Minutes of the meeting of Board of Studies in Plant Science

Date: 15-4-2019 Time 10 .00 AM to 5.00 PM
Venue: Department of Plant Science,
Central University of Kerala, Periye-671316

Ref. CUK/ACA/BoS/187/2013/2019/1714/E5566 dated 05th February 2019

As per the CUK letter cited, Board of studies meeting was conduced on 15-4-2019 from 10.00 AM to 5.00 PM with the following members.

Members present

Dr. K. Arunkumar
Chairman, PLS-BOS

Prof. (Dr.) T. Parimelazhagan
Expert-Member, Department of Botany
Bharathira University, Coimbatore

Prof. (Dr.) G. R. Janardhana
Expert-Member,Department of Botany
University of Mysore
Mysore

Prof. (Dr.) V. Sivaram
Expert-Member, Department of Botany
Bangalore University
Bangarore

Prof. Dr. T. Dennis Thomas
Member

Dr. K. Ramachandran
Member

Dr. Ginny Antony
Member

Draft syllabus submitted by the Department of Plant Science was thoroughly gone through and discussed based on the CUK CBCS regulations. Accordingly the board unanimously passed the following resolutions.

- Resolved to approve the proposed syllabus for M.Sc Plant Science programme to be adopted from the Academic year 2019-2020.
- Specific Textbooks of 10 to 15 are limited to each course.
- The credits for core courses were decided as 60 credits and 12 credits for elective courses.
- Accordingly 13 core courses each carry 4 credits were finalized
- Suggestions in the course content by the expert members were included and coursers were accordingly revised.
- Recent topics in all courses were included as per the expert suggestions.

15/4/19

Dr. K. Arunkumar
Chairman, PLS-BOS

Prof. Dr. T. Dennis Thomas 15/4/19
Member

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Expert-Member

Dr. K. Ramachandran
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Expert-Member

Dr. Ginny Antony
Member 15/4/19

Prof. (Dr.) V. Sivaram
Expert-Member

BTY 5006	**BIOMASS AND BIOENERGY** (Credits 3; Theory 3 hrs)
AIM	This course aims to make the learners understand how plant biomass can be utilized to generate bioenergy
Objectives	➢ To understand the current International and national status of biofuel production ➢ To know the structure of cell wall polymers and their conversion to biofuel by efficient pretreatment methods ➢ To discuss the major bottlenecks in the biofuel productions from plants
Learning outcome	➢ The course is having great scope in current scenario of search for a sustainable energy resource. The learners will understand how plant biomass can be completely utilized for biofuel production cost effectively.
S.No	**Theory**
1	Fundamental concepts in understanding biofuel/bioenergy production- Various biofuels/bioenergy from biomass
2.	Bioenergy current status: National and international; Biofuel generations (first, second, third and fourth), Recent advances in second generation biofuel production and its advantages, Feedstocks. - Important bioenergy crops, agri-residues, oil seeds.
3	Plant cell walls: Renewable energy resource of biofuel; Derivation of cell walls and wall architecture- Cellulose, Hemicelluloses, Pectic polysaccharides, Hydroxycinnamates, mixed linked glucans, proteins and glycoproteins, Lignin, Value added products from lignin, suberin, cutin, waxes; Recalcitrance of cell wall
3	Cell wall profiling: Compositional analysis of cell wall using different biochemical and analytic methods such as HPLC, GC, FTIR etc.
4.	Biosynthesis of cell wall polymers-General mechanism of polymer assembly. Glycosyl transferases and polysaccharide synthases, regulation of polysaccharide synthesis; Wall polymers: Extraction and fractionation
5	Cell wall degradation- Biomass pretreatment; different pretreatment methods-Physical, Chemical, Biological, Recent advances in cost effective pretreatment methods; Microbial source for cell wall degrading enzymes: Cellulolytic, Xylanolytic and Ligninolytic microbes and their identification.
6	Saccharification and fermentation: Estimation of the saccharification efficiency of the pretreated biomass; Factors affecting saccharification, Simultaneous saccharification and Fermentation.
7	Modification/ engineering of plant cell wall for better fuel production: Hemicellulose and Lignin engineering
8	Environmental and economic aspects: Environmental impacts of biofuel production; Value-added processing of biofuel

	residues and co-product
9	Policies and regulations on biofuel production; biofuel polices, underlying drivers, technical standardisation

Text Books:

1. Goldstein WE. 2016. The Science of Ethanol:CRC Press;
2. Fry SC. 2001. The Growing Plant Cell Wall: Chemical and Metabolic Analysis The Blackburn Press
3. Hayashi T. 2006. The Science and Lore of the Plant Cell Wall: Biosynthesis, Structure and Function Brown Walker Press
4. Linskens HF and Jackson, JF. 2011. Plant Cell Wall Analysis. Springer; Softcover reprint of the original 1st ed. 1996 edition
5. Ahluwalia VK 2018. Renewable Energy In india; Impacts and Responses for the Built Environment. Booh Shores, ,second edition
6. Singh RS and Pandey A. 2017. Biofuels Production and future Prospectives. Edgard gnansounou, crc press
7. Shoukat S. 2011. Progress In Biomass and Bioenergy Production:vol 7,IntechOpen
8. Khanna M and Zilberman D. 2017. Handbook of Bioenergy Economics and Policy: Springer
9. Marco Aurelio Dos Santos Bernardes. 2011. Biofuel production:;Recent Developments and Prospects:vol 8,IntechOpen
10. Lima MAP, Policastro Natalense AP. 2012. Bioethanol:Intech,
11. Albersheim P, Darvill A, Roberts K, Sederoff R and Staehelin A. 2010. Plant Cell Walls. Garland Science; 1 edition
12. Li Y and S.K. Khanal SK. 2016. Bioenergy: Principles and Applications. ISBN 9781118568316 (paper) / 9781118568378 (epub). Wiley Blackwell
13. Vairavan K, Thukkaiyannan P, Paramathma M Venkatachalam P, Sampathrajan A. 2007. Biofuel Crops: Cultivation and Management (Jatropha, Sweet Sorghum and Sugarbeet) Published by Agrobios