

REFERENCES

- Aachary, A.A., and Prapulla, S.G. 2009. Value addition to corncob: Production and characterization of xylooligosaccharides from alkali pretreated lignin-saccharide complex using *Aspergillus oryzae* MTCC 5154. *Bioresour. Technol.*, 100(2): 991-995.
- Aachary, A.A., and Prapulla, S.G. 2011. Xylooligosaccharides (XOS) as an emerging prebiotic: microbial synthesis, utilization, structural characterization, bioactive properties, and applications. *Compr. Rev. Food Sci. Food Saf.*, 10(1): 2-16.
- Aditiya, H.B., Mahlia, T.M.I., Chong, W.T., Nur, H., and Sebayang, A.H. 2016. Second generation bioethanol production: A critical review. *Renew. Sustain. Energy Rev.*, 66: 631-653.
- Aguiar, A., Alencar Nascimento, R.A., Ferretti, L.P., and Gonçalves, A.R. 2005. Determination of organic acids and ethanol in commercial vinegars. *Braz. J. Food Technol.*, 51-56.
- Aguilar-Reynosa, A., Romani, A., Ma. Rodríguez-Jasso, R., Aguilar, C.N., Garrote, G., and Ruiz, H.A. 2017. Microwave heating processing as alternative of pretreatment in second-generation biorefinery: An overview. *Energy Conv. Manag.*, 136: 50-65.
- Ai, Z., Jiang, Z., Li, L., Deng, W., Kusakabe, I., and Li, H. 2005. Immobilization of *Streptomyces olivaceoviridis* E-86 xylanase on Eudragit S-100 for xylooligosaccharide production. *Process Biochem.*, 40(8): 2707-2714.
- Akhtar, N., Goyal, D., and Goyal, A. 2017. Characterization of microwave-alkali-acid pre-treated rice straw for optimization of ethanol production via simultaneous saccharification and fermentation (SSF). *Energy Convers. Manag.*, 141: 133-144.

- An, J., Xie, Y., Zhang, Y., Tian, D., Wang, S., Yang, G., and Feng, Y. 2015. Characterization of a thermostable, specific GH10 xylanase from *Caldicellulosiruptor bescii* with high catalytic activity. *J. Mol. Catal. B: Enzym.*, 117: 13-20.
- Antil, P.S., Gupta, R., and Kuhad, R.C. 2015. Simultaneous saccharification and fermentation of pretreated sugarcane bagasse to ethanol using a new thermotolerant yeast. *Ann. Microbiol.*, 65(1): 423-429.
- Anuar, N., Mohd Adnan, A.F., Saat, N., Aziz, N., and Mat Taha, R. 2013. Optimization of extraction parameters by using response surface methodology, purification, and identification of anthocyanin pigments in *Melastoma malabathricum* Fruit. *Sci. World J.*, 2013: 1-11.
- Arevalo-Gallegos, A., Ahmad, Z., Asgher, M., Parra-Saldivar, R., and Iqbal, H.M.N. 2017. Lignocellulose: A sustainable material to produce value-added products with a zero waste approach-A review. *Int. J. Biol. Macromol.*, 99: 308-318.
- Arora, R., Behera, S., and Kumar, S. 2015. Bioprospecting thermophilic/thermotolerant microbes for production of lignocellulosic ethanol: A future perspective. *Renew. Sustain. Energy Rev.*, 51: 699-717.
- Baeyens, J., Kang, Q., Appels, L., Dewil, R., Lv, Y., and Tan, T. 2015. Challenges and opportunities in improving the production of bio-ethanol. *Prog. Energy Combust. Sci.*, 47: 60-88.
- Bai, Y., Saren, G., and Huo, W. 2015. Response surface methodology (RSM) in evaluation of the vitamin C concentrations in microwave treated milk. *J. Food Sci. Technol.*, 52(7): 4647-4651.
- Bajpai, P. 2014a. Chapter 5-Sources, production, and classification of xylanases. *In: Xylanolytic enzymes*, Bajpai, P. (Ed.), Academic Press, Amsterdam, Netherlands. pp. 43-52.
- Bajpai, P. 2014b. Chapter 8-Industrial applications of xylanases. *In: Xylanolytic enzymes*, Bajpai, P. (Ed.), Academic Press, Amsterdam, Netherlands. pp. 69-104.

- Balat, M., Balat, H., and Öz, C. 2008. Progress in bioethanol processing. *Prog. Energy Combust.*, 34(5): 551-573.
- Bastawde, K.B. 1992. Xylan structure, microbial xylanases, and their mode of action. *World J. Microbiol. biotechnol.*, 8(4): 353-368.
- Bayer, E.A., Lamed, R., White, B.A., Ding, S.Y., and Himmel, M.E. 2010. Conversion of agricultural residues to bioethanol: The roles of cellulases and cellulosomes. *In: Biofuels from agricultural wastes and byproducts*, Blaschek, H.P., Ezeji, T.C., and Scheffran, J. (Eds), Wiley-Blackwell, USA. pp. 67-96.
- Behera, B.C., Sethi, B.K., Mishra, R.R., Dutta, S.K., and Thatoi, H.N. 2017. Microbial cellulases-Diversity and biotechnology with reference to mangrove environment: A review. *J. Genet. Eng. Biotechnol.*, 15(1): 197-210.
- Berg, J.M., Tymoczko, J.L., and Stryer, L. "Biochemistry 5th edition". [Online]. Available at: <http://www.ncbi.nlm.nih.gov/books/NBK22593/>. (12 February 2015)
- Bhatia, L., Johri, S., and Ahmad, R. 2012. An economic and ecological perspective of ethanol production from renewable agro waste: a review. *AMB Express*, 2(1): 1-19.
- Bian, J., Peng, F., Peng, X.P., Peng, P., Xu, F., and Sun, R.C. 2013. Structural features and antioxidant activity of xylooligosaccharides enzymatically produced from sugarcane bagasse. *Bioresour. Technol.*, 127: 236-241.
- Biely, P., Singh, S., and Puchart, V. 2016. Towards enzymatic breakdown of complex plant xylan structures: State of the art. *Biotechnol. Adv.*, 34(7): 1260-1274.
- Binod, P., Sindhu, R., Singhania, R.R., Vikram, S., Devi, L., Nagalakshmi, S., Kurien, N., Sukumaran, R.K., and Pandey, A. 2010. Bioethanol production from rice straw: An overview. *Bioresour. Technol.*, 101(13): 4767-4774.
- Bomble, Y.J., Lin, C.Y., Amore, A., Wei, H., Holwerda, E.K., Ciesielski, P.N., Donohoe, B.S., Decker, S.R., Lynd, L.R., and Himmel, M.E. 2017. Lignocellulose deconstruction in the biosphere. *Curr. Opin. Chem. Biol.*, 41: 61-70.

- Boonchuay, P., Takenaka, S., Kuntiya, A., Techapun, C., Leksawasdi, N., Seesuriyachan, P., and Chaiyaso, T. 2016. Purification, characterization, and molecular cloning of the xylanase from *Streptomyces thermovulgaris* TISTR1948 and its application to xylooligosaccharide production. *J. Mol. Catal. B: Enzym.*, 129: 61-68.
- Boonchuay, P., Techapun, C., Seesuriyachan, P., and Chaiyaso, T. 2014. Production of xylooligosaccharides from corncob using a crude thermostable endo-xylanase from *Streptomyces thermovulgaris* TISTR1948 and prebiotic properties. *Food Sci. Biotechnol.*, 23(5): 1515-1523.
- Brar, K.K., Kaur, S., and Chadha, B.S. 2016. A novel staggered hybrid SSF approach for efficient conversion of cellulose/hemicellulosic fractions of corncob into ethanol. *Renew. Energy*, 98: 16-22.
- Brienzo, M., Carvalho, W., and Milagres, A.F. 2010. Xylooligosaccharides production from alkali-pretreated sugarcane bagasse using xylanases from *Thermoascus aurantiacus*. *Appl. Biochem. Biotechnol.*, 162(4): 1195-1205.
- Brodeur, G., Yau, E., Badal, K., Collier, J., Ramachandran, K.B., and Ramakrishnan, S. 2011. Chemical and physicochemical pretreatment of lignocellulosic biomass: A review. *Enzym. Res.*, 1-17.
- Broekaert, W.F., Courtin, C.M., Verbeke, K., Van de Wiele, T., Verstraete, W., and Delcour, J.A. 2011. Prebiotic and other health-related effects of cereal-derived arabinoxylans, arabinoxylan-oligosaccharides, and xylooligosaccharides. *Crit. Rev. Food Sci. Nutr.*, 51(2): 178-194.
- Campbell, J.M., Fahey, G.C., and Wolf, B.W. 1997. Selected indigestible oligosaccharides affect large bowel mass, cecal and fecal short-chain fatty acids, pH and microflora in rats. *J. Nutr.*, 127(1): 130-136.
- Carvalho, A.F.A., Neto, P.d.O., da Silva, D.F., and Pastore, G.M. 2013. Xylooligosaccharides from lignocellulosic materials: Chemical structure, health benefits and production by chemical and enzymatic hydrolysis. *Food Res. Int.*, 51(1): 75-85.

- Cha, Y.L., An, G.H., Yang, J., Moon, Y.H., Yu, G.D., and Ahn, J.W. 2015. Bioethanol production from *Miscanthus* using thermotolerant *Saccharomyces cerevisiae* mbc 2 isolated from the respiration-deficient mutants. *Renew. Energy*, 80: 259-265.
- Chaiyaso, T., Kuntiya, A., Techapun, C., Leksawasdi, N., Seesuriyachan, P., and Hanmoungjai, P. 2011. Optimization of cellulase-free xylanase production by thermophilic *Streptomyces thermovulgaris* TISTR1948 through Plackett-Burman and response surface methodological approaches. *Biosci. Biotechnol. Biochem.*, 75(3): 531-537.
- Chakdar, H., Kumar, M., Pandiyan, K., Singh, A., Nanjappan, K., Kashyap, P.L., and Srivastava, A.K. 2016. Bacterial xylanases: biology to biotechnology. *3 Biotech*, 6(2): 1-15.
- Chang, Y.H., Chang, K.S., Huang, C.W., Hsu, C.L., and Jang, H.D. 2012. Comparison of batch and fed-batch fermentations using corncob hydrolysate for bioethanol production. *Fuel*, 97: 166-173.
- Chapla, D., Pandit, P., and Shah, A. 2012. Production of xylooligosaccharides from corncob xylan by fungal xylanase and their utilization by probiotics. *Bioresour. Technol.*, 115: 215-221.
- Chen, H., Liu, J., Chang, X., Chen, D., Xue, Y., Liu, P., Lin, H., and Han, S. 2017. A review on the pretreatment of lignocellulose for high-value chemicals. *Fuel Process. Technol.*, 160: 196-206.
- Chen, Y., Dong, B., Qin, W., and Xiao, D. 2010. Xylose and cellulose fractionation from corncob with three different strategies and separate fermentation of them to bioethanol. *Bioresour. Technol.*, 101(18): 6994-6999.
- Cheng, K.K., Zhang, J.A., Chavez, E., and Li, J.P. 2010. Integrated production of xylitol and ethanol using corncob. *Appl. Microbiol. Biotechnol.*, 87(2): 411-417.
- Chi, W.J., Lim, J.H., Park, D.Y., Park, J.S., and Hong, S.K. 2013. Production and characterization of a thermostable endo-type β -xylanase produced by a newly-

- isolated *Streptomyces thermocarboxydus* subspecies MW8 strain from Jeju Island. *Process Biochem.*, 48(11): 1736-1743.
- Childs, C.E., Röytiö, H., Alhoniemi, E., Fekete, A.A., Forssten, S.D., Hudjec, N., Lim, Y.N., Steger, C.J., Yaqoob, P., Tuohy, K.M., Rastall, R.A., Ouwehand, A.C., and Gibson, G.R. 2014. Xylo-oligosaccharides alone or in synbiotic combination with *Bifidobacterium animalis* subsp. *lactis* induce bifidogenesis and modulate markers of immune function in healthy adults: a double-blind, placebo-controlled, randomised, factorial cross-over study. *Br. J. Nutr.*, 111(11): 1945-1956.
- Choudhary, J., Singh, S., and Nain, L. 2016. Thermotolerant fermenting yeasts for simultaneous saccharification fermentation of lignocellulosic biomass. *Electron. J. Biotechnol.*, 21: 82-92.
- Choudhary, J., Singh, S., and Nain, L. 2017. Bioprospecting thermotolerant ethanologenic yeasts for simultaneous saccharification and fermentation from diverse environments. *J. Biosci. Bioeng.*, 123(3): 342-346.
- Christakopoulos, P., Katapodis, P., Kalogeris, E., Kekos, D., Macris, B.J., Stamatis, H., and Skaltsa, H. 2003. Antimicrobial activity of acidic xylo-oligosaccharides produced by family 10 and 11 endoxylanases. *Int. J. Biol. Macromol.*, 31: 171-175.
- Chung, Y.C., Hsu, C.K., Ko, C.Y., and Chan, Y.C. 2007. Dietary intake of xylooligosaccharides improves the intestinal microbiota, fecal moisture, and pH value in the elderly. *Nutr. Res.*, 27(12): 756-761.
- Collins, T., Gerday, C., and Feller, G. 2005. Xylanases, xylanase families and extremophilic xylanases. *FEMS Microbiol. Rev.*, 29(1): 3-23.
- Coseri, S. 2017. Cellulose: To depolymerize... or not to?. *Biotechnol. Adv.*, 35(2): 251-266.
- Crittenden, R., Karppinen, S., Ojanen, S., Tenkanen, M., Fagerström, R., Mättö, J., Saarela, M., Mattila-Sandholm, T., and Poutanen, K. 2002. *In vitro* fermentation of cereal dietary fibre carbohydrates by probiotic and intestinal bacteria. *J. Sci. Food Agric.*, 82(8): 781-789.

- Dagnino, E.P., Felissia, F.E., Chamorro, E., and Area, M.C. 2018. Studies on lignin extraction from rice husk by a soda-ethanol treatment: Kinetics, separation, and characterization of products. *Chem. Eng. Res. Des.*, 129: 209-216.
- de Barros, E.M., Carvalho, V.M., Rodrigues, T.H.S., Rocha, M.V.P., and Gonçalves, L.R.B. 2017. Comparison of strategies for the simultaneous saccharification and fermentation of cashew apple bagasse using a thermotolerant *Kluyveromyces marxianus* to enhance cellulosic ethanol production. *Chem. Eng. J.*, 307, 939-947.
- de Jong, E., and Gosselink, R.J.A. 2014. Chapter 17 - Lignocellulose-based chemical products. *In: Bioenergy research: Advances and applications*, Gupta, V.K., Tuohy, M.G., Kubicek, C.P., Saddler, J., Xu, F. (Eds.), Elsevier, Amsterdam, Netherlands. pp. 277-313.
- Deesukon, W., Nishimura, Y., Harada, N., Sakamoto, T., and Sukhumsirichart, W. 2011. Purification, characterization and gene cloning of two forms of a thermostable endo-xylanase from *Streptomyces* sp. SWU10. *Process Biochem.*, 46(12): 2255-2262.
- Deng, W., Zhang, Q., and Wang, Y. 2014. Catalytic transformations of cellulose and cellulose-derived carbohydrates into organic acids. *Catal. Today.*, 234: 31-41.
- Department of alternative energy development and efficiency, Ministry of Energy. 2018. "Biomass Database Potential in Thailand". [Online]. Available at: <http://weben.dede.go.th/webmax/content/biomass-database-potential-thailand>. (31 January 2018)
- Deutschmann, R., and Dekker, R.F.H. 2012. From plant biomass to bio-based chemicals: Latest developments in xylan research. *Biotechnol. Adv.*, 30(6): 1627-1640.
- Diep, N.Q., Fujimoto, S., Minowa, T., Sakanishi, K., and Nakagoshi, N. 2012. Estimation of the potential of rice straw for ethanol production and the optimum facility size for different regions in Vietnam. *Appl. Energy*, 93: 205-211.

- Dyartanti, E.R., Margono, Pranolo, S.H., Setiani, B., and Nurhayati, A. 2015. Bioethanol from sorghum grain (*Sorghum bicolor*) with SSF reaction using biocatalyst co-immobilization method of glucoamylase and yeast. *Energy Procedia*, 68: 132-137.
- Ebersbach, T., Andersen, J.B., Bergström, A., Hutkins, R.W., and Licht, T.R. 2012. Xylo-oligosaccharides inhibit pathogen adhesion to enterocytes *in vitro*. *Res. Microbiol.*, 163(1): 22-27.
- Ebringerová, A., and Heinze, T. 2000. Xylan and xylan derivatives-biopolymers with valuable properties, part 1: Naturally occurring xylans structures, isolation procedures and properties. *Macromol. Rapid Commun.*, 21(9): 542-556.
- Egüés, I., Stepan, A.M., Eceiza, A., Toriz, G., Gatenholm, P., and Labidi, J. 2014. Corncob arabinoxylan for new materials. *Carbohydr. Polym.*, 102: 12-20.
- Erdei, B., Frankó, B., Galbe, M., and Zacchi, G. 2012. Separate hydrolysis and co-fermentation for improved xylose utilization in integrated ethanol production from wheat meal and wheat straw. *Biotechnol. Biofuels*, 5: 1-12.
- Fan, C., Qi, K., Xia, X.X., and Zhong, J.J. 2013. Efficient ethanol production from corncob residues by repeated fermentation of an adapted yeast. *Bioresour. Technol.*, 136: 309-315.
- G.C., P., Choi, Y.H., Choi, Y.S., Seong, C.N., Cho, S.S., Lee, H.J., and Yoo, J.C. 2013. A novel thermostable cellulase free xylanase stable in broad range of pH from *Streptomyces* sp. CS428. *Process Biochem.*, 48(8): 1188-1196.
- Gaur, R., Tiwari, S., Rai, P., and Srivastava, V. 2015. Isolation, production, and characterization of thermotolerant xylanase from solvent tolerant *Bacillus vallismortis* RSPP-15. *Int. J. Polym. Sci.* 2015: 1-10.
- Ghose, T.K. 1987. Measurement of cellulase activities. *Pure. Appl. Chem.*, 59(2): 257-268.

- Gírio, F.M., Fonseca, C., Carvalheiro, F., Duarte, L.C., Marques, S., and Bogel-Lukasik, R. 2010. Hemicelluloses for fuel ethanol: A review. *Bioresour. Technol.*, 101(13): 4775-4800.
- Gobinath, D., Madhu, A.N., Prashant, G., Srinivasan, K., and Prapulla, S.G. 2010. Beneficial effect of xylo-oligosaccharides and fructo-oligosaccharides in streptozotocin-induced diabetic rats. *Br. J. Nutr.*, 104(1): 40-47.
- Godbey, W.T. 2014. Chapter 16-Fermentation, beer, and biofuels. *In: An introduction to biotechnology*, Godbey, W.T. (Ed.), Woodhead publishing, England. pp. 331-351.
- Gomathi, D., Muthulakshmi, C., Kumar, D.G., Ravikumar, G., Kalaiselvi, M., and Uma, C. 2012. Submerged fermentation of wheat bran by *Aspergillus flavus* for production and characterization of carboxy methyl cellulase. *Asian. Pac. J. Trop. Biomed.*, 2(1): 67-73.
- Gowdhaman, D., and Ponnusami, V. 2015. Production and optimization of xylooligosaccharides from corncob by *Bacillus aerophilus* KGJ2 xylanase and its antioxidant potential. *Int. J. Biol. Macromol.*, 79: 595-600.
- Graciano, L., Corrêa, J., Vieira, F., Bosetto, A., Loth, E., Kadowaki, M., Gandra, R., and Simão, R.d.C.G. 2015. Cloning and expression of the xynA1 gene encoding a xylanase of the GH10 group in *Caulobacter crescentus*. *Appl. Biochem. Biotechnol.*, 175(8): 3915-3929.
- Gu, H., Zhang, J., and Bao, J. 2014. Inhibitor analysis and adaptive evolution of *Saccharomyces cerevisiae* for simultaneous saccharification and ethanol fermentation from industrial waste corncob residues. *Bioresour. Technol.*, 157: 6-13.
- Gullón, P., Moura, P., Esteves, M.P., Gírio, F.M., Domínguez, H., and Parajó, J.C. 2008. Assessment on the fermentability of xylooligosaccharides from rice husks by probiotic bacteria. *J. Agric. Food Chem.*, 56(16): 7482-7487.
- Haaland, P.D. 1989. *Experimental design in biotechnology*. Marcel Dekker Inc., New York, USA.

- Hägström, C., Rova, U., Brandberg, T., and Hodge, D.B. 2014. Chapter 8-Integration of ethanol fermentation with second generation biofuels technologies. *In: Biorefineries*, Vertès, N.Q.B.H.A. (Ed.), Elsevier, Amsterdam, Netherlands. pp. 161-187.
- Harmsen, P. 2010. Literature review of physical and chemical pretreatment processes for lignocellulosic biomass. Wageningen UR, Food and Biobased Research, Wageningen, Netherlands.
- Hasunuma, T., and Kondo, A. 2012. Consolidated bioprocessing and simultaneous saccharification and fermentation of lignocellulose to ethanol with thermotolerant yeast strains. *Process Biochem.*, 47(9): 1287-1294.
- He, J., Su, L., Sun, X., Fu, J., Chen, J., and Wu, J. 2014. A novel xylanase from *Streptomyces* sp. FA1: Purification, characterization, identification, and heterologous expression. *Biotechnol. Bioprocess Eng.*, 19(1): 8-17.
- Holt, S.M., Miller-Fosmore, C.M., and Côté, G.L. 2005. Growth of various intestinal bacteria on alternansucrase-derived oligosaccharides. *Lett. Appl. Microbiol.*, 40(5): 385-390.
- Hoyer, K., Galbe, M., and Zacchi, G. 2010. Effects of enzyme feeding strategy on ethanol yield in fed-batch simultaneous saccharification and fermentation of spruce at high dry matter. *Biotechnol. Biofuels*, 3(1): 1-14.
- Hsu, C.K., Liao, J.W., Chung, Y.C., Hsieh, C.P., and Chan, Y.C. 2004. Xylooligosaccharides and fructooligosaccharides affect the intestinal microbiota and precancerous colonic lesion development in rats. *J. Nutr.*, 134(6): 1523-1528.
- Huang, C., Jeuck, B., Du, J., Yong, Q., Chang, H.M., Jameel, H., and Phillips, R. 2016. Novel process for the coproduction of xylo-oligosaccharides, fermentable sugars, and lignosulfonates from hardwood. *Bioresour. Technol.*, 219: 600-607.

- Huang, C., Lai, C., Wu, X., Huang, Y., He, J., Huang, C., Li, X., and Yong, Q. 2017. An integrated process to produce bio-ethanol and xylooligosaccharides rich in xylobiose and xylotriose from high ash content waste wheat straw. *Bioresour. Technol.*, 241: 228-235.
- Ishizaki, H., and Hasumi, K. 2014. Ethanol production from biomass. *In: Research approaches to sustainable biomass systems*, Tojo, S., and Hirasawa, T. (Eds.), Elsevier Inc., Oxford, UK. pp. 243-258.
- Javier, P.I., Óscar, G., Sanz-Aparicio, J., and Díaz, P. 2007. Xylanases: Molecular properties and applications. *In: Industrial enzymes*, Polaina, J., and MacCabe, A. (Eds.), Springer, Netherlands. pp. 65-82.
- Jayapal, N., Samanta, A.K., Kolte, A.P., Senani, S., Sridhar, M., Suresh, K.P., and Sampath, K.T. 2013. Value addition to sugarcane bagasse: Xylan extraction and its process optimization for xylooligosaccharides production. *Ind. Crops Prod.*, 42: 14-24.
- Jørgensen, H., Vibe-Pedersen, J., Larsen, J., and Felby, C. 2007. Liquefaction of lignocellulose at high solids concentrations. *Biotechnol. Bioeng.*, 96(5): 862-870.
- Juturu, V., Wu, J.C. 2012. Microbial xylanases: Engineering, production and industrial applications. *Biotechnol. Adv.*, 30(6): 1219-1227.
- Juturu, V., Wu, J.C. 2014. Microbial cellulases: Engineering, production and applications. *Renew. Sustain. Energy Rev.*, 33: 188-203.
- Kahar, P., Taku, K., and Tanaka, S. 2010. Enzymatic digestion of corncobs pretreated with low strength of sulfuric acid for bioethanol production. *J. Biosci. Bioeng.*, 110(4): 453-458.
- Kossatz, H.L., Rose, S.H., Viljoen-Bloom, M., and van Zyl, W.H. 2017. Production of ethanol from steam exploded triticale straw in a simultaneous saccharification and fermentation process. *Process Biochem.*, 53: 10-16.

- Kubata, B.K., Suzuki, T., Horitsu, H., Kawai, K., and Takamizawa, K. 1994. Purification and characterization of *Aeromonas caviae* ME-1 xylanase V, which produces exclusively xylobiose from xylan. *Appl. Environ. Microbiol.*, 60(2): 531-535.
- Laemmli, U.K. 1970. Cleavage of structural proteins during the assembly of the head of bacteriophage T4. *Nat.*, 227(5259): 680-685.
- Lagaert, S., Pollet, A., Courtin, C.M., and Volckaert, G. 2014. β -Xylosidases and α -L-arabinofuranosidases: Accessory enzymes for arabinoxylan degradation. *Biotechnol. Adv.*, 32(2): 316-332.
- Lasrado, L.D., and Gudipati, M. 2013. Purification and characterization of β -D-xylosidase from *Lactobacillus brevis* grown on xylo-oligosaccharides. *Carbohydr. Polym.*, 92(2): 1978-1983.
- Lee, J., Heo, S.Y., Lee, J.W., Yoon, K.H., Kim, Y.H., and Nam, S.W. 2009. Thermostability and xylan-hydrolyzing property of endoxylanase expressed in yeast *Saccharomyces cerevisiae*. *Biotechnol. Bioprocess Eng.*, 14(5): 639-644.
- Leksawasdi, N. 2016. Enzyme and enzyme kinetics. Nopburee Press Co. Ltd., Chiang Mai, Thailand. (in Thai)
- Li, N., Shi, P., Yang, P., Wang, Y., Luo, H., Bai, Y., Zhou, Z., and Yao, B. 2009. Cloning, expression, and characterization of a new *Streptomyces* sp. S27 xylanase for which xylobiose is the main hydrolysis product. *Appl. Biochem. Biotechnol.*, 159(2): 521-531.
- Li, X., Li, E., Zhu, Y., Teng, C., Sun, B., Song, H., and Yang, R. 2012. A typical endoxylanase from *Streptomyces rameus* L2001 and its unique characteristics in xylooligosaccharide production. *Carbohydr. Res.*, 359: 30-36.
- Liang, X., Hua, D., Wang, Z., Zhang, J., Zhao, Y., Xu, H., Li, Y., Gao, M., and Zhang, X. 2013. Production of bioethanol using lignocellulosic hydrolysate by the white rot fungus *Hohenbuehelia* sp. ZW-16. *Ann. Microbiol.*, 63(2): 719-723.

- Limayem, A., and Ricke, S.C. 2012. Lignocellulosic biomass for bioethanol production: Current perspectives, potential issues and future prospects. *Prog. Energy Combust. Sci.*, 38(4): 449-467.
- Liu, Y., Xu, J., Zhang, Y., Yuan, Z., He, M., Liang, C., Zhuang, X., and Xie, J. 2015. Sequential bioethanol and biogas production from sugarcane bagasse based on high solids fed-batch SSF. *Energy*, 90: 1199-1205.
- Lowry, O.H., Rosebrough, N.J., Farr, A.L., and Randall, R.J. 1951. Protein measurement with the Folin phenol reagent. *J. Biol. Chem.*, 193(1): 265-275.
- Lu, F., and Ralph, J. 2010. Chapter 6-Lignin. *In: Cereal straw as a resource for sustainable biomaterials and biofuels*, Run-Cang, S. (Ed.), Elsevier, Amsterdam, Netherlands. pp. 169-207.
- Lu, J., Li, X., Zhao, J., and Qu, Y. 2012. Enzymatic saccharification and ethanol fermentation of reed pretreated with liquid hot water. *J. Biomed. Biotechnol.*, 2012: 1-9.
- Madhukumar, M.S., and Muralikrishna, G. 2012. Fermentation of xylo-oligosaccharides obtained from wheat bran and Bengal gram husk by lactic acid bacteria and bifidobacteria. *J. Food Sci. Technol.*, 49(6): 745-752.
- Maity, S.K. 2015. Opportunities, recent trends and challenges of integrated biorefinery: Part I. *Renew. Sustain. Energy Rev.*, 43: 1427-1445.
- Mäkeläinen, H., Juntunen, M., and Hasselwander, O. 2009. Prebiotic potential of xylo-oligosaccharides. *In: Prebiotics and probiotics science and technology*, Charalampopoulos, D., and Rastall, R. (Eds.), Springer, New York, USA, pp. 245-258.
- Mamo, G., Hatti-Kaul, R., and Mattiasson, B. 2006. A thermostable alkaline active endo- β -1-4-xylanase from *Bacillus halodurans* S7: Purification and characterization. *Enzym. Microb. Technol.*, 39(7): 1492-1498.

- Mander, P., Choi, Y.H., G.C, P., Choi, Y.S., Hong, J.H., Cho, S.S., and Yoo, J.C. 2014. Biochemical characterization of xylanase produced from *Streptomyces* sp. CS624 using an agro residue substrate. *Process Biochem.*, 49(3): 451-456.
- Manisseri, C., and Gudipati, M. 2010. Bioactive xylo-oligosaccharides from wheat bran soluble polysaccharides. *LWT – Food Sci. Technol.*, 43(3): 421-430.
- Mekala, N.K., Potumarthi, R., Baadhe, R.R., and Gupta, V.K. 2014. Chapter 1-Current bioenergy researches: Strengths and future challenges. *In: Bioenergy research: Advances and applications*, Gupta, V., Tuohy, M., Kubicek, C., Saddler, J., and Xu. F. (Eds.), Elsevier, Amsterdam, Netherlands. pp. 1-21.
- Menon, V., and Rao, M. 2012. Trends in bioconversion of lignocellulose: Biofuels, platform chemicals & biorefinery concept. *Prog. Energy Combust. Sci.*, 38(4): 522-550.
- Merico, A., Sulo, P., Piškur, J., and Compagno, C. 2007. Fermentative lifestyle in yeasts belonging to the *Saccharomyces* complex. *FEBS J.*, 274(4): 976-989.
- Michlmayr, H., Hell, J., Lorenz, C., and Kneifel, W. 2013. Arabinoxylan oligosaccharide hydrolysis by family 43 and 51 glycosidases from *Lactobacillus brevis* DSM 20054. *Appl. Environ. Microbiol.*, 79(21): 6747-6754.
- Miller, G.L. 1959. Use of dinitrosalicylic acid reagent for determination of reducing sugar. *Anal. Chem.*, 31(3): 426-428.
- Mohd Azhar, S.H., Abdulla, R., Jambo, S.A., Marbawi, H., Gansau, J.A., Mohd Faik, A.A., and Rodrigues, K.F. 2017. Yeasts in sustainable bioethanol production: A review. *Biochem. Biophys. Rep.*, 10: 52-61.
- Moura, P., Barata, R., Carneiro, F., Gírio, F., and Loureiro-Dias, M.C., Esteves, M.P. 2007. *In vitro* fermentation of xylo-oligosaccharides from corn cobs autohydrolysis by *Bifidobacterium* and *Lactobacillus* strains. *LWT – Food Sci. Technol.*, 40(6): 963-972.

- Moura, P., Cabanas, S., Lourenço, P., Gírio, F., and Loureiro-Dias, M.C., Esteves, M.P. 2008. *In vitro* fermentation of selected xylo-oligosaccharides by piglet intestinal microbiota. *LWT – Food Sci. Technol.*, 41(10): 1952-1961.
- Moure, A., Gullón, P., Domínguez, H., and Parajó, J.C. 2006. Advances in the manufacture, purification and applications of xylo-oligosaccharides as food additives and nutraceuticals. *Process Biochem.*, 41(9): 1913-1923.
- Mousdale, D.M. 2010. Introduction to biofuels. Taylor & Francis Group, USA.
- Murciano Martínez, P., Kabel, M.A., and Gruppen, H. 2016. Delignification outperforms alkaline extraction for xylan fingerprinting of oil palm empty fruit bunch. *Carbohydr. Polym.*, 153: 356-363.
- Mussatto, S.I., and Mancilha, I.M. 2007. Non-digestible oligosaccharides: A review. *Carbohydr. Polym.*, 68(3): 587-597.
- Nagarajan, S., Skillen, N.C., Irvine, J.T.S., Lawton, L.A., and Robertson, P.K.J. 2017. Cellulose II as bioethanol feedstock and its advantages over native cellulose. *Renew. Sustain. Energy Rev.*, 77: 182-192.
- Naidu, D.S., Hlangothi, S.P., and John, M.J. 2018. Bio-based products from xylan: A review. *Carbohydr. Polym.*, 179: 28-41.
- Narra, M., James, J.P., and Balasubramanian, V. 2015. Simultaneous saccharification and fermentation of delignified lignocellulosic biomass at high solid loadings by a newly isolated thermotolerant *Kluyveromyces* sp. for ethanol production. *Bioresour. Technol.*, 179: 331-338.
- Nascimento, R.P., Coelho, R.R.R., Marques, S., Alves, L., Gírio, F.M., Bon, E.P.S., and Amaral-Collaco, M.T. 2002. Production and partial characterization of xylanase from *Streptomyces* sp. strain AMT-3 isolated from Brazilian cerrado soil. *Enzym. Microb. Technol.*, 31: 549-555.
- Nascimento Viviane, M., Manrich, A., Tardioli Paulo, W., de Campos Giordano, R., de Moraes Rocha George, J., and Giordano Raquel de Lima, C. 2016. Alkaline

- pretreatment for practicable production of ethanol and xylooligosaccharides. *Bioethanol.*, 2: 112-125.
- Nelson, D.L., and Cox, M.M. 2004. *Lehninger Principles of Biochemistry* (3th Edition). W.H. Freeman, USA.
- Norgren, M., and Edlund, H. 2014. Lignin: Recent advances and emerging applications. *Curr. Opin. Colloid. Interface Sci.*, 19(5): 409-416.
- Ortíz, I., and Quintero, R. 2014. Chapter 4-Recent advancements in pretreatment technologies of biomass to produce bioenergy. *In: Bioenergy research: Advances and applications*, Gupta, V., Tuohy, M., Kubicek, C., Saddler, J., and Xu, F. (Eds.), Elsevier, Amsterdam, Netherlands. pp. 57-69.
- Otieno, D.O., and Ahring, B.K. 2012. A thermochemical pretreatment process to produce xylooligosaccharides (XOS), arabinooligosaccharides (AOS) and mannoooligosaccharides (MOS) from lignocellulosic biomasses. *Bioresour. Technol.*, 112: 285-292.
- Paës, G., Berrin, J.G., and Beaugrand, J. 2012. GH11 xylanases: Structure/function/properties relationships and applications. *Biotechnol. Adv.*, 30(3): 564-592.
- Parisutham, V., Chandran, S.P., Mukhopadhyay, A., Lee, S.K., and Keasling, J.D. 2017. Intracellular cellobiose metabolism and its applications in lignocellulose-based biorefineries. *Bioresour. Technol.*, 239: 496-506.
- Paulova, L., Patakova, P., Branska, B., Rychtera, M., and Melzoch, K. 2015. Lignocellulosic ethanol: Technology design and its impact on process efficiency. *Biotechnol. Adv.*, 33(6): 1091-1107.
- Pessani, N.K., Atiyeh, H.K., Wilkins, M.R., Bellmer, D.D., and Banat, I.M. 2011. Simultaneous saccharification and fermentation of Kanlow switchgrass by thermotolerant *Kluyveromyces marxianus* IMB3: The effect of enzyme loading, temperature and higher solid loadings. *Bioresour. Technol.*, 102(22): 10618-10624.

- Pleissner, D., Neu, A.K., Mehlmann, K., Schneider, R., Puerta-Quintero, G.I., and Venus, J. 2016. Fermentative lactic acid production from coffee pulp hydrolysate using *Bacillus coagulans* at laboratory and pilot scales. *Bioresour. Technol.*, 218: 167-173.
- Ptasinski, K.J. 2015. Chapter 17-biorefineries. *In: Efficiency of biomass energy*, Ptasiniski, K.J. (Ed.), John Wiley & Sons Inc., New Jersey, USA. pp. 673-706.
- Qing, Q., Zhou, L., Guo, Q., Gao, X., Zhang, Y., He, Y., and Zhang, Y. 2017. Mild alkaline presoaking and organosolv pretreatment of corn stover and their impacts on corn stover composition, structure, and digestibility. *Bioresour. Technol.*, 233: 284-290.
- Qiu, Z., Shi, P., Luo, H., Bai, Y., Yuan, T., Yang, P., Liu, S., and Yao, B. 2010. A xylanase with broad pH and temperature adaptability from *Streptomyces megasporus* DSM 41476, and its potential application in brewing industry. *Enzym. Microb. Technol.*, 46(6): 506-512.
- Qureshi, A.S., Zhang, J., and Bao, J. 2015. High ethanol fermentation performance of the dry dilute acid pretreated corn stover by an evolutionarily adapted *Saccharomyces cerevisiae* strain. *Bioresour. Technol.*, 189: 399-404.
- Ren, J.L., and Sun, R.C. 2010. Chapter 4-Hemicelluloses. *In: Cereal straw as a resource for sustainable biomaterials and biofuels*, Sun, R.-C. (Ed.), Elsevier, Amsterdam, Netherlands. pp. 73-130.
- Ricardo Soccol, C., Faraco, V., Karp, S., Vandenberghe, L.P.S., Thomaz-Soccol, V., Woiciechowski, A., and Pandey, A. 2011. Chapter 5-Lignocellulosic bioethanol: Current status and future perspectives. *In: Biofuels*, Pandey, A. (Ed.), Academic Press. Amsterdam, Netherlands. pp. 101-122.
- Rivière, A., Moens, F., Selak, M., Maes, D., Weckx, S., and De Vuyst, L. 2014. The ability of Bifidobacteria to degrade arabinoxylan oligosaccharide constituents and derived oligosaccharides is strain dependent. *Appl. Environ. Microbiol.*, 80(1): 204-217.

- Romaní, A., Garrote, G., and Parajó, J.C. 2012. Bioethanol production from autohydrolyzed *Eucalyptus globulus* by simultaneous saccharification and fermentation operating at high solids loading. *Fuel*, 94: 305-312.
- Roopan, S.M. 2017. An overview of natural renewable bio-polymer lignin towards nano and biotechnological applications. *Int. J. Biol. Macromol.*, 103: 508-514.
- Rycroft, C., Rastall, R., and Gibson, G. 2002. The role of prebiotics in human gut microbiology. *In: Novel frontiers in the production of compounds for biomedical use*, Broekhoven, A. Shapiro, F., and Anné, J. (Eds.), Springer, Netherlands. pp. 411-428.
- Rycroft, C.E., Jones, M.R., Gibson, G.R., and Rastall, R.A. 2001. A comparative *in vitro* evaluation of the fermentation properties of prebiotic oligosaccharides. *J. Appl. Microbiol.*, 91(5): 878-887.
- Sabiha-Hanim, S., Noor, M.A.M., and Rosma, A. 2011. Effect of autohydrolysis and enzymatic treatment on oil palm (*Elaeis guineensis* Jacq.) frond fibres for xylose and xylooligosaccharides production. *Bioresour. Technol.*, 102(2): 1234-1239.
- Salma, F. 2008. Investigation of β -xylosidase, α -L-arabinofuranosidase and acetylsterase from *Thermotoga hypogea*. Master degree Thesis. University of Waterloo. Waterloo, Ontario, Canada.
- Samanta, A.K., Jayapal, N., Jayaram, C., Roy, S., Kolte, A.P., Senani, S., and Sridhar, M. 2015. Xylooligosaccharides as prebiotics from agricultural by-products: Production and applications. *Bioact. Carbohydr. Diet. Fibre.*, 5(1): 62-71.
- Samanta, A.K., Jayapal, N., Kolte, A.P., Senani, S., Sridhar, M., Suresh, K.P., and Sampath, K.T. 2012a. Enzymatic production of xylooligosaccharides from alkali solubilized xylan of natural grass (*Sehima nervosum*). *Bioresour. Technol.*, 112: 199-205.
- Samanta, A.K., Senani, S., Kolte, A.P., Sridhar, M., Sampath, K.T., Jayapal, N., and Devi, A. 2012b. Production and *in vitro* evaluation of xylooligosaccharides generated from corn cobs. *Food Bioprod. Process.*, 90(3): 466-474.

- Sanjivkumar, M., Silambarasan, T., Palavesam, A., and Immanuel, G. 2017. Biosynthesis, purification and characterization of β -1,4-xylanase from a novel mangrove associated actinobacterium *Streptomyces olivaceus* (MSU3) and its applications. *Protein Expr. Purif.*, 130: 1-12.
- Sedlmeyer, F.B. 2011. Xylan as by-product of biorefineries: Characteristics and potential use for food applications. *Food Hydrocoll.*, 25(8): 1891-1898.
- Silva, G.P.d., Araújo, E.F.d., Silva, D.O., and Guimarães, W.V. 2005. Ethanol fermentation of sucrose, sugarcane juice and molasses by *Escherichia coli* strain ko11 and *Klebsiella oxytoca* strain P2. *Braz. J. Microbiol.*, 36: 395-404.
- Sindhu, R., Binod, P., Janu, K., Sukumaran, R., and Pandey, A. 2012. Organosolvent pretreatment and enzymatic hydrolysis of rice straw for the production of bioethanol. *World J. Microbiol. Biotechnol.*, 28(2): 473-483.
- Singh, A., and Bishnoi, N. 2012. Optimization of enzymatic hydrolysis of pretreated rice straw and ethanol production. *Appl. Microbiol. Biotechnol.*, 93(4): 1785-1793.
- Singh, R.D., Banerjee, J., and Arora, A. 2015. Prebiotic potential of oligosaccharides: A focus on xylan derived oligosaccharides. *Bioact. Carbohydr. Diet. Fibre*, 5(1): 19-30.
- Singhania, R. 2009. Cellulolytic enzymes. *In: Biotechnology for agro-industrial residues utilisation*, Singh nee' Nigam, P., and Pandey, A. (Eds.), Springer, Netherlands. pp. 371-381.
- Singhania, R.R., Saini, J.K., Saini, R., Adsul, M., Mathur, A., Gupta, R., and Tuli, D.K. 2014. Bioethanol production from wheat straw via enzymatic route employing *Penicillium janthinellum* cellulases. *Bioresour. Technol.*, 169: 490-495.
- Spurway, T.D., Morland, C., Cooper, A., Sumner, I., Hazlewood, G.P., O'Donnell, A.G., Pickersgill, R.W., and Gilbert, H.J. 1997. Calcium protects a mesophilic xylanase from proteinase inactivation and thermal unfolding. *J. Biol. Chem.*, 272(28): 17523-17530.

- Su, R., Ma, Y., Qi, W., Zhang, M., Wang, F., Du, R., Yang, J., Zhang, M., and He, Z. 2013. Ethanol production from high-solid SSCF of alkaline-pretreated corncob using recombinant *Zymomonas mobilis* CP4. *Bioenergy Res.*, 6(1): 292-299.
- Sutay Kocabaş, D., Güder, S., and Özben, N. 2015. Purification strategies and properties of a low-molecular weight xylanase and its application in agricultural waste biomass hydrolysis. *J. Mol. Catal. B: Enzym.*, 115: 66-75.
- Takenaka, S., Miyatake, A., Tanaka, K., Kuntiya, A., Techapun, C., Leksawasdi, N., Seesuriyachan, P., Chaiyaso, T., Watanabe, M., and Yoshida, K.I. 2015. Characterization of the native form and the carboxy-terminally truncated halotolerant form of α -amylases from *Bacillus subtilis* strain FP-133. *J. Basic Microbiol.*, 55(6): 780-789.
- Tan, L., Wang, M., Li, X., Li, H., Zhao, J., Qu, Y., Choo, Y.M., and Loh, S.K. 2016. Fractionation of oil palm empty fruit bunch by bisulfite pretreatment for the production of bioethanol and high value products. *Bioresour. Technol.*, 200: 572-578.
- Technical Association of the Pulp and Paper Industry (TAPPI). 1999. Alpha-, beta- and gamma-cellulose in pulp (T 203 cm-99), Georgia, USA.
- Technical Association of the Pulp and Paper Industry (TAPPI). 2002. Ash in wood, pulp, paper and paperboard: combustion at 525°C (T 211 om-02), Georgia, USA.
- Technical Association of the Pulp and Paper Industry (TAPPI). 2006. Acid-insoluble lignin in wood and pulp (Reaffirmation of T 222 om-02). Georgia, USA.
- Techapun, C., Poosaran, N., Watanabe, M., and Sasaki, K. 2003. Thermostable and alkaline-tolerant microbial cellulase-free xylanases produced from agricultural wastes and the properties required for use in pulp bleaching bioprocesses: a review. *Process Biochem.*, 38(9): 1327-1340.

- Teng, C., Yan, Q., Jiang, Z., Fan, G., and Shi, B. 2010. Production of xylooligosaccharides from the steam explosion liquor of corncobs coupled with enzymatic hydrolysis using a thermostable xylanase. *Bioresour. Technol.*, 101(19): 7679-7682.
- Thammasittirong, S.N.R., Thirasaktana, T., Thammasittirong, A., and Srisodsuk, M. 2013. Improvement of ethanol production by ethanol-tolerant *Saccharomyces cerevisiae* UVNR56. Springer Plus., 1-5.
- Trache, D., Hussin, M.H., Hui Chuin, C.T., Sabar, S., Fazita, M.R.N., Taiwo, O.F.A., Hassan, T.M., and Haafiz, M.K.M. 2016. Microcrystalline cellulose: Isolation, characterization and bio-composites application-A review. *Int. J. Biol. Macromol.*, 93: 789-804.
- Uçkun Kiran, E., Akpınar, O., and Bakir, U. 2013. Improvement of enzymatic xylooligosaccharides production by the co-utilization of xylans from different origins. *Food Bioprod. Process.*, 91(4): 565-574.
- Van Dyk, J.S., and Pletschke, B.I. 2012. A review of lignocellulose bioconversion using enzymatic hydrolysis and synergistic cooperation between enzymes-Factors affecting enzymes, conversion and synergy. *Biotechnol. Adv.*, 30(6): 1458-1480.
- Veenashri, B.R., and Muralikrishna, G. 2011. *In vitro* anti-oxidant activity of xylooligosaccharides derived from cereal and millet brans-A comparative study. *Food Chem.*, 126(3): 1475-1481.
- Wanderley, M.C.d.A., Martín, C., Rocha, G.J.d.M., and Gouveia, E.R. 2013. Increase in ethanol production from sugarcane bagasse based on combined pretreatments and fed-batch enzymatic hydrolysis. *Bioresour. Technol.*, 128: 448-453.
- Wang, T.H., and Lu, S. 2013. Production of xylooligosaccharide from wheat bran by microwave assisted enzymatic hydrolysis. *Food Chem.*, 138: 1531-1535.

- Watanabe, I., Miyata, N., Ando, A., Shiroma, R., Tokuyasu, K., and Nakamura, T. 2012. Ethanol production by repeated-batch simultaneous saccharification and fermentation (SSF) of alkali-treated rice straw using immobilized *Saccharomyces cerevisiae* cells. *Bioresour. Technol.*, 123: 695-698.
- Watanabe, I., Nakamura, T., and Shima, J. 2009. Characterization of a spontaneous flocculation mutant derived from *Candida glabrata*: A useful strain for bioethanol production. *J. Biosci. Bioeng.*, 107(4): 379-382.
- Watanabe, I., Nakamura, T., and Shima, J. 2010. Strategy for simultaneous saccharification and fermentation using a respiratory-deficient mutant of *Candida glabrata* for bioethanol production. *J. Biosci. Bioeng.*, 110(2): 176-179.
- Xu, F. 2010. Chapter 2-Structure, Ultrastructure, and chemical composition. *In: Cereal straw as a resource for sustainable biomaterials and biofuels*, Sun, R.-C., (Ed.), Elsevier, Amsterdam, Netherlands. pp. 9-47.
- Xu, Q., Adney, W.S., Ding, S.Y., and Michael, H.E. 2007. Cellulases for biomass conversion. *In: Industrial enzymes: Structure, function and applications*, Polaina, J., MacCabe, A.P. (Eds.), Springer, Netherlands. pp. 35-50.
- Xue, J.L., Zhao, S., Liang, R.M., Yin, X., Jiang, S.X., Su, L.H., Yang, Q., Duan, C.J., Liu, J.L., and Feng, J.X. 2016. A biotechnological process efficiently co-produces two high value-added products, glucose and xylooligosaccharides, from sugarcane bagasse. *Bioresour. Technol.*, 204: 130-138.
- Yan, Q., Hao, S., Jiang, Z., Zhai, Q., and Chen, W. 2009. Properties of a xylanase from *Streptomyces matensis* being suitable for xylooligosaccharides production. *J. Mol. Catal. B: Enzym.*, 58: 72-77.
- Yang, M., Zhang, J., Kuittinen, S., Vepsäläinen, J., Soininen, P., Keinänen, M., and Pappinen, A. 2015. Enhanced sugar production from pretreated barley straw by additive xylanase and surfactants in enzymatic hydrolysis for acetone-butanol-ethanol fermentation. *Bioresour. Technol.*, 189: 131-137.

- Zabed, H., Sahu, J.N., Boyce, A.N., and Faruq, G. 2016. Fuel ethanol production from lignocellulosic biomass: An overview on feedstocks and technological approaches. *Renew. Sustain. Energy Rev.*, 66: 751-774.
- Zabed, H., Sahu, J.N., Suely, A., Boyce, A.N., and Faruq, G. 2017. Bioethanol production from renewable sources: Current perspectives and technological progress. *Renew. Sustain. Energy Rev.*, 71: 475-501.
- Zerva, A., Savvides, A.L., Katsifas, E.A., Karagouni, A.D., and Hatzinikolaou, D.G. 2014. Evaluation of *Paecilomyces variotii* potential in bioethanol production from lignocellulose through consolidated bioprocessing. *Bioresour. Technol.*, 162: 294-299.
- Zhang, H., Xu, Y., and Yu, S. 2017. Co-production of functional xylooligosaccharides and fermentable sugars from corncob with effective acetic acid prehydrolysis. *Bioresour. Technol.*, 234: 343-349.
- Zhang, M., Shukla, P., Ayyachamy, M., Permaul, K., and Singh, S. 2010a. Improved bioethanol production through simultaneous saccharification and fermentation of lignocellulosic agricultural wastes by *Kluyveromyces marxianus* 6556. *World J. Microbiol. Biotechnol.*, 26(6): 1041-1046.
- Zhang, M., Wang, F., Su, R., Qi, W., and He, Z. 2010b. Ethanol production from high dry matter corncob using fed-batch simultaneous saccharification and fermentation after combined pretreatment. *Bioresour. Technol.*, 101(13): 4959-4964.
- Zhang, P.Y.H., Hong, J., and Ye, X. 2009. Cellulase Assays. *In: Biofuels: methods and protocols*, Mielenz, J.R. (Ed.), Springer. Netherland. pp. 213-231.
- Zhang, W., Lin, Y., Zhang, Q., Wang, X., Wu, D., and Kong, H. 2013. Optimisation of simultaneous saccharification and fermentation of wheat straw for ethanol production. *Fuel*, 112: 331-337.

- Zheng, H.C., Sun, M.Z., Meng, L.C., Pei, H.S., Zhang, X.Q., Yan, Z., Zeng, W.H., Zhang, J.S., Hu, J.R., Lu, F.P., and Sun, J.S. 2014. Purification and characterization of a thermostable xylanase from *Paenibacillus* sp. NF1 and its application in xylooligosaccharides production. *J. Microbiol. Biotechnol.*, 24(4): 489-496.
- Zhou, J., Shi, P., Zhang, R., Huang, H., Meng, K., Yang, P., and Yao, B. 2011. Symbiotic *Streptomyces* sp. TN119 GH 11 xylanase: a new pH-stable, protease- and SDS-resistant xylanase. *J. Ind. Microbiol. Biotechnol.*, 38(4): 523-530.
- Zhou, W., Chen, P., Min, M., Ma, X., Wang, J., Griffith, R., Hussain, F., Peng, P., Xie, Q., Li, Y., Shi, J., Meng, J., and Ruan, R. 2014. Environment-enhancing algal biofuel production using wastewaters. *Renew. Sustain. Energy Rev.*, 36: 256-269.
- Zhu, J., Zhu, Y., Jiang, F., Xu, Y., Ouyang, J., and Yu, S. 2013. An integrated process to produce ethanol, vanillin, and xylooligosaccharides from *Camellia oleifera* shell. *Carbohydr. Res.*, 382: 52-57.