REFERENCES

Aksu, Z. and Eren, A.T. 2005. Carotenoids production by the yeast *Rhodotorula mucilaginosa*: use of agricultural wastes as a carbon source. Process Biochem. 40: 2985-2991.

Aksu, Z. and Eren, A.T. 2007. Production of carotenoids by the isolated yeast of *Rhodotorula glutinis*. Biochem Eng J. 35: 107-113.

Ananda, N. and Vadlani, P.V. 2010. Production and optimization of carotenoid-enriched dried distiller's grains with solubles by *Phaffia rhodozyma* and *Sporobolomyces roseus* fermentation of whole stillage. J Ind Microbiol Biotechnol. 37: 1183-1192.

André, A., Diamantopoulou, P., Philippoussis, A., Sarris, D., Komaitis, M. and Papanikolaou, S. 2010. Biotechnological conversions of bio-diesel derived waste glycerol into added-value compounds by higher fungi: production of biomass, single cell oil and oxalic acid. Ind Crop Prod. 31: 407-416.

Ashby, R.D., Nunez, A., Solaiman, D.K.Y. and Foglia, T.A. 2005. Sophorolipid biosynthesis from a biodiesel co-product stream. J Am Oil Chem Soc. 82: 625-630.

Ashby, R.D., Solaiman, D.K.Y. and Foglia, T.A. 2004. Bacterial poly (hydroxyalkanoate) polymer production fromthe biodiesel co-product stream. J Polym Environ. 12: 105-112.

Athalye, S.K., Garcia, R.A. and Wen, Z.Y. 2009. Use of biodiesel-derived crude glycerol for producing eicosapentaenoic acid (EPA) by the fungus *Pythium irregular*. J Agric Food Chem. 57: 2739-2744.

Barbour, L., Hanna, M. and Xiao, W. 2006. Mutagenesis. *In* Yeast protocols: Second Edition. Xiao, W. (ed). Humana Press Inc., New Jersey. pp. 121-127.

Bautista, L.F., Vicente, G. and Garre, V. 2012. Biodiesel from microbial oil. Woodhead Publishing Limited, USA. pp. 179-203.

Belitz, H.D. and Grosch, W. 1986. Food chemistry. *In* Aroma Substances: Translation from German. Hadziyev, D. (ed.). Springer-Verlag, New York. pp. 257-303.

Bhosale, P. 2004. Environmental and cultural stimulants in the production of carotenoids from microorganisms. Appl Microbiol Biotechnol. 63: 351-361.

Bhosale, P. and Gadre, R.V. 2001. Optimization of carotenoid production from hyper-producing *Rhodotorula glutinis* mutant 32 by factorial approach. Lett Appl Microbiol. 33: 12-16.

Bligh, E.G. and Dyer, W.J. 1959. A rapid method of total lipids extraction and purification. Can J Biochem Physiol. 37: 911-917.

Buzzini, P. 2000. An optimization study of carotenoid production by *Rhodotorula glutinis* DBVPGG 3853 from substrates containing concentrated rectified grape must as the sole carbohydrate source. J Ind Microbiol Biotechnol. 4: 41-45.

Certik, M., Hanusova, V., Breierova, E., Marova, I. and Rapta, P. 2009. Biotechnological production and properties of carotenoid pigments. *In* Biocatalysis and agricultural biotechnology. Hou, C.T. and Shaw, J.F. (ed). Taylor & Francis Group, LLC., Taiwan. pp. 355-375.

Certik, M., Masrnova, S., Sitkey, V., Minarik, M. and Breierova, E. 2005. Biotechnological production of astaxanthin. Chem Listy. 99: 237-240.

Chaiyaso, T., Seesuriyachan, P., Zimmermann, W. and H-Kittikun, A. 2012. Purification and characterization of lipase from newly isolate *Burkholderia multivorans* PSU-AH130 and it application for biodiesel production. Ann Microbiol. 62: 1615-1624.

Chang, Y.H., Chang, K.S., Lee, C.F., Hsu, C.L., Huang, C.W. and Jang, H.D. 2015. Microbial lipid production by oleaginous yeast *Cryptococcus* sp. in the batch cultures using corncob hydrolysate as carbon source. Biomass Bioenergy. 72: 95-103.

Chatzifragkou, A. and Papanikolaou, S. 2012. Effect of impurities in biodiesel-derived waste glycerol on the performance and feasibility of biotechnological processes. Appl Microbiol Biotechnol. 95: 13-27.

Chatzifragkou, A., Makri, A., Belka, A., Bellou, S., Mavrou, M., Mastoridou, M., Mystrioti, P., Onjaro, G., Aggelis, G. and Papanikolaou, S. 2011a. Biotechnological conversions of biodiesel derived waste glycerol by yeast and fungal species. Energy. 36: 1097-1108.

Chatzifragkou, A., Papanikolaou, S., Dietz, D., Doulgeraki, A.I., Nychas, G.J.E. and Zeng, A.P. 2011b. Production of 1, 3-propanediol by *Clostridium butyricu* growing on biodiesel-derived crude glycerol through a non-sterilized fermentation process. Appl Microbiol Biotechnol. 91: 101-112.

Cheirsilp, B., Suwannarat, W. and Niyomdecha, R. 2011. Mixed culture of oleaginous yeast *Rhodotorula glutinis* and microalga *Chlorella vulgaris* for lipid production from industrial wastes and its use as biodiesel feedstock. New Biotechnol. 28: 362-368.

Chen, Y.H. and Walker, T.H. 2011. Biomass and lipid production of heterotrophic microalgae *Chlorella protothecoide* by using biodiesel-derived crude glycerol. Biotechnol Lett. 33: 1973-1983.

Choi, W.J., Hartono, M.R., Chan, W.H. and Yeo, S.S. 2011. Ethanol production from biodiesel-derived crude glycerol by newly isolated *Kluyvera cryocrescen*. Appl Microbiol Biotechnol. 89: 1255-1264.

Cutzu, R., Coi, A., Rosso, F., Bardi, L., Ciani, M., Budroni, M., Zara, G., Zara, S. and Mannazzu, I. 2013. From crude glycerol to carotenoids by using a *Rhodotorula glutinis* mutant. World J Microb Biot. 29: 1009-1017.

da Silva, G.P., Mack, M. and Contiero, J. 2009. Glycerol: A promising and abundant carbon source for industrial microbiology. Biotechnol Adv. 27: 30-39.

Das, A., Yoon, S.H., Lee, S.H., Kim, J.Y., Oh, D.K. and Kim, S.W. 2007. An update on microbial carotenoids production: Application of recent metabolic engineering tools. Appl Microbiol Biotechnol. 77: 505-512.

Davoli, P., Mierau, V. and Weber, R.W.S. 2004. Carotenoids and fatty acids in red yeasts *Sporobolomyces roseus* and *Rhodotorula glutinis*. Appl Biochem Microbiol. 40: 392-397.

Doig, S.D., Baganz, F. and Lye, G.J. 2006. High-throughput screening and process optimisation. *In* Basic biotechnology. Ratledge, C. and Kristiansen, B. (ed). Cambridge University Press, UK. pp. 289-305.

Dominguez-Bocanegra, A.R. and Torres-Munoz, J.A. 2004. Astaxanthin hyper production by *Phaffia rhodozyma* (now *Xanthophyllomyces dendrorhous*) with raw coconut milk as sole source of energy. Appl Microbiol Biotechnol. 66: 249-252.

Doran, P.M. 1995. Bioprocess engineering principles. Elsevier Science and Technology, Australia. p. 439.

Dufosse, L. 2006. Microbial production of food grade pigments. Food Technol Biotech. 44: 313-321.

Easterling, E.R., French, W.T., Hernandez, R. and Licha, M. 2009. The effect of glycerol as a sole and secondary substrate on the growth and fatty acid composition of *Rhodotorula glutinis*. Bioresour Technol. 100: 356-361.

Ethier, S., Woisard, K., Vaughan, D. and Wen, Z.Y. 2011. Continuous culture of the microalgae *Schizochytrium limacinu* on biodiesel-derived crude glycerol for producing docosahexaenoic acid. Bioresour Technol. 102: 88-93.

Fan, X., Burton, R. and Zhou, Y. 2010. Glycerol (byproduct of biodiesel production) as a source for fuels and chemicals-mini review. Open Fuel Energ Sci J. 3: 17-22.

Frengova, G., Simova, E. and Beshkova, D. 2004. Use of whey ultrafiltrate as a substrate for production of carotenoids by the yeast *Rhodotorula rubra*. Appl Biochem Biotech. 112: 133-141.

Frengova, G.I. and Beshkova, D.M. 2009. Carotenoids from *Rhodotorula* and *Phaffia*: yeasts of biotechnological importance. J Ind Microbiol Biotechnol. 36: 163-180.

Fuji Health Science, Inc. 2012. "Nutraceutical about astaxanthin." [Online]. Available http://www.fujihealthscience.com/astaxanthin.html (19 January 2015).

Galafassi, S., Cucchetti, D., Pizza, F., Franzosi, G., Bianchi, D. and Compagno, C. 2012. Lipid production for second generation biodiesel by the oleaginous yeast *Rhodotorula graminis*. Bioresour Technol. 111: 398-403.

Garcia-Ochoa, F. and Gomez, E. 2009. Bioreactor scale-up and oxygen transfer rate in microbial processes: an overview. Biotechnol Adv. 27: 153-176.

Geiger, E.O. 1997. Statistical method for fermentation optimization. *In* Fermentation and biochemical engineering handbook. Vogel, H.C. and Todaro, C.C. (ed). Noyes Publication, New Jersey. pp. 161-180.

Gerpen, J.V. 2005. Biodiesel processing and production. Fuel Process Technol. 86: 1097-1107.

Gonçalves, F.A.G., Colen, G. and Takahashi, J.A. 2014. *Yarrowia lipolytica* and its multiple applications in the biotechnological industry. The Scientific World Journal. 2014: 1-14.

Goodwin, T.W. 1993. Biosynthesis of carotenoids: an overview. *In* Methods in enzymology volume 214 carotenoids part B: metabolism, genetics and biosynthesis. Packer, L. (ed). Academic Press, San Diego. pp. 330-340.

Gruszecki, W.I. 1999. Carotenoids in membranes. *In* The photochemistry of carotenoids. Frank, H.A., Young, A.J., Britton, G. and Cogdell, R.J. (ed). Kluwer Academic Publishers, Netherlands. pp. 365-377.

Haaland, P.D. 1989. Experimental design in biotechnology. Marcel Dekker Inc., New York. p. 284.

Hall, T.A. 1999. BioEdit: a user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. Nucl Acids Symp Ser. 41: 95-98.

Hájek, M. and Skopal, F. 2009. Purification of the glycerol phase after transesterification of vegetable oils. Paper presented at 44th International petroleum conference; September 21-22, 2009, Slovak Republic.

Harada, Y., Sakata, K., Sato, S. and Takayama, S. 1997. Fermentation Pilot Plant. *In* Fermentation and biochemical engineering handbook. Second Edition. Vogel, H.C. and Todaro, C.L. (ed). Noyes Publications, USA. pp. 1-38.

Hayyan, A., Alam, M.Z., Mirghani, M.E.S., Kabbashi, N.A., Hakimi, N.I.N.M., Siran, Y.M. and Tahiruddin, S. 2010. Production of biodiesel from sludge palm oil by esterification process. J Energy and Power Engineering. 4(1): 11-17.

Hu, Z.C., Zheng, Y.G., Wang, Z. and Shen, Y.C. 2006. pH control strategy in astaxanthin fermentation bioprocess by *Xanthophyllomyces dendrorhous*. Enzyme Microb Tech. 39(4): 586-590.

Ibeto, C.N., Okoye, C.O.B. and Anyanwu, C.N. 2009. Fossil fuels and heavy metal pollution of the Nigerian environment. J Sci Ind Policy. 2: 9-20.

Ignacimuthu, S.J. 2012. Biotechnology: an introduction. Second Edition. Alpha science international, Oxford, UK. p. 458.

Isahak, W.N.R.W., Ismail, M., Yarmo, M.A., Jahim, J.M. and Salimon, J. 2010. Purification of crude glycerol from transesterification RBD palm oil over homogeneous and heterogeneous catalysts for the biolubricant preparation. J Appl Sci. 10(21): 2590-2595.

Ito, T., Nakashimada, Y., Senba, K., Matsui, T. and Nishio, N. 2005. Hydrogen and ethanol production from glycerol-containing wastes discharged after biodiesel manufacturing process. J Biosci Bioeng. 100: 260-265.

Iturriaga, E.A., Papp, T., Breum, J., Arnau, J. and Eslava, A.P. 2005. Strain and culture conditions improvement for β-carotene production with *Mucor*. *In* Methods in biotechnology: microbial processes and products. Barredo, J.L. (ed). Humana Press, New Jersey. pp. 239-256.

Kim, J.H., Choi, S.K., Park, Y.S., Yun, C.W., Cho, W.D. and Chee, K.M. 2006. Effect of culture conditions on astaxanthin formation in red yeast *Xanthophyllomyces dendrorhous* mutant JH1. J Microbiol Biotechnol. 16: 438-442.

Kim, S.J., Kim, G.J., Park, D.H. and Ryu, Y.W. 2003. High-level production of astaxanthin by fed-batch culture of mutant strain *Phaffia rhodozyma* AJ-6-1. J Microbiol Biotechnol. 13: 175-181.

King, R.D. 1978. Developments in food analysis techniques-1. Applied science publishers Ltd., London, UK. p. 323.

Kitcha, S. and Cheirsilp, B. 2011. Screening of oleaginous yeasts and optimization for lipid production using crude glycerol as a carbon source. Energy Procedia. 9: 274-282.

Khunna, P. 2010. Mutation. *In* Cellular and biochemical sciences. Tripathi, G. (ed). I.K. International Publishing House Pvt. Ltd., New Delhi. pp. 437-456.

Knothe, G. 2005. Introduction. *In* The biodiesel handbook. Knothe, G., Gerpen, J.V. and Krahl, J. (ed). AOCS Press, USA. p. 303

Kusdiyantini, E., Gaudin, P., Goma, G. and Blanc, P.J. 1998. Growth kinetics and astaxanthin production of *Phaffia rhodozyma* on glycerol as a carbon source during batch fermentation. Biotechnol Lett. 20(10): 929-934.

Kuzuyama, T. 2002. Mevalonate and nonmevalonate pathways for the biosynthesis of isoprene units. Biosci Biotechnol Biochem. 66(8): 1619-1627.

Li, C., Zhenming, C., Jing, L. and Xianghong, W. 2007. Enhanced carotenoid production by a mutant of the marine yeast *Rhodotorula* sp. hidai. J Ocean U China. 6(1): 66-71.

Liaaen-Jensen, S. 2004. Basic carotenoid chemistry. *In* Carotenoids in health and disease. Krinsky, N.T., Mayne, S.T. and Sies, H. (ed). Marcel Dekker Inc., New York. pp. 1-30.

Liang, Y.N., Sarkany, N., Cui, Y. and Blackburn, J.W. 2010a. Batch stage study of lipid production from crude glycerol derived from yellow grease or animal fats through microalgal fermentation. Bioresour Technol. 101: 6745-6750.

Liang, Y.N., Cui, Y., Trushenski, J. and Blackburn, J.W. 2010b. Converting crude glycerol derived from yellow grease to lipids through yeast fermentation. Bioresour Technol. 101: 7581-7586.

Libkind, D. and van Broock, M. 2006. Biomass and carotenoid pigment production by patagonian native yeasts. World J Microb Biot. 22: 687-692.

Maldonade, I.R., Rodriguez-Amaya, D.B. and Scamparini, A.R.P. 2008. Carotenoids of yeasts isolated from the Brazilian ecosystem. Food Chem. 107(1): 145-150.

Malisorn, C. and Suntornsuk, W. 2008. Optimization of β-carotene production by *Rhodotorula glutinis* DM28 in fermented radish brine. Bioresour Technol. 99: 2281-2287.

Manowattana, A., Seesuriyachan, P., Techapun, C. and Chaiyaso, T. 2012. Optimization of carotenoids production by red yeast *Sporobolomyces pararoseus* TISTR5213 using waste glycerol as a sole carbon source. KKU Res J. 17(4): 607-621.

Manowattana, A., Techapun, C., Seesuriyachan, P., Hanmoungjai, P. and Chaiyaso, T. 2015. β-carotene production by *Sporobolomyces pararoseus* TISTR5213 using crude glycerol as the sole carbon source. Chiang Mai J Sci. 42(1): 17-33.

Mantzouridou, F., Naziri, E. and Tsimidou, M.Z. 2008. Industrial glycerol as a supplementary carbon source in the production of β-carotene by *Blakeslea trispora*. J Agric Food Chem. 56: 2668-2675.

Marova, I., Certik, M. and Breierova, E. 2011. Production of enriched biomass by carotenogenic yeasts-application of whole-cell yeast biomass to production of pigments and other lipid compounds. *In* Biomass-detection, production and usage. Matovic, D. (ed). InTech, Croatia. pp. 345-384.

Mata-Gómez, L.C., Montañez, J.C., Méndez-Zavala, A. and Aguilar, C.N. 2014. Biotechnological production of carotenoids by yeasts: an overview. Microbial Cell Factories. 13: 1-12.

McCurry, J.D. 2011. GC-MS analysis of trace fatty acid methyl esters (FAME) in Jet fule using energy institute method P585. Agilent Technology, Inc., USA. pp.1-8.

Meng, X., Yang, J., Xu, X., Zhang, L., Nie, Q. and Xian, M. 2009. Biodiesel production from oleaginous microorganisms. Renew Energ. 34: 1-5.

Nicol, R.W., Marchand, K. and Lubitz, W.D. 2012. Bioconversion of crude glycerol by fungi. Appl Microbiol Biotechnol. 93: 1865-1875.

Nigam, P.S. and Singh, A. 2011. Production of liquid biofuels from renewable resources. Prog Energy Combust Sci. 37: 52-68.

Nitschke, M., Costa, S.G.V.A. and Contiero, J. 2005. Rhamnolipid surfactants: an update on the general aspects of these remarkable biomolecules. Biotechnol Prog. 21: 1593-1600.

O'Grady, J. and Morgan, J.A. 2011. Heterotrophic growth and lipid production of *Chlorella protothecoide* on glycerol. Bioprocess Biosyst Eng. 34: 121-125.

Oh, B.R., Seo, J.W., Choi, M.H. and Kim, C.H. 2008. Optimization of culture conditions for 1, 3-propanediol production from crude glycerol by *Klebsiella pneumonia* using response surface methodology. Biotechnol Bioprocess Eng. 13: 666-670.

Official Methods of Analysis of AOAC International, 17th ed. 2002. Association of Official Analytical Chemists, Aoac Ed.; Maryland, USA.

Pachauri, N. and He, B. 2006. Value-added utilization of crude glycerol from biodiesel production: A survey of current research activities. *In* The 2006 ASABE Annual International Meeting. Oregon Convention Center Portland, Oregon.

Pantazaki, A.A., Dimopoulou, M.I., Simou, O.M. and Pritsa, A.A. 2010. Sunflower seed oil and oleic acid utilization for the production of rhamnolipids by *Thermus thermophilus* HB8. Appl Microbiol Biotechnol. 88: 939-951.

Papanikolaou, S. and Aggelis, G. 2011. Lipids of oleaginous yeasts. Part I: Biochemistry of single cell oil production. Eur J Lipid Sci Technol. 113: 1031-1051.

Papanikolaou, S., Muniglia, L., Chevalot, I., Aggelis, G. and Marc, I. 2002. *Yarrowia lipolytia* as a potential producer of citric acid from raw glycerol. J Appl Microbiol. 92: 737-744.

Plackett, R.L. and Burman, J.P. 1946. The design of optimum multifactorial experiments. Biometrika. 33: 305-325.

Rakicka, M., Lazar, Z., Dulermo, T., Fickers, P. and Nicaud, J.M. 2015. Lipid production by the oleaginous yeast *Yarrowia lipolytica* using industrial by-products under different culture conditions. Biotechnol Biofuels. 8: 104.

Ratledge, C. 2004. Fatty acid biosynthesis in microorganisms being used for single cell oil production. Biochimie. 86: 807-815.

Rattray, J.B.M., Schibeci, A. and Kidby, D.K. 1975. Lipids of yeasts. Bacteriol Rev. 39(3): 197-231.

Razavi, S.H., Mousavi, S.M., Yeganeh, H.M. and Marc, I. 2007. Fatty acid and carotenoid production by *Sporobolomyces ruberrimus* when using technical glycerol and ammonium sulfate. J Microbiol Biotechnol. 17(10): 1591-1597.

Roadjanakamolson, M. and Suntornsuk, W. 2010. Production of β-carotene enriched rice bran using solid-state fermentation of *Rhodotorula glutinis*. J Microbiol Biotech. 20(3): 525-531.

Rock, C.L. 1997. Carotenoids: Biology and treatment. Pharmacol Ther. 75(3): 185-197.

Rossi, M., Amaretti, A., Raimondi, S. and Leonardi, A. 2011. Chapter 4: Getting lipids for biodiesel production from oleaginous fungi. *In* Biodiesel–feedstocks and processing technologies. Stoytcheva, M. and Montero, G. (ed). InTech, Croatia. pp. 71-92.

Rymowicz, W., Rywińska, A. and Marcinkiewicz, M. 2009. High-yield production of erythritol from raw glycerol in fed-batch cultures of *Yarrowia lipolytica*. Biotechnol Lett. 31: 377-380.

Sabourin-Provost, G. and Hallenbeck, P.C. 2009. High yield conversion of a crude glycerol fraction from biodiesel production to hydrogen by photofermentation. Bioresour Technol. 100: 3513-3517.

Saenge, C., Cheirsilp, B., Suksaroge, T.T. and Bourtoom, T. 2011. Potential use of oleaginous red yeast *Rhodotorula glutinis* for the bioconversion of crude glycerol from biodiesel plant to lipids and carotenoids. Process Biochem. 46: 210-218.

Sanchez, S., Ruiz, B., Rodríguez-Sanoja, R. and Flores-Cotera, L.B. 2013. Microbial production of carotenoids. *In* Microbial production of food ingredients, enzymes and nutraceuticals. McNeil, B., Archer, D., Giavasis, I. and Harvey, L. (ed). Woodhead Publishing Limited, New Delhi. pp. 194-233.

Sankh, S., Thiru, M., Saran, S. and Rangaswamy, V. 2013. Biodiesel production from a newly isolated *Pichia kudriavzevii* strain. Fuel. 106: 690-696.

Sarin, A. 2012. Biodiesel production and properties. The Royal Society of Chemistry, UK. p. 256.

Schneider, T., Graeff-Hönninger, S., French, W.T., Hernandez, R., Merkt, N., Claupein, W., Hetrick, M. and Pham, P. 2013. Lipid and carotenoid production by oleaginous red yeast *Rhodotorula glutinis* cultivated on brewery effluents. Energy. 61: 34-43.

Sha, Q. 2013. A comparative study on four oleaginous yeasts on their lipid accumulating capacity. Department of Microbiology, Swedish University of Agricultural Sciences. p. 32.

Smith, J.E. 2009. Biotechnology. Fifth Edition. Cambridge University Press, New York. p. 266.

Smith, C.A. and Wood, E.J. 1991. Molecular biology and biotechnology. Chapman and Hall Limited, Hong Kong. p. 256.

Sul, H.S. and Smith, S. 2008. Fatty acid synthesis in eukaryotes. *In* Biochemistry of lipids, lipoproteins and membranes. Fifth Edition. Vance, D.E. and Vance, J.E. (ed). Elsevier, Netherlands. pp. 155-190.

Taconi, K.A., Venkataramanan, K.P. and Johnson, D.T. 2009. Growth and solvent production by *Clostridium pasteurianu* ATCC® 6013™ utilizing biodiesel-derived crude glycerol as the sole carbon source. Environ Prog Sustainable Energy. 28: 100-110.

Tamarin, R.H. 1996. Principles of genetics. Fifth Edition. Brown Publishers, USA. p. 246.

Thompson, J.C. and He, B. 2006. Characterization of crude glycerol from biodiesel production from multiple feedstocks. Appl Eng Agric. 22(2): 261-265.

Tyson, K.S., Bozell, J., Wallace, R., Petersen, E. and Moens, L. 2004. Biomass oil analysis: Research needs and recommendations. Midwest Research Institute. p. 92.

Valduga, E., Ribeiro, A. H. R., Cence, K., Colet, R., Tiggemann, L., Zeni, J. and Toniazzo, G. 2014. Carotenoids production from a newly isolated *Sporidiobolus pararoseus* strain using agroindustrial substrates. Biocatal Agric Biotechnol. 3: 207-213.

Vanot, G.E. and Sergent, M. 2005. Experimental design in microbiology. *In* Microbial processes and products. Barredo, J.L. (ed). Humana press, NewJersey. pp. 25-39.

Volpato, G., Rodrigues, R.C., Heck, J.X. and Ayub, M.A.Z. 2008. Production of organic solvent tolerant lipase by *Staphylococcus caseolyticu* EX17 using raw glycerol as substrate. J Chem Technol Biotechnol. 83: 821-828.

Waites, M.J., Morgan, N.L., Rockey, J.S. and Higton, G. 2001. Chapter 13: food additives and supplyments. *In* Industrial microbiology: an induction. Blackwell Science Ltd., USA. pp. 210-217.

Wang, S.L., Sun, J.S., Han, B.Z. and Wu, X.Z. 2007. Optimization of β-carotene production by *Rhodotorula glutinis* using high hydrostatic pressure and response surface methodology. J Food Sci. 72(8): 325-329.

Willium, J.A. 2002. Keys to bioreactor selections. CEP Magazine, New York. pp. 34-41.

Xie, H., Zhou, Y., Hu, J., Chen, Y. and Liang, J. 2014. Production of astaxanthin by a mutant strain of *Phaffia rhodozyma* and optimization of culture conditions using response surface methodology. Ann Microbiol. 64(4): 1473-1481.

Xu, J., Du, W., Zhao, X., Zhang, G. and Liu, D. 2012a. Microbial oil production from various carbon sources and its use for biodiesel preparation. Biofuels Bioprod Bioref. 7(1): 65-77.

Xu, J., Zhao, X., Wang, W., Du, W. and Liu, D. 2012b. Microbial conversion of biodiesel byproduct glycerol to triacylglycerols by oleaginous yeast *Rhodosporidium toruloides* and the individual effect of some impurities on lipid production. Biochem Eng J. 65: 30-36.

Yang, F., Hanna, M.A. and Sun, R. 2012. Value-added uses for crude glycerol-a byproduct of biodiesel production. Biotechnol Biofuels. 5: 13.

Yang, X., Jin, G., Gong, Z., Shen, H., Bai, F. and Zhao, Z.K. 2014. Recycling biodiesel-derived glycerol by the oleaginous yeast *Rhodosporidium toruloides* Y4 through the two-stage lipid production process. Biochem Eng J. 91: 86-91.

Yasbin, R.E. 2002. DNA repair mechanisms and mutagenesis. *In* Modern microbial genetics. Second Edition. Streips, U.N. and Yasbin, R.E. (ed). Wiley-Liss, Inc., New York. pp. 27-46.

Yen, H.W. and Chang, J.T. 2015. Growth of oleaginous *Rhodotorula glutinis* in an internal-loop airlift bioreactor by using lignocellulosic biomass hydrolysate as the carbon source. J Biosci Bioeng. 119: 580-584.

Yen, H.W. and Liu, Y.X. 2014. Application of airlift bioreactor for the cultivation of aerobic oleaginous yeast *Rhodotorula glutinis* with different aeration rates. J Biosci Bioeng. 118(2): 195-198.

Yen, H.W. and Zhang, Z. 2011. Effects of dissolved oxygen level on cell growth and total lipid accumulation in the cultivation of *Rhodotorula glutinis*. J Biosci Bioeng. 112(1): 71-74.

Yimyoo, T., Yongmanitchai, W. and Limtong, S. 2011. Carotenoid production by *Rhodosporidium paludigenum* DMKU3-LPK4 using glycerol as the carbon source. Kasetsart J. (Nat Sci). 45: 90-100.

Zhang, J., Fang, X., Zhu, X.L., Li, Y., Xu, H.P., Zhao, B.F., Chen, L. and Zhang, X.D. 2011. Microbial lipid production by oleaginous yeast *Cryptococcus curvatus* O_3 grown in fed-batch culture. Biomass Bioenergy. 35: 1906-1911.

Zhang, Z., Schwartz, S., Wagner, L. and Miller, W. 2000. A greedy algorithm for aligning DNA sequences. J Comput Biol. 7: 203-214.

Zhang, Z., Zhang, X. and Tan, T. 2014. Lipid and carotenoid production by *Rhodotorula glutinis* under irradiation/high-temperature and dark/low-temperature cultivation. Bioresour Technol. 157: 149-153.

Zhu, L.Y., Zong, M.H. and H.Wu. 2008. Efficient lipid production with *Trichosporon fermentans* and its use for biodiesel preparation. Bioresour Technol. 99: 7881-7885.