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Notice for the PhD Viva-Voce Examination

Mr Christine Kurian (Registration Number: 1981801), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend his PhD thesis at the public viva-voce examination on Wednesday, 18 September 2024 at 11.00 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**A Study on the Utilization of Lactic Acid Bacteria Fermented Seaweed as Aqua Feed for Growth and Disease Resistance in *Oreochromis Niloticus***
Discipline	:	**Zoology**
External Examiner (Outside Karnataka)	:	**Dr K Karthikeyan** Principal Scientist and Head Gujarat Institute of Desert Ecology Mundra Road, Bhuj Gujarat
External Examiner (Within Karnataka)	:	**Dr Gangadhar Barlaya** Professor and Principal Scientist Central Institute of Freshwater Aquaculture Hesaraghatta, Bengaluru Karnataka
Supervisor	:	**Dr Paari K A** Assistant Professor Department of Life Sciences School of Sciences CHRIST (Deemed to be University) Bengaluru – 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar

Place: Bengaluru
Date: 09 September 2024

ABSTRACT

Consumption of fermented foods are known to provide various health benefits. Fermentative microbes present in traditional foods are reported to confer health benefits. The present study was aimed to isolate a novel potent probiotic strain from the homemade fermented Indian recipe Moor Kuzhambu and Pickle, and its characterization to elucidate the efficacy of isolate in cholesterol and heavy metal reduction. Cultures isolated from Pickle (CK2) and Moor Kuzhambu (CK3) were identified as different strains of Pediococcus pentosaceus using 16S rDNA sequence based bacterial identification method. The isolated strains exhibited tolerance to gastric juice and was able to exhibit a broad range of tolerance to varying temperatures, pH, NaCl, solvent, phenol, trypsin, and artificial gastric juice. Cell surface studies such as auto aggregation, co-aggregations, and cell surface hydrophobicity determined the ability of the strains to aggregate on to intestinal cell surface and manifest competitive pathogen displacement. Remarkable biofilm reduction of 48% to 80% was observed in the probioticsupplemented samples. Similarly, a reduction of 80% to 85% free cholesterol was noted in cholesterol assimilation assays, and heavy metal (Cu+, Pb+, Zn+ & Fe+) assimilation ability was observed. Pediococcus pentosaceus MK459541 strain CK2 and (MK459539) CK3 were assessed for EPS synthesis, structural characteristics, antioxidant properties and heavy metal assimilation abilities. Maximum yield of EPS was observed in carbon source Xylose for CK3 and fructose for CK2. Similarly, EPS production was found to maximum when bacteria were supplemented with meat extract (CK2) and yeast extract (CK3). FTIR results exhibited the presence of functional groups such as Imine/Oxime group, carboxylic group, Halo groups, Nitro compounds, etc.

Further studies on EPS CK2 and EPS CK3 revealed a strong antioxidant capacity of 73.92% to 97.75%. Heavy metal assimilation ability of the EPS was found to be strong and in decreasing order as follows Cu+, Fe+ and Zn+. Monosaccharides analysis revealed that the isolated EPS are heterogenic in nature with monomers such as Ribose, Ribulose, Xylose, Mannose, Rhamnose, etc. The study investigated the efficacy of fermented seaweed Sargassum wightii and Gracilaria corticata as aquafeed in the growth and development of Nile tilapia (Oreochromis niloticus). Fermentation parameters optimized using RSM revealed that Pediococcus infused seaweeds displayed enhanced yields of protein, reducing sugars, and lipid. Fermented seaweeds were observed to have higher antioxidant activity in SWSG_CK2, SWSG_CK3 and SWGR_CK2, SWGR_CK3 compared to non-fermented seaweeds. The growth performance of Nile tilapia (O. niloticus) was assessed through 56-day trials in which a significant difference of 25 % to 35 % weight gain was observed between the fermented seaweed fed group and the nonfermented seaweed fed groups. The formulated feed fed group also conferred to have resilience against Vibrio harveyi and Aeromonas hydrophila in challenge studies allowing it to be developed as a sustainable, eco-friendly aquatic functional feed.

Keywords: Probiotics, lactic acid bacteria characterization, exopolysaccharides, seaweed fermentation, solid state fermentation, feed formulation.

Publications:

1. **Christine Kurian** and Kuppusamy Alagesan Paari. Cholesterol reduction and heavy metal assimilation characteristics of Pediococcus pentosaceus strains isolated from pickle and moorkuzhambu.2023, Malaysian Journal of Microbiology. 19 (2), 101-114. Published (Scopus indexed), DOI: http://dx.doi.org/10.21161/mjm.220091
2. **Christine Kurian**, Anandi Mathur, KuppusamyAlagesan Paari. Dietary Factors in Fermented Foods and their Efficacy in Disease Management.2022, Current Nutrition & Food Science. 18 (2), 144-165. Emerging Sources Citation Index (ESCI), Scopus Indexed), DOI: https://doi.org/10.2174/1573401318666220118144750.
3. Desai, S., **Kurian, C.**, Das, S., Rebello, S., Acharyya, S., & Paari, K. (2023). A Revitalising Approach towards Aging: Unveiling the Potential Use of Probiotics for Wellness in Elderly Populations. Journal of Health Science and Medical Research, 0, e20231015. Published (Scopus indexed), doi:http://dx.doi.org/10.31584/jhsmr.20231015.
4. Swati Soni, Anvil Jennifer W, **Christine Kurian**, Prapti Chakraborty, Kuppusamy Alagesan Paari.Food Additives and Infant Foods: A Critical Review About Their Health Risk, Trends and Recent Developments. Food Production, Processing and Nutrition, 2023. Springer (Emerging Sources Citation Index (ESCI), Scopus Indexed), Manuscript ID FPPN-D-23-00294.
5. Thejaswi Bhandary, **Christine Kurian**, Magesh Muthu, Asha Anand, Thirunavukarasou Anand and Kuppusamy Alagesan Paari. Exopolysaccharides Derived from Probiotic Bacteria and their Health Benefits. 2023, J Pure Appl Microbiol. 17 (1), 35-50. (Scopus Indexed), https://doi.org/10.22207/JPAM.17.1.40
6. Gauri S Khatri, **Christine Kurian**, Asha Anand and Paari K A. Gut Homeostasis; Microbial Cross Talks in Health and Disease Management. 2021, Current Research in Nutrition and Food Science. (Emerging Sources Citation Index (ESCI), Scopus Indexed), Doi: