

## References

- Abraham, N. G., Tsenovoy, P. L., McClung, J., Drummond, G. S. (2008). Heme oxygenase: A target gene for anti-diabetic and obesity. *Current Pharmaceutical Design* 14: 412 – 421.
- Abreu, P. M., Martins, E. S., Kayser, O., Bindseil, K.-U., Siems, K., Seemann, A. & Frevert, J., (1999). Antimicrobial, antitumor and antileishmania screening of medicinal plants from Guinea-Bissau. *Phytomedicine* 6(3): 187–195.
- Acanthus ilicifolius*  
Available [http:// tidechaser.blogspot.com](http://tidechaser.blogspot.com) (February, 2011)
- Adeneye, A. A., Ajagbonna, O. P., Adeleke, T. I., Bello, S.O. (2006). Preliminary toxicity and phytochemical studies of the stem bark of *Musanga cecropiodes* in rats. *Journal of Ethnopharmacology* 105: 374 – 379.
- Aeplakorn, W., Stolk, R. P., Neal, B., Suriyawongpaisal, P., Chongsuvivatwong, V., Cheepudomwits, S., Woodward, M. (2003). The prevalence and management of diabetes in Thai Adults. The International Collaborative Study of Cardiovascular disease in Asia. *Diabete Care* 26: 2758 – 2763.
- Ahmadu, A., Haruna A.K., Magaji G. and Yaro A. H. (2003): Antispasmodic actions of the leaves of *Daniellia oliveri*. *Nigerian Journal of Natural Products and Medicine*. 7: 13 – 15.
- Ahmadu, A., Haruna A.K., Garba M., Ehinmidu J.O. and Sarker S. D. (2004): Phytochemical and antimicrobial activities of the *Daniellia oliveri* leaves. Intergrated Taxonomic Information System (ITIS) for ITIS Taxonomic Serial Number 506247.

- Akpata, E. S., Akinrimimi, E. O. (1977). Antibacterial activity of extract from African chewing sticks. *Oral Surgery, Oral Medicine, Oral Pathology* 44(5): 717 – 722.
- Akobundu, I O. and Agyaka C.W. (1987): *A hand book of West African Weeds. International Institute of Tropical Agriculture. Pp 222 – 223.*
- Alarcon-Aguilara, F. J., Jimenez-Estrada, M., Reyes-Chilpa, R., Roman-Ramos, R. 2000. Hypoglycemic activity of root water decoction, sesquiterpenoids and one polysaccharide fractions from *Psacalium decompositum* in mice. *Journal of Ethnopharmacology* 69:207 – 215.
- Alessia, P. Gaetanobi. P, Ugoa, T. (2009). Triterpenoids as new promising anticancer drugs. *Anticancer Drugs* 20(10): 880 – 892.
- Aliero, B. L., Umar, M. A., Suberu, H.A., Abubakar, A. (2001). A hand Book of common plant in Northern Western Nigeria pp. 78.
- American Diabetes Association (2002). National Diabetes Fact Sheet. In: Adibe, M. O., Aguwa, C. N., Ukwe, C. V., Okonta, J. M., Udegaranya, P. O. (2009). Outpatient utilization of anti-diabetic drugs in South Eastern Nigeria. *Int J. Drug Dev & Res* 1(1): 27 – 36.
- Ambroma malvaceae*  
Available <http://envis.frlht.org> (March, 2011)
- Ammomum krevanh* Pierre  
Available [http://www.biogang.net/biodiversity\\_view.php?menu=biodiversity&uid=1518&id=8162](http://www.biogang.net/biodiversity_view.php?menu=biodiversity&uid=1518&id=8162) (June, 2011)
- Andres, E., Noel, E. and Goichot, B., (2000), “Metformin - associated vitamin B<sub>12</sub> deficiency”. *Arch Intern Med* 162(19): 2251-2.

Anderson, R. A., Polansky, M. M. (2002). Tea enhances insulin activity. *Journal of Agric Chemistry* 50: 7182 – 7186.

*Anogeissus acuminata*

Available <http://plantspedia.wikia.com/wiki/Category:Anogeissus> (10 February, 2011)

*Anogiessus leiocarpus*

Available [http://www.prota4u.org/protav8.asp?h=M4&t=Anogeissus, leiocarpa](http://www.prota4u.org/protav8.asp?h=M4&t=Anogeissus,leiocarpa) &p=Anogeissus+leiocarpa (June, 2011)

Anu, C., Abbas, A. M., Sohail, A., Raj Kumar, S., (2007). Indian herbs results in hyperglycemic responses in streptozocin induced diabetic rats. *Nutrition Research*. 27:161-168.

Anturlikar, S. D., Gopumadhaven, S., Chauham, B. L., Mitra, S. K. 1995. Effect of D-400 a herbal formulation on blood sugar of normal and alloxan – induced diabetic rats. *Indian Journal of Physiology and Pharmacology* 39(2):95 – 100.

Arthorn, R., Wongsathit, C., Wachara, R., *et al.*, (1993). The Study on Using Medicinal Plants for Self-Treatment of Diabetes Mellitus Patients Attended at Community Hospitals in Nakhonpathom Province. *Bulletin of the Department of Medical Services* 18: 232-8.

Arbonnier, M. (2004). *Trees, Shrubs and Lianas of West African Dry Zones*. Quae. ISBN 2876145790.

Artanti, N., Ma'arifa, Y., Hanafi, M. (2006). Isolation and identification of active antioxidant compounds from star fruit (*Averrhoa carambola*) Mistletoe (*D. pentandra*) (L.) Miq. Ethanol extract. *Journal of Applied Science* 6(8): 1659 – 1663.

- Asayama, K., English, D., Slonim, A. E. (1984). Chemoluminescence as an index of drug induced free radical production in pancreatic islet. *Diabetes* 33:160.
- Atsumi, T., S. Fujisawa and K. Tonosaki, 2005. A comparative study of the antioxidant/prooxidant activities of eugenol and isoeugenol with various concentrations and oxidation condition. *Toxicology In Vitro*, 19: 1025-1033.
- Auletta, C. S. (2002). Acute, subchronic and chronic toxicology. In: Derelamko, M. I., Hollinger, M. A. editors. *Handbook of Toxicology*. U.S.A. CRC Press Inc. Pp. 69 – 126.
- Bailey, C. J., Day, C. (2004). Metformin: its botanical background. *Practical Diabetes International*. 21(3):115–7.
- Bailey, C. J., Turner, R. C., (1996). Metformin. *New England Journal of Medicine* 334:574-9.
- Bajaj, M., Suraamornkul, S., Pratipanawatr, T., Hardies, L. J., Pratipanawatr, W., Glass, L., Cersosimo, E., Miyazaki, Y., DeFronzo, R. A. (2003). Pioglitazone reduces hepatic fat content and augments splanchnic glucose uptake in patients with type 2 diabetes. *Diabetes* 52:1364–1370.
- Barda J.S. (2011). The Body Hunters: How the Drug Industry Tests its Products on the World's Poorest Patients. *The American Journal of Bioethics*, 8: 2, 52 — 53, First published on: 01February 2008 (iFirst). DOI: 10.1080/15265160802074872
- Bell, D. S. H. (2002). Current status of diabetes treatment: side effects of oral anti-diabetic agents. *South Med. J.* 95(1).Bensky, D., Gamble, A. (1993). *Chinese Herbal Medicine: Materia Medica*, 1993 rev. ed., Eastland Press, Seattle, WA.

- Biapa, N. P. C., Kuate, J. R., Wankeu, M., Ntiokam, D. (2010). Acute and subacute toxicity studies of *Zingiber officinalis* Roscoe essential oil on mice (Swiss) and Rats (Wistar). *African Journal of Pharmacological Science and Pharmacy* 1(1): 39 – 49.
- Bizimana, N. (1994). *Traditional Veterinary Practice in Africa*. German Technical Cooperation. ISBN 3880855021.
- Blake, S. (2004). Medicinal Plant Actions. [www.naturalhealthwizard.com](http://www.naturalhealthwizard.com).
- Bojang, L. (2000): Plant genetic resources for wild fruits/trees. In Mamneh B.(ed.) National Conference on the State of Plant Genetic Resource in Gambia. Proceeding of a conference jointly organized by NARI, DOF, NEA and GAFNA Feb. 2000.
- Bonner-Weir, S., Trent, D. F., Weir, G. C. (1983). Partial pancreatectomy in the rat and subsequent defect in glucose- induced insulin release. *J Clin Invest* 71:1544.
- Bowen, R., (1999). The structure of insulin. (Online resource).
- Boye, G. L., Ampofo, O. (1983). In Proceedings of the first international symposium on Cryptolepine. University of Science and Tachnology, Kumasi, Ghana.
- Buettner, G. R. (1993). The peckingorder of free radicals and antioxidants: Lipid peroxidation, alpha tocopherol and ascorbate. *Archives of Biochemistry Biophysics* 300: 535 – 543
- Bun, S., Laget, M., Chea, A., Bun, H., Ollivier, E., Elias, R. (2009). Cytotoxic activity of alkaloids isolated from *Stephania rotunda* in vitro cytotoxic activity of cepharanthine. *Phytotherapy Research* 23(4): 587–590.

- Bunyapraphatsara, N. (1999). Medicinal plants indigenous to Thailand vol.3 (In Thai). Mahidol University, Bangkok: Prachachon Ltd. p. 540.
- Burkill, H.M. (1985): The useful plants of West Tropical Africa, Vol.3. Published by Royal Botanic Gardens, Kew (K).
- Beer, S. F. et al. (1989). The effect of a 72 h fast on plasma levels of pituitary, adrenal, thyroid, pancreatic and gastro intestinal hormone in health men and women. *Journal of Endocrinology* 120(2): 337 – 350.
- Briskin, D. P. (2000). Medicinal plants and phytochemicals: Linking plant biochemistry and physiology 127: 507 – 514.
- Broadhurst, C. L., Polansky, M. M., Anderson, R. A. (2000). Insulin like biological activity of culinary and medicinal plant aqueous extracts in vitro. *J Agric Food Chem.*, 48(3): 849 – 852.
- Catunaregam tormentosa*  
Available <http://chm-Thai.onep.go.th> (February, 2011)
- Carr, T. P., Jesch, E. D. (2006). Food component that reduce cholesterol absorption. *Advances in Food and Nutrition Research*. 51:165 – 204.
- Chamratpan, S., Homchuen, S. (2010). Ethnobotany in upper Northeastern Thailand  
Available <http://www.whitelotusaromatics.com> (23 January, 2011).
- Chan, P. K., O'Hara, G. P., Hayes, A. W. (1982). Principles and methods for acute and subchronic toxicity. In Hayes, A. W. editor. Principles and methods in toxicology. New York Raven Press. Pp. 17 – 19.
- Chandrasekaran, C. V., Sundarajan, K., David, K., Agarwal, A. (2010). In vitro efficacy and safety of poly-herbal formulations. *Toxicology* 24: 885 – 897.

- Cheeseman, K. H., Slater, T. F. (1993). Free radical in Medicine. *Br Med Bull.* 49: 479 – 724. In: Mukherjee, P. K., Houghton, P. J. (2009). Evaluation of herbal medicinal products. Pharmaceutical Press. Pp. 261 – 264.
- Chen, X., Bai, X., Liu, Y., Tian, L., Zhou, J., Zhou, Q., Fang, J., Chen, J. (2009). Anti-diabetic effects of water extract and crude polysaccharides from tuberous root of *Liriope spicata* var. *prolifera* in mice. *Journal of Ethnopharmacology* 122: 205 – 209.
- Cheng, J. T., Hsu, F. L., Chen, H. F. (1993). Antihypertensive principles from the leaves of *Melastoma candidum*. *Planta Medica* 59(5): 405 – 406.
- Chuakul W, Saralamp P, Boonpleng A. (2002). Medicinal plants used in the Kutchum District, Yasothon province, Thailand. *Thai Journal of Phytopharmacy* 9(1): 23 -51.
- Cisneros, F. J., Jayo, M., Niedziela, L. (2005). An *Uncaria tormentosa* (cat's claw) extract protects mice against ozone-induced lung inflammation. *Journal of Ethnopharmacology* 96: 355 – 364.
- Coker, M. E., Emikpe, B. O., Adeniyi, B. A., Budale, B. A. (2009). The anti inflammatory potential, hematological and histological changes induced in rats due to the administration of methanolic extracts of *Ficus thonningii* leaves. *African Journal of Pharmacy and Pharmacology* 3(5):273–276.
- Covington, M. B. (2001). Traditional Chinese medicine in the treatment of diabetes. *Diabetes Spectrum*, 14(3): 154 – 159.
- Craig, W. J., (1999). Health promoting properties of common herbs. *American Journal of Clinical Nutrition* 70 (Suppl): 4915 – 95.

Cunha, W. R., Arantes, G. M., Ferreira, D. S., Lucarini, R., *et al.*, (2008).

Hypoglycemic effect of *Leandra lacunosa* in Normal and alloxan- induced diabetic rats. *Fitoterapia* 79: 356 – 360.

Creutzfeldt, W., Nauck, M. (1992). Gut hormones and diabetes mellitus. *Diabetes Metab Rev.* 8:149. In: Ellenberg and Rifkin's Diabetes Mellitus 6<sup>th</sup> Edition.

Porte, D. Sherwin, R. S., Baron, A. (2003). McGraw – Hill Medical Publishing Division. USA. Pp. 85 – 6.

*Curcuma zedoria* (Berg) Roscoe

Available <http://blog.taradkaset.com> (December, 2010)

*Cyprus rotundus*

Available <http://australianinsects.com/lepidoptera/plants/cype/cyperaceae.html>

(December, 2010)

Daduang, S. N., Sattayasai, J., Tophrom, P., Thammathaworn, A., Chaveerach, A.,

Konkchaiyaphum, M. (2005). "Screening of plants containing *Naja naja siamensis* cobra venom inhibitory activity using modified ELISA technique".

*Analytical Biochemistry* 341 (2): 316–325.

Dahare, D. K., Jain, A. (2010). Ethnobotanical studies on plant resources of Tahsil

Multai, District Betul, Pradesh, India. *Ethnobotanical Leaflets* 14: 694 – 705.

*Daniella oliveri* (Rolfe) Hutch & Dalz

Available <http://herbaria.plants.ox.ac.uk> (January, 2011)

Danthu, P., Soloviev, P., Gaye, A., Sarr, A., Seck, M., and Thomas, J. (2002).

Vegetative propagation of some West African *Ficus* species by cuttings.

*Agroforestry Systems* 55: 57 – 63.

David, L., Enrique, B., William, B., Michele, O. and James, N., (2002). Obesity and gender differences in the risk of type 2 diabetes mellitus in Uganda  
*Nutrition*. 18(5): 417- 421.

Deepak, D., Srivastav, S., Khare, N. K., Khare, A. (1996). Progress in the Chemistry of Organic Natural Products. PMID:8981834.

DeNoon, D. J. (2010). New study: Avandia Riskier than Actos. In: Martin, L. J. (2010). Diabetes Health Center. <http://diabetes.webmd.com/news/20100628/new-study-avandia-riskier-than-actos>

*Dendrophthoe pentandra*

Available at <http://garden-frenzy.blogspot.com/2011/03/sterculia-cordata.html>  
(March, 2011)

*Detarium macrocarpum* Harms

Available [http://database.prota.org/PROTAhtml/Detarium%20microcarpum\\_En.htm](http://database.prota.org/PROTAhtml/Detarium%20microcarpum_En.htm) (November, 2010)

*Detarium macrocarpum* Harms

Available at [http://www.cartographie.ird.fr/images/phyto\\_afri.pdf](http://www.cartographie.ird.fr/images/phyto_afri.pdf) (March, 2011)

Dharmananda, S. (2010). TURMERIC: What's in a name?

(<http://www.itmonline.org/arts/turmeri3.htm>)

Dièye, A.M., *et al.*, (2004). Medicinal plants and the treatment of diabetes in Senegal: survey with patients. *Fundamental & Clinical Pharmacology*.(www).

*Dioecrescis erythroclada*

Available <http://www.qsbg.org/index2Demo.asp> (March, 2011)

- Duweijua, M., Zeitlin, I. J. (1993). Plants as a source of anti-inflammatory substance. In: *Drugs from Natural products* eds, eds. Harvey, A. L., Ellis, H., Chichester, UK. Pp. 152- 167. In: Mukherjee, P. K., Houghton, P. J. (2009). Evaluation of herbal medicinal product. *Pharm Press*. UK. pp. 252.
- Duwiejua, M. and Zeitlin, I. J. (2003). Plants as a source of anti-inflammatory substances. In. *Drugs from natural products*, Eds. Harvey, A. L. Ellis Horwood, Chichester, UK, pp. 152- 167.
- Drucker, D. J., Nauck, M. A. (2006). "The incretin system: glucagon-like peptide-1 receptor agonists and dipeptidyl peptidase-4 inhibitors in type 2 diabetes". *Lancet* 368 (9548): 1696–705.
- Eugenia caryophyllum*
- Available at <http://www.viable-herbal.com/singles/Herbs/s835.htm> (March, 2011)
- European Prospective Investigation into Cancer and Nutrition (EPIC, 2011).
- Fahey, J. W. (2005). *Moringa oleifera*: A review of the medicinal evidence for its nutritional, therapeutic and prophylactic properties. Clinical studies.
- Farnsworth, N.R., Kinghorn, A.D., Soejarto, D.D., Waller, D.P., (1985). Siberian Ginseng (*Eleutherococcus senticosus*) current status as an Adaptogen. In: Wagner, H., Hikino, H., Farnsworth, N.R. (Eds.), *Economic and Medicinal Plant Research*, vol. 1. Academic Press, Orlando, FL, pp. 155–215.
- Feldman, J.M., (1985). Glyburide: A second generation sulfonylurea hypoglycemic agent. *Pharmacotherapy* 5:43-62.

Ferreira, P. MP., Farias, D. F., Oliveira, J. A., Carvalho, A. F. U. (2008). *Moringa oleifera*: bioactive compounds and nutritional potential. *Review of Nutrition Compinas* 21(4): 431 – 437.

Feng, Y., Wang, N., Zhu, M., Feng, Y., Li, H. and Tsao, S. (2011). Recent progress on anticancer candidates in patent of herbal medicinal product. *Recent Patents on food, Nutrition and Agriculture* 3: 30 – 48.

Fengli, H., Ruili, L., Bao, H., Liang, M. (2004). Free radical scavenging activity of extracts prepared from fresh leaves selected Chinese medicinal plants. *Fitoterapia* 75: 14 – 23.

*Ficus thonningii*

Available at <http://plants.usda.gov/java/profile?symbol=FITH2> (November, 2010)

Frankel, E. N. (1991). Recent advances in Lipid Oxidation. *J. Sci. Food Ag.* 54:495 – 511.

Fridrich, D., Glabasnia, A., Fritz, J., Esselen, M., Marko, D. (2009). Oak ellagitannins suppress the phosphorylation of the epidermal growth factor receptor in human colon carcinoma cells. *Journal of Agric and Food Chemistry* 56: 3010 – 3015.

Fritsche, K. L., Johnston, P. V. (1988). Rapid autoxidation of fish oil in diets without added antioxidants. *Journal of Nutrition* 118: 425 – 426.

Gad, S.C. and Chengelis, C.P. (1988) In, *Acute toxicity testing perspectives and horizons*. (S.C. Gad and C.P. Chengelis eds.) The Telford Press. Caldwell, N.J. pp. 2 - 4.

- Gao, L. M., Wei, X. M., Cheng, D. L., (2003). Oleanane triterpene saponins from *Clinopodium urticifolium*. *Chinese Chemical Letters* 14(10): 1041 – 1044.
- Genest, J. (1955). Clinical uses of *Rauwolfia*. *The Canadian Medical Association Journal* 72(7): 483 – 489.
- Ghasemzade, A., Jeafar, H.Z.E., Rahmat, A. (2011). Effects of solvent types on phenols and flavonoids content and antioxidant activities in two varieties of young ginger (*Zingiber officiale* Roscoe) extracts. *J Med Plant Res* 5(7): 1147 – 1154.
- Gidado, A., Ameh, D. A. and Atawodi, S. E. , (2005). Effect of *Nauclea latifolia* leaves aqueous extracts on blood glucose levels of normal and alloxan-induced diabetic rats. *African Journal of Biotechnology* 4: (1):91-93.
- Gouinguene, S. P. and Turlings, T. C.J. (2002). The effects of abiotic factors on induced volatile emissions in corn plants. *Plant Physiology* 129: 1296 – 1307.
- Gülçin, I., Elias, R., Gepdiremen, A., Chea, A., Topal, F. (2010). Antioxidant activity of bisbenzylisoquinoline alkaloids from *Stephania rotunda*: cepharanthine and fangchinoline. *Journal of Enzyme Inhibition and Medicinal Chemistry* 25(1):44-53.
- Gustavo, M. L., Villegas, L. F., Marcalo, A., Vaisberg, A. J., Hammond, G. B. (2006). *In vitro* wound healing activity of oleanolic acid derived from the acid hydrolysis of *Anredera diffusa*. *Journal of Natural Product* 69(6): 978 – 979.
- Ha, H., Lee, J. K., Lee, Y. H., Koh, S. W., Seo, S. C., Lee, M., Huang, D. S., Shin, H. (2010). Safety Evaluation of Yukmijihwang-tang: Assessment of Acute and sub-chronic toxicity in rats. *Evidence Based Complementary and Alternative Medicine* 2011: 1- 8.

- Ha, Y. W., Na, Y. C., Seo, J. J., Kim, S. N., Lindhardt, R. J., Kim, Y. S. (2006). Quantitative and qualitative determination of ten major saponins in *Platycodi Radix* by HPLC with ELSD and MS. *Journal of Chromatography A*. 1135 – 27 – 35.
- Haffner, S.M., Lehto, S., Rönnemaa, T., Pyörälä, K., Laakso, M., (1998). Mortality from coronary heart disease in subjects with type 2 diabetes and in nondiabetic subjects with and without prior myocardial infarction. *New England Journal of Medicine* 339: 229-234.
- Halim , E. M., Huassain, A. , Jamil, K., Rao, M. (2001). Preliminary studies on the hypoglycemic effect of *Abroma augusta* in alloxan diabetic rats. *Indian Journal of Clinical Biochemistry* 16(1): 77 – 80.
- Hanausek, M., Ganesh, P., Walaszek, Z., Amtzen, J. C., Slaga, T. J., Gutterman, J. U. (2001). Avicins, a family of triterpenoid saponins from *Acacia victoriae* (Benth), suppress H-ras mutations and aneuploidy in murin skin carcinogenesis model. *Medicinal Science PNAS* 98(20): 11551 – 11566.
- Hannele, Y.J., (2004). Thiazolidinediones. *New England Journal of Medicine* No. 11, Vol 351:1106- 1118.
- Hanson, R. L., Pratley, R. E., Bogardus, C. (2000). Evaluation of simple indices of insulin sensitivity and insulin secretion for use in epidemiologic studies. *American Journal of Epidemiology* 151:1512.
- Haque, M. E., Alan, M. B., Hossain, M. S. (2011). The efficacy of curcubitane type triterpenoids glycosides and phenolic compounds isolated from *Momordica charantia*. *International Journal of Pharmaceutical Science Research* 2(5): 1 – 12.

- Harisaranraj, R., Suresh, K., Saravanababu, S. (2009). Evaluation of the Chemical Composition *Rauwolfia serpentina* and *Ephedra vulgaris*. *Advances in Biological Research* 3 (5-6): 174-178.
- Haslam, E., Cai, Y. (1994). Plant polyphenols (vegetables tannins): Gallic acid metabolism. *Natural Product Reports* 11: 41 – 66.
- Helal, R., Melziq, M. F. (2011). *In vitro* effects of selected saponins on the production and release of lysozyme activity of human monocytic and epithelial cell lines. *Scientia Pharmaceutica* 79: 337 – 349.
- Hemamalini, K., Naik Prasad, O. K., Ashok, P. (2010). Anti-inflammatory and analgesic effect of methanolic extract of *Anogeissus acuminata* leaf. *International Journal of Pharmaceutical and Biomedical Research* 1(3): 98 – 101.
- Ho, R. S., Aranda, C. G., Tillery, S. J. (1988). In vivo and in vitro glucose metabolism on a low dose STZ rat model on non insulin dependent diabetes. In: Shafir, E., Renold, A. E., editors. *Lessond from animal diabetes*. Libbey 1988: 202.
- Hout, S., Chea, A., Bun, S.S., Elias, R., Gasquet, M., Timon-David, P., Balansard, G., Azas, N., (2006). Screening of selected indigenous plants of Cambodia for antiplasmodial activity. *Journal of Ethnopharmacol* 107, 12–18.
- Hundal, R. S., Krssak, M., Dufour, S., Laurent, D., Lebon, V., Chandramouli, V., Inzucchi, S. E., Schumann, W. C., Petersen, K. F., Landau, B. R. (2000). Mechanism by which metformin reduces glucose production in type 2 diabetes. *Diabetes* 49 2063–2069.

- Huo, Y., Winters, W. D., Yao, D. (2003). Prevention of diet-induced type 2 diabetes in C57BL/6J mouse model by an anti-diabetic herbal formulation. *Phytotherapy Research* 17: 48 – 55.
- Hutchinson, J., Dalziel, J. M. (1963). Flora of West Tropical Africa. 2nd edition. Vol. 2. Crown Agents for Overseas Government and Administration, London. p. 98.
- Hutchinson J, Dalziel JM (1937). *Leptadenia*, the useful plants of tropical Africa. London (1): 387–388.
- Iorizzi, M., Lanzotti, V., Ranalli, G., De Marino, S., Zollo, F. (2002). Antimicrobial furostanol saponins from the seeds of *Capsicum annum* L. var. *acuminatum*. *Journal of Agric and Food Chemistry* 50: 4310 – 4316.
- Ishida, A., Nakajima, W., Takada, G. (1997). Short term fasting alters neonatal rat striatal dopamine levels and serotonin metabolism: an in vitro microdialysis study. *Developmental Brain Research* 104: 131 – 136.
- Iwu, M. M. (1983). The hypoglycemic properties of *Bridellia ferruginea*. *Fitoterapia* 54(6): 243 – 248.
- Jaijoy, K., Vannasiri, S., Piyabhan, P., Lerdvuthisoporn, N., Boonraeng, S., Khonsung, P., Lertprasertsuke, N., Sornratowong, S. (2011). Acute and subchronic toxicity studies of the water extract from the fruits of *Piper chaba* Hunter in rats. *International Journal of Applied Research in Natural Product* 3(4): 29 – 35.
- Jaiswal, D., Rai, K. P., Kumar, A., Mehta, S., Watal, G. (2009). Effect of *Moringa oleifera* Lam. leaves aqueous extract therapy on hyperglycemic rats. *Journal of Ethnopharmacology* 123: 392 – 396.

- Jaiyesimi, A. A. F., Abo, K. A., Jaiyesimi, A.E.A., (2008). Ethnobotanical studies of medicinal plants used in the management of diabetes mellitus in South Western Nigeria. *Journal of Ethnopharmacol.* 115:67–71.
- Jed W. F. (2005). *Moringa oleifera*: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1. *Trees for Life Journal* 1:5- 30.
- Ji, e., Xiao, G., Dong, L., Ma, Z., Ni, J. (2010). Development of alpha glucosidase inhibitors from medicinal herbs. *Zhonqquo Ya Zi Zhi* 35(12): 1633 -1640.
- Juurlink, D. N. (2010). Rosiglitazone and the case for safety over certainty. *Journal of American Medical Association* 304 No.4
- Just, M. J., Recio, M. C., Giner, R. M., Cueller, M. J., Manez, S., Bilia, A. R., Rios, J. L. (1998). Anti-inflammatory activity of unusual Lupane saponins from *Bupleurum fruticosens*. *Planta Medica* 64: 404 – 407.
- Kaewkrud, W., Matsunami, K., Otsuka, H., Ruchirawat, S., Kanchanapoom, T. (2007). Chemical constituents of the Thai medicinal plant, *Dioecrescis erythroclada* (Kurz) Tiveng. *Journal of Natural Medicine* 16: 476 – 477.
- Kahn, S. E., Porte, D. (1999). Beta cell dysfunction in type 2 diabetes: pathophysiologic and genetic bases. In: Seriver *et al.* The metabolic molecular bases of inherited disease. McGraw-Hill 1999:1407.
- Kako, M., Miura, T., Nishiyama, Y., Ichimaru, M., Moriyasu, M., Kato, A. (1997). Hypoglycemic activity of some triterpenoid glycosides. *Journal of Natural Products* 60(6): 604 – 605.

- Kalamanyi, A., Djamen, D., Nkeh, B. (1994). Hypoglycemic properties of the aqueous root extracts of *Morinda lucida* (Rubiaceae) study in the mouse. *Phytotherapy Research* 8, 369 – 371.
- Karimi, E., Jaafar, H. Z. E., Ahmad, S. (2011). Phytochemical analysis and antimicrobial activities of methanolic extracts of leaf, stem and root from different varieties of *Labisa pumila Benth.* *Molecules* 16: 4438 – 4450.
- Kaufman, P. B., Cseke, L. J., Warder, S., Duke, J. A., Briemann, H. L. (1999). Natural Products from plants. CRC Press, Boca Raton Fl. In: Briskin, D. P. (2000). *Medicinal plants and phytomedicines: Linking plant biochemistry and physiology* 127: 507 – 514.
- Keen, C. L., German, J. B., Mareshi, J. P. and Gershwin, M. E. (1991). Nutritional modulation of murine models of autoimmunity. *Rheumatic Disease Clinical North America* 17:223 – 234.
- Kieffer, T. J., Habener, J. F. (1999). The glucagon-like peptides. *Endocrinology Review*. 20: 876.
- Kirtikar, K. R., Basu, B. D., 1980. Indian Medicinal Plants, vol. 1, second ed., B. Singh, M. P. Singh, India. In: Taufiq-Ur-Rahmana, M. D., Shilpi, J. A., Ahmed, M., Hossain, C. F. (2005). Preliminary pharmacological studies on *Piper chaba* stem bark. *Journal of Ethnopharmacology* 99 (2005) 203–209.
- Klarlund, K., Cherniack, A. D., Conway, B. R., VanRenterghem, B., Czech, M. P. (2003). Mechanism of Insulin Action In: Ellenberg and Rifkin's Diabetes Mellitus 6<sup>th</sup> Edition. Porte, D., Sherwin, R. S., Baron, A. (2003). McGraw – Hill Medical Publishing Division. USA. Pp. 67 – 8.

- Klein, G., Kim, J., Himmeldirk, K., Cao, Y., Chen, X. (2007). Anti-diabetes and anti-obesity activity of *Lagerstroemia speciosa*. *eCAM* 4(4): 401 – 407.
- Komlaga, G. (2005). Hypoglycemic activity of the alcoholic fruit extract of *Tetrapleural tetraptera* in normoglycemic Wistar albino rats. *African Journal of Traditional Complementary and Alternative Medicines Vol. 2*. 2:177-205.
- Kumar, V. (2010). Isolation of phytoconstituents from *Mimosa pudica* leaves. *J Pharmacological Research* 3(7): 1697 – 1699.
- Kumar, A. (2009). *Myristica fragrans* Houtt.(Nutmeg). *Science* 2.0
- Kuo, R. Y., Qian, K., Morris-Natschik, S. L., Kuo, H. L. (2009). Plant derived triterpenoid and analogues as antitumor and anti HIV agents. *Natural Product Report* 26: 1321 – 1344.
- Kwak, W. J., Han, C. K., Chang, H. W., Kim, H. P., Kang, S. S., Son, K. H. (2003). Loniceroside C. and anti-inflammatory saponin from *Lonicera japonica*. *Chemical and Pharmaceutical Bulletin* 51:33 -335.
- Lahtela, J. T., Knip, M., Paul, R., Anttonen, J., Salmi, J. (1997). Severe antibody-mediated human insulin resistance: successful treatment with the insulin analog lispro. A case report. *Diabetes Care*. 20(1):71-3.
- Lawal, I .O., Uzokwe, N. E., Igboanugo, A. B. I., Adio, A. F., Awosan, E. A., Nwogwugwu, J. O., Faloye, B., Olatunji, B. P., and Adesoga, A. A. (2010). Ethno medicinal information on collation and identification of some medicinal plants in Research Institutes of South-west Nigeria. *African Journal of Pharmacy and Pharmacology*. 4(1): 001-007.

- Lebovitz, H.E., Kreider, M., Feed, M.I., (2002). Evaluation of liver function in type 2 diabetic patients during clinical trials: evidence that rosiglitazone dose not cause hepatic dysfunction. *Diabetes Care* 25: 815-821.
- Lee, K. T., Sohn, I. C., Kim, D. H., Choi, J. W., Kwon, S. H., Park, H. J. (2003). Hypoglycemic and hypolipidaemic effects of Tectorigenin and Kaikasaponin III in the streptozotocin induced diabetic rat and their antioxidant activity in vitro. *Archives of Pharmaceutical Research* 23(5): 461 – 466.
- Lei, Z. (2002). Monomeric ellagitanins in oaks and sweet gum. A dissertation submitted to the Faculty of Virginia Polytechnic Institute and State University. U. S.A.
- Li, W., Zhang, W., Xiang, L., Zhang, Y., Wang, Y., Wang, Y. P., Zhang J., Chen, L. (2010). Platycoside. A new oleanane type triterpenoid saponin from the roots of *Platycodon grandiflorum*. In: Lei, Z. (2002). Monomeric ellagitanins in oaks and sweetgum. A dissertation submitted to the Faculty of Virginia Polytechnic Institute and State University. U. S.A.
- Liu, J. (1995). Pharmacology of oleanolic acid and Ursolic acid. *Journal of Ethnopharmacology* 49: 57 - 68.
- Lipnick R. L., J. A. Cotruvo, R. N. Hill, R. D. Bruce, K. A. Stitzel, A. P. Walker, I. Chu, M. Goddard, L. Segal, J. A. Springer, and R. C. Myers. (1995). Comparison of the Up-and-Down, Conventional LD50 and Fixed Dose Acute Toxicity Procedures. *Food Chemistry and Toxicology* 33: 223-231.
- Locket, C. T., Grivetti, L. E., (2000) Food-related behaviour during drought: a study of rural Fulani, Northeastern Nigeria. *International Journal of Food Science and Nutrition* 51:91–107.

- Luo, A., Fan, Y. and Luo, A. (2011). In vitro free radical scavenging activity of polysaccharide from *Polygonum multiflorum* Thunb. *Journal of Medicinal Plant Research* 5(6): 966 – 972.
- Maghraby, A. S., Hamed, M. A., Ali, S. A. (2010). Bioimmunological responses to *Schistosoma mansoni* and *Fasciola gigantica* worm homogenate either with or without saponin. *Journal of infection in Developing Countries* 4(5): 334 – 344.
- Maria, D. P. T., Gunawan, P., Kawabata, J. (2010). Novel  $\alpha$ -glucosidase inhibitors from *Macaranga tanarius* leaves. *Food Chemistry* 123 (2): 384 – 389.
- Matsuda, H., Li, Y., Murakami, T., Matsumura, N., Yamahara, J., Yoshikawa, M. (1996). Anti-diabetic principles of natural medicines III. Structure-related inhibitory activity and mode of action of oleanolic acid glycoside on hypohlycemic activity. *Chemical and Pharmaceutical Bulletin* 46(9): 1399 – 1403.
- Moreau, R. A., Whitaker, B. D., Hicks, K. B. (2002). Phytosterol, phytostanol and their conjugates in foods: Stimulating diversity quantitative analysis and health promoting uses. *Progress in Lipid Research* 41: 457 – 500.
- Morikawa, T., Li, X., Nishida, E., Ito, Y., Matsuda, H., Nakamura, S., Muraoku, O., Yoshikawa, M. (2008). Perennisoside I – VII, acetylated triterpene saponins with anti-hyperlipidemic activities from the flowers of *Bellis perennis*. *Journal of Natural Product* 71: 828 – 835.
- Moufid A. 2009. Mechanistic study of antidiabetic effect of *Chamaemelum nobile* in diabetic mice. *Advances in Phytotherapy Research (Res. Signpost)* 37/661(2).

- Macdonald, I. and D. I. Olorunfemi (2000): Plants used for medicinal purposes by the Koma people of Adamawa State, Nigeria. Published by *Indigenous and Development Monitor* IK Monitors (8-3).
- Maggs, D. G., Buchanan, T. A., Burant, C. F., *et al.*, (1998). Metabolic effect of troglitazone monotherapy in type II diabetes mellitus. A randomized double blind, placebo-controlled trial. *Annals of Internal Medicine*. 128:176.
- Mak, D. H. F., Ip, S. P., Li, P. C. (1996). Alterations in tissue glutathione antioxidant system in Streptozotocin induced diabetic rats. *Molecular and Cell Biochemistry* 162:153.
- Malaisse, W. J. (1982). Alloxan toxicity to the pancreatic beta cell. A new hypothesis. *Biochemistry and Pharmacology* 31:3527.
- Mann, A.; Y. Yahaya, A. Bansa and G. O. Ajayi (2008). Phytochemical and antibacterial screening of *Anogeissus leiocarpus* against some microorganisms associated with infectious wounds. *African Journal of Microbiological Research* 2:060 - 062
- Mann, A., Amupitan, J. O., Oyewale, A. O., Okogun, J. I., Ibrahim, K. (2007). An Ethnobotanical survey of indigenous flora for treating tuberculosis and other respiratory diseases in Niger State, Nigeria. *Journal of Phytomedicine and Therapeutics*. 12: 1-12.
- Manosroi, J., Zaruwa, M. Z., Manosroi, A. (2011). Potent hypoglycemic effect of Nigerian antidiabetic medicinal plants. *Journal of Complementary and Integrative Medicine*. 8(1): 1 – 16.

*Map of Nigeria*

Available <http://www.worldofmaps.net/> (March, 2011)

Marcu, M. G. (2010). Moringa: The Ideal Food for Obese and Malnourished. *Ethnobotanical Leaflets* 13: 431-36, 2009.

Markowitz, K., Moynihan, M., Liu, M., Kim, S. (1992). Biological properties of eugenol and zinc oxide-eugenol. *Oral. Surgery. Oral. Medicine. Oral, Pathology.* 73: 723 – 737.

McWhorter, L. S. (2005). Ivy Gourd. ([www.diabeteshealth.com](http://www.diabeteshealth.com))

Michael, U. A., David, B. U., Theophine, C. O., Philip, F. U., Ogochukwu, A. M., Benson, V. A. (2010). Anti-diabetic effect of combined aqueous leaf extract of *Vernonia amygdalina* and metformin in rats. *Journal of Basic Clinical Pharmacy* 1(3): 97 – 202.

*Mimosa pudica* var. *hispida*. Bren

Available at <http://herbal-ayurveda-remedy.com/herbs/mimosa.php> (January, 2011)

Miyazaki, Y., Mahankali A, Matsuda M, *et al.* (2001). Improved glycemic control and enhanced insulin sensitivity in type 2 diabetic subjects treated with pioglitazone. *Diabetes Care* 24:710-9.

Monami, M., Lamanna, C., Marchionni, N., Mannucci, E. (2000). Rosiglitazone and risk of cancer. *Diabetes Care* 31: 1455 – 1460.

*Moringa oleifera*

Available at <http://www.helpfulhealthtips.com/moringa-oleifera-information-uses-and-benefits/> (January, 2011)

*Moringa oleifera* Linn.

Available <http://santanindia.com/deal.html> (March, 2011)

- Moufid A. 2009. Mechanistic study of antidiabetic effect of *Chamaemelum nobile* in diabetic mice. *Advances in Phytotherapy Research* (Res. Signpost) 37/661(2).
- Muggli, R. (1989). Dietary fish oils increase the requirement for vitamin E in humans. In: Health effects of fish and fish oils. Chandra, R. K., *et al.*, St. John's Newfoundland, Canada: ARTS Biomedical Publishers and Distributors Ltd., pp. 201 –210.
- Mukherjee, P. K., Houghton, P. J. (2009). Evaluation of herbal medicinal products. Pharmaceutical Press. Pp. 261 – 264.
- Musa, A. M., Aliyu, A. B., Yaro, A. H., Magaji, M. G., Hassan, H. S., Abdullahi, M. I. (2009). Preliminary phytochemical, analgesic and anti-inflammatory studies of the methanol extract of *Anisopus mannii* (N. E. Br) (*Asclepiadaceae*) in rodent. *African Journal of Pharmacy and Pharmacology* 3(8): 374 – 378.
- Myristica fragrans* Houtt  
Available [www.uni-graz.at/~katzer/engl/Myri\\_fra.html](http://www.uni-graz.at/~katzer/engl/Myri_fra.html) (January, 2011)
- National Diabetes Data Group. (1979). Classification and diagnosis of diabetes mellitus and other categories of glucose tolerance. *Diabetes* 28:1039.
- Nauck, M., Frid, A., Hermansen, K., Shah, N. S., Tankova, T., Mitha, I. H., Zdravkovic, M., Düring, M., Matthews, D. R. (2008). Efficacy and safety comparison of liraglutide, glimepiride, and placebo, all in combination with metformin in type 2 diabetes mellitus (LEAD-2 Met). *Diabetes Care* Publish Ahead of Print, published online.
- Navarro, P., Giner, R. M., Recio, M. C., Manez, S. C., Cerdanicolas, M., Rios, J. L. (2001). In vitro anti-inflammatory activity of saponin from *Bupleurum rotundifolium*. *Life Science* 68:1199 – 1206.

- Nickavar, B., Kamalinejad, M., Izadpanah, H. (2007). In vitro free radical scavenging activities of five *Salvia* species. *Pakistan Journal of Pharmaceutical Science* 20(4): 291 – 294.
- Nikolava, M., and Dzhurmanski, A. (2009). Evaluation of free radical scavenging activities of extracts from cultivated plants. *Biotechnol and Biotechnol Eq.* 23: 109 – 111.
- Nikiema, J. B., Vanhaelen-Fastre, R., Vanhaelen, M., Fontaine, J., Gracq, C. D. E., Heenen, M. (2001). Effects of anti-inflammatory triterpenes isolated from *Leptadenia hastata* latex on keratinocyte proliferation. *Phytotherapy Research* 15(2): 131-134.
- Nissen, S. E. and Wolski, K. (2007). Effect of Rosiglitazone on the risk of myocardial infarction and death from cardiovascular causes. *New England Journal of Medicine* 356: 2457 – 2471.
- Nolan, J.J., Judvik, B., Beerdsen, P., et al.,(1994). Improvement in glucose tolerance and insulin resistance in obese subjects treated troglitazone. *New England Journal of Medicine.* 331:1188.
- Nyunai, N., Njikam, N., Abdennebi, E., Mbafor, J. T., Lamnaouer, D. (2009). Hypoglycemic and antihyperglycemic activity of *Ageratum conyzoides* L. in rats. *African Journal of Traditional Complementary and Alternative Medicine* 6(2): 123 – 130.
- Odubgemi, T. (2008). A textbook of medicinal plants from Nigeria. University of Lagos Press. Pp. 107.
- OECD (2000) Guidance Document on Acute Oral Toxicity . Environmental Health and Safety Monograph Series on Testing and Assessment No 24.

- Ogbru, O., Mark, J. W. (2011). Exenatide, Byetta (www.medicinenet.com).
- Olaleye, M. T., Afolabi, C. A., Akindahunsi, A. A. (2006). Antioxidant properties of *Myristica fragrance* (Houtt) and its effect on selected organs of albino rats. *African Journal of Biotechnology* 5(13): 1274 – 1278.
- Olearczyk, J. J., Field, M. B., Kim, I. H., Morisseau, C., Hammock, B. D., Imig, J. D. (2006). Substituted adamantyl-urea inhibitors of the soluble epoxide hydrolase dilate mesenteric resistance vessels. *Journal of Pharmacology and Experimental Therapeutics*. 318(3): 1307– 1314.
- Olivier-Bover BEP (1986). Medicinal plants in tropical West Africa. 1P stPEd. P. 375 in: A. A. Aliero and S. H. Wara, (2009). Validating the medicinal potential of *Leptadenia hastata*. *African Journal of Pharmacy and Pharmacology* 3(6): 335-338.
- Okine, L.K.N., (2005). Evaluation of the efficacy and safety of the Anti diabetic preparation ADD- 199 in some laboratory animals. *African Journal. Traditional Complementary and Alternative Medicines Vol. 2. 2: 177-205.*
- Okuda, T. (1999). Novel aspects of Tannins –renewed concepts and structure activity relationships. *Curr. Org. Chem.* 3: 609 – 622. In: Lei, Z. (2002). In: Lei, Z. (2002). Monomeric ellagitanins in oaks and sweetgum. A dissertation submitted to the Faculty of Virginia Polytechnic Institute and State University. U. S.A.
- Okuda, T., Yoshida, T., Hatano, T. (1989). Ellagitanins as active constituents of medicinal plants. *Planta Medica*. 55(2): 117 – 122.

- Olefsky, J. M., Kruszynska, Y. T. (2003). Insulin resistance. In: Porte, D., Sherwin, R. S., Baron, A. (2003). Elenberg and Rifkin's Diabetes mellitus. McGraw-Hill Medical Publishing Division. U. S. A. Pp. 367.
- Onal, S., Timur, S., Okutucu, B., Zihnioglu, F. (2005). Inhibition of alpha – glucosidase by extracts of some potential anti-diabetic medicinal herbs. *Prep Biochemistry and Biotechnology* 35(1): 29 – 36.
- Osier, T. L., Lindroth, R. L. (2001). Effects of genotype, nutrient availability and defoliation on Aspen phytochemistry and insect performance. *Journal of Chemical Ecology* 27(7): 1-25.
- Oskoueian, E., Abdullah, N., Saad, W. Z., Omar, A. R., Ahmed, S., Kuan, W. B., Zolkiafli, N. A., Hendra, R., Ho, YW., (2011). Antioxidant anti-inflammatory and anticancer activities of methanolic extracts from *Jatropha curcas* Linn. *Journal of Medicinal Plant Research*. 5(1): 49 – 57.
- Ozturk, Y., Atlan, V. M., Yildizoglu-Ari, N. (1996). Effects of experimental diabetes and insulin on smooth muscle functions. *Pharmacological Review*. 48:69-72.
- Panichayupakaranant, P. (2009). RP-HPLC analysis of rhinacanthins in *Rhinacanthus nasutus*: validation and application to preparation of rhinacanthin high-yielding extract. *Journal Chromatographic Science* 47: 705-708.
- Pari, L., Saravanan, R. (2004). Antidiabetic effect of Diasulin, an herbal drug, on blood glucose, plasma insulin and hepatic enzymes of glucose metabolism in hyperglycaemic rats. *Diabetes, Obesity and Metabolism* 6(4): 286 – 291.

Perry, L.M. (1980). Medicinal Plants of East and Southeast Asia. MIT Press, Cambridge, MA, p. 620. In: Aun et al., (2007). Antimalarial activity of alkaloids isolated from *Stephania rotunda*. *Journal of Ethnopharmacology* 112 (2007): 132–137.

Peungvicha, P., Thirawarapan, S. S., Temsiririrkkul, R., Watanabe, H., Prasain, J. K. and Kadota, S., (1998). Hypoglycemic effect of the water extract of *Piper sarmentosum* in rats. *J Ethnopharmacol.* Vol 60, (1): 27-32.

Picard, F. and Auwerx, J., (2002). PPAR $\gamma$  and glucose homeostasis. *Annu Rev Nutr.* 22:167-197.

#### *Piper chaba* Hunt

Available at <http://prapan-39.exteen.com/> (February, 2011)

Pongprayon, U., Soontornsaratune, P., Janikasem, S., Sematong, T., Wasuwat, S., Claeson, P. (1997). Topical anti-inflammatory activity of the major lipophilic constituents of the rhizome of *Zingiber cassumunar* 1. The essential oil. *Phytomedicine* 3(4): 311 – 322.

Porte, N. A., Caldwell, S. E., and Mills, S. A. (1995). Mechanism of free radical oxidation of unsaturated lipids. *Lipids*, 30:277- 290. *Pharmacol* 4: 25 In: Mukherjee, P. K., Houghton, P. J. (2009). editors Evaluation of herbal medicinal products. Pharmaceutical Press USA. Pp.250 -255.

Porath, D., Riegger, C., Drewe, J. (2005). Epigallocatechin-3- gallate impairs chemokine production in human colon epithelial cells lines. *J Pharmacol Exp Ther* 315: 1172 1180.

#### *Pterocarpus erinaceus*

Available at <http://universaldata.sytes.net/> (March, 2011)

*Pterocarpus macrocarpus*

Available at <http://ecocrop.fao.org/ecocrop/srv/en/cropView?id=9045>

(March, 2011)

- Puangpronpitag, D., Niamsa, N., Sittiwet, C. (2009). Anti-microbial properties of clove (*Eugenia caryophyllum* Bullock & Harrison) aqueous extract against food borne pathogen bacteria. *International Journal of Pharmacology* 5(4): 281 – 284.
- Puech, J. L., Mertz, C., Michon, V., Le Guerneve, C., Doco, T., Du Penhoat, C. (1999). Evolution of Castalagin and vescalagin in ethanol solutions: Identification of new derivatives. *J Agric Food Chem* 47(5): 2060 – 2066.
- Pulok, k., Mukherjee, K. M., Kakali, M., Peter, J. H., (2006). Leads from Indian medicinal plants with hypoglycemic potentials. *Journal of Ethnopharmacology* 106:1 -28.
- Puttarak, P., Charoonratana, T., Panichayupakaranant, P. (2010). Antimicrobial activity and stability of rhinacanthins-rich *Rhinacanthus nasutus* extract. *Phytomedicine* 17(5): 323-327.
- Purseglove, J. W. (1968). Tropical crops. Dicotyledons. London, Longman. In: Leon, C. (1997). *Myristica fragrans* Houtt. General edit and botanical review: Singapore. <http://www.inchem.org/documents/pims/plant/pim355.htm>
- Rackova, L., Oblonzinsky, M., Kostalova, D., Kettmann, V., Bezakova, L. (2007). Free radical scavenging activity and lipooxygenase inhibition of Inhibition of *Mahonia aquifolium* extract and isoquinoline alkaloid. *Journal of inflammation* 4(15): 1 -7.

Rajkumar, M. H., Sringswar, A. N., Rajanna, M. D. (2011). Ex-situ conservation of medicinal plants at University of Agricultural Science, Bangalore, Karnataka. *Recent Res Sc & Tech*. 3(4): 21 – 29.

*Raphia vinifera* P. Beauv

Available at [http://www.virboga.de/Raphia\\_vinifera.htm](http://www.virboga.de/Raphia_vinifera.htm) (October, 2010)

*Rauwolfia serpentina*

Available at <http://www.motherherbs.com/rauwolfia-serpentina.html> (June, 2011)

Reaven, G. M., Sageman, W. S., Swenson, R. S. (1977). Development of insulin resistance in normal dogs following alloxan induced insulin deficiency. *Diabetologia* 13(5):459 – 462.

*Rhinacantus nasutus*

Available at <http://www.flowersofindia.in/catalog/slides/Snake%20Jasmine.html> (April, 2011)

Rimando, A. M., Nagmani, R., Feller, D. R. and Yokoyama, W. (2005). Pterostilbene, a new agonist for the Peroxisome proliferator-activated receptor  $\alpha$ -isoform, lowers plasma lipoprotein and cholesterol in hypercholesterolemic Hamster. *Journal of Agric Food Chemistry* 53: 3403 – 3407.

Rimando, A. M., Pezzuto, J. M., Farnsworth, N. R., Santisuk, T., Reutraku, V., Kawanishi, K. (1994). New Lignans from *Anogeissus acuminata* with HIV-1 reverse transcriptase inhibitory activity. *Journal of Natural Product* 57(7): 896 – 904.



- Robinson, R. D., Williams, L. A., Lindo, J. F., Terry, S. I., Mansingh, A. (1990). Inactivation of strongyloids *stercoralis* filariform larvae in vitro by six Jamaican plant extracts and three commercial anthelmintics. *West Indian Medical Journal* 39(4): 213 – 7.
- Rossini, A. A., Like, A. A., Dulin, W. E. (1977). Pancreatic beta toxicity by STZ anomers. *Diabetes* 26: 1120.
- Royal Pharmaceutical Society of Great Britain and British Medical Association (RPSGBBMA), (2000). “Chapter 6: Endocrine system - 6.1.2.2 Biguanides” *British National Formulary*, Pp. 54-55.
- Rosencrans, J. A., Glennon, R. A. (1979). Drug induced cues in studying mechanism of drug action. *Neuropharmacology* 18(12): 981 – 989.
- RxList.com., (2007). Glucophage Side Effects & Drug Interactions. (online resource).
- Salaellanont, K. (1998). Hypotensive effect of compounds from a stem of parasitic plant (*Mangifera indica*). Data of Thai Medicinal Plants.
- Ryu, K., Susa, M., Choy, E., Yang, C., Hornick, F. J., Markin, H. J., Duan, Z. (2010). Oleanane triterpenoid CDD-ME induced apoptosis in multidrug resistant osteosarcoma cells through inhibition of STAT3 pathway. *BMC Cancer* 10:187.
- Saghizadeh, M., Ong, J. M, Garrey, W. T, Henry, R. R, (1996). The expression of TNF-alpha by human muscle: relationship to insulin resistance. *Journal of Clinical Investigation* 97:1111 – 1116.
- Salpeter, S., Greyber, E., Pasternak, G. and Salpeter, E., (2003) “Risk of fatal and non fatal lactic acidosis with metformin use in type 2 diabetes mellitus: systematic review and meta-analysis”. *Archive of Internal Medicine* 163 (21):2594-607.

- Sani, D., Sani, S., Ngulde, S. I. (2009). Phytochemical and microbial screening of the stem aqueous extract of *Anisopus mannii*. *Journal of Medicinal Plant Research* 3(3): 112 – 115.
- Sato, Y., Henquin, J. C. (1998). The K<sup>+</sup> ATP channel-dependent pathway of regulation of Insulin secretion by glucose. In: Search of the underlying mechanism. *Diabetes* 47:1713 – 1721.
- Schwartz, S., Raskin, P., Fonseca, V., Graveline, J.F., (1998). Effect of troglitazone in insulin treated patients with type II diabetes mellitus. *New England Journal Medicine* 338:861.
- Segher, V., Nakazaki, M., Demayo, F., Aguilar-Bryan, L., Bryan, J. (2000). Sur 1 knockout mice. A model for K(ATP) channel-independent regulation of insulin secretion. *Journal of Biology and Chemistry*. 275: 9270 – 9277
- Sena, L. P., Vanderjagt, D. J., Rivera, C., Tsin, A. T., Muhamada, I., Millson, M., Pastuszyn, A., Glew, R. H. (1998). Analysis of nutritional component of eight famine foods of the republic of Niger. *Plant Foods and Human Nutrition*. 52(1): 17- 30.
- Senthivet, G., Jegadeesan, M., Austin, A., Thirugnanasambanthan, P., Mayisurem, E., Balasubramanian, M., Narayanan, N., Viswanathan, S. (2006). Effect of a polyherbal formulation (Diarun plus) on STZ induced experimental diabetes. *International Journal of Tropical Medicine* 2:88 – 92.
- Shekhawat, N., Soam, P. S., Singh, P. and Vijavergia, R. (2000). Assessment of free radical scavenging activity of crude extracts of some medicinal plants. *Middle East Journal of Scientific Research*. 5(4): 298 – 301.

- Shalmashi, A. (2008). New route to methformin hydrochloride (N, N-dimethylimidodicarbonylimidic diamide hydrochloride) synthesis. Molbank. M564. Available <http://www.mpi.org/molbank/>.
- Shibata, S. (2001). Chemistry and cancer preventing activities of Ginseng saponins and some related triterpenoid compounds. *Journal of Korean Medical Science* 16 (Suppl): S28 – 37.
- Shuaibu, M. N., Pandey, K., Wuyep, P. A., Yanagi, T., Hirayama, K., Ichinose, A., Tanaka, T., Kouno, I. (2008). The use of microfluorometric method for activity-guided isolation of antiplasmodial compound from plant extracts. *Parasitol Res.* 102(6): 1119 – 27.
- Shuaibu, M.N., Pandey, K., Wuyep, P. A., Yanagi, T., Hirayama, K., Ichinose, A., Tanaka, T., Kouno, I. (2008). Castalagin from *Anogeissus leiocarpus* mediates the killing of Leishmania in vitro. *Parasitology Research.* 103(6):1333-8.
- Siedle, B., Garcia-Pirieres A., Murillo, R. (2004). Quantitative structure-activity relationship of sesquiterpene lactones as inhibitors of the transcription factor NF-Kb. *Journal of Medicinal Chemistry* 47: 6042 – 6054.
- Sies, H. (1991). Oxidative stress: from basic research to clinical application. *American Journal of Medicine* 91 (Supp. 3C): 31-38.
- Singh, A., Duggal, S., Sutte, A. (2009). *Acanthus ilicifolius* Linn. - Lesser Known Medicinal Plants with Significant Pharmacological Activities. *Archives of Pharmacological Research* 31(7): 823-829.
- Singh, P. N., Singh, S. B. C. (1986). A new saponin from the mature tubers of *Cyperus rotundus*. *Phytochemistry* 19: 2056.

Somova, L. O., Nadar, A., Rammanon, P., Shode, F. O. (2003). Cardiovascular, antihyperlipidemic and antioxidant effect of oleanolic and ursolic acids in experimental hypertension. *Phytomedicine* 10(2-3):115 – 121.

Sonboli, A., Mojarrad, M., Ebrahimi, S. N., Enayat, S. (2010). Free radical scavenging activity and total phenolic content of the methanolic extract from male inflorescence of *Salix aegyptiaca* grown in Iran. *Iranian J Phar Res* 9(3): 293 - 296.

Srinivasan, K., Ramarao, P. (2007). Animal model in type 2 diabetes research: An overview. *Indian Journal of Medical Research* 125:451-472.

#### *Stephania rotunda*

Available <http://forums.gardenweb.com/forums/load/cacti/msg090053174445.html> (January, 2011)

Sturis, J., Gotfredsen, C. F., Romer, J., Rolin, B., Ribel, U., Brand, C. L., Wilken, M., Wasserman, K., Decacon, C. F., Carr, R. D., Knudsen, L. B. (2003). GLP-1 derivative liraglutide in rats with  $\beta$ -cell deficiencies: influence of metabolic state on  $\beta$ -cell mass dynamic. *British Journal of Pharmacology* 140: 123 – 132.

Suba, V., Murugesan, T., Arunachalam, G., Mandal, S.C., Saha, B. P. (2004). Anti-diabetic potential of *Barleria lupulina* extracts in rats. *Phytomedicine* 11: 202 – 205.

- Suzuki, Y. J., Mizuno, M., Tritschler, H. J., Packer, L. (1995). Redox regulation of NF-Kappa B DNA binding activity by dihydrolipoate. *Biochem. Mol. Biol. Internant.* 36:241 – 246. In: Bidlack, W. R., Omaye, S. T., Meshkin, M. S., Jahner, D. (1998). *Phytochemicals: A new paradigm.* CRC Press. USA. Pp. 13 -18.
- Sumathi, C. S., Balasubramanian, V., Ramesh, N., Kannan, V. R. (2008). Influence of biotic and abiotic features on *Curcuma longa* L. plantation under tropical condition. *Middle-East Journal of Scientific Research* 3(4): 171 – 178.
- Sun, Y., Liu, J., Gong. C. (2010). Isolation and evaluation of immunological adjuvant activities of saponins from the roots of *Pulsatilla chinensis* with less adverse reactions. *International immunopharmacology* 10: 584 – 590.
- Svarstad, H. and Dhillion, S.S. , (2000). Responding to bioprospecting: rejection or regulation? In: H. Svarstad and S.S. Dhillion, Editors, *Responding to Bioprospecting, from Biodiversity in the South to Medicines in the North*, Spartacus Forlag As, Oslo. pp. 9–15. .
- Tabuti, J.R.S., Dhillion, S.S. and Lye, K.A., (2003). Traditional medicine in Bulamogi county, Uganda: its practitioners, users and viability. *Journal of Ethnopharmacology* 85: 119–129.
- Tachibana Y, Kikuzaki H, Hj-Lajis N, Nakatani N. 2001. Antioxidant activity of carbazoles from *Murraya koenigii* leaves. *Journal of Agric and Food Chemistry* 49: 5589 – 5594.
- Taguri, T., Tanaka, T., Kouno, I. (2004). Antimicrobial activity of 10 different plant polyphenols against bacterial causing food borne diseases. *Biological and Pharmaceutical Bulletin.* 27(12): 1965 – 1969..

Tanko, Y., Yerima, M., Mahdi, M. A., Yaro, A. H., Musa, K. Y., Mohammed, A. (2008). Hypoglycemic activity of methanolic stem bark of *Adansonia digitata* extract on blood glucose levels of streptozotocin induced diabetic Wistar rats. *International Journal of Applied Research in Natural Product* 1(2): 33 – 36.

Tajuddin, S. A., Latif, A., Qasmi, I. A., Amin, K. M. Y. (2005). An experimental study of sexual function improving effect of *Myristica fragrance* Houtt (nutmeg). *BMC Complementary and Alternative Medicine* 5(16): 1 – 7.

Tamboura, H. H., Bayala, B., Lompo, M., Guissou, I. P., Sawadogo, L. (2005). Ecological distribution, morphological characteristics and acute toxicity of aqueous extracts of *Holarrhena floribunda* (G. Don) Durand & Schinz, *Leptadenia hastata* (Pers.) Decne and *Cassia sieberiana* (dc) used by veterinary healers in Burkina Faso. *African Journal of Traditional Complementary and Alternative Medicine*. 2 (1): 13 – 24.

The British Pharmaceutical Codex, 1911, was published by direction of the Council of the Pharmaceutical Society of Great Britain.

#### *Thiazolidiendiones*

Available at <http://news.softpedia.com/newsImage/New-Find-Explains-Why-Diabetes-Drugs-Affect-the-Heart-2.jpg/> (10 February, 2011)

Thomson, L. A. J. (2006). Species Profiles for Pacific Island Agroforestry. [www.traditional tree.com](http://www.traditional tree.com)

- Tiangda, C., Mekmanee, R., Malyn, U., Kampanat, P., Paovalo, C. (1987). The hypoglycemic activity of *Momordica charantia* Linn. in normal and alloxan – induced diabetic rabbits. *Journal National Research Council of Thailand* 19(1): 1 – 11.
- Ting, R., Szeto, C., Chan, M., Ma, K. and Chow, K.(2006). “Risk factors of vitamin B12 deficiency in patients receiving metformin” *Archive of Internal Medicine* 166(18): 1975-9.
- Tirvengadam, D. D. 1982. A study of the tribe *Gardenieae* (Rubiaceae) of South and South East Asia. Generic delimitation and revision with enumeration of species. *Thai Forrest Bulletin* No. 31: 19 – 34.
- Tragoolpua, Y., Jatsantenr, A. (2007). Anti-herpes simplex virus activity of *Eugenia caryophyllus* (Spreng) Bullock & Harrison and essentialoil Eugenol. *Phytotherapy Research*. 21:1154 – 1158.
- Tuma, R. S. (2003). Taxol’s journey from discovery to use: Lessons and update. *Oncology Times* 25(18): 52 -57.
- Trease CE, Evans WC. 2002. *Pharmacognosy* 13<sup>th</sup> edition. Balliere and Tindall. London, pp. 315 – 679.
- Tsopmo, A., Kamanaing, P., Jin-Ming, G., Konishi, Y., Sterner, O. (2009). Chemical constituents from the bark of *Anisopus mannii*. *Canadian Journal of Chemistry* 87(2): 397 400.
- Tyler, V. E. (1999). *Phytomedicines: back from the future*. *Journal of Natural Product*. 62: 1589 -1592.

- Tyler, V. E., Brady, L. R., Robbers, J. E. (1981). Pharmacognosy 8<sup>th</sup> ed. Lea and Ferbiger, U.S.A. p. 67. In: Spang, S. G., Light, M. E., Van Staden, J. Biological activities and distribution of plant saponins. *Journal of Ethnopharmacology* 94: 219 – 243.S
- UKPDS (UK Prospective Diabetic Study, 1998). Intensive blood-glucose control with SUs or Insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 352, 837 – 853.
- United Kingdom Prospective Diabetes Study (UKPDS) Group., (1998). Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes (UKPDS 34). *Lancet*; 352:854-865.
- Van Beek, T. A., (2003). Chemical analysis of *ginkgo biloba* leaves and extracts. *Journal of Chromatography A*. 967, 2155.
- Vedtofte, L., Bodvarsdottir, T. B., Gotfredsen, C. F., Karlsen, A. E., Knudsen, Scott Heller, L. B. R. (2010). Liraglutide, but not vildagliptin, restores normoglycaemia and insulin content in the animal model of type 2 diabetes, *Psammomys obesus*. *Regulatory Peptides* 160 (2010) 106–114.
- Venable, S. J. and Aschenbrenner, D.S., (2006). *Drug Therapy In Nursing*. Hagerstwon, MD: Lippincott Williams & Wilkins.
- Viana, F. A., Filho, R. B., Poliquen, Y. B. M., Neto, M. A., Santiago, G. M. P., Filho, E. R. (2004). Triterpenoid saponins from stem bark of *Pentaclethra macroloba*. *Journal of Brazilian Chemical Society* 15(4): 595 – 602.
- Vigersky, R.A, Filmore, N.A. and Glass, A.R. (2006). “Thyrotropin suppression by metformin” *Journal of Clinical Endocrinology* 91(1): 225-7.

- Viriot, C., Scalbert, A., Herve du Penhoat, C. L. M., Montounet, M. (1994). Ellagitannins in woods of sessile oak and sweet chestnut dimerization and hydrolysis during wood aging. *Phytochemistry* 36: 1253 – 1260.
- Vliathan, M.S., 1998. Healing plants. *Current science* 75, 1122–1126.
- Von Maydell, H.J. (1983). Arbes et arbustes du Sahel. *Leurs caractéristiques et leurs utilisations*. Eschnorn, GTZ. 531 p.
- Wang Y, Campbell T, Perry B, Beaurepaire C, Qin L (March 2010). "Hypoglycemic and insulin-sensitizing effects of berberine in high-fat diet- and streptozotocin-induced diabetic rats". *Metabolism: Clinical and Experimental*. 60(2):298-305.
- Wang, J., Wan, R., Mo, Y., Zhang, Q., Sherwood, L. C., Chien, S. (2010). Creating a long term diabetic rabbit model. *Experimental Diabetes Research* 2010:1- 10.
- Walzem, R. L., Watkins, S., Frankel, E. N., Hansen, R. J., German, J. B. (1995). Older plasma lipoproteins are more susceptible to oxidation: a linking mechanism for the lipid and oxidation theories of atherosclerotic cardiovascular disease. *Proceedings of the National Academy of Science*. USA, 92:7460 -7464.
- Ward, W. K., Wallum, B. J., Beard, J. C. (1988). Reduction of glycemc potentiation. Sensitive indicator of beta cell loss in partially pancreatectomized dogs. *Diabetes* 37:723.
- Wild, S., Roglic, G., Green, A., Sicree, R., King, H. (2004). Global prevalence of diabetes: Estimates for the year 2000 and the projections for 2030. *Diabetes Care* 27: 1047 – 1053.

- William, M.E. and Roshan, B., (1999). Role of the new oral hypoglycemic drugs in the diabetic patient with ESRD. Review Articles. Seminar on Dialysis. Vol 12, No 1.Pp 25-31.
- World Health Organization (1999). Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications. Report of WHO consultation. Department of Noncommunicable Disease Surveillance. Geneva, Switzerland.
- Wink, M. (1999). Introduction : Biochemistry role and Biotechnology of secondary products. In: Wink, M. ed. Biochemistry of secondary products of metabolism. CRC Press, Boca Raton, Fl. Pp. 1-16. In: Briskin, D. P. (2000). Medicinal plants and phytomedicines: *Linking plant biochemistry and physiology* 127: 507 – 514.
- Wu, C., Li, Y., Chen, Y., Lao, X., Sheng, L., Dai, R., Meng, W., Deng, Y. (2011). Hypoglycemic effect of *Belacanda chinensis* leaf extract in normal and STZ-induced diabetic rats and its potential active fraction. *Phytomedicine* 18(4): 292 – 297.
- Yano, Y., M. Satomi and H. Oikawa, 2006. Antimicrobial effect of spices and herbs on *Vibrio parahaemolyticus*. *Journal of Food Microbiology* 111: 6-11.
- Yili, G., Hong, P., Xiqun, S., Gongchen, Z., Jun, Z., Miao, W., Xiaoping, Z., Kaixun, H. (2009). Effects of alloxan induced diabetes on the expression of insulin signal transmission molecules. *Wuhan University Journal of Natural Sciences* 14(5):447-451.

- Ying, X., Zhi-Hong, J., Hua, Z., Xiong, C., Yuen- Fan, W., Zhong, Q. L., Zhao, X. B., Hong, X. X., Liang, L., (2007). Combinative method using HPLC quantitative and qualitative analysis for quality consistency assessment of herbal medicinal preparation. *Journal of Pharmaceutical and Biomedical Analysis*. 43:204-212.
- Yusuf, M., Chowdhury, J.U., Wahab, M.A., Begum, J., 1994. Medicinal Plants of Bangladesh. BCSIR, Dhaka, Bangladesh, p. 193. In: Taufiq-Ur-Rahmana, M. D., Shilpi, J. A., Ahmed, M., Hossain, C. F. (2005). Preliminary pharmacological studies on *Piper chaba* stem bark. *Journal of Ethnopharmacology* 99 (2005) 203–209.
- Xi, M., Hai, C., Tang, H., Wen, A., Chen, H., Liu, R., Liang, X., Chen, M. (2010). Antioxidant and antiglycation properties of triterpenoid saponin, from *Aralia taibaiensis* traditionally used for treating diabetes mellitus. *Redox Report* 15(1): 20 – 28.
- Ye, W. C., Zhang, Q. W., Liu, X., Chen, C. T., Zhao, S. X. (2000). Oleanane saponins from *Gymnema sylvestre*. *Phytochemistry* 53: 893 – 899.
- Yoon, J. H., Baek, S. J. (2005). Molecular targets of dietary polyphenols and anti-inflammatory properties. *Yonsei Medical Journal*. 46: 585 – 596.
- Yoshida, T., Amakura, Y., Yoshmura, M. (2010). Structural features and biological properties of ellagotannins in some plant families of the Order *Myrtales*. *International Journal of Molecular Sciences* 11: 79 – 106.
- Yoshida, T., Hatano, T., Ito, H., Okuda, T. (2007). Chemical and biological perspectives of ellagitanins oligomers from medicinal plants. *Studies in Natural Products Chemistry* 23: 395 – 453.

- Yoshikawa, K., Mizutani, A., Kan, Y., Anihara, S. (1997). Antisweet natural products. XII. Structure of sitakisoides XI – XX from *Stephanotis luchuensis* KOIDZ.var. *japonica*. *Chemical and Pharmaceutical Bulletin* 45(1):65 – 67.
- Yoshikawa, M., Matsuda, H. (2000). Antidiabetogenic activity of oleanolic acid glycosides from the medicinal foodstuffs. *Biofactors* 13(1-4): 231 – 237.
- Yoshikawa, M., Murakami, T., Kishi, A., Kageura, T., Matsuda, H. (2001). Medicinal flowers III. Marigold (1): hypoglycemic, gastric emptying inhibitory and gastro protective principles and new oleanane type triterpene oligoglycosides, Calendasaponins A, B, C and D from Egyptian *Calendula officinalis*. *Chemical and Pharmaceutical Bulletin* 49(7): 863 -870.
- Yun, B. S., Ryoo, I. J., Lee, I. K., Park, K. H., Choung, D. H., Han, K. H., Yoo, I. D. (1998). Two bioactive pentacyclic triterpene esters from the root bark of *Hibiscus syriacus*. *Journal of Natural Product* 62: 764 – 766.
- Zakaria, Z. A. (2007). Free radical scavenging activity of some plants available in Malaysia. *Iranian Journal of Pharmacy and Therapeutics* 6: 87 – 91.
- Zimmet, P. (1983). Epidemiology of diabetes mellitus. In: Ellenberg, M., Riffin, H. eds. *Diabetes mellitus-therapy and clinical practice*, 3<sup>rd</sup> ed. New York, Medical Examination Publishing. 451.
- Zingiber cassumunar* Roxb.  
Available <http://herbal.medicalonlinemedia.com> (June, 2011)
- Zhou T, Luo D, Li X, Luo Y. 2009. Hypoglycemic and hypolipidaemic effects of flavonoids from lotus (*Nelumbo nucifera* Gaertn) leaf in diabetic mice. *Journal of Medicinal Plant Research* 3(4): 290 – 293.

## **APPENDICES**

## Appendix A

### 1. Calculation of insulin dosage

The insulin used in the study was in the form of powder.

- a. mg (human insulin) was dissolved in 1 ml normal saline solution and administered in approximately 0.22  $\mu$ l because it was calculated to contain about 0.4338  $\mu$ g.

Dosage to be given to each mice (25 g bw) = 1 iu/kg

1000 g  $\rightarrow$  1 iu

25 g  $\rightarrow$   $1/1000 \times 25 = 0.025$  iu

0.025 iu = 0.8675  $\mu$ g

### 2. Calculation of glibenclamide dosage

Glibenclamide 1mg/kg

Dissolve 5 mg of glibenclamide in 50 ml of distilled water = 0.1 mg/ml

$\therefore$  25 g mice will receive  $\rightarrow$   $0.1 \times 25 = 250$   $\mu$ l equivalent to 0.25 ml

## Appendix B

### Calculations of the doses administered to the mice from the Thai medicinal plant extracts

The average body weight for the Thai adult is 60 kg

Concentration of powder sample used for extraction is equal to that used locally for medicine in Nigeria = 20 kg

The extracts are as follows:

1. *Anogeissus acuminata* yield = 4.55 g .....22.75%

$$\text{Powder 20g} = 4550\text{mg}/60\text{kg}$$

$$= 75.83 \text{ mg/kg}$$

$$\text{For a 25 g mice} = 75.83/1000 \times 25/1 = 1.895 \text{ mg}$$

$$\text{Low Dose} = 1.895 \text{ mg, Mid Dose} = 3.79 \text{ mg, High Dose} = 7.58 \text{ mg}$$

2. *Catunaregam tomentosa* yield = 2.50 g .....12.50%

$$\text{Powder 20g} = 2500\text{mg}/60\text{kg}$$

$$= 41.66 \text{ mg/kg}$$

$$\text{For a 25 g mice} = 41.66/1000 \times 25/1 = 1.041 \text{ mg}$$

$$\text{Low Dose} = 1.041 \text{ mg, Mid Dose} = 2.082 \text{ mg, High Dose} = 4.164 \text{ mg}$$

3. *Dioecrescis erythroclada* yield = 1.50 g .....7.50%

$$\text{Powder 20g} = 1500\text{mg}/60\text{kg}$$

$$= 25 \text{ mg/kg}$$

$$\text{For a 25 g mice} = 25/1000 \times 25/1 = 0.625 \text{ mg}$$

$$\text{Low Dose} = 0.625 \text{ mg, Mid Dose} = 1.25\text{mg, High Dose} = 2.50 \text{ mg}$$

4. Yamed Boraped Pungchang yield = 9.04 g .....45.20%

1 capsule weighs 1.035 g

2 capsules weigh 2.0714 g

Extracts from 20 g = 9.04

Extracts from 2 capsules =  $9.04 \times 2.0714/20 = 0.9362$  g

Extracts for a 60 kg man =  $0.9362 \text{ g}/60 = 0.0156$  g/kg

Extracts for 25 g mice =  $0.0156/1000 \times 25/1 = 0.39$  mg

∴

Low Dose = 0.39 mg, Mid Dose = 0.78 mg, High Dose = 1.56 mg

5. *Mai Tau Lusi* yield = 6.00 g .....58.8%

1 capsule weighs 0.6312 g

2 capsules weigh 1.262 g

Extracts from 10.21 g = 6.00 g

Extracts from 2 capsules =  $6 \times 1.262/20 = 0.3786$  g

Extracts for a 60 kg man =  $0.3786 \text{ g}/60 = 0.00631$  g/kg

Extracts for 25 g mice =  $0.00631/1000 \times 25/1 = 0.0002$  mg

Low Dose = 0.0002 mg, Mid Dose = 0.0002 mg, High Dose = 0.0008 mg

6. *Dendrophthoe pentandra* yield = 4.95 g .....24.75%

Powder 20g = 4950mg/60kg

= 82.5 mg/kg

For a 25 g mice =  $82.5/1000 \times 25/1 = 2.062$  mg

Low Dose = 2.062 mg, Mid Dose = 4.124mg, High Dose = 8.248 mg

7. *Mimosa pudica* yield = 1.83 g .....9.15%

There were 2 plants in the recipe containing *M. pudica*. Here a factor of  $\frac{1}{2}$  will be used in its calculation

$$\begin{aligned}\text{Powder } 20\text{g} &= 1830\text{mg}/60\text{kg} \\ &= 30.5 \text{ mg/kg}\end{aligned}$$

$$\text{For a } 25 \text{ g mice} = 30.5/1000 \times 25/1 = 0.3812 \text{ mg}$$

$$\text{Low Dose} = 0.3812 \text{ mg}, \text{ Mid Dose} = 0.7625\text{mg}, \text{ High Dose} = 1.525 \text{ mg}$$

8. *Moringa pterygosperma* yield = 4.60 g .....23.00%

Factor  $\frac{1}{8}$  (one of 8 plants in the recipe)

$$\begin{aligned}\text{Powder } 20\text{g} &= 4600\text{mg}/60\text{kg} \\ &= 76.66 \text{ mg/kg}\end{aligned}$$

$$\text{For a } 25 \text{ g mice} = 76.66/1000 \times 25/1 \times 1/8 = 0.2395 \text{ mg}$$

$$\text{Low Dose} = 0.2395 \text{ mg}, \text{ Mid Dose} = 0.479\text{mg}, \text{ High Dose} = 0.958 \text{ mg}$$

9. *Pterocarpus macrocarpus* yield = 0.40 g .....2.00%

$$\begin{aligned}\text{Powder } 20\text{g} &= 400\text{mg}/60\text{kg} \\ &= 6.66 \text{ mg/kg}\end{aligned}$$

$$\text{For a } 25 \text{ g mice} = 6.66/1000 \times 25/1 = 0.1665 \text{ mg}$$

$$\text{Low Dose} = 0.1665 \text{ mg}, \text{ Mid Dose} = 0.333\text{mg}, \text{ High Dose} = 0.666 \text{ mg}$$

10. *Rauwolfia serpentina* yield = 5.10 g .....25.50%

Powder 20g = 5100mg/60kg

= 85 mg/kg

For a 25 g mice =  $85/1000 \times 25/1 = 2.125$  mg

Low Dose = 2.125 mg, Mid Dose = 4.25mg, High Dose = 8.50 mg

### Appendix C

**Calculations of the percentage yield of chloroform and methanol fractions of *A. acuminata* and *A. mannii***

<i>A. Acuminata</i>	
Dry Powder (g)	650
Crude MeOH extract (g)	117.308
Percentage Yield	18.05
Methanol Fraction (g)	107.820
Percentage Yield	6.59
Chloroform Fraction (g)	9.018
Percentage Yield	1.39
Fraction obtained/Total Powder x 100/1	

## Appendix C (continued)

<i>A. mannii</i>	
Dry Powder (g)	1220
Crude MeOH extract (g)	242.704
Percentage Yield	19.89
Methanol Fraction (g)	114.028
Percentage Yield	9.35
Chloroform Fraction (g)	127.704
Percentage Yield	10.47
Fraction obtained/Total Powder x 100/1	

## Appendix D

### Calculation on the dosage of *A. acuminata* sub-fractions

1. 100 g of *A. acuminata* powder was weighed and extract was made with 2 litres of methanol
2. 14.42 g of dry extract was obtained
3. The extract in (2) was re-extracted with chloroform to obtain 0.8766 g dry matter
4. Methanol extract remaining was 13.15 g
5. TLC (CHCl<sub>3</sub>: CH<sub>3</sub>OH: HCOOH – 9:1:0.1) was used to ascertain solvent for fractionation and the following was obtained
6. Methanol fraction (1g of fraction was partitioned)
  - a. Ethyl acetate = 0.09 g
  - b. Chloroform = 0.00 g
  - c. Butanol = 0.62 g
  - d. Methanol(residual) = 0.26 g
7. Chloroform fraction (0.8766 g was chromatographed)
  - a. Chloroform = 0.67 g
  - b. Chloroform: Methanol = 0.1 g
  - c. Methanol (residual) = 0.03 g

NB: All calculations are scaled down to 1 g only, representing the approximate weight of traditional Thai capsules, caplets and tablet. Therefore “total extract from powder is divided by 100”.

$$\text{Dosage} = \frac{\text{Fraction obtained}}{\text{Total fraction used}} \times \frac{\text{Total extract from powder}}{1}$$

## 8. Methanol fraction

a. Ethyl acetate = 0.09 g = 9%

$$0.09/1 \times 0.1315/1 = 0.0118 \text{ g}$$

1 g = approximate weight of Thai capsule may contain 11.83 mg

Average body weight of a Thai man = 60 kg

To obtain dosage per kg body weight =  $11.83 \text{ mg}/60 \text{ kg} = 0.1971 \text{ mg/kg}$

Convert to mg/g =  $0.000197 \text{ mg/g} = 0.0002 \text{ mg/g}$

Low dose = 0.0002 mg/g, Mid dose = 0.0004 mg/g, High dose = 0.0008 mg/g

b. Butanol = 0.62 g = 62 %

$$0.62/1 \times 0.1315/1 = 0.0815 \text{ g}$$

1 g = approximate weight of Thai capsule may contain 81.50 mg

Average body weight of a Thai man = 60 kg

To obtain dosage per kg body weight =  $81.50 \text{ mg}/60 \text{ kg} = 1.3583 \text{ mg/kg}$

Low dose = 0.0013 mg/g, Mid dose = 0.0026 mg/g, High dose = 0.0052 mg/g

c. Methanol residue = 0.26 g = 26%

$$0.26/1 \times 0.1315/1 = 0.0341 \text{ g}$$

1 g = approximate weight of Thai capsule may contain 34.10 mg

Average body weight of a Thai man = 60 kg

To obtain dosage per kg body weight =  $34.10 \text{ mg}/60 \text{ kg} = 0.5683 \text{ mg/kg}$

Convert to mg/g =  $0.00056 \text{ mg/kg} = 0.0006 \text{ mg/kg}$

Low dose = 0.0006 mg/g, Mid dose = 0.0012 mg/g, High dose = 0.0024 mg/g



## 9. Chloroform extracts

Here total extract obtained from powder was 0.8766 g. Since the calculation will be scaled down from 100 to 1, the above value is divided by 100 to obtain 0.0087.

a. Chloroform = 0.67 g = 76.4%

$$0.67/0.8766 \times 0.0087/1 = 0.0066 \text{ g } 0.007$$

1 g = approximate weight of Thai capsule may contain 7.0 mg

Average body weight of a Thai man = 60 kg

To obtain dosage per kg body weight = 7 mg/60 kg = 0.116 mg/kg

Low dose = 0.0001 mg/g, Mid dose = 0.0002 mg/g, High dose = 0.0004 mg/g

b. Chloroform: Methanol fraction = 0.1 g = 11.4%

$$0.1/0.8766 \times 0.0087/1 = 0.0009 \text{ g}$$

1 g = approximate weight of Thai capsule may contain 0.90 mg

Average body weight of a Thai man = 60 kg

To obtain dosage per kg body weight = 0.90 mg/60 kg = 0.015 mg/kg

Low dose = 0.00001 mg/g, Mid dose = 0.00002 mg/g

c. Methanol residue 0.03 g = 3.42%

$$0.03/0.8766 \times 0.0087/1 = 0.00029 \text{ g} = 0.0003 \text{ g}$$

1 g = approximate weight of Thai capsule may contain 0.3 mg

Average body weight of a Thai man = 60 kg

To obtain dosage per kg body weight = 0.3 mg/60 kg = 0.005 mg/kg

Low dose = 0.000005 mg/g, Mid dose = 0.00001 mg/g

## Dosage calculations for *A. mannii*

Calculation of the dosages of *A. mannii* sub-fractions are as follows:

$$\text{Formula} = \frac{\text{Fraction obtained}}{\text{Total fraction used}} \times \frac{\text{Total extract from Powder}}{1}$$

### A. Chloroform sub-fractions

#### 1. Chloroform sub-fraction I = 0.360 g

(CHCl<sub>3</sub>) (18.00%)

$$0.360/2 \times 0.91/1 = 0.163 \text{ g}$$

20 g yield 163 mg sub-fractions only

$$= 163 \text{ mg}/70 \text{ kg}$$

$$= 2.328 \text{ mg}/\text{kg}$$

$$= 0.002328 \text{ mg}/\text{g}$$

Low dose = 0.002328 mg/g, Mid dose = 0.004656 mg/g, High dose = 0.009312 mg/g

#### 2. Chloroform sub-fraction II = 0.098 g

(CHCl<sub>3</sub>) (4.90%)

$$0.098/2 \times 0.91/1 = 0.044 \text{ g}$$

20 g yield 44 mg sub-fraction only

$$= 44 \text{ mg}/70 \text{ kg}$$

$$= 0.628 \text{ mg}/\text{kg}$$

$$= 0.000628 \text{ mg}/\text{g}$$

Low dose = 0.000628 mg/g, Mid dose = 0.001256 mg/g, High dose = 0.002512 mg/g

**3. Chloroform sub-fraction III = 0.031 g****(CHCl<sub>3</sub>) (1.55%)**

$$0.031/2 \times 0.91/1 = 0.014 \text{ g}$$

20 g yield 14 mg sub-fraction only

$$= 14 \text{ mg}/70\text{kg}$$

$$= 0.2 \text{ mg}/\text{kg}$$

$$= 0.0002 \text{ mg}/\text{g}$$

Low dose = 0.0002 mg/g, Mid dose = 0.0004 mg/g, High dose = 0.0008 mg/g

**4. Chloroform : Methanol sub-fraction = 0.521 g****(CHCl<sub>3</sub>:CH<sub>3</sub>OH) (26.05%)**

$$0.521/2 \times 0.91/1 = 0.237 \text{ g}$$

20 g yield 237 mg sub-fraction only

$$= 237 \text{ mg}/70 \text{ kg}$$

$$= 3.385 \text{ mg}/\text{kg}$$

$$= 0.003385 \text{ mg}/\text{g}$$

Low dose = 0.003385mg/g, Mid dose = 0.00677mg/g, High dose = 0.01354 mg/g

**5. Chloroform: Methanol: Acetic acid sub-fraction = 0.913 g****(CHCl<sub>3</sub>:CH<sub>3</sub>OH:CH<sub>3</sub>COOH) (45.65%)**

$$0.913/2 \times 0.91/1 = 0.415 \text{ g}$$

20 g yield 415 mg sub-fraction only

$$= 415 \text{ mg}/70 \text{ kg}$$

$$= 5.928 \text{ mg}/\text{kg}$$

$$= 0.005 \text{ mg/g}$$

Low dose = 0.005 928mg/g, Mid dose = 0.011 856 mg/g, High dose = 0.023 712 mg/g

**NB:** Chloroform gave three separate bands during column chromatography

### **A. Methanol sub-fraction**

#### **1. Ethyl acetate sub-fraction = 0.012 g**



$$0.012/2 \times 0.86/1 = 0.005 \text{ g}$$

20 g powder yield 5 mg ethyl acetate sub-fraction only

$$= 5 \text{ mg}/70 \text{ kg}$$

$$= 0.071 \text{ mg/kg}$$

$$= 0.000 07 \text{ mg/g}$$

Low dose = 0.000 071 mg/g, Mid dose = 0.000 142 mg/g, High dose = 0.000 284 mg/g

#### **2. Ethyl acetate: acetic acid sub-fraction = 0.802 g**



20 g yield 344 mg sub-fraction only

$$= 344 \text{ mg}/70 \text{ kg}$$

$$= 4.91 \text{ mg/kg}$$

$$= 0.004 91\text{mg/g}$$

Low dose = 0.004 91mg/g, Mid dose = 0.009 82 mg/g, High dose = 0.019 64 mg/g

**3. Ethyl acetate: acetic acid: methanol sub-fraction = 1.069 g****(CH<sub>3</sub>COOCH<sub>2</sub>CH<sub>3</sub>:CH<sub>3</sub>COOH:CH<sub>3</sub>OH) (53.45%)**

$$1.069/2 \times 0.86/1 = 0.459 \text{ g}$$

20 g yield 459 mg sub-fraction only

$$= 459 \text{ mg}/70 \text{ kg}$$

$$= 6.55 \text{ mg}/\text{kg}$$

$$= 0.00655 \text{ mg}/\text{g}$$

Low dose = 0.00655 mg/g, Mid dose = 0.0131 mg/g, High dose = 0.0262 mg/g

**4. Methanol sub-fraction = 0.070 g****(CH<sub>3</sub>OH) (3.50%)**

$$0.07/2 \times 0.86/1 = 0.030 \text{ g}$$

20 g yield = 30 mg sub-fraction

$$= 30 \text{ mg}/70 \text{ kg}$$

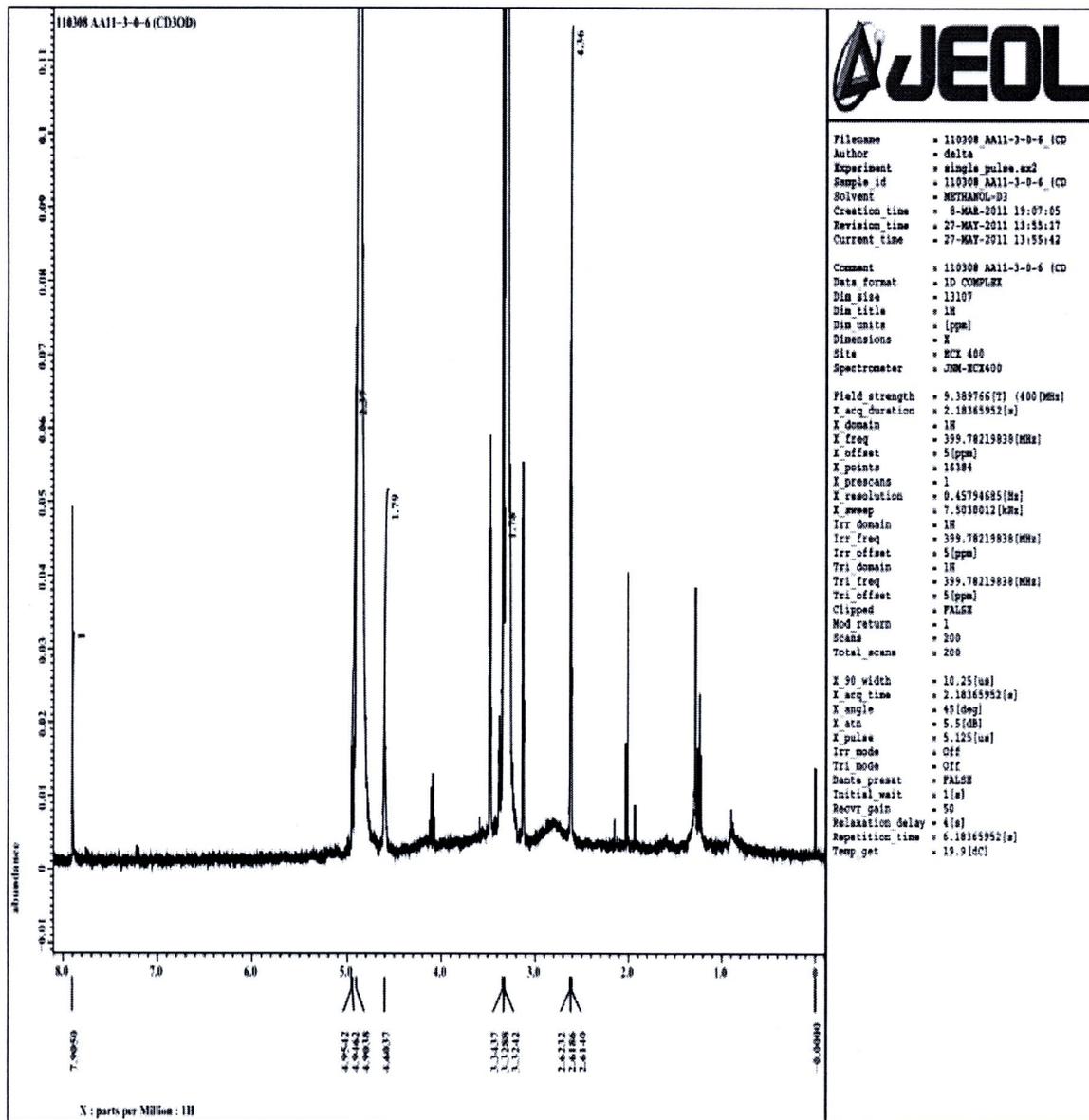
$$= 0.428 \text{ mg}/\text{kg}$$

$$= 0.000428 \text{ mg}/\text{g}$$

Low dose = 0.000428 mg/g, Mid dose = 0.000856 mg/g, High dose = 0.001

712g/mg

## Appendix E

<sup>1</sup>H - NMR Castalagin

## Appendix F

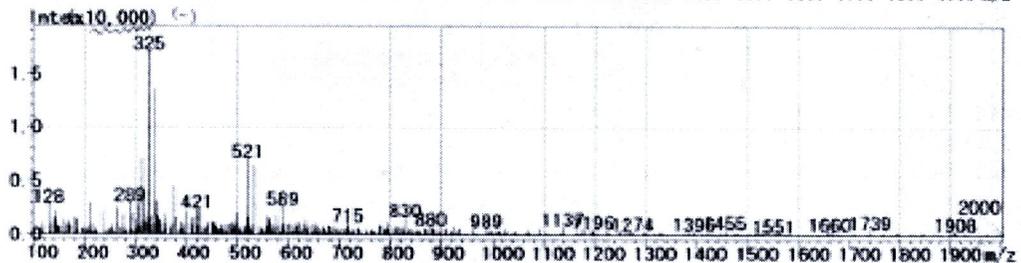
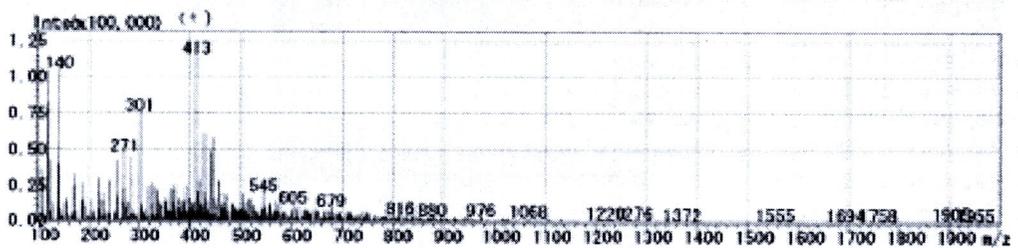
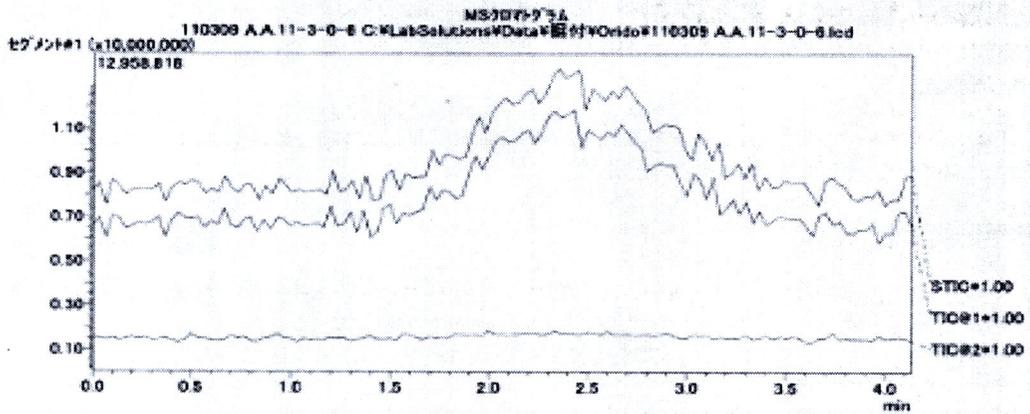
Mass spectroscopy data of Castalagin (*Anogeissus acuminata* methanol sub-fraction - 3-0-6)

2011/03/09 16:17:33 1 / 1

## ==== Shimadzu LCMSsolution 分析レポート ====

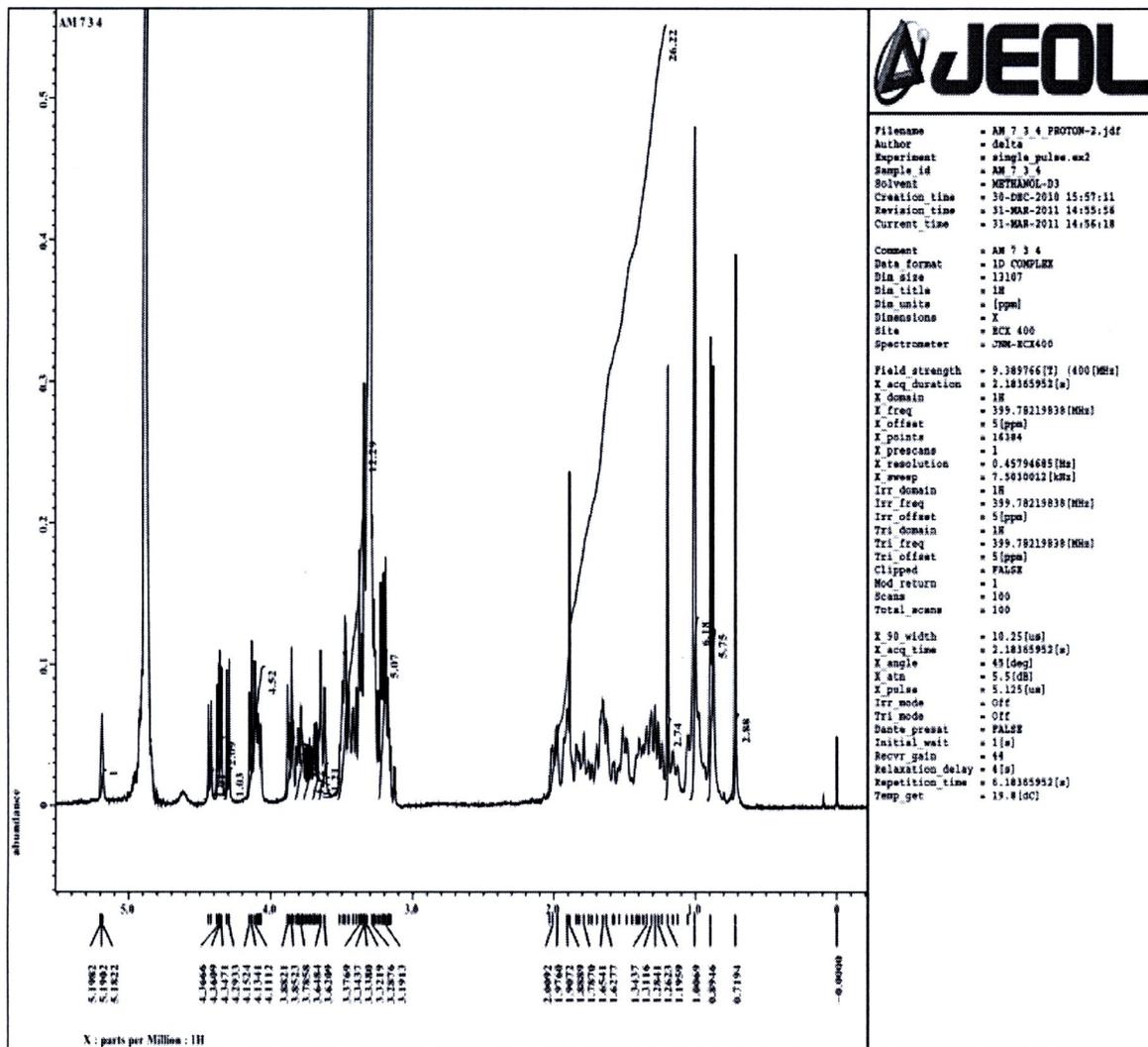
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 バッチファイル :  
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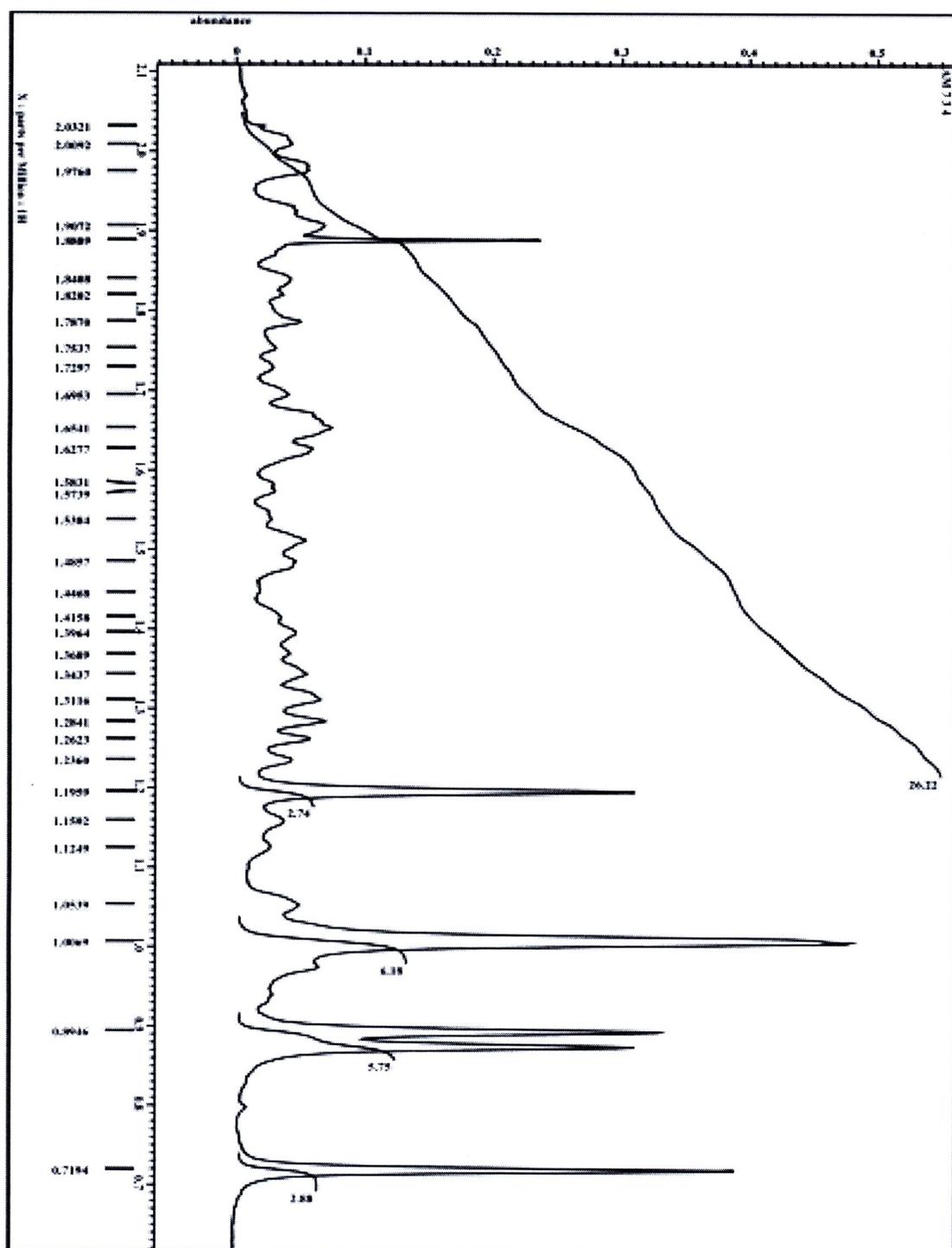
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## Appendix G

 $^1\text{H}$  NMR for *A. manni* pure compound

Appendix G  $^1\text{H}$  NMR for *A. mannii* pure compound (continued)



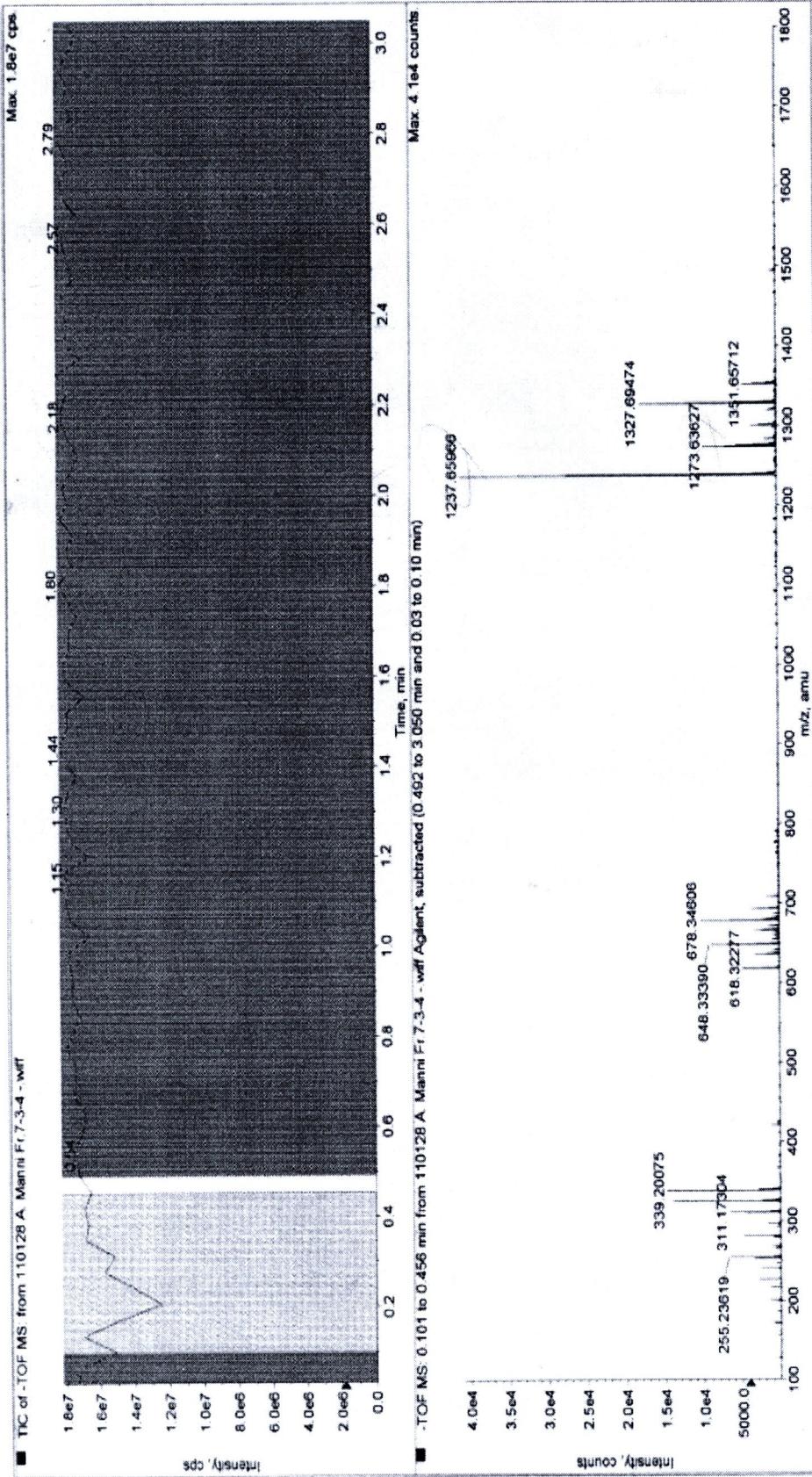
Appendix H Mass spectroscopy data for Manosrin (*Anisopus manni* methanol sub-fraction)

Elemental composition calculator

Target m/z: +1237.6597 amu  
 Tolerance: +40.0000 ppm  
 Result type: Elemental  
 Max num of results: 20  
 Min DBE: -10.0000 Max DBE: +50.0000  
 Electron state: Odd/even  
 Num of charges: 0  
 Add water: N/A  
 Add proton: N/A  
 File Name: 110128 A. Manni Fr.7-3-4 -.wiff

Elements	Min Number	Max Number
C	0	100
H	0	100
O	0	50

Formula	Calculated m/z (amu)	mDa Error	PPM Error	DBE
1 C78 H93 O13	1237.6616	-1.9590	-1.5928	32.5
2 C85 H89 O8	1237.6557	3.9143	3.1626	41.5
3 C67 H97 O21	1237.6522	7.4236	5.9981	19.5
4 C71 H97 O18	1237.6674	-7.0323	-6.3283	23.5
5 C89 H89 O6	1237.6710	-11.3417	-9.1638	45.5
6 C74 H93 O16	1237.6463	13.2570	10.7436	28.5
7 C82 H93 O10	1237.6768	-17.2151	-13.9094	36.5
8 C81 H89 O11	1237.6404	19.1704	15.4892	37.5
9 C63 H97 O24	1237.6369	22.6797	18.3247	15.5
10 C75 H97 O15	1237.6827	-23.0884	-18.6549	27.5
11 C88 H85 O6	1237.6346	25.0437	20.2347	46.5
12 C93 H89 O2	1237.6862	-26.5978	-21.4904	49.5
13 C70 H93 O19	1237.6311	28.5531	23.0702	24.5
14 C86 H93 O7	1237.6921	-32.4711	-26.2359	40.5
15 C77 H89 O14	1237.6252	34.4264	27.8157	33.5
16 C59 H97 O27	1237.6217	37.9358	30.6512	11.5
17 C79 H97 O12	1237.6980	-38.3445	-30.9815	31.5



## Appendix I

### Calculation of dosages of the pure compounds for animal treatment

#### I. Calculation of dosage for the pure compound Castalagin

Powder 650 g	Reduced to 100 g	Reduced to 1 g
Crude extract = 117.308 g	18.05 g	0.18 g
Sub-fraction = 16.163 g	2.487 g	0.025 g
Castalagin = 0.0034 g	0.0005 g	0.000005 g

A 60 kg man will get 0.000005 g/60kg

$$= 0.00000008 \text{ g/kg}$$

$$= 80 \text{ ng/kg}$$

25 g mouse will get  $80 \text{ ng}/1000 \times 25 = 2 \text{ ng}$  in 0.5ml

$\therefore 2.0 \text{ ng}/0.5 \text{ ml} = 4.0 \text{ ng/ml}$  considered as low dose crude extract equivalent

Preparation of doses for treatment

1. 3.39 mg Castalagin + 848 ul (DW) = 3.9 ug/ul (approx 4 mg/ml)
2. 10 ul of (1) + 990 ul (DW) = 1,000 = 0.04 mg/ml = 40,000 ng/ml
3. 10 ul of (2) + 990 ul (DW) = 1,000 = 0.0004 mg/ml = 400 ng/ml

Experiment

4. 400 mg/kg bw

$$\text{Extract} = 4 \text{ ng/ml} \times 4 = 16 \text{ ng/ml}$$

$$250 \text{ ul of (3)} + 6,250 \text{ ul (DW)} = 16 \text{ ng/ml (0.000016 mg/ml)}$$

5. 2,000 mg/kg bw = 80 ng  
1,000 ul of (3) + 4,000 ul (DW) = 80 ng/ml (0.00008 mg/ml)
6. 5,000 mg/kg bw = 200 ng/ml  
2,500 ul of (3) + 2,500 ul (DW) 200 ng/ml (0.0002 mg/ml)

## II. Calculation of dosage for pure compound of *A. mannii*

Powder used = 1220 g	Reduced to 100 g	Reduced to 1 g
Crude extract = 242.704 g	19.89 g	0.199 g
Sub-fraction = 6.429 g	0.527 g	0.005 g
Pure compound = 0.0025 g	0.0002 g	0.000 002 g

A 60 kg man will get 0.000 002 g/60 kg

$$= 0.000\ 000\ 033\ \text{g/kg} = 30\ \text{ng/kg} = 0.033\ \text{ng/g}$$

25 g mice will get = 0.75 = **0.83** ng which is considered as the **low dose i.e.**

100 mg/kg *bw*

Volume to be given to each mouse is 0.5 ml

Since 0.5 ml solution will be administered, it becomes 0.83 ng/0.5 ml

There are 5 mice in each group : . 1.66 ng/ml can be used for 1 mouse

Total volume for 5 mice = **2.5 ml**, therefore **4 ml** will be prepared.

### Preparation of the drug for administration

- 2.5 mg of pure compound dissolve in 1 ml of DW = 0.025 mg/ul (2500 ng/μl)
- 10,000 mg/kg *bw*  
1,000 ul of (1) + 5,250 ul of DW  
= 0.00016 mg/ml (160 ng/ml)
- 4000 mg/kg *bw*  
2,000 ul of (2) + 3,000 ul DW  
= 0.000,064 mg/ml (64 ng/ml)

4. 4,000 mg/kg bw  
1,000 ul of (3) + 9,000 ul DW  
= 0.000,0064 mg/ml (6.4 ng/ml)

5. 100,000 mg/kg bw  
250 ul of (1) + 3,650 ul DW  
= 0.00160 mg/ml (1,600 ng/ml)

6. 1,000,000 mg/kg bw  
3,000 ul of (1) + 1,680 ul DW  
= 0.016 mg/ml (16,000 ng/ml)

Note: Only 0.5 ml is administered to the mouse

## CURRICULUM VITAE

**Name:** Moses Zira Zaruwa (Mr.)

**Date of Birth:** 12<sup>th</sup> November, 1969

**Place of Birth:** Ibadan, Nigeria

**Nationality:** Nigerian

**Marital Status:** Married

**Education:**

<b>Year</b>	<b>Year</b>	<b>Year</b>
	2005-2006	Certificate in Research Ethics Aga Khan University, Karachi, Pakistan.
	1998-2002	MSc in Biochem University of Maiduguri, Maiduguri. Borno State. Nigeria
	1999-1999	Certificate in Milling Technology Flour Mills of Nig Plc, Training School, Apapa, Lagos. Nigeria.

**Contact Address:** Adamawa State University, Department of Chemistry

P.M.B. 25, Mubi,

Adamawa State, Nigeria

**Award(s):** 1. Best Teacher of the year (1994-5). Salawu Abiola Comprehensive High School, Osiele, Abeokuta, Ogun State, Nigeria (National Youth Service Corps)

- For attendance of Certificate Course at the Aga Khan University, Karachi, Islamic Republic of Pakistan. **Awarded** by The Welcome Trust UK. (2005).
- Research Grant: Research in Indigenous Science and Knowledge Systems. **Awarded** by The Central State University of Connecticut, USA (2006).

## **Publications**

1. Manosroi, J., **Zaruwa, M. Z.**, Manosroi, A. (2011). Potent hypoglycemic effect of Nigerian anti-diabetic medicinal plants. *Journal of Complementary and Integrative medicine*. 8(1): 1 – 16.
2. Manosroi, J., **Zaruwa, M. Z.**, Manosroi, A. (2011). Hypoglycemic activity of Thai medicinal plants selected from the Thai/Lanna medicinal recipe database MANOSROI II. (Accepted for publication in the *Journal of Ethnopharmacology*)
3. **Zaruwa Z. Moses**, Aranya Manosroi , Toshihiro Akihisa, Worapaka Manosroi, Samreung Rangdaeng, Jiradej Manosroi (2011). Hypoglycemic activity of the *Anisopus mannii* methanolic leaf extract in normal and alloxan induced diabetic mice. (In Press)

4. Jiradej Manosroi, **Zaruwa Z. Moses**, Toshihiro Akihisa, Worapaka Manosroi, Aranya Manosroi (2011). Anti-diabetic activity of *Anogeissus acuminata* a medicinal plant selected from the Thai medicinal plant recipe database MANOSROI II. (In Process)
5. D. L. David, A. Edward, **M. Z. Zaruwa** and P. A. Addass (2010). Barbing Saloon Associated Fungal Disease in Mubi, Adamawa State, Nigeria. *World Journal of Medical Sciences* 5(1): 17 – 21.
6. Barminas, J. T., Onen, A. I., Williams, E. T., **Zaruwa, M. Z.**, Mamuru, S. A. (2008). Studies on the functional properties of borassus starch from fresh germinating nuts of giginya (*Borassus aetiopium*) palm. *Food Hydrocolloids*, vol 22, issue 2. March 2008, pages 298 - 304.
7. **Zaruwa, M. Z.**, Kwaghe, Z. E. (2008). Traditional tannery and dyeing (*Yirie*) methods in Northeastern Nigeria. *African Update Newsletter. Vol. XV, Issue 1*(winter 2008): pp. 2-9. Nigeria's Indigenous Chemistry. (<http://www.ccsu.edu/afstudy/upd15-1.html>).
8. **Zaruwa, M. Z.**, Ibok, U. N. and Ibok, U. I. (2008). Traditional brewing techniques in Northeastern Nigeria: An indigenous approach to the exploitation of enzymes (*Tsiro*). *African Update Newsletter. Vol. XV, Issue 1* (winter 2008): pp. 9-15. Nigeria's Indigenous Chemistry. (<http://www.ccsu.edu/afstudy/upd15-1.html>).

9. **Zaruwa, M. Z.**, Barminas, J. T. and Apampa, R. O. (2008). *Ab-initio* assessment of indigenous distillation in Northeastern Nigeria and the production of *Argi*. African Update Newsletter. Vol. XV, Issue 1(winter 2008): pp. 16-19. Nigeria's Indigenous Chemistry. (<http://www.ccsu.edu/afstudy/upd15-1.html>).
10. **Zaruwa, M. Z.**, Manosroi, J., Manosroi, A. and Gidado, R. S. M. (2008). Some essential oils from plants and their medicinal uses and aroma therapy in the Northern part of Nigeria. In. Conference Journal of the eighth National Seminar on Pharmaceutical Biotechnology, Chiang Mai. Thailand.
11. Oweh, K. T., **Zaruwa, M. Z.** and Okoronka, U. A. (2007). African traditional marriage: An indigenous application of genetics. (Book Chapter), International Conference on African Indigenous Science and Knowledge systems. Keffi. Nassarawa State. Nigeria.
12. Okoronka, U.A., Malosan, M. and **Zaruwa, M. Z.** (2007). African Traditional concept of environmental preservation. (Book Chapter), International Conference on African Indigenous Science and Knowledge systems. Keffi. Nassarawa State. Nigeria.
13. **Zaruwa, M.Z.**, Geidam, A.M., Hassan, S. and Ibok, N. (2007). Serum Sodium, Potassium analysis and rehydration therapy in asthma sufferers in a selected population in northeastern Nigeria. *Journal of Science and*

*Technology* (2006). Duncan international conference on Industrial science and development Publications.

14. **Zaruwa, M.Z.** (2007). Nutraceuticals: The re-emergence of African Traditional Science in Nutritional Therapy. In: Roots. African Indigenous Science and Knowledge systems (Book Chapter). ([www.africanhistory.com](http://www.africanhistory.com)).
15. **Zaruwa, M.Z.**, Umar, A.I. and Chibuzo, E.C. (2006). Fermentation of Phytomilk with *Lactobacillus Spp*, towards improving on its acceptability. In: Chemical Society of Nigeria Conference Book of the 28<sup>th</sup> International conference. Maiduguri. Borno State. Nigeria.
16. **Zaruwa, M. Z.**, Umar, A.I. and Chibuzo, E.C. (2005). Formulation and Evaluation of Phytomilk as an Alternative to Dairy Milk. *Chemclass Journal*. Vol. 2, 88-92.

### **Conference Presentations**

1. **Zaruwa, M. Z.**, Manosroi, J., Ibok, U.I., Manosroi, A. (2011). Practice of traditional medicine in North Eastern Nigeria: The management of diabetes mellitus, hemorrhoid and bronchial asthma. ICETM, Thailand. (Oral Presentation)

2. **Zaruwa, M. Z.**, Aranya Manosroi., Jiradej Manosroi (2009). Free Radical Scavenging Activity and Phytochemistry of the Methanolic Extracts of Antidiabetic Medicinal Plants from Nigeria. Book of Abstract. The 35<sup>th</sup> Congress on Science and Technology of Thailand (STT 35). Burapha University, Chonburi, Thailand. (Poster Presentation)
3. **Zaruwa, M. Z.**, Manosroi, A. and Manosroi, J. (2009). Free radical scavenging activity and phytochemical constituents of aqueous extracts of traditional Lanna medicinal plants for diabetes. *Journal of Thai Traditional and Alternative Medicine* Vol. 7 No.2 May –August (Supp), p -3. (Poster Presentation)
4. **Zaruwa, M. Z.**, Manosroi, J., Manosroi, A. (2009). Free radical scavenging activity and phytochemical constituents of methanolic extracts of traditional medicinal plants for hypoglycemic treatment in the North of Thailand. *Journal of Thai Traditional and Alternative Medicine* Vol. 7 No.2 May – August (Supp). PP-4. (Poster Presentation)
5. Manosroi, J., **Zaruwa, M. Z.** and Manosroi, A. (2008). Free radical scavenging activity of extracts from the medicinal plants selected from the Thai Lanna recipes for diabetes treatment. *Journal of Thai traditional and alternative medicine*, Vol.6 N0. 2(supplement). Thailand. (Poster Presentation)

6. **Zaruwa, M. Z.**, Manosroi, J. and Manosroi, A. (2008). Medicinal plants for diabetes mellitus treatment in Nigeria. *Journal of Thai traditional and alternative medicine*, Vol.6 NO. 2(supplement).Thailand. (Poster Presentation)
7. **Zaruwa, M. Z.** (2007). The demerits of food supplementation with vitamin A in Nigeria: A critical review. Duncan international conference on Industrial science and development. Uyo, Akwa Ibom State. Nigeria.
8. Ibok, N. U., Paul, T. T. and **Zaruwa, M. Z.** (2006). Extraction and identification of the thickening substance from *Brachystegia eurycoma*, "Achi". A preliminary study. Chemical Society of Nigeria, Ahmadu Bello University Branch (Chemclass), Zaria. Kaduna State. Nigeria.
9. Kwahge, N. Z. and **Zaruwa, M. Z.** (2006). Fatherhood: The Right Perspective. Presented at the Seventh Regional Interdisciplinary Colloquium-Quality Development and Management Resources Center, Markurdi, Benue State. Nigeria.
10. **Zaruwa, M. Z.**, Umar, I. A., Chibuzo, E. C. and Kibikiwa, T. M. (2006). A Physicochemical comparative study of the fermentation of Phytomilk using *Aspergillus niger* and *Bacillus Spp.* In: Book of proceedings of the Nigerian Society of Microbiology (NSM) 30<sup>th</sup> Annual conference and general meeting. Keffi, Nasarawa State. Nigeria. (Oral Presentation)



