MICROBIAL LIPID ACCUMULATION THROUGH BIOREMEDIATION OF PALM OIL MILL EFFLUENT BY CO-CULTURING YEAST AND BACTERIA

MD AHASANUL KARIM

DOCTOR OF PHILOSOPHY

UNIVERSITI MALAYSIA PAHANG

SUPERVISOR'S DECLARATION

We hereby declare that we have checked this thesis, and, in our opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Doctor of Philosophy.

_____

(Supervisor's Signature)

Full Name : DR. CHE KU MOHAMMAD FAIZAL

Position : ASSOCIATE PROFESSOR

Date : DECEMBER 16, 2020

(Co-supervisor's Signature)

Full Name : DR. MD. MAKSUDUR RAHMAN KHAN

Position : PROFESSOR

Date : DECEMBER 16, 2020

(Co-supervisor's Signature)

Full Name : DR. ABU YOUSUF

Position : PROFESSOR

Date : DECEMBER 16, 2020

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

(Student's Signature)

Full Name : MD AHASANUL KARIM

ID Number : PKE16005

Date : DECEMBER 16, 2020

MICROBIAL LIPID ACCUMULATION THROUGH BIOREMEDIATION OF PALM OIL MILL EFFLUENT BY CO-CULTURING YEAST AND BACTERIA

MD AHASANUL KARIM

Thesis submitted in fulfillment of the requirements
for the award of the degree of
Doctor of Philosophy

Faculty of Chemical and Process Engineering Technology
UNIVERSITI MALAYSIA PAHANG

DECEMBER 2020

ACKNOWLEDGEMENTS

The research presented in this thesis has been carried out at the Faculty of Engineering Technology, Universiti Malaysia Pahang, Malaysia. The journey of my research would not be possible without help and support of several persons.

At first, I wish to my humble gratefulness and sincere thanks to honorable supervisor, Associate Professor Dr. Che Ku Mohammad Faizal for his valuable support and guidance throughout the study. Indeed, it was utmost opportunity for me to get him as my main supervisor. He has always been able to keep on amazing me with his introspective thinking, ideas and insights. I would also like to give special thanks to my other supervisors, Professor Dr. Md. Maksudur Rahman Khan and Professor Dr. Abu Yousuf for their ideas, valuable inputs, inspiration and support.

I am highly grateful to the Universiti Malaysia Pahang (UMP), Malaysia, for funding this work under the grant number of FRGS RDU 160150 and PRGS 180317. Apart from that, I would like to acknowledge the authority LKPP Corporation Sdn. Bhd., Gambang, Pahang, Malaysia for their continuous support by giving me palm oil mill effluent and anaerobic sludge samples.

I would like to express my sincere gratitude to Dr. M. Amirul Islam for his unconditional support for his kind helps and suggestions to conduct my experiments and to write-up my thesis as well as research paper. Special thanks also go to Dr. Puranjan Mishra for helping me to do the optimization by Response Surface Methodology. I also greatly appreciate to Miss. Fatin Zafirah Mansur and Miss. Nur Ain Zakiah Mohd Yusof for correcting and polishing my thesis abstract (Malay version). Special thanks must be given to Mr. Zaied bin Khalid for giving me support for thesis formatting and in dealing with official matters.

Lastly, I also want to thank to my parents and family for their continuous supports, encouragements and inspirations. It would be tough to finish my study without their supports and devotions.

ABSTRAK

Pelepasan efluen kilang kelapa sawit (POME) ke tanah pertanian menyebabkan pencemaran alam sekitar kesan daripada ketinggian kepekatan komponen fenolik, keperluan oksigen kimia (COD) dan keperluan oksigen biokimia (BOD). Malah, penyusutan progresif bahan api fosil dan sumber mineral turut dikenal pasti sebagai cabaran pada masa hadapan. Kaedah penghasilan lipid mikrobial secara serentak melalui rawatan air sisa berpotensi menjadi penyelesaian terhadap kedua-dua isu tersebut. Kajian ini bertujuan untuk menghasilkan lipid microbial menggunakan bakteria dan yis oleaginous yang kuat iaitu *Bacillus cereus* (*B. cereus*) dan *Lipomyces starkeyi* (*L. starkeyi*) melalui bioremediasi POME dengan penapaian secara berkelompok. Kepekatan substrat POME yang berbeza (25%, 50%, 75%, dan 100%) digunakan sebagai nutrien untuk mengkaji tahap optimum kepekatan POME bagi pengeluaran hasil biojisim dan lipid paling maksimum. Hasil pemerhatian menunjukkan larutan POME yang mempunyai kepekatan sederhana (POME 50%) mempunyai kadar pertumbuhan mikrobial dan pengumpulan lipid yang lebih tinggi serta tahap bioremediasi yang signifikan. Tahap bioremediasi dinilai menggunakan beberapa parameter sisa air (BOD, COD, jumlah fenol, jumlah karbon organik dan lain-lain) dan indeks percambahan benih (GI) kacang hijau (*Vigna radiata*). POME yang dirawat menggunakan gabungan inokulum kultur (*B. cereus* dan *L. starkeyi*) menunjukkan penurunan ketara kadar pencemaran, khususnya COD bagi POME 50%, iaitu kecekapan penyingkiran sebanyak 83.66%. POME tersebut turut mencapai nilai GI yang lebih tinggi berbanding sampel yang lain (dirawat menggunakan kultur tulen dan tanpa rawatan) kesan daripada remediasi yang ketara terhadap kehadiran organik berbahaya di dalam POME seperti yang dibuktikan oleh analisis Gas Kromatografi-Spektometri Jisim (GC-MS). Gabungan inokulum kultur telah menyumbang kepada pertumbuhan biojisim tertinggi (9.16 g/L) dan penghasilan lipid (2.21 g/L), dengan kandungan lemak 24.12% (berasaskan berat kering) dalam 50% (v/v) POME. Komposisi lipid dianalisa berdasarkan metil ester asid lemak menggunakan GC-MS. Kajian mendapati bahawa C16 dan C18 adalah asid lemak utama dalam lipid inokulum kultur yang membolehkan lipid mikrobial dapat digunakan sebagai bahan biodiesel. Satu kaedah baru pengekstrakan lipid, iaitu elektroporasi (EP) telah digunakan untuk mengekstrak lipid mikrobial dan kecekapan EP turut dibandingkan dengan beberapa kaedah konvensional yang lain. EP menunjukkan tahap kecekapan pengekstrakan lipid yang lebih tinggi sebanyak 31.88% (wt.%) berbanding dengan kaedah ultrabunyi (11.89%), reagen Fenton (16.80%), dan pengekstrakan pelarut (9.60%). Pengaruh parameter kajian seperti komposisi inokulum, pH, suhu, dan masa bagi penilaian kecekapan proses penyingkiran COD dan penghasilan lipid dioptimumkan menggunakan kaedah rangsangan permukaan. Pengoptimuman gabungan inokulum kultur menunjukkan bahawa komposisi inokulum, pH, suhu, dan masa mempunyai kesan yang signifikan terhadap prestasi penyingkiran COD dan pengumpulan lipid. Kecekapan maksimum penyingkiran COD sebanyak 86.54% dan pengumpulan lemak 2.95 g/L tercapai dengan komposisi inokulum, pH, suhu, dan masa inkubasi masing-masing adalah 50:50, 6.50, 32.5 °C dan 90 h. Oleh itu, hasil kajian ini menunjukkan bahawa gabungan kultur *B. cereus* dan *L. starkeyi* adalah inokulum yang berpotensi untuk mencapai pertumbuhan biojisim dan penghasilan lipid yang lebih tinggi dengan bioremediasi POME. Pendekatan kaedah gabungan bagi mencapai dwi-objektif kajian (bioremediasi POME dan penghasilan lipid mikrobial) memberikan sebuah strategi baru kepada pengilang minyak kelapa sawit.

ABSTRACT

The discharge of palm oil mill effluent (POME) on arable land causes large amounts of environmental distress due to its high concentration of phenolic compounds, chemical oxygen demand (COD), and biochemical oxygen demand (BOD). On the other hand, the progressive depletion of fossil fuels and mineral resources have also been identified as a future challenge. The approach of simultaneous microbial lipid production through the wastewater treatment could be a potential option to address both renewable energy production and environmental resilience. This study aims to produce microbial lipids using robust oleaginous bacteria and yeast of *Bacillus cereus* (*B. cereus*) and *Lipomyces starkeyi* (*L. starkeyi*) through the bioremediation of POME in batch mode fermentation. Different concentrations of POME substrates (25%, 50%, 75%, and 100%) were used as nutrients to determine the optimum POME concentration for achieving maximum yield of biomass as well as lipid production. It was observed that among the different dilutions, the moderately diluted solution of POME (50% POME) showed higher microbial growth and lipid accumulation and offered a significantly higher degree of bioremediation. The degree of bioremediation was assessed by evaluating several wastewater parameters (*i.e.*, BOD, COD, total phenol, total organic carbon, *etc.*) and determining the seed germination index (GI) of Mung bean (*Vigna radiata*). POME treated with a co-culture inoculum (*B. cereus* and *L. starkeyi*) substantially reduced the pollution load, particularly, in COD for 50% POME, thus demonstrating a removal efficiency of 83.66%. Furthermore, POME treated with co-culture inoculum obtained a higher GI value than the other samples (treated by pure cultures and untreated) due to the significant remediation of detrimental organics present in the POME as evidenced by Gas Chromatography-Mass Spectrometry (GC-MS) analysis. Nevertheless, the co-culture inoculum was found to have potential for the highest biomass growth (9.16 g/L) and lipid accumulation (2.21 g/L), with a lipid content of 24.12% (dry weight basis) in the 50% (v/v) POME. Lipid composition was analyzed in terms of fatty acid methyl esters using GC-MS. C16 and C18 were found to be the predominant fatty acids in the lipid of co-culture inoculum suggesting the potential of microbial lipid to be used as a biodiesel feedstock. A novel lipid extraction method, namely electroporation (EP) was used to extract microbial lipid and the efficiency of EP was compared with some other conventional methods. The EP demonstrated a higher lipid extraction efficiency of 31.88% (wt.%) compared to the ultrasound (11.89%), Fenton's reagent (16.80%), and solvent extraction (9.60%). Finally, the influence of several process parameters such as inoculum compositions, pH, temperature, and time on the performance of the COD removal efficiency and lipid accumulation were optimized using response surface methodology. Optimization of co-culture inoculum showed that the inoculum composition, pH, temperature, and time had a significant effect on the performance of the COD removal and lipid accumulation. The maximum COD removal efficiency of 86.54% and lipid accumulation of 2.95 g/L could be obtained while the inoculum composition, pH, temperature, and incubation time were 50:50, 6.50, 32.5 ℃, and 90 h, respectively. Therefore, the results of this study suggest that the co-culture of *B. cereus* and *L. starkeyi* could be a promising inoculum for attaining higher biomass growth and lipid production in conjunction with the bioremediation of POME. This combined approach of achieving dual objectives (bioremediation of POME and microbial lipid production) that is utilized in the present study provides a novel strategy for palm oil millers.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

V	Voltage
Hz	Hertz
SD	Standard Deviation
°C	Degree Celsius
Min	Minute
cm	Centimeter
D	Diameter
d	Days
g	Gram
s	Second
h	Hour
kg	Kilogram
L	Length
M	Micro Mole
m^3	Cubic Meter
V	Volume
µ	Micro ($10^{-6)}$
C	Carbon
N	Normality
kV	Kilovolts (10^3)
µs	Microsecond ($10^{-6)}$
ms	Millisecond (10^{-3})
J	Joule
L	Liter
mL	Milliliter
π	Pi
σ	Sigma
atm	Standard atmosphere
Ω	Ohm
kJ	Kilojoule
W	Watt

kW	Kilowatt (10^3)
f	Frequency
T	Period
Σ	Summation
b_i	Linear coefficient
b_o	Constant coefficient
b_{ii}	Quadric coefficient
b_{ij}	Interaction of coefficient, x_i, x_j coded values
x_1	Concentration of inoculum A
x_2	Substrate pH
x_3	Temperature
x_4	Operational time
y_1	COD removal efficiency
y_2	Lipid accumulation

LIST OF ABBREVIATIONS

GHGs	Greenhouse Gases
AD	Anaerobic Digestion
VS	Volatile Solid
AS	Activated Sludge
BOD	Biochemical Oxygen Demand
TAGs	Triacylglycerols
COD	Chemical Oxygen Demand
PUFA	Polyunsaturated Fatty Acids
C/N	Carbon to Nitrogen Ratio
HRT	Hydraulic Retention Time
H_2O_2	Hydrogen Peroxide
OLR	Organic Loading Rate
SCOs	Single-cell Oils
POME	Palm Oil Mill Effluent
TI	Treatment Intensity
DAGs	Diacylglycerols
SS	Suspended Solids
TN	Total Nitrogen
TOC	Total Organic Carbon
TPC	Total Phenolic Content
TSS	Total Suspended Solids
VFA	Volatile Fatty Acids
VSS	Volatile Suspended Solids
NN	Nitrate Nitrogen
AN	Ammoniacal Nitrogen
TS	Total Solids
TDS	Total Dissolved Solids
CH_4	Methane
CO_2	Carbon Dioxide
CO	Carbon Monoxide
DC	Direct Current

OD	Optical Density
EP	Electroporation
IRE	Irreversible Electroporation
RE	Reversible Electroporation
GC-MS	Gas Chromatography and Mass Spectrophotometry
FESEM	Field Emission Electron Microscopy
FAME	Fatty Acid Methyl Esters
CCD	Central Composite Design
SMR	Steam Methane Reforming
WGSR	Water Gas Shift Reaction
FFAs	Free Fatty Acids
FAME	Fatty Acid Methyl Ester
FAAE	Fatty Acid Alkyl Ester
DNA	Deoxyribonucleic Acid
PEF	Pulsed Electric Field
SCOD	Soluble Chemical Oxygen Demand
TCOD	Total Chemical Oxygen Demand
ECP	Exocellular Polymers
PHA	Polyhydroxyalkanoates
PHB	Polyhydroxybutyrate
FD	Factorial Design
ANOVA	Analysis of Variance
OFAT	One Factor at A Time
BBD	Box-Behnken Design
PBD	Placket-Burman Design
DoE	Design of experiment
RSM	Response Surface Methodology
CFU	Colony Forming Units
DO	Dissolved Oxygen
GI	Germination Index
PMW	Pulse-Width Modulation
IDE	Arduino Software
DI	Deionization

LB	Luria Bertani
mV	Millivolt
rpm	Revolutions per Minute
mM	Milli Mole
mg/L	Milligram per liter
g/L	Gram per liter
APHA	American Public Health Association

REFERENCES

Abdelhamid, S. A., Hussein, A. A., Asker, M. S., El Sayed, O. H., & Mohamed, S. S. (2019). Optimization of culture conditions for biodiesel production from Egyptian isolate *Penicillium commune* NRC2016. *Bulletin of the National Research Centre, 43*(1), 15.

Agarry, S. (2017). Bioelectricity generation and treatment of petroleum refinery effluent by *Bacillus cereus* and *Clostridium butyricum* using microbial fuel cell technology. *Nigerian Journal of Technology, 36*(2), 543-551.

Ageitos, J. M., Vallejo, J. A., Veiga-Crespo, P., & Villa, T. G. (2011). Oily yeasts as oleaginous cell factories. *Applied microbiology and biotechnology, 90*(4), 1219-1227.

Ahmad, A., Bhat, A., Buang, A., Shah, S., & Afzal, M. (2018). Biotechnological application of microalgae for integrated palm oil mill effluent (POME) remediation: a review. *International Journal of Environmental Science and Technology*, 1-26.

Ahmad, A., Buang, A., & Bhat, A. H. (2016). Renewable and sustainable bioenergy production from microalgal co-cultivation with palm oil mill effluent (POME): A review. *Renewable and Sustainable Energy Reviews, 65*, 214-234. doi:10.1016/j.rser.2016.06.084

Ahmad, A., & Chan, C. (2009). Sustainability of palm oil industries: an innovative treatment via membrane technology. *Journal of Applied Sciences, 9*(17), 3074-3079.

Ahmad, A., Shah, S., Othman, M., & Abdullah, M. (2014a). Enhanced palm oil mill effluent treatment and biomethane production by aerobic and anaerobic co-cultivation of *Chlorella sp*. *Canadian Journal of Chemical Engineering, 92*, 1636-1642.

Ahmad, A., Shah, S., Othman, M., & Abdullah, M. (2015). Aerobic and anaerobic co-cultivation of *Nannochloropsis oculata* with oil palm empty fruit bunch for enhanced biomethane production and palm oil mill effluent treatment. *Desalination and Water Treatment, 56*(8), 2055-2065.

Ahmad, A., Shah, S. M. U., Buang, A., Othman, M. F., & Abdullah, M. A. (2014b). *Evaluation of aerobic and anaerobic co-digestion of Tetraselmis suecica and oil palm empty fruit bunches by response surface methodology.* Paper presented at the Advanced Materials Research.

Ahmad, F. B., Zhang, Z., Doherty, W. O., & O'Hara, I. M. (2019). The prospect of microbial oil production and applications from oil palm biomass. *Biochemical Engineering Journal, 143,* 9-23.

Akhbari, A., Kutty, P. K., Chuen, O. C., Ibrahim, S., Akhbari, A., Kutty, P. K., . . . Ibrahim, S. (2019). A study of palm oil mill processing and environmental assessment of palm oil mill effluent treatment. *Environmental Engineering Research, 25*(2), 212-221.

Alhaji, M. H., Sanaullah, K., Lim, S.-F., Khan, A., Hipolito, C. N., Abdullah, M. O., . . . Jamil, T. (2016). Photocatalytic treatment technology for palm oil mill effluent (POME) – A review. *Process Safety and Environmental Protection, 102*, 673-686. doi:http://dx.doi.org/10.1016/j.psep.2016.05.020

Alhattab, M., Kermanshahi-Pour, A., & Brooks, M. S.-L. (2019). Microalgae disruption techniques for product recovery: influence of cell wall composition. *Journal of Applied Phycology, 31*(1), 61-88.

Ali, T. H., El-Gamal, M. S., El-Ghonemy, D. H., Awad, G. E., & Tantawy, A. E. (2017). Improvement of lipid production from an oil-producing filamentous fungus, *Penicillium brevicompactum* NRC 829, through central composite statistical design. *Annals of Microbiology, 67*(9), 601-613.

Ali, T. H., & El-Ghonemy, D. H. (2014). Optimization of culture conditions for the highest lipid production from some oleaginous fungi for biodiesel preparation. *Asian Journal of Applied Sciences (ISSN: 2321–0893), 2*(05).

Almohammed, F., Mhemdi, H., & Vorobiev, E. (2016). Pulsed electric field treatment of sugar beet tails as a sustainable feedstock for bioethanol production. *Applied Energy, 162*, 49-57.

Amanullah, A., McFarlane, C., Emery, A., & Nienow, A. (2001). Scale-down model to simulate spatial pH variations in large-scale bioreactors. *Biotechnology and bioengineering, 73*(5), 390-399.

Angerbauer, C., Siebenhofer, M., Mittelbach, M., & Guebitz, G. (2008). Conversion of sewage sludge into lipids by *Lipomyces starkeyi* for biodiesel production. *Bioresource technology, 99*(8), 3051-3056.

Arenas, E., Rodriguez Palacio, M., Juantorena, A., Fernando, S., & Sebastian, P. (2017). Microalgae as a potential source for biodiesel production: techniques, methods, and other challenges. *International Journal of Energy Research, 41*(6), 761-789.

Arous, F., Frikha, F., Triantaphyllidou, I.-E., Aggelis, G., Nasri, M., & Mechichi, T. (2016). Potential utilization of agro-industrial wastewaters for lipid production by the oleaginous yeast *Debaryomyces etchellsii*. *Journal of cleaner production, 133*, 899-909.

Asadi, E., Makhdoumi, A., & Asoodeh, A. (2020). Laccase mediator system obtained from a marine spore exhibits decolorization potential in harsh environmental conditions. *Ecotoxicology and Environmental Safety, 191*, 110184.

Awad, G. E., Esawy, M. A., Salam, W. A., Salama, B. M., Abdelkader, A. F., & El-diwany, A. (2011). Keratinase production by *Bacillus pumilus* GHD in solid-state fermentation using sugar cane bagasse: optimisation of culture conditions using a Box-Behnken experimental design. *Annals of Microbiology, 61*(3), 663-672.

Back, A., Rossignol, T., Krier, F., Nicaud, J.-M., & Dhulster, P. (2016). High-throughput fermentation screening for the yeast *Yarrowia lipolytica* with real-time monitoring of biomass and lipid production. *Microbial Cell Factories, 15*(1), 147.

Bala, J. D., Lalung, J., Al-Gheethi, A. A., Kaizar, H., & Ismail, N. (2018). Reduction of Organic Load and Biodegradation of Palm Oil Mill Effluent by Aerobic Indigenous Mixed Microbial Consortium Isolated from Palm Oil Mill Effluent (POME). *Water Conservation Science and Engineering*, 1-18.

Bala, J. D., Lalung, J., & Ismail, N. (2014). Biodegradation of palm oil mill effluent (POME) by bacterial. *Int J Sci Res Publ, 4*(3), 502-511.

Bala, J. D., Lalung, J., & Ismail, N. (2015). Studies on the reduction of organic load from palm oil mill effluent (POME) by bacterial strains. *International Journal of Recycling of Organic Waste in Agriculture, 4*(1), 1-10.

Band, V. I., Crispell, E. K., Napier, B. A., Herrera, C. M., Tharp, G. K., Vavikolanu, K., . . . Trent, M. S. (2016). Antibiotic failure mediated by a resistant subpopulation in *Enterobacter cloacae*. *Nature microbiology, 1*(6), 16053.

Banerjee, A., & Ghoshal, A. K. (2017). Bioremediation of petroleum wastewater by hyper-phenol tolerant *Bacillus cereus*: Preliminary studies with laboratory-scale batch process. *Bioengineered, 8*(5), 446-450.

Baranitharan, E., Khan, M. R., Yousuf, A., Teo, W. F. A., Tan, G. Y. A., & Cheng, C. K. (2015). Enhanced power generation using controlled inoculum from palm oil mill effluent fed microbial fuel cell. *Fuel, 143*, 72-79.

Beccari, M., Bonemazzi, F., Majone, M., & Riccardi, C. (1996). Interaction between acidogenesis and methanogenesis in the anaerobic treatment of olive oil mill effluents. *Water research, 30*(1), 183-189.

Benka-Coker, M., & Ekundayo, J. (1997). Applicability of evaluating the ability of microbes isolated from an oil spill site to degrade oil. *Environmental Monitoring and Assessment, 45*(3), 259-272.

Beopoulos, A., Cescut, J., Haddouche, R., Uribelarrea, J.-L., Molina-Jouve, C., & Nicaud, J.-M. (2009). *Yarrowia lipolytica* as a model for bio-oil production. *Progress in lipid research, 48*(6), 375-387.

Bharte, S., & Desai, K. (2018). Techniques for harvesting, cell disruption and lipid extraction of microalgae for biofuel production. *Biofuels*, 1-21.

Bhumibhamon, O., Koprasertsak, A., & Funthong, S. (2002). Biotreatment of high fat and oil wastewater by lipase producing microorganisms. *Kasetsart J.(Nat. Sci.), 36*, 261-267.

Bligh, E. G., & Dyer, W. J. (1959). A rapid method of total lipid extraction and purification. *Canadian journal of biochemistry and physiology, 37*(8), 911-917.

Borowitzka, M. A. (2013). High-value products from microalgae—their development and commercialisation. *Journal of Applied Phycology, 25*(3), 743-756.

Brennan, L., & Owende, P. (2010). Biofuels from microalgae—A review of technologies for production, processing, and extractions of biofuels and co-products. *Renewable and Sustainable Energy Reviews, 14*(2), 557-577. doi:https://doi.org/10.1016/j.rser.2009.10.009

Brianceau, S., Turk, M., Vitrac, X., & Vorobiev, E. (2015). Combined densification and pulsed electric field treatment for selective polyphenols recovery from fermented grape pomace. *Innovative Food Science & Emerging Technologies, 29*, 2-8.

Brigham, C. J., Kurosawa, K., Rha, C., & Sinskey, A. J. (2011). Bacterial carbon storage to value added products.

Byreddy, A. R., Barrow, C. J., & Puri, M. (2016). Bead milling for lipid recovery from thraustochytrid cells and selective hydrolysis of *Schizochytrium* DT3 oil using lipase. *Bioresource technology, 200*, 464-469.

Byreddy, A. R., Gupta, A., Barrow, C. J., & Puri, M. (2015). Comparison of cell disruption methods for improving lipid extraction from *thraustochytrid* strains. *Marine drugs, 13*(8), 5111-5127.

Cai, S., Hu, C., & Du, S. (2007). Comparisons of growth and biochemical composition between mixed culture of alga and yeast and monocultures. *Journal of bioscience and bioengineering, 104*(5), 391-397.

Carlile, M. J., Watkinson, S. C., & Gooday, G. W. (2001). *The fungi*: Gulf Professional Publishing.

Cea, M., Sangaletti-Gerhard, N., Acuña, P., Fuentes, I., Jorquera, M., Godoy, K., . . . Navia, R. (2015). Screening transesterifiable lipid accumulating bacteria from sewage sludge for biodiesel production. *Biotechnology Reports, 8*, 116-123.

Chaijak, P., Lertworapreecha, M., & Sukkasem, C. (2018). Phenol removal from palm oil mill effluent using Galactomyces reessii termite-associated yeast. *Polish Journal of Environmental Studies, 27*(1), 39-44.

Chan, Y. J., & Chong, M. F. (2019). Palm Oil Mill Effluent (POME) Treatment—Current Technologies, Biogas Capture and Challenges *Green Technologies for the Oil Palm Industry* (pp. 71-92): Springer.

Chatzifragkou, A., Makri, A., Belka, A., Bellou, S., Mavrou, M., Mastoridou, M., . . . Papanikolaou, S. (2011). Biotechnological conversions of biodiesel derived waste glycerol by yeast and fungal species. *Energy, 36*(2), 1097-1108.

Cheah, W. Y., Show, P. L., Juan, J. C., Chang, J.-S., & Ling, T. C. (2018a). Enhancing biomass and lipid productions of microalgae in palm oil mill effluent using carbon and nutrient supplementation. *Energy conversion and management, 164*, 188-197.

Cheah, W. Y., Show, P. L., Juan, J. C., Chang, J.-S., & Ling, T. C. (2018b). Microalgae cultivation in palm oil mill effluent (POME) for lipid production and pollutants removal. *Energy conversion and management, 174*, 430-438.

Cheah, W. Y., Show, P. L., Juan, J. C., Chang, J.-S., & Ling, T. C. (2018c). Waste to energy: the effects of *Pseudomonas sp.* on *Chlorella sorokiniana* biomass and lipid productions in palm oil mill effluent. *Clean Technologies and Environmental Policy, 20*(9), 2037-2045.

Cheah, W. Y., Show, P. L., Juan, J. C., Chang, J.-S., & Ling, T. C. (2018d). Waste to energy: the effects of Pseudomonas sp. on Chlorella sorokiniana biomass and lipid productions in palm oil mill effluent. *Clean Technologies and Environmental Policy*, 1-9.

Cheirsilp, B., & Louhasakul, Y. (2013). Industrial wastes as a promising renewable source for production of microbial lipid and direct transesterification of the lipid into biodiesel. *Bioresource technology, 142*, 329-337.

Cheirsilp, B., Suwannarat, W., & 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 Biotechnology, 28*(4), 362-368.

Chemat, F., & Khan, M. K. (2011). Applications of ultrasound in food technology: processing, preservation and extraction. *Ultrasonics sonochemistry, 18*(4), 813-835.

Chen, J., Li, J., Dong, W., Zhang, X., Tyagi, R. D., Drogui, P., & Surampalli, R. Y. (2018). The potential of microalgae in biodiesel production. *Renewable and Sustainable Energy Reviews, 90*, 336-346.

Chen, Y., Cheng, J. J., & Creamer, K. S. (2008). Inhibition of anaerobic digestion process: a review. *Bioresource technology, 99*(10), 4044-4064.

Chen, Y., Tang, X., Kapoore, R. V., Xu, C., & Vaidyanathan, S. (2015). Influence of nutrient status on the accumulation of biomass and lipid in *Nannochloropsis salina* and *Dunaliella salina*. *Energy conversion and management, 106*, 61-72.

Chew, K. W., Yap, J. Y., Show, P. L., Suan, N. H., Juan, J. C., Ling, T. C., . . . Chang, J.-S. (2017). Microalgae biorefinery: high value products perspectives. *Bioresource technology, 229*, 53-62.

Chigusa, K., Hasegawa, T., Yamamoto, N., & Watanabe, Y. (1996). Treatment of wastewater from oil manufacturing plant by yeasts. *Water Science and Technology, 34*(11), 51-58.

Chin, M. J., Poh, P. E., Tey, B. T., Chan, E. S., & Chin, K. L. (2013). Biogas from palm oil mill effluent (POME): Opportunities and challenges from Malaysia's perspective. *Renewable and Sustainable Energy Reviews, 26*, 717-726.

Chisti, Y. (2007). Biodiesel from microalgae. *Biotechnology advances, 25*(3), 294-306.

Choi, H.-J., & Lee, S.-M. (2012). Effects of microalgae on the removal of nutrients from wastewater: various concentrations of *Chlorella vulgaris*. *Environmental Engineering Research, 17*(S1), 3-8.

Choi, H., Jeong, S.-W., & Chung, Y.-j. (2006). Enhanced anaerobic gas production of waste activated sludge pretreated by pulse power technique. *Bioresource technology, 97*(2), 198-203.

Choi, S.-A., Lee, J.-S., Oh, Y.-K., Jeong, M.-J., Kim, S. W., & Park, J.-Y. (2014). Lipid extraction from *Chlorella vulgaris* by molten-salt/ionic-liquid mixtures. *Algal Research, 3*, 44-48.

Choong, Y. Y., Chou, K. W., & Norli, I. (2018). Strategies for improving biogas production of palm oil mill effluent (POME) anaerobic digestion: A critical review. *Renewable and Sustainable Energy Reviews, 82*, 2993-3006.

Chowdhary, P., Raj, A., & Bharagava, R. N. (2018). Environmental pollution and health hazards from distillery wastewater and treatment approaches to combat the environmental threats: a review. *Chemosphere, 194*, 229-246.

Clarke, A., Prescott, T., Khan, A., & Olabi, A. (2010). Causes of breakage and disruption in a homogeniser. *Applied Energy, 87*(12), 3680-3690.

Concas, A., Pisu, M., & Cao, G. (2015). Disruption of microalgal cells for lipid extraction through Fenton reaction: modeling of experiments and remarks on its effect on lipids composition. *Chemical Engineering Journal, 263*, 392-401.

Cooney, M., Young, G., & Nagle, N. (2009). Extraction of bio-oils from microalgae. *Separation & Purification Reviews, 38*(4), 291-325.

Coustets, M., Al-Karablieh, N., Thomsen, C., & Teissié, J. (2013). Flow process for electroextraction of total proteins from microalgae. *The Journal of membrane biology, 246*(10), 751-760.

Crampon, C., Mouahid, A., Toudji, S.-A. A., Lépine, O., & Badens, E. (2013). Influence of pretreatment on supercritical CO_2 extraction from *Nannochloropsis oculata*. *The Journal of Supercritical Fluids, 79*, 337-344.

Cravotto, G., Boffa, L., Mantegna, S., Perego, P., Avogadro, M., & Cintas, P. (2008). Improved extraction of vegetable oils under high-intensity ultrasound and/or microwaves. *Ultrasonics sonochemistry, 15*(5), 898-902.

Cristiani-Urbina, E., Netzahuatl-Muñoz, A. R., Manriquez-Rojas, F. J., Juárez-Ramírez, C., Ruiz-Ordaz, N., & Galíndez-Mayer, J. (2000). Batch and fed-batch cultures for the treatment of whey with mixed yeast cultures. *Process Biochemistry, 35*(7), 649-657.

Dai, C.-c., Tao, J., Xie, F., Dai, Y.-j., & Zhao, M. (2007). Biodiesel generation from oleaginous yeast *Rhodotorula glutinis* with xylose assimilating capacity. *African Journal of Biotechnology, 6*(18).

Dai, J., Li, X., Li, B., & Wang, L. (2011). *Design and modeling of an underwater energy harvesting system.* Paper presented at the Proceedings of the international congress on analytical sciences (ICAS 2011). Kyoto, Japan.

de Boer, K., Moheimani, N. R., Borowitzka, M. A., & Bahri, P. A. (2012). Extraction and conversion pathways for microalgae to biodiesel: a review focused on energy consumption. *Journal of Applied Phycology, 24*(6), 1681-1698.

De Felice, B., Pontecorvo, G., & Carfagna, M. (1997). Degradation of waste waters from olive oil mills by *Yarrowia lipolytica* ATCC 20255 and *Pseudomonas putida*. *Acta Biotechnologica, 17*(3), 231-239.

de San, A. J. d. J., & Parres, J. B. E. (2014). Process and apparatus for extracting biodiesel from algae: Google Patents.

Ding, G. T., Yaakob, Z., Takriff, M. S., Salihon, J., & Rahaman, M. S. A. (2016). Biomass production and nutrients removal by a newly-isolated microalgal strain *Chlamydomonas sp* in palm oil mill effluent (POME). *international journal of hydrogen energy, 41*(8), 4888-4895.

Dong, T., Knoshaug, E. P., Pienkos, P. T., & Laurens, L. M. (2016). Lipid recovery from wet oleaginous microbial biomass for biofuel production: a critical review. *Applied Energy, 177*, 879-895.

Doucha, J., & Lívanský, K. (2008). Influence of processing parameters on disintegration of *Chlorella* cells in various types of homogenizers. *Applied microbiology and biotechnology, 81*(3), 431.

Drees, K. P., Abbaszadegan, M., & Maier, R. M. (2003). Comparative electrochemical inactivation of bacteria and bacteriophage. *Water research, 37*(10), 2291-2300.

Đurđica, K., Davor, K., Slavko, R., Daria, J., Robert, S., & Marina, T. (2019). Electroporation of harvest residues for enhanced biogas production in anaerobic co-digestion with dairy cow manure. *Bioresource technology, 274*, 215-224.

Edwards, D. J., & Truong, D. H. (2011). A comparison of designs for one-step screening and response surface estimation. *Quality and Reliability Engineering International, 27*(8), 1009-1024.

Ehimen, E., Sun, Z., & Carrington, C. (2010). Variables affecting the in situ transesterification of microalgae lipids. *Fuel, 89*(3), 677-684.

El-Fadaly, H., El-Ahmady, N., & Marvan, E. (2009). Single cell oil production by an oleaginous yeast strain in a low cost cultivation medium. *Research Journal of Microbiology, 4*(8), 301-313.

El-Masry, M. H., El-Bestawy, E., & Nawal, I. (2004). Bioremediation of vegetable oil and grease from polluted wastewater using a sand biofilm system. *World Journal of Microbiology and Biotechnology, 20*(6), 551-557.

Enamala, M. K., Enamala, S., Chavali, M., Donepudi, J., Yadavalli, R., Kolapalli, B., . . . Kuppam, C. (2018). Production of biofuels from microalgae-A review on cultivation, harvesting, lipid extraction, and numerous applications of microalgae. *Renewable and Sustainable Energy Reviews, 94*, 49-68.

Enshaeieh, M., Abdoli, A., & Madani, M. (2018). Single cell oil (SCO) production by *Rhodotorula mucilaginosa* and its environmental benefits.

Enshaeieh, M., Abdoli, A., Nahvi, I., & Madani, M. (2012). Bioconversion of different carbon sources in to microbial oil and biodiesel using oleaginous yeasts. *Journal of biology and today's world, 1*(2), 82-92.

Enshaeieh, M., Abdoli, A., Nahvi, I., & Madani, M. (2013). Selection and optimization of single cell oil production from *Rodotorula* 110 using environmental waste as substrate. *Journal of cell and molecular research, 4*(2), 68-75.

Evans, C. T., & Ratledge, C. (1984). Phosphofructokinase and the regulation of the flux of carbon from glucose to lipid in the oleaginous yeast *Rhodosporidium toruloides*. *Microbiology, 130*(12), 3251-3264.

Fakas, S., Galiotou-Panayotou, M., Papanikolaou, S., Komaitis, M., & Aggelis, G. (2007). Compositional shifts in lipid fractions during lipid turnover in *Cunninghamella echinulata*. *Enzyme and microbial technology, 40*(5), 1321-1327.

Fakas, S., Papanikolaou, S., Batsos, A., Galiotou-Panayotou, M., Mallouchos, A., & Aggelis, G. (2009). Evaluating renewable carbon sources as substrates for single cell oil production by *Cunninghamella echinulata* and *Mortierella isabellina*. *Biomass and Bioenergy, 33*(4), 573-580.

Faridnia, F., Burritt, D. J., Bremer, P. J., & Oey, I. (2015). Innovative approach to determine the effect of pulsed electric fields on the microstructure of whole potato tubers: Use of cell viability, microscopic images and ionic leakage measurements. *Food Research International, 77*, 556-564.

Federation, W. E., & Association, A. P. H. (2005). Standard methods for the examination of water and wastewater. *American Public Health Association (APHA): Washington, DC, USA*.

Fei, Q., Chang, H. N., Shang, L., Kim, N., & Kang, J. (2011). The effect of volatile fatty acids as a sole carbon source on lipid accumulation by *Cryptococcus albidus* for biodiesel production. *Bioresource technology, 102*(3), 2695-2701.

Feng, H., Yang, W., & Hielscher, T. (2008). Power ultrasound. *Revista de Agaroquimica y Tecnologia de Alimentos, 14*(5), 433-436.

Flisar, K., Meglic, S. H., Morelj, J., Golob, J., & Miklavcic, D. (2014). Testing a prototype pulse generator for a continuous flow system and its use for *E. coli* inactivation and microalgae lipid extraction. *Bioelectrochemistry, 100*, 44-51.

Folch, J., Lees, M., & Sloane Stanley, G. (1957). A simple method for the isolation and purification of total lipides from animal tissues. *J biol Chem, 226*(1), 497-509.

Fontanille, P., Kumar, V., Christophe, G., Nouaille, R., & Larroche, C. (2012). Bioconversion of volatile fatty acids into lipids by the oleaginous yeast *Yarrowia lipolytica*. *Bioresource technology, 114*, 443-449.

Ganapathy, B., Yahya, A., & Ibrahim, N. (2019). Bioremediation of palm oil mill effluent (POME) using indigenous *Meyerozyma guilliermondii*. *Environmental Science and Pollution Research, 26*(11), 11113-11125.

Ganeva, V., Galutzov, B., & Teissie, J. (2014). Evidence that pulsed electric field treatment enhances the cell wall porosity of yeast cells. *Applied biochemistry and biotechnology, 172*(3), 1540-1552.

Garay, L. A., Boundy-Mills, K. L., & German, J. B. (2014). Accumulation of high-value lipids in single-cell microorganisms: a mechanistic approach and future perspectives. *Journal of agricultural and food chemistry, 62*(13), 2709-2727.

Garcia, P. A., Ge, Z., Moran, J. L., & Buie, C. R. (2016). Microfluidic screening of electric fields for electroporation. *Scientific reports, 6*, 21238.

Garode, A. (2018). Isolation, characterization and identification of extracellular enzyme producer *Bacillus licheniformis* from municipal wastewater and evaluation of their biodegradability. *Biotechnology Research and Innovation*.

Garoma, T., & Shackelford, T. (2014). Electroporation of *Chlorella vulgaris* to enhance biomethane production. *Bioresource technology, 169*, 778-783.

Gawai, K., Mogha, K., & Prajapati, J. (2017). Evaluation of *B. cereus* MTCC 25641 for the Treatment of Dairy Waste Effluent. *Water Environment Research, 89*(5), 466-471.

Gerken, H. G., Donohoe, B., & Knoshaug, E. P. (2013). Enzymatic cell wall degradation of *Chlorella vulgaris* and other microalgae for biofuels production. *Planta, 237*(1), 239-253.

Ghafari, S., Aziz, H. A., Isa, M. H., & Zinatizadeh, A. A. (2009). Application of response surface methodology (RSM) to optimize coagulation–flocculation treatment of leachate using poly-aluminum chloride (PAC) and alum. *Journal of hazardous materials, 163*(2), 650-656.

Gobi, K., & Vadivelu, V. (2013). By-products of palm oil mill effluent treatment plant–A step towards sustainability. *Renewable and Sustainable Energy Reviews, 28*, 788-803.

Goettel, M., Eing, C., Gusbeth, C., Straessner, R., & Frey, W. (2013). Pulsed electric field assisted extraction of intracellular valuables from microalgae. *Algal Research, 2*(4), 401-408.

Gómez, N., García, D., Álvarez, I., Raso, J., & Condón, S. (2005). A model describing the kinetics of inactivation of *Lactobacillus plantarum* in a buffer system of different pH and in orange and apple juice. *Journal of Food Engineering, 70*(1), 7-14.

Gong, Z., Wang, Q., Shen, H., Hu, C., Jin, G., & Zhao, Z. K. (2012). Co-fermentation of cellobiose and xylose by *Lipomyces starkeyi* for lipid production. *Bioresource technology, 117*, 20-24.

Gonzalez, M. E., & Barrett, D. M. (2010). Thermal, high pressure, and electric field processing effects on plant cell membrane integrity and relevance to fruit and vegetable quality. *Journal of Food Science, 75*(7), R121-R130.

Gopalakrishnan, S., Sathya, A., Vijayabharathi, R., Varshney, R. K., Gowda, C. L., & Krishnamurthy, L. (2015). Plant growth promoting *rhizobia:* challenges and opportunities. *3 Biotech, 5*(4), 355-377.

Gouda, M. K., Omar, S. H., & Aouad, L. M. (2008). Single cell oil production by *Gordonia sp.* DG using agro-industrial wastes. *World Journal of Microbiology and Biotechnology, 24*(9), 1703.

Grady, C. L., Daigger, G. T., Love, N. G., & Filipe, C. D. (2011). *Biological wastewater treatment*: CRC press.

Granot, Y., & Rubinsky, B. (2010). Mathematical models of mass transfer in tissue for molecular medicine with reversible electroporation *Porous Media: Applications in Biological Systems and Biotechnology* (pp. 45-74): CRC Press.

Grimi, N., Dubois, A., Marchal, L., Jubeau, S., Lebovka, N., & Vorobiev, E. (2014). Selective extraction from microalgae *Nannochloropsis sp.* using different methods of cell disruption. *Bioresource technology, 153*, 254-259.

Günerken, E., d'Hondt, E., Eppink, M., Garcia-Gonzalez, L., Elst, K., & Wijffels, R. (2015). Cell disruption for microalgae biorefineries. *Biotechnology advances, 33*(2), 243-260.

Gupta, N., Manikandan, N. A., & Pakshirajan, K. (2018). Real-time lipid production and dairy wastewater treatment using *Rhodococcus opacus* in a bioreactor under fed-batch, continuous and continuous cell recycling modes for potential biodiesel application. *Biofuels, 9*(2), 239-245.

Gusbeth, C., Frey, W., Schwartz, T., & Rieder, A. (2009a). Critical comparison between the pulsed electric field and thermal decontamination methods of hospital wastewater. *Acta Physica Polonica-Series A General Physics, 115*(6), 1092.

Gusbeth, C., Frey, W., Volkmann, H., Schwartz, T., & Bluhm, H. (2009b). Pulsed electric field treatment for bacteria reduction and its impact on hospital wastewater. *Chemosphere, 75*(2), 228-233.

Haas, C., & Aturaliye, D. (1999). Semi-quantitative characterization of electroporation-assisted disinfection processes for inactivation of *Giardia* and *Cryptosporidium*. *Journal of applied microbiology, 86*(6), 899-905.

Haberl, S., Jarc, M., Štrancar, A., Peterka, M., Hodžić, D., & Miklavčič, D. (2013). Comparison of alkaline lysis with electroextraction and optimization of electric pulses to extract plasmid DNA from *Escherichia coli*. *The Journal of membrane biology, 246*(11), 861-867.

Halim, R., Rupasinghe, T. W., Tull, D. L., & Webley, P. A. (2014). Modelling the kinetics of lipid extraction from wet microalgal concentrate: A novel perspective on a classical process. *Chemical Engineering Journal, 242*, 234-253.

Harak, C., Meyrath, M., Romero-Brey, I., Schenk, C., Gondeau, C., Schult, P., Schnitzler, P. (2017). Tuning a cellular lipid kinase activity adapts hepatitis C virus to replication in cell culture. *Nature microbiology, 2*(3), 16247.

Harde, S., Wang, Z., Horne, M., Zhu, J., & Pan, X. (2016). Microbial lipid production from SPORL-pretreated Douglas fir by *Mortierella isabellina*. *Fuel, 175*, 64-74.

Hofmann, G. A., & Evans, G. A. (1986). Electronic genetic-physical and biological aspects of cellular electromanipulation. *IEEE Engineering in Medicine and Biology Magazine, 5*(4), 6-25.

Hu, C., Wu, S., Wang, Q., Jin, G., Shen, H., & Zhao, Z. K. (2011). Simultaneous utilization of glucose and xylose for lipid production by *Trichosporon cutaneum*. *Biotechnology for biofuels, 4*(1), 25.

Huang, G., Chen, F., Wei, D., Zhang, X., & Chen, G. (2010). Biodiesel production by microalgal biotechnology. *Applied Energy, 87*(1), 38-46.

Huang, L., Zhang, B., Gao, B., & Sun, G. (2011). Application of fishmeal wastewater as a potential low-cost medium for lipid production by *Lipomyces starkeyi* HL. *Environmental Technology, 32*(16), 1975-1981.

Hülsheger, H., Potel, J., & Niemann, E.-G. (1981). Killing of bacteria with electric pulses of high field strength. *Radiation and environmental biophysics, 20*(1), 53-65.

Hülsheger, H., Potel, J., & Niemann, E.-G. (1983). Electric field effects on bacteria and yeast cells. *Radiation and environmental biophysics, 22*(2), 149-162.

Huo, Z.-Y., Li, G.-Q., Yu, T., Feng, C., Lu, Y., Wu, Y.-H., . . . Hu, H.-Y. (2018). Cell Transport Prompts the Performance of Low-Voltage Electroporation for Cell Inactivation. *Scientific reports, 8*(1), 15832.

Hwang, J.-H., Choi, J.-A., Abou-Shanab, R. A., Min, B., Song, H., Kim, Y., Jeon, B.-H. (2011). Feasibility of hydrogen production from ripened fruits by a combined two-stage (dark/dark) fermentation system. *Bioresource technology, 102*(2), 1051-1058.

Iqbal, J., & Theegala, C. (2013). Microwave assisted lipid extraction from microalgae using biodiesel as co-solvent. *Algal Research, 2*(1), 34-42.

Islam, M. A., Ethiraj, B., Cheng, C. K., Yousuf, A., & Khan, M. M. R. (2017a). Electrogenic and anti-methanogenic properties of *Bacillus cereus* for enhanced power generation in anaerobic sludge driven microbial fuel cell. *Energy & Fuels*.

Islam, M. A., Ethiraj, B., Cheng, C. K., Yousuf, A., Thiruvenkadam, S., Prasad, R., & Rahman Khan, M. M. (2018a). Enhanced current generation using mutualistic interaction of yeast-bacterial coculture in dual chamber microbial fuel cell. *Industrial & engineering chemistry research, 57*(3), 813-821.

Islam, M. A., Karim, A., Mishra, P., Mohammad, C. K., Faizal, M., Khan, M. R., & Yousuf, A. (2019). Role of Biocatalyst in Microbial Fuel Cell Performance. *Waste to Sustainable Energy: MFCs–Prospects through Prognosis*.

Islam, M. A., Karim, A., Woon, C. W., Ethiraj, B., Cheng, C. K., Yousuf, A., & Khan, M. M. R. (2017b). Augmentation of air cathode microbial fuel cell performance using wild type *Klebsiella variicola*. *RSC advances, 7*(8), 4798-4805.

Islam, M. A., Ong, H. R., Ethiraj, B., Cheng, C. K., & Khan, M. M. R. (2018b). Optimization of co-culture inoculated microbial fuel cell performance using response surface methodology. *Journal of environmental management, 225*, 242-251.

Islam, M. A., Woon, C. W., Ethiraj, B., Cheng, C. K., Yousuf, A., & Khan, M. M. R. (2016). Ultrasound driven biofilm removal for stable power generation in microbial fuel cell. *Energy & Fuels, 31*(1), 968-976.

Islam, M. A., Yousuf, A., Karim, A., Pirozzi, D., Khan, M. R., & Ab Wahid, Z. (2018c). Bioremediation of palm oil mill effluent and lipid production by *Lipomyces starkeyi:* A combined approach. *Journal of cleaner production, 172*, 1779-1787.

Ismail, S., Idris, I., Ng, Y., & Ahmad, A. (2013). Coagulation of Palm Oil Mill Effluent (POME) at High Temperature.

Iwuagwu, J. O., & Ugwuanyi, J. O. (2014). Treatment and valorization of palm oil mill effluent through production of food grade yeast biomass. *Journal of Waste Management, 2014*.

Jeong, D.-Y., Cho, S.-K., Shin, H.-S., & Jung, K.-W. (2015). Application of an electric field for pretreatment of a feedstock (*Laminaria japonica*) for dark fermentative hydrogen production. *Biomass and Bioenergy, 72*, 184-188.

Jia, Q., Wei, L., Han, H., & Shen, J. (2014). Factors that influence the performance of two-chamber microbial fuel cell. *international journal of hydrogen energy, 39*(25), 13687-13693.

Jin, G., Yang, F., Hu, C., Shen, H., & Zhao, Z. K. (2012). Enzyme-assisted extraction of lipids directly from the culture of the oleaginous yeast *Rhodosporidium toruloides*. *Bioresource technology, 111*, 378-382.

Jiru, T. M., Groenewald, M., Pohl, C., Steyn, L., Kiggundu, N., & Abate, D. (2017). Optimization of cultivation conditions for biotechnological production of lipid by *Rhodotorula kratochvilovae* (syn, *Rhodosporidium kratochvilovae*) SY89 for biodiesel preparation. *3 Biotech, 7*(2), 145.

Jones, E. M., Cochrane, C. A., & Percival, S. L. (2015). The effect of pH on the extracellular matrix and biofilms. *Advances in wound care, 4*(7), 431-439.

Jordan, C. A., Neumann, E., & Sowers, A. E. (2013). *Electroporation and electrofusion in cell biology*: Springer Science & Business Media.

Joseph, V. R., & Melkote, S. N. (2009). Statistical adjustments to engineering models. *Journal of Quality Technology, 41*(4), 362.

Joseph, V. R., & Yan, H. (2015). Engineering-driven statistical adjustment and calibration. *Technometrics, 57*(2), 257-267.

Joshi, R., & Schoenbach, K. (2000). Electroporation dynamics in biological cells subjected to ultrafast electrical pulses: a numerical simulation study. *Physical review E, 62*(1), 1025.

Kakkad, H., Khot, M., Zinjarde, S., & RaviKumar, A. (2015). Biodiesel production by direct in situ transesterification of an oleaginous tropical mangrove fungus grown on untreated agro-residues and evaluation of its fuel properties. *BioEnergy Research, 8*(4), 1788-1799.

Kandušer, M., Belič, A., Čorović, S., & Škrjanc, I. (2017). Modular Serial Flow Through device for pulsed electric field treatment of the liquid samples. *Scientific reports, 7*(1), 8115.

Kandušer, M., & Miklavčič, D. (2009). Electroporation in biological cell and tissue: an overview *Electrotechnologies for extraction from food plants and biomaterials* (pp. 1-37): Springer.

Karatay, S. E., & Dönmez, G. (2010). Improving the lipid accumulation properties of the yeast cells for biodiesel production using molasses. *Bioresource technology, 101*(20), 7988-7990.

Karim, A., Islam, M. A., Mohammad Faizal, C. K., Yousuf, A., Howarth, M., Dubey, B. N., . . . Khan, M. M. R. (2018a). Enhanced biohydrogen-production from citrus wastewater using anaerobic sludge pretreated by electroporation technique. *Industrial & engineering chemistry research*.

Karim, A., Islam, M. A., Mohammad Faizal, C. K., Yousuf, A., Howarth, M., Dubey, B. N., . . . Rahman Khan, M. M. (2018b). Enhanced biohydrogen production from citrus wastewater using anaerobic sludge pretreated by an electroporation technique. *Industrial & engineering chemistry research, 58*(2), 573-580.

Karim, A., Islam, M. A., Yousuf, A., Khan, M. M. R., & Faizal, C. K. M. (2019). Microbial Lipid Accumulation through Bioremediation of Palm Oil Mill Wastewater by *Bacillus cereus*. *ACS Sustainable Chemistry & Engineering, 7*(17), 14500-14508.

Karim, A., Yousuf, A., Islam, M. A., Naif, Y. H., Faizal, C. K. M., Alam, M. Z., & Pirozzi, D. (2018c). Microbial lipid extraction from Lipomyces starkeyi using irreversible electroporation. *Biotechnology Progress*.

Karim, A., Yousuf, A., Islam, M. A., Naif, Y. H., Faizal, C. K. M., Alam, M. Z., & Pirozzi, D. (2018d). Microbial lipid extraction from *Lipomyces starkeyi* using irreversible electroporation. *Biotechnology progress, 34*(4), 838-845.

Khongkhaem, P., Suttinun, O., Intasiri, A., Pinyakong, O., & Luepromchai, E. (2016). Degradation of Phenolic Compounds in Palm Oil Mill Effluent by Silica-Immobilized Bacteria in Internal Loop Airlift Bioreactors. *CLEAN–Soil, Air, Water*.

Khot, M., Kamat, S., Zinjarde, S., Pant, A., Chopade, B., & RaviKumar, A. (2012). Single cell oil of oleaginous fungi from the tropical mangrove wetlands as a potential feedstock for biodiesel. *Microbial Cell Factories, 11*(1), 71.

Kim, C., Song, Y. E., Lee, C. R., Jeon, B.-H., & Kim, J. R. (2016). Glycerol-fed microbial fuel cell with a co-culture of *Shewanella oneidensis* MR-1 and *Klebsiella pneumonae* J2B. *Journal of industrial microbiology & biotechnology, 43*(10), 1397-1403.

Kim, Y.-H., Park, S., Kim, M. H., Choi, Y.-K., Yang, Y.-H., Kim, H. J., . . . Lee, S. H. (2013). Ultrasound-assisted extraction of lipids from *Chlorella vulgaris* using [Bmim][MeSO4]. *Biomass and Bioenergy, 56*, 99-103.

Kinosita, K., & Tsong, T. Y. (1979). Voltage-induced conductance in human erythrocyte membranes. *Biochimica et Biophysica Acta (BBA)-Biomembranes, 554*(2), 479-497.

Kirubakaran, M., & Selvan, V. A. M. (2018). A comprehensive review of low cost biodiesel production from waste chicken fat. *Renewable and Sustainable Energy Reviews, 82*, 390-401.

Kollár, R., Reinhold, B. B., Petráková, E., Yeh, H. J., Ashwell, G., Drgonová, J., Cabib, E. (1997). Architecture of the yeast cell wall β (1→ 6)-glucan interconnects mannoprotein, β (1→ 3)-glucan, and chitin. *Journal of Biological Chemistry, 272*(28), 17762-17775.

Kosa, M., & Ragauskas, A. J. (2011). Lipids from heterotrophic microbes: advances in metabolism research. *Trends in biotechnology, 29*(2), 53-61.

Kotnik, T., Frey, W., Sack, M., Meglič, S. H., Peterka, M., & Miklavčič, D. (2015). Electroporation-based applications in biotechnology. *Trends in biotechnology, 33*(8), 480-488.

Koutinas, A. A., Vlysidis, A., Pleissner, D., Kopsahelis, N., Garcia, I. L., Kookos, I. K., . . . Lin, C. S. K. (2014). Valorization of industrial waste and by-product streams via fermentation for the production of chemicals and biopolymers. *Chemical Society Reviews, 43*(8), 2587-2627.

Kraisintu, P., Yongmanitchai, W., & Limtong, S. (2010). Selection and optimization for lipid production of a newly isolated oleaginous yeast, *Rhodosporidium toruloides* DMKU3-TK16. *Kasetsart Journal (Natural Science), 44*(1), 436-445.

Kreith, F. (1999). *Handbook of solid waste management*.

Kube, M., Spedding, B., Gao, L., Fan, L., & Roddick, F. (2020). Nutrient removal by alginate-immobilised *Chlorella vulgaris*: Response to different wastewater matrices. *Journal of Chemical Technology & Biotechnology*.

Kumar, M., Rathour, R., Gupta, J., Pandey, A., Gnansounou, E., & Thakur, I. S. (2020). Bacterial production of fatty acid and biodiesel: opportunity and challenges *Refining Biomass Residues for Sustainable Energy and Bioproducts* (pp. 21-49): Elsevier.

Kumar, M., Sundaram, S., Gnansounou, E., Larroche, C., & Thakur, I. S. (2018). Carbon dioxide capture, storage and production of biofuel and biomaterials by bacteria: A review. *Bioresource technology, 247*, 1059-1068.

Kumar, S., Gupta, N., & Pakshirajan, K. (2015). Simultaneous lipid production and dairy wastewater treatment using *Rhodococcus opacus* in a batch bioreactor for potential biodiesel application. *Journal of environmental chemical engineering, 3*(3), 1630-1636.

Kumar, S. J., Kumar, G. V., Dash, A., Scholz, P., & Banerjee, R. (2017). Sustainable green solvents and techniques for lipid extraction from microalgae: A review. *Algal Research, 21*, 138-147.

Kumar, V. L., & Singhal, A. (2009). Germinating seeds of the mung bean, *Vigna radiata* (Fabaceae), as a model for the preliminary evaluation of cytotoxic effects of drugs. *Biocell, 33*(1), 19-24.

Lalaurette, E., Thammannagowda, S., Mohagheghi, A., Maness, P.-C., & Logan, B. E. (2009). Hydrogen production from cellulose in a two-stage process combining fermentation and electrohydrogenesis. *international journal of hydrogen energy, 34*(15), 6201-6210.

Lanka, S., & Pydipalli, M. (2018a). Reduction of organic load from palm oil mill effluent (POME) using selected fungal strains isolated from POME dump sites. *Afr. J. Biotechnol, 17*(36), 1138-1145.

Lanka, S., & Pydipalli, M. (2018b). Reduction of organic load from palm oil mill effluent (POME) using selected fungal strains isolated from POME dump sites. *African Journal of Biotechnology, 17*(36), 1138-1145.

Lee, A. K., Lewis, D. M., & Ashman, P. J. (2012). Disruption of microalgal cells for the extraction of lipids for biofuels: processes and specific energy requirements. *Biomass and Bioenergy, 46*, 89-101.

Lee, J.-Y., Yoo, C., Jun, S.-Y., Ahn, C.-Y., & Oh, H.-M. (2010). Comparison of several methods for effective lipid extraction from microalgae. *Bioresource technology, 101*(1), S75-S77.

Lee, S. J., Yoon, B.-D., & Oh, H.-M. (1998). Rapid method for the determination of lipid from the green alga *Botryococcus braunii*. *Biotechnology techniques, 12*(7), 553-556.

Lee, S. Y., Cho, J. M., Chang, Y. K., & Oh, Y.-K. (2017). Cell disruption and lipid extraction for microalgal biorefineries: A review. *Bioresource technology, 244*, 1317-1328.

Lee, Z.-K., Li, S.-L., Lin, J.-S., Wang, Y.-H., Kuo, P.-C., & Cheng, S.-S. (2008). Effect of pH in fermentation of vegetable kitchen wastes on hydrogen production under a thermophilic condition. *international journal of hydrogen energy, 33*(19), 5234-5241.

Lek, B. L. C., Peter, A. P., Chong, K. H. Q., Ragu, P., Sethu, V., Selvarajoo, A., & Arumugasamy, S. K. (2018). Treatment of palm oil mill effluent (POME) using chickpea (*Cicer arietinum*) as a natural coagulant and flocculant: Evaluation, process optimization and characterization of chickpea powder. *Journal of environmental chemical engineering, 6*(5), 6243-6255.

Li, Yu, H.-Q., & He, Z. (2014). Towards sustainable wastewater treatment by using microbial fuel cells-centered technologies. *Energy & Environmental Science, 7*(3), 911-924.

Li, G., Chen, J., Yan, W., & Sang, N. (2017). A comparison of the toxicity of landfill leachate exposure at the seed soaking and germination stages on *Zea mays L.(maize)*. *Journal of Environmental Sciences, 55*, 206-213.

Liang, Y., Sarkany, N., & Cui, Y. (2009). Biomass and lipid productivities of *Chlorella vulgaris* under autotrophic, heterotrophic and mixotrophic growth conditions. *Biotechnology letters, 31*(7), 1043-1049.

Liau, B.-C., Shen, C.-T., Liang, F.-P., Hong, S.-E., Hsu, S.-L., Jong, T.-T., & Chang, C.-M. J. (2010). Supercritical fluids extraction and anti-solvent purification of carotenoids from microalgae and associated bioactivity. *The Journal of Supercritical Fluids, 55*(1), 169-175.

Liddell, J. (1994). Solvent extraction processes for biological products *Engineering Processes for Bioseparations*: Butterworth-Heinemann Ltd, Oxford.

Liew, W. L., Kassim, M. A., Muda, K., Loh, S. K., & Affam, A. C. (2015). Conventional methods and emerging wastewater polishing technologies for palm oil mill effluent treatment: a review. *Journal of environmental management, 149*, 222-235.

Lilly, V. G., & Barnett, H. L. (1951). Physiology of the fungi. *Physiology of the fungi.*

Lindmark, J., Lagerkvist, A., Nilsson, E., Thorin, E., & Dahlquist, E. (2014). Evaluating the effects of electroporation pre-treatment on the biogas yield from ley crop silage. *Applied biochemistry and biotechnology, 174*(7), 2616-2625.

Liu, D., Ding, L., Sun, J., Boussetta, N., & Vorobiev, E. (2016). Yeast cell disruption strategies for recovery of intracellular bio-active compounds—A review. *Innovative Food Science & Emerging Technologies, 36*, 181-192.

Liu, G., Lin, Q., Jin, X., Wang, X., & Zhao, Y. (2010). Screening and fermentation optimization of microbial lipid-producing molds from forest soils. *African Journal of Microbiology Research, 4*(14), 1462-1468.

Loginova, K., Vorobiev, E., Bals, O., & Lebovka, N. (2011). Pilot study of countercurrent cold and mild heat extraction of sugar from sugar beets, assisted by pulsed electric fields. *Journal of Food Engineering, 102*(4), 340-347.

Loretta, O., Stephen, E., Ezeata, A., & Usman, E. (2016). In vitro Biodegradation of palm oil mill effluent (POME) by *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Aspergillus niger*. *J Bioremediat Biodegrad, 7*(361), 2.

Louhasakul, Y., Cheirsilp, B., & Prasertsan, P. (2016). Valorization of palm oil mill effluent into lipid and cell-bound lipase by marine yeast *Yarrowia lipolytica* and their application in biodiesel production. *Waste and biomass valorization, 7*(3), 417-426.

Luengo, E., Martínez, J. M., Bordetas, A., Álvarez, I., & Raso, J. (2015). Influence of the treatment medium temperature on lutein extraction assisted by pulsed electric fields from *Chlorella vulgaris*. *Innovative Food Science & Emerging Technologies, 29*, 15-22.

Luo, S., Sun, H., Ping, Q., Jin, R., & He, Z. (2016). A review of modeling bioelectrochemical systems: engineering and statistical aspects. *Energies, 9*(2), 111.

Madani, M., Enshaeieh, M., & Abdoli, A. (2017). Single cell oil and its application for biodiesel production. *Process Safety and Environmental Protection, 111*, 747-756.

Madani, S., Gheshlaghi, R., Mahdavi, M. A., Sobhani, M., & Elkamel, A. (2015). Optimization of the performance of a double-chamber microbial fuel cell through factorial design of experiments and response surface methodology. *Fuel, 150*, 434-440.

Magdouli, S., Brar, S. K., & Blais, J.-F. (2016). Co-culture for lipid production: advances and challenges. *Biomass and Bioenergy, 92*, 20-30.

Mahmood, W. M. A. W., Theodoropoulos, C., & Gonzalez-Miquel, M. (2017). Enhanced microalgal lipid extraction using bio-based solvents for sustainable biofuel production. *Green Chemistry, 19*(23), 5723-5733.

Manzoor, F., Karbassi, A., & Golzary, A. (2019). Removal of Heavy Metal Contaminants from Wastewater by Using *Chlorella vulgaris* Beijerinck: A Review. *Current Environmental Management (Formerly: Current Environmental Engineering), 6*(3), 174-187.

Marina, B., Noor, A. I., & Aweng, E. R. (2013). Biodegradation of oily wastewater by pure culture of *Bacillus cereus*. *Journal of Agricultural and Biological Science, 8*(2), 108-115.

Marjakangas, J. M., Lakaniemi, A.-M., Koskinen, P. E., Chang, J.-S., & Puhakka, J. A. (2015). Lipid production by eukaryotic microorganisms isolated from palm oil mill effluent. *Biochemical Engineering Journal, 99*, 48-54.

Marquez, V., Mittal, G., & Griffiths, M. (1997). Destruction and inhibition of bacterial spores by high voltage pulsed electric field. *Journal of Food Science, 62*(2), 399-401.

Martin, O., Qin, B., Chang, F., Barbosa-Cánovas, G., & Swanson, B. (1997). Inactivation of *Escherichia coli* in skim milk by high intensity pulsed electric fields. *Journal of Food Process Engineering, 20*(4), 317-336.

Masi, M., Refregiers, M., Pos, K. M., & Pages, J.-M. (2017). Mechanisms of envelope permeability and antibiotic influx and efflux in Gram-negative bacteria. *Nature microbiology, 2*(3), 17001.

Mata, T. M., Martins, A. A., & Caetano, N. S. (2010). Microalgae for biodiesel production and other applications: a review. *Renewable and Sustainable Energy Reviews, 14*(1), 217-232.

Mehta, P., Singh, D., Saxena, R., Rani, R., Gupta, R. P., Puri, S. K., & Mathur, A. S. (2018). High-value coproducts from algae—An innovational way to deal with advance algal industry *Waste to wealth* (pp. 343-363): Springer.

Meng, X., Yang, J., Xu, X., Zhang, L., Nie, Q., & Xian, M. (2009). Biodiesel production from oleaginous microorganisms. *Renewable Energy, 34*(1), 1-5.

Meullemiestre, A., Breil, C., Abert-Vian, M., & Chemat, F. (2016). Microwave, ultrasound, thermal treatments, and bead milling as intensification techniques for extraction of lipids from oleaginous *Yarrowia lipolytica* yeast for a biojetfuel application. *Bioresource technology, 211*, 190-199.

Meullemiestre, A., Breil, C., Abert-Vian, M., & Chemat, F. (2017a). Manothermosonication as a useful tool for lipid extraction from oleaginous microorganisms. *Ultrasonics sonochemistry, 37*, 216-221.

Meullemiestre, A., Breil, C., Abert-Vian, M., & Chemat, F. (2017b). Manothermosonication as a useful tool for lipid extraction from oleaginous microorganisms. *Ultrasonics sonochemistry*.

Middelberg, A. P. (1995). Process-scale disruption of microorganisms. *Biotechnology advances, 13*(3), 491-551.

Miklavčič, D. (2012). Network for development of electroporation-based technologies and treatments: COST TD1104. *The Journal of membrane biology, 245*(10), 591-598.

Miklavčič, D., Šemrov, D., Mekid, H., & Mir, L. M. (2000). A validated model of in vivo electric field distribution in tissues for electrochemotherapy and for DNA electrotransfer for gene therapy. *Biochimica et Biophysica Acta (BBA)-General Subjects, 1523*(1), 73-83.

Milano, J., Ong, H. C., Masjuki, H., Chong, W., Lam, M. K., Loh, P. K., & Vellayan, V. (2016). Microalgae biofuels as an alternative to fossil fuel for power generation. *Renewable and Sustainable Energy Reviews, 58*, 180-197.

Minhas, A. K., Hodgson, P., Barrow, C. J., & Adholeya, A. (2016). A review on the assessment of stress conditions for simultaneous production of microalgal lipids and carotenoids. *Frontiers in microbiology, 7*, 546.

Mir, L. M., & Orlowski, S. (1999). Mechanisms of electrochemotherapy. *Advanced drug delivery reviews, 35*(1), 107-118.

Mishra, P., Ameen, F., Zaid, R. M., Singh, L., Ab Wahid, Z., Islam, M. A., . . . Al Nadhari, S. (2019). Relative effectiveness of substrate-inoculum ratio and initial pH on hydrogen production from palm oil mill effluent: Kinetics and statistical optimization. *Journal of cleaner production, 228*, 276-283.

Mlaik, N., Bouzid, J., Hassan, I. B., Woodward, S., Elbahri, L., & Mechichi, T. (2015). Unhairing wastewater treatment by *Bacillus pumilus* and *Bacillus cereus*. *Desalination and Water Treatment, 54*(3), 683-689.

Moen, G., Stensel, H. D., Lepistö, R., & Ferguson, J. F. (2003). Effect of solids retention time on the performance of thermophilic and mesophilic digestion of combined municipal wastewater sludges. *Water Environment Research, 75*(6), 539-548.

Mohammed, R. R., Ketabchi, M. R., & McKay, G. (2014). Combined magnetic field and adsorption process for treatment of biologically treated palm oil mill effluent (POME). *Chemical Engineering Journal, 243*, 31-42.

Mosqueda-Melgar, J., Raybaudi-Massilia, R. M., & Martín-Belloso, O. (2007). Influence of treatment time and pulse frequency on *Salmonella Enteritidis*, *Escherichia coli* and *Listeria monocytogenes* populations inoculated in melon and watermelon juices treated by pulsed electric fields. *International Journal of Food Microbiology, 117*(2), 192-200.

Mujtaba, G., Rizwan, M., Kim, G., & Lee, K. (2018). Removal of nutrients and COD through co-culturing activated sludge and immobilized *Chlorella vulgaris*. *Chemical Engineering Journal, 343*, 155-162.

Muniraj, I. K., Xiao, L., Hu, Z., Zhan, X., & Shi, J. (2013). Microbial lipid production from potato processing wastewater using oleaginous filamentous fungi *Aspergillus oryzae*. *Water research, 47*(10), 3477-3483.

Nanganuru, H. Y., Korrapati, N., & Prakash, B. M. (2012). Studies on the potential of *Bacillus subtilis* in the biodegradation of engine oil. *Journal of Chemical, Biological and Physical Sciences (JCBPS), 2*(3), 1599.

Narsetti, R., Curry, R. D., McDonald, K. F., Clevenger, T. E., & Nichols, L. M. (2006). Microbial inactivation in water using pulsed electric fields and magnetic pulse compressor technology. *IEEE Transactions on Plasma Science, 34*(4), 1386-1393.

Nayak, M., Karemore, A., & Sen, R. (2016). Performance evaluation of microalgae for concomitant wastewater bioremediation, CO_2 biofixation and lipid biosynthesis for biodiesel application. *Algal Research, 16*, 216-223.

Ng, Y. S., Lim, C. R., & Chan, D. J. C. (2016). Development of treated palm oil mill effluent (POME) culture medium for plant tissue culture of *Hemianthus callitrichoides*. *Journal of environmental chemical engineering, 4*(4, Part B), 4890-4896. doi:http://dx.doi.org/10.1016/j.jece.2016.05.004

Nizami, A., Rehan, M., Waqas, M., Naqvi, M., Ouda, O., Shahzad, K., Ismail, I. (2017). Waste biorefineries: Enabling circular economies in developing countries. *Bioresource technology, 241*, 1101-1117.

Nur, M. (2012). Potential of palm oil mill effluent (POME) as medium growth of *Chlorella sp* for bioenergy production. *Potential of Palm Oil Mill Effluent (POME) as Medium Growth of Chlorella sp for Bioenergy Production, 3*(2), 67-74.

Nur, M. (2014). Lipid extraction of microalga *Chlorella sp.* cultivated in palm oil mill effluent (POME) medium. *World Applied Sciences Journal, 31*(5), 959-967.

Nur, M. A., & Hadiyanto, H. (2015). Enhancement of *Chlorella vulgaris* biomass cultivated in POME medium as biofuel feedstock under mixotrophic conditions. *Journal of Engineering and Technological Sciences, 47*(5), 487-497.

Nwoko, O. C., Ogunyemi, S., & Nkwocha, E. (2010). Effect of pre-treatment of Palm oil Mill effluent (POME) and Cassava Mill Effluent (CME) on the Growth of Tomato (*Lycopersicum esculentum*). *Journal of Applied Sciences and Environmental Management, 14*(1).

Nwuche, C. O., Aoyagi, H., & Ogbonna, J. C. (2014a). Treatment of palm oil mill effluent by a microbial consortium developed from compost soils. *International scholarly research notices, 2014*.

Nwuche, C. O., Ekpo, D. C., Eze, C. N., Aoyagi, H., & Ogbonna, J. C. (2014b). Use of palm oil mill effluent as medium for cultivation of *Chlorella sorokiniana*. *Biotechnology Journal International*, 305-316.

Ogunwenmo, K., Oyelana, O., Ibidunmoye, O., Anyasor, G., & Ogunnowo, A. (2010). Effects of brewery, textile and paint effluent on seed germination of leafy vegetables-*Amaranthus hybridus* and *Celosia argentea* (*Amaranthaceae*). *J Biol Sci, 10*(2), 151-156.

Ohimain, E. I., & Izah, S. C. (2017). A review of biogas production from palm oil mill effluents using different configurations of bioreactors. *Renewable and Sustainable Energy Reviews, 70*, 242-253.

Ojo, E. O., Auta, H., Baganz, F., & Lye, G. J. (2015). Design and parallelisation of a miniature photobioreactor platform for microalgal culture evaluation and optimisation. *Biochemical Engineering Journal, 103*, 93-102.

Onumaegbu, C., Mooney, J., Alaswad, A., & Olabi, A. (2018). Pre-treatment methods for production of biofuel from microalgae biomass. *Renewable and Sustainable Energy Reviews, 93*, 16-26.

Organization, W. H. (2014). *Antimicrobial resistance: 2014 global report on surveillance*: World Health Organization.

Ortiz-Martínez, V., Salar-García, M., De Los Ríos, A., Hernández-Fernández, F., Egea, J., & Lozano, L. (2015). Developments in microbial fuel cell modeling. *Chemical Engineering Journal, 271*, 50-60.

Oswal, N., Sarma, P., Zinjarde, S., & Pant, A. (2002a). Palm oil mill effluent treatment by a tropical marine yeast. *Bioresource technology, 85*(1), 35-37.

Oswal, N., Sarma, P. M., Zinjarde, S. S., & Pant, A. (2002b). Palm oil mill effluent treatment by a tropical marine yeast. *Bioresource technology, 85*(1), 35-37. doi:http://dx.doi.org/10.1016/S0960-8524(02)00063-9

Padmaperuma, G., Kapoore, R. V., Gilmour, D. J., & Vaidyanathan, S. (2018). Microbial consortia: a critical look at microalgae co-cultures for enhanced biomanufacturing. *Critical reviews in biotechnology, 38*(5), 690-703.

Pan, L.-X., Yang, D.-F., Shao, L., Li, W., Chen, G.-G., & Liang, Z.-Q. (2009). Isolation of the oleaginous yeasts from the soil and studies of their lipid-producing capacities. *Food technology and Biotechnology, 47*(2), 215-220.

Pandey, A., Singh, M. P., Kumar, S., & Srivastava, S. (2019). Phycoremediation of Persistent Organic Pollutants from Wastewater: Retrospect and Prospects *Application of Microalgae in Wastewater Treatment* (pp. 207-235): Springer.

Pandey, S., Nautiyal, B., & Sharma, C. (2008). Pollution level in distillery effluent and its phytotoxic effect on seed germination and early growth of maize and rice. *Journal of Environmental Biology, 29*(2), 267.

Papazi, A., Andronis, E., Ioannidis, N. E., Chaniotakis, N., & Kotzabasis, K. (2012). High yields of hydrogen production induced by meta-substituted dichlorophenols biodegradation from the green alga *Scenedesmus obliquus*. *PLoS One, 7*(11), e49037.

Park, J.-Y., Park, M. S., Lee, Y.-C., & Yang, J.-W. (2015). Advances in direct transesterification of algal oils from wet biomass. *Bioresource technology, 184*, 267-275.

Patel, A., Karageorgou, D., Rova, E., Katapodis, P., Rova, U., Christakopoulos, P., & Matsakas, L. (2020). An Overview of Potential Oleaginous Microorganisms and Their Role in Biodiesel and Omega-3 Fatty Acid-Based Industries. *Microorganisms, 8*(3), 434.

Patel, A., Mikes, F., & Matsakas, L. (2018). An overview of current pretreatment methods used to improve lipid extraction from oleaginous microorganisms. *Molecules, 23*(7), 1562.

Pillet, F., Formosa-Dague, C., Baaziz, H., Dague, E., & Rols, M.-P. (2016). Cell wall as a target for bacteria inactivation by pulsed electric fields. *Scientific reports, 6*, 19778.

Pinto, R., Tartakovsky, B., & Srinivasan, B. (2012). Optimizing energy productivity of microbial electrochemical cells. *Journal of Process Control, 22*(6), 1079-1086.

Pinzi, S., Leiva, D., López-García, I., Redel-Macías, M. D., & Dorado, M. P. (2014). Latest trends in feedstocks for biodiesel production. *Biofuels, Bioproducts and Biorefining, 8*(1), 126-143.

Pirozzi, D., Ausiello, A., Zuccaro, G., Sannino, F., & Yousuf, A. (2013). *Culture of oleaginous yeasts in dairy industry wastewaters to obtain lipids suitable for the production of II-generation Biodiesel.* Paper presented at the Proceedings of World Academy of Science, Engineering and Technology.

Pirozzi, D., Ausielloa, A., Yousuf, A., Zuccaroa, G., & Toscanoa, G. (2014). Exploitation of Oleaginous Yeasts for the Production of Microbial Oils from Agricultural Biomass. *CHEMICAL ENGINEERING, 37*.

Pirozzi, D., Fiorentino, N., Impagliazzo, A., Sannino, F., Yousuf, A., Zuccaro, G., & Fagnano, M. (2015). Lipid production from *Arundo donax* grown under different agronomical conditions. *Renewable Energy, 77*, 456-462.

Pleissner, D., Lau, K. Y., & Lin, C. S. K. (2017). Utilization of food waste in continuous flow cultures of the heterotrophic microalga *Chlorella pyrenoidosa* for saturated and unsaturated fatty acids production. *Journal of cleaner production, 142*, 1417-1424.

Pliquett, U., Joshi, R., Sridhara, V., & Schoenbach, K. (2007). High electrical field effects on cell membranes. *Bioelectrochemistry, 70*(2), 275-282.

Powers, M. J., Sanabria-Valentín, E., Bowers, A. A., & Shank, E. A. (2015). Inhibition of cell differentiation in *Bacillus subtilis* by *Pseudomonas protegens*. *Journal of bacteriology, 197*(13), 2129-2138.

Qadeer, S., Mahmood, S., Anjum, M., Ilyas, N., Ali, Z., & Khalid, A. (2018). Synchronization of lipid-based biofuel production with waste treatment using oleaginous bacteria: A biorefinery concept. *Process Safety and Environmental Protection, 115*, 99-107.

Qi, F., Pei, H., Ma, G., Zhang, S., & Mu, R. (2016). Improving productivity and quality of biodiesel from *Chlorella vulgaris* SDEC-3M through customized process designs. *Energy conversion and management, 129*, 100-107.

Qin, B.-L., Zhang, Q., Barbosa-Canovas, G. V., Swanson, B. G., & Pedrow, P. D. (1994). Inactivation of microorganisms by pulsed electric fields of different voltage waveforms. *IEEE Transactions on Dielectrics and Electrical Insulation, 1*(6), 1047-1057.

Rajendhran, J., Krishnakumar, V., & Gunasekaran, P. (2002). Optimization of a fermentation medium for the production of *Penicillin* G acylase from *Bacillus sp*. *Letters in applied microbiology, 35*(6), 523-527.

Rajesh, P., Jadhav, D., & Ghangrekar, M. (2015). Improving performance of microbial fuel cell while controlling methanogenesis by *Chaetoceros* pretreatment of anodic inoculum. *Bioresource technology, 180*, 66-71.

Ramos, C., & Teissié, J. (2000). Electrofusion: a biophysical modification of cell membrane and a mechanism in exocytosis. *Biochimie, 82*(5), 511-518.

Rao, A. R., Dayananda, C., Sarada, R., Shamala, T., & Ravishankar, G. (2007). Effect of salinity on growth of green alga *Botryococcus braunii* and its constituents. *Bioresource technology, 98*(3), 560-564.

Raschke, D. (2010). *Pulsed electric fields-Influence on physiology, structure and extraction processes of the oleaginous yeast Waltomyces lipofer*. Dissertation. Universitat Berlin. Berlin. Germany.

Read, S. T., Dutta, P., Bond, P. L., Keller, J., & Rabaey, K. (2010). Initial development and structure of biofilms on microbial fuel cell anodes. *BMC microbiology, 10*(1), 1. doi:10.1186/1471-2180-10-98

Ren, X., Zhao, X., Turcotte, F., Deschênes, J.-S., Tremblay, R., & Jolicoeur, M. (2017). Current lipid extraction methods are significantly enhanced adding a water treatment step in *Chlorella protothecoides*. *Microbial Cell Factories, 16*(1), 26.

Reno, U., Regaldo, L., & Gagneten, A. M. (2020). Circular Economy and Agro-Industrial Wastewater: Potential of Microalgae in Bioremediation Processes *Valorisation of Agro-industrial Residues–Volume I: Biological Approaches* (pp. 111-129): Springer.

Rieder, A., Schwartz, T., Schön-Hölz, K., Marten, S. M., Süß, J., Gusbeth, C., . . . Frey, W. (2008). Molecular monitoring of inactivation efficiencies of bacteria during pulsed electric field treatment of clinical wastewater. *Journal of applied microbiology, 105*(6), 2035-2045.

Rittmann, B. E., Lee, H.-s., Zhang, H., Alder, J., Banaszak, J. E., & Lopez, R. (2008). Full-scale application of focused-pulsed pre-treatment for improving biosolids digestion and conversion to methane. *Water Science and Technology, 58*(10), 1895-1901.

Rodolfi, L., Biondi, N., Guccione, A., Bassi, N., D'Ottavio, M., Arganaraz, G., & Tredici, M. R. (2017). Oil and eicosapentaenoic acid production by the diatom *Phaeodactylum tricornutum* cultivated outdoors in Green Wall Panel (GWP®) reactors. *Biotechnology and bioengineering, 114*(10), 2204-2210.

Rout, P. R., Dash, R. R., Bhunia, P., & Rao, S. (2018). Role of *Bacillus cereus* GS-5 strain on simultaneous nitrogen and phosphorous removal from domestic wastewater in an inventive single unit multi-layer packed bed bioreactor. *Bioresource technology, 262*, 251-260.

Ruan, Z., Zanotti, M., Archer, S., Liao, W., & Liu, Y. (2014). Oleaginous fungal lipid fermentation on combined acid-and alkali-pretreated corn stover hydrolysate for advanced biofuel production. *Bioresource technology, 163*, 12-17.

Rude, M. A., & Schirmer, A. (2009). New microbial fuels: a biotech perspective. *Current opinion in microbiology, 12*(3), 274-281.

Ryckebosch, E., Muylaert, K., & Foubert, I. (2012). Optimization of an analytical procedure for extraction of lipids from microalgae. *Journal of the American Oil Chemists' Society, 89*(2), 189-198.

Sabirova, J. S., Haddouche, R., Van Bogaert, I., Mulaa, F., Verstraete, W., Timmis, K., Soetaert, W. (2011). The 'LipoYeasts' project: using the oleaginous yeast *Yarrowia lipolytica* in combination with specific bacterial genes for the bioconversion of lipids, fats and oils into high-value products. *Microbial biotechnology, 4*(1), 47-54.

Sack, M., Sigler, J., Frenzel, S., Eing, C., Arnold, J., Michelberger, T., . . . Müller, G. (2010). Research on industrial-scale electroporation devices fostering the extraction of substances from biological tissue. *Food Engineering Reviews, 2*(2), 147-156.

Sadabad, H. R., & Gholikandi, G. B. (2017). Harvesting direct electricity from municipal waste-activated sludge simultaneous with its aerobic stabilization process: Investigation and optimization. *Journal of environmental chemical engineering, 5*(1), 1174-1185.

Saenge, C., Cheirsilp, B., Suksaroge, T. T., & 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 Biochemistry, 46*(1), 210-218.

Safavi, S. M., & Unnthorsson, R. (2017). Enhanced methane production from pig slurry with pulsed electric field pre-treatment. *Environmental Technology*, 1-11.

Sahena, F., Zaidul, I., Jinap, S., Karim, A., Abbas, K., Norulaini, N., & Omar, A. (2009). Application of supercritical CO_2 in lipid extraction–A review. *Journal of Food Engineering, 95*(2), 240-253.

Saldaña, G., Álvarez, I., Condón, S., & Raso, J. (2014). Microbiological aspects related to the feasibility of PEF technology for food pasteurization. *Critical reviews in food science and nutrition, 54*(11), 1415-1426.

Sale, A., & Hamilton, W. (1967). Effects of high electric fields on microorganisms: I. Killing of bacteria and yeasts. *Biochimica et Biophysica Acta (BBA)-General Subjects, 148*(3), 781-788.

Salerno, M. B., Lee, H.-S., Parameswaran, P., & Rittmann, B. E. (2009). Using a pulsed electric field as a pretreatment for improved biosolids digestion and methanogenesis. *Water Environment Research, 81*(8), 831-839.

Salgado, J. M., Abrunhosa, L., Venâncio, A., Domínguez, J. M., & Belo, I. (2016). Combined bioremediation and enzyme production by *Aspergillus sp.* in olive mill and winery wastewaters. *International Biodeterioration & Biodegradation, 110*, 16-23. doi:http://dx.doi.org/10.1016/j.ibiod.2015.12.011

Samorì, G., Samorì, C., Guerrini, F., & Pistocchi, R. (2013). Growth and nitrogen removal capacity of *Desmodesmus communis* and of a natural microalgae consortium in a batch culture system in view of urban wastewater treatment: part I. *Water research, 47*(2), 791-801.

Sangeetha, J., Thangadurai, D., David, M., & Abdullah, M. A. (2016). Integrated Algal Industrial Waste Treatment and Bioenergy Co-Generation *Environmental Biotechnology* (pp. 175-246): Apple Academic Press.

Sapci, Z., & Morken, J. (2014). The effect of algae species on biodiesel and biogas production observed by using a data model combines algae cultivation with an anaerobic digestion (ACAD) and a biodiesel process. *Energy conversion and management, 79*, 519-524.

Sathishkumar, M., Binupriya, A. R., Baik, S. H., & Yun, S. E. (2008). Biodegradation of crude oil by individual bacterial strains and a mixed bacterial consortium isolated from hydrocarbon contaminated areas. *CLEAN–Soil, Air, Water, 36*(1), 92-96.

Sati, H., Mitra, M., Mishra, S., & Baredar, P. (2019). Microalgal lipid extraction strategies for biodiesel production: A review. *Algal Research, 38*, 101413.

Saulis, G. (2010). Electroporation of cell membranes: the fundamental effects of pulsed electric fields in food processing. *Food Engineering Reviews, 2*(2), 52-73.

Saunders, J. A., Matthews, B. F., & Miller, P. D. (1989). Plant gene transfer using electrofusion and electroporation. *Electroporation and Electrofusion in Cell Biology*, 343-354.

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

Schwenzfeier, A., Helbig, A., Wierenga, P. A., & Gruppen, H. (2013). Emulsion properties of algae soluble protein isolate from *Tetraselmis sp*. *Food Hydrocolloids*, *30*(1), 258-263.

Scott, S. D., Armenta, R. E., Berryman, K. T., & Norman, A. W. (2011). Use of raw glycerol to produce oil rich in polyunsaturated fatty acids by a *thraustochytrid*. *Enzyme and microbial technology, 48*(3), 267-272.

Shah, M. R., Lutzu, G. A., Alam, A., Sarker, P., Chowdhury, M. K., Parsaeimehr, A., . . . Daroch, M. (2018). Microalgae in aquafeeds for a sustainable aquaculture industry. *Journal of Applied Phycology, 30*(1), 197-213.

Shah, S., Ahmad, A., Othman, M., & Abdullah, M. (2016). Effects of palm oil mill effluent media on cell growth and lipid content of *Nannochloropsis oculata* and *Tetraselmis suecica*. *International Journal of Green Energy, 13*(2), 200-207.

Sheng, J., Vannela, R., & Rittmann, B. (2012). Disruption of *Synechocystis* PCC 6803 for lipid extraction. *Water Science and Technology, 65*(3), 567-573.

Sheng, J., Vannela, R., & Rittmann, B. E. (2011). Evaluation of cell-disruption effects of pulsed-electric-field treatment of *Synechocystis* PCC 6803. *Environmental science & technology, 45*(8), 3795-3802.

Shoaib, A., Bhran, A., Rasmey, A.-H., & Mikky, Y. (2018). Optimization of cultural conditions for lipid accumulation by *Aspergillus wentii* Ras101 and its transesterification to biodiesel: application of response surface methodology. *3 Biotech, 8*(10), 417.

Shuba, E. S., & Kifle, D. (2018). Microalgae to biofuels:'Promising'alternative and renewable energy, review. *Renewable and Sustainable Energy Reviews, 81*, 743-755.

Singh, R., Ibrahim, M. H., Esa, N., & Iliyana, M. (2010). Composting of waste from palm oil mill: a sustainable waste management practice. *Reviews in Environmental Science and Bio/Technology, 9*(4), 331-344.

Singleton, V. L., & Rossi, J. A. (1965). Colorimetry of total phenolics with phosphomolybdic-phosphotungstic acid reagents. *American journal of Enology and Viticulture, 16*(3), 144-158.

Soleimaninanadegani, M., & Manshad, S. (2014). Enhancement of Biodegradation of Palm Oil Mill Effluents by Local Isolated Microorganisms. *International scholarly research notices, 2014*.

Spilimbergo, S., Dehghani, F., Bertucco, A., & Foster, N. R. (2003). Inactivation of bacteria and spores by pulse electric field and high pressure CO_2 at low temperature. *Biotechnology and bioengineering, 82*(1), 118-125.

Sreeharsha, R. V., & Mohan, S. V. (2020). Obscure yet Promising Oleaginous Yeasts for Fuel and Chemical Production. *Trends in biotechnology*.

Srinophakun, P., Thanapimmetha, A., Rattanaphanyapan, K., Sahaya, T., & Saisriyoot, M. (2017). Feedstock production for third generation biofuels through cultivation of *Arthrobacter* AK19 under stress conditions. *Journal of cleaner production, 142*, 1259-1266.

Sriwongchai, S., Pokethitiyook, P., Kruatrachue, M., Bajwa, P. K., & Lee, H. (2013). Screening of selected oleaginous yeasts for lipid production from glycerol and some factors which affect lipid production by *Yarrowia lipolytica* strains. *The Journal of Microbiology, Biotechnology and Food Sciences, 2*(5), 2344.

Steriti, A., Rossi, R., Concas, A., & Cao, G. (2014). A novel cell disruption technique to enhance lipid extraction from microalgae. *Bioresource technology, 164*, 70-77.

Subhash, G. V., & Mohan, S. V. (2014). Lipid accumulation for biodiesel production by oleaginous fungus *Aspergillus awamori*: Influence of critical factors. *Fuel, 116*, 509-515.

Subhash, G. V., Rajvanshi, M., Kumar, B. N., Govindachary, S., Prasad, V., & Dasgupta, S. (2017). Carbon streaming in microalgae: extraction and analysis methods for high value compounds. *Bioresource technology, 244*, 1304-1316.

Suganya, T., Varman, M., Masjuki, H., & Renganathan, S. (2016). Macroalgae and microalgae as a potential source for commercial applications along with biofuels production: a biorefinery approach. *Renewable and Sustainable Energy Reviews, 55*, 909-941.

Sugiura, K., Ishihara, M., Shimauchi, T., & Harayama, S. (1996). Physicochemical properties and biodegradability of crude oil. *Environmental science & technology, 31*(1), 45-51.

Sun, M., Zhai, L.-F., Li, W.-W., & Yu, H.-Q. (2016). Harvest and utilization of chemical energy in wastes by microbial fuel cells. *Chemical Society Reviews*.

Tabassum, S., Zhang, Y., & Zhang, Z. (2015). An integrated method for palm oil mill effluent (POME) treatment for achieving zero liquid discharge – A pilot study. *Journal of cleaner production, 95*, 148-155. doi:http://dx.doi.org/10.1016/j.jclepro.2015.02.056

Taha, M. R., & Ibrahim, A. (2014). COD removal from anaerobically treated palm oil mill effluent (AT-POME) via aerated heterogeneous Fenton process: Optimization study. *Journal of Water Process Engineering, 1*, 8-16.

Tai, H. P., & Kim, K. P. T. (2014). Supercritical carbon dioxide extraction of Gac oil. *The Journal of Supercritical Fluids, 95*, 567-571.

Tanzi, C. D., Abert Vian, M., Ginies, C., Elmaataoui, M., & Chemat, F. (2012). Terpenes as green solvents for extraction of oil from microalgae. *Molecules, 17*(7), 8196-8205.

Tao, W., & Zhang, M. (2008). Physical methods for gene therapy, micro-and nano-manipulations: fundamentals with biomedical applications: Artech Publishing House.

Teissie, J., Eynard, N., Vernhes, M., Benichou, A., Ganeva, V., Galutzov, B., & Cabanes, P. (2002). Recent biotechnological developments of electropulsation. A prospective review. *Bioelectrochemistry, 55*(1), 107-112.

Thakur, C., Srivastava, V. C., & Mall, I. D. (2009). Electrochemical treatment of a distillery wastewater: Parametric and residue disposal study. *Chemical Engineering Journal, 148*(2), 496-505.

Thanh, L. T., Okitsu, K., Boi, L. V., & Maeda, Y. (2012). Catalytic technologies for biodiesel fuel production and utilization of glycerol: a review. *Catalysts, 2*(1), 191-222.

Thani, M., Hussin, R., Ibrahim, W., & Sulaiman, M. (1999). Industrial processes & the environment: crude palm oil industry, Handbook No. 3. *Department of Environment, Kuala Lumpur*, 7-54.

Theerachat, M., Tanapong, P., & Chulalaksananukul, W. (2017). The culture or co-culture of *Candida rugosa* and *Yarrowia lipolytica* strain rM-4A, or incubation with their crude extracellular lipase and laccase preparations, for the biodegradation of palm oil mill wastewater. *International Biodeterioration & Biodegradation, 121*, 11-18.

Thomann, R. V. (1989). Deterministic and statistical models of chemical fate in aquatic systems *Applied Mathematical Ecology* (pp. 322-351): Springer.

Tsang, Y. F., Kumar, V., Samadar, P., Yang, Y., Lee, J., Ok, Y. S., . . . Jeon, Y. J. (2019). Production of bioplastic through food waste valorization. *Environment international, 127*, 625-644.

Tsolcha, O. N., Tekerlekopoulou, A. G., Akratos, C. S., Aggelis, G., Genitsaris, S., Moustaka-Gouni, M., & Vayenas, D. V. (2017). Biotreatment of raisin and winery wastewaters and simultaneous biodiesel production using a *Leptolyngbya*-based microbial consortium. *Journal of cleaner production, 148*, 185-193.

Uldal, M., Andreas, L., & Lagerkvist, A. (2009). *Optimerad gasproduktion med elektroporation*: Svenskt gastekniskt center (SGC).

Uzel, A., Önçağ, Ö., Çoğulu, D., & Gençay, Ö. (2005). Chemical compositions and antimicrobial activities of four different Anatolian propolis samples. *Microbiological research, 160*(2), 189-195.

Valič, B., Pavlin, M., & Miklavčič, D. (2004). The effect of resting transmembrane voltage on cell electropermeabilization: a numerical analysis. *Bioelectrochemistry, 63*(1-2), 311-315.

Van Hamme, J. D., Odumeru, J. A., & Ward, O. P. (2000). Community dynamics of a mixed-bacterial culture growing on petroleum hydrocarbons in batch culture. *Canadian journal of microbiology, 46*(5), 441-450.

Vasconcelos, B., Teixeira, J. C., Dragone, G., & Teixeira, J. A. (2019). Oleaginous yeasts for sustainable lipid production—from biodiesel to surf boards, a wide range of "green" applications. *Applied microbiology and biotechnology, 103*(9), 3651-3667.

Venkataraman, A., Rosenbaum, M. A., Perkins, S. D., Werner, J. J., & Angenent, L. T. (2011). Metabolite-based mutualism between *Pseudomonas aeruginosa* PA14 and *Enterobacter aerogenes* enhances current generation in bioelectrochemical systems. *Energy & Environmental Science, 4*(11), 4550-4559.

Verma, P., & Sharma, M. (2016). Review of process parameters for biodiesel production from different feedstocks. *Renewable and Sustainable Energy Reviews, 62*, 1063-1071.

Vicente, G., Bautista, L. F., Rodríguez, R., Gutiérrez, F. J., Sádaba, I., Ruiz-Vázquez, R. M., . . . Garre, V. (2009). Biodiesel production from biomass of an oleaginous fungus. *Biochemical Engineering Journal, 48*(1), 22-27.

Vidal, O. (2014). First pulsed electric field (PEF) application at industrial scale in beet sugar industry. *Sugar Industry, 139*(64), 37-39.

Vijayaraghavan, K., Ahmad, D., & Ibrahim, M. K. B. (2006). Biohydrogen generation from jackfruit peel using anaerobic contact filter. *international journal of hydrogen energy, 31*(5), 569-579.

Wahlen, B. D., Willis, R. M., & Seefeldt, L. C. (2011). Biodiesel production by simultaneous extraction and conversion of total lipids from microalgae, cyanobacteria, and wild mixed-cultures. *Bioresource technology, 102*(3), 2724-2730.

Walde, P., Giuliani, A. M., Boicelli, C. A., & Luisi, P. L. (1990). Phospholipid-based reverse micelles. *Chemistry and physics of lipids, 53*(4), 265-288.

Wang, R., Xue, S., Zhang, D., Zhang, Q., Wen, S., Kong, D., . . . Cong, W. (2015a). Construction and characteristics of artificial consortia of *Scenedesmus obliquus*-bacteria for *S. obliquus* growth and lipid production. *Algal Research, 12*, 436-445.

Wang, Y., Yang, Y., Ma, F., Xuan, L., Xu, Y., Huo, H., . . . Dong, S. (2015b). Optimization of *Chlorella vulgaris* and bioflocculant-producing bacteria co-culture: enhancing microalgae harvesting and lipid content. *Letters in applied microbiology, 60*(5), 497-503.

Weaver, J. C., & Chizmadzhev, Y. A. (1996). Theory of electroporation: a review. *Bioelectrochemistry and bioenergetics, 41*(2), 135-160.

Weaver, J. C., Smith, K. C., Esser, A. T., Son, R. S., & Gowrishankar, T. (2012). A brief overview of electroporation pulse strength–duration space: A region where additional intracellular effects are expected. *Bioelectrochemistry, 87*, 236-243.

Weiland, P. (2010). Biogas production: current state and perspectives. *Applied microbiology and biotechnology, 85*(4), 849-860.

Wen, Q., Wu, Y., Cao, D., Zhao, L., & Sun, Q. (2009). Electricity generation and modeling of microbial fuel cell from continuous beer brewery wastewater. *Bioresource technology, 100*(18), 4171-4175.

Wu, Y., Mittal, G., & Griffiths, M. (2005). Effect of pulsed electric field on the inactivation of microorganisms in grape juices with and without antimicrobials. *Biosystems Engineering, 90*(1), 1-7.

Wu, Y., Zhou, S., Qin, F., Zheng, K., & Ye, X. (2010). Modeling the oxidation kinetics of Fenton's process on the degradation of humic acid. *Journal of hazardous materials, 179*(1), 533-539.

Xu, J., Du, W., Zhao, X., Zhang, G., & Liu, D. (2013). Microbial oil production from various carbon sources and its use for biodiesel preparation. *Biofuels, Bioproducts and Biorefining, 7*(1), 65-77.

Xu, L., Brilman, D. W. W., Withag, J. A., Brem, G., & Kersten, S. (2011). Assessment of a dry and a wet route for the production of biofuels from microalgae: energy balance analysis. *Bioresource technology, 102*(8), 5113-5122.

Xu, P., Qiao, K., Ahn, W. S., & Stephanopoulos, G. (2016). Engineering *Yarrowia lipolytica* as a platform for synthesis of drop-in transportation fuels and oleochemicals. *Proceedings of the National Academy of Sciences, 113*(39), 10848-10853.

Yang, X., Sun, W., Shen, H., Zhang, S., Jiao, X., & Zhao, Z. K. (2018). Expression of phosphotransacetylase in *Rhodosporidium toruloides* leading to improved cell growth and lipid production. *RSC advances, 8*(43), 24673-24678.

Yano, K.-i., Rems, L., Kotnik, T., Miklavčič, D., Weaver, J. C., Smith, K. C., . . . Levine, Z. A. (2017). Biological Responses *Bioelectrics* (pp. 155-274): Springer.

Yeo, S. K., & Liong, M. T. (2013). Effect of electroporation on viability and bioconversion of isoflavones in mannitol-soymilk fermented by *lactobacilli* and *bifidobacteria*. *Journal of the Science of Food and Agriculture, 93*(2), 396-409.

Yousuf, A. (2012). Biodiesel from lignocellulosic biomass–Prospects and challenges. *Waste Management, 32*(11), 2061-2067.

Yousuf, A., Khan, M. R., Islam, A., Monir, M. U., Ab Wahid, Z., & Pirozzi, D. (2017a). *Application of Electroporation Technique in Biofuel Processing.* Paper presented at the MATEC Web of Conferences.

Yousuf, A., Khan, M. R., Islam, M. A., Ab Wahid, Z., & Pirozzi, D. (2017b). Technical difficulties and solutions of direct transesterification process of microbial oil for biodiesel synthesis. *Biotechnology letters, 39*(1), 13-23.

Yousuf, A., Khan , M. R., Islam, M. A., Wahid, Z. A., & Pirozzi, D. (2016). Technical difficulties and solutions of direct transesterification process of microbial oil for biodiesel synthesis. *Biotechnology letters*.

Yousuf, A., Khan, M. R., Islam, M. A., Wahid, Z. A., & Pirozzi, D. (2017c). Technical difficulties and solutions of direct transesterification process of microbial oil for biodiesel synthesis. *Biotechnology letters, 39*(1), 13-23. doi:10.1007/s10529-016-2217-x

Yousuf, A., & Pirozzi, D. (2009). *Prospect of agro-industrial residues as feedstock of biodiesel.* Paper presented at the Developments in Renewable Energy Technology (ICDRET), 2009 1st International Conference on the.

Yousuf, A., Sannino, F., Addorisio, V., & Pirozzi, D. (2010). Microbial conversion of olive oil mill wastewaters into lipids suitable for biodiesel production. *Journal of agricultural and food chemistry, 58*(15), 8630-8635.

Yousuf, A., Sultana, S., Monir, M. U., Karim, A., & Rahmaddulla, S. R. B. (2017d). Social business models for empowering the biogas technology. *Energy Sources, Part B: Economics, Planning, and Policy, 12*(2), 99-109.

Yu, Z., Zhang, X., Ren, P., Zhang, M., & Qian, J. (2012). Therapeutic potential of irreversible electroporation in sarcoma. *Expert review of anticancer therapy, 12*(2), 177-184.

Yuan, Y., Wang, S., Liu, Y., Li, B., Wang, B., & Peng, Y. (2015). Long-term effect of pH on short-chain fatty acids accumulation and microbial community in sludge fermentation systems. *Bioresource technology, 197*, 56-63.

Yusaf, T., & Al-Juboori, R. A. (2014). Alternative methods of microorganism disruption for agricultural applications. *Applied Energy, 114*, 909-923.

Yusuf, R. O., Noor, Z. Z., Hassan, M. A. A., Agarry, S. E., & Solomon, B. O. (2013). A comparison of the efficacy of two strains of *Bacillus subtilis* and *Pseudomonas fragii* in the treatment of tannery wastewater. *Desalination and Water Treatment, 51*(16-18), 3189-3195.

Zbinden, M. D. A., Sturm, B. S., Nord, R. D., Carey, W. J., Moore, D., Shinogle, H., & Stagg-Williams, S. M. (2013). Pulsed electric field (PEF) as an intensification pretreatment for greener solvent lipid extraction from microalgae. *Biotechnology and bioengineering, 110*(6), 1605-1615.

Žgalin, M. K., Hodžić, D., Reberšek, M., & Kandušer, M. (2012). Combination of microsecond and nanosecond pulsed electric field treatments for inactivation of *Escherichia coli* in water samples. *The Journal of membrane biology, 245*(10), 643-650.

Zhan, Y., Martin, V. A., Geahlen, R. L., & Lu, C. (2010). One-step extraction of subcellular proteins from eukaryotic cells. *Lab on a chip, 10*(16), 2046-2048.

Zhang, C., Qi, J., & Cao, Y. (2014a). Synergistic effect of yeast-bacterial co-culture on bioremediation of oil-contaminated soil. *Bioremediation journal, 18*(2), 136-146.

Zhang, J., Fang, X., Zhu, X., Li, Y., Xu, H., Zhao, B., . . . Zhang, X. (2011). Microbial lipid production by the oleaginous yeast *Cryptococcus curvatus* O3 grown in fed-batch culture. *Biomass and Bioenergy, 35*(5), 1906-1911.

Zhang, K., Pei, Z., & Wang, D. (2016). Organic solvent pretreatment of lignocellulosic biomass for biofuels and biochemicals: a review. *Bioresource technology, 199*, 21-33.

Zhang, Q., Li, Y., & Xia, L. (2014b). An oleaginous endophyte *Bacillus subtilis* HB1310 isolated from thin-shelled walnut and its utilization of cotton stalk hydrolysate for lipid production. *Biotechnology for biofuels, 7*(1), 152.

Zhang, Y., Su, H., Zhong, Y., Zhang, C., Shen, Z., Sang, W., . . . Zhou, X. (2012). The effect of bacterial contamination on the heterotrophic cultivation of *Chlorella pyrenoidosa* in wastewater from the production of soybean products. *Water research, 46*(17), 5509-5516.

Zhang, Z., Jiaqiang, E., Deng, Y., Pham, M., Zuo, W., Peng, Q., & Yin, Z. (2018). Effects of fatty acid methyl esters proportion on combustion and emission characteristics of a biodiesel fueled marine diesel engine. *Energy conversion and management, 159*, 244-253.

Zhao, S., Wang, Y., Li, T., Zhang, S., & Cong, F. (2017). Exploration on Mixed Cultivation of *Lactobacillus*, Yeast and *Bacillus subtilis*. *Chemical and Biomolecular Engineering, 1*(2), 45.

Zhao, X., Hu, C., Wu, S., Shen, H., & Zhao, Z. K. (2011). Lipid production by *Rhodosporidium toruloides* Y4 using different substrate feeding strategies. *Journal of industrial microbiology & biotechnology, 38*(5), 627-632.

Zheng, Y., Yu, X., Zeng, J., & Chen, S. (2012). Feasibility of filamentous fungi for biofuel production using hydrolysate from dilute sulfuric acid pretreatment of wheat straw. *Biotechnology for biofuels, 5*(1), 50.

Zhu, L., Wang, Z., Shu, Q., Takala, J., Hiltunen, E., Feng, P., & Yuan, Z. (2013). Nutrient removal and biodiesel production by integration of freshwater algae cultivation with piggery wastewater treatment. *Water research, 47*(13), 4294-4302.

Zularisam, A., Ismail, A. F., Salim, M., Sakinah, M., & Hiroaki, O. (2007). Fabrication, fouling and foulant analyses of asymmetric polysulfone (PSF) ultrafiltration membrane fouled with natural organic matter (NOM) source waters. *Journal of Membrane Science, 299*(1), 97-113.