


CERTIFICATE


I certify that the thesis entitled "**Development and Evaluation of *Ulva Lactuca* Based Probiotic Beverage and *In Vitro* Bioavailability of Iron Using Caco-2 Cell Model**" submitted for the degree of Doctor of Philosophy (Ph.D.) in Food Science and Nutrition by **Guntiboina Karishma Yadav, Ph. D Scholar**, Department of Food Science and Nutrition is the record of research work carried out by her during the period from 2018 to 2024 under my guidance and supervision, and that this work has not formed the basis for the award of any Degree/ Diploma/ Associateship/ Fellowship or other Titles in this Institute or any other University or Institution of higher learning.



Signature of the
Head of the Department



Signature of the
Supervisor with designation

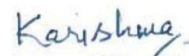


Signature of the Dean
School of Home Science

DECLARATION

I declare that this thesis entitled "**Development and Evaluation of *Ulva Lactuca* Based Probiotic Beverage and *In Vitro* Bioavailability of Iron Using Caco-2 Cell Model**" submitted by me for the award of the degree of **Doctor of Philosophy (Ph.D.)** in Food Science and Nutrition is the record of work carried out by me during the period from 2018 to 2024 under the guidance of **Dr. S. Kowsalya** Professor, Department of Food Science and Nutrition and former Registrar, Avinashlingam Institute for Home Science and Higher Education for Women, Coimbatore and has not formed the basis for the award of any Degree or Diploma, Associateship or Fellowship or other Titles in this Institute or any other University or other similar Institution of higher Learning.


Signature of the Supervisor


Signature of the Candidate

ACKNOWLEDGEMENT

First and foremost, the investigator places her humble salutations at the feet of God Almighty for his manifold blessings and infinite grace showered on her throughout the study and also providing adequate strength and courage which helped her to overcome the hurdles, enabled her towards the successful completion of the study.

The author expresses her profound sense of gratitude and due respect to **Padma Bhushan late Sri Dr. T.S. Avinashilingam Ayya Avargal., Founder President** and the **first Chancellor** of Sri Avinashilingam Educational Trust and Institutions for providing this Temple of Learning.

The author places her reverential gratitude to the first Vice Chancellor of the Institute **Padma Shri late Dr. Rajammal P. Devadas, MSc, MA, Ph.D., Former Chancellor**, an International Home Scientist and Nutritionist, a dynamic administrator, true philosopher and great academician for heavenly blessings.

The investigator owes her reverential gratitude and sincere thanks to a dynamic administrator and great academician, **Padma Shri late Dr. P. R. Krishna Kumar, Former Chancellor**, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for heavenly blessings and for having provided the infrastructure and all amenities to conduct the study.

The investigator expresses her profound sense of gratitude and sincere thanks to **Prof. S. P. Thyagarajan, D.Sc., Ph.D. and M.D. former Chancellor**, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for facilitating and providing the possible amenities for the smooth conduct of the study.

The author places her deep sense of gratitude and sincere thanks to **Sri. Dr. T.S.K. Meenakshisundaram, M.A., M.Phil., Ph.D., Managing Trustee and Chancellor**, Avinashilingam Institute for Home science and Higher Education for Women University, Coimbatore, for having provided the infrastructure and all amenities to conduct the study.

She expresses her sincere thanks to **Dr. Premavathy Vijayan, M.Sc., M.Ed., Dip. Spl. Edn., M.Phil., Ph.D., Former Vice Chancellor**, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for providing all the facilities and support required for completion of the study.

The author expresses her deep sense of gratitude and sincere thanks to **Dr. V. Bharathi Harishankar, M.A., M.Phil., Ph.D., FRSA, Vice Chancellor,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for providing infrastructural facilities and support for the conduct of the study.

She expresses her grateful thanks to **Dr. Indu H, M.Sc, M.Ed, M.Phil, Ph.D, MBA, Registrar,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for providing all the help and support for the conduct of the study.

The author expresses her gratitude to **Dr. K. Manimozhi, M.Sc., B.Ed., M.Phil., Ph.D., former Controller of Examinations** and **Dr. K. Sambath Rani M.R.Sc., M.Phil., M.Ed., Ph.D., NET, Controller of Examinations,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for extending all possible help towards the submission of this work.

The author expresses her gratitude to **Dr. G.P. Jeyanthi, M.Sc., M.Phil., Ph.D., Former Research and Consultancy** and **Dr. P. Lalitha, M.Sc., M.Phil., Ph.D., Director Research and Development,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for her help and valuable suggestions, timely support and guidance during the tenure of my research work.

The investigator owes her heartfelt thanks and a deep sense of gratitude to **Dr. N. Vasugi, M.Sc., M.Phil., Ph.D., Former Dean, Faculty of Home Science,** and **Dr. S. Amsamani, Dean School of Home Science,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for their kind and positive approach and support and encouragement to execute this research work.

The investigator would like to express her humble note of thanks to **Dr. A. Thirumani Devi, M.Sc, M.Phil., Ph.D., Professor, Former Head,** Department of Food Science and Nutrition and **Dr. M. Sylvia Subapriya, M.Sc, M.Phil., B.Ed., Ph.D. Professor and Former Head** of the Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women Coimbatore for their continued guidance, patience and support throughout the study period.

The author would like to express her sincere gratitude to **Dr. C.A. Kalpana M.Sc., B.Ed., M.Phil., Ph.D., SLET., NET, Professor & HOD, Deputy Dean, School of Home Science,** Avinashilingam Institute for Home Science and Higher Education for

Women Coimbatore, for her constant encouragement, motivation and support, throughout the period of the study.

The researcher feels extremely happy and fortunate to place on record her deep sense of gratitude to **Dr. S. Kowsalya, M.Sc., M.Phil., Ph.D, former Registrar and Professor** Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for her methodical guidance, constant encouragement, her patience advice in every stage of work, explicit guidance, motivation, skilful instructions and suggestions throughout the study period. She provided the spirit of confidence and gain deep knowledge in the field of research and great concern that made this research works a successful and memorable one. She expresses her sincere gratitude for her immense care and support in all pros and cons through our astounding journey and especially during pandemic and tough periods of the study.

The investigator expresses her deep appreciation to all the **Faculty** members of the Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women for their extended support, warmth and valuable suggestions rendered during her study.

The author expresses her thanks to **University Grants Commission (UGC)**, for providing **Swami Vivekananda Single Girl Child Fellowship for Research in Social Sciences** to carry out the research work.

With a deep sense of gratitude and honesty, the researcher places her immense gratitude and heartfelt sincere thanks to fellow **Ph. D Scholars** and **Lab Assistants**, Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, who had also been part of the journey during the crucial hours of the study, submission and also rendering their constant and timely support.

She expresses her heartfelt and everlasting love and gratitude to her beloved **Parents, Husband** and all **family members** for their unconditional love, prayers, courtesy, wishes and sacrifice. She is indebted for their support, encouragement and patience during tough times. Without their motivation and inspiration, this level of academic achievement could not be accomplished.

Guntiboina Karishma Yadav