REFERENCES

Abe, Y., 1989. Effect of moisture on decay of wood by Xylariaceous and Diatrypaceous fungi and quantitative changes in the chemical components of decayed wood. Transactions of the Mycological Society of Japan 30: 169-181.

Adney, W., Rivard, C., Grohmann, K., and Himmel, M. 1989. Detection of extracellular hydrolytic enzymes in the anaerobic digestion of municipal solid waste. Biotechnology and Applied Biochemistry 11: 387-400.

Ainsworth, G.C. 1976. Introduction to the history of mycology. London: Cambridge University Press.

Altschul, S.F., Gish, W., Miller, W., Myers, E. and Lipman, D.J. 1990. Basic local alignment search tool. Journal of Molecular Biology 215: 403-410.

Amersham Pharmacia Biotech. 1999. Protein purification handbook. Sweden.

Archibald, F.S. 1992. Lignin perixidase activity is not important in biological bleaching and delignification of unbleached kraft pulp by *Trametes versicolor*. Applied and Environmental Microbiology 58: 3101-3109.

Armesilla, A.L., Thurston, C.F., and Yague, E. 1994. CELI: a novel cellulose binding protein secreted by *Agaricus bisporus* during growth on crystalline cellulose. FEMS Microbiology Letter 116: 293-299.

Atalla, R.H. 1993. The structures of native cellulose. In Suominen, P., and Reinikainen, E. (eds.), *Trichoderma reesei*: Cellulase and Other Hydrolyses, pp. 25-30. Helsinki: Foundation for Biotechnical and Industrial Fermentation Research.

Baum, S., Sieber, N.T., Schwarze, F.W.M.R., and Fink, C. 2003. Latent infections of Fomes fomentarius in the xylem of European beech (*Fagus sylvatica*). Mycological Progress 2: 141-148.

Bause, E., and Legler, G. 1980. Isolation and structure of a tryptic glycopeptide from the active site of β-glucosidase A3 from *Aspergillus wentii*. Biochimica et Biophysica Acta 626: 459-465.

Beguin, P., and Aubert, J.P. 1993. The biological degradation of cellulose. FEMS Microbiology Reviews 13: 25-58.

Bhatia, Y., Mishra, S., and Bisaria, V.S. 2002. Biosynthetic activity of recombinant *Escherichia coli* expressed *Pichia etchellsii* β-glucosidase II. Applied Biochemistry and Biotechnology 103: 367-369.

Bhatia, Y., Mishra, S., Bisaria, V.S. 2002. Microbial β-Glucosidases: Cloning, Properties, and Applications. Critical Reviews in Biotechnology 22: 375-407.

Blanchette, G.F.L., Attridge, M. and Akhtar, M. 1991. Biomechanical Pulping with *C. subvermispora*. US Patent 5,055,159.

Boddy, L. Gibbon, O.M. and Grundy, M.A. 1985. Ecology of *Daldinia concentrica*: effect of abiotic variables on mycelial extension and interspecific interactions. Transaction of the British Mycological Society 85: 201-211.

Boddy, L., and Griffith, G.S. 1989. Role of endophytes and latent invasion in the development of decay communities in sap wood of angiospermous trees. Sydowia 41: 41-73.

Bolton, J. 1789. An history of funguses growing about Halifax III. Halifax and Huddersfield.

Bollag, D. M., Rozycki. M.D., and Edelstein, S. J. 1996. Protein methods. 2nd. New York: Wiley-Interscience.

Bothast, R.J., and Saha, B.C. 1997 Ethanol production from agricultural biomass substrates. Advances in Applied Microbiology 44: 261-286.

Broda, P., Birch, P.R.J., Brooks, P.R., and Sims, P.F.G. 1996. Lignocellulose degradation by *Phanerochaete chrysosporium*: gene families and gene expression for a complex process. Molecular Microbiology 19: 923-932.

Bronnenmeier, K., and Staudenbauer, W.L. 1998. Purification and properties of an extracellular β-glucosidase from the cellulolytic thermophile *Clostridium stercorarium*. Applied Microbiology and Biotechnology 28: 380-386.

Brunner, F. and Petrini, O. 1992. Taxonomy of some Xylaria species and xylariaceous endophytes by isozyme electrophoresis. Mycological Research 96: 723-733.

Cai, Y.J., Buswell, J.A., and Chang, S.T. 1998. β-Glucosidase component of the cellulolytic system of the edible straw mushroom, *Volvariella volvacea*. Enzyme and Microbial Technology 22: 122-129.

Cao, W., and Crawford, D.L. 1993. Purification and some properties of β-glucosidase from the ectomycorrhizal fungus *Pisolithus tinctorius* strain SMF. Canadian Journal of Microbiology 39: 25-129.

Carroll, G., and Petrini, O. 1981. Patterns of substrate utilization by some fungal endophytes from coniferous foliage. Mycologia 75: 53-63.

Cartwright, K. St. G. and Findlay, W.P.K. 1958. Decay of timber and its prevention London: HMSO.

Castro, M.J.L., Kovensky, J., and Cirelli, A.F. 1997. Gemini surfactants from alkyl-glucosides. Tetrahedron Letters 38: 3995-3998.

Chahid, Z., Montet, D., Pina, M., and Graille, J. 1992. Enzymatic effect of water activity on the enzymatic synthesis of alkyl glucosides. Biotechnology Letters 14: 281-284.

Chapela, I.H. 1989. Fungi in healthy stems and branches of American beech and aspen: a comparative study. The New Phytologist 113: 65-75.

Chapela, I.H., and Boddy, L. 1988a. Fungal colonization of attached beech branches I. Early stages of development of fungal communities. The New Phytologist 110: 39-45.

Chapela, I.H. and Boddy, L. 1988b. Fungal colonization of attached beech branches II. Spatial and temporal organization of communities arising from latent invaders in bark and functional sapwwod, under different moisture regimes. The New Phytologist 110: 47-57.

Chapela, I.H., Petrini, O. and Bielser, G. 1993. The physiology of ascospore enclosion in *Hypoxilon fragiforme*: mechanisms in the early recogition and establishment of an endophytic symbiosis. Mycological Research 97: 157-162.

Chapela, I.H., Petrini, O. and Hagmann, L. 1991. Monolignol glucosides as specific recognition messengers in fungudplant symbiosis. Physiological and Molecular Plant Pathology 39: 289-298.

Chapela, I.H., Petrini, O. and Petrini, L.E. 1990. Unusual ascospore germination in *Hypoxylon fragiforme*: first steps in the establishment of an endophytic symbiosis. Canadian Journal of Botany 68: 2571-2575.

Chen, H., Hayn, M., and Hermann, E. 1992. Purification and Characterization of Two Extracellular β-Glucosidases from *Trichoderma reesei*. Biochimica et Biophysica Acta 1121: 54-60.

Chen, H., Li, X., and Ljungdahl, L.G. 1994. Isolation and properties of an extracellular β-glucosidase from the polycentric rumen fungus *Orpinomyces sp.* Strain PC-2. Applied and Environmental Microbiology 60: 64-70.

Chirico, W.J., and Brown, R.D. 1987. Purification and characterization of a β-glucosidase from *Trichoderma reesei*. European Journal of Biochemistry 165: 333-341.

Christakopoulos, P., Goodenough, P.W., Kekos, D., Macris, B.J., Claeyssens, M., and Bhat, M.K. 1994 Purification and characterisation of an extracellular beta-glucosidase with transglycosylation and exo-glucosidase activities from *Fusarium oxysporum*. European Journal of Biochemistry 224: 379-385.

Clausen, C.A. and Ferge, L., 1995. Dimensional lumber model demonstrates the sensitivity of the particle capture immunoassay in early detection of brown-rot fungi. International Research Group on Wood Preservation Doc. NO. IRG/WP/95-20058.

Clarke, A.J. 1990. Chemical modification of a β-glucosidase from *Schizophyllum commune*: evidence for essential carboxyl groups. Biochimica et Biophysica Acta 1040: 145-152.

Clarke, A. J. 1997. Biodegradation of Cellulase: Enzymology and Biotechnology. Pennsylvania: Technomic Publishing Company.

Copa-Patino, J.L., and Broda, P. 1994. A *Phanerochaete chrysosporium* β-D-glucosidase/β-D-xylosidase with specificity for (1-3)-β-D-glucan linkages. Carbohydrate Research 253: 265-275.

Coughlan, M.P. 1985. The properties of fungal and bacterial cellulases with comment on their production and application. Biotechnology and Genetic Engineering Reviews 3: 39-109.

Crivelli, P. Petrini, L., Petrini, O. and Samuels, G.J. 1981. A list of Daldini's fungus taxa deposited at the museo Cantonale di Storia naturale in Lugano, TI (Switzerland). Sydowia 34: 49-81.

Dainippon–Ink–Chem 1996. Simple and selective preparation of alkyl-laminarioligosaccharides. PN: JP-JP08196290. Japan.

Dan, S., Marton, I., Dekel, M., Bravdo, B.A., He, S., Withers, S.G., and Shoseyov, O. 2000. Cloning, expression, characterization, and nucleophile identification of family 3, *Aspergillus niger* β-glucosidase. Journal of Biological Chemistry 275: 4973-4980.

Davies, G.J., Brzozowski, A.M., Dauter, M., Varrot, A., and Schulein, M. 2000. Structure and function of *Humicola insolens* family 6 cellulase: structure of the endoglucanase, CelB, at 1.6 A resolution. Biochemistry Journal 348: 201-207.

Decker, C.H., Visser, J., Schreier, P. 2001. Beta-glucosidase multiplicity from *Aspergillus tubingensis* CBS 643.92: purification and characterization of four beta-glucosidases and their differentiation with respect to substrate specificity, glucose inhibition and acid tolerance. Applied Microbiology and Biotechnology 55: 157-163.

Dekker, R.F.H. 1981. Induction, localization and characterization of β-glucosidases produced by *Monila*. Journal of General and Applied Microbiology 127: 177-184.

Dennis, R.W.G. 1963. Hypoxyloideae of Congo. Bulletin Jardin Botanique de l'Etat (Bruxelles) 33: 317-343.

Dennis, R.W.G. 1974. Xylariaceae from Papua and New Guinea. Bulletin Mensucl Societe Linnacene de Lyon 43: 127-138.

Derek, K.W., Hiroshi, O., and Kiyoshi, H. 1998. *Agrobacterium tumefaciens* β-glucosidase is also an effective β-xylosidase, and has a high transglycosylation activity in the presence of alcohols. Biochimica et Biophysica Acta 1385: 78-88.

Divne, C., Ståhlberg, J., Reinikainen, T., Ruohonen, L., Pettersson, G., Knowles, J.K.C., Teeri, T.T., and Jones, A.T. 1994. The three-dimensional crystal structure of the catalytic core of cellobiohydrolase I from *Trichoderma reesei*. Science 265: 524-528.

Dong, W., Yinbo, Q.U., and Peiji, G. 1996. Transglycosylation of extracellular β-glucosidase of *Trichoderma pseudokoningii* S38 and its function in regulation of cellulase biosynthesis. Journal of General and Applied Microbiology 42: 363-369.

Eriksson, K.E.L., Blanchette, R.A.,and Ander, P. 1990. Microbial and enzymatic degradation of wood and wood componenets New York: Springer-Verlag.

Eveleigh, D.E. 1987. Cellulase: a perspective. Philosophical Transactions of the Royal Society of London 321: 435-437.

Eveleigh, D.E., and Montenecourt, B.S. 1979. Increasing yields of extracellular enzymes. Advances in Applied Microbiology 25: 57-74.

Fischer, L., Bronmann, R., Kengen, S.W.M., De Vos, W.M., and Wagner, F. 1996. Catalytical potency of β-glucosidase from the extremophile *Pyrococcus furiosus* in glycoconjugate biosynthesis. Biocontrol Science and Technology 14: 88-91.

Fontaine, T., Hartland, R.P., Diaquin, M., Simenel, C., and Latgé, J.P. 1997. Differential patterns of activity displayed by two exo-β-1,3-glucanases associated with the *Aspergillus fumigatus* cell wall. Journal of Bacteriology 179: 3154-3163.

Freer, S.N. 1985. Purification and characterization of the extracellular β-glucosidase produced by *Candida wickerhamii*. Archives of Biochemistry and Biophysics 243: 515-522.

Fujita, M., and Harada, H. 1991. Ultrastructure and formation of wood cell wall. In David, N., Hon, S., and Shiraishi, N., (eds). Wood and cellulosic chemistry, p. 3-58. New York: Marcel Dekker.

Gardes, M., and Bruns, T.D. 1993. ITS primers with enhanced specificity for basidiomycetes-application to the identification of mycorrhizae and rusts. Molecular Ecology 2: 113-118.

Gielkens, M. M., Dekkers, E., Visser, J., and de Graaff, L. H. 1999. Two cellobiohydrolase-encoding genes from *Aspergillus niger* require D-xylose and the xylanotic transcriptional activator XlnR for their expression. Applied and Environment Microbiology 65: 4340-4345.

Gowan, S.P. and Vilgalys, R. 1991. Ribosomal DNA length polymorphism within populations of *Xylaria magnoliae* (Ascomycotina). American Journal of Botany 78: 1603- 1607.

Ghosh, B.K., and Gosh, A. 1992. Degradation of Cellulose by fungal Cellulase. In Winkelmann, G. (ed.), Microbial Degradation of Natural Products, pp. 84-116. New York: VCH Publisher.

Gopalan, V., Glew, R.H., Libell, D.P., and DePetro, J.J. 1989. The dual effects of alcohols on the kinetic properties of guinea pig liver cytosolic beta-glucosidase. Journal of Biological Chemistry 264: 15418-15422.

Grew, R.H., Venkatakrishnan, G., Forsyth, G.W., and VanderJagt, D.J. 1993. The mammalian cytosolic broad-specificity β-glucosidase. In Esem, A. (ed.), β-glucosidase: biochemistry and molecular biology, pp. 83-112. Washington, D.C.: American Chemistry Society.

Griffith, G.S. and Boddy, L. 1990. Fungal decomposition of attached angiosperm twigs. I. Decay community development in ash, beech and oak. The New Phytologist 116: 407-415.

Grohmann, K., and Himmel, M.E. 1991. Enzymes for fuels and chemical feedstocks. In Leatham, G.F. and Himmel, M.E. (eds). Enzyme on Biomass Coversion, pp. 84-126. Washington, D.C.: American Chemical Society.

Gueguen, Y., Chemardin, P., Arnaud, A., and Galzy, P. 1995. Purification and characterization of an intracellular β-glucosidase from *Botrytis cinerea*. Enzyme and Microbial Technology 78: 900-906.

Gueguen, Y., Chemardin, P., Janbon, G., Arnaud, A., and Galzy, P. 1996. A very efficient β-glucosidase catalyst for the hydrolysis of flavor precursors of wines and fruit juice. Journal of Agricultural Food Chemistry 44: 2336-2340.

Gunata, Z., Vallier, M.J., Sapis, J.C., Baumes, R., and Bayonove, C. 1994. Enzymatic synthesis of monoterpenyl β-glucosides by various β-glucosidases. Enzyme and Microbial Technology 16: 1055-1058.

Hang, Y.D. and Woodams, E.E. 1994. Apple pomace: a potential substrate for production of beta-glucosidase by *Aspergillus foetidus*. Food Science and Technology/Lebensmittel-Wissenschaft und Technologie 27: 587-589.

Henrissat, B. 1998. Glycosidase families. Biochemical Society Transactions 26: 153-156.

Henrissat, B. 1991. A classification of glycosyl-hydrolases based on amino acid sequence similarities. Biochemistry Journal 293: 781-788.

Henrissat, B., Callebaut, I., Fabrega, S., Lehn, P., Mornon, J.P., and Davies, G.J. 1995. Conserved catalytic machinery and the prediction of a common fold for several families of glycosyl hydrolases. Proceedings of the National Academy of Sciences 92: 7090-7094.

Henrissat, B. and Bairoch, A. 1996. Updating the sequence-based classification of glycosyl hydrolases. Biochemistry Journal 316: 695-696.

Henrissat, B. and Davies, G. 1997. Structural and sequence-based classification of glycoside hydrolases. Current Opinion in Structural Biology 7: 637-644.

Highley, T.L. 1988. Cellulolytic activity on brown-rot and white-rot fungi on solid media. Holzforschung 42: 211-216.

Hofer, H. Weissinger, E., Mischak, H., Messner, R., Meixner-Monori, B., Blaas, D., Visser, J., and Kubicek, C.P. 1989. A monoclonal antibody against the alkaline extracellular β-glucosidase from *Trichoderma reesei*: reactivity with other *Trichoderma* β-glucosidases. Biochimica et Biophysica Acta 992: 298-306.

Hoh, Y.K., 1992. Properties of β-glucosidase purified from *Aspergillus niger* mutant USDB0827 and USDB082. Applied Microbiology and Biotechnology 37: 590-593.

Hotten, P.M., Jones, K.L., and Grainger, J.M. 1981. An assessment of the "dyed cellulose substrate" approach to studies on cellulolysis. The Journal of Applied Bacteriology 51: xvii

Howell, J., and Stuck, J. 1975. Kinetics of Solka Floc, cellulose hydrolysis by *Trichoderma viride* cellulase. Biotechnology and Bioengineering 17: 873-893.

Ichikawa, Y., Look, G.C., and Wong, C.H. 1992. Enzyme-catalyzed oligosaccharides synthesis. Analytical Biochemistry 202: 215-238.

Inglin, M., Feinberg, B.A., and Loewenberg, J.R. 1980. Partial purification and characterization of a new intracellular β-glucosidase of *Trichoderma reesei*. Biochemistry Journal 185: 515-519.

Ingold, C.T. 1954. The ascogenous hyphae in *Daldinia*. Transactions of the British Mycological Society 108-110.

Ingold, C.T. 1959. Spore discharge in *Pyrenomycetes*. Friesia 6: 148-163.

Ingram, L.O., Lai, X., Moniruzzaman, M., Wood, B.E., and York, S.W. 1997. Fuel ethanol production from lignocellulose using genetically engineered bacteria. In Saha, B.C., and Woodward, J. (eds). Fuel and Chemicals from Biomass, pp. 57-63. Washington D.C.: American Chemical Society.

Jenkins, J., Leggio, L.L., Harris, G., and Pickersgill, R. 1995. β-Glucosidase, β-galactosidase, family A cellulases, family F xylanases and two barley glycanases form a superfamily of enzymes with a 8-fold architecture and with two conserved glutamates near the carboxy-terminal ends of β-strands four and seven. FEBS Letters 362: 281- 285.

Johannesson, H., Laessøe, T. and Stenlid, J. 2000. Molecular and morphological investigation of *Daldinia* in northern Europe. Mycological Research 104: 275-280.

Ju, Y-M., Rogers, J.D., and San Martin, F. 1997. A revision of the genus *Daldinia*. Mycotaxon 61: 1243-293.

Kirk, T. K., and E. B., Cowling. 1984. Biological decomposition of solid wood. In Rowell, R.M. (ed.). The chemistry of solid wood, p. 455-87. Advances in Chemistry series 207, Washington D.C.: American Chemical Society.

Kirk, T. K., and D. Cullen. 1998. Enzymology and molecular genetics of wood degradation by white-rot fungi. In R. A. Young, and M. Akhtar (eds.) Environmentally friendly technologies for the pulp and paper industry, pp. 273-308. New York: John Wiley & Sons.

Kirk, T.K., Farrell, R.L., 1987. Enzymatic "combustion": the microbial degradation of lignin. Annual Review Microbiology 41: 465-505.

Kirk, T.K., Higuchi, T., Chang, H., 1980. Lignin biodegradation: summary and perspectives. In Kirk, T.K., Higuchi, T., and Chang, H. (eds.). Lignin Biodegradation: Microbiology, Chemistry and Potential Applications, vol. 2. pp. 77-100. Boca Raton, FL.: CRC Press.

Kitpreechavanich, V., Hayashi, M., and Nagai, S. 1986. Purification and characterization of extracellular beta-xylosidase and beta-glucosidase from *Aspergillus fumigatus*. Agricultural and Biological Chemistry 50:1703-1711.

Kiwada, H., Niimura, H., Fujisaki, Y., Yamada, S., and Kato, Y. 1985. Application of synthetic alkylglucoside vesicles as drug carriers. I. Preparation and physical properties. Chemical and Pharmaceutical Bulletin 33: 753-759.

Krishna, S.H., Reddy, T.J., and Chowdary, G.V. 2001. Simultaneous saccharification and fermentation of lignocellulosic wastes to ethanol using thermotolerant yeast. Bioresource Technology 77: 193-196.

Kubicek, C.P. 1992. The cellulase proteins of *T. reesei*: The structure, multiplicity, mode of action and regulation formation. Advances in Biochemical Engineering 45: 1-27.

Kubicek, C.P., Messner, R., Gruber, F., Mach, R.L., and Kubicek, P.E.M. 1993. The *Trichoderma reesei* cellulase regulatory puzzle from the interior of a secretory fungus. Enzyme and Microbial Technology 15: 90-99.

Kuriyama, K. 1995. Some propreties of transglycosylation activity of seasame β-glucosidase. Bioscience Biotechnology and Biochemistry 59: 1142-1143.

Kwon, K.S., Kang, H.G., and Hah, Y.C. 1992 Purification and characterization of two extracellular β-glucosidases from *Aspergillus nidulans*. FEMS Microbiol Letters 97: 149-154.

Laemmli, U.K. 1970. Cleavage of structural proteins during the assembly of the head of bacteriophage T4. Nature 227: 680-685.

Lee, Y.S. 1997. The Biology of Xylariaceous Fungi and Their Role in Wood Decay. Doctoral Dissertation, University of Portsmouth.

Leah, R., Kigel, J., Svendsen, I., and Mundy, J. 1995. Biochemical and molecular characterization of a barley seed β-glucosidase. Journal of Biological Chemistry 270: 15789-15797.

Li, X., Calza, R.E. 1991. Purification and characterization of an extracellular β-glucosidase from the rumen fungus *Neocallimastix frontalis* EB188. Enzyme and Microbial Technology 13: 622-628.

Ljunger, G., Adlercruz, P., and Mattiason, B. 1994. Enzymatic synthesis of octyl-β-glucoside in octanol at controlled water activity. Enzyme and Microbial Technology 16: 751-755.

Lo, A.C., Barbier, J.R., and Willick, G.E. 1990. Kinetics and specificities of two closely related beta-glucosidases secreted by *Schizophyllum commune*. European Journal of Biochemistry 192: 175-81.

Lundblad, R.L., and Noyes, C.M. 1985. The modification of carboxyl groups. Chemical Reagents for Protein Modification, pp. 105-122. Florida: CRC Press.

Lunjungdahl, L.G., and Eriksson, K.E. 1985. Ecology of microbial cellulose degradation. Advances in Microbial Ecology 8: 237-299.

Lymar, E. S., Li, B., and Renganathan, V. 1995. Purification and characterization of a cellulose-binding β-glucosidase from cellulose-degrading cultures of *Phanerochaete chrysosporium*. Applied and Environmental Microbiology 61: 2976-2980.

McCarter, J.D., and Withers, S.G. 1994. Mechanisms of enzymatic glycoside hydrolysis. Current Opinion in Structural Biology 4: 885-892.

Mackenzie, L.F., Davis, G.J., Schulein, M., and Withers, S.G. 1997. Identification of the catalytic nucleophile of endoglucanase I from *Fusarium oxysporum* by mass spectrometry. Biochemistry 36: 5893-5901.

Makropoulou, M., Christakopoulos, P., Tsitsimpikou, C., Kekos, D., Kolis, F.N., and Macris, B.J. 1998. Factors affecting the specificity of β-glucosidase from *Fusarium oxysporum* in enzymatic synthesis of alkyl-β-D-glucosides. International Journal of Biological Macromolecules 22: 97-101.

Mandels, M., and Reese, T.M. 1960. Induction of cellulase in fungi by cellobiose. Journal of Bacteriology 78: 816-826.

Mandels, M., Parrish, F.W., and Reese, T.M. 1962. Sophorose as an inducer of cellulase in *Trichoderma viridae*. Journal of Bacrteriology 83: 400-408.

Mandels, M., and Weber, J. 1969. Production of cellulases. Advances in Chemistry series 95: 391-414.

Marchin, G.L., and Duerksen, J.D. 1969. Comparison of the Catalytic and Immunological Properties of β-glucosidases from Three Strains of Saccharomyces lactis. Journal of Bacteriology 97: 237-243.

Mata, I., Castillón, M.P., Domínguez, J.M., Macarrón, R., and Acebal, C. 1993. Chemical modification of β-glucosidase from *Trichoderma reesei* QM 9414. Journal of Biochemistry 114: 754-759.

Mekkamol, S. 1998. Endophytic fungi in Tectona grandis L. (Teak). Doctoral Dissertation, Liverpool John Moores University.

Merrill, W., French, D.W. and Wood, F.A. 1964. Decay of wood by species of The Xylariaceae. Phytopathology 54: 56-58.

Mitchell, J.I., Roberts, P.J., and Moss, S.T. 1995. Sequence or structure? A short review on the application of nucleic acid sequence information to fungal taxonomy. Mycologist 9: 67-75.

Mikhaylova, M., Wiederschain, G., Mikhaylov, V. and Aerts, J.M. 1996. The enzymatic hydrolysis of 6-acylamino-4-methylumbelliferyl-β-D-glucosides: identification of a novle human acid β-glucosidase. Biochemica et Biophysica Acta 1317: 71-79.

Nilsson, K.G.I. 1988. Enzymatic synthesis of oligosaccharides. Trends in Biotechnology 6: 256-264.

Nilsson, T., Daniel, G., Kirk, T.K. and Obst. J.R. 1989. Chemistry and microscopy of wood decay by some higher ascomycetes. Holzforschung 43: 11-18.

Nilsson, T. and Ginns, J. 1979. Cellulolytic activity and the taxonomic position of selected brown-rot fungi. Mycologia 71: 170-177.

Otto, R.T., Bornsheuer, U.T., Syldatk, C., and Schmic, R.D. 1998. Synthesis of aromatic *n*-alkyl-glucoside esters in a coupled β-glucosidase and lipase reaction. Biotechnology Letters 20: 437-440.

Panintrarux, C., Adachi, S., Araki, Y., Kimura, Y., and Matsuno, R. 1995. Equilibrium yield of *n*-alkyl-β-glucoside through condensation of glucose and *n*-alcohol by β-glucosidase in a biphasic system. Enzyme and Microbial Technology 17: 32-40.

Panisset, T.E. 1929. *Daldinia concentrica* attacking the wood of *Fraxinus excelsior*. Annals of Applied Biology 16: 400-421.

Palmisano, A. C. Schwab, B. S. and Maruscik , D. A. 1993. Hydrolytic enzyme activity in landfilled refuse. Applied Microbiology and Biotechnology 38: 828-832.

Pou J, Fernandez MJ, Defaye J, Driguez H. 1988. Induction of cellulases and xylanases in *Aureobasidium pullulans*. Microbiologia 4: 87-96.

Petrini, L.E. & Muller, E. 1986. Teleomorphs and anamorphs of European species of *Hypoxylon* (*Xylariaceae, Sphaeriales*) and allied genera. Mycologia Helvetica 1: 501-627.

Petrini, O. and Petrini, L.E. 1985. *Xylariaceous* fungi as endophytes. Sydowia 38: 216-234.

Petrini, O, Petrini, L.E., and Rodrigues, K.F. 1995. *Xylariaceous* endophytes: an exercise in biodiversity. Fitopatologia brasiliera 20: 1-9.

Pitson, S.M., Seviour, R.J., and McDougall, B.M. 1993. Noncellulolytic fungal β-glucanases: their physiology and regulation. Enzyme and Microbial Technology 15: 178-192.

Pitson, S.M., Seviour, R,J., and McDougall, B.M. 1997. Purification and characterization of an extracellular β-glucosidase from the filamentous fungus *Acremonium persicinum* and its probable role in β-glucan degradation. Enzyme and Microbial Technology 21: 182-190.

Pointing, S.B. 1999. Qualitative methods for the determination of lignocellulolytic enzyme production by tropical fungi. Fungal Diversity 2: 17-33.

Post, W.M., T.H. Peng, W. R. Emanuel, A. W. King, V. H. Dale, and D. L. De Angelis. 1990. The global carbon cycle. American Scientist 78: 310-326.

Queiroz, J.A. Tamaz, C.T., and Cabral, J.M.S. 2001. Hydrophobic interaction chromatography of proeins. Journal of Biotechnology 87: 143-159.

Rapp, P. 1989. 1,3-β-Glucanase, 1,6-β-glucanase and β-glucosidase activities of *Sclerotium glucanicum*: synthesis and properties. Journal of General and Applied Microbiology 135: 2847-2858.

Rayner, A.D.M., and Boddy, L. 1988. Fungal decomposition of wood, its biology and ecology. London: Wiley Chichester.

Redlin, S.C., and Carris, L.M. 1996. Endophytic fungi in grass and woody plants: systematic,ecology, and evolution. Minnesota: APS Press.

Reese, E.T. 1956. A microbiological progress report: enzymatic hydrolysis of cellulose. Applied Microbiology 4: 39-50.

Reese. E.T., Siu, R.G.H. and Levinson, H.S. 1950. The biological degradation of soluble cellulose derivatives and its relationship to the mechanism of cellulose hydrolysis. Journal of Bacteriology 59: 484-497.

Riou, C., Salmon, J.M., Vallier, I.Z., Gunata, Z., and Barre, P. 1998. Purification, characterization and substrate specificity of a novel highly glucose-tolerant β-glucosidase from *Aspergillus oryzae*. Applied Microbiology and Biotechnology 64: 3607-3614.

Rodrigues, K.F., Leuchtmann, A. and Petrini O. 1993. Endophytic species of *Xylaria*, cultural and isozymic studies. *Sydowia* 45: 116-138.

Rogers, J.D. 1979. The *Xylariaceae*: systematic, biological and evolutionary aspects. Mycologia 71: 1-42.

Rajagopalan, C. 1966. Studies on four species of wood rotting fungi. Transactions of the Kansa Academy of Science 68: 541-552.

Rojas, A., Arola, L., and Romeu, A. 1995. β-Glucosidase families revealed by computer analysis of protein sequences. Biochemistry and Molecular Biology International 35: 1223-1231.

Roni, C., Melissa, R. S., and Kenneth, E. H. 2005. Processive Endoglucanase Active in Crystalline Cellulose Hydrolysis by the Brown Rot Basidiomycete *Gloeophyllum trabeum*. Applied and Environment Microbiology 71: 2412-2417.

Ryu, D.D.Y., and Mandels, M. 1980. Cellulases: biosynthesis and applications. Enzyme and Microbial Technology 2: 91-102.

Sadana, J.C., Patil, R.V., and Shewale, J.G. 1988. β-D-Glucosidases from *Sclerotium rolfsii*. Methods in Enzymology 160: 424-431.

Saha, B.C., and Bothast, R.J. 1996. Production, purification, and characterization of a highly glucose-tolerant novel β-glucosidase from *Candida peltata*. Applied and Environmental Microbiology 62: 3165-3170.

Sasaki, I., and Nagayama, H. 1995. Purification and characterization of β-glucosidase from *Botrytis cinerea*. Bioscience Biotechnology and Biochemistry 59: 100-101.

Saxena, I.M., Brown, R.M., Ferre, J.M., Geremia, R.A., and Henrisaat, B. 1995. Multidomain architecture of β-glucosyl transferases: implications for mechanism of action. Journal of Bacteriology 177: 1419-1424.

Schmid, G., and Wandrey, C. 1987. Purification and partial characterization of a cellodextrin glucohydrolase (β-glucosidase) from *Trichoderma reesei* strain QM 9414. Biotechnology and Bioengineering 30: 571-585.

Schmidhalter, D.R., and Canevascini, G. 1992. Isolation and characterization of the cellobiose dehydrogenase from the brown-rot fungus *Coniophora puteana* (Schum ex Fr.) Karst. Archives of Biochemistry and Biophysics 300: 559-563.

Schmidhalter, D.R. and Canevascini, G. 1993. Purification and characterization of two exocellobiohydrolases from the brown-rot fungus *Coniophora puteana* (Schum ex Fr.) Karst. Archives of Biochemistry and Biophysics 300: 551-558.

Schwarze, F.W.M.R., Engels, J., Mattheck, C. 2004. Fungal Strategies of Wood Decay in Trees. Springer Verlag, Heidelberg.

Shen, H., Gilkes, N.R., Kilburn, D.G., Miller, R.C. and Warren, R.A.J. 1995. Cellobiohydrolase B, a second exo-cellobiohydrolase from the cellulolytic bacterium *Cellulomonas fimi*. Biochemical Journal 311: 67-74.

Shewale, J.G. 1982. β-Glucosidase: its role in cellulose synthesis and hydrolysis of cellulose. The International Journal of Biochemistry and Cell Biology 14: 435-443.

Shinnot, M.L. 1990. Catalytic mechanisms of enzymatic glycosyl transfer. Chemical Reviews 90: 1171-1202.

Shinoyama, H., Takei, K., Ando, A., Fujii, T., Sasaki, M., and Doi, Y. 1991. Enzymatic synthesis of useful alkyl β-glucosides. Agricultural and Biological Chemistry 55: 1679-1681.

Skory, C.D., Freer, S.N., and Bothast, R.J. 1996. Properties of an intracellular β-glucosidase purified from cellobiose-fermening yeast *Candida Wickerhamii*. Applied Mirobiology and Biotechnoly 46: 353-359.

Sutherland, J.B., and Crawford, D.L 1981. Lignin and glucan degradation by species of Xylariaceae. Transactions of the British Mycological Society 76: 335-337.

Srivastava, S.K., Gopalkrishnan, K.S., and Ramachandran, K.B. 1984. Kinetic characterization of a crude beta-D-glucosidase from *Aspergillus wentii* Pt 2804. Enzyme and Microbial Technology 6: 508-512.

Suwannasai, N. 2005. Molecular taxonomic studies of selected members of the Xylariaceae (Fungi). Doctoral Dissertation, Suranaree University of Technology.

Teeri, T. 1997. Crystalline cellulose degradation: new insight into the function of cellobiohydrolases. Trends in Biotechnology 15: 160-167.

Takashima, S., Nakamura, A., Masaki, H., and Uozumi, T. 1996. Purification and characterization of cellulases from *Humicola grisea*. Bioscience Biotechnology and Biochemistry 60: 77-82.

Thienhirun, S. 1997. A preliminary account of the xylariaceae of Thailand. Doctoral Dissertation, Liverpool John Moore University.

Thind, K.S., and Dargan, J.S. 1978. Xylariaceae of India-IV The genus Daldinia. Kavaka 6: 15-24.

Tomme, P., Warren, R.A.J., and Gilkes, N.R. 1995. Cellulose hydrolysis by bacteria and fungi. Advances in Microbial Physiology 37: 2-81.

Tricone, A. and Pagnotta, E. 1995. Efficient chemoselectiv synthesis of 3,4, dihydroxypropiophenone 3-β-D-glucoside by thermophilic β-glycosidase fromSulfolobus solfataricus. Biotechnology Letters 17: 45-48.

Vandamme, E.J., and Soetaert, W. 1995. Biotechnical modification of carbohydrates. FEMS Microbiology Reviews 16: 163-186.

Van der Gucth, K. 1995. Illustrations and descriptions of xylariaceous fungi collected in Papua New Guinea. Bulletin Jardin Botanique National de Belgique 64: 219-403.

Vanderjagt, D.J., Fry, D.E., and Glew, R.H. 1994. Human glucocerebrosidase catalyses transglucosylation between glucocerebroside and retinol. Biochemical Journal 300: 309-315.

Varela, E., Mester, T., Tien, M. 2003. Culture conditions affecting biodegradation components of the brown-rot fungus *Gloeophyllum trabeum*. Archives of Microbiology 180: 251-256.

Vic, G., Biton, J., Le Beller, D., Michel, J.M., and Thomas, D. 1995. Glycosylation of hydrophobic alcohols in organic medium by the reverse hydrolysis reaction using almond β-D-glucosidase. Biotechnology and Bioengineering 46: 109-116.

Vrijmoed, L. L. P., Hodgkiss, I. J. and Thrower, L. B. 1982. Factors affecting the distribution of lignicolous marine fungi in Hong Kong. Hydrobiologia 87: 143160.

Voet, D. and Voet, J.G. 1995. Biochemistry. pp.333-337. Canada: Jonh Wiley & Sons.

Wall, M.B., Cameron, D.C., and Lightfoot, E.N. 1993. Biopulping Process Design and Kinetics. Biotechnology Advance 11: 645-662.

Wallecha, A. 2000. Purification and characterization of β-glucosidase from a thermotolerant yeast, *Pichia etchelsii*. Doctoral Dissertation, Indian Institute of Technology-Delhi.

Watanabe, T., Sato, T., Yoshioka, S., Koshijima, T., Kuwahara, M. 1992. Purification and properties of *Aspergillus niger* β-glucosidase. European Journal of Biochemistry 209: 651-659.

Watt, D.K., Ono, H., and Hayashi, K. 1998. *Agrobacterium tyumefaciens* β-glucosidase is also an effective β-xylosidase, and has a high transglycosylation activity in the presence of alcohol. Biochemica et Biophysica Acta 1385: 78-88.

Wei, D.L., Chang, T.H., Lin, Y.W., Chuang, C.L., and Jong, S.C. 1992. Production of cellulolytic enzymes from Xylaria and Hypoxylon species of Xylariaceae. World Journal of Microbiology and Biotechnology 8: 141-146.

Withers, S.G. 2001. Mechanisms of glycosyl transferases and hydrolases. Carbohydrate Polymers 44: 325-337.

Whalley, A.J.S. 1985. The Xylariaceae: some ecological considerations. Sydowia 38: 369-382.

Whalley, A.J.S. 1996. The Xylariaceous way of life. Mycological Research 100: 897-922.

Whalley, A.J.S. and Edwards, R.L. 1995. Secondary metabolites and systematic arrangements within the Xylariaceae. Canadian Journal of Botany 73: S802-S810.

White, T.J., Bruns, T., Lee, S., and Taylor, J. 1990. Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In Innis, M.A., Gelfand, D.H., Shinsky, J.J., and White, T.J (eds.). PCR Protocols: A Guide to Methods and Applications, pp. 315-322. San Diego: Academic Press.

Whithers, S.G., and Street, I.P. 1989. β-Glucosidase: mechanisms and inhibition. In: Lewis, N.G. (ed.) Plant cell wall polymers: biogenesis and biodegradation, pp. 597-604. Washington, D.C.: American Chemistry Society.

Wood, T.M., and McCrae, S.I. 1982. Purification and some properties of the extracellular β-glucosidase of the cellulolytic fungus *Trichoderma koningii*. Journal of General and Applied Microbiology 128: 2973-2982.

Worrall, J.J., Anagnost, S.E., and Zabel, R.A., 1997. Comparison of wood decay among diverse lignicolous fungi. Mycologia 89: 199-219.

Yan, T.R, and Liau, J.C. 1998. Synthesis of cello-oligosaccharides from cellobiose with beta-glucosidase II from *Aspergillus niger*. Biotechnology Letters 20: 591-594.

Yan, T.R., and Lin, Y.H. 1997. Purification and characterization of a glucose-tolerant β-glucosidase from *Aspergillus niger* CCRC 31494. Bioscience Biotechnology Biochemistry 61: 965-970.

Yazaki, T. 1997. Subsite structure of the β-glucosidase from *Aspergillus niger*, evaluated by steady-state kinetics with cello-oligosaccharides as substrates. Carbohydrate Research 298: 51-57.

Yazdi, M.T., Khosravi, A.A., Nemati, M., and Davoodi, N. 2003. Purification and characterization of two intracellular beta-glucosidases from the *Neurospora crassa* mutant cell-1. World Journal of Microbiology and Biotechnology 19: 79-84.

Young, R.A., and Rowell, R.M. 1986. Cellulose: Structure, Modification and Hydrolysis. New York: John Willey & Sons.

Zabel, R.A., and Morell, J.J., 1992. Wood microbiology decay and its prevention. San Diego: Academic Press.

Zare-Maivan, H. and Shearer, C.A. 1988a. Extracellular enzyme production and cell wall degradation by freshwater lignicolous fungi. Mycologia 80: 365-75.

Zare-Maivan, H. and Shearer, C.A. 1988b. Wood decay activity and cellulase production by freshwater lignicolous fungi. International Biodeterioration 24: 459-474.

Zhou, Z., Miwa, M., and Hogetsu, T. 1999. Analysis of genetics structure of a *Suillus grevillei* population in a *Larix kaempferi* stand by polymorphism of Inter-simple sequence repeat (ISSR). The New Phytologist 144: 55-63.

APPENDICES

APPENDIX A

MEDIA

The media were prepared by sterilization in the autoclave at 121 °C for 15 minutes.

1. Potato dextrose agar (PDA)

Potato, peeled and diced	200	g
Glucose	20.0	g
Agar	15.0	g
Distilled water	1000	ml

Boil 200 g of peels, dried potato for 1 hr in 1000 ml. of distilled water. Filter, and make up the filtrate to one liter. Add the glucose and agar and dissolve by streaming and sterilize by autoclaving at 121 °C for 15 minutes.

2. Cellulolysis basal medium (per liter) (Poiting, 1999)

$C_4H_{12}N_2O_6$	5.0	g
Yeast extracts	0.1	g
KH_2PO_4	1.0	g
$MgSO_4 \cdot 7H_2O$	2.0	g
$Ca_2Cl_2 \cdot 2H_2O$	0.001	g

pH 5.5

3. Mendel's medium (per liter) (Mandels and Weber, 1969)

Urea	0.3	g
$(NH_4)_2SO_4$	1.4	g
KH_2PO_4	2.0	g
$CaCl_2 \cdot 2H_2O$	0.4	g
$MgSO_4 \cdot 4H_2O$	0.3	g
Peptone	1.0	g
$FeSO_4 \cdot 7H_2O$	5.0	mg
$MnSO_4 \cdot 4H_2O$	1.6	mg
$ZnSO_4 \cdot 7H_2O$	1.4	mg
$CoCl_2 \cdot 6H_2O$	2.0	mg
Tween 80	2.0	ml
Carbon source	1.0	g

pH 5..5

APPENDIX B

Preparation for non-denaturing polyacrylamide gel electrophoresis (Native-PAGE)

1. Stock solutions

2 M Tris-HCl (pH 8.8)

Tris (hydroxymethyl)-aminomethane 24.2 g

Adjusted pH to 8.8 with 1 M HCl and adjusted volume to 100 ml with distilled water

1 M Tris-HCl (pH 6.8)

Tris (hydroxymethyl)-aminomethane 12.1 g

Adjusted pH to 6.8 with 1 M HCl and adjusted volume to 100 ml with distilled water.

1% Bromophenol blue (w/v)

Bromophenol blue 100 mg

Brought to 10 ml with distilled water and stirred until dissolved.

Filtration will remove aggregated dye.

2. Working solution

Solution A (30% (w/v) acrylamide, 0.8% (w/v) bis-acrylamide)

Acrylamide 29.2 g

N,N,-methylene-bis-acrylamide 0.8 g

Adjust volume to 100 ml with distilled water

Solution B (1.5 M Tris-HCl pH 8.8)

2 M Tris-HCl (pH 8.8) 75 ml

Distilled water 25 ml

Solution C (0.5 M Tris-HCl pH 6.8)

1 M Tris-HCl (pH 6.8)	50 ml
Distilled water	50 ml

10% Ammonium persulfate

Ammonium persulfate	0.5 g
Distilled water	50 ml

Electrophoresis buffer (25 mM Tris, 192 mM glycine)

Tris (hydroxymethyl)-aminomethane	3 g
Glycine	14.4 g

Dissolved in distilled water to 1 litre without pH adjustment
(final pH should be 8.3)

5x sample buffer

(312.5 mM Tris-HCl pH 6.8, 50% glycerol, 1% bromophenol blue)

1 M Tris-HCl (pH 6.8)	0.6 ml
Glycerol	5 ml
1% Bromophenol blue	0.5 ml
Distilled water	1.4 ml

3. Native-PAGE

7.5% Separating gel

Solution A	2.5 ml
Solution B	2.5 ml
Distilled water	5 ml
10% Ammonium persulfate	50 µl
TEMED	5 µl

5.0% Stacking gel

Solution A	0.67 ml
Solution B	1 ml
Distilled water	2.3 ml
10% Ammonium persulfate	30 µl
TEMED	5 µl

APPENDIX C

Preparation for denaturing polyacrylamide gel electrophoresis

1. Stock solutions

2 M Tris-HCl (pH 8.8)

Tris (hydroxymethyl)-aminomethane 24.2 g

Adjusted pH to 8.8 with 1 M HCl and adjusted volume to 100 ml with distilled water

1 M Tris-HCl (pH 6.8)

Tris (hydroxymethyl)-aminomethane 12.1 g

Adjusted pH to 6.8 with 1 M HCl and adjusted volume to 100 ml with distilled water.

10% SDS (w/v)

Sodium dodecyl sulfate (SDS) 10 g

50% Glycerol (w/v)

100% Glycerol 50 ml

Added 50 ml of distilled water

1% Bromophenol blue (w/v)

Bromophenol blue 100 mg

Brought to 10 ml with distilled water and stirred until dissolved.

Filtration will remove aggregated dye.

2. Working solution

Solution A (30% (w/v) acrylamide, 0.8% (w/v) bis-acrylamide)

Acrylamide 29.2 g

N,N,-methylene-bis-acrylamide 0.8 g

Adjust volume to 100 ml with distilled water

Solution B (1.5 M Tris-HCl pH 8.8, 0.4% SDS)

2 M Tris-HCl (pH 8.8)	75 ml
10% SDS	4 ml
Distilled water	21 ml

Solution C (0.5 M Tris-HCl pH 6.8, 0.4% SDS)

1 M Tris-HCl (pH 6.8)	50 ml
10% SDS	4 ml
Distilled water	46 ml

10% Ammonium persulfate

Ammonium persulfate	0.5 g
Distilled water	5 ml

Electrophoresis buffer (25 mM Tris, 192 mM glycine, 0.1% SDS)

Tris (hydroxymethyl)-aminomethane	3 g
Glycine	14.4 g
SDS	1 g

Dissolved in distilled water to 1 litre without pH adjustment
(final pH should be 8.3)

5x sample buffer
(60 mM Tris-HCl pH 6.8, 25% glycerol, 2% SDS, 0.1% bromophenol blue, 14.4 mM 2-mercaptoethanol)

1 M Tris-HCl (pH 6.8)	0.6 ml
Glycerol	5 ml
10% SDS	2 ml
1% Bromophenol blue	1 ml
2-mercaptoethanol	0.5 ml
Distilled water	0.9 ml

3. SDS-PAGE

12.5% Separating gel

Solution A	4.2 ml
Solution B	2.5 ml
Distilled water	3.3 ml
10% Ammonium persulfate	50 µl
TEMED	5 µl

5.0% Stacking gel

Solution A	0.67 ml
Solution B	1 ml
Distilled water	2.3 ml
10% Ammonium persulfate	30 µl
TEMED	5 µl

APPENDIX D

Preparation for isoelectric focusing gel electrophoresis

Monomer-ampholyte solution

30% acrylamide solution	2 ml
Ampholyte pH 3-10	240 µl
Distilled water	9.7 ml
10% $(NH_4)_2S_2O_8$	50 µl
TEMED	5 µl

Fixative solution, 100 ml

Trichloroacetic acid	10 g

Immerse gels in this solution for 30 minutes.

Staining solution, 100 ml

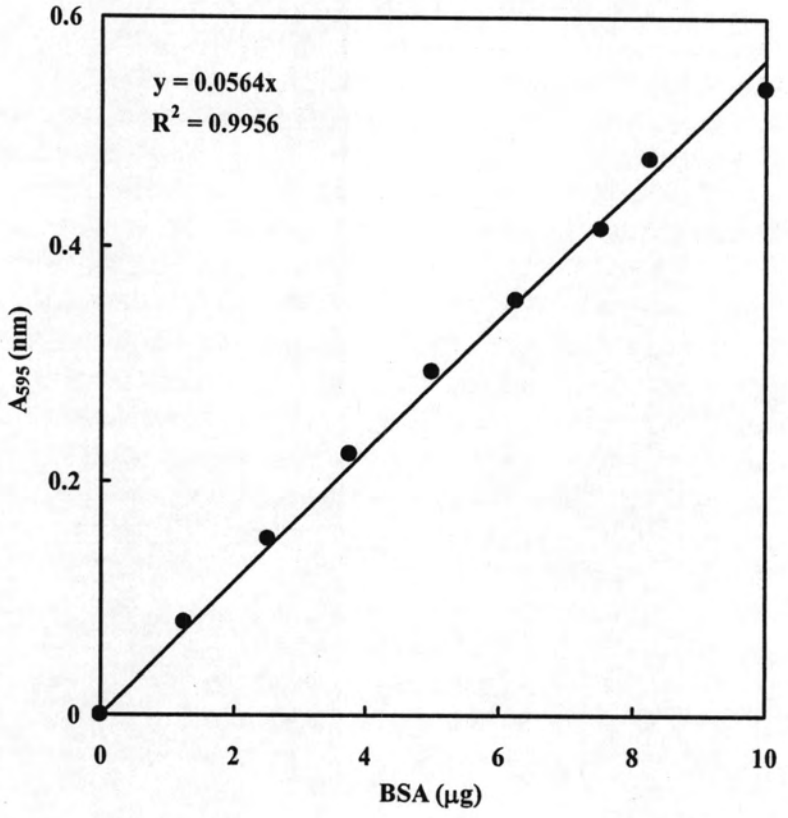
Ethanol	27 ml
Acetic acid	10 ml
Coomassie brilliant blue R-250	0.04 g
$CuSO_4$	0.5 g
Distilled water	63 ml

Dissolve the $CuSO_4$ in water before adding the alcohol. Either dissolve the dye in alcohol or add it to the solution at the end.

Immerse the gel in the stain for approximately 0.5-1 hours. After that immerse the gel in destain solution to remove the last traces of stain and $CuSO_4$.

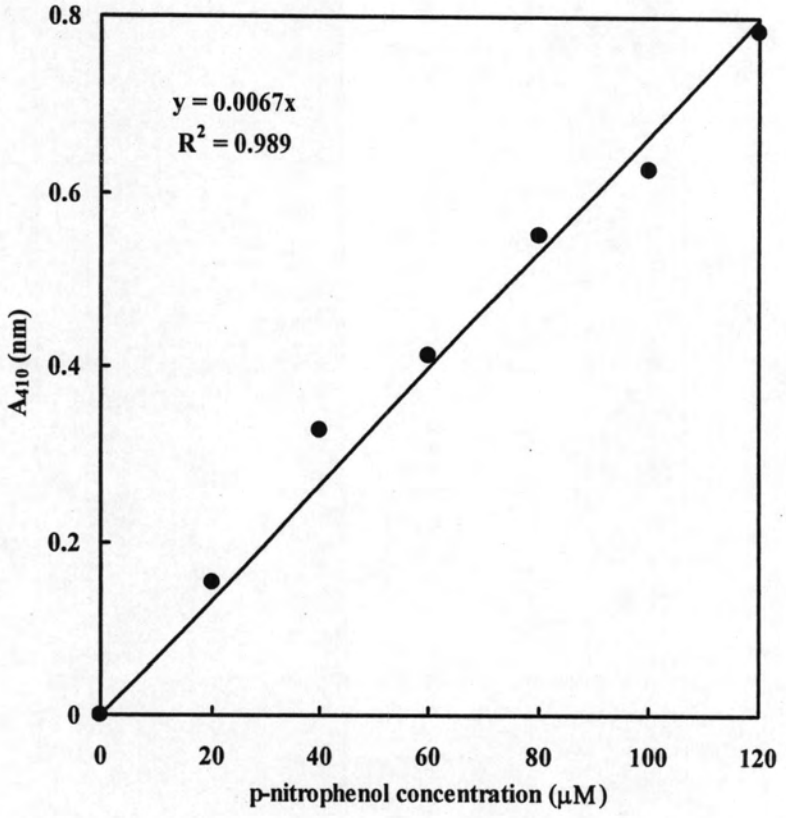
APPENDIX E

Calibration curve for protein determination Bradford method



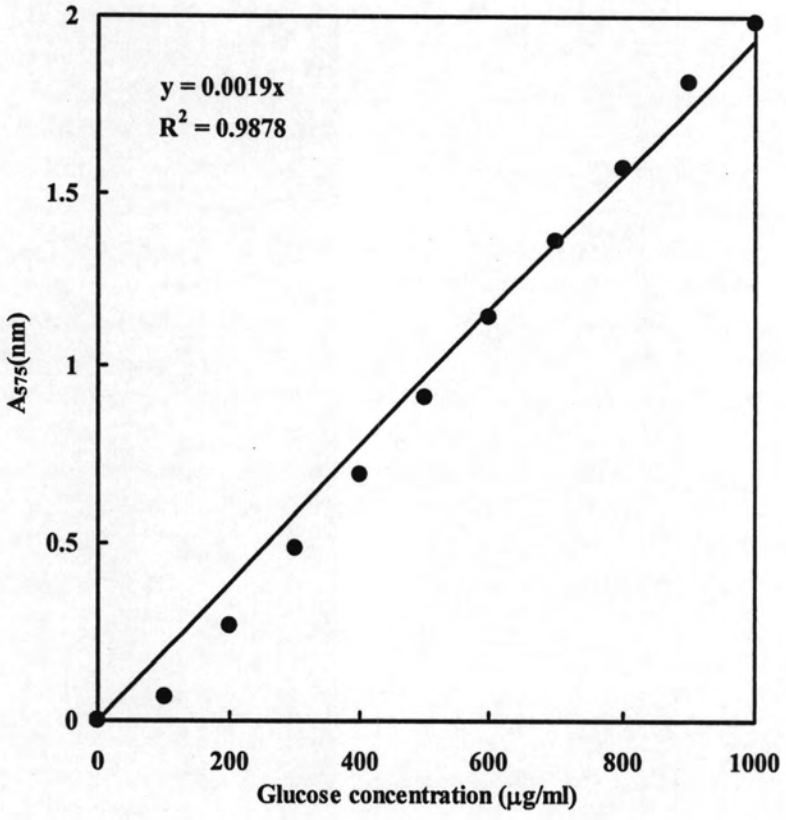
APPENDIX F

Calibration curve for various concentration of p-nitrophenol

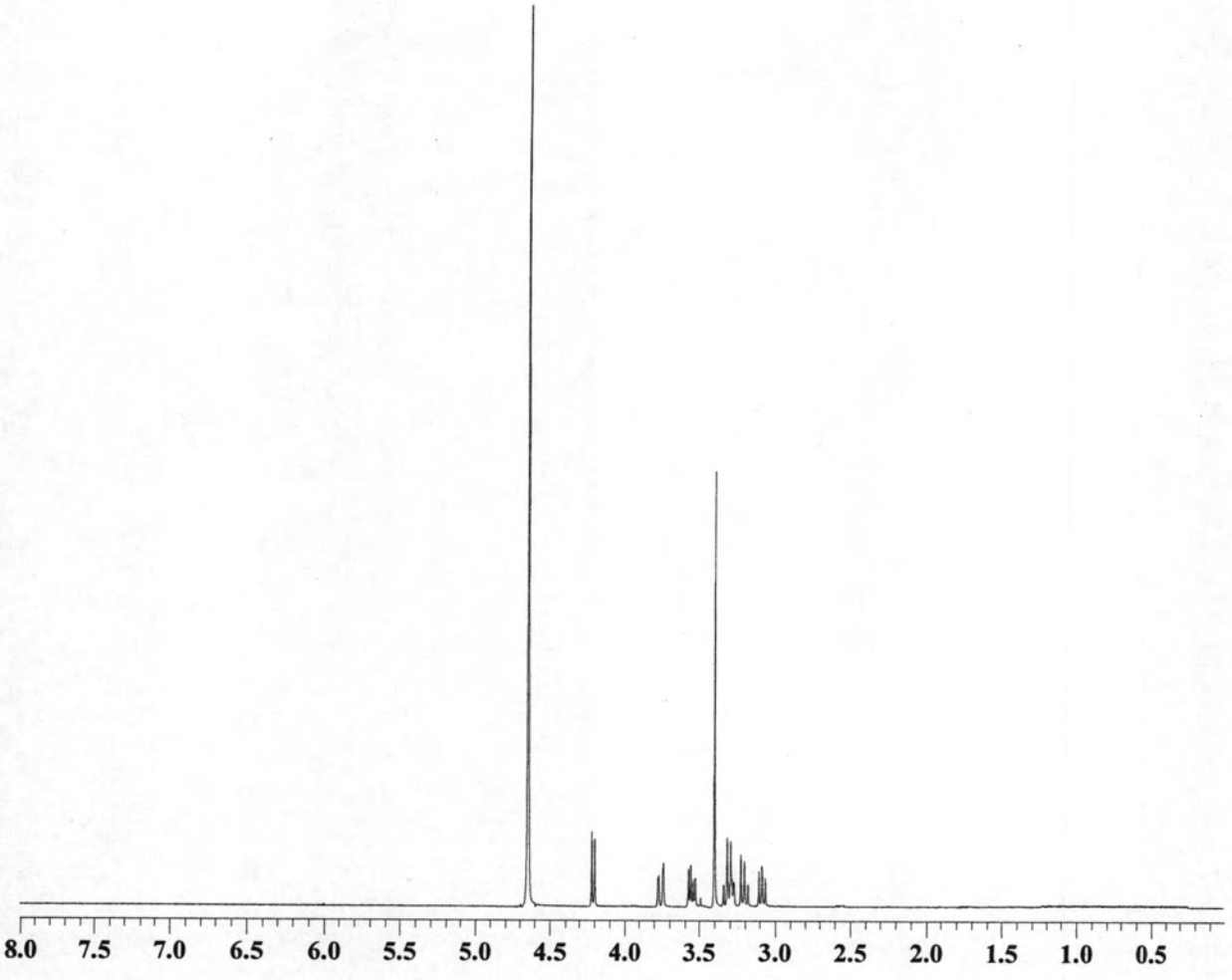


APPENDIX G

Calibration curve for various concentration of glucose by DNS method



APPENDIX H



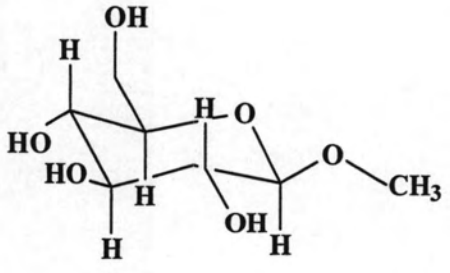
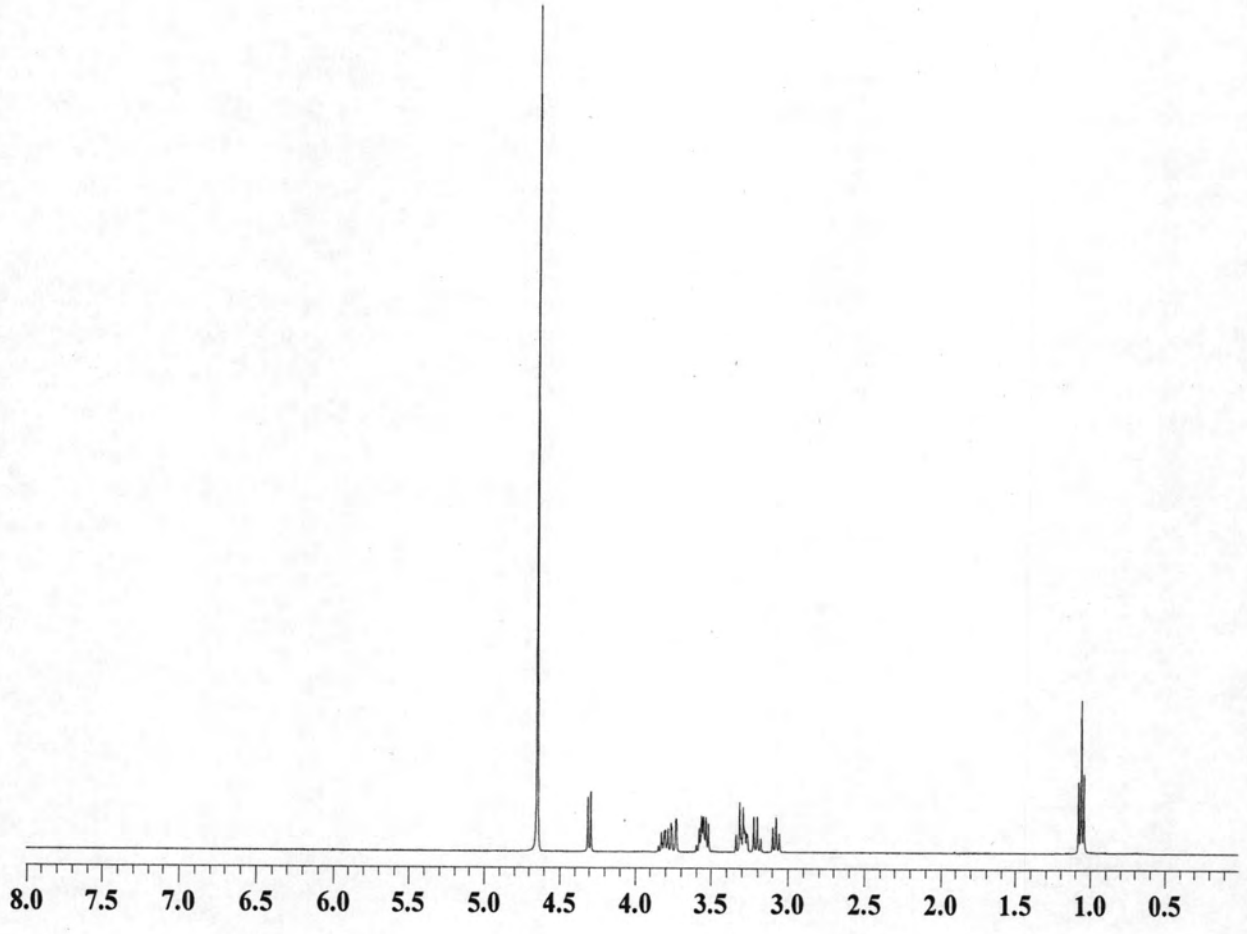


Figure H.1 ^{1}H-NMR spectrum of Methyl-β-D-glucoside



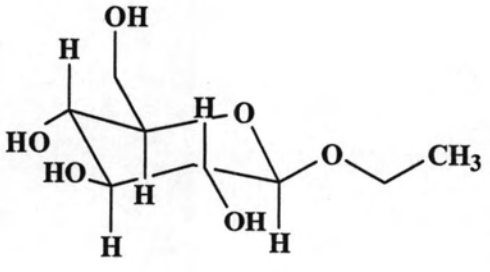
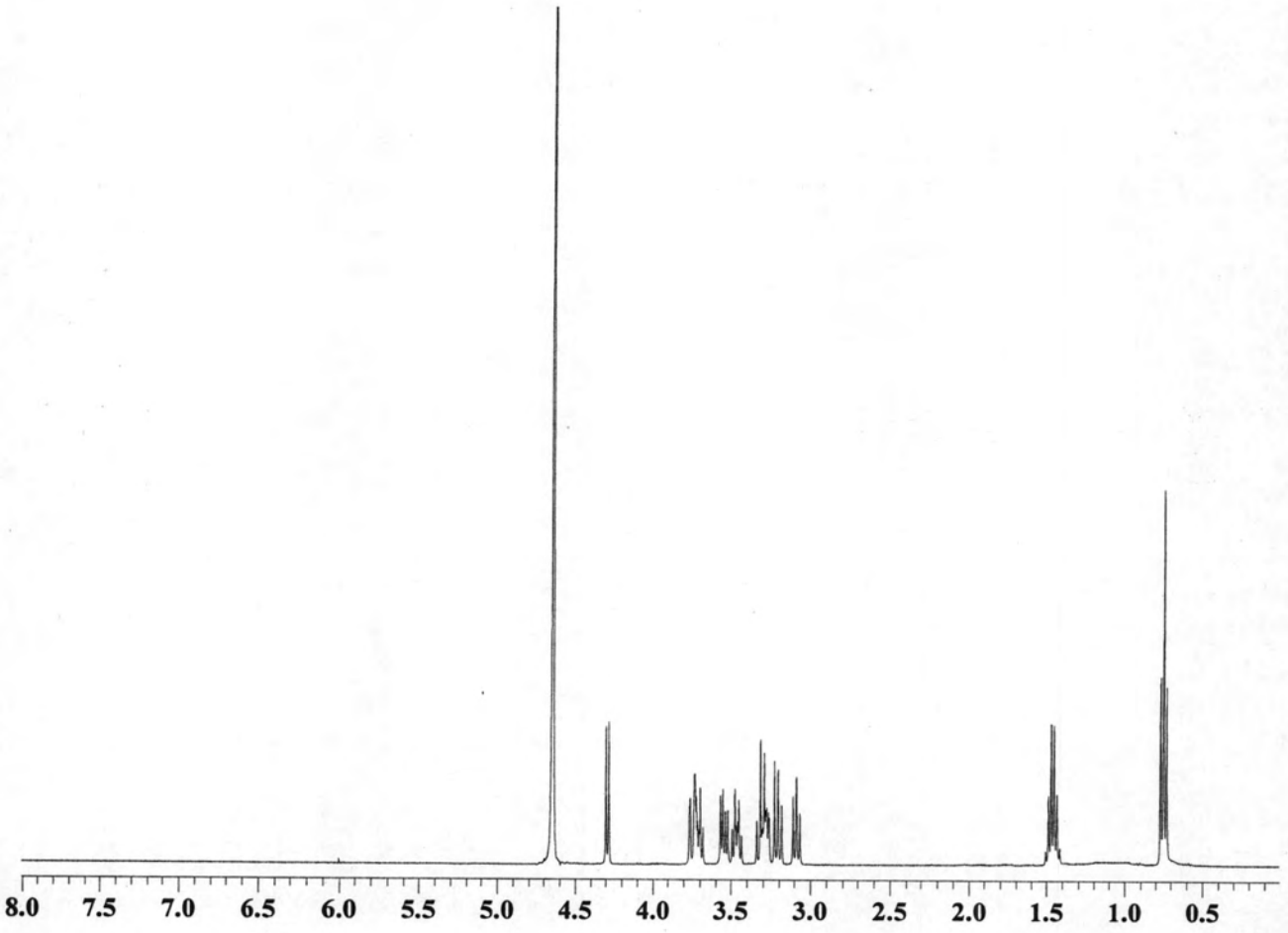


Figure H.2 ^{1}H-NMR spectrum of Ethyl-β-D-glucoside



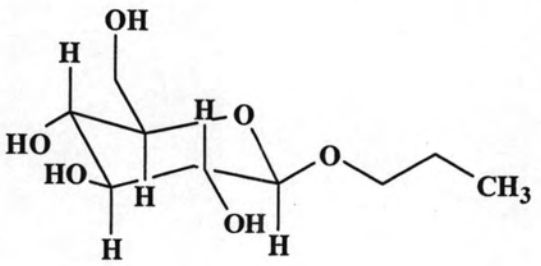
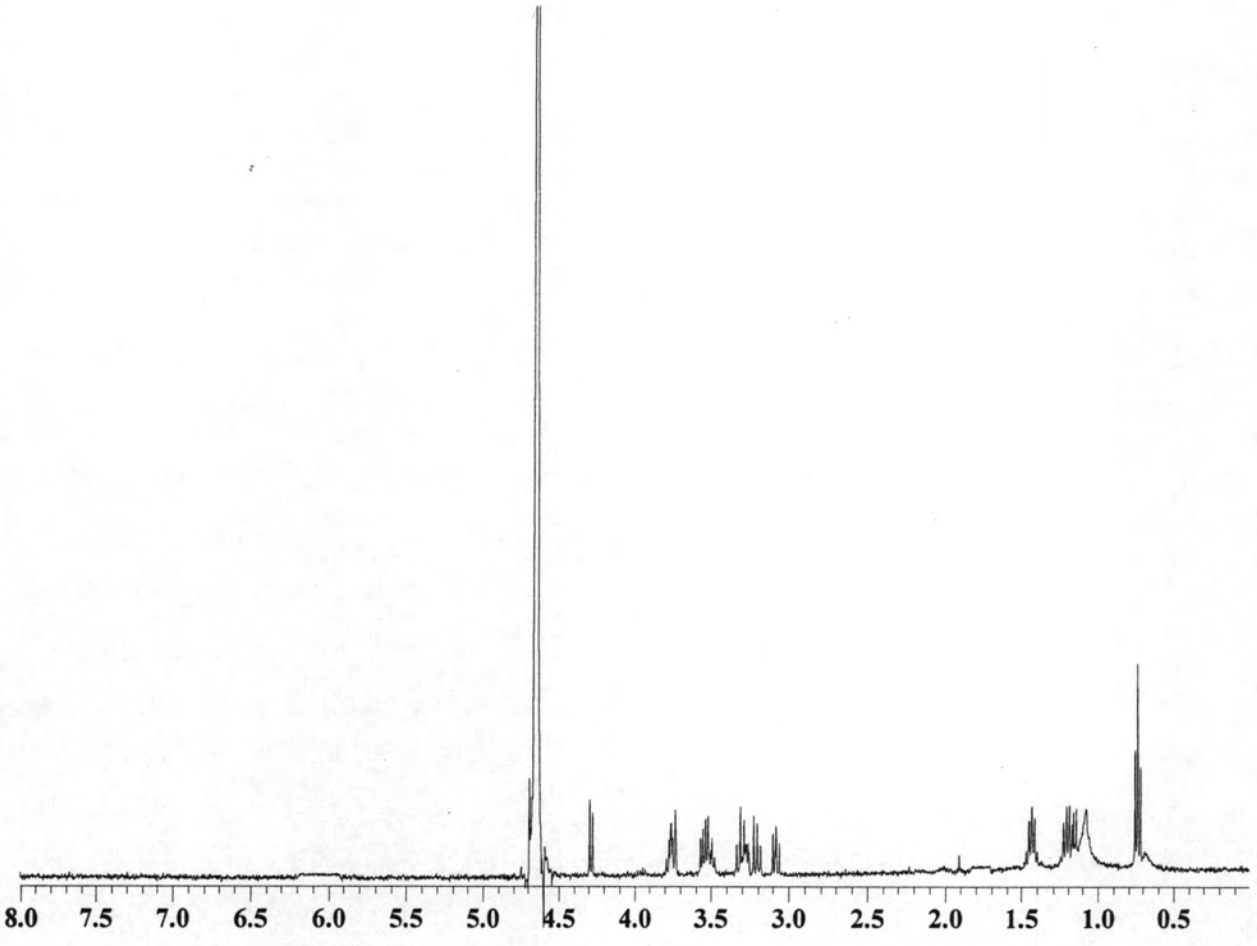


Figure H.3 ^{1}H-NMR spectrum of *n*-Propyl-β-D-glucoside



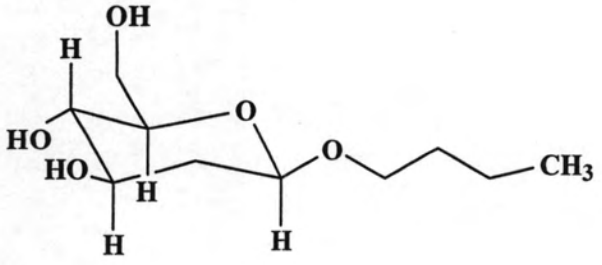
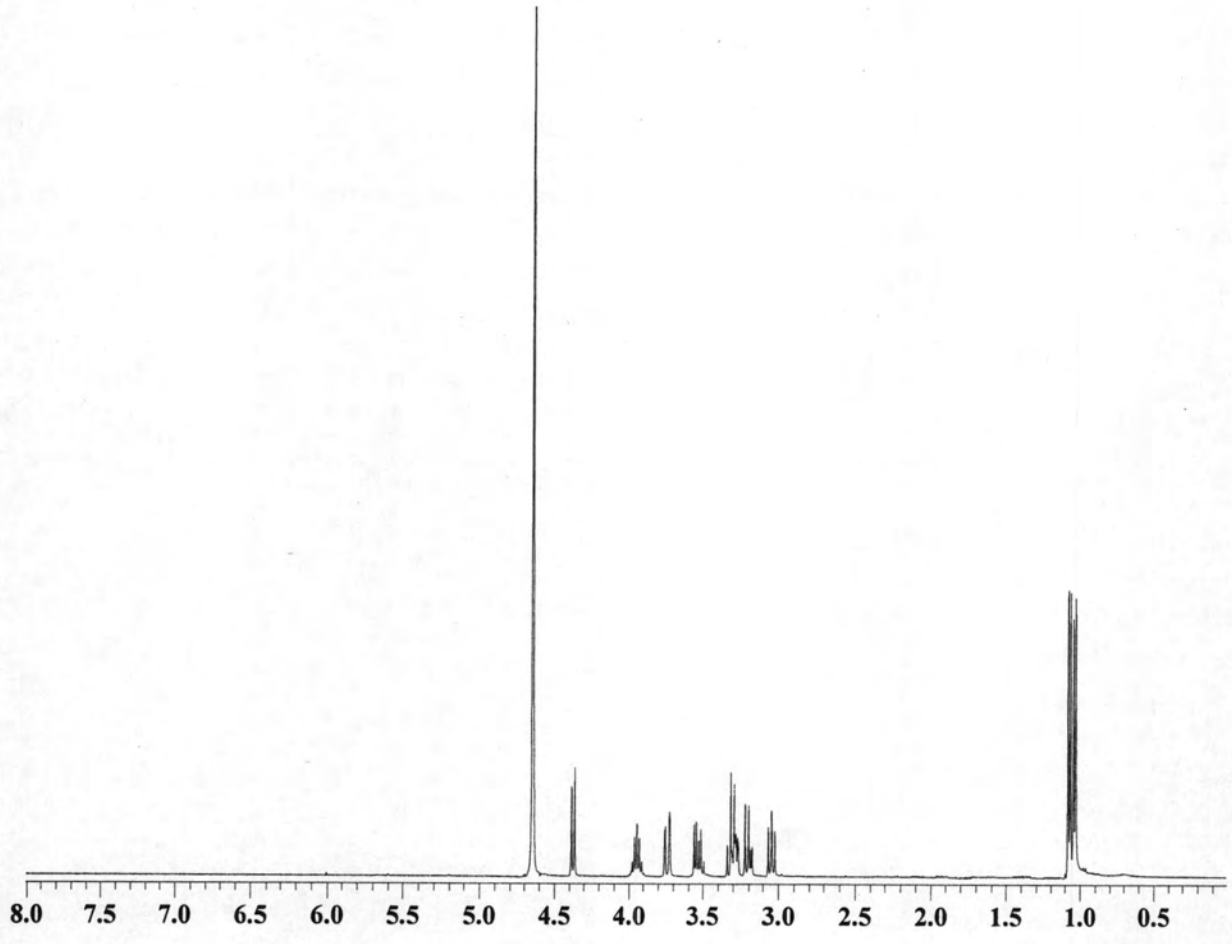


Figure H.4 ^{1}H-NMR spectrum of *n*-Butyl-β-D-glucoside



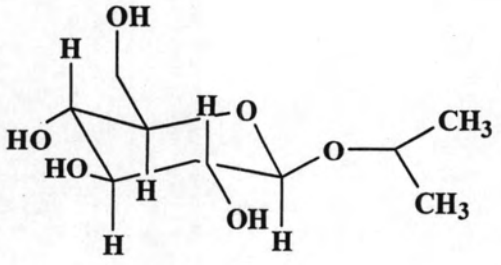
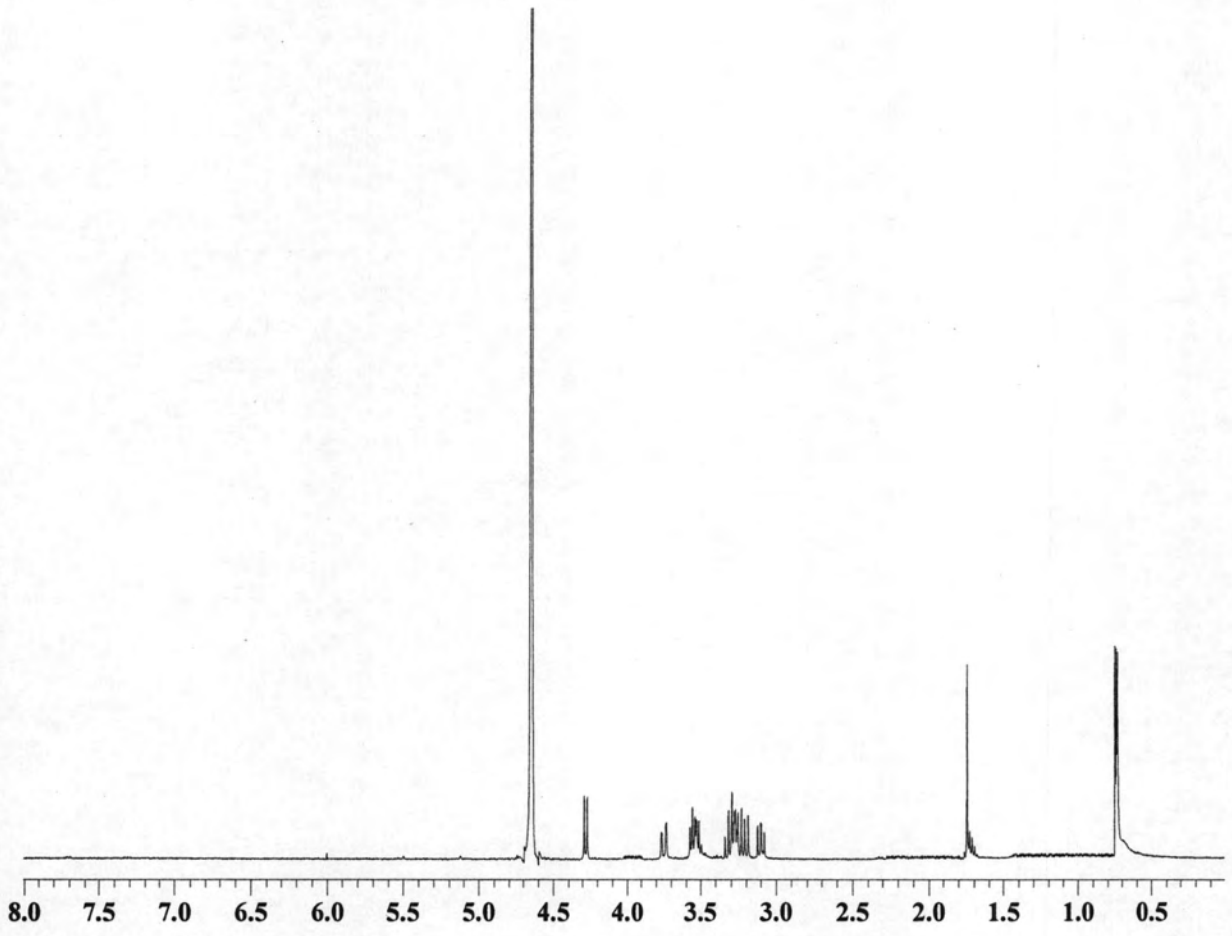


Figure H.5 ^{1}H-NMR spectrum of 2-Propyl-β-D-glucoside



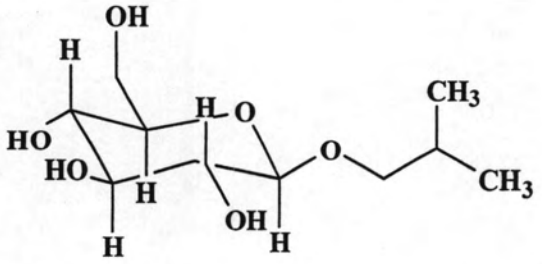
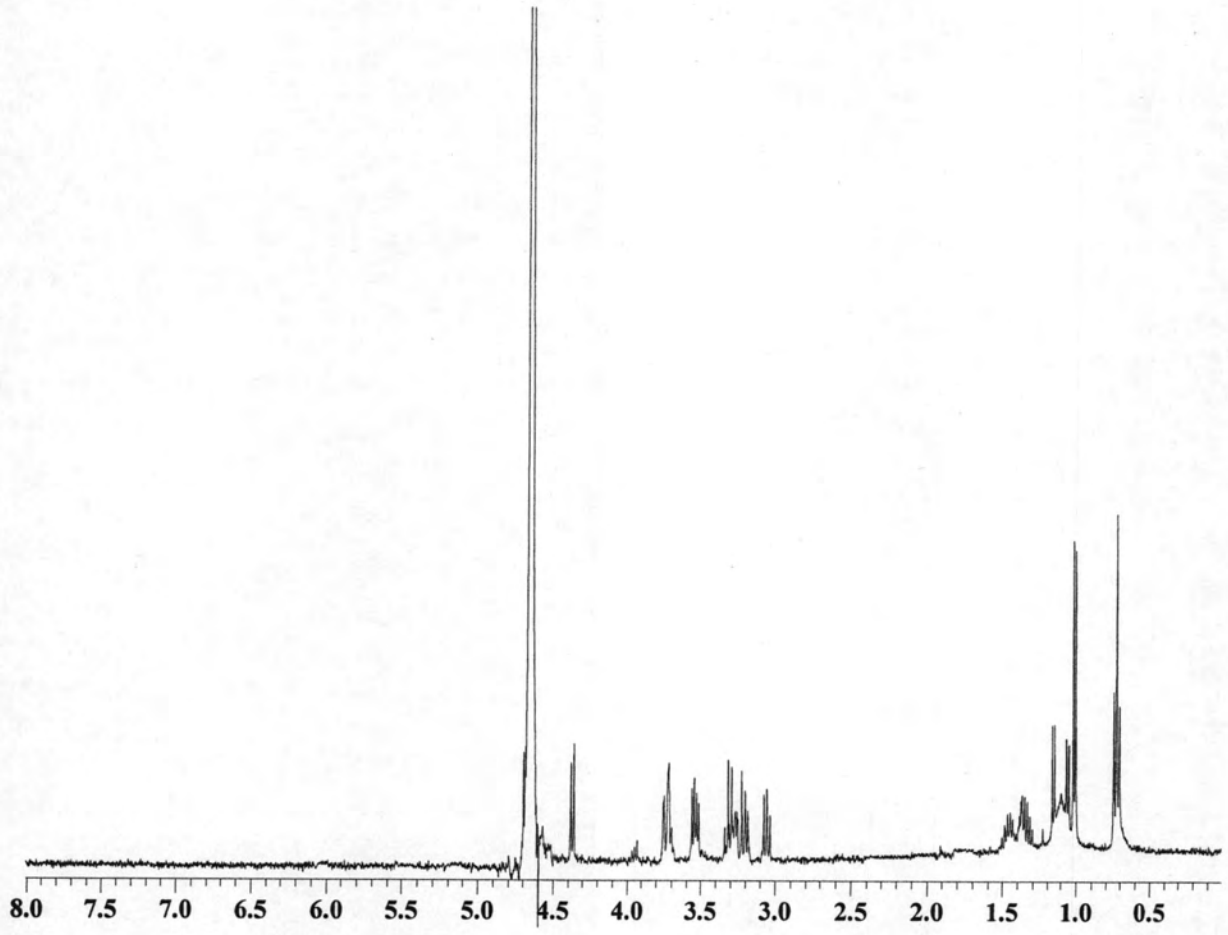


Figure H.6 ^{1}H-NMR spectrum of 2-Methyl-1-Propyl-β-D-glucoside



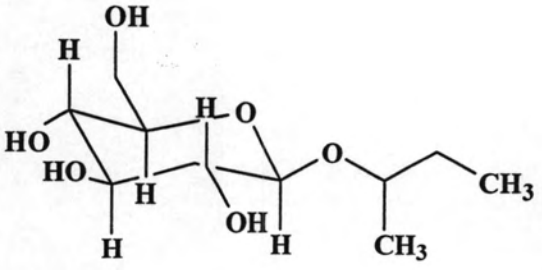
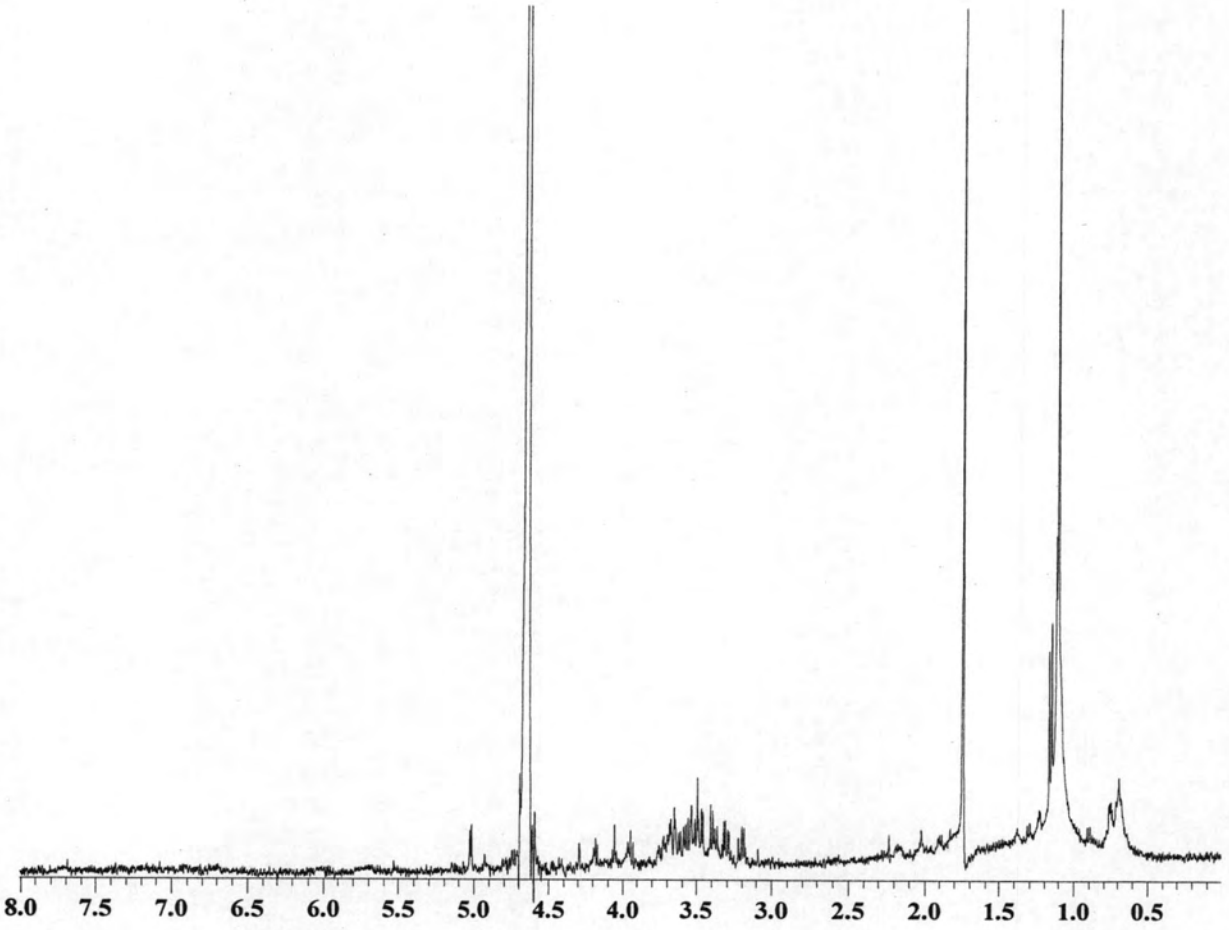


Figure H.7 ^{1}H-NMR spectrum of 2-Butyl-β-D-glucoside



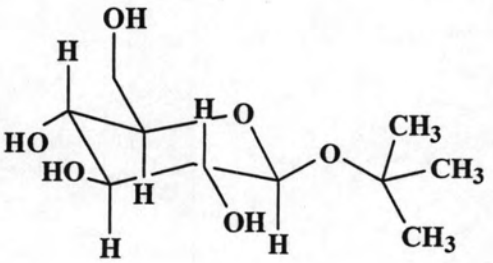


Figure H.8 ^{1}H-NMR spectrum of 2-Methyl-2-Propyl-β-D-glucoside

APPENDIX I

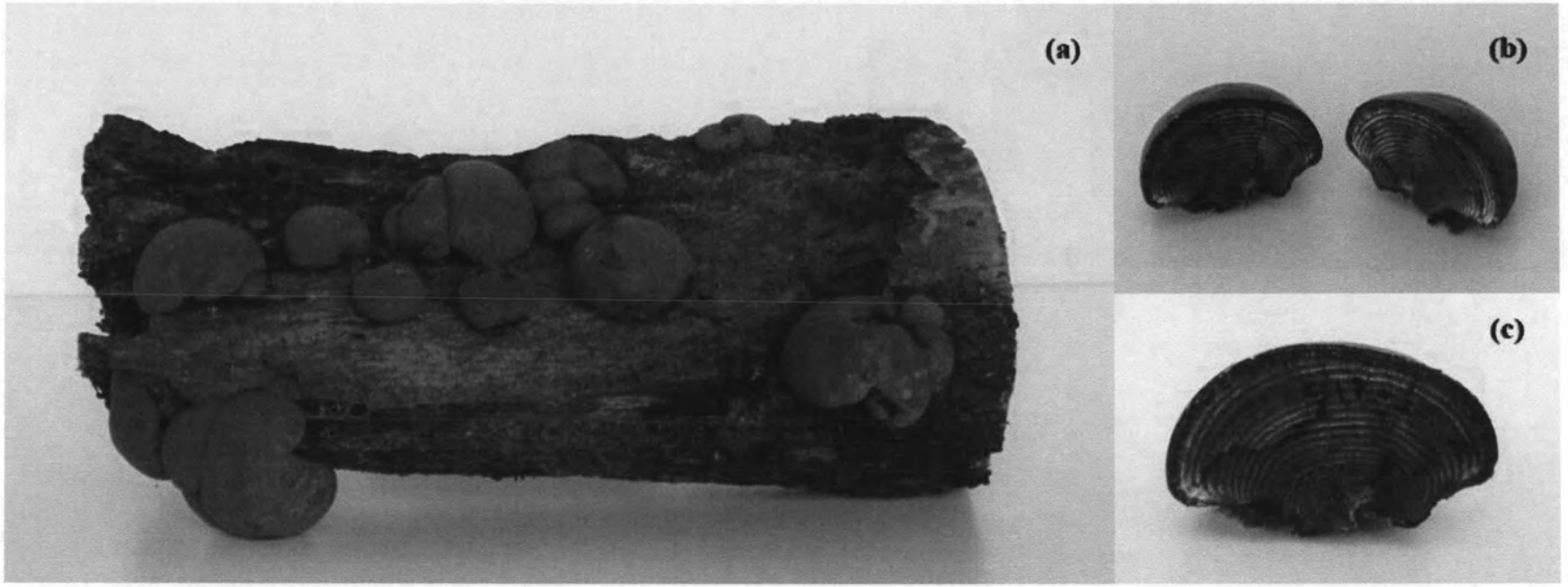


Figure I.1 *D.eschscholzii* on Mango Twig obtained from Dr. Jittra Piapukiew (a); Stromata on twig (b, c); cross section on the stromata having concentric zone.

APPENDIX J

Abbreviation for amino acid residues (Voet *et al.*, 1995)

Amino acid	3 Letter-Abbreveation	1 Letter-Abbreveation
Alanine	Ala	A
Arginine	Arg	R
Asparagine	Asn	N
Aspartic acid	Asp	D
Cysteine	Cys	C
Glutamine	Gln	Q
Glutamic acid	Glu	E
Glycine	Gly	G
Histidine	His	H
Isoleucine	Ile	I
Leucine	Leu	L
Lysine	Lys	K
Methionine	Met	M
Phenylalnine	Phe	F
Proline	Pro	P
Serine	Ser	S
Threonine	Thr	T
Tryptophan	Trp	W
Tyrosine	Tyr	Y
Valine	Val	V

BIOGRAPHY

Mr. Aphichart Karnchanatat was born on August 24, 1976 in Bangkok, Thailand. He graduated with a Bachelor Degree of Science in the Chemistry Department from the Faculty of Science, Ramkhumhang University in 1999, and Master Degree of Science in the Biochemistry Department from the Faculty of Science, Chulalongkorn University in 2001. He had been studying for a Doctor's Degree of Science in Biotechnology, the Faculty of Science, Chulalongkorn University since 2003. The Royal Golden Jubilee Program of the Thailand Research Fund financially supported his Ph.D. Program. He has publication:

1. Karnchanatat, A., Petsom, A., Sangvanich, P., Piapukiew, J., Whalley, A.J.S., Reynolds, C.D., and Sihanonth, P. 2007. Purification and biochemical characterization of extracellular β-glucosidase from the wood-decaying fungus *Daldinia eschescholzii* (Ehrenb.:Fr.) Rehm. FEMS Microbiology Letter 270: 162-170.