.A., Oyewole, I.O., Başer, K.H.C., Ozek, T. and Ozek, G. 2009. Studies on the volatile oils of *Momordica charantia* L. (Cucurbitaceae) and *Phyllanthus amarus* Sch. et Thonn (Euphorbiaceae). Journal of Essential Oil Research. **21(5)**: 393-399.
- Mukazayire, M.J., Allaey, V., Buc Calderon, P., Stevigny, C., Bigendako, M.J. and Duez, P. 2010. Evaluation of the hepatotoxic and hepatoprotective effect of Rwandese herbal drugs on *in vivo* (guinea pigs barbiturate-induced sleeping time) and *in vitro* (rat precision-cut liver slices, PCLS) models." Experimental and Toxicologic Pathology. **62(3)**: 289-299.



- Murugaiyah, V. and Chan, K.L. 2007. Determination of four lignans in *Phyllanthus niruri* L. by a simple high-performance liquid chromatography method with fluorescence detection. Journal of Chromatography A. **1154**(1): 198-204.
- Nayak, P.S. 2011. Quantitative determination of phyllanthin in *Phyllanthus amarus* by high-performance thin layer chromatography. Boletin Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas **9**(5): 353-358.
- Oonsivilai, R., Cheng, C., Bomser, J., Ferruzzi, M.G. and Ningsanond, S. 2007. Phytochemical profiling and phase II enzyme-inducing properties of *Thunbergia laurifolia* Lindl. (RC) extracts. Journal of Ethnopharmacology. **114**(3): 300-306.
- Oonsivilai, R., Ferruzzi, M. and Ningsanond, S. 2008. Antioxidant activity and cytotoxicity of Rang Chuet (*Thunbergia laurifolia* Lindl.) extracts. Asian Journal of Food and Agro-Industry. **1**(02): 116-128.
- Palipoch, S., Jiraungkoorskul, W., Tansatit, T., Preyavichyapugdee, N., Jaikua, W. and Kosai, P. 2011. Protective efficiency of *Thunbergia laurifolia* leaf extract against lead (II) nitrate-induced toxicity in *Oreochromis niloticus*. Journal of Medicinal Plants Research. **5**(5): 719-728.
- Patel, J.R., Tripathi, P., Sharma, V., Chauhan, N.S. and Dixit, V.K. 2011. *Phyllanthus amarus*: ethnomedicinal uses, phytochemistry and pharmacology: a review. Journal of Ethnopharmacology. **138**(2): 286-313.
- Phattanawasin, P., Sotaphun, U., Sukwattanasinit, T., Akkarawarathorn, J. and Kitchaiya, S. 2012. Quantitative determination of sibutramine in adulterated herbal slimming formulations by TLC-image analysis method. Forensic Science International. **219**(1-3): 96-100.
- Pramyothin, P., Chirdchupunsare, H., Rungsipat, A. and Chaichantipyuth, C. 2005. Hepatoprotective activity of *Thunbergia laurifolia* Linn extract in rats treated with ethanol: *In vitro* and *in vivo* studies. Journal of Ethnopharmacology. **102**(3): 408-411.
- Pramyothin, P., Ngamtin, C., Pongshompoo, S. and Chaichantipyuth, C. 2007. Hepatoprotective activity of *Phyllanthus amarus* Schum. et. Thonn. extract in ethanol treated rats: *in vitro* and *in vivo* studies." Journal of Ethnopharmacology. **114**(2): 169-173.
- Purnima, M., and Gupta, P. 1978. Colouring matters from the flowers of *Thunbergia laurifolia*. Journal of Indian Chemistry Society. **55**: 622-623.
- Raphael, K.R. and Kuttan, R. 2003. Inhibition of experimental gastric lesion and inflammation by *Phyllanthus amarus* extract. Journal of Ethnopharmacology. **87**(2-3): 193-197.



- Sarin, B., Verma, N., Martin, J.P. and Mohanty, A. 2014. An overview of important ethnomedicinal herbs of *Phyllanthus* species: present status and future prospects. The Scientific World Journal 2014.
- Satake, T., Kamiya, K., Saiki, Y., Hama, T., Fujimoto, Y., Kitanaka, S., Kimura, Y., Uzawa, J., Endang, H. and Umar, M. 1999. Studies on the constituents of fruits of *Helicteres isora* L." Chemical and Pharmaceutical Bulletin-Tokyo- 47: 1444-1447.
- Shanker, K., Singh, M., Srivastava, V., Verma, R., Gupta, A. and Gupta, M. 2011. Simultaneous analysis of six bioactive lignans in *Phyllanthus* species by reversed phase hyphenated high performance liquid chromatographic technique. Acta Chromatographica. 23(2): 321-337.
- Shanmugam, S., Manikandan, K. and Rajendran, K. 2009. Ethnomedicinal survey of medicinal plants used for the treatment of diabetes and jaundice among the villagers of Sivagangai District, Tamilnadu. Ethnobotanical Leaflets 2009(1): 22.
- Singh, A.K., Pandey, M., Singh, S., Singh, A.K. and Singh, U. 2008. Antifungal activity of securinine against some plant pathogenic fungi. Mycobiology 36(2): 99-101.
- Singh, M., Tiwari, N., Shanker, K., Verma, R.K., Gupta, A.K. and Gupta, M.M. 2009. Two new lignans from *Phyllanthus amarus*. Journal of Asian Natural Products Research. 11(6): 562-568.
- Somanabandhu, A., Nitayangkura, S., Mahidol, C., Ruchirawat, S., Likhitwitayawuid, K., Shieh, H.L., Chai, H., Pezzuto, J.M. and Cordell, G.A. 1993. 1H- and 13C-NMR assignments of phyllanthin and hypophyllanthin: lignans that enhance cytotoxic responses with cultured multidrug-resistant cells. Journal of Natural Products. 56(2): 233-239.
- Suwanchaikasem, P. 2011. DNA fingerprints, chromatographic patterns and bioactivities of "Rang Chuet". Master's Thesis, Chulalongkorn University.
- Suwanchaikasem, P., Phadungcharoen, T. and Sukrong, S. 2013. Authentication of the Thai medicinal plants sharing the same common name 'Rang Chuet': *Thunbergia laurifolia*, *Crotalaria spectabilis*, and *Curcuma* aff. *amada* by combined techniques of TLC, PCR-RFLP fingerprints, and antioxidant activities. ScienceAsia. 39: 124-133.
- Tachakittirungrod, S., Okonogi, S. and Chowwanapoonpohn, S. 2007. Study on antioxidant activity of certain plants in Thailand: Mechanism of antioxidant action of guava leaf extract. Food Chemistry. 103(2): 381-388.
- Tangpong, J. and Satarug, S. 2010. Alleviation of lead poisoning in the brain with aqueous leaf extract of the *Thunbergia laurifolia* (Linn.). Toxicology Letters. 198(1): 83-88.



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- Tejasen, P. and Thongthapp, C. 1980. The study of the insecticide antitoxicity of *Thunbergia laurifolia* Linn. Chiang Mai Medical Bulletin. **19**: 105-114.
- Thabrew, M., Hughes, R.D. and Mcfarlane, I.G. 1997. Screening of hepatoprotective plant components using a HepG2 cell cytotoxicity assay. Journal of Pharmacy and Pharmacology **49**(11): 1132-1135.
- Thongsaard, W. and Marsden, C.A. 2002. A herbal medicine used in the treatment of addiction mimics the action of amphetamine on in vitro rat striatal dopamine release. Neuroscience Letters. **329**(2): 129-132.
- Tripathi, A.K., Verma, R.K., Gupta, A.K., Gupta, M.M. and Khanuja, S.P. 2006. Quantitative determination of phyllanthin and hypophyllanthin in *Phyllanthus* species by high-performance thin layer chromatography. Phytochemical Analysis **17**(6): 394-397.
- Verma, R.J. and Mathuria, N. 2008. Curcumin ameliorates aflatoxin-induced lipid-peroxidation in liver and kidney of mice. Acta Poloniae Pharmaceutica **65**: 195-202.
- Walaiphachara, N. 1994. Effect of Phyllanthus Amarus on Carbon Tetrachloride (CCl₄) Induced Hepatotoxicity in Rats. Master's Thesis, Mahidol University.
- Wang, H., Feng, F., Zhuang, B.Y. and Sun, Y. 2009. Evaluation of hepatoprotective effect of Zhi-Zi-Da-Huang decoction and its two fractions against acute alcohol-induced liver injury in rats. Journal of Ethnopharmacology. **126**(2): 273-279.
- Wongnawa, M., Thana, P., Bumrungwong, N., Nitiruangjarat, A., Muso, A. and Prasartthong, V. 2005. Effect of *Phyllanthus amarus* Schum. & Thonn. and its protective mechanism on paracetamol hepatotoxicity in rats. Acta Horticulturae **680**: 195-201.
- Wonkchalee, O., Boonmars, T., Aromdee, C., Laummaunwai, P., Khunkitti, W., Vaeteewoottacharn, K., Sriraj, P., Aukkanimart, R., Loilome, W., Chamgramol, Y., Pairojkul, C., Wu, Z., Juasook, A. and Sudsarn, P. 2012. Anti-inflammatory, antioxidant and hepatoprotective effects of *Thunbergia laurifolia* Linn. on experimental opisthorchiasis. Parasitology Research. **111**(1): 353-359.
- Yadav, N.P., Pal, A., Shanker, K., Bawankule, D.U., Gupta, A.K., Darokar, M.P. and Khanuja, S.P.S 2008. Synergistic effect of silymarin and standardized extract of *Phyllanthus amarus* against CCl₄-induced hepatotoxicity in *Rattus norvegicus*. Phytomedicine **15**(12): 1053-1061.
- Zakhari, S. 2006. Overview: how is alcohol metabolized by the body? Alcohol Research and Health. **29**(4): 245-254.



Zheng, S., Yumei, F. and Chen, A. 2007. De novo synthesis of glutathione is a prerequisite for curcumin to inhibit hepatic stellate cell (HSC) activation. Free Radical Biology and Medicine. **43**(3): 444-453.



APPENDIX

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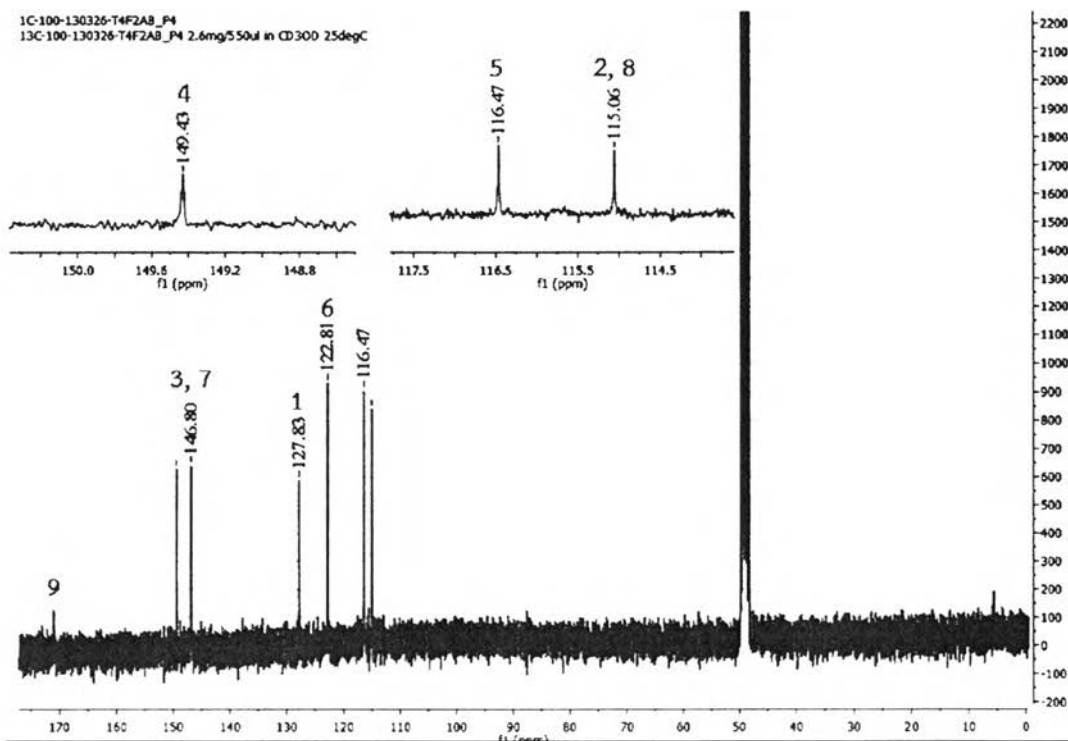
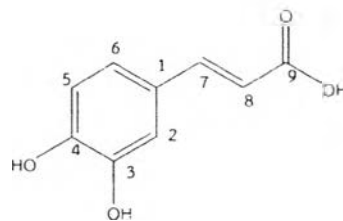


Figure A1 ^{13}C NMR (75 MHz) Spectrum of compound T4F2AB (in CD_3OD)



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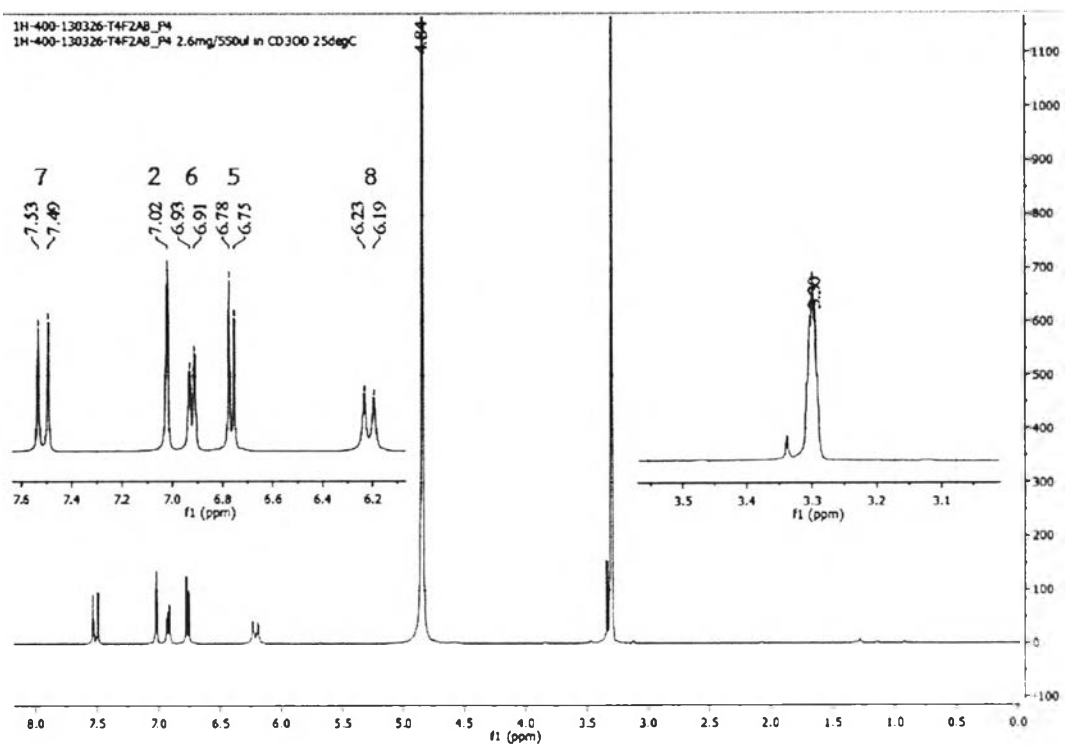
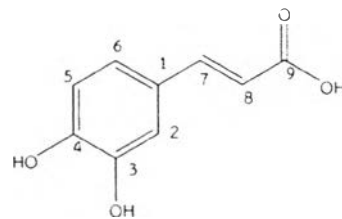


Figure A2 ¹H NMR (300 MHz) Spectrum of compound T4F2AB (in CD₃OD)



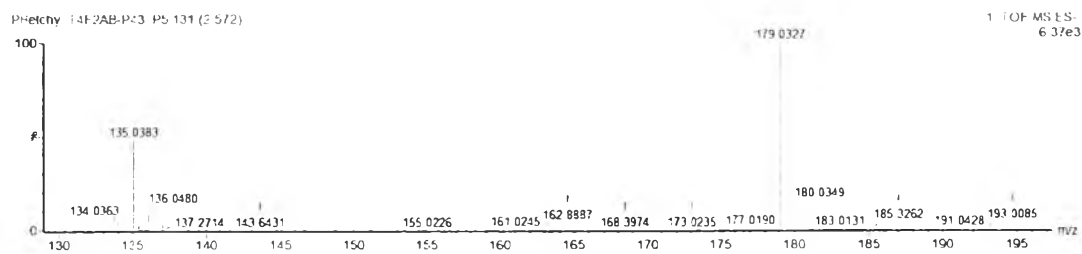
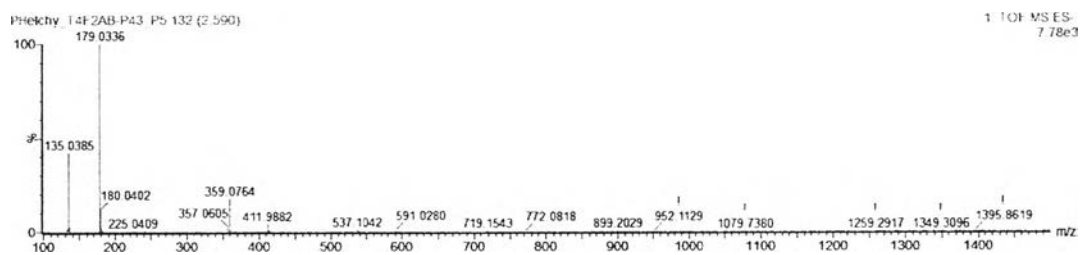
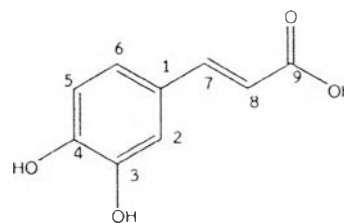


Figure A3 ESI Mass spectrum of compound T4F2AB



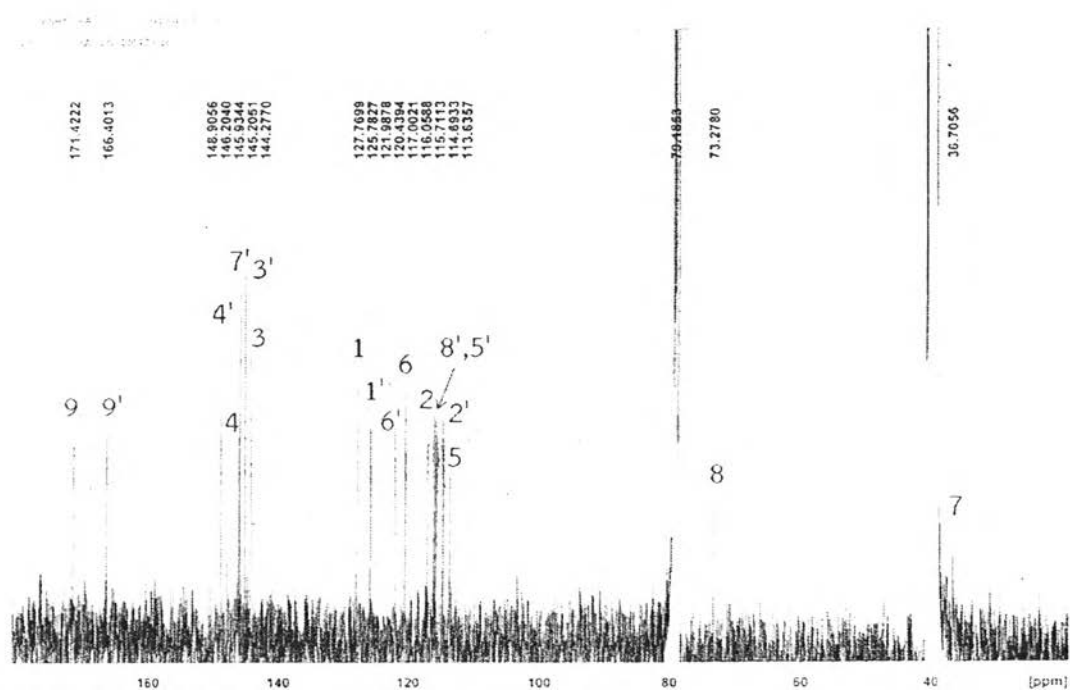
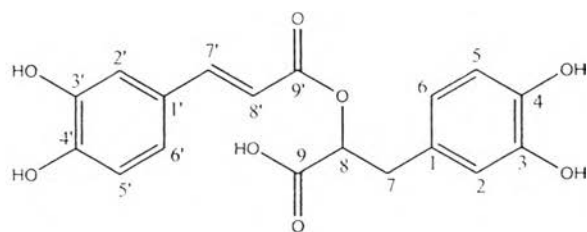


Figure A4 ^{13}C NMR (75 MHz) Spectrum of compound T5F5 (in $\text{DMSO-}d_6$)

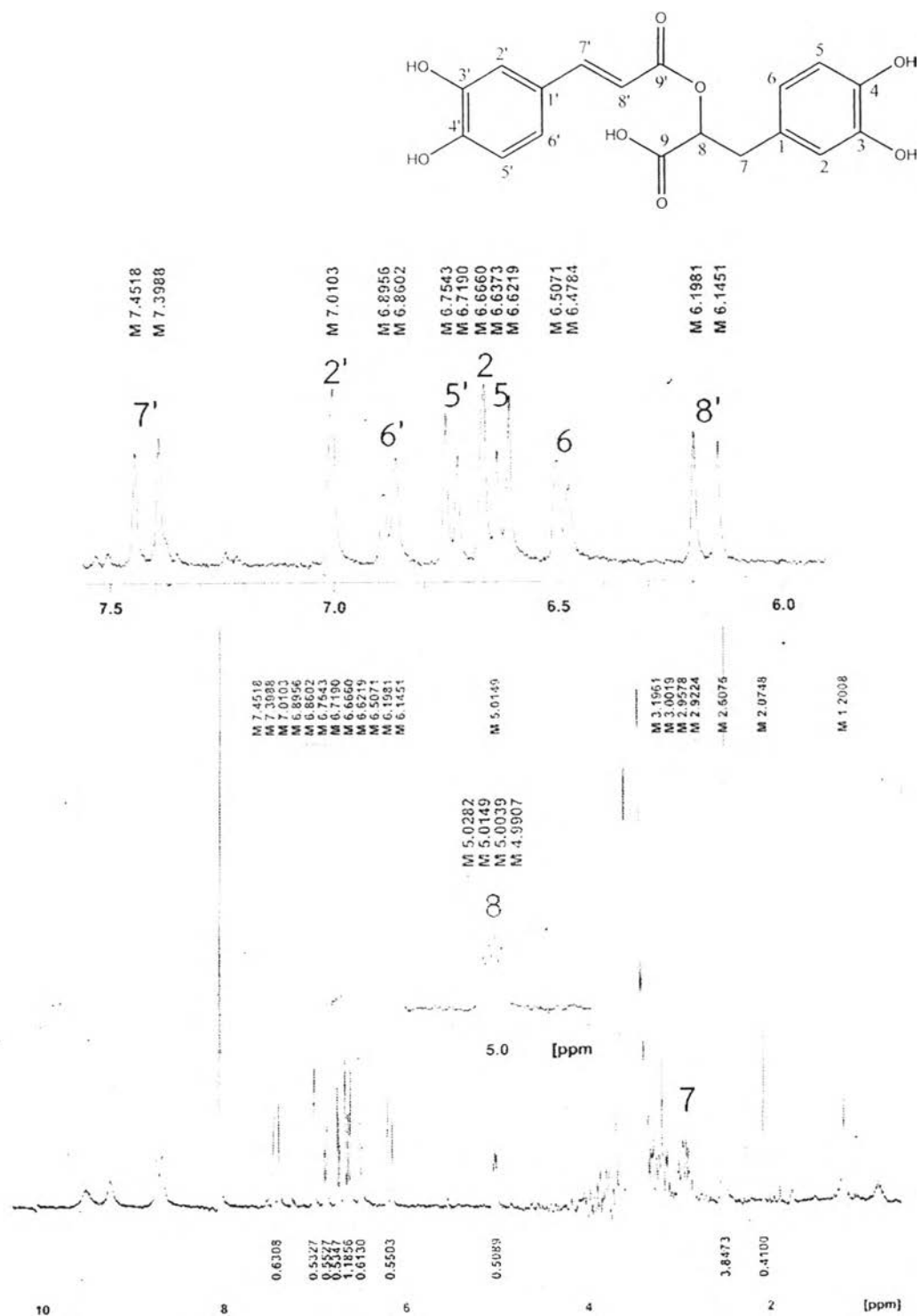
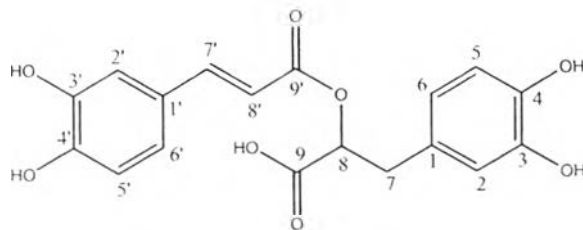


Figure A5 ^1H NMR (300 MHz) Spectrum of compound T5F5 (in $\text{DMSO-}d_6$)



Mass Spectrum List Report

Analysis Info

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 Sample Name RA
 RA

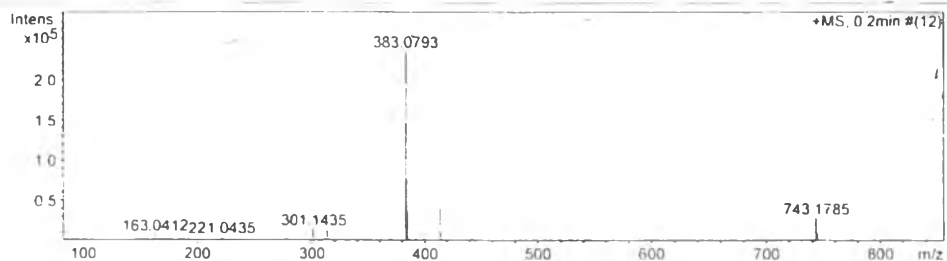
Acquisition Date: 6/5/2014 2:21 58 PM
 Operator Administrator
 Instrument micrOTOF 72

Acquisition Parameter

Source Type ESI
 Scan Range n/a
 Scan Begin 50 m/z
 Scan End 3000 m/z

Ion Polarity Positive
 Capillary Exit 150.0 V
 Hexapole RF 90.0 V
 Skimmer 1 45.5 V
 Hexapole 1 25.0 V

Set Corrector Fill 79 V
 Set Pulsar Pull 406 V
 Set Pulsar Push 388 V
 Set Reflector 1300 V
 Set Flight Tube 9000 V
 Set Detector TOF 1910 V



#	m/z	I	1%	S/N	FWHM	Res
1	163.0412	7550	3.2	902.0	0.0272	6000
2	185.0229	3247	1.4	294.6	0.0293	6308
3	188.0718	1545	0.7	135.6	0.0289	6497
4	221.0435	4795	2.0	312.1	0.0333	6532
5	245.0793	2121	0.9	116.0	0.0341	7177
6	277.1589	2935	1.3	132.5	0.0404	6853
7	301.1435	14404	6.2	573.4	0.0437	7046
8	302.1467	3427	1.0	96.4	0.0446	7388
9	311.1685	2566	1.1	97.7	0.0454	6848
10	313.1802	13029	5.6	492.2	0.0422	7419
11	314.1838	2335	1.0	87.7	0.0442	7112
12	317.1778	2087	0.9	77.3	0.0521	6084
13	333.1540	2234	1.0	77.2	0.0507	6565
14	360.3282	3816	1.6	134.2	0.0470	7668
15	381.3002	1870	0.8	69.3	0.0606	6287
16	383.0793	234309	100.0	8759.7	0.0544	7044
17	384.0821	36335	15.5	1361.8	0.0518	7414
18	385.0831	5738	2.4	215.4	0.0506	7609
19	391.3558	3005	1.3	114.6	0.0586	6676
20	393.3025	1753	0.7	67.1	0.0563	6981
21	399.0525	8848	3.8	345.3	0.0569	7016
22	400.0553	1733	0.7	67.6	0.0560	7140
23	405.0617	2435	1.0	96.5	0.0552	7341
24	413.2717	40662	17.4	1654.1	0.0554	7465
25	414.2743	8915	3.8	363.5	0.0566	7317
26	441.3025	7769	3.3	344.0	0.0593	7444
27	442.3074	1848	0.8	81.8	0.0630	7016
28	743.1785	28418	12.1	2829.2	0.1261	5895
29	744.1809	9501	4.1	948.0	0.1273	5846
30	745.1865	1973	0.8	195.8	0.1378	5408

Figure A6 ESI Mass spectrum of compound T5F5

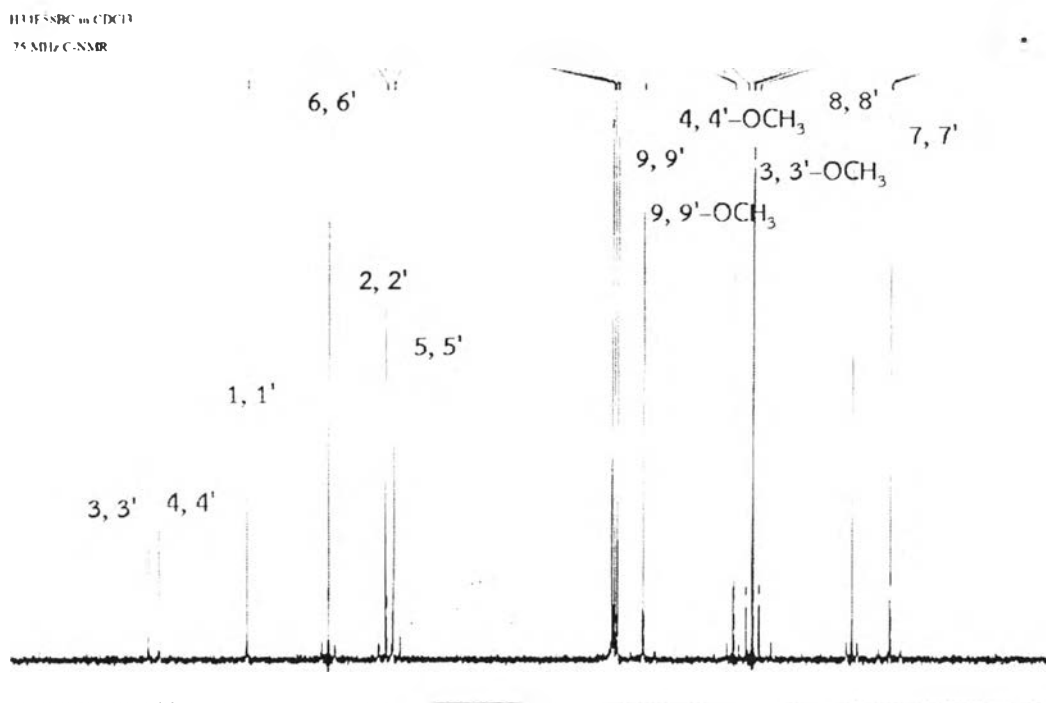
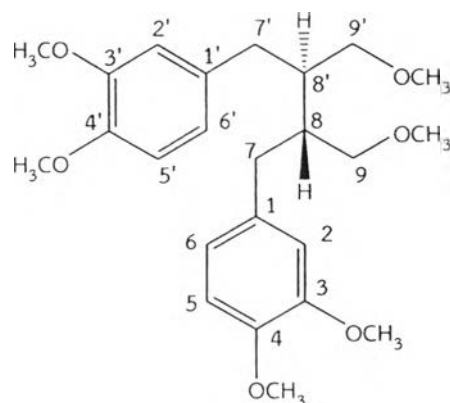


Figure A7 ¹³C NMR (75 MHz) Spectrum of compound H34F58BC (in CDCl₃)



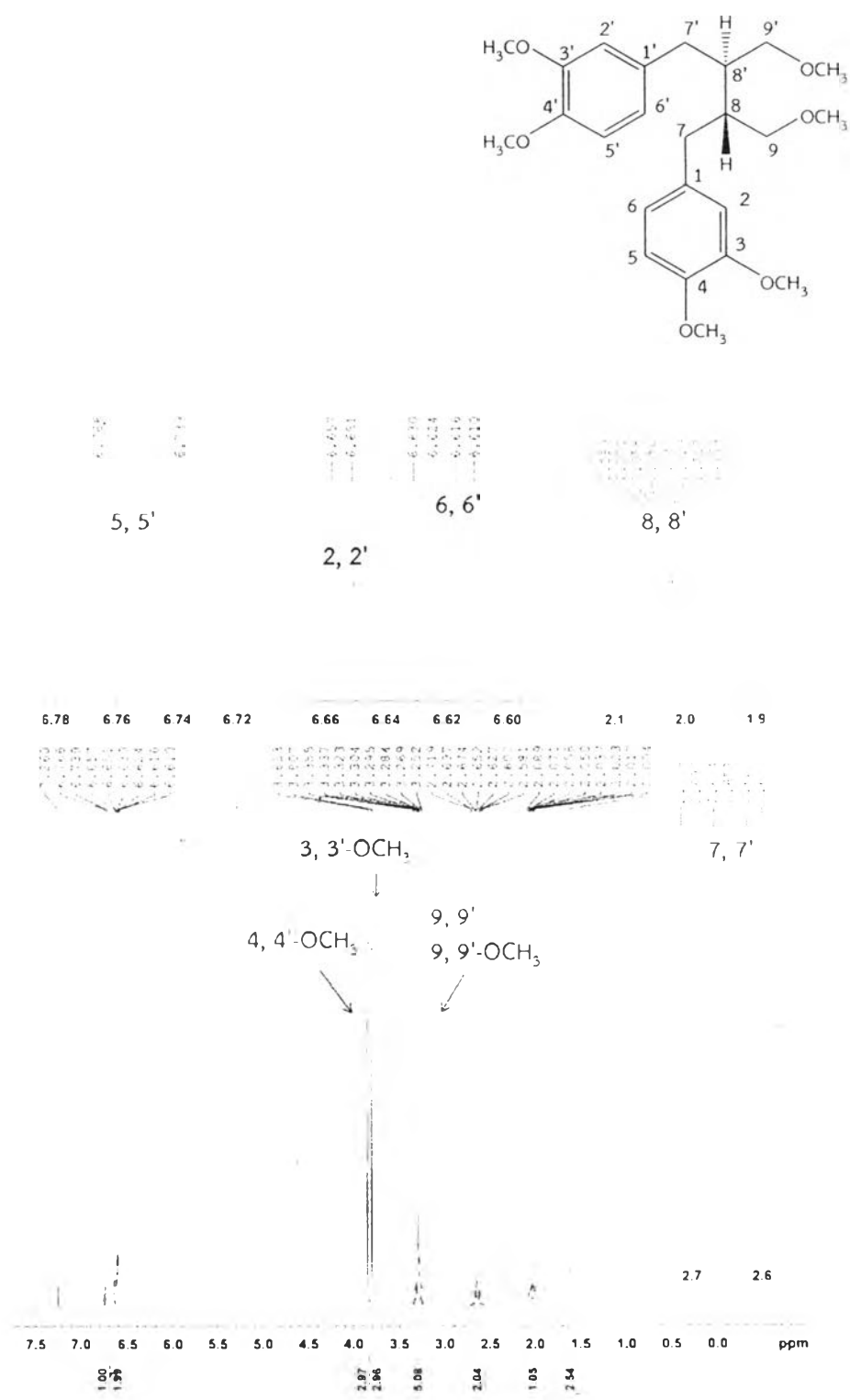
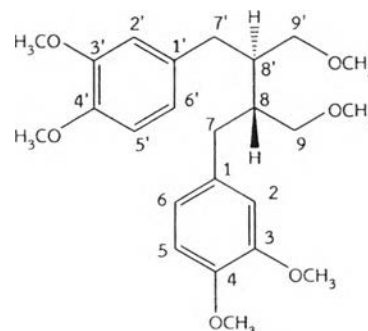


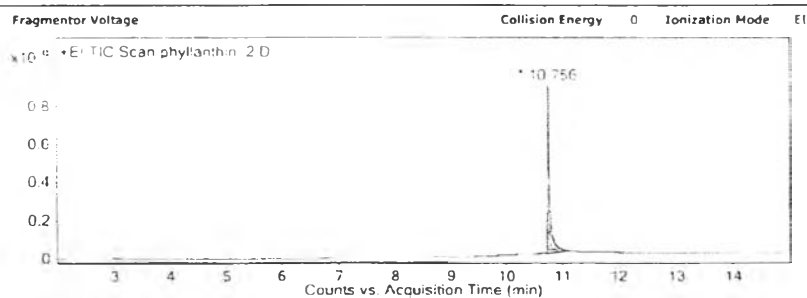
Figure A8 ^1H NMR (300 MHz) Spectrum of compound H34F58BC (in CDCl_3)



Qualitative Analysis Report

Data Filename	phyllanthin_2.D	Sample Name	phyllanthin_2
Sample Type		Position	1
Instrument Name	GCQQQ	User Name	Paweena Ekkaphan
Acq Method	20140718_Phyllanthin_Phakaporn_CU.M	Acquired Time	7/18/2014 12:53:26 PM
IRM Calibration Status	Not Applicable	DA Method	default.m
Comment			
Expected Barcode		Sample Amount	
Dual Inj Vol	1	TuneName	atunes_eex.tune.xml
TunePath	D:\MassHunter\GCMS\1\7000	TuneDateStamp	6/17/2014 1:25:15 AM
MSFirmwareVersion	DSP: 7000.2900.030Server: G.7000.044-RUN	OperatorName	Paweena Ekkaphan
RunCompletedFlag	True	Acquisition SW Version	MassHunter GC/MS Acquisition B.07.00 SP2.1654 29 Aug 2013 Copyright © 1989-2013 Agilent Technologies, Inc.

User Chromatograms



Integration Peak List

Peak	Start	RT	End	Height	Area	Area %
1	10.71	10.756	11.144	889494136.2	2643387608	100

User Spectra

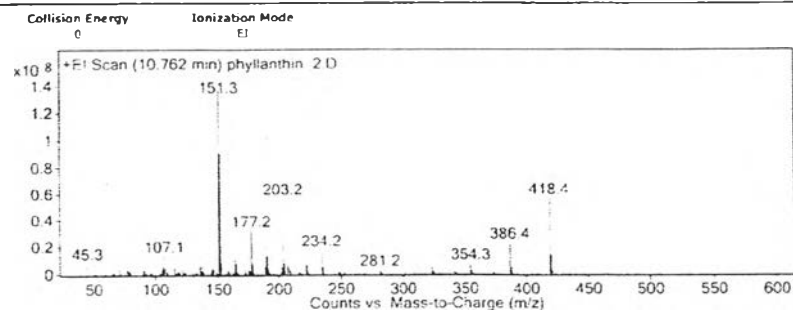


Figure A9 ESI Mass spectrum of compound T5F5



VITA

Miss Pakabhorn Ketmongkhonsit was born on July 31, 1984 in Bangkok, Thailand. She received her B.Sc. in Chemistry in 2006 from the Faculty of Science and Technology, Rajabhat Bansomdejchaopraya University. She was a recipient of THE 90th ANNIVERSARY OF CHULALONGKORN UNIVERSITY FUND (Ratchadaphiseksomphot Endowment Fund) in the year 2010.

Poster presentation

Ketmongkhonsit P. and Chaichantipyuth C. Chemical substances from *Phyllanthus amarus* schum.&thonn. and anti-hepatotoxic activity. Presented at the 9th NRCT-JSPS Joint Seminar “Natural Medicine Research for the Next Decade: New Challenges and Future Collaboration”, December 8-9, 2010, Bangkok, Thailand.

