



# PROCEEDINGS



## 8<sup>th</sup> International Conference on Multidisciplinary Approaches -2021

*“Multidisciplinary Perspective for Re-emerging with Resilience,  
Perseverance and Adaptability for a Sustainable Future”*

Organized by  
Faculty of Graduate Studies  
University of Sri Jayewardenepura  
Nugegoda, Sri Lanka

22<sup>nd</sup> & 23<sup>rd</sup> November 2021

# **International Conference on Multidisciplinary Approaches – 2021**

**“Multidisciplinary Perspective for Re-emerging with  
Resilience, Preservance and Adaptability for a Sustainable  
Future”**

## **Conference Proceedings**

**22<sup>nd</sup> & 23<sup>rd</sup> November 2021**

Faculty of Graduate Studies  
University of Sri Jayewardenepura  
Nugegoda, Sri Lanka

Proceedings of the 8<sup>th</sup> International Conference on Multidisciplinary Approaches  
(iCMA) – 2021

Faculty of Graduate Studies  
University of Sri Jayewardenepura  
Nugegoda  
Sri Lanka

122 Pages

ISSN: 2386 – 1509

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Published by:  
Faculty of Graduate Studies, University of Sri Jayewardenepura, Nugegoda,  
Sri Lanka

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Official website of the Conference

<http://www.graduate.sjp.ac.lk/icma>

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## MESSAGE FROM THE VICE-CHANCELLOR

It is with great delight that I provide a message for the 8<sup>th</sup> International Conference on Multidisciplinary Approaches (*iCMA*) - 2021, which is one of the leading research events of the Faculty of Graduate Studies of the University of Sri Jayewardenepura.

The theme selected for this year's conference; "Multidisciplinary Perspective for re-emerging with Resilience, Perseverance and Adaptability for a Sustainable Future" is timely and of high significance. By conducting this conference virtually for the second consecutive time, I strongly believe that the Faculty of Graduate Studies of the University of Sri Jayewardenepura fulfilled their academic mission as well as the research demand of the University.

I am happy to note that the academics of the University of Sri Jayewardenepura stands out in the field of research and we have strengthened our position in the world university rankings as well. Furthermore, as a University, we play a prominent role in producing quality graduates, postgraduates as well as leaders equipped with adequate knowledge on multidisciplinary approaches who can drive forward innovation in the country. In this sense, *iCMA* 2021 will be a prolific experience again like the previous conferences.

The Faculty of Graduate Studies has taken a great effort in organizing this conference for the eighth consecutive time and is bearing an important responsibility in inspiring the research culture and output of this nation. Thus, my sincere gratitude goes to the organizing committee of the *iCMA* 2021 for their tireless effort in ensuring the success of this event. I am sure that *iCMA* 2021 will be a fruitful event which will benefit all participants and the country.

**Senior Professor Sudantha Liyanage**

*BSc (Hons) (USJ), PhD (Cardiff), C Chem, FRSC, FIChem C, FPRISL*

Vice-Chancellor

University of Sri Jayewardenepura

## MESSAGE FROM THE CONFERENCE CHAIR

It gives me great pleasure to send this message as Dean of the University of Sri Jayewardenepura's Faculty of Graduate Studies and Chair of the Organizing Committee for the 8th International Conference on Multidisciplinary Approaches (iCMA – 2021). The Faculty of Graduate Studies (FGS) of the University of Sri Jayewardenepura has come a long way in a relatively short period of time since its original conception in 1996, and is on track to achieving its mission: 'to produce high caliber professionals with knowledge and skills by designing and providing innovative courses, achieving excellence in teaching, research, and scholarship through local and global partnerships for the larger community'. The University of Sri Jayewardenepura's Faculty of Graduate Studies (FGS) is the official coordinating body for postgraduate academic and research programs. The FGS conducts the iCMA conference since it is partnered with nine Boards of Studies that cover all of the University's academic disciplines (i.e., Board of Studies in Humanities, Social Sciences, Management Studies & Commerce, Physical Sciences, Life Sciences, Medical Sciences, Engineering, Industrial Technology, and Multidisciplinary Studies).

FGS hosts the International Conference on Multidisciplinary Approaches (iCMA) to bring together academics and industry professionals working on multidisciplinary projects. I am delighted to announce that this year's iCMA - 2021, the eighth consecutive international conference, will be held under the theme "Multidisciplinary Perspective for Re-emerging with Resilience, Perseverance, and Adaptability for a Sustainable Future," a highly contemporary theme for the year 2021 that summarizes the major international and national regions of high significance.

Let me express my sincere appreciation to the Chief Guest, Vice-Chancellor Snr. Prof. Sudhantha Liyanage, and the University of Sri Jayewardenepura for providing all of the infrastructure and facilities that allowed us to successfully organize this conference. In addition, I'd like to express my gratitude to Prof. Dominic Roser of the University of Fribourg, Switzerland, for addressing at the iCMA - 2021.

We received over 120 abstracts in this year's conference, and 89 were accepted for oral presentations in six specific disciplines. Because the country's COVID-19 pandemic condition, the conference will be held in a hybrid format, with all oral presentations presented via a virtual platform. As a result, I respectfully request that you all participate virtually, sharing your experiences, views, and understandings in terms of improving your and our knowledge. Thank you so much for your dedication and commitment in making iCMA - 2021 a success.

**Senior Professor M. M. Pathmalal**

Dean & Conference Chair, Faculty of Graduate Studies  
University of Sri Jayewardenepura

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## **Engineering, Physical Sciences and Technological Innovation**



# A NON-INTRUSIVE LOW-COST REMOTE MONITORING AND CONTROLLING SYSTEM FOR ELECTRICAL APPLIANCES

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## Abstract

Smart energy meters help consumers easily monitor their total energy consumption. However, these meters do not provide a detailed breakdown of energy consumed by individual appliances and cannot be used to turn off connected devices remotely. This paper proposes a non-intrusive load monitoring (NLM) and controlling system for small-home owners. Although various NLM solutions were proposed in the past, their results have often been obtained via simulations and by performing tests in controlled laboratory environments. Thus, the real-world applicability of existing solutions in the literature remains a question. Moreover, a solution that incorporates NLM and remote controlling are yet to be developed. The proposed solution in this paper consists of a plug-and-play type product and a user-friendly mobile application. Not only can our proposed method identify electrical appliances individually, but it can also change their operating status remotely. The system comprises a data acquisition unit, a controlling module, a mobile application, and a low-complexity heuristic algorithm. The energy signatures of different appliances are captured by the current transformer of the data acquisition unit. A 12-bit analog-to-digital converter and the ESP 32 module are used to process and relay the information to the database for analysis. The developed algorithm distinguishes individual appliances by evaluating the captured signals' current and power factor values. A detailed energy report is then presented to the consumer via the mobile application. A solid-state relay is used within the control module to manage the operating state of the circuit breakers. The control module was carefully fabricated to be housed within existing distribution boards. The mobile application allows the user to change the operating status of the appliances with a single touch. Actual experiments were performed with multiple appliances both in a laboratory environment and in true consumer premises to verify the accuracy of the proposed system.

**Keywords:** *electrical load identification, control, data acquisition, mobile application, remote sensing, NILM, appliance monitoring, energy reporting*



# A SMART METHOD OF ESTIMATING THE MATURITY OF TEA LEAVES

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## **Abstract**

In the agriculture sector, the most labor-intensive tasks are now being replaced by modern technology. One example is the semi-automated tea harvesting machine, which was recently introduced by the Tea Research Institute (TRI) of Sri Lanka. The "matureness of plucked tea leaves" is considered to be an important property in the tea industry. . However, detecting maturity by visual inspections requires skilled labor with trained eyes, becoming scarce in recent years. Although semi-automated tea harvesting machines can perform the task of several labours, due to inherent limitations, manual sorting is often required to remove mature foliage and twigs from the harvested crop.. Thus, we propose a novel automated system that can correctly distinguish between mature and immature leaves at the time of harvesting. Our system uses contact imaging technique and a newly developed Neural Network (NN). A simple apparatus with an adjustable platform that helps in aligning the mobile phone camera, the backlight source, and the leaves was designed to demonstrate the proposed system's validity. The use of contact imaging ensured that environmental conditions had little influence over captured images. Literature indicates that the matureness of leaves can be determined by analyzing the color spectrum of the captured images, albeit limited studies have explored tea leaves. Thus, most correlated color indexes extracted from the photos taken were selected as features for the learning algorithm. Tests were performed using selectively captured images (i.e. sample) of 450 tea leaves from some tea estates in Badulla district. While 80% of the sample were used for training, the remaining 20% was used for testing. Overall, the system achieved accuracy of over 95%. The proposed system can also be integrated within any semi-automated machine or used separately as a sorting machine. A mobile application was developed to show real-time results in the smartphone.

**Keywords:** *Contact Imaging, Matureness of leaves, Neural Network*

# CORRELATION BETWEEN SPT-N VALUE AND FRICTION ANGLE FOR THE SRI LANKAN CONTEXT

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## Abstract

The Standard Penetration Test (SPT) N value is the main parameter use in empirical equations to predict the shear strength parameter of soil. These empirical equations are generalized based on the selected published data/tests from different sources having inconsistency of test material, test procedures and data interpretation. Hence it is very difficult to predict the outcomes of those relations without justifying them for local conditions. As such Sri Lanka as a tropical country, applicability of such empirical correlations developed by other countries is questionable. Hence the local soil may follow previous correlations with slight deviation or may not follow the trend at all this research has the aim to establish a correlation between SPT-N value and internal friction angle for the local context. For this study, 25 soil samples were collected and followed by laboratory testing and classified the soil type, determine the shear strength parameters, moisture content, bulk density, dry density etc. Laboratory test results and relevant SPT-N values were modelled using SPSS software under regression analysis. Square root SPT- N value and friction angle show the highest meaningful relationship. For the developed correlation, the reliability index value was 0.857, Kendall's tau \_b, Spearman's rho, and Pearson correlation values were 0.833, 0.924 and 0.924 respectively. Comparison results show proposed correlation is in the range of existing predictors indicating its accuracy. Hence, the proposed correlation will give a quick and easy approach to determine the internal friction angle in local context.

**Keywords:** *SPT N, Friction Angle, Correlations, Local Context, SPSS*

# EXPLORING LEAN CONSTRUCTION AS AN INNOVATION FOR CONSTRUCTION INDUSTRY RESILIENCE

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## Abstract

Construction Industry is often accompanied with unsustainability due to various reasons including slow adaptability to innovations. This aggravates during crises such as the current pandemic, questioning the resilience of the industry in the face of uncertainty. Compared to construction sector, production sector seems to be showing more resilience to crises suggesting that Construction Industry has the room to learn from the Production Sector and can adapt and emulate strategies and models. Further, a narrow, product and process focused definition of innovation alone is not sufficient to understand the needed responses to an economic crisis, therefore, a multi-disciplinary viewpoint is necessary. “Lean Construction” is a project management method, inspired by a set of production processes which primarily focus on minimizing wastage while maximizing the value of projects. However there is a misalignment of Lean concepts and techniques with traditional conducts in the industry in many places, and the viability of Lean Construction as an innovation that make construction firms resilient for crisis are less explored. Having such a backdrop, the current study intends to critically assess how Lean Construction could be considered as an innovation that drives resilience in the construction industry. For this purpose, several lean tools such as 5S, Kanban, Just-In-Time, *Jidoka* (Automation), Line Balancing etc. were mapped to a set of selected indicators of innovations i.e. Novelty, New value for stakeholders, Improving the current state and Driving economic growth and those of Resilience i.e. Resistance, Recovery, Renewal and Reorientation. The study suggests that while there are some lean tools that create innovation while highly increasing the resilience, some tools display only moderate characteristics of innovation while increasing the resilience. In addition, the study discusses that certain tools may neither be considered as innovation leading nor as increasing the resilience of the construction industry.

**Keywords:** *Resilience, Innovation, Lean Construction*

# IMPLICATIONS FOR PROSPECTIVE CONSTRUCTION CONTRACTS DUE TO THE IMPACT OF COVID-19 (WITH EMPIRICAL EVIDENCE FROM SRI LANKAN CONSTRUCTION INDUSTRY)

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## Abstract

The Covid-19 outbreak has made a giant impact on the entire planet as a continuing global pandemic. As far as Sri Lanka is concerned, the scenario is almost identical. The substantial influence on the construction sector in Sri Lanka is made by the pandemic which caused several difficulties in achieving project goals within the agreed budget and on time. Among these concerns, the terms of construction contracts have been harshly affected by the epidemic. Consequently, the formulating of existing and imminent contractual terms in construction contracts has been demanded considerable attention. Since the findings on this perspective reflect the historical dearth, it has yet to be researched. Hence the aim of this study is nested within to investigate the impact of covid-19 on contractual provisions in construction contracts with empirical evidence from the Sri Lankan construction industry. The study adopted a qualitative approach, and semi-structured interviews were conducted with 10 industry experts to gather data. The manual content analysis method is employed. The results of the study demonstrated that the ramifications of the Covid 19 pandemic had a substantial impact on contractual provisions. Under seven major headlines namely licenses, permits, deadlines, and other approvals, dispute resolution, audit, notice, facility access rights and inspection, and consent, the impact was examined and identified considerations to be amended or newly introduced to the contracts. Entitlements for the contractor due to the impact under the contract clauses were identified. The insights gained from this research can be used, to enhance the awareness of construction stakeholders on the contractual scenarios that may occur as a result of the Covid-19, convince the importance of amending and introduce contractual provisions to make the construction activities more effective and efficient.

**Keywords:** *Construction Industry, Contractual Provision, Covid-19, Sri Lanka*

# OPTIMIZATION OF Ag NANOPARTICLES TOWARDS THE SEMI QUANTITATIVE DETECTION OF CIPROFLOXACIN IN AQUEOUS MEDIA BY SURFACE ENHANCED RAMAN SPECTROSCOPY

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## Abstract

The increasing consumption of antibiotics has increased the antibiotic pollution in the environment. Even very low concentrations of antibiotics in aqueous medium can affect the human and nature to a large extent. A major problem that arises from the antibiotic pollution is the antimicrobial resistance. Therefore, detection and treatment of antibiotics are essential. Many studies have proven the presence of antibiotics inground and surface water. Although antibiotics are found in aqueous environments, the major issue in detecting these antibiotics is that they present in water in very low concentrations. According to recorded literature 1.270-1.344 ppb range has been detected using HPLC. Therefore, developing methods to detect antibiotics are essential. This study focuses on detecting ciprofloxacin in aqueous medium by Surface Enhanced Raman spectroscopy (SERS). Silver nanoparticles were synthesized by Leopold and Lendl method. Synthesized nanoparticles showed an UV-VIS absorption peak at 414 nm. Qualitative and semi-quantitative determination of ubiquitous Ciprofloxacin procedure was optimized by varying the Ag nanoparticle ratios and different aggregating agents like NaCl and MgSO<sub>4</sub>. The ratio of 4:1 silver colloid to Ciprofloxacin gave the best enhancement along with the MgSO<sub>4</sub> as an aggregating agent. Different electromagnetic matrix conditions were provided by Different nanoparticle ratios and aggregating agents to perform the peak enhancement. Currently, concentrations of 2.5 ppm level were sensed with this triplicated optimized technique. Sharp peaks were appeared at 1357.2 cm<sup>-1</sup>, 1389.1 cm<sup>-1</sup>, 1479.7 cm<sup>-1</sup> and 1630 cm<sup>-1</sup> in the SERS spectrum of ciprofloxacin confirming the presence of ciprofloxacin in the studied sample. With further optimizations, this method could be served as a cost-effective novel technique in ultra-low detection and quantification of Ciprofloxacin in various environmental samples.

**Keywords:** *silver nanoparticles, Ciprofloxacin, SERS, ultra-low concentrations*

# THE STUDY OF URBAN PARKS IN ADDRESSING THE NEIGHBOURHOOD DENSITY FOR EASING PANDEMIC OUTBREAK IN COLOMBO METROPOLITAN AREA

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## Abstract

The pandemic of novel coronavirus 2(SARS-CoV-2) has developed into the “new normal” across the Globe. In Sri Lanka, urban cities like Colombo with high population densities are challenged in balancing the viral spread due to unprecedented behaviours of city dwellers. Allowing access to urban parks is a vital requirement to ensure the health and wellbeing of people. Since gatherings and crowding in urban parks are inevitable, the risk of being infected is irrepressible. Thus, it is paramount important to study the physical distribution of parks/playgrounds in densified neighbourhoods of Colombo to evaluate their user attraction to reinvent strategies to ease the pandemic outbreak. This study investigates five main variables; Neighbourhood Density (ND), Park Values (PV), User Mobility (UM), Park Capacity (PC), and Park Extent (PE) of 34 public parks and playgrounds. Selected settings represent all accessible parks/playgrounds above 0.0001sq.km located within Colombo-metro area. PVs are equipped to numerically interpret user attraction of selected case studies, derived from 40 factors of attraction. Each variable was simulated using Geographical Information system and Space Syntax and further correlated using SPSS formulas. The findings prioritize that the large-scale parks with multifunctioning facilities attract more users ( $R^2=0.967$ ) than small-scale parks. Furthermore, vehicle parking, park capacity, location emphasis a high positive co-relationship with user attraction. The even distribution of such facilities enabled to reduce 41% of total user attraction. Thus, the findings strongly suggest that the distribution pattern of parks be isolated pockets to absorb the threshold of park users within a neighbourhood bubble while discouraging outer bubble interactions. Moreover, fragmenting large-scale parks and facilitating local parks less than 0.05sq.km will be able to control the excessive attraction of users. In conclusion, the study promote that suitable planning and design recommendations towards functional small neighbourhood pockets can ensure a healthy community by easing the pandemic outbreak.

**Keywords:** *Neighbourhood Density, Park Values, Mobility, Physical Distribution, Isolated Pockets*



**Environmental Pollution and Natural Resources  
Management**





# AN ASSESSMENT OF ENVIRONMENTAL FLOW RELEASING METHODOLOGIES IN SRI LANKA – A REVIEW

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## Abstract

Environmental Flow (EF) is broadly defined as the water required to sustain upstream and downstream habitats, riparian vegetation, human livelihoods and wildlife of a river or stream. River flow regimes have been severely altered by human activities in Sri Lanka over the past decades particularly for hydropower and irrigation. EF maintenance has thus become important to sustain the downstream ecology. Therefore, this study aimed to compare and contrast main EF calculating methodologies available in Sri Lanka. Environmental Impact Assessment reports (n=30; 9 irrigation projects, 21 hydropower projects) for past 50 years related to water resource development projects (WP) in Sri Lanka and related literature were studied for identifying parameters and methodologies adopted for EF calculations. According to the results, three common EF calculation methods namely,  $Q_{90}$  method ( $EF_{Q90}$ ), International Water Management Institute EF calculator ( $EF_{IWMi}$ ) and Central Environmental Authority EF calculation method ( $EF_{CEA}$ ) were identified as widely used EF calculation methods in Sri Lanka. Using the above three methods, EFs and the mean annual EFs (MAEFs) were calculated and statistically compared for selected thirty WP. The MAEFs for all WP showed;  $EF_{Q90} < EF_{IWMi} < EF_{CEA}$  indicating that  $EF_{CEA}$  method provides the largest EF. In  $EF_{Q90}$  and  $EF_{IWMi}$  methods utilizes forms of flow duration curve analysis while  $EF_{CEA}$  method uses an extension of Tennant method with scrutiny of biological, socio economic and hydrological factors. Therefore,  $EF_{CEA}$  method is the best method among the studied EF calculation methods owing to integration of biological, socio economic and hydrological factors. However, further development of the same is important for smooth functioning of downstream ecology.

**Keywords:** *Environmental Flow, Water Resource Development Projects, Flow Duration Curve, Tennant method, Environmental Impact Assessments*

# SYNTHESIS AND CHARACTERIZATION OF BARE, Ag-DOPED, AND Gd-DOPED TiO<sub>2</sub> NANOPARTICLES FOR THE PHOTO-DEGRADATION OF METHYLENE BLUE DYE

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## Abstract

TiO<sub>2</sub> nanoparticles (NPs) doped with different Ag and Gd contents were prepared by a modified sol-gel method using titanium tetraisopropoxide (TTIP), silver nitrate (AgNO<sub>3</sub>) and gadolinium oxide (Gd<sub>2</sub>O<sub>3</sub>) as precursors and 2-propanol as the solvent. In this study, bare, 1% and 2% Ag-doped and Gd-doped TiO<sub>2</sub> NPs were synthesized and the effects of Ag and Gd doping on the crystallization, Ti-O-Ti metal bonding, particle size and photocatalytic activity were analyzed using PXRD, FT-IR spectroscopy, particle size analyzer and UV-Visible spectroscopy respectively. The XRD investigations of all these TiO<sub>2</sub> NPs confirmed the tetragonal form of anatase phase of TiO<sub>2</sub>. FT-IR spectra showed the TiO<sub>2</sub> peaks in the characteristic region of Ti-O-Ti metal bond at the wavenumber between 450 and 900 cm<sup>-1</sup>. Average particle size of synthesized TiO<sub>2</sub> NPs was varied according to the type and the amount of dopant added. Average particle size of bare TiO<sub>2</sub>, 1% and 2% Ag-doped TiO<sub>2</sub> and 1% and 2% Gd-doped TiO<sub>2</sub> were 68.1 nm, 189.5 nm, and 314 nm respectively. Gd-doped TiO<sub>2</sub> NPs have shown the highest particle size compared to bare and Ag-doped TiO<sub>2</sub>. Photocatalytic activity was measured using the cationic dye, methylene blue (MB) which commonly used as a dye and as a medication and, injection of MB cause different side effects including dizziness, nausea, headache etc. Here, 2% Gd-doped TiO<sub>2</sub> has shown the highest colour degradation efficiency under 2-hour UV irradiation at the wavelength of 365 nm. According to the photo degradation efficiency of methylene blue dye, bare TiO<sub>2</sub> NPs only showed 78.3 % while 2% Ag-doped and 2% Gd-doped TiO<sub>2</sub> NPs have shown 90.3 % and 95.1 % photo degradation efficiency respectively. Therefore, it can be concluded that doping with, noble metal ions and lanthanide metal ions can enhance the photo degradation efficiency of methylene blue and when increasing the doping concentration, dye degradation rate too increased.

**Keywords:** *Metal ion doping, Ag-doped TiO<sub>2</sub> NPs, Gd-doped TiO<sub>2</sub> NPs, Methylene blue dye, Photocatalytic activity*

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## සාරසංක්ෂේපය

පරිසරය ස්වාභාවික පරිසරය හා ස්වාභාවික නො වන පරිසරය යනුවෙන් කොටස් ද්වයකට වර්ග කළ හැකි ය. ස්වාභාවික ව හටගත් අවට ඇති ද්‍රව්‍ය වස්තූන් ස්වාභාවික පරිසරය යනුවෙන් ද මානව මැදිහත් වීමෙන් යුක්ත ව ගොඩනගන ලද පරිසරය ස්වාභාවික නො වන පරිසරය යනුවෙන් ද අර්ථ දැක්වේ. වාස්තවික අර්ථයෙන් බැලීමේ දී පරිසරය යනුවෙන් නිර්වචනය කරන්නේ මිනිසා ඇතුළු අවට ඇති ලෝකය යි. සතුන්, වනාන්තර, ගංගා, ඇළ, දොළ, ජලය, වාතය, ආදී මිනිසා ඇතුළු සියල්ල පරිසරය වේ. මෙකී පරිසරය වර්තමානය වන විට දැඩි අර්බුදයකට පත් ව තිබේ. ප්‍රධාන වශයෙන් දේශගුණික වෙනස්වීම්, මිහිතලය උණුසුම් වීම, ජල, වායු, වනාන්තර, පාංශු, ශබ්ද, ජෛව විවිධත්ව වැනි දෑ මානව පැවැත්ම හමුවේ දැඩි අර්බුදයකට ලක්ව තිබේ. මෙවැනි පාරිසරික අර්බුද අවම කිරීමට බෞද්ධ පාරිසරික ආචාරධර්ම උපයෝගී කරගත හැකි ය. එබැවින් සන්ධාර පර්යේෂණ ක්‍රමවේදය යටතේ මේ පිළිබඳ මෙහි ලා සාකච්ඡා කෙරේ. පරිසරය සම්බන්ධයෙන් බෞද්ධ විග්‍රහයෙහි දැකිය හැකි වනුයේ පරිසර කේන්ද්‍රවාදී (Eco centrism) අදහසකි. මානව කේන්ද්‍රවාදී අදහසක් නොමැති බැවින් මිනිසා පරිසරයෙන් විතැන් නො වේ. ඒ අනුව බුදු දහමෙහි පරිසරය යනුවෙන් අර්ථ විභාග කරනුයේ මිනිසා ද ඇතුළු සමස්ත වටපිටාව යි. පූර්වයෙහි වෙන් වශයෙන් දක්වන ලද පාරිසරික අර්බුදවලට අයත් ගැටලු අවම කිරීමට අදාළ දේශනා බෞද්ධ පාරිසරික ආචාරධර්මවල ඇතුළත් වේ (සූත්‍ර-විනය පිටක). බුදුරජාණන් වහන්සේ පරිසරයෙහි තුලිත බව රැක ගැනීමට අදාළ ව දේශනා කර ඇත්තේ වන රෝපණය හා පැන්-පොකුණු තැනවීම පිං සිදු වන ක්‍රියාවන් වශයෙනි. පරිසරයෙහි තුලිත බවට සියලු ජෛව පද්ධතීන් අවශ්‍යමය සාධකයකි. සියලු ජෛව පද්ධති පැවතුණහොත් පරිසර අතුලිත බවක් නිර්මාණය නො වේ. පරිසරය දූෂණයට ප්‍රධාන හේතු වනුයේ අල්පේච්ඡ ගුණය නොමැති වීම, කෘතගුණ නො සැලකීම හා තෘෂ්ණාව යි. බුදුරජාණන් වහන්සේ ද අනිමිසලෝචන පූජාව මගින් බෝධීන් වහන්සේට කෘතගුණ සලකා තිබේ. එයින් පරිසරයෙහි හා මිනිසා අතර අන්‍යෝන්‍ය බැඳීම විස්තර කරයි. මිනිසා අධික තෘෂ්ණාවෙන් යුක්ත ව ආර්ථිකයට සමීප වීම හේතුවෙන් හා අල්පේච්ඡ බවක් නොමැතිකමින් පරිසර හායනය කරයි. ඒ අනුව පරිසර දූෂණය අවම කිරීමට බෞද්ධ විකල්ප වනුයේ පරිසරය හා අන්‍යෝන්‍ය බැඳීමෙන් යුක්ත ව සදාචාරාත්මක ජීවිතයකට හුරු වීම යි.

**ප්‍රමුඛ පද:** අර්බුද, ආචාරධර්ම, දූෂණය, පරිසරය, බුදුදහම

# BIODEGRADATION OF THE CYANOTOXIN CYLINDROSPERMOPSIN USING *Bacillus cereus*

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## Abstract

Cylindrospermopsin (CYN) is known to be one of the most common cyanotoxins, produced by cyanobacteria and found in various drinking water sources around the world. It is considered to be toxic to several human body organs including livers and kidneys, through the inhibition of protein synthesis. CYN is a heat stable alkaloid and could not be removed through conventional water treatment processes or even by heating at 100 °C. Moreover, available physico-chemical removal methods for CYN are not practically applicable for large scale in the water treatment systems, due to high initial and operating costs. However, recent studies have shown that there is a potential to remove cyanotoxins by microbial treatments, but such studies on degradation of CYN by microorganisms are limited. Thus, the present study has used four bacterial strains; *Bacillus cereus*-Y, *Bacillus cereus*-S, *Micrococcus luteus* and *Alcaligenes faecalis* which were previously isolated from water sources for the purpose of degradation of hydrocarbons and MC-LR. According to the HPLC analysis of the degradation kinetic study, *B. cereus*-S degrade three different initial concentrations of CYN; 1.0 ppm, 2.5 ppm and 5.0 ppm, with removal percentages of 39.06±2.43 %, 34.22±1.25 % and 26.35±0.40 % respectively, at 14 days of incubation where the other bacterial strains showed lower degradations. The highest rates of degradation for *B. cereus*-S were obtained at the 6<sup>th</sup> (0.0479±0.00174 ppm day<sup>-1</sup>), 8<sup>th</sup> (0.0402±0.009 ppm day<sup>-1</sup>) and 12<sup>th</sup> (0.0202±0.012 ppm day<sup>-1</sup>) days of incubation for 1.0 ppm, 2.5 ppm and 5.0 ppm CYN concentrations respectively. Compared to the few existing literature regarding bacterial degradation of CYN, the present study highlights the efficient degradation capability of different concentrations of CYN by the bacterium *Bacillus cereus*-S.

**Keywords:** *Cylindrospermopsin*, *Biodegradation*, *Degradation kinetics*, *Bacillus cereus*-S

# ASSESSMENT OF PHYSIOCHEMICAL PROPERTIES OF ETHANOL-DIESEL FUEL BLENDS

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## Abstract

Bioethanol is considered as a potential solution for future energy crisis as an alternative fuel because it is used as an automotive fuel directly in specially designed engines or used as a fuel extender by blending with diesel. To assess the compatibility of bioethanol as an alternative fuel, four ethanol-diesel blends were prepared by mixing ethanol with Lanka Grade 02 Auto Diesel through stirring and sonication. Hence, ethanol was partially miscible with diesel ethanol-diesel emulsions were obtained. The physiochemical properties critical for the commercial use of these blends were tested by Ceypetco refinery laboratory. Accordingly, density values of E2, E5, E7, and E10 blends were varied as 827.7 kg m<sup>-3</sup>, 827.4 kg m<sup>-3</sup>, 827.0 kg m<sup>-3</sup>, and 826.5 kg m<sup>-3</sup> respectively. Flash point values of E2 were 35 °C and less than 30 °C for E5, E7, and E10 blends. The lubricity values of the blends E2, E5, E7 and E10 were measured in HFRR wear scar diameter at 60 °C and the values were varied as 370, 390, 420, and 430 respectively. The sulphur content of the blends were recorded as; E2 (223 mg kg<sup>-1</sup>), E5 (224 mg kg<sup>-1</sup>), E7 (217 mg kg<sup>-1</sup>) and E10 (217 mg kg<sup>-1</sup>). Viscosity values (at 40 °C) of the blends were 3.470 cSt for E2, 3.160 cSt for E5, 2.902 cSt for E7 and 2.386 cSt for E10 where the calorific values of the E2, E5, E7, and E10 blends were 11321.0 Kcal kg<sup>-1</sup>, 11172.0 Kcal kg<sup>-1</sup>, 11034.0 Kcal kg<sup>-1</sup>, and 11139.0 Kcal kg<sup>-1</sup> respectively. The results revealed that all the ethanol-diesel blends complied with Ceypetco standards for calorific value, viscosity, density, lubricity and sulphur content except the flashpoint. Thus the results of the present study emphasized that lower ethanol-diesel blends are a promising alternative to automotive fuels.

**Keywords:** *Bioethanol, energy crisis, alternative fuel, ethanol-diesel blends, physiochemical properties*

# DEVELOPMENT OF A BIOCHAR-BASED LABORATORY- SCALE FILTER FOR INDUSTRIAL WASTEWATER TREATMENT

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## Abstract

Industries produce wastewater at an alarming rate, which may have a negative impact on the environment. Recently, Biochar (BC) has become a promising agent for wastewater treatment. Production of BC using aquatic invasive plants is an alternative management strategy to control invasive plants. In this study, invasive aquatic plant *Pistia* spp. was used to produce BC. Prepared non-activated and chemical activated BC were separately incorporated as a sandwich layer in sand and gravel filter. Wastewater from a rubber factory was used for the experiment and following water quality parameters were measured; pH, Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Kjeldahl Nitrogen (TKN), Ammoniacal-Nitrogen (NH<sub>3</sub>-N), Electrical Conductivity (EC), Total Dissolved Solids (TDS), turbidity, Total Phosphates (TP), Nitrate, and heavy metals (Chromium, Zinc). Measurements were taken before and after treatment. The control filter was developed only with sand and gravel. Brine shrimp lethality assay (BSLA) was carried for toxicological evaluation. Optimization studies were carried out by repeated treating and investigating the effect of particle sizes (65-125µm and 125-250µm) on treatment efficiency. The study concludes that the filter unit incorporated with activated BC gave the best treatment efficiency compared to the control setup and non-activated biochar incorporated filter. BSLA showed zero mortality in activated BC treated water. The optimization study showed that the activated BC had the potential to treat wastewater for three consecutive times according to the standard values. The filter unit with 65-125µm BC gave the best treatment compared to the 125-250µm particles containing filter unit. Filter unit with 65-125µm activated BC showed more than 80% reduction in Turbidity, TP, NH<sub>3</sub>-N, TSS, COD, BOD<sub>5</sub>, TKN and nitrate. Hence, the present study proposed a sustainable green technique to treat wastewater with effective usage of invasive aquatic plants.

**Keywords:** *Biochar, Waste water, Water quality parameters, Pistia spp.*

# WATER QUALITY AND MICROBIAL CONTAMINATION STATUS OF WEST-SOUTH COASTAL WATERS IN SRI LANKA

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## Abstract

The Western-Southern coastal belt in Sri Lanka has given more attention as around 40% of the country population inhabits this region and also it covers the commercial capital city, Colombo. The present study was aimed to identify the point sources of pollution towards the coastal belt of the west-south. Physico-chemical and microbiological parameters of coastal water were evaluated using the standard analytical and microbial methods. 64 sampling sites from Negombo to Mirissa coastal belt was selected and the sampling sites were categorized into 11 land segments based on the environment and land use practice type. pH values of most of the sampling sites remained within standards given for coastal water (5.5-9.0) except the location of the Mangala road site (9.6). Dissolved Oxygen (DO) was ranged between 0.65-20.19 mg dm<sup>-3</sup> where the Electric Conductivity (EC) was within ranged between 2.2-69.2 mS cm<sup>-1</sup>. Acceptable concentrations of nitrate (N-NO<sub>3</sub>) (<0.1mg dm<sup>-3</sup>), nitrite (N-NO<sub>2</sub>) (<0.1-2.94 µg dm<sup>-3</sup>) and ammonium (N-NH<sub>4</sub>) (<0.1-19.57µg dm<sup>-3</sup>) were detected in all sampling locations. More than 90% of the sampling locations were found to be low nitrogenous pollutants while more than 95% of sites exceeded 100 µg dm<sup>-3</sup> of total phosphate concentrations showing a suitable environment for algae growth. All the collected samples showed high COD (112.5-7318.86 mg dm<sup>-3</sup>) which was exceeded the coastal water quality standards. The oil and grease concentration varied between <2-192.34 mg dm<sup>-3</sup>. Among the sampling location, 85% of sampling sites were contaminated with both total coliform and faecal coliform bacteria and pathogenic *Salmonella* sp. were recorded in water drain to the coast via Dehiwala and Ratmalana canals. Thus, the results of the present study revealed that the west-south coast has been contaminated with pathogenic bacteria, oil and grease, phosphate and chemicals that indicate the Negombo to Mirissa coastal stretch was polluted and continuous monitoring strategies are needed with a proper management plan to utilize the coastal zone for tourism, fishing, and recreational activities.

**Keywords:** *Coastal Pollution, Water quality, Total coliform, Total phosphate*



# OPTIMIZATION OF BACTERIAL CONSORTIUM FOR REDUCTION OF COD IN SOLID WASTE LEACHATE

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## Abstract

Solid waste landfill leachate is considered as one of the highly complex polluted wastewater type varying with the composition of the accumulated pollutants. Therefore the treatment process of the leachate is complicated and expensive. Direct disposal of the untreated leachate to the aquatic environment causes a number of adverse impacts to the ground and surface water quality. Thus, the present study was focus to formulate bacterial consortium to reduce the Chemical Oxygen Demand (COD) of solid waste leachate in efficient and cost effective manner. In the study, the COD of the leachate was measured by the closed reflux method and environmental bacteria were isolated from leachate, solid waste and the soil samples collected from the Karadiyana controlled open dump site, Sri Lanka. Five gram-negative bacterial isolates (A, B, C, D and E) were identified as more potential bacterial genera's to reduce COD. The reduction of COD with the bacterium A, B, C, D and E were 50.85%, 48.21%, 45.21%, 49.6% and 55 % respectively. Following the results of the COD reduction potential by the individual bacteria, bacterial consortium (ABC) was formulated using the promising bacteria isolates of A, B, and C. The bacteria consortium showed 62% reduction of COD within 14 days of time at room temperature (30 C). The COD reduction showed by the bacteria consortium was greater than the application of individual bacteria. More over the prepared bacterium consortium was optimised for metal Co - factors and it was found that the COD degradation was enhanced to 76% with addition of Cu<sup>+2</sup> metal in 0.01 ppm concentration. Further studies are in progress to characterize specific enzymes involve for leachate degradation for industrial perspective.

**Keywords:** *Bacterial consortium, metal co-factors, Leachate, COD, Biological treatment*

# ZOOTECHNICAL PERFORMANCES OF DIFFERENT CARBON SOURCES ON BIOFLOC COMPOSITION AND GROWTH OF TILAPIA (*Oreochromis mossambicus*)

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## Abstract

Biofloc technology (BFT) is a novel technique of enhancing water quality in aquaculture systems through balancing carbon and nitrogen, with the added value of producing proteinaceous feed *in-situ*. The present study was carried out to evaluate the physio-chemical characteristics of different locally available carbon-treated bioflocs, and their suitability as a proteinaceous feed over traditional fish meal in enhancing the growth of *Oreochromis mossambicus*, in zero-water exchange culture systems. Carbon treatments: Wheat Flour (WF), Molasses (MOL), and Rice Bran (RB), and the controls were randomly assigned and duplicated. Mixed-sex of *O.mossambicus* fingerlings with an initial body weight  $\pm$  SD (3.6 $\pm$ 0.2g) were added to each tank at the rate of 40 fish m<sup>-3</sup> and fed with commercial feed at 3% of their body weight. Carbon was only added to the treatment tanks in a 15:1 carbon to nitrogen ratio. Fish weight was measured weekly throughout the 60 days of the culture period. Biofloc samples, was structurally analyzed using Scanning Electron Microscope (SEM) and biochemically analyzed in terms of crude protein, lipid, fiber, ash and moisture. Total Weight Gain (TWG), Specific Growth Rate (SGR), and Feed Conversion Ratio (FCR) were used to evaluate the growth of the fish. One way ANOVA was used for analysis of data. Protein content was significantly higher in WF (19.24 $\pm$ 0.40%) and RB (18.18 $\pm$ 0.50%). WF showed significantly higher ash (4.20 $\pm$ 0.10%) and moisture (73.92 $\pm$ 0.07%) contents, while MOL indicated the highest fiber (7.38 $\pm$ 0.27%) and carbohydrate (82.52 $\pm$ 0.23%) contents (P<0.05). There was no significant difference in lipid content. In SEM images the morphological structure differed slight between treatment groups. TWG and SGR were significantly enhanced in RB treated biofloc (90.53 $\pm$ 0.39% and 4.21 $\pm$ 0.07% respectively) with a significantly lower FCR of 0.59 $\pm$ 0.01. Hence, RB is recommended as a better carbon source in biofloc-based *O.mossambicus* culture, to encourage the low-cost production and higher production rates.

**Keywords:** *Biofloc, Oreochromis mossambicus, Rice bran, Wheat flour, Molasses*

# ESTIMATION OF *CHLOROPHYLL-A* CONCENTRATION FOR A FRESHWATER LAKE FROM SENTINEL 2A MSI DATA

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## Abstract

Harmful algal blooms (HABs) have been a major concern for aquatic ecosystems, including killing fish and birds, discoloring water, food web vectoring, and airborne toxic events. Thus, the monitoring of HABs is critical for the formation of water governance policies. Satellite remote sensing is a promising method for monitoring these phenomena in inland and near-coastal waters (synoptic coverage and temporal consistency). The multispectral instrument onboard European Space Agency's Sentinel 2A (S2A) satellite initiates a new era in high-to-moderate resolution (10, 20, 60 m) of Earth observation mission launched in 2015 as a part of the Copernicus program. S2A MSI filter-based push-broom imager measures the reflected solar spectral radiances in 13 spectral bands ranging from the visible-near infrared (VNIR) (0.4422-0.8640  $\mu\text{m}$ ) to the shortwave infrared bands (0.9432-2.1857  $\mu\text{m}$ ). This study aims to develop a method to estimate chlorophyll-a (Chl-a) concentration in freshwater lake waters using in situ data of Chl-a, water reflectance, and contemporaneous S2A MSI imagery over the Kotmale reservoir. The prediction models were developed by applying the regression analysis between spectral sensor radiance of band ratio and in situ Chl-a concentration over the study points. This was shown through a strong correlation of S2A green-red band ratio with Chl-a by an exponential curve ( $R^2 = 0.910$  and  $SE = 0.239 \text{ mg l}^{-1}$ ). The small error between in situ Chl-a and model-fitted Chl-a from S2A acquired, confirmed the S2A green-red band ratio as the most suitable option for monitoring Chl-a in Kotmale reservoir. Although, measurements located under semi-transparent clouds were performed using  $R^2$  as 0.501 and SE as 0.105  $\text{mg l}^{-1}$  by polynomial fit. Besides, Chl-a retrieval from S2A imagery over the study points under clouds and cloud shadows resulting a larger margin of error likened to non-cloudy locations. Overall, this study showed that remote sensing can be integrated into future operational water quality monitoring systems.

**Keywords:** *Sentinel 2 MSI, remote sensing, algal blooms, water quality, chlorophyll-a*

# ISOLATION AND CHARACTERIZATION OF THERMO-STABLE CELLULASE ENZYME PRODUCING BACTERIA FROM GOMARANKADAWALA HOT SPRING, SRI LANKA

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## Abstract

Discovering eco-friendly alternatives for chemical catalysts used in industrial sector is essential to overcome the negative impacts of chemical wastes, impose on the environment. Identification of novel microbial enzymes and enzyme-producing bacteria has been recognized as a better solution. Amylase, cellulase, proteinase, and xylanase play a leading role in biotechnological studies while cellulase plays a major role in bio-fuel, pulp and paper, food and beverage, animal feed, textile, pharmaceutical industries and contribute 8% of the world enzyme market. Therefore, the present study aimed at the isolation and identification of thermo-stable cellulose-producing bacteria from hot springs. In the present study, water samples were collected from Gomarankadawala (Rankihiriya / Ulpotha) hot spring in Sri Lanka. Temperature, Electric Conductivity (EC), pH, and Dissolved Oxygen (DO) were measured at the site. The standard pour plate method was performed to isolate bacteria and screened for cellulase production by spot test on Carboxy Methyl Cellulose agar plates. Temperature and pH stability of crude enzyme extracts were measured using the spectrophotometric method. Molecular-level identification of bacterial isolates was performed using the 16S rRNA gene sequencing. Temperature, EC, pH, DO levels of hot spring were ranged between 36.3 – 36.8 °C, 621 - 572 µS/cm, 6.76 – 6.78, and 2.75 – 2.83 mg/L respectively. Six morphologically different, cellulose-producing bacteria isolates were observed. Thermo-stable cellulase producing bacterial isolate GS<sub>2</sub> was identified as *Bacillus cereus* strain RW074 using 16S rRNA sequencing and optimum temperature and pH for the enzyme activity was found to be 60°C and 7 respectively. The results of the study revealed that the Gomarankadawala hot spring bacterial isolate GS<sub>2</sub> which produces cellulase could be successfully used for industrial settings operates under temperatures around 60 °C in neutral pH. Thus, further optimizations studies are in progress to enhance the production of enzymes, so that the bacteria can be effectively used for industrial perspectives.

**Keywords:** *Hot springs, Thermo-stable Enzymes, α-amylase, Biotechnology, Exteremophiles*

# SYNERGISTIC EFFECT OF FLUORIDE AND HARDNESS OF DRINKING WATER ON NEPHROTOXICITY; CYTOTOXICITY ASSAY USING VERO CELLS

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## Abstract

Chronic Kidney Disease of Unknown Aetiology (CKDu) is viewed as a non-communicable disease and it is responsible for high mortality in rural farming communities in North Central province. Increasing shreds of evidences on this phenomenon suggest that high concentrations of fluoride and hardness in drinking water induce renal injury. The present study was focused to determine the synergistic effect of fluoride and hardness by evaluating the cytotoxicity and possible apoptotic effect on epithelial kidney cells using Vero cell line (ATCC® CCL-81™). 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide(MTT) assay was done to determine the cell viability and cells were seeded in 96-well plates as  $5 \times 10^3$  cells per well. Cells in different wells were exposed to different concentrations of fluoride (0.5,2.5,5.0,7.5,10.0,12.5,15.0 mgL<sup>-1</sup>) hardness (60,100,200,400,600,800,1000 mgL<sup>-1</sup>) and fluoride: hardness ratios (0.5:60,2.5:100,5.0:200,7.5:400,10.0:600,12.5:800, 15.0:1000 mgL<sup>-1</sup>). The assay was performed in triplicates and IC<sub>50</sub> values of fluoride, hardness alone and fluoride:hardness ratios on the Vero cells were determined. Mortality rates of the cells exposed to fluoride concentration series were ranged from 10.90% to 37.12% while the cells exposed to hardness concentrations were ranged from 13.69% to 37.70% indicating increment with the high concentrations. Further, the mortality rate was increased from 11.11% to 49.09% in the cells exposed to fluoride and hardness ratios. IC<sub>50</sub> values of fluoride, hardness alone and fluoride:hardness ratios were recorded as 20.34, 1479.53 and 16.19:1045.29 mgL<sup>-1</sup> respectively. When IC<sub>50</sub> values were compared, the significantly higher value was observed in the cells exposed to fluoride alone than the cells exposed to fluoride:hardness ratio ( $p < 0.05$ ), as well as significantly higher value, was observed in the cells exposed to hardness alone than the cells exposed to fluoride:hardness ratio ( $p < 0.05$ ). Thus, the significant increment in cell mortality rate in cells exposed to fluoride:hardness ratio indicates the nephrotoxic effect. Therefore, the synergistic effect of fluoride and hardness may contribute to the CKDu.

**Keywords:** *fluoride, hardness, MTT assay, cell mortality, Vero cells*

# EVALUATION OF THE HEPATOTOXICITY OF CYLINDROSPERMOPSIN IN WISTAR RATS

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## Abstract

A naturally derived cyanotoxin, cylindrospermopsin (CYN) present in freshwater systems is considered as a threat to human health due to its ability to induce hepatotoxicity. The present study aims to determine the hepatotoxicity of CYN on mammalian liver by using male Wistar rats, as the experimental model. Thirty-five healthy eight-week-old male Wistar rats were used for the study. The rats were divided into five groups (n=7 in each), including the control group. Test groups were orally treated with three doses of CYN (0.175 µg kg<sup>-1</sup>, 0.140 µg kg<sup>-1</sup> and 0.105 µg kg<sup>-1</sup>). Well water, collected from Padaviya area (0.161 µg kg<sup>-1</sup>) was given to the environmental exposure group (EN) and distilled water was administered to the control group. Body weight was recorded at every week throughout the experiment. The total duration of exposure of the rats was 90 days, once a day. Blood samples were collected at 0, 7, 14, 28, 42, 60, 90 days. Aspartate Amino Transferase (AST) and Aspartate Alanine Transferase (ALT) were analysed. Following the completion of 90-day dosing, animals were anaesthetized, weighed (g) and the liver resected out with minimum trauma. The rats were later euthanized. According to the results, the mean body weight of the treated and the control groups of rats gradually increased until the 90<sup>th</sup> day. A statically significant reduction (p<0.05) in increment of bodyweights was observed in treated groups at 12 and 13 weeks in comparison to the control. The absolute and relative weights of liver of the treated groups were significantly lesser (p<0.05) than the control group. The highest AST and ALT concentrations were recorded in rats treated with CYN at the dose of 0.175 µg kg<sup>-1</sup>. The hepatocytes showed ballooning degeneration, kupffer cell hyperplasia, lobular haemorrhage and necrosis, dilated central vein with perivenous inflammation in EN (0.161 µg kg<sup>-1</sup>). Lobular haemorrhage and necrosis, lobular inflammation, Lobular haemorrhage, sinusoidal congestion and centrilobular haemorrhage and necrosis were prominent in 0.175 µg kg<sup>-1</sup> group. The lobular inflammation and necrosis were in 0.140 µg kg<sup>-1</sup>. Lobular inflammation and central vein dilatation and surrounding inflammation were in 0.105 µg kg<sup>-1</sup> group. All histological features were normal in the control group. The results of this study suggest that prolonged exposure to CYN is associated with histologically subtle and variable liver injury.

**Keywords:** *Cylindrospermopsin (CYN), Wistar Rats, AST, ALT, histopathology*

# OCCURRENCE OF MICROPLASTICS IN WASTEWATER TREATMENT PLANTS

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## Abstract

Microplastics have become an emerging concern as they are hazardous to the environment, organisms as well as to human. Wastewater treatment plants have been identified as a possible source of microplastics. The present study was to evaluate the abundance, composition and removal efficiency of microplastics in six wastewater treatment plants. Samples were collected in three random visits to each treatment plant. Effluent and influent samples were collected using 200 $\mu$ m, 500 $\mu$ m and 1 mm sieves and sludge samples were also collected. All samples were subjected to wet peroxide oxidation to extract microplastics. Microplastics were detected in all the samples studied. Those were analysed based on their shape (fiber, fragments, foam, and film/sheet), size (>1mm, 1mm-500 $\mu$ m and 500 $\mu$ m - 200 $\mu$ m), and color. Abundance of microplastics in influent, effluent and sludge was 1100 - 66500 items per m<sup>3</sup>, 2 - 2960 items per m<sup>3</sup> and 4365 - 12280 items per kg respectively. Four out of six wastewater treatment plants investigated showed more than 98% microplastics removal efficiency. Daily discharge of microplastics into the aquatic environment was observed to range between 3000 to 26,595,000 items per day. Fibers were the dominant microplastic type in both influent and effluent waters (> 55% and >56%, respectively). More than 50% of microplastics were in the size range 200 $\mu$ m - 500 $\mu$ m in influent and > 1mm in the effluent, indicating smaller the particles (200 $\mu$ m - 500 $\mu$ m), higher the removal efficiency (99.13% - 99.58%). Raman spectroscopy showed that Polyethylene and Polyethylene terephthalate were the major polymer types found in wastewater. It can be concluded that the wastewater treatment plants can retain more than 98% of microplastics in the wastewater and serve as point source due to large daily discharge of treated effluent. Prevention of releasing of microplastics into the environment is important as microplastics cause ecosystem and human health impacts mainly due to the potential transfer via food chain and toxicity effects.

**Keywords:** *Effluent, Influent, Microplastics, Wastewater treatment plant*

# MICROPLASTIC POLLUTION ALONG THE ATTANAGALLA RIVER, SRI LANKA

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## **Abstract**

Microplastics are identified as an emerging environmental contaminant in recent decades. Understanding the prevalence of microplastics in the environment is required to mitigate unfavorable consequences. Freshwater environments are at a greater risk of microplastics pollution due to frequent anthropogenic interaction. Microplastics studies on rivers have been suggested as a pathway to identify the sources and drivers of microplastics pollution. The present study was conducted to evaluate the microplastics pollution from headwater to downstream along the Attanagalla River. The surface water and sediment samples were collected from fifteen sampling sites along the river in May and October of 2019. Surface water samples were collected using a plankton net (circular opening of  $d = 20$  cm,  $100 \mu\text{m}$  mesh) and sediment samples were collected deploying a Van Veen grab sampler (HYDRO-BIOS 4373330 Kiel, Germany). Wet peroxide digestion was carried out to remove organic matter in surface water and sediment. Suction filtration technique was used to extract the microplastics. Identification and classification of microplastics were done under the inspection of a stereomicroscope (Nikon SMZ 1270i, Japan). Microplastics were found in all the samples studied. Abundance of microplastics in surface water ranged from  $1.12 \text{ m}^{-3}$  -  $17.45 \text{ items m}^{-3}$  and in sediment  $11.38$  -  $129.47 \text{ items kg}^{-1}$ . The river microplastics load exhibited an ascending order from upstream to downstream of the river. Retention of microplastics was observed mainly at the area closer to the river mouth. Secondary microplastics which include fibers, fragments, film and foams were predominately recorded in all the sampling sites. Fibers were dominant microplastics category that accounted as 63%, 58% in surface waters and 46%, 49% in sediment. Polyethylene, polypropylene, polyvinylchloride and polystyrene were the polymer types detected by the Raman spectroscopy. Further studies are needed to understand the major pathways of MP pollution in the river.

**Keywords:** *Attanagalla River, Microplastics, Sediment, Surface water*



# THE PREVALENCE OF MUSCULOSKELETAL DISORDERS AMONG LATEX HARVESTERS IN THE SMALLHOLDER RUBBER SECTOR: A CASE STUDY IN MONERAGALA DISTRICT IN SRI LANKA

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## Abstract

The study was aimed to investigate the prevalence of the Musculoskeletal Disorders (MSDs) among the Latex Harvesters (LHs) of rubber (*Hevea brasiliensis*) farming and to identify the factors affect MSDs. The data was collected employing a questionnaire survey, from 297 LHs in Moneragala in 2020, where the sample was selected using stratified random sampling technique. The pain of the nine anatomical body regions of the LHs was measured as in the dichotomous responses as yes or no, during the last 12 months. Results indicated that, 78% of the LHs experienced an MSD. Female LHs (69%) were dominated in the sample and 91% of them were married. The age of LHs varied from 22 to 79 years. The majority of LHs (45%) were included in the age category of 46-55 years. About nine percent of the respondents were above the age of 65 years, while only 30% were found below the age of 35 years. The average harvesting extent was 0.7 ha/day (approx. 350 trees). The most (43%) of the LHs had work experience in rubber tapping from 7.5 – 9.5 years. The mean working hours/day was 6. The most commonly affected body region among the respondents was Neck Pain (NP) (76%), followed by low back pain (67%), shoulder pain (54%), knee pain (55%), ankle/foot pain (56%), elbow pain (31%), upper back pain (36%), wrist pain (53%) and hip/thigh pain (21%). So that, the LHs were in potential risk of NP among the other MSDs. Forty-seven percent of the LHs with neck pain were directed to medical advice. The NP had significant association with the age ( $r=0.7776$ ), working hours per day ( $r=0.5821$ ), number of trees tapped per day ( $r=0.3776$ ) and work experience in rubber tapping ( $r=0.8021$ ). Marital status, education level, gender have not shown a significant association with the NP. It is important for the LHs to be aware and to be trained on occupational health and safety by professionals in regular manner. These results suggest an urgent necessity for work process modifications, as in harvesting methodology and harvesting tools to prevent MSDs of LHs in smallholder rubber sector.

**Keywords:** *Latex Harvesters, Musculoskeletal Disorders, Rubber Smallholders*

# EVALUATION OF THE MYCO-REMEDICATION POTENTIAL OF REAL TEXTILE WASTEWATERS BY NATIVE FUNGAL SPECIES

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## Abstract

Textile industry positively drives the Sri Lankan economy, though its effluent creates various negative impacts on the environment. Therefore, the present study evaluated the decolorization potential of real textile wastewater effluents using five different fungal strains (*Aspergillus aculeatus* (SUB6585851), *Aspergillus nomius* (MN718216), *Aspergillus niger* (MN990895), *Cuvularia aerea* (MN999546) and *Talaromyces* sp. (MT005744)) that previously identified as potential dye decolorizing agents. Textile wastewater samples collected from seven textile wastewater effluents sites in Poogoda (2), Biyagama (3) Rathmalana (1) and Negambo (1) were centrifuged and filter sterilized (0.22  $\mu$ m) prior to the experiment. Each fungal species was grown on agar plates and four discs of mycelium (d=10 mm) were inoculated to 50 mL of textile wastewater contained flasks and incubated at 28 °C under shaking at 100 rpm. All the experiments were carried out in triplicates and controls were maintained without the addition of fungi. The color removal percentage was recorded by measuring the changes of absorbance at  $\lambda$  max for each wastewater sample. All five tested fungal strains were shown over 90% of dye decolorization within 120 h of incubation with response to seven wastewater samples screened. Among them, *A. niger* was the most efficient fungal strain which showed over 95% of decolorization for all seven textile wastewater samples tested within 48–72 h time and the least potential of dye decolorization was recorded by *A. nomius* while controls remained unchanged. In all seven wastewater samples, the basic water quality parameters; COD, N-NH<sub>4</sub><sup>+</sup>, TSS, TDS were reduced to 50-75% after the treatment by *A. niger* and pH has recorded in the range of 6.5- 8.0. Hence, the results of the present study emphasize the potential applicability of *A. niger* for the development of a bioreactor to treat real textile wastewater in an environmentally friendly manner.

**Keywords:** *Decolorization, Textile wastewater, Myco-remediation, Fungi, Aspergillus niger*



## **Health Sciences & Nutrition**



# CERVICAL CANCER SCREENING PROGRAMME: WHY URBAN SRI LANKAN WOMEN DO NOT PARTICIPATE?

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## Abstract

Morbidity and mortality due to cervical cancer is preventable by early detection through screening. Our objective was to determine the factors associated with non-participation in cervical cancer screening among women in an urban Sri Lankan setting. A community based descriptive cross-sectional study was conducted among 247 women aged 35-60 years in Boralesgamuwa Medical Officer of Health area selected using simple random sampling. A pretested interviewer administered questionnaire was used to collect socio-demographic information and knowledge level about pap test. Data were analyzed using SPSS version 26.0. Comparisons were made between participation rates of different groups using Chi-square test with  $p < 0.05$  as significant level. Marital status (married 76.1% vs unmarried 23.9%,  $\chi^2 = 25.813$ ,  $df = 1$ ,  $p = 0.001$ ), education level of the spouse (secondary or above 90.9% vs primary 9.1%  $\chi^2 = 12.327$ ,  $df = 2$ ,  $p = 0.002$ ), parity (equal or more than two 52.3% vs less than two 47.7%,  $\chi^2 = 30.628$ ,  $df = 1$ ,  $p < 0.001$ ), having children (Yes 60.6% vs No 39.4%,  $\chi^2 = 44.970$ ,  $df = 1$ ,  $p < 0.001$ ), having heard of Pap test (Yes 76.7% vs No 23.3%,  $\chi^2 = 13.766$ ,  $df = 1$ ,  $p < 0.001$ ), being aware of free availability of Pap test (Yes 50.8% vs No 49.2%,  $\chi^2 = 42.379$ ,  $df = 1$ ,  $p = 0.001$ ) were factors associated with non-participation. Age, education level or occupational status did not show a significant association with non-participation. Being unmarried, parity of  $< 2$  or not having children, less educated spouse, not heard of Pap test and not being aware of free availability of Pap test are the factors associated with non-participation of women in cervical cancer screening programme in an urban Sri Lankan setting.

**Keywords:** *Cervical cancer screening, Pap test, non-participation, Sri Lanka, urban*

# EVALUATION OF CONTENT VALIDITY AND RELIABILITY OF SINHALA VERSION OF END STAGE RENAL DISEASE- ADHERENCE QUESTIONNAIRE (SINESRD-AQ) FOR USE AMONG PATIENTS RECEIVING IN-CENTRE HAEMODIALYSIS IN SRI LANKA

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## Abstract

Haemodialysis is a lifesaving therapeutic procedure used in managing patients with End Stage Renal Disease (ESRD). Reported adherence to recommended treatment regimen among patients receiving haemodialysis varies due to lack of a valid and reliable instrument. Thus, the current study aimed to evaluate the validity and reliability of End Stage Renal Disease-Adherence Questionnaire -Sinhala version (SINESRD-AQ) for use among patients receiving in-centre haemodialysis in Sri Lanka using methodological approach. Content validity of the SINESRD-AQ was evaluated using modified Delphi method with an expert panel (n=6). The content relevance of the instrument was assessed by the indices of Item-level content validity index (I-CVI), Average content validity index for the whole scale (S-CVI), Item-level content validity ratio (I-CVR) and Modified kappa statistic coefficient (k). SINESRD-AQ was administered to ten patients receiving haemodialysis in Teaching Hospital, Kurunegala with a retest interval of one week in order to assess test-retest reliability. Internal consistency reliability for two subscales measuring treatment adherence in SINESRD-AQ was assessed with Cronbach's alpha coefficient. SPSS version 25.0 software and Microsoft office excel were used to analyse data. Ethical approval for the study was obtained from the Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura and Teaching Hospital, Kurunegala. The expert panel evaluated all forty-six items of the SINESRD-AQ as excellent for content validity with I-CVI ranging from 0.83 – 1.00 (I-CVI>0.8), S-CVI = 0.93, I-CVR ranging from 0.67 – 1.00 (I-CVR>0.6) and modified kappa statistics coefficient ranging from 0.81-1.0 (k>0.74). Strong test-retest reliability existed across all the items measuring adherence in SINESRD-AQ with an average Intra Class Correlation coefficient of 0.861 (p<0.01). Cronbach's Alpha of 0.649 for whole two subscales showed acceptable internal consistency. SINESRD-AQ is a valid and reliable instrument to assess treatment adherence behaviours among patients receiving haemodialysis in Sri Lankan hospital setting.

**Keywords:** *Content validity, Treatment adherence, End Stage Renal Disease, Reliability, Haemodialysis*

# EFFECT OF PROCESSING CONDITIONS ON FUNCTIONAL PROPERTIES OF SOME SELECTED TRADITIONAL RICE VARIETIES IN SRI LANKA

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## Abstract

Incorporation of traditional rice into Sri Lankan diet due to their nutritional benefits is a positive trend nowadays. However, functional properties of differently processed traditional rice flour which could have potential to be used in food industry haven't been explored. The aim was to determine the effect of polishing and parboiling on functional properties of six traditional rice varieties (*Goda heenati*, *Batapola el*, *Dik wee*, *Dahanala*, *Unakola samba* and *Hangimuththan*). Water absorptivity (WAI) & water solubility (WSI) indices, amylose & amylopectin contents, swelling capacities (SC), oil absorption capacities (OAC), emulsion activity (EA) & stabilities (ES), foam capacities (FC) & stabilities (FS) and bulk densities (BD) of raw under milled, raw polished (4%) and parboiled uncooked rice flour were determined by standard methods. WAI of raw polished rice were the least (129-159) followed by raw (166-183) and highest in parboiled rice (182-223). WSI of parboiled rice was the highest (1.7-6.4) followed by raw rice (1.2-5.6) and raw polished (0.9-1.9). However, raw and parboiled *Godaheenati* and *Batapola el* had significantly high WSI compared to other varieties. All parboiled (28-32%) and majority of raw (24-32%) and raw polished (24-33%) varieties were categorized as high amylose rice. SC of raw (18-21%) was the least, followed by raw polished (23-24%) and parboiled rice (24-25%). OAC ranged between 102-113% with parboiled varieties having the highest OAC. EC and ES of the rice flour were 42-51% and 41-48% respectively. Raw polished varieties showed the least EC and ES. BD of rice varied from 0.9-1.0 g/cm<sup>3</sup>. FC of rice flour were negligible. The parboiled or raw rice have good functional properties and thus incorporation of these rice flour in food industry replacing wheat flour will provide many health benefits and be socio-economically and environmentally beneficial.

**Keywords:** *Traditional rice, Parboiling, Functional properties, Raw rice and Food industry*



# **CARE SEEKING BEHAVIOUR OF VICTIMS SUBJECTED TO ANIMAL BITES ATTENDING PRELIMINARY CARE UNIT AT BASE HOSPITAL – BALAPITIYA, SRI LANKA**

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## **Abstract**

Rabies infects domestic or wild animals and is spread to human through close contact with infected animal bites. Although rabies is 100% fatal it is 100% preventable in humans with proper Post Exposure Prophylaxis (PEP). Since care seeking behaviour is an important factor in preventing rabies deaths, it is a timely need to find out the care seeking behaviour of animal bite victims and factors influencing the care seeking behaviour. The objective of the present study was to describe the care seeking behaviour of victims subjected to animal bites and to determine their associated factors with their care seeking behaviour. This was a descriptive cross sectional study conducted at the Primary Care Unit (PCU) at Base Hospital Balapitiya. A sample of 392 participants were recruited fulfilling the recruitment criteria. A pretested interviewer administered questionnaire was used to collect data. Majority 63.8% were dog bites. Of them 70.7% were bitten by a domestic rearing animal. Of the animal bites victims who presented to the hospital only 18.1% were vaccinated regularly. When consider the care seeking behaviour 96.4% attended the hospital for treatment within 3 days of the animal bite. The two factors found to be significantly associated with appropriate care seeking behaviour were having multiple wounds following animal bite ( $\chi^2 = 4.856$ ,  $p < 0.05$ ) and the residence of the participants ( $\chi^2 = 6.654$ ,  $p < 0.05$ ). The place of residence and having multiple wounds directly influence the treatment seeking behaviour of animal bite victims for the post exposure prophylaxis. The social status or the type of animal did not influence the treatment seeking behaviour. Majority of animals not being vaccinated is also a factor which is of a major concern in rabies prevention.

**Keywords:** *Rabies 1, bites 2, care seeking 3, dog 4, treatment 5*

# **GRAMEEYA DENGUE COMMITTEE IN CONTROL OF DENGUE THROUGH COMMUNITY EMPOWERMENT IN A SELECTED MOH AREA IN SRI LANKA**

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## **Abstract**

Dengue fever is an acute febrile illness caused by Flavi virus spread by a container breeding mosquito. It's one of the significant global public health threats. Grameeya dengue committees were established for community empowerment in proper garbage disposal in keeping the environment free of mosquito breeding sites. Reduced mosquito breeding sites in turn reduce the reported number of dengue patients from a particular area, and it is the ultimate expected impact of the project (grameeya dengue committee). The present study was carried out in Medical Officer of Health (MOH) area Bope Poddala to assess the impact and perception of the stakeholders involved in dengue control activities and community towards Grameeya Dengue committees in the control of dengue. To get the perception of the stakeholders and the community involved in mosquito control activities towards Grameeya dengue committees, in-depth interviews and focus group discussions were conducted. In-depth interviews were carried out with MOH, PHI, grama niladharee at Bope Poddala. Two focus group discussions were carried out, one with a group of villages and another one with village dengue committee members. For the impact assessment, the incidence of dengue cases reported in both the MOH areas MC Galle and Bope Poddala during 2017 and 2019 were compared. The comparison of difference in the incidence rate of dengue cases of 2017 with 2019 of the two MOH areas were shown to be significantly different (Incidence rate Difference in two MOHs - 1.391%,  $X^2$  - 761.819,  $p < 0.001$ ). The overall attitude of the villagers were that the support received from the grameeya dengue committees is appropriate and need to be continued. The social acceptance received because of the engagement in social activities are more encouraging and stimulating the committee members to do a better job in prevention and control of dengue. The committee members are of the view that members will be motivated if their work is appreciated by higher officials.

**Keywords:** *Dengue 1, Grameeya dengue committee 2, control 3, community empowerment 4*

# **MATERNAL EXPERIENCE WITH CONGENITAL SURGICAL PROBLEMS IN NEONATES MANAGED IN A PEDIATRIC INTENSIVE CARE UNIT**

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## **Abstract**

Mothers who are having a neonate with congenital surgical problems face a highly stressful situation. Their experience is fraught with a range of emotions of fear and powerlessness. Exploring the experiences may provide insight to assist the mothers in managing difficult circumstances by addressing their needs. The study aim was to explore the experience of mothers with babies having congenital surgical problems in the Paediatric Intensive Care Unit at Teaching Hospital Kandy (THK). A phenomenological research design was used in this qualitative study. Data were collected by semi-structured in-depth interviews over a one month from purposively selected 15 mothers at the PICU. The ethical approval was obtained from the Ethics Review Committee of THK. Data were analysed using the thematic analysis methods. Five themes that emerged from the findings are physical discomforts, psychological distress, lack of family support, social isolation, and economic difficulties. Almost all the mothers expressed that they are suffering from physical discomforts due to breast engorgement, caesarean section surgical site pain, swollen legs, loss of appetite and poor hygiene. Feeling of fear, sadness, anxiety, and disappointment due to separation and potential threat to the baby have a harmful influence on their mental health. Further, lack of family support due to abandonment by relatives and neglect by society has led to social isolation and financial difficulties resulting in negative impact on the socio-economical aspect. Mothers with babies having congenital surgical problems are suffering from various physical, psychological, and socioeconomic difficulties. Thus, organizing awareness programmes regarding the treatment plan and encouraging support groups among mothers, facilitating coping techniques to reduce the burden and improve their wellbeing while developing incorporated care with health professionals and the family is recommended.

**Keywords:** *Neonatal, Congenital surgical problems, Paediatric Intensive Care Unit, Mothers' experience*

# **A COMPARISON OF EATING HABITS OF MARTIAL ARTS ATHLETES REPRESENTING UNIVERSITY OF SRI JAYEWARDENEPURA AND SRI LANKA ARMY**

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## **Abstract**

Dietary intake and eating habits significantly influence the performance of athletes. This cross-sectional survey aimed to compare the eating habits of martial arts athletes representing University of Sri Jayewardenepura and Sri Lanka (SL) Army. The sample included 30 university athletes (male: 15, female: 15) and 43 SL Army athletes (male: 28; female: 15) aged between 20-32 years. Participants were briefed about the study procedure and explained that their agreement to participate was completely voluntary. Informed written consent was obtained from all participants before data collection. The eating habits of participants were recorded using a pre-validated questionnaire during normal training days (from November to December 2020). Chi-Square test was used to determine the associations between the athlete groups and eating habits. Majority of Army athletes (91%) and university athletes (57%) consumed 5-6 L of water per day for 5-7 days per week. Majority of SL Army athletes (74%) and university athletes (63%) reported consuming vegetables 5-7 days per week. However, only 30% of Army athletes and 40% of university athletes consumed fruits 5-7 days per week. Regarding unhealthy food habits, 2% of Army athletes and 37% of university athletes reported consuming carbonated beverages 5-7 days per week whereas 5% of Army athletes and 37% of university athletes consumed fast foods 5-7 days per week. Significant associations ( $P < 0.05$ ) were found between athlete groups and eating habits such as consumption of fruits, vegetables, starchy foods, protein-rich foods, dairy products, sweets, carbonated beverages, and fast food. Based on Food-based dietary guidelines for Sri Lankans, it can be concluded that SL Army athletes show healthier food habits compared to university athletes. Both groups should increase the consumption of fruits. University athletes must minimize unhealthy food habits such as frequent consumption of carbonated beverages, fast foods and sweets while increasing water consumption.

**Keywords:** *Eating habits, martial arts athletes, fruits and vegetables, fast food*

# THE EFFECT OF PERCEIVED SELF-CONFIDENCE ON GOAL ORIENTATION: SPECIAL REFERENCE TO CLUB LEVEL BASEBALL PLAYERS IN SRI LANKA

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## Abstract

Baseball is one of the world-famous games and is a bat-and-ball game played between two teams where each team consist of nine players. Goal orientation is an important predictor of player achievement. This study aimed to investigate the relationships between the perceived self-confidence and goal orientation of club-level baseball players in Sri Lanka. The study population consisted of 81 (n=81) Central province and Western province club level baseball players and a universal sampling technique was used in selecting the sample. The two provinces were selected considering the data collection convenience due to covid-19 pandemic. A standard questionnaire was used to identify the perceived self-confidence and goal orientation of the baseball players. SPSS version 26.0 was used for data analysis. Methods used to analyse data were bivariate data analysis techniques considering the regression weights. Results revealed that there is a positive significant relationship between perceived self-confidence and goal orientation ( $p < 0.05$ ), suggesting that perceived self-confidence parameters lead coaches to focus on enhancing team performances. The findings of the study may also help coaches to develop their performance enhancement techniques and workshops.

**Keywords:** *Baseball players, Goal orientation, Perceived Self-confidence, Bivariate, Performance*

# **AGGRESSION OF FOOTBALL PLAYERS AND ITS INFLUENCE ON SPORTS PERFORMANCE IN EASTERN PROVINCE, SRI LANKA**

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## **Abstract**

Sport aggression is a common phenomenon evident among athletes on the field of play. Aggression encompasses a variety of behaviours aimed at inflicting pain or injury on the opponent. Therefore, the objective of this research was to see if there is a relationship between aggression and sports performance of male and female football players who had participated in the final football tournament in 2019 in the Eastern Province, Sri Lanka. One hundred and fifteen (80 male and 35 female) football players were randomly selected as the study sample. The subjects were instructed to complete the Buss-Perry Aggression Questionnaire (BPAQ) and Sports Performance Questionnaire. Independent Sample T-Test and regression were used to detect significant differences, and the Coefficients test was used to investigate the relationships. The significance level for this research was set at 0.05. The study's findings revealed that sports performance and anger have a negative significant relationship which is considered as an influential predictor of aggression.

**Keywords:** *Aggression, anger, sports performance, football, behaviour*



## **Humanities & Social Sciences and Education**





# PASSION AS A METAPHOR FOR THE ACT OF WRITING IN THE NOVEL “PASSION SIMPLE” BY ANNIE ERNAUX

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## **Abstract**

Ernaux writes *that writing should attempt to give the impression provoked by the sexual act on a screen, that anguish and stupefaction, a suspension of moral judgement.* (Ernaux, 1992). In this study, we examine how passionate love is used as a metaphor for the act of writing, based on the novel *Passion simple* by the French writer Annie Ernaux. “All the traits that define passion are found there in writing: quest towards an impossible object, the extreme tension that binds the subject to its object in a dual relationship, a mixture of elation and pain.” (Mion, D. 2010). Literary analysis was applied to examine the text, which revealed the analogy between the extreme obsessive passion of the narrator for a married man, and the nature and the different stages of writing. The analysis of the semantic fields and the form of the text reveal that passion is short, intense, and traumatizing, leaves indelible traces in the narrator, parallel to her act of writing which originates through the sparks of inspiration, but forces to relentless work in isolation to create an everlasting literary work. Passion is also portrayed as raw, immoral, more shameful for the female narrator, like the act of writing auto-fiction for a female writer portrayed through the technique of “flat writing”. The technique of stream of consciousness was used to describe the process of depersonalization of a writer. As per the narrator, it’s an “existence lived entirely for someone else” which clearly implies the intention of a writer. Writing is also described as therapeutic, with the emotional discharge on a paper as well as an attempt to relive an experience by retelling through words. What makes Ernaux stand out as “a writer” among the other accounts of confessions, is the objectification of her personal experience.

**Keywords:** *Passion simple, Annie Ernaux, Writing, Passion, Auto-fiction*

# ‘KEM’ FOR PROTECTION OF THE ENVIRONMENT: A CASE STUDY IN HENAWATTA GND, PANAGODA

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## Abstract

From the ancient time Sri Lankans have practiced ‘kem’ methods which are very elementary rituals. Even though ‘kem’ has been practiced in both negative and positive manners, most probably it has been practiced as a positive method in agricultural society. Especially these rituals have been used to protect paddy and other cereals from insects and other animals. In the modern society, ‘kem’ methods are accepted as indigenous knowledge. As an agricultural society, various types of ‘kem’ methods and rituals can be identified in Sri Lanka. At present, even international bodies like UNESCO have recognized ‘kem’ as an Intangible Cultural Heritage (ICH). The main objective of this research is to identify how to protect the environment by using ‘kem’ methods. Henawatta GND, Panagoda in Homagama was selected as the study area. When conducting this research both primary and secondary sources were used. As secondary sources, relevant documents were referred. Observation and interview methods were employed to collect primary data. According to the research findings, ‘Akusāththuva’, ‘Alusāththuva’, ‘Pahan ugul’, ‘Batalee gēma’, ‘Pelali gēma’ Danda adīma’, ‘Boku gēma’, ‘Lanu adīma’, ‘Lēn adīma’ and ‘Paskiri gēma’, ‘Bera gasīma’, ‘Tati gasīma’, ‘Raban gasīma’, ‘Garā yakum yāgaya’, ‘Irimā pidīma’, ‘Abhimānā pidīma’ and various types of yagas, ‘Gokkola diviya’, ‘Diya takaya’, ‘Diya holmana’, ‘Diya yakā’, ‘Sulan holmana’ and ‘Sulan bambara’ etc. were identified as rituals, ‘kem’ and social practices. Almost every peasant and other knowledgeable individuals have deep knowledge about this concept and vastly practiced by the older generation. Even though these rituals have been practiced very rarely, they have faced many difficulties and obstacles when practicing these methods. Practices such as drum beating, traditional ritual Gammaduwa, scarecrow and starting almost every agricultural activity in the auspicious time can be observed even today. Therefore, these ‘kem’ methods and rituals should be safeguarded as ICH as these methods are not harmful for the health of the environment and human beings.

**Keywords:** *Kem, Natural environment, Paddy cultivation, White magic, Ritual*

# **A GEOMORPHOLOGICAL STUDY ON THE DIVERSITY OF MICRO KARST LANDFORMS OF A LIMESTONE CAVE: A CASE STUDY IN WAULPANE CAVE, RATNAPURA DISTRICT**

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## **Abstract**

Karsts are the result of complex interplay between geology, climate, hydrology and biological factors over long-time scales. It is a collection of surface and subterranean landforms, formed through the dissolution of soluble bedrocks. The dissolution process produces surface landforms and network of cavities while the depositional process of  $\text{CaCO}_3$  produces secondary mineral deposits inside the caves known as speleothems. Waulpane limestone cave in Palledbedda is important due to its geological importance and geo-diversity. The main objective of this study was to identify the diversity of micro karst landforms of a limestone cave. The entire Waulpane cave was taken as the sample. Water and rock samples were collected randomly and landforms were measured and photographed while respondents were interviewed to get further information. The research findings show that the cave is consisted of speleothems like stalactites, stalagmites, drapery like features and karren on the walls, ceilings and ground with various sizes. Some stalactites seem like bulbs, cones, leaves and pillars while some resemble pencils, wall lamps, rounded arches, sand clocks and flower petals. Most of the features have scattered in the middle of the cave due to favourable conditions. The main factors for these formations are the calcium carbonate laden water spring, climate, topography, vegetation cover, hydrological pattern and limestone distribution.

**Keywords:** *Karst, Dissolution process, Limestone cave, Depositional process, Micro karst landforms*

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## සාරසංක්ෂේපය

පරිසරය හා මිනිසා අතර පවතිනුයේ අවිඥානීය බැඳීමකි. ඒ අතර පරිසර සමතුලිතතාවට වෘක්ෂ හා මිනිසා අතර ඇති අන්තර් සම්බන්ධතාව වැදගත් වේ. ලක්දිව පහතරට ශාන්තිකර්ම පද්ධතියේ අන්තර්ගත වෘක්ෂ ඇදහිලි විශ්වාස පරිසර පැවැත්මට උපයෝගී වන්නේ දැයි විමසීම අධ්‍යයන ගැටලුව විය. පහතරට ශාන්තිකර්මවල වෘක්ෂ කෙරෙහි දක්වන ලද පුද-පූජා, වත්-පිළිවෙත් ආදී ඇදහිලි හා විශ්වාස අධ්‍යයනය කිරීම මෙම පර්යේෂණයේ මූලික අරමුණ යි. මෙය මානවවංශ පර්යේෂණයක් වන අතර ගුණාත්මක ක්‍රමය භාවිත වීණි. ප්‍රාථමික හා ද්විතීයික මූලාශ්‍රය යටතේ දත්ත රැස් කිරීම සිදු විය. පහතරට සුනියම් කැපීම, දෙවොල් මඩු හා බලි ශාන්තිකර්ම නිරීක්ෂණය හා සහභාගීත්ව නිරීක්ෂණය ප්‍රාථමික මූලාශ්‍රය යටතේ ද, ඒ හා බැඳුණු සාහිත්‍යය අධ්‍යයනය ද්විතීයික මූලාශ්‍රය යටතේ ද සිදු කෙරුණි. වත්මන් පරිසර විනාශයට ඇතැම් සංවර්ධන ක්‍රියා මෙන් ම ජන සන්නවය, දේශපාලන, ආර්ථික, සමාජ ආදී තත්ත්ව බලපා ඇත. මිනිසාගේ සදාචාරය පරිසර පැවැත්ම කෙරෙහි බෙහෙවින් බලපායි. වෘක්ෂ හා මිනිසා අතර ඒකාත්මික සබඳතාව වටහාගත් අතීත ජනයා එය ආරක්ෂා කිරීමේ උපක්‍රමයක් ලෙස ඊට ආගමික වන්දනීයත්වයක් එක්කොට ඇත. පහතරට ශාන්තිකර්මවල රුක් පේ කිරීම, මල පේ කිරීම, මිල්ල කැපීම, රුක් පූජා, මල් පූජා, අත්ත මැතිරීම, නවකොළ අත්ත පූජා, කප් සිටුවීම වැනි වෘක්ෂ හා බැඳුණු වත්පිළිවෙත් මගින් සංස්කෘතික හා මනෝ විද්‍යාත්මක සාධක රැසක් ගම්‍යමාන කෙරේ. පරිසරයට සංවේදී මානසිකත්වයක් ගොඩනැගීමට ඉවහල් වන පරිසරය හා බැඳුණු ආගමික විශ්වාස මුල් කොටගත් ශාන්තිකර්ම උපත් කථා, පුරා කථා ආදී ජනශ්‍රැති ද මෙහි දී වැදගත් ය. එමගින් මිනිසා හා පරිසරය අතර සෞන්දර්යාත්මක, ආගමික සබඳතාවන් ගොඩනැගී ඇත. ඇගයුම්ශීලී චින්තනයත්, දාර්ශනික ඥානයත්, සාම්ප්‍රදායික දැනුමත් යන විවිධ දෘෂ්ටිකෝණයන්ගෙන් ඒ පිළිබඳ විමර්ශනයේ දී ඒවා හුදු මිට්‍යා පිළිවෙත් නො වන බව පැහැදිලි ය. මෙම වත්-පිළිවෙත් මගින් පරිසරයට උත්තරීතර බවක් ප්‍රදානය කොට වෘක්ෂ කෙරෙහි මානවවාදී ආකල්ප හා ධර්මතා සංයුක්ත දර්ශනයක් ගොඩනගා ඇත. ඒ අනුව පහතරට ශාන්තිකර්මයන්හි අන්තර්ගත ඇදහිලි හා විශ්වාස මගින් පරිසරයෙහි පැවැත්මට හා ආරක්ෂාවට සහනදායී බලපෑමක් සිදු කර ඇති බව මෙම අධ්‍යයනයෙන් සනාථ විය.

ප්‍රමුඛ පද: පරිසරය, වෘක්ෂ, අභිචාර, සංස්කෘතිය

# පහතරට ශාන්තිකර්මවල අවස්ථෝචිත රස උද්දීපනයෙහි ලා භාවිත නාද නිෂ්පත්ති විධික්‍රම

සම්පත් එන්.ජී.සී.

පහතරට නර්තන අධ්‍යයනාංශය, සෞන්දර්ය කලා විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව  
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## සාරසංක්ෂේපය

පහතරට නර්තන සම්ප්‍රදායට අයත් ශාන්තිකර්ම විවිධ අභිලාෂයන් මූලික කොට ගෙන පවත්වනු ලබයි. ප්‍රේක්ෂකයාට මානසික සුවය හා විවිධත්වයකින් යුත් රස උද්දීපනයට අවස්ථෝචිත ව නාද උපයෝගී කොට ගනී. එහි දී ශාන්තිකර්ම ශිල්පීන් භාවිත කළ විධික්‍රම අධ්‍යයනය හා එහි වර්තමාන භාවිතය පිළිබඳ පර්යේෂණය කිරීම මෙමගින් අරමුණු වේ. කටහඬ, බෙරහඬ, ගෙජ්ජ, සිලම්බු, වළලු, වස්දණ්ඩ ආදී නාද ගණනාවක් අවස්ථෝචිත ව එකිනෙකට වෙනස් අයුරින් ශාන්තිකර්ම තුළ භාවිත කරනුයේ ඇයි ද? යන ගැටලුව පිළිබඳ මෙහි දී අධ්‍යයනය කෙරේ. එසේ අධ්‍යයනය කිරීම මගින් පහතරට ශාන්තිකර්ම තුළ අන්තර්ගත විවිධ නාද, ප්‍රේක්ෂක මනස උද්දීපනය සඳහා ඉවහල් වන බවත්, ශාන්තිකර්මය පවත්වන කාලය තුළ ප්‍රේක්ෂකයා ග්‍රහණය කර ගැනීමට හැකි බව පැහැදිලි විය. සාහිත්‍ය මූලාශ්‍රය අධ්‍යයනය, සම්මුඛ සාකච්ඡා හා සහභාගීත්ව නිරීක්ෂණ මගින් ඒ සඳහා අවශ්‍ය දත්ත රැස්කරගන්නා ලදී. එමගින් ක්‍රමවත් ව, පදනමක් සහිත ව මෙකී නාද සංයෝජනය ශාන්තිකර්ම තුළ ගොඩනැගී ඇති බව වඩාත් තහවුරු විය. පර්යේෂණය සම්බන්ධයෙන් ප්‍රශ්නාවලියක් සකස් කොට තත් විෂය ක්ෂේත්‍රයෙහි නියැලෙන පාරම්පරික ශිල්පීන්, ශබ්ද පරිපාලන ශිල්පීන් හා මානසික වෛද්‍යවරුන් සමග සාකච්ඡා පවත්වා ඊට අදාළ දත්ත රැස්කර ගන්නා ලදී. එම දත්ත විශ්ලේෂණය මගින් ශාන්තිකර්මවල නාද භාවිතය ක්‍රමවත් ව ගොඩනැගීමෙන් පුද්ගල මනසෙහි රස උද්දීපනයට අවස්ථෝචිත ව අයුරින් යොදා ගෙන ඇති බව නිගමනය විය. නාද තුළ පවතින විස්තාරයේ ප්‍රබලතාව මත සංඛ්‍යාතය වෙනස් වේ. ඒ අනුව ශාන්තිකර්මයන්හි භාවිත විවිධ නාදවල සංඛ්‍යාතයන් තාක්ෂණික ක්‍රම ඔස්සේ එහි තීව්‍රතාව ගණනය කොට මෙම පර්යේෂණය වඩාත් තහවුරු කිරීමට හැකි විය. එමගින් ශාන්තිකර්මයෙහි නාදවල තරංග ශක්තිය මගින් ප්‍රේක්ෂකයාට මානසික ව සිදු කරන බලපෑම පිළිබඳ අවබෝධයක් ලබා ගැනීමට හැකි විය. තව ද වර්තමානයේ දී ශාන්තිකර්මයන්හි එකී නාදය තුළින් රස උද්දීපනය කිරීමේ ක්‍රමවේදයෙන් බැහැර ව ඇතැම් අවස්ථාවල ශාන්තිකර්ම ශිල්පීන් කටයුතු කරන බව හඳුනාගත හැකි වූ අතර ඊට හේතුව එම නාද භාවිතයේ නිවැරදි අවබෝධයක් නොමැති නිසා බව නිගමනය විය. මෙම පර්යේෂණය මගින් ශාන්තිකර්ම තුළ තිබෙන නාද විධික්‍රම හඳුනාගැනීම, ඒ පිළිබඳ තත් විෂය ක්ෂේත්‍රයේ නියැලෙන ශිල්පීන්ට අවබෝධයක් ලබා දීම හා ශාන්තිකර්මයන්හි අන්තර්ගත ගුණාත්මකභාවය පවත්වා ගැනීම සහ වර්තමාන අවශ්‍යතාවක් බව ද නිගමනය විය. ඒ පිළිබඳ ශාන්තිකර්ම ශිල්පීන්ගේ අවධානය යොමු කරවීමේ අවශ්‍යතාවක් ඇති බවත් එය ශාන්තිකර්ම ක්ෂේත්‍රයේ ප්‍රවර්ධනයට හේතු වන බවත් මෙහි දී වඩාත් ප්‍රත්‍යක්ෂ විය.

**ප්‍රමුඛ පද:** පහතරට ශාන්තිකර්ම, අවස්ථෝචිත, රස උද්දීපනය, නාද විධික්‍රම, ප්‍රේක්ෂකයා

# PRELIMINARY SURVEY ON HUMAN MACAQUE INTERACTION

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## Abstract

Human-monkey interactions have reached crisis proportions in Sri Lanka over the last 10 years due to extensive deforestation aimed at promoting rapid economic growth and agricultural expansion. The main objective of this study was to determine the current status of human macaque interactions in some selected areas in Kuliypitiya Electoral District, North Western Province. This on-going research has selected the most reported activities of macaques respectively in Ihala Ambawa (V1), Deegalla (V2), and Kabalewa (V3) GN divisions which are surrounded by Balagalla reserved forest. 15 interviewees (V1 – 7, V2 – 5, V3 – 3) were selected for the pilot survey. The purposive sampling method was used to collect data under two main categories: farmers and villagers. The in-depth interview method was used to collect the data through a questionnaire consisting of open and closed questions. Participatory monitoring was used to collect data from interviewees' homes, where the main questionnaire was modified to improve the quality of the data from time to time. People who have good experience with macaques' activities and particularly older (over 50 years) were selected as interviewees. No previous research or actions like workshops about prevention methods or wildlife actions can be found in the research area regarding this conflict. The current human macaque interaction has rapidly increased in the research area from 2000 to 2010 with an increase in their population inside the forest and the following reasons were found to be responsible for this status. There has been mass deforestation on their food supplements inside the forest for the last couple of months compelling them to find quick food availabilities in the village. Hence, their interaction with humans increased in the last 10 years thus familiarizing themselves with the village resulting in their hunt for more comfortable food resources. Consequently, villagers have to face daily economic loss which can be quantified as property damages and crop damages. The present study attempted to quantify the economic loss as home gardening, economic crops, home property damages, and economic crop sites' properties gradually for 2 years. The climatic condition of the area, floral and faunal biodiversity, human population, subsistence patterns, and agricultural practices were also considered in looking for the best mitigation actions for the problem.

**Keywords:** *Monkey, Interaction, Conflict, Agro-Economic, Attitude*

# PERCEIVED BARRIERS TO ONLINE TEACHING AMONG TEACHERS OF NATIONAL SCHOOLS IN COLOMBO DISTRICT

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## Abstract

With the COVID-19 pandemic leading to disruption of traditional face to face classroom-based education, the need of online teaching arose. In a country like Sri Lanka where online school education is a completely new experience in the state sector, assessing different aspects of online teaching relevant to school education was crucial. Therefore, the objective of this study was to describe commonly used online teaching tools and perceptions on online teaching among secondary school teachers in Colombo district. A descriptive, cross-sectional study was conducted among 368 secondary school (grades 6-13) teachers of National schools in the Colombo Educational zone selected by convenience sampling using a self-administered online questionnaire. Participants were requested to rate, following barriers they faced in a 5-point Likert scale where zero represented 'no barrier': cost of data, availability of a device, connectivity issues, computer literacy, English language literacy and low level of student enthusiasm. Data was analysed using SPSS and presented as percentages for qualitative variables. Majority were females (78.8%, n= 286) and between 31-50 years (61.4%, n=223). The most commonly used online teaching platform for real-time teaching was Zoom (69.3%, n=244) while WhatsApp was the majority's (96.9%, n=341) choice to send messages/links to students. Only 19.8% (n=73) were satisfied with the effectiveness of online teaching. However, 84.8% (n=212) were agreeable for blended teaching. A majority perceived lack of technical fluency (59.3%, n=207), connectivity issues (58.2%, n=203) and lack of devices (57.9%, n=202) as barriers to online teaching. If the aforementioned challenges were addressed, 51.0% (n=188) of the participants were willing to conduct online teaching. Teachers need to be provided with necessary support to make online education more effective.

**Keywords:** *online teaching, online teaching platforms, perceived barriers*



# ARCHAEOLOGY OF COMMON PEOPLE IN THE PAST: THE JOURNEY OF SETTLEMENT ARCHAEOLOGY IN SRI LANKAN CONTEXT

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## Abstract

The thought structures of any field of study do not remain the same in a static way. Those change from time to time owing to different causes giving rise to paradigm shifts. Sri Lanka's archaeological thought has been no exception to this. The settlement archaeology project of Prof. Senake Bandaryake and the team resulted in a different way of thinking during that time as they followed a concept highlighting 'commoners of past', who most likely supported the elite layer of the ancient societies. However, some scholars argue that the trend was not substantially carried out after Bandaranayake. Considering this fact, this study was carried out with the objectives of addressing the significance of Sigiriya Dambulla project in terms of archaeological thought, to assess whether it has not been really sufficiently established later on and looking for possible reasons behind the insufficient grounding of this concept in a contemporary social context. The researchers adopted a literature-based desk study to bring the existing literature together about the settlement archaeology establishment in Sri Lanka, and content analysis was used for data analysis. Findings include the comparison of archaeological thought before 1998 and the Sigiriya Dambulla project by following a model depicting a paradigm shift. Lack of opportunities and financial support, insufficient educational knowledge on the given discipline, conflicting perceptions of different schools, political intervention, tourism industry, and the social needs were identified as the main reasons for the scanty continuation of the given concept afterward.

**Keywords:** *Settlement Archaeology, Sigiriya Dambulla Project, Common people of the past, Sri Lanka*

# THE EFFECT OF A DEVELOPMENT PROJECT ON SOCIO-CULTURAL ASPECTS OF PEOPLE; BASED ON THE SAMANALAWEWA RESERVOIR PROJECT, SRI LANKA

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## Abstract

As any other country, in Sri Lanka development projects are being conducted to deliver a specific output aiming to improve the economic and social conditions of the people. However, only a few projects have paid their attention to socio-cultural aspects of the people prior to the initiation of the project or during the planning stage to get the ideas of a particular group of society. Therefore, this research was conducted to find out the effect of a development project on people and their socio-cultural aspects based on the Samanalawewa Reservoir Hydroelectric Project in Balangoda, even after 2 decades from its commencement. Among these Wegapitiya, Kinchigune and Imbulpe areas were selected as the study setting. The qualitative data was gathered from 150 families, including 50 families from each area and interviews were conducted with a questionnaire guide composite with open-ended and close-ended questions. The first generation can be identified as those who were victimized and first-affected from the development project and the second generation represents those who were born and raised in the relocated areas. Therefore, a comparative analysis was carried out based on the socio-cultural aspects which both generations have gone through during the past two decades. The socio-cultural aspects of the people were converted into a new form of life in socially, economically and mentally. All social and kinship bonds as well as social solidity were disrupted and people became commercialized. People had to give up on farming and agriculture and had to work at industries in this new life. Access to the new livelihood opportunities, education and health were expanded while culture, religion, values and attitudes, customer preferences, population and rate of growth, age distribution and social mobility transformed at the other end. People have gone through different stages that resulted from the development and post-development situations. They have been able to manage and adapt to new socio-cultural aspects with the effect of modernization and commercialization during the last two decades.

**Keywords:** *Relocation, Socio-culture, Development, Commercialization, Society*

# **REPRESENTATION OF WIDOWHOOD IN TAMIL FILMS: SPECIAL REFERENCE TO MOVIES PRODUCED DURING 2008 – 2018**

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## **Abstract**

The film industry is one of the platforms of mass media with the audio-visual medium for communication. A good film can entertain, educate, motivate, and encourage the audience in several ways, and in some cases, movies can even awaken a sense of empathy in people who have never experienced it in any context. Widowhood is a very sensitive and serious problem in Hindu culture and Tamil society. India is considered as the nation with the largest widow population in the world. It is estimated that there are 40 million widows in India, and it is 10% of the country's female population. Now, most of the filmmakers have tried to focus on this crucial problem through the big screen and this may help in the future to make changes in their lives. This study has focused on the portrayal of widowhood in Tamil films and the sociological analysis of these films aids to understand how these vulnerable people are suffering due to widowhood, how the Hindu culture and rituals related to widows are depicted in the Tamil films, how the society is dealing with such problems and finally the changes to represent them in Tamil films. Relational analysis-based content analysis has been used as a qualitative research tool to analyse the selected samples. Three Tamil movies which are released during 2008-2018 were randomly selected for this study. The study has concluded that a slight deviation from traditional characterization would also count as pioneering and unique. Now, Tamil cinema has understood the concept and has tried to challenge these stereotypical depictions of widows in recent films. Further, the study highlights that widows are not Disney princesses waiting for princes to bring colour back into their lives and they are not any less human than anyone else in the world.

**Keywords:** *Widowhood, Tamil Films, Representation, Hindu religion, Tamil Culture*

# PROLONGATION OF LIFE AFTER DEATH IN EGYPT

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## **Abstract**

Ancient Egypt civilization is located northeastern Africa along the banks of the Nile and dates from the fourth millennium BCE. “Egypt was the river Nile. It was a narrow carpet of soil enclosed within a rocky slot in the sands” (White, 1963: P.15). Egyptian society was divided into social classes, with the Pharaoh at the very top. After that, noblemen and priests were important and priests controlled the religious affairs of the state. Scribes or record keepers were citizens who were able to read, write while sailors, soldiers, artisans, and merchants belonged to the middle class and had a good financial rank. Peasants cultivated the lands by affiliating to the Pharaohs, temples, and aristocrats. The last social class was slaves and they were considered as prisoners of war who were building monuments and pyramids. One of the substantial facts about Egypt culture is that they believed the body and soul were significant to human existence, in life as well as in death, thus, Egyptians gave immense precedence to build pyramids. Therefore, when studying Egyptian civilization, it illustrates that their funerary practices, such as mummification and burial in tombs, were designed to assist the deceased to find their way in the afterworld. They believed that the body was the link to a spiritual existence in the afterlife. Hence, the main objective of this research is to carry out an in-depth analysis of the reasons for building pyramids and how Egyptians linked them to prolong life after death. The secondary objective is a historical study through the ancient Egyptian civilization to discover the importance of preserving ancient heritage in a country since they are the best indications that exemplified the identity of a country. The research is based on primary and secondary data and secondary data is obtained from both published sources and articles including “*The Black Land*” written by Merlin Peris and “*Everyday Life in Ancient Egypt*” by Jon White. Conclusive evidence brings to light that the Egyptians achieved their religious goals through the creation of the pyramids, and their beliefs in the life after death concept are disclosed through the stuff that they buried which still leads to important discoveries. Also, Egyptians have gifted the world a unique and novel creation which exemplified their identity to the world.

**Keywords:** *Egypt, Pyramids, Prolongation, Afterlife, Death*

# A MODEL FOR EVALUATING HIGHER EDUCATION PERFORMANCE: QUALITY ASSURANCE PERSPECTIVE CONCEPT PAPER

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## Abstract

In Quality assurance, performance indicators are employed to measure the prespecified quality aspects. The lack of performance evaluation mechanisms in the Sri Lankan higher education context has been reported by scholars and in quality assurance reviews. This concept paper proposes an information system enabled higher education performance evaluation model. The study follows design science research methodology in modelling the process of performance evaluation that leads to developing a quality assurance performance evaluation system. First, it identifies the key performance indicators that can measure the important quality aspects of the higher education context. Required data is planned to extract from existing information systems, in the implementation stage. The proposed information system will calculate the respective key performance indicators and measure the results against the quality assurance objectives. For this process, this study proposes a multidimensional data model to represent the performance data. A sample three-dimensional data model is further illustrated. It presents the data under three dimensions as student, time and discipline. The review or checking phase is one of the key phases of the ISO 9001:2000 quality management PDCA (Plan-Do-Check-Act) model. Therefore, proposed performance evaluation model can be implemented to fulfil the Check phase of the PDCA model. Accordingly, higher education institutes can be employed this performance evaluation model based information system to check the achieved level of expected objectives in the quality assurance process.

**Keywords:** *Higher education, performance evaluation, performance indicators, quality assurance*

# රොඩ් විත්තියෙන් ප්‍රකට වන කවිනළු රංගක්‍රම පිළිබඳ අධ්‍යයනයක්

වන්දුසේකර සී.ඇම්.ආර්.පී.

ලලිත කලා අධ්‍යයනාංශය, මානවශාස්ත්‍ර පීඨය, කැලණිය විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව  
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## සාරසංක්ෂේපය

අතීතයේ නාට්‍ය හැඳින්වීම උදෙසා නාඩගම්, කවිනළු, කවිරඟ හා නාට්‍ය යන පර්යාය පද රාශියක් යෙදී ඇත. කවිනළු යන්නෙන් කාව්‍ය නාටක යන්න අර්ථවත් වේ. යම් කතා පුවතක් පද්‍යාවලියකට අනුව රඟ දැක්වීම මෙම කවිනළුවේ දී සිදු වේ. සිංහල ජන සමාජයේ අතීතයේ පටන් අන-වින, කොඩිවින යන ගුප්ත විද්‍යා ශාස්ත්‍ර පිළිබඳ දැඩි විශ්වාස පවතිනු දක්නට ඇත. යම් පුද්ගලයෙකු හට අනිටු විපාක ඇති කිරීමේ අරමුණින් සිදු කෙරෙන ගුප්ත විද්‍යා ක්‍රම කොඩිවින ලෙස හැඳින් වේ. මෙම කොඩිවින බන්ධන ඉවත් කිරීමට නම් රොඩ් ජනයා සතු නිවකුල මන්ත්‍ර භාවිත කළ යුතු බව මන්ත්‍ර ශාස්ත්‍ර සිදු කරන ඇදුරන්ගේ මතය යි. මෙම කොඩිවින බන්ධන ඉවත් කිරීමට ප්‍රථම රොඩ් විත්තිය නමින් පද්‍යාවලියක් ගායනා කෙරේ. එම පද්‍යාවලියෙන් කියැවෙනුයේ අතීතයේ රොඩ් කුලය ඇති වූ ආකාරය යි. මෙම රොඩ් විත්තිය පද්‍යාවලියෙන් කවිනළු රංග ක්‍රම ප්‍රකට වේ ද? යන්න මෙම පර්යේෂණයේ ගැටලුව වේ. මෙම පද්‍යාවලිය ගායනා කරමින් ඉදිරිපත් කෙරෙන රංගයන්හි කවිනළු රංග ආකෘතික ලක්ෂණ අන්තර්ගත ව පවතී ද? යන්න හඳුනාගැනීම මෙම පර්යේෂණයේ අරමුණ යි. මෙය දේශීය සංස්කෘතික ලක්ෂණ ප්‍රකට කෙරෙන මානවවංශ විධි විචරණයක් වන හෙයින් දත්ත විශ්ලේෂණය ගුණාත්මක පර්යේෂණ විධික්‍රමය යටතේ සිදු කරන ලද අතර උද්ගාමී තර්කන ඔප්පේ නිගමනයන්ට එළඹිණි. මෙම පර්යේෂණය සඳහා දත්ත රැස් කිරීමේ දී ප්‍රාථමික සාහිත්‍ය මූලාශ්‍රය භාවිත කරන ලදී. එහි දී ගාල්ලේ මනෝජී ඒකනායක මහතා සතු රොඩ් මාලය පද්‍යාවලිය ද අධ්‍යයනය කළ අතර පාරම්පරික ව නිවකුල බන්ධන කැපීම් සිදු කරනු ලබන පුද්ගලයින් සමඟ කරන ලද සම්මුඛ සාකච්ඡා මගින් හා ශාන්තිකර්ම නිරීක්ෂණ මගින් ද දත්ත රැස් කරගන්නා ලදී. ද්විතීයික සාහිත්‍ය මූලාශ්‍රය යටතේ පොත්පත්, සඟරා ආදියෙන් ද දත්ත රැස් කළේ ය. මෙසේ රැස්කර ගන්නා ලද දත්ත, විශ්ලේෂණයේ දී කවිනළු රංග සම්ප්‍රදායේ ඇතුළත් රංග ආකෘතික ලක්ෂණ වන ඉෂ්ට දේවතා නමස්කාරය, පොතේගුරු, අත්වැල් ගායන, ගායන වෘත්ත, වාදන වෘත්තය, රංග භූමිය ඉදි කිරීම, වාචික අභිනය, ආභාර්ය අභිනය, සාන්වික අභිනය යන රංග ආකෘතික ලක්ෂණ මෙම රොඩ් විත්තිය නම් රංගනය රඟ දැක්වීමේ දී ඉදිරිපත් වන බව දක්නට ලැබුණි. එම කරුණු අනුව මෙම රොඩ් විත්තිය යනු කවිනළු රංග ක්‍රමයක් බව මෙහි දී නිගමනය කළ හැකි විය.

**ප්‍රමුඛ පද:** රොඩ්, කවිනළුව, ජනයා, ආකෘතිය, අභිනය

**සබරගමු නර්තනයේ ශාන්තිකර්මයන්හි අන්තර්ගත සාම්ප්‍රදායික  
ලක්ෂණ සමකාලීන වේදිකාවට ගෙන ඒමේ දී නව ශිල්පක්‍රම හා  
තාක්ෂණය භාවිතය පිළිබඳ අධ්‍යයනයක්**

කරුණාරත්න පී.එම්.පී.එම්.

සබරගමු නර්තන අධ්‍යයනාංශය, නර්තන හා නාට්‍ය කලා පීඨය,  
සෞන්දර්ය කලා විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව  
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**සාරසංක්ෂේපය**

අද්‍යතන ප්‍රාසංගික කලාව තාක්ෂණික හා ශිල්ප විධික්‍රමයන්ගෙන් පොහොසත් වුවකි. දේශීය නර්තනය ජාතික හා ජාත්‍යන්තර තලයට ගෙන යාමට නම් නව ශිල්පක්‍රම හා තාක්ෂණික විධික්‍රම ඔස්සේ වඩාත් සංවර්ධනය කළ යුතු ව ඇත. අනෙකුත් දේශීය නර්තන සාම්ප්‍රදායන් හා සංසන්දනය කිරීමේ දී සබරගමු නර්තන සාම්ප්‍රදාය, සමාජගත වීම හා නව ප්‍රවණතාවන්ට ලක් වූවේ මන්දගාමී ව ය. ඊට හේතු වූ දේශපාලන, සංස්කෘතික, ආගමික, සමාජීය හේතු සාධක බොහොමයක් ඇති අතර ඒවා තත් සාම්ප්‍රදායේ පසුගාමීත්වයට සෘජු ව බලපා ඇත. අනෙකුත් නර්තන සාම්ප්‍රදායන් නව ප්‍රවණතාවන්ට ලක්වූයේ යටත්විජිත සමය හා පශ්චාත් යටත්විජිත සමයේ දී ය. එහෙත් ස්වාභාවික ව රට මැද පිහිටි සබරගමු ප්‍රදේශය විදේශීය ආක්‍රමණයන්ට හා සංක්‍රමණවලට ලක් නො වීමෙන් අද්‍යතනය දක්වා පවත්නා පුරාමික ලක්ෂණ ආරක්ෂා වී ඇත. සබරගමු නර්තනයේ භාවිත සාම්ප්‍රදායික ශිල්පක්‍රම එහි ප්‍රාසංගිකත්වය උදෙසා යම් දායකත්වයක් දක්වනු ලැබූව ද අද්‍යතන ප්‍රවණතා හමුවේ ඒවා ප්‍රමාණවත් වේ ද යන්න පිළිබඳ මෙම පර්යේෂණය මගින් සාකච්ඡා කිරීම, අරමුණු විය. මෙම පර්යේෂණය සඳහා සාහිත්‍ය මූලාශ්‍රය, නිරීක්ෂණ සහ සම්මුඛ සාකච්ඡා මගින් දත්ත රැස්කර ගන්නා ලදී. අතීතයේ ප්‍රේක්ෂකයාගේ රස විඳීමේ බුද්ධිමට්ටම අනුව ශාන්තිකර්ම ශිල්පියා විවිධ ක්‍රමෝපායන් මගින් ප්‍රාසංගිකත්වය පිළිබිඹු කරනු ලැබූව ද වර්තමාන ප්‍රේක්ෂකයාගේ අවශ්‍යතාව මත නවතාවන්ට ලක්කිරීමට සිදු ව ඇත. මේ අනුව මෙම පර්යේෂණය සම්බන්ධයෙන් ගොඩනගන ලද ප්‍රශ්නාවලියක් සකස් කොට පාරම්පරික සබරගමු ශාන්තිකර්ම ශිල්පීන් පස් දෙනෙකු හා වර්තමාන ශ්‍රී ලාංකික නව නර්තන නිර්මාණ ශිල්පීන් පස් දෙනෙකු සමග සාකච්ඡා පැවැත්වීම ද ඉන්දියාව, චීනය රුසියාව, ප්‍රංශය සහ ඇමරිකාව යන රටවල් නර්තනය සඳහා භාවිත කරන නව ශිල්පක්‍රම පිළිබඳ ව අධ්‍යයනය කිරීම ද සිදු කරන ලදී. ඒ අනුව උක්ත ගැටලුව සම්බන්ධයෙන් දත්ත රැස්කරගත් අතර එම දත්ත විශ්ලේෂණය මගින් සබරගමු නර්තන සාම්ප්‍රදායේ ප්‍රධාන ශාන්තිකර්මය වන පහන්මඩු ශාන්තිකර්මය තුළ අන්තර්ගත ප්‍රාසංගික ලක්ෂණ සාමාන්‍ය ජනයාගේ රස විඳීම සඳහා ප්‍රමාණවත් වුව ද, එම නර්තනයන් සමකාලීන වේදිකාවට ගෙන ඒමේ දී නව ශිල්පක්‍රම හා තාක්ෂණය භාවිත කිරීම වර්තමාන අවශ්‍යතාවක් බව නිගමනය විය.

**ප්‍රමුඛ පද:** සබරගමු නර්තනය, ප්‍රාසංගිකත්වය, ශිල්පක්‍රම, නව ප්‍රවණතා, තාක්ෂණය

## මෙතම්පිටමින් (අයිස්) භාවිතය ආශ්‍රිත ප්‍රවණතා සහ පුද්ගල වර්ගයාමය සහ සෞඛ්‍ය ගැටලු පිළිබඳ සමාජ විද්‍යාත්මක අධ්‍යයනයක්

අමරබන්දු පී.එන්., සේනානායක බී., දර්ශන ඒ.ටී., වලස්මුල්ලගේ ටී., මධුහංසි ජී.ජී.ඒ\*  
සහ ප්‍රියදර්ශන එස්.

අන්තරායකර ඖෂධ පාලක ජාතික මණ්ඩලය, ශ්‍රී ලංකාව  
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### සාරසංක්ෂේපය

වර්තමානයේ ගෝලීය ව පවතින ප්‍රධාන ගැටලුවක් ලෙස මත්ද්‍රව්‍ය භාවිතය හේතුවෙන් පුද්ගලයන් තුළ ඇති වන ඇබ්බැහිකාරීත්වය හඳුනාගත හැකි ය. මුල්කාලීන ව, වැඩිවශයෙන් හෙරොයින් සහ ගංජා වැනි මත්ද්‍රව්‍ය පිළිබඳ ව අවධානය යොමු කරනු ලැබූව ද වර්තමානයේ කෘත්‍රීම ව නිපදවන මනෝවර්ථක ගණයේ ඖෂධ හා මෙතම්පිටමින් (අයිස්) කෙරෙහි පුද්ගලයින් යොමුවීමේ සැලකිය යුතු ප්‍රවණතාවක් පවතින බව නිල සංඛ්‍යාත්මක තොරතුරු මගින් තහවුරු වී ඇත. මේ අනුව, මෙතම්පිටමින් භාවිතයේ ප්‍රවණතාවයන් සහ භාවිත කරන පුද්ගලයින්ගේ මනෝ-සමාජ භාවයන් හා වර්ගාත්මක වෙනස්කම්, මෙතම්පිටමින් භාවිතයෙන් ඔවුන් වෙත එල්ල වී ඇති සෞඛ්‍යමය බලපෑම් කෙබඳු ද යනාදිය පිළිබඳ තොරතුරු අනාවරණය කරගැනීමේ අරමුණින් මෙම අධ්‍යයනය සිදු කරන ලදී. මෙතම්පිටමින් භාවිත කරන පුද්ගලයින්ගේ පැතිකඩ, භාවිත රටාවන්, භාවිතය හා සම්බන්ධ සුවිශේෂී වර්ගාවන් සහ භාවිතයෙන් සිදු වන සෞඛ්‍ය බලපෑම කවරේ ද? යන්න මෙම අධ්‍යයනයේ ගැටලුව විය. අධ්‍යයන ක්ෂේත්‍රය තෝරා ගැනීමේ දී මත්ද්‍රව්‍ය භාවිතයේ ව්‍යාප්තිය අනුව ඉහළ ව්‍යාප්තියක් සහිත කොළඹ හා ගම්පහ දිස්ත්‍රික්කයන් ඇතුළු ව අනෙකුත් දිස්ත්‍රික්කයන් ද අධ්‍යයන ක්ෂේත්‍රය ලෙස සලකන ලදී. පර්යේෂණ ක්‍රමවේදය ලෙස මිශ්‍ර පර්යේෂණ ක්‍රමවේදයක් භාවිත කළ අතර මත්ද්‍රව්‍ය භාවිත කරන පුද්ගලයින් සැගවුණු කණ්ඩායම් වන බැවින් හිමබෝල නියැදිම් ක්‍රමය අනුව මෙතම්පිටමින් භාවිත කළ පුද්ගලයින් 50 දෙනෙකු අධ්‍යයනයේ නියැදිය ලෙස යොදාගන්නා ලදී. එසේ ම, දත්ත රැස් කිරීමේ ශිල්ප ක්‍රම ලෙස සම්මුඛ සාකච්ඡා, ප්‍රත්‍යාක අධ්‍යයන සහ නිරීක්ෂණය භාවිත කර ඇත. අධ්‍යයනයේ සොයාගැනීම් අනුව, නියැදියට අයත් මෙතම්පිටමින් භාවිත කරන පුද්ගලයින්ගෙන් බහුතරය එනම් 72% (36) වයින්ස් ක්‍රමය (බල්බ කොටසක් තුළ මෙතම්පිටමින් දමා රත්කර) ආඝ්‍රාණය කර අයිස් භාවිත කර ඇත. එසේ ම, මෙතම්පිටමයින් භාවිත කරන පුද්ගලයින් තුළ ඇති වන කෙටිකාලීන වර්ගාත්මක වෙනස්කම් ලෙස, නින්ද නො යාම (72%), දැඩි ආහාර අරුචිය (36%), දත්මිටි කෑම, දත් එකමත එක තද වීම (26%) හා කායික වශයෙන්, ඉහළ උෂ්ණත්වයන් හට ගැනීම (08%) යනාදිය හඳුනාගත හැකි ය. එසේ ම, දිගුකාලීන ව ඇති වන ප්‍රධාන වෙනස්කම් ලෙස, කායික ව ඇඟ කෙටිටු වීමේ ස්වභාවය හා දුර්වල වීම (32%), මනෝවිද්‍යාත්මක වශයෙන් සිදු වන වෙනස්කම් ලෙස, මානසික විකෘතිතාවයන් සමඟ ප්‍රවණ්ඩකාරී ස්වභාවය හෙවත් 'මෙන් සයිකෝසිස්' රෝග තත්ත්වය ඇති වීම (10%), ප්‍රාන්තිකාරක තත්ත්වයන් ඇති වීම (4%) හඳුනාගත හැකි ය. තව ද, අධ්‍යයනයට භාජනය කළ මෙතම්පිටමින් භාවිත කළ 64% (32) දෙනෙක් මෙතම්පිටමින් සම්බන්ධ ඉහළ ඇබ්බැහිකාරීත්වයක් පෙන්නුම් කරයි. මේ අනුව, මෙතම්පිටමින් භාවිතය කායික හා මානසික ව පුද්ගලයා කෙරෙහි ඉතාමත් ඉහළ බලපෑමක් සිදු කරන බව නිගමනය කළ හැකි ය. එසේ ම, අයිස් මගින් පුද්ගලයාට හා සමාජයට වන බලපෑම ඉතාමත් අහිතකර බවත් එය ප්‍රතිකාර ක්‍රියාවලියකින් සියයට සියයක් යථා තත්ත්වයකට ගෙන ඒමට නො හැකි බවත් අධ්‍යයනය මගින් අනාවරණය විය. මේ අනුව, මෙතම්පිටමින් ඇතුළු මත්ද්‍රව්‍ය දුර්භාවිතය, නිවාරණය සඳහා කඩිනම් වැඩසටහන් දියත් කිරීම හා මෙතම්පිටමින් සඳහා ඇබ්බැහි වූ පුද්ගලයින් සඳහා විශේෂ ප්‍රතිකාර ක්‍රියාවලියක් ආරම්භ කිරීම, ව්‍යාප්තිය හා එහි හානිය අවම කිරීමට ප්‍රජා මූලික උපදේශන වැඩසටහන් සිදු කළ යුතු ය.

**ප්‍රමුඛ පද:** මෙතම්පිටමින්, ඇබ්බැහිකාරීත්වය, මෙන් සයිකෝසිසාව, මත්ද්‍රව්‍ය, සෞඛ්‍ය



# PSYCHOSOCIAL ATTRIBUTES OF DRUG ABUSE AMONG YOUTHS AND ADOLESCENTS

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## **Abstract**

Currently, drug abuse has emerged as a major social problem subjected to discussions globally. Furthermore, youths and adolescents engaging in socially deviant actions such as drug abuse can be a cause for the uncertainty of the future of a country. The main objective of this study is to identify types of drugs popular among youths and adolescents, drug-using patterns, family factors affecting drug abuse, the influence of environmental factors and psychosocial factors as well as policies, plans, and actions to address these conditions. Youths and adolescents representing the 10-24 age category being treated in rehabilitation centres were selected, under the Random Sampling Method, and the total sample was 64 individuals. In order to collect data, data collecting techniques such as Semi Structure Questionnaire and in-depth interviews were used and for data analysis SPSS and Content Analysis were used. The majority of the youths and adolescents represented in the sample stated that they use cigarette as the primary drug and 31 (48.5%) individuals had started to use drugs for the first time when they were 16-20 years of age. When considering psychosocial factors related to drugs, as individual psychological factors- (curiosity, mental confusion, disappointment), as environmental factors- (living in an area where consuming drugs without any obstacle is possible, availability of drugs in the residing area), as family-related factors- (making disputes with family members, drug use of family members), and as social factors - (peer pressure, facing legal issues) were revealed as factors that had mainly influenced the abuse of drugs among youths and adolescents through this study. The research showed a tendency among young individuals to take part in Parties organized by social media. Ecstasy, tablets used for medicinal purposes, LSD, Amphetamine type Stimulants, Cannabis, Heroin, Cocaine, Alcohol, Cigarettes, Tobacco related products and Magic Mushrooms were revealed to be the drugs that were mostly used by young individuals at parties organized through social media.

**Keywords:** *Youths, Adolescents, Drugs, Psychosocial attributes*

# TRENDS AND PATTERNS OF DRUG USE AMONG CONSTRUCTION WORKERS (SPECIAL REFERENCE TO COLOMBO DISTRICT)

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## Abstract

Trends and patterns of drug use vary from time to time, from region to region and from place to place. Considering the emerging trends and patterns of drug abuse, a tendency to use drugs can also be identified among workers at large scale building construction workplaces. The main objective of the study was to identify trends and patterns of workers' drug use in construction workplaces. The problem of the study was what are the current trends and patterns of workers' drug use in construction workplaces. The research was conducted at eight selected building construction workplaces in Colombo and suburbs and the sample size was 400 workers. Colombo District was selected based on the high level of construction work being carried out in the Colombo District and the high prevalence of the use of dangerous drugs in the Colombo District. Construction workers were selected for the sample using random sampling and a Survey method was used for carrying out this study. The structured questionnaire was used to identify trends and patterns of workers' drug use and in-depth interviews and observation were used to identify workers' drug use behaviour and their perception of using drugs. Quantitative data were analyzed using SPSS software and qualitative data were analysed by the thematic analysis method. Out of the total population, 79% of workers use Kerala cannabis, 76% use legal alcohol, 30% use local cannabis and 21% use smoke powder related products. A high percentage of workers (44%) who use Kerala cannabis has a high tendency to get it from a friend at work. The percentage of workers using tablets and heroin is 16% and 9%, respectively and the percentage of workers who used LSD is 0.25 %, as revealed by the study. In addition, 20% of workers use processed tobacco. Out of the workers who are using Kerala cannabis, the majority (54%) is daily users. 99% of workers are using cigarette/tobacco and it is further revealed that the highest percentage of workers (38%) use drugs due to body pains after completion of work. It can be concluded that all the workers who use drugs are poly-drug users. Furthermore, it can be concluded that Kerala cannabis has high popularity among dangerous drugs and also there is high popularity of the daily consumption of Kerala cannabis. It is hoped to create drug-free workplaces by designing and implementing preventive treatment and rehabilitation programs based on research findings.

**Keywords:** *Construction workers, Drugs, Drug use, Heroin, Kerala cannabis*

# **A STUDY ON RETICENCE OF SRI LANKAN ADULT LEARNERS IN PRODUCING SPOKEN UTTERANCES IN SECOND LANGUAGE CONTEXTS**

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## **Abstract**

In studying the group of adult learners in question which comprises some public and private sector employees along with a set of young school leavers, in the conduct of a language improvement programme, the researchers of the substantive study in the capacity of resource persons came to an understanding. This is based on the fact that the learners lag behind in making English as a Second Language (ESL) spoken discourse utterances compared to other three remaining language skills, listening, reading, and writing. This milieu has led to do a study as to how speaking needs are required for a given set of learners compared to other language skills. The study paves the way to inquire why the adult learners are reluctant to engage in discussions and what kinds of measures can be exploited to enhance their involvement and motivation to be engaged in English speaking activities during the programme. Previous studies further affirm the reticence of adult learners in producing spoken discourse utterances as a conspicuous challenge in the contexts of teaching and learning English as a second language. The researchers made use of structured interviews and open-ended questionnaires to accrue qualitative data pertaining to find the causative factors behind the voluntary participants' reticence in spoken language practicing sessions. The results have indicated that the reluctance of learners on spoken discourse may depend on a myriad of factors spread in sociocultural, affective, and educational domains. Having studied the causative factors, a set of remedial measures have been further proposed to mitigate the experienced challenges in pedagogic delivery in terms of speaking.

**Keywords:** *Adult learners, English as a Second Language, Learner interaction, Reticence, Spoken discourse*

# ගුර්ඛානී සංගීතය කෙරෙහි හින්දුස්තානී සංගීතයේ ධ්‍රැපද් ගායන ශෛලියේ අභාසය ලැබුණේ ද? විමර්ශනාත්මක අධ්‍යයනයක්

නිශ්ශංක එල්.එන්.ඒ.ඩී.පී.

පශ්චාද් උපාධි අධ්‍යයන පීඨය, ශ්‍රී ජයවර්ධනපුර විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව  
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## සාරසංක්ෂේපය

ගුර්ඛානී සංගීතය යනු භාරතීය සංගීත සම්ප්‍රදායන් අතුරින් පැරැණිතම සංගීත සම්ප්‍රදායක් වන අතර සික් ආගමික පසුබිම හා බැඳී පවතින්නකි. සික් ආගමික සම්ප්‍රදායේ ප්‍රධානතම ආගමික නායකයන් වන සික් ගුරු විසින් මෙම සංගීත සම්ප්‍රදායය නිර්මාණය කොට පැවතගෙන එනු ලබන බව සැලකේ. අතීතයේ භාරතයෙහි පැවැති ගායන ශෛලීන් අතර ප්‍රමුඛ ස්ථානයක් ගත් ගායන ශෛලියක් ලෙස ද ධ්‍රැපද් ගායන ශෛලිය හැඳින්විය හැකි ය. මෙම පර්යේෂණයෙහි අරමුණ වනුයේ ගුර්ඛානී කීර්තන් ගායන ශෛලිය කෙරෙහි හින්දුස්තානී සංගීතයේ ධ්‍රැපද් ගායන ශෛලියෙහි අභාසය ලැබී තිබේ ද? යන්න විමර්ශනයට ලක් කිරීම යි. එසේ අභාසය ලැබී ඇත්නම් ඒ කුමන ආකාරයකට ද සහ එයින් ගුර්ඛානී කීර්තන් ගායන ශෛලියෙහි මූලික ආකෘතිය කෙරෙහි යම් කිසි බලපෑමක් සිදු වී තිබේ ද යන ගැටලු කෙරෙහි ද මෙම පර්යේෂණයේ දී අවධානය යොමු කරනු ලැබී ය. එමෙන් ම මෙහි දී ගුර්ඛානී කීර්තන් ගායන ශෛලිය සඳහා ධ්‍රැපද් ගායන ශෛලිය ගායනා කිරීමේ දී භාවිත කළ වාද්‍ය භාණ්ඩයන්හි උපයෝගීතාව පිළිබඳ ව ද අවධානය යොමු විය. තව ද ගුර්ඛානී කීර්තන් ගායන ශෛලිය කෙරෙහි ධ්‍රැපද් ගායන ශෛලියෙහි අභාසය ලැබීමට මූලික වූ හේතූන් කවරේ දැයි යන්න ද අධ්‍යයනයට භාජනය කෙරිණි. මෙම පර්යේෂණය ගුණාත්මක අධ්‍යයන ක්‍රමවේදය ඔස්සේ සිදු කරන ලදී. මෙම පර්යේෂණය සඳහා සම්මුඛ සාකච්ඡා ක්‍රමය ප්‍රධාන වශයෙන් යොදා ගනු ලැබූ අතර ග්‍රන්ථ, පර්යේෂණ පත්‍රිකා සහ සඟරා ආදිය ද්විතීයික මූලාශ්‍රය ලෙස යොදාගන්නා ලදී. විශේෂයෙන් ම දත්ත විශ්ලේෂණය කිරීමේ දී ධ්‍රැපද් ගායන ශෛලිය සහ ගුර්ඛානී කීර්තන් ගායන ශෛලිය ඉතා සියුම් ව අධ්‍යයනය කළ අතර ධ්‍රැපද් ගායන ශෛලියෙහි ප්‍රධාන වශයෙන් දැකිය හැකි අංග, ගුර්ඛානී කීර්තන් ගායන ශෛලියෙහි යොදාගෙන ඇති ආකාරය ගායන ශෛලීන්හි තිබිය යුතු ප්‍රමුඛ ලක්ෂණ අධ්‍යයන කිරීම තුළින් විශ්ලේෂණයට භාජනය කෙරිණි. පර්යේෂණයේ සොයාගැනීම්වලට අනුව පෙනී යනුයේ ගුර්ඛානී කීර්තන් ගායන ශෛලිය සඳහා හින්දුස්තානී සංගීතයේ ධ්‍රැපද් ගායන ශෛලියෙහි අභාසය යම් ප්‍රමාණයකට ලැබී ඇති බව යි. එමෙන් ම ධ්‍රැපද් ගායන ශෛලිය සඳහා තාල වාද්‍ය භාණ්ඩ ලෙස යොදා ගන්නා ලද පබාවජ් සහ ජෝරි පබාවජ් යන වාද්‍ය භාණ්ඩ ගුර්ඛානී කීර්තන් ගායන ශෛලිය සඳහා ද යොදා ගන්නා ලද බව පර්යේෂණයෙහි දත්ත විශ්ලේෂණය කිරීම තුළින් සොයාගන්නා ලදී.

ප්‍රමුඛ පද: ගුර්ඛානී කීර්තන්, සික්, ධ්‍රැපද්, බ්‍යාල්, ගුරුද්වාරා

# **KNOWLEDGE ON AUTISM SPECTRUM DISORDERS AMONG PRE-SCHOOL TEACHERS IN THE COLOMBO DISTRICT AND FACTORS AFFECTED WITH THIS KNOWLEDGE**

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## **Abstract**

Autism spectrum disorders (ASD) are increasingly prevalent conditions in the modern world in which early diagnosis and commencement of intervention services are shown to be effective in the management of symptoms. In this sense, preschool teachers can play an important role in the early identification of children with ASD. However, limited studies have been carried out assessing pre-school teachers' knowledge about ASD, especially in identifying ASD affected children. A descriptive cross-sectional study was carried out to determine the knowledge level of 211 preschool teachers from the Colombo District of Sri Lanka: these teachers were selected using cluster sampling with randomly selected pre-schools in the Colombo district. A self-administered questionnaire, distributed as a Google form, was used to collect the data regarding the pre-school teachers' knowledge, their attitudes regarding ASD, and their knowledge sources, and to assess the proportion of pre-school teachers who had encountered a child with ASD. Most teachers had good knowledge level regarding the signs, symptoms, and identification features of ASD. Seminars, diplomas which included developmental disorders, books, workshops, and training programs on ASD and other developmental disorders were found to be the most effective sources of knowledge. 70% of teachers had encountered children with ASD, and most have positive attitudes towards ASD: however only 54% of teachers had good overall knowledge, and specific knowledge about the risk factors of ASD, which could be improved according to the recommendations suggested in the study.

**Keywords:** *Autism, Autism Spectrum Disorders, Preschool teachers, Autism awareness, Knowledge and Attitudes on ASD*

# පුද්ගල සාක්ෂරතාව සහ සේවා නියුක්තිය අතර පවතින සම්බන්ධතාව පිළිබඳ අධ්‍යයනයක්

කරුණාරත්න එම්.එම්.එස්.ඒ\*, ජයසිංහ එන්.එම්.ඒ. සහ ප්‍රියදර්ශනී අයි.ටී.එන්.

ආර්ථික විද්‍යා අධ්‍යයනාංශය, මානවශාස්ත්‍ර හා සමාජීය විද්‍යා පීඨය,  
ශ්‍රී ජයවර්ධනපුර විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව  
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## සාරසංක්ෂේපය

මෙම පර්යේෂණය මගින් ශ්‍රී ලංකාව තුළ 2007-2020 කාල සීමාවට අදාළ පුද්ගල සාක්ෂරතා අනුපාතය සහ සේවා නියුක්තිය අතර පවතින සම්බන්ධතාව අධ්‍යයනය කරන ලදී. ඒ අනුව ස්වායත්ත විචල්‍යය ලෙස පුද්ගල සාක්ෂරතා අනුපාතය යොදාගත් අතර, පරායත්ත විචල්‍යය ලෙස සේවා නියුක්ති පුද්ගලයන් සංඛ්‍යාව යොදා ගන්නා ලදී. මෙහි දී වාර්ෂික මහ බැංකු වාර්තා පදනම් කර ගනිමින් දත්ත රැස් කරන ලදී. සාක්ෂරතා අනුපාතය සහ සේවා නියුක්තියට අදාළ ව යොදා ගන්නා ලද දත්තයන් ප්‍රමත ව ව්‍යාප්ත නො වීම හේතුවෙන් එම දත්ත විශ්ලේෂණයේ පහසුව සඳහා ලොග් සංඛ්‍යා බවට පරිවර්තනය කරන ලදී. ඒ අනුව සාක්ෂරතා අනුපාතය සහ සේවා නියුක්තිය අතර පවතින සම්බන්ධතාව අධ්‍යයනය කිරීම සඳහා සරල රේඛීය ප්‍රතිපායනයක් සිදු කරන ලදී. එහි දී ස්වායත්ත විචල්‍යය සහ පරායත්ත විචල්‍යය අතර අනුලෝම හෙවත් ධන සම්බන්ධතාවක් පවතින බව හඳුනාගත හැකි විය. ඒ අනුව ලැබුණු සරල රේඛීය ප්‍රතිපායන සමීකරණය  $E = 1.356 + 2.819L$  වේ. මේ අනුව පැහැදිලි වනුයේ පුද්ගල සාක්ෂරතා අනුපාතය එක ඒකකයකින් ඉහළ යන විට සේවා නියුක්තිය 2.819කින් ඉහළ යන බව ය. මේ අනුව පර්යේෂණ ප්‍රතිඵල මත පදනම් ව ඉදිරිපත් කළ හැකි යෝජනා කිහිපයකි. එනම් සංවර්ධනය වෙමින් පවතින රටක් ගණයෙහි ලා සැලකෙන ශ්‍රී ලංකාව ඉහළ ආර්ථික වර්ධනයක් කරා ගමන් කිරීමේ දී සේවා නියුක්තිය ඉහළ නංවා ගැනීම අත්‍යවශ්‍ය වන අතර, ඒ සඳහා පුද්ගල සාක්ෂරතාව ධනාත්මක බලපෑමක් ඇති කරන බැවින් ඒ පිළිබඳ අවධානය යොමු කිරීම අත්‍යවශ්‍ය වේ. එහි දී සාක්ෂරතා අනුපාතය ඉහළ නැංවීම සඳහා ප්‍රාරම්භ අධ්‍යාපනය අනිවාර්ය කිරීම, අධ්‍යාපනය නගා සිටුවීම සඳහා අවශ්‍ය පහසුකම් සැපයීම, දුෂ්කර පාසල් සහ ඒවායේ අධ්‍යාපනය ලබන දරුවන් කෙරෙහි විශේෂ අවධානයක් යොමු කිරීම මෙන් ම අවශ්‍ය පහසුකම් සපයා දීම වැනි උපායමාර්ග හරහා සේවා නියුක්තිය ඉහළ නංවා ගැනීමට යොමු වීම වැදගත් වේ.

ප්‍රමුඛ පද: අධ්‍යාපනය, ශ්‍රී ලංකාව, සාක්ෂරතාවය, සේවා නියුක්තිය

**විශ්වවිද්‍යාල සිසුන් අර්ධකාලීන රැකියාවලට යොමු වීම හරහා සිසුන්ගේ ශ්‍රේණි ලකුණු සාමාන්‍ය අගයට සිදු වන බලපෑම**

ප්‍රියදර්ශනී අයි.ටී.එන්.\*, කරුණාරත්න ජී.ඩී.පී., සහ කරුණාරත්න එම්.එම්.එස්.ඒ

ආර්ථික විද්‍යා අධ්‍යයනාංශය, මානවශාස්ත්‍ර හා සමාජීයවිද්‍යා පීඨය,  
ශ්‍රී ජයවර්ධනපුර විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව  
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**සාරසංක්ෂේපය**

විශ්වවිද්‍යාල සිසුන් අර්ධ කාලීන රැකියාවලට යොමු වීමට බලපාන සාධක හා ඒ හරහා ඔවුන්ගේ අධ්‍යාපනයට සිදු වන බලපෑම මෙම අධ්‍යයනය තුළින් විමසා බලන ලදී. ඒ සඳහා 2019 වර්ෂයේ මානවශාස්ත්‍ර හා සමාජීයවිද්‍යා පීඨයේ සිසුන් 200කින් යුතු නියැදියක් සරල සසම්භාවී නියැදීම යටතේ අධ්‍යයනයට භාජනය කරන ලදී. ප්‍රශ්නාවලියක් ආශ්‍රයෙන් අධ්‍යයනයට අදාළ ප්‍රාථමික දත්ත එක් රැස් කිරීම සිදු කළ අතර විශ්වවිද්‍යාල සිසුන් අර්ධකාලීන රැකියාවලට යොමු වීමට බලපාන සාධක හඳුනාගැනීම සඳහා ද්විමය ප්‍රවර්ධන ප්‍රතිපායන (Binary Logistic Regression) ආකෘතියක් භාවිත කරන ලදී. එසේ ම අර්ධකාලීන රැකියාවක් කිරීම නිසා ශිෂ්‍යයන්ගේ අධ්‍යාපනයට බලපෑමක් සිදු වේ ද යන්න අධ්‍යයනය කිරීම සඳහා බහු ගුණ ප්‍රතිපායන ආකෘතියක් යොදා ගන්නා ලදී. එහි දී පරායත්ත විචල්‍ය ලෙස ශ්‍රේණි ලකුණු සාමාන්‍ය අගයක් (GPA), ස්වායත්ත විචල්‍යයන් ලෙස අර්ධකාලීන රැකියාවලට යොමු වීම, සිසුන්ගේ වයසල සිසුන් විශ්වවිද්‍යාලයට පැමිණෙන්නේ කිනම් ස්ථානයක සිට ද?, සිසුන් හදාරන උපාධි පාඨමාලාව, අධ්‍යයන පරික්ෂණ සඳහා සිසුන් තුළ පවතින පෙර සුදානම, දේශනවලට සහභාගී වීම ඇතුළු සාහිත්‍ය විමර්ශනයෙන් හඳුනාගත් විචල්‍යයන් කිහිපයක් භාවිතා කරන ලදී. පර්යේෂණයේ ප්‍රතිඵලවලට අනුව පෙනී යන්නේ මානවශාස්ත්‍ර හා සමාජීයවිද්‍යා පීඨයේ විශ්වවිද්‍යාල සිසුන් අර්ධකාලීන රැකියා සඳහා යොමු වීමට පුමිතිරි බව, පවුලේ මාසික ආදායම, මවගේ අධ්‍යාපන මට්ටම යන සාධක බලපාන බව යි. ඒ තුළින් ඔවුන් දේශන පවතින අතරතුර අර්ධකාලීන රැකියාවලට යොමු වීම හරහා ඔවුන්ගේ ශ්‍රේණි ලකුණු සාමාන්‍ය අගය කෙරෙහි සෘණ බලපෑමක් සිදු කරන බවත් මේ පර්යේෂණ හරහා ගම්‍ය විය.

**ප්‍රමුඛ පද:** *අර්ධකාලීන රැකියා, ශ්‍රේණි ලකුණු සාමාන්‍ය, විශ්වවිද්‍යාල සිසුන්*

# DOES MARRIAGE REDUCE CRIMES? THE IMPACT OF MALE SPOUSE ON FEMALE SPOUSE'S CRIMINALITY

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## Abstract

Marriage in Asia has recently undergone several changes and the relationship between spouses is considered as one of the most important mature life course transitions. This concept imposes explanatory power on females as they are influenced by different attitudes of male spouses after the marriage. While empirical studies emphasized that criminal desistance for male spouses are visible subsequently to this union, the study explores the impact of the male spouses towards the female criminality after the marriage. Moreover, the nature of the impact has been substantiated throughout the study. Based on randomly selected 63 married women in the Magazine remand prison in Welikada, the study collected primary data through interviews, observations, questionnaires, participant observations and case studies. Secondary data were gathered through empirical literature. The effect of marriage was analysed through qualitative and quantitative methods such as SPSS (V24) and qualitative content analysis. The highest criminal participation was reported in substances and money laundering offences which interlink with poverty and family survival. Temporary wedges holders and the absence of permanent occupations strongly influence criminality. The study revealed the co-relation between spouses and emphasized that deviant male spouses were the direct cause to criminal tendencies, including theft attempts and attempted murder. The nature of the behaviour of male spouses reflected direct pressure on females for crime commission or acted as an intermediate during the commission. The role of maternity was a determinant fact in developing frustration when coping with marital bonds. The outcomes suggest creating a sophisticated system for government officials to strengthen their financial status by creating self-employment for women. Further, programmes to enhance the value of 'family' and to protect the cultural value of the unit are more crucial in order to prevent broken families. In-depth studies on consequences of broken families will co-operate significantly to determine more loopholes of the social system including children and additionally will assist practitioners in policy making.

**Keywords:** *Criminal tendency, Deviant influence, Female criminality, Marital bond, Spouse*



# SYMBOLIC REPRESENTATIONS OF WATER IN BRITISH AND SRI LANKAN POETRY – A COMPARISON OF JOHN KEATS AND H. M. KUDALIGAMA

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## **Abstract**

Poetry is enriched with different manifestations of water. The symbolic representation of water in the poetry of British Romantic era and the poetical works of the second wave of Colombo Age is investigated in this research. The study is conducted with reference to John Keats and H.M.Kudaligama. The objectives of this research are to identify the metaphoric manifestations of water while exploring the compatibility of both poets in this regard. The references to water in their poems were extracted from a qualitative investigation of secondary materials. Purity, ferocity, power and resilience of water in their poetic manifestations can be identified as a symbolic representation which respectively draws upon impermanence, transience, fluidity, changeability, non-stagnation, renewability and complexity of life. Thus, it can be argued that there is an allegorical perception of water in both poets despite the temporal and special distinction both poets.

**Keywords:** *Water, Romanticism, Symbolic Representation, Keats, Kudaligama*

# සිංහල ග්‍රාමනාමකරණයේ සුසමාදර්ශය විතැන් වීම පිළිබඳ කොළොන්න කෝරළය පදනම් කරගත් අධ්‍යයනයක්

ලංකාමුල්ල කේ.එල්.\* සහ විරංග ජී.ඒ.එච්.

සිංහල හා ජනසන්නිවේදන අධ්‍යයනාංගය, මානවශාස්ත්‍ර හා සමාජීයවිද්‍යා පීඨය,  
ශ්‍රී ජයවර්ධනපුර විශ්වවිද්‍යාලය  
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## සාරසංක්ෂේපය

සිංහල ග්‍රාමනාමකරණයේ සුසමාදර්ශය විතැන් වීම පිළිබඳ මෙම පර්යේෂණයේ අරමුණ සිංහල ග්‍රාමනාමකරණයේ සංස්කෘතික විකාසනය තෝමස් කුන්ගේ සුසමාදර්ශය විතැන් වීම සංකල්පයේ ආභාසය ලබා විශ්ලේෂණය කිරීම ය. එම සංකල්පය මානවශාස්ත්‍ර අධ්‍යයනයට දායක කරගැනීමේ තාර්කික සම්බන්ධය වන්නේ සියවස් ගණනාවක පිළිගැනීම වෙනස් වීම යන සාධකය මත ය. සුසමාදර්ශය විතැන් වීම යනු එක් දැනුම් ක්ෂේත්‍රයක පවත්නා දැනුම් ධාරාවක් විශාල කාල පරාසයකට පසු ව දැඩි වෙනසකට ලක් වීම යි. පර්යේෂණ සීමාව ලෙස කොළොන්න කෝරළය තෝරාගන්නා ලද්දේ ගම්මාන 123ක නියෝජනයකින් ය. සිංහල ග්‍රාමනාමකරණයේ සුසමාදර්ශය විතැන් වීම යනු මෙරට ග්‍රාමනාමකරණය සංස්කෘතික ක්‍රියාවලියක සිට අසංස්කෘතික ක්‍රියාවලියක් වෙතට පසුබැසීම ය. එය සමාජ ස්වාභාවිකත්වය මත පදනම් වීම වඩාත් සංස්කෘතික වූ ක්‍රියාවලිය යි. නූතනයේ ග්‍රාම නාමකරණය කිරීම හිතුවක්කාරී ලෙස සිදු වෙයි. සමාජයේ සංස්කෘතික ස්වාභාවිකත්වය කෘත්‍රීම ව වෙනස් කිරීමක් වෙතට පොළො පැන තිබේ. මෙම නව නාමකරණ ක්‍රියාවලිය සමාජ අවශ්‍යතාව හේතුවෙන් කරන ලද්දක් නො වේ. කොළොන්න කෝරළයේ නාමකරණ ක්‍රියාවලිය විවිධ සමාජ ව්‍යාපාර මත වෙනස් වී තිබේ. සංස්කෘතික නාම යනු සමාජ වටිනාකමකි. එම වෙනස්කම සංක්‍රාන්තියක් හෝ පරිණාමයක් වශයෙන් සැලකිය නො හැකිය. එය ග්‍රාම නාමකරණය විෂයෙහි දී සිදු වන්නේ ග්‍රාමනාමකරණය සංස්කෘතික වශයෙන් දුර්වල තත්ත්වයකට පත් කරවමිනි. අතීත ග්‍රාමනාමකරණය දීර්ඝ කාලීන සංස්කෘතික ක්‍රියාවලියේ ප්‍රතිඵලයක් ලෙස ගොඩනැගුණි. විදේශීය අසංස්කෘතික නාමකරණ බලපෑම් හා දේශීය දේශපාලන ව්‍යාපෘතිවල බලපෑම් මත කොළොන්න කෝරළයේ ග්‍රාමනාම විවිධ විපර්යාසයන්ට ලක් වී තිබේ. මෙම පර්යේෂණ නියැදියේ ප්‍රතිඵල ද මත ලංකාවේ විශාල වශයෙන් මෙම තත්ත්වය නිරීක්ෂණය වන බව පැහැදිලි විය. කොළොන්න කෝරළයේ සාම්ප්‍රදායික සංස්කෘතිකාර්ථ නො සලකා හරිමින් ගොඩනගන ලද ග්‍රාමනාම නවයක් දක්නට තිබේ. එනම් වෙස්ටන් වත්ත, ජී.ජී. කොටස, ලොර්ඩේල් වත්ත, නන්දනගම, ඇබ්පොයිල් වතු යාය, හේයස්වත්ත, ලෝන්ෆෝඩ් වත්ත, සාම ගම්මානය, යන නාමකරණයන් ය. එම අසංස්කෘතික නාමකරණ ග්‍රාම නාමකරණය සඳහා මෙතෙක් බල පැවැත්වූ සංස්කෘතික ක්‍රියාවලියෙන් විතැන් වී තිබේ. එය ග්‍රාමනාමකරණයේ සුසමාදර්ශය විතැන් වීම යනුවෙන් මෙම පර්යේෂණයෙන් නිගමනය වේ.

**ප්‍රමුඛ පද:** සුසමාදර්ශය විතැන් වීම, ග්‍රාමනාමකරණය, කොළොන්න කෝරළය, අසංස්කෘතික නාමකරණය

# **BALANCING THE RIGHTS OF MAN AND ANIMAL: THE LEGISLATION ANALYSIS OF STATUS OF THE STREET DOG IN SRI LANKA**

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## **Abstract**

The future of the planet reside in the balance humans would strike between nature and the human conduct. In that grand picture, the perception man holds about the animal marks a significance. This paper seeks to evaluate the approaches man had taken in catering the animal kingdom, and further induces to suggest a new form of thinking regarding that aspect particularly considering the street dogs and the legislative address of them in the Sri Lankan context. Though the paper confines the finding to the canine companions, addressing the issue of concurrent existence of man and animal can be initiated through this paper in a different approach shedding away the existing cultural and religious affiliations on the relationship between man and animals. The objective of this paper is to analyze the adequacy of the legislations and to advocate an efficient way to address the matters regarding abandoned dogs. Regarding this aspect, the paramount legislation is the Dog Registration Ordinance, which prescribes the registration of pet dogs, eradicating the pet dogs being released stray later, together with Rabies Ordinance which helps to keep the existing stray dog population minimum. Thereby the government can save Rs.325million per on post-bit treatments. The paper follows the methodology of black letter approach, and further, this paper uses qualitative analysis of legislative enactments and case law as primary data and books and journal articles as secondary data. The paper concludes with the suggestion that the rabies ordinance should be utilized with full effect.

**Keywords:** *Stray dogs, Legal analysis, Human animal co-existence, Sri Lanka*

# **ADDITION: AS A METHOD TO ENHANCE THE SENSE OF THE ORIGINAL: WITH SPECIAL REFERENCE TO *ĀDARANIYA VICTORIA* BY MOHAN RAJ MADAWALA AND ‘DEAR VICTORIA’ BY SOMASIRI MUNASINGHE**

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## **Abstract**

The term "addition" refers to a translation approach that involves adding information to the source text (ST). It serves stylistic as well as strategic reasons, to compensate for linguistic (structural, stylistic, and rhetorical) differences between two languages. The additional information was always integrated in the context or scenario when certain information from the ST that was assigned secondary status in the target text (TT) is given higher importance in the TT through focus, emphasis, or lexical choice. When there is a necessity of giving additional information about the term or a phrase, to provide a better clarification to the target audience, translators tend to use addition as a translation strategy. To manage the scope of the study, the present study was, therefore, conducted with the intention of identifying the types of addition employed in the selected first seven chapters of the English translation ‘Dear Victoria’ (2019) of the novel *Ādaraniya Victoria* (2014) and how they have involved to preserve the meaning of the original. In this regard, the types of addition proposed by Peter Newmark in 1988 have been further referred. In conclusion, it was investigated that the translator has mainly used strategies within the text additions: with an alternative, with an adjectival clause, as a noun, a participial group and the parenthesis, and notes or glossary at the end of book, and it was also revealed that, with the help of the addition translator could give the sense of the original as it is.

**Keywords:** *Addition, Translation, Untranslatability*

# STUDY ON AMBIGUITY OF NEWSPAPER HEADLINES AND ITS IMPACT ON TARGET READERSHIP

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## **Abstract**

Headline writing is an art which employs ambiguity as an ornament. The intent of this study was to observe the impact of lexical and syntactic ambiguity on target readership referring to newspaper headlines from Sinhala to English. It also examined the factors that should be considered in translating ambiguous headlines, difficulties encountered by translators in translating ambiguous headlines and suggestions to overcome them. To gather data, thirty ambiguous headlines selected from different newspapers were set in three test papers, with ten headlines in each. They were applied to six professional translators and twelve Translation Studies undergraduates. The undergraduates were asked to note down the difficulties they encountered in translating headlines in the test paper itself. The data were analysed qualitatively using Error-Analysis method. Since there were 61% acceptable translations, it was clear that the overall impact of ambiguity in newspaper headlines on target readership was positive. The complete absence of non-acceptable translations from professional translators also proved that the impact of their headlines on target readership was positive. It was identified that meaning, grammar, style and sense were the major factors that should be considered in translating ambiguous headlines. Lack of practice, background knowledge, inability to grasp idiomatic meanings, untranslatability, lack of English knowledge, and difficulty in achieving the style were the major difficulties confronted by translators when translating ambiguous headlines. These difficulties could be overcome by referring to dictionaries and glossaries, employing strategies like italics, direct translation, omission and searching background knowledge before translating and dedicating more time to practice headline translation.

**Keywords:** *Lexical ambiguity, Newspaper headline, Syntactic ambiguity, Target readership, Translation*

# THE PSYCHOLOGICAL EFFECTS OF QUARANTINING FOR COVID-19: WITH REFERENCE TO BOREDOM, FRUSTRATION, STRESS AND FEAR

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## Abstract

The spreading of COVID-19 is controlled via quarantining individuals who are infected and who had close contact with an infected party. Quarantining is considered the primary community control measure implemented in many virus outbreaks like SARS-2003. However, there are several drawbacks to the quarantine process as it is a new concept to most countries. One such drawback is the negative psychological impact it has on people. The main causes behind the above are longer quarantine periods, fear of infection, frustration, boredom, inadequate supplies, financial losses and stigma. Such psychological concerns have the potential to retain a long-lasting impact on people if not addressed properly. However, addressing all of these at once will conceal some of the important information. Hence, this study mainly focuses on the effect of Quarantine Type (QT) on psychological factors such as boredom, frustration, stress and fear. Required data for the study were collected from 60 participants living in the Western province (48.6% of total Covid-19 patients reported) which is the most contaminated area in Sri Lanka. As locating Covid-19 positive patients is difficult due to lack of availability of information, respondents were approached via referrals. Hence, the snowball sampling technique was used. A self-developed questionnaire was validated for internal consistency after a pilot test. Based on the findings derived via linear regression, the QT significantly predicted the level of boredom,  $F(1, 58) = 8.020$ ,  $p(= 0.006) < 0.05$ , level of frustration,  $F(1, 58) = 6.361$ ,  $p = 0.014$  and level of stress with a  $F(1, 58) = 4.776$ ,  $p(= 0.033) < 0.05$ . In addition, results reported increased levels of boredom, frustration and stress in self-isolated individuals. However, the linear regression results did not establish that QT statistically significantly predicted the level of fear. Based on the evidence, inspected guidance especially for self-isolation is recommended.

**Keywords:** *Quarantine type, Boredom, Frustration, Stress, Fear*

# A STUDY ON THE DESIGN FEATURES OF THE KLINGON LANGUAGE

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## **Abstract**

Language is generally understood as a human system of communication that uses arbitrary signals, such as voice sounds, gestures, and written symbols. Various definitions tend to explain the nature of language. Sapir (1921) has identified language as a human and non-instinctive method of communication. Constructed languages are different from natural languages precisely due to their origin. A constructed language is defined as a complete language system written by one person who wants his/her language to be used by others for specific purposes. The Klingon language is the constructed language created for the movie *Star Trek*, spoken by the fictional Klingons in the *Star Trek* universe. Upon request of the director of *Star Trek*, the linguist Okrand deliberately designed the Klingon language for the warrior clan in the movie. Many linguists pay less attention or completely disregard constructed languages. However, the researcher is under the impression that conducting a study of this novel area is essential due to the apparent research gap in the available literature. Hence, the main objective of this study is to focus on the highly advanced alien language and identify its design features. This study is descriptive in design and mainly centres on the Klingon as its primary research data. Hockett's (1960) list of design features of language is employed for this purpose which enabled the researcher to develop a thorough content analysis of the Klingon language. It allowed the researcher to identify that several design features, such as productivity, displacement, and traditional transmission, cannot be identified in the Klingon language. Therefore, it is evident that as a constructed language, Klingon does not achieve all the criteria identified by Hockett. Yet, it does possess certain salient features that enable Klingon to function as a language in the real world.

**Keywords:** *Klingon language, Constructed languages, Natural languages, Design features, Arbitrary, Salient features*

# USING SATSCAN METHOD AND GIS FOR THE IDENTIFICATION OF SPATIAL AND TEMPORAL CLUSTERING OF DENGUE CASES (WITH SPECIAL REFERENCE TO THE KOLONNAWA DIVISION SECRETARIAT)

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## **Abstract**

Dengue fever is a mosquito-borne illness that has a significant impact on developing countries in the tropics. Sri Lanka, as a tropical country, is also impacted by the dengue fever, which has a high morbidity and mortality rate. The Kolonnawa Divisional Secretariat (DS) in Sri Lanka is one of the major dengue transmission divisions in the country. The aim of this study is to map and analyse the spatial and temporal distribution of dengue in the Kolonnawa DS division between April to September of 2019. Using conclusively confirmed individual cases from the Kolonnawa Medical Office of Health (MOH) across the study period, SaTScan software was utilised to identify dengue clusters using the space-time permutation and the Bernoulli purely spatial model. The statistical significance and distribution of clusters were explored using Monte Carlo replication of data sets under the null hypothesis with replications greater than 999 to give a significant level for cluster determination. ArcMap 10.1 was used to display the spatial and temporal clusters associated with the reported cases. SaTScan discovered five space-clusters and three space-time clusters over the study period. The region's excess dengue fever cluster was statistically significant ( $p < 0.05$ ). These cases varied significantly between the divisions during the study period. Most of the reported clusters revealed a high level of spatial distribution in the western half of the kolonnawa DS division such as Welewaththa, Kuruniyaththa and Sedawaththa divisions. Additional space-time clusters were observed in Udumulla, Gothatuwa, Dodamgahahena, Kotuwila and Malgama divisions. The integration of SaTScan and GIS technologies to analyse household-level dengue cases enables more precise targeting of preventative measures on identified high-risk zones. This mapping of the dengue risk paves the way for the prioritisation of control operations, with high-risk zones labelled as a priority, as well as the organisation of intervention trials or research studies on dengue outbreak prediction.

**Keywords:** *Dengue, SaTScan, Kolonnawa, GIS*



# A COMPARATIVE STUDY OF THE SOCIAL RESTRICTIONS USED IN TRADITIONAL MEDICINE IN THE PAST AND IN WESTERN MEDICINE TODAY FOR EPIDEMIC CONTROL

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## Abstract

According to the Oxford Dictionary, “A large number of cases of a particular disease happening at the same time in a particular community, is called an epidemic”. Thus, it is essential to impose restrictions in any society to control the spread of epidemics from one person to another. A detailed analytical methodology has been used for this research and the overall research is based on secondary sources. The purpose of the research is to make a comparative study of the social restrictions imposed during an epidemic, and the research question is whether there are similarities between past and present social restrictions. Among the various social restrictions found in the indigenous medical system of Sri Lanka, the restrictions imposed during an epidemic are unique. These are called ‘*Wasangatha Thahanchi*’ (epidemic taboos). Here are some of them. That is *Anabōla-thahanchi* (if the use of something is forbidden, a leafy branch is tied and symbolized), *Ranchu-thahanchi* (prohibition of gathering), *Yām-ēm-thahanchi* (prohibition of travel), *Waw-thahanchi* (prohibition of using the tank), and *Aththam-thahanchi* (prohibition of participating in agricultural actions). Through each of these taboos, the spread of an epidemic has been brought under control. All the world accepted social restrictions in western medicine for controlling the Covid-19 epidemic today are embedded in our social taboos of the past. That is, maintaining social isolation (lockdowns), stopping crowds, quarantine, imposing restrictions on travel (curfews), and adhering to health advice are all imposed taboos. It can be seen that it is difficult to control the behaviour of individuals to control the current Covid-19 epidemic. But in the indigenous system of medicine, all these taboos were used as a ritual. Cultural man prefers to follow such things. It can be concluded that even in the present day Sri Lankan society which is full of cultural people, the past social taboos in the form of a custom are more practical than the present restrictions in the form of a law to control the Covid-19 epidemic.

**Keywords:** *Traditional, medicine, Taboos, Epidemic, Restrictions*

# THE NATURE OF INTER ETHNIC RELATIONSHIPS BETWEEN MINORITY ETHNIC COMMUNITY AND MINORITY OF MAJORITY ETHNIC COMMUNITY: A STUDY BASED ON MOONRUMURIPPU, VAVUNIYA

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## Abstract

This research paper analyses the nature of inter-ethnic relationships between a minority ethnic group and a minority of a majority ethnic group. The primary data has been collected from two ethnic communities who are living in Moonrumurippu Grama Niladhari division in the Vavuniya Divisional Secretariat Division in Vavuniya district in Northern Province, Sri Lanka. As a pluralistic society, the majority ethnic group in Sri Lanka is Sinhalese and one of the minority ethnic groups is Tamil. In the selected study area, the Sinhalese have become the minority of the majority quantitatively. The Tamil community was selected as the minority ethnic group and the Sinhala community as the minority of the majority ethnic group based on the study area. The research problem of this study was how does the socio-economic structure contribute to maintaining the current inter-ethnic relationship status between the minority ethnic group (Tamil) and minority of majority (Sinhala) ethnic group? Finding out the nature of social relationships, economic relationships and administrative relationships were the main objectives of the study. A mixed method approach incorporating both quantitative and qualitative data was employed as the methodology of the study 34 persons from the total population applying the convenience sampling method were selected as a sample to collect primary data. The primary data were collected through semi-structured interviews and in-depth Key Informants Interviews. Collected data were analysed through the thematic method. According to findings, the interrelationships between these two communities were studied under three sections. In accordance to that the social relationships as neighbours, both ethnic groups have good relationships among them, while considering the loan and other relationships keep together with external parties are very important to interact with people to fulfil the financial needs in the community and regional level. The majority of the Tamil community attended for special occasions of the Sinhala community while the only fewer amount of Sinhala people attending for Tamil peoples' weddings and special occasions. Though economic relationships are also on the same status, the administrative relationships have deviated from this condition. Especially the political representation, voting behaviours, composing the national anthem in the Tamil language are more remote than other relationships. The study concluded by highlighting that while Sinhalese are less in representation numerically, the national level power relationship and ideology encourage them to stand as power holding group in the location. The study findings highlight that though the majority of Sri Lanka; the Sinhala, became the minority in certain special places, they do not discriminate like other minorities.

**Keywords:** *Ethnicity, Ethnic Relationships, Minority, Majority, Minority of majority*



## **Life Sciences & Agriculture**



# DETERMINING THE CAPABILITY OF USING FENUGREEK SEED GUM AS AN EDIBLE FILM-FORMING MATERIAL

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## Abstract

Recently, many researchers have focused on investigating novel biopolymer sources of biodegradable and edible films as a successful alternative for synthetic polymers that leads to environmental pollution. Galactomannan is identified as a potential source of film making material. Fenugreek seed gum (FSG) is a rich source of galactomannan, which can be utilized as a film-forming-agent. The main objective of this study is to identify the capability of FSG in formulating food packaging film along with its performance. In this study, FSG extracted from fenugreek seeds was dissolved in distilled water with previously determined contents of plasticizer, glycerol. The film preparation was carried out by casting the film-forming solutions followed by drying, and the physical and mechanical properties of developed films were measured. According to the findings, the film matrices were brittle and not strong, not cohesive. With the increase of glycerol content, the films become stickier. Further, the physical properties; moisture content, thickness, colour parameters ( $L^*$ ,  $a^*$ ,  $b^*$ ) of FSG based films were increased from  $0.062 \pm 0.001$  mm,  $54.27 \pm 0.06\%$ ,  $66.54 \pm 0.23$ ,  $6.95 \pm 0.03$ ,  $25.20 \pm 0.03$  to  $0.094 \pm 0.002$  mm,  $60.30 \pm 0.06\%$ ,  $73.23 \pm 0.06$ ,  $8.93 \pm 0.02$ ,  $26.37 \pm 0.01$  with the increase of glycerol concentration from 0.0 to 1.5%, respectively. Regarding the mechanical properties, the tensile strength and Young's module were decreased from  $35.61 \pm 0.21$ ,  $41.68 \pm 0.23$  to  $28.37 \pm 0.11$ ,  $29.65 \pm 0.10$  and the elongation at break was increased from  $85.45 \pm 0.03$  to  $95.67 \pm 0.08$  with the increase of glycerol content from 0.0 to 1.5% respectively. The analysis of physical and mechanical properties reveals that FSG is an applicable source in making edible film for food packaging and further studies are needed to analyse its biochemical properties.

**Keywords:** *Food packaging, edible films, biodegradability, galactomannan, fenugreek seed gum*

# EFFECT OF SUBSTITUTION OF WHEAT FLOUR WITH ARROWROOT FLOUR ON THE CHARACTERISTICS OF MUFFINS

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## Abstract

Arrowroot (*Maranta arundinacea*) is an underutilized gluten-free tuber crop available in Sri Lanka with a rich nutritional and therapeutic profile. The purpose of this study was to develop muffins supplemented with Arrowroot flour and to evaluate its nutritional and sensory qualities. Fresh tubers of Arrowroot were cleaned, peeled and cut into thin slices. The slices were dried and ground into flour, sieved through a 60 mesh screen and stored in air-tight glass container. Five types of muffins were prepared using different composite blends of wheat and Arrowroot flour which were mixed in the ratios of 100:0 (control), 80:20, 70:30, 60:40, and 50:50. The sensory profile and nutritional profile of the developed muffins were analyzed and microbial studies were conducted over four weeks at ambient temperature storage (25 °C). The results revealed that the ash content of the muffins increased from 1.18±0.05% to 1.72±0.03% with the addition of Arrowroot flour from 0 to 50%. However, protein content (7.95±0.10% to 6.55±0.01%), total fat content (12.61±0.06% to 10.05±0.05%), carbohydrate content (68.41±0.01% to 64.45±0.01%) and energy value (418.89±1.37 to 374.46±0.51 kcal 100 g<sup>-1</sup>) showed a gradual decline along with the addition of Arrowroot flour. The sensory evaluation revealed that there were significant differences among the muffins in terms of appearance, colour, texture, taste, aroma, and overall acceptability. Furthermore, the sum of ranks for overall acceptability of muffins with 80:20, 70:30 substitution was higher than the sum of ranks for overall acceptability of the control sample. According to the microbial test results, aerobic plate counts and yeast and mold count increased drastically while coliforms and *Escherichia coli* were not detected during the experimental time period. Therefore, 30% (w/w) substituted muffin was found to be microbiologically safe for a minimum of 7 days at ambient temperature storage.

**Keywords:** Arrowroot, Muffin, Nutritional profile, Sensory profile, Microbial studies

# ACCLIMATIZATION OF MICROPROPAGATED *Stevia rebaudiana* (Bert.) PLANTLETS AND COMPARISON OF THEIR GROWTH AND STEVIOSIDE CONTENT WITH CONVENTIONALLY PROPAGATED PLANTS

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## Abstract

*Stevia rebaudiana* (Family Asteraceae) is commercially cultivated to obtain non caloric sweet Steviol glycosides from leaves. Micropropagation through *in vitro* culture can be used to overcome limitations in conventional propagation methods. However micropropagated plantlets need gradual exposure to the natural environment for successful establishment in soil. Therefore a protocol was developed to determine the best acclimatization procedure. Micropropagated plantlets were initially transferred into coir pellets, then after four weeks they were transferred into different potting mixtures. Acclimatized and conventionally propagated plants with more or less similar morphology (approximately 10 cm) were planted in the same potting mixture and the growth parameters (shoot morphology and pigment contents) were compared. After four weeks on coir pellets, 76.0 % of micropropagated plantlets survived. The plantlets grown in sand: compost: coir dust (1:1:1) potting mixture showed the highest percentage of survival (90.0 %) after four weeks. After one month of growth, conventionally propagated plants showed non significantly higher mean shoot length ( $14.70 \pm 2.73$  cm), mean number of leaves ( $17.30 \pm 2.81$ ), total chlorophyll ( $31.47 \pm 0.07$  mg L<sup>-1</sup>) and total carotenoid ( $5.10 \pm 0.09$  mg L<sup>-1</sup>) than acclimatized plants. However, after three months of growth, acclimatized plants showed higher growth ( $26.4 \pm 1.10$  cm of mean shoot length,  $63.0 \pm 36.26$  of mean number of leaves) and significantly higher pigment contents ( $42.25 \pm 0.22$  mg L<sup>-1</sup> of total chlorophyll and  $7.15 \pm 0.05$  mg L<sup>-1</sup> of total carotenoid) than the conventionally propagated plants. After three months of growth Stevioside contents in both plant types were compared. According to HPLC analysis, Stevioside contents in acclimatized micropropagated plants ( $11.46 \pm 0.03$  mg mL<sup>-1</sup>) was higher than the conventionally propagated plants ( $10.13 \pm 0.03$  mg mL<sup>-1</sup>). Results suggests that this acclimatization procedure can be used to obtain genetically uniform better quality micropropagated *S. rebaudiana* plantlets for commercial scale plantations.

**Keywords:** *Stevia rebaudiana*, micropropagation, acclimatization, Stevioside, HPLC



# ***IN VITRO* SEED GERMINATION AND CALLUS INDUCTION OF *Catunaregam spinosa***

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## **Abstract**

*Catunaregam spinosa* is a medicinal plant with significant diversity of phytochemicals. There is insufficient evidence based on *in vitro* growth of *C. spinosa*. *In vitro* seed germination and callus induction of *C. spinosa* were studied as part of direct and indirect organogenesis. Best surface sterilization protocol was tested with different concentrations and time intervals of Carbendazim and Clorox. Seed germination protocol was optimized using mature seeds grown in Murashige and Skoog (MS) medium treated with different concentrations (1.0-4.0mg L<sup>-1</sup>) of Gibberellic Acid (GA<sub>3</sub>). Leaf discs from *in vitro* grown seedlings were cultured on MS medium supplemented with different concentration combinations (1.0-6.0 mg L<sup>-1</sup>) of 6-Benzylaminopurine (BAP) and 1-Naphthaleneacetic acid (NAA). Experiment was conducted in Completely Randomized Design with ten replicates. Data was statistically analysed using ANOVA and means were compared at significant level of  $p=0.05$ . Disinfecting with 0.3% (w/v) Carbendazim for 10 minutes and 10.0% Clorox for 10 minutes followed by two washings of sterile distilled water found to be the best surface sterilization technique. Highest seedling height was recorded in MS medium supplemented with 4.0 mg L<sup>-1</sup> of GA<sub>3</sub> after 16 days of incubation. Highest mean dry calli weight (0.097±0.92 g) was recorded at concentrations of 1.0 mgL<sup>-1</sup> BAP and 3.0 mg L<sup>-1</sup> NAA after 3 months of incubation under dark conditions. Visual observations highlighted morphologically different calli at low (compact and green) and high (friable and white) concentrations of NAA. Statistical data showed calli induction and growth is significantly different upon concentrations of BAP and NAA. This study describes an efficient sterilization protocol, best medium for *in vitro* seed germination and callus induction of *C. spinosa*.

**Keywords:** *Catunaregam spinosa*, *in vitro* growth, callus induction, seed germination

# QUALITATIVE AND QUANTITATIVE ANALYSIS OF PHYTOCHEMICALS IN *Plumbago indica* L.

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## Abstract

*Plumbago indica* L. (Ratnetol) is commonly known as rose coloured leadwort and widely used in traditional medicinal systems worldwide. Plumbagin is the main bioactive compound responsible for its pharmaceutical value. The amounts of Plumbagin present in roots of eight months old field-grown conventionally propagated plants ( $23.53 \pm 6.54 \mu\text{g/mL}$ ) was higher than roots of field-grown *in vitro* propagated plants ( $12.90 \pm 2.96 \mu\text{g/mL}$ ), callus which induced from inter nodal explants on Murashige and skoog (MS) medium supplemented with 2.5 mg/L 6-Benzylaminopurine (BAP) and 1.5 mg/L 1-Naphthaleneacetic acid (NAA) ( $0.009 \pm 0.00 \mu\text{g/mL}$ ), cell culture pellet ( $0.015 \pm 0.01 \mu\text{g/mL}$ ) and supernatant extracts ( $4.23 \pm 2.07 \mu\text{g/mL}$ ) which obtained from three weeks old cell culture on MS medium supplemented with 2.5 mg/L 2,4-Dichlorophenoxyacetic acid (2,4-D), 1.5 mg/L Indol-3-acetic acid (IAA) and 1.0 mg/L NAA. Acclimatized two months old *in vitro* propagated plants showed 100% survival in all provinces. However, plants that grown in Sabaragamuwa province showed the highest mean plant height and Plumbagin content ( $104.60 \pm 8.35 \text{ cm}$ ,  $42.90 \pm 3.25 \mu\text{g/mL}$ ) when compared with Western ( $94.40 \pm 6.50 \text{ cm}$ ,  $35.81 \pm 3.78 \mu\text{g/mL}$ ), North Central ( $34.40 \pm 7.96 \text{ cm}$ ,  $17.29 \pm 5.23 \mu\text{g/mL}$ ) and North Western ( $84.00 \pm 6.32 \text{ cm}$ ,  $27.57 \pm 4.00 \mu\text{g/mL}$ ) provinces. Plants were watered in two days interval and exposed to natural environmental condition in particular area. Root extract of conventionally propagated plants showed a higher number of phytochemicals (16) while roots of *in vitro* propagated plants indicated the presence of only four chemical compounds. Callus extract showed the presence of one compound. However, the cell culture pellet was evident with nine compounds while cell culture supernatant only contained three compounds. The present study suggested that, conventionally propagated *P. indica* L. is an excellent source of several medicinally important phytochemicals. However, it is also possible to use different *in vitro* techniques that can be used effectively for to obtain phytochemicals in order to reduce the over exploitation of *P. indica* grown in nature and overcome the limitations associated with conventional plant cultivation.

**Keywords:** *Plumbago indica* L., *Plumbaginaceae*, *Plumbagin*, *Phytochemicals*, *cell culture*

**RE-REPORT OF *Luffariella*  
*herdmani* (DICTYOCERATIDA: THORECTIDAE),  
MARINE SPONGE FROM SRI LANKA.**

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**Abstract**

Sri Lankan marine spongology is still in its infancy, leaving a significant number of sponge species understudied. *Luffariella herdmani*, which was reported for the first time from Sri Lankan waters in 1905, has subsequently been recorded from elsewhere in the Indian Ocean, but has remained poorly studied for its taxonomy since its discovery. Thus, the present study reports a detailed taxonomy of *L. herdmani* after 115 years of its discovery. General morphology and skeleton analysis by light and Scanning Electron Microscopy (SEM) were used to identify *L. herdmani*. Morphological parameters including shape, colour, texture, smell, mucus production, distribution of surface pores, and surface ornamentation were observed. Cross sections of the skeleton representing both ectosome and choanosome were prepared by hand sectioning technique and examined under a compound light and Scanning Electron Microscope. The diameters of a minimum of 30 fibres from each type were measured using Image Tool Version 3.0 software. According to the results, the *L. herdmani* contained digitiform processes (mean height of 8.1 mm and mean diameter of 3.4 mm) which were truncated with a single oscule (mean diameter of 1.9 mm) in the middle. The skeleton was mainly comprised of highly cored, primary fibres (mean diameter of 70.4 µm) and uncored, secondary fibres with varying diameters. These findings were comparable with the identifications of Dendy in 1905, with slight alterations. Further, the present study is the first record of this species from the southern coast of Sri Lanka. A comprehensive biomolecular study based on DNA barcoding is underway to support the morphological identification of *L. herdmani*.

**Keywords:** *Marine sponges, Luffariella herdmani, Taxonomy, Morphology, Scanning Electron Micrograph*

# IMPACT OF SIMULATED *IN VITRO* DIGESTION ON THE ANTIOXIDANT AND ANTI-INFLAMMATORY PROPERTIES OF SELECTED EDIBLE FLOWERS

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## Abstract

Edible flowers have been identified as novel sources of polyphenols, which are capable of combatting oxidative stress and exerting bioactivities. However, the bioactivities of these flowers within the human body, depends upon the amount of polyphenols absorbed through the digestive system. Thus the present study assessed the effect of *in vitro* gastro-intestinal digestion on the contents of phenolics along with the antioxidant and anti-inflammatory properties of six edible flowers. Antioxidant activity was measured using nitric oxide and hydrogen peroxide scavenging activities. Anti-inflammatory properties were measured using inhibition of egg albumin denaturation and heat- induced hemolysis. Based on the outcomes, among the methanolic extracts the highest total phenolic content was noted in *Cassia auriculata* (230.60  $\mu\text{mol}$  gallic acid equivalents/g of dry weight). Total phenolic content of all the flowers have decreased after the gastric phase and total flavonoid content has increased. The total anthocyanin content of three species of flowers has decreased after the intestinal phase of digestion. The highest recovery of anthocyanins after the intestinal phase was noted in *Cassia auriculata* ( $374.66 \pm 0.03$  nmol/g dry weight). Hydrogen peroxide scavenging activity of *Bauhinia racemose* and *Tamarindus indicus* has increased in the gastric phase by 20.50% and 0.52% respectively. *Bauhinia racemose* was able to inhibit  $4.43 \pm 0.15\%$  of heat-induced hemolysis of red blood cells after dialysis. Though a reduction in the phenolic contents after gastro-intestinal digestion was noted, sufficient quantity of phenolic compounds were available to be absorbed with the dialysis to exert antioxidant and anti-inflammatory activities.

**Keywords:** Antioxidant, edible flowers, polyphenols, *in vitro* digestion

# NUTRITIONAL AND PHYSICO - CHEMICAL PROPERTIES OF COCONUT (*Cocos nucifera* L.) JAGGERY AND VALUE ADDED COCONUT JAGGERY

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## Abstract

Coconut (*Cocos nucifera* L.) saps traditionally collected Hal bark (*Vateria copallifera*) (HAL Jaggery) and pure sap collected by novel sap collection method (NSC Jaggery) were used to produce pure solid jaggery and value added solid jaggery. Three concentration of cinnamon (0.2 %, 0.4 %, 0.6 %) and nutmeg (0.05 %, 0.1 %, 1.5 %) were used to prepare cinnamon (CIN Jaggery) and nutmeg (NUT Jaggery) flavoured jaggery. Significant taste attribute was ranked by NSC Jaggery when it compared with HAL Jaggery. Only texture of jaggery has changed significantly within the cinnamon percentages and 0.2 % cinnamon was selected as best level. The addition of more than 0.05 % of nutmeg has created a significant effect on taste, texture and overall acceptability. The physico-chemical and nutritional composition of selected jaggery of 0.2 % cinnamon added jaggery and 0.05% of nutmeg added jaggery were compared with HAL Jaggery and NSC jaggery. The yield (16 %) and hardness (1184 g) of four types of coconut jaggery were not changed significantly. The pH (5.49±0.02) and browning index (50.74) of CIN Jaggery was significantly (P<0.05) higher than NSC Jaggery. Significantly (P<0.05) higher moisture content (8.92±0.22%) was resulted in NSC Jaggery. Addition of 0.2% of cinnamon into the pure coconut sap has increased the fiber content of jaggery significantly (P<0.05) from 0.05% to 0.54%. The total sugar content of HAL Jaggery and NSC Jaggery were significantly (P<0.05) high (82.20%). Significant (P<0.05) amount of phenolic constituents were incorporated from hal bark (560.50mg GAE/100g) followed by cinnamon (232.6 GAE/100g). Therefore, the sap collection through traditional concept with Hal bark and value addition of jaggery with cinnamon have increased the nutritional benefits of coconut jaggery than NUT Jaggery and NCS Jaggery.

**Keywords:** *Coconut jaggery, sap collection, value added jaggery, Vateria copallifera*

# ACTIVITY OF PROTEIN-BASED TRYPSIN INHIBITORS PRESENT IN TWO SELECTED VARIETIES OF *Vigna unguiculata* ssp *sesquipedalis*

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## Abstract

Although trypsin is a serine proteases which is vital for the survival of many living organisms, it is also leads to different kind of diseases in humans such as cancers. Legumes with high protein content are reported to contain protein-based trypsin inhibitors which have been recognized as promising therapeutic agents against pathogenic proteases. The current study aimed to investigate on the presence of potential protein-based trypsin inhibitors in two local varieties of *Vigna unguiculata* ssp *sesquipedalis* called Gannoruwa Hawari Mae (GHM) and Polon Mae (PM). Seed samples were collected from five batches released from Field Crops Research and Development Institute of Sri Lanka and pooled together. A concentration gradient of aqueous seed extracts (20%, 10%, 5%, 2.5% and 1.25%) were tested for trypsin inhibitory activity (TIA) and total protein content followed by ammonium sulphate precipitation and anion exchange chromatography. Among the tested concentrations, 10% of GHM ( $89.87 \pm 1.64$ ) and 5% PM ( $85.33 \pm 1.81\%$ ) seed samples showed the highest percentage TIA. The seed sample of GHM had a relatively higher protein content ( $2.56 \pm 0.04$  mg/ml) compared to PM sample ( $2.41 \pm 0.02$  mg/ml). The ammonium precipitation of these samples revealed that both GHM ( $89.23 \pm 2.43\%$ ) and PM ( $87.96 \pm 1.08\%$ ), proteins precipitated in 60% ammonium sulphate saturation exerted maximum inhibitory activity against trypsin. The results of the dialysis indicated that the protein-based trypsin inhibitors present in highly active fractions of both varieties are larger than 8kDa. The aqueous protein extract (1.25%) was fractionated by anion exchange chromatography using a positively charged resin called DEAE-cellulose. Highly active protein-based trypsin inhibitors were successfully eluted with 0.2M and 0.4M sodium chloride solutions. The results suggest that the tested local varieties of *V. unguiculata* ssp *sesquipedalis* are promising natural resources of therapeutically active Protein-based trypsin inhibitors and further studies are recommended to isolate active agents.

**Keywords:** *Trypsin, inhibitors, Vigna, proteins, Mae*

# WASTEWATER TREATMENT EFFICACY OF INDIVIDUAL TREATMENT COMPONENTS IN CONCENTRATED FRUIT JUICE MANUFACTURING PLANT

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## Abstract

The study was carried out to determine the suitability of the wastewater treatment process in a concentrated fruit juice manufacturing plant. The wastewater treatment process mainly consists of pH balancing, anaerobic treatment, aerobic treatment, sludge separation and chlorination. Selected physical and chemical parameters of raw wastewater and treated wastewater were analysed. Samples were collected at the start and the end of the treatment for 3 days with a time interval of 7 days. The pH and the conductivity of treated wastewater were  $7.63 \pm 0.08$  and  $1957.00 \pm 29.71 \mu\text{cm}^{-1}$ . Dissolved Oxygen (DO), BOD and COD values were  $0.49 \pm 0.50$  ppm,  $165 \pm 5.00$  mg l<sup>-1</sup> and  $220.00 \pm 10.00$  mg l<sup>-1</sup> respectively. Kjeldahl nitrogen, Nitrates, Nitrites and Ammonia concentrations were  $39.62 \pm 0.16$  ppm,  $12.25 \pm 0.23$  ppm,  $9.97 \pm 0.018$  ppb and  $7.15 \pm 0.36$  ppm respectively. The Phosphate concentration was  $1.26 \pm 0.34$  ppm. All the analyses were done using the standard methods of the American Public Health Association (APHA). The results of treated water were compared with the standard limits of the Central Environmental Authority. BOD value of treated water was higher than the maximum tolerable limit. The pH of the treated wastewater was within the acceptable level. Electrical conductivity, Kjeldahl Nitrogen, Nitrates, Nitrites, and Phosphates concentrations of treated water were higher than the values of raw wastewater, but they are within the acceptable levels. The Uria and Phosphoric acid added before the aerobic treatment as a nutrient for microorganisms in the Moving Bed Biofilm Reactors (MBBR) was the reason for this phenomenon. Therefore, the amount of Uria and Phosphoric acid should be reduced after conducting a study. Also, it was concluded that treated wastewater of the concentrated fruit juice manufacturing plant was not suitable to release the environment and further treatment should be done.

**Keywords:** *Efficacy, Fruit Juice, Manufacturing Plant, Wastewater, Wastewater Treatment*

# MASCULINISATION EFFECT OF TRIBUTYLTIN ON ZEBRAFISH (*DANIO RERIO*)

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## Abstract

Tributyltin (TBT) is an antifouling agent and is responsible for the masculinization of fish species worldwide. However, the masculinizing mechanism is not fully understood. In this study, the action of TBT as an endocrine disruptor in zebrafish (*Danio rerio*) has been evaluated. Analysis of the steroid (17 $\beta$ -estradiol and testosterone) hormone of fish were performed using Enzyme-Linked Immuno-Sorbent Assay (ELISA) as it is highly rapid, accurate and specific. Laboratory cultured (60 days after hatching) 30 male and female Zebrafish were exposed to different concentrations of 1, 10, and 100 ng/L of TBT for 3 months and non-treated zebrafish were kept as a control. After the exposure, three individual of female and male zebrafish (n=3) were randomly collected from the control and experimental tanks. Blood of fish was collected from caudal vein and treated immediately with anticoagulant EDTA-Na. ELISA kits (Elabscience, USA) were used to determine the concentrations of estradiol (E2) and testosterone (T) in blood samples. The results showed that the level of 17 $\beta$ -estradiol significantly decreased ( $p < 0.05$ ) in TBT-treated fish at 10 and 100 ng/L compared to the control. There was no significant ( $p > 0.05$ ) reduction of the 17 $\beta$ -estradiol when fish treated at 1 ng/L of TBT. In the control and 1 ng/L TBT treated fish, 17 $\beta$ -estradiol levels in plasma were recorded as  $94.17 \pm 13.10$  pg/ mL and  $78.75 \pm 7.70$  pg/ mL. Fish exposure at 10 ng/L of TBT, there was a concomitant reduction of the 17 $\beta$ -estradiol found to be  $30.42 \pm 10.94$  pg/ mL where as fish exposed to the higher concentration of TBT (100 ng/L), the 17 $\beta$ -estradiol levels decreased drastically to the level of  $12.92 \pm 8.60$  pg/ mL. It was detected that significant increase of the testosterone ( $p < 0.05$ ) in fish treated at 100 ng/L of TBT compared to the control. There was no significant increase of testosterone levels ( $p > 0.05$ ) where as fish treated at 1 ng/L and 10 ng/L of TBT. The blood plasma testosterone levels in control, 1 ng/L and 10 ng/L of TBT treated fish were recorded as  $3.205 \pm 0.68$  ng/ mL,  $4.582 \pm 0.30$  ng/ mL and  $5.281 \pm 0.2$  ng/ mL respectively where in high TBT exposure (100 ng/L) showed increase level of testosterone ( $17.823 \pm 0.35$  ng/ mL) in blood plasma compare to the control. The results of this study revealed that at a higher concentration of TBT (100 ng/L) there are decreases in levels of 17 $\beta$ -estradiol while increasing the testosterone in plasma. These effects might be associated with inhibition of P450 aromatase activity. Accordingly, the changes in sex hormone levels would influence the ovarian development and maturation of fish. Thus, the results of the study concluded that the TBT induced masculinization and complete sex reversal in the genetically female fish.

**Keywords:** Tributyltin, masculinization, Zebrafish (*Danio rerio*), sex hormone



# MESO-MAMMAL CARNIVORE ABUNDANCE AND ACTIVITY PATTERNS IN SINHARAJA, SRI LANKA

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## Abstract

A camera trap-based study was conducted in Sinharaja National Heritage Wilderness Area (SNHWA) to investigate the abundance and activity patterns of meso-mammal carnivores. Four main habitat types were identified within the forest area as; dense wet evergreen forest, low dense wet evergreen forest, riverine forest and sub-montane forest. A passive infrared camera trap network was established following a stratified random approach in three selected survey zones representing all four habitat types. The survey period was from January 2019 to April 2021 establishing 36 camera stations with a cumulative sampling effort of 2160 trap days. The average survey period at a single camera location was ~ 60 days. Time stamped camera trap photos/videos were utilized for the analysis of relative abundance and activity patterns of focal species. Relative Abundance Index (RAI) was calculated for each species as records per 100 trap days. Activity level (the proportion of day a species was active) and activity patterns of focal species were analyzed using “*activity*” and “*overlap*” R packages. Activity and overlap density graphs were prepared using the same packages. Eight of the 12 meso-mammal carnivores present in the island were recorded in SNHWA. With a capture frequency of 76 and an overall RAI of 3.52 the endemic *Paradoxurus zeylonensis* was the most abundant species followed by *Viverricula indica*. Interestingly both species were more abundant in the sub-montane forest recording high RAI values (*P. zeylonensis*: 8.1, *V. indica*, 6.1). *Urva viticollis* (RAI: 5.3) and *Lutra lutra* (RAI: 3.6) were more abundant in the riverine habitat. *P. viverrinus*, *Prionailurus rubiginosus* and *Paradoxurus hermaphroditus* were the rarest with <5 total records. Based on the activity pattern analysis, the mongoose species (*Urva viticollis* and *Urva fuscus*) were observed to be diurnal while all other meso-mammal carnivores were mostly nocturnal. Highest activity level was recorded for *U. fuscus* (0.43). Highest activity overlap (0.82) was between *P. zeylonensis* and *V. indica*. The study reveals the coexistence of meso-mammal carnivores in SNHWA and its facilitation by the spatiotemporal variation in activity patterns of different carnivore species.

**Keywords:** *Activity pattern, camera trapping, activity overlap, species co-occurrence, meso-mammals*

# MICROHABITAT UTILIZATION OF MONOTYPIC AGAMID LIZARD SPECIES, *Lyriocephalus scutatus* WITHIN SELECTED FOREST HABITATS OF SINHARAJA FOREST RESERVE

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## Abstract

Distribution of *Lyriocephalus scutatus* within Sri Lanka is restricted to the wet and intermediate climatic zones below 1500m above sea level and known to be most abundant in tropical rainforests. The present study was aimed to determine the microhabitat utilization of the species within the unlogged and selectively logged forest habitats of Sinharaja Forest Reserve (SFR). The microhabitat availability and utilization within the selected habitats were determined using visual encounter surveys traversing 200m transects and fifty quadrats of 1m x 1m area randomly placed. The study was carried out from January 2020 to March 2021 spending 420 person-hours in the field throughout the study period. Within the selectively logged habitats, there was a significant difference (*Mann-Whitney U-test*,  $p < 0.05$ ) in microhabitat variables of leaf litter depth - LLD ( $5.99 \pm 1.59$ cm), leaf litter cover percentage - LC % ( $32.82 \pm 1.76\%$ ), bare soil cover percentage - BC % ( $5.24 \pm 1.20\%$ ), number of woody plants of circumference  $\leq 10$ cm ( $WP \leq 10$ cm =  $6.03 \pm 1.87$ ) and number of woody plants of circumference  $> 10$ cm ( $WP > 10$ cm =  $3.38 \pm 1.10$ ). Furthermore, a Principle Component Analysis (PCA) suggested that the LLD and LC % were most preferred by *L. scutatus*. In comparison, within the unlogged habitats, there was a significant difference in the LC % ( $33.78 \pm 5.36\%$ ), BC % ( $4.14 \pm 1.59\%$ ),  $WP \leq 10$ cm ( $7.11 \pm 1.90$ ) and  $WP > 10$ cm ( $4.67 \pm 1.00$ ), showing a greater preference in BC % and the  $WP \leq 10$ cm. Further, the microhabitat use varied with associated behaviours which favoured its survival within the forest habitats. The results of the present study elaborates the importance of the selected habitats for the persistence of *L. scutatus* which can assist in future population studies of the species and route the stakeholders to enact significant conservation and management implications of the species within SFR, and forest habitats with similar microhabitat availability.

**Keywords:** *Agamid, Lyriocephalus, Sinharaja, Microhabitat, Conservation and Management*

# HABITAT PREFERENCE OF ENDEMIC PIT VIPER *Trimeresurus trigonocephalus* (REPTILIA: VIPERIDAE) IN SINHARAJA MAN AND BIOSPHERE RESERVE, SRI LANKA

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## Abstract

*Trimeresurus trigonocephalus* (Sri Lankan green pit viper) is an endemic moderately venomous reptile species with island wide distribution in all three climatic zones except arid zone and higher mountains (>1800 m). *T. trigonocephalus* is the only known species from genus *Trimeresurus* in Sri Lanka. This study was conducted to investigate the habitat preferences of *T. trigonocephalus* population in Sinharaja Man and Biosphere Reserve (SMBR). The study was carried out from January 2020 to March 2021 spending 420 person-hours in the field throughout the study period. An equal amount of man hours was allocated into lowland rain forest and tropical sub montane forest habitats. Both unlogged habitat and selectively logged habitat inside SMBR was surveyed. Proportionate number of fixed length line transects of 100m were randomly surveyed in each habitat. Snakes were observed within 2m per either side of the line transect and up to the height of 3m. All transects were surveyed monthly from 0800 h to 2000 h in three time periods (morning (08:00h-10:45h), midday (11:15h-14:15h), evening (14:15h-17:15h) and night (17:15h-20.00h). Highest abundance percentage was recorded inside lowland rainforest habitat (91.30%). There was a significant difference (*Mann-Whitney U-test*,  $p < 0.05$ ) in temperature between lowland rainforest habitat and submontane forest habitat. Light intensity, relative humidity, leaf litter depth and canopy cover percentage showed no significance difference between the two forest types. In lowland rainforest abundance of *T. trigonocephalus* was higher inside selectively logged habitat (61.90%). *T. trigonocephalus* was only recorded inside selectively logged habitat in submontane forest. There was no significant difference on habitat variables except light intensity between selectively logged and unlogged habitat types within lowland rainforest habitat. This study might be helpful for conservation and management of the focal species and their habitats by maintaining natural habitat structure.

**Keywords:** *Trimeresurus*, *Pit vipers*, *Snakes*, *Sinharaja*, *Habitat*, *Tropical rainforest*

**Management, Commerce, Governance, and Industry  
Development**



# FACTORS CONTRIBUTING TO AUDIT EXPECTATIONS-PERFORMANCE GAP (AEG) IN THE CONTEXT OF LISTED FIRMS: EVIDENCE FROM SRI LANKA

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## Abstract

The discrepancy between society's expectations and auditors' perceived performance, referred to as the 'audit expectation-performance gap' (AEG), has always been and will continue to be a serious concern. Neither auditors nor researchers, on the other hand, had successfully identified the sources of AEG using an appropriate theoretical lens. Furthermore, these factors that give rise to the AEG have not been considered in the context of South Asia. Thus, the current study aimed to investigate the factors contributing to the AEG in Sri Lanka, which is motivated based on its present importance, lack of a theoretical foundation (on the causes of AEG), and the empirical dearth observed. The current study employed a quantitative methodology and administered a structured questionnaire survey to seven stakeholder groups. The AEG was perceived to occur significantly due to 15 factors, as determined by the mean rank and one-sample t-test findings. The respondents identified a lack of auditing education and experience among users as the two primary contributing factors, while other significant factors included users' less awareness of new and revised auditing standards, the use of excessive technical language in the audit engagement letter, and the auditor's lack of interaction with intended users. The Institutional Theory accounted for the majority of the key contributory components observed. Sri Lankan regulators and policymakers need to develop a suitable policy framework for increasing public awareness, with a special emphasis on audit education, in order to reduce the AEG in the country.

**Keywords:** *Audit Expectation-performance Gap (AEG), audit education, contributory factors, Institutional Theory*

# PERCEPTION ON THE CONTENT ELEMENTS OF INTEGRATED REPORTING IN SRI LANKAN LISTED COMPANIES

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## Abstract

Integrated Reports (IRs) offer information to capital providers, including financial capital providers, to assist them in making economic decisions. In this context, the purpose of this study is to determine the level of perceived importance attributed to the content elements of IRs by users and preparers, as well as to examine the perception gap between preparers and users regarding the content elements of IRs. The study employed a quantitative approach, with data obtained via a self-administered questionnaire survey. To analyze the data received from preparers and users, parametric t-tests were employed. The findings suggested that respondents perceived the content elements of IRs to be significant on an *overall basis*, with a mean value of 4.21 (out of 5). Further, among the content elements of IRs, *Organizational overview and external environment* was perceived as the most important content element by the respondents (mean value: 4.31 out of 5). On the other hand, participants rated the element: *Business model* as the least important content element (mean value: 4.06 out of 5). Additionally, it is worth noting that practically all content element categories were regarded as important (more than the neutral value: 3 and significant). Then, in terms of perception differences, the results suggest that there is a significant difference between the perceived importance of preparers and users, with preparers perceiving more importance on an *overall basis* (mean difference: 0.1184). Further, the results on each content element category suggested that preparers attributed more importance to the content elements: *Strategy and resource allocation*, *Basis of preparation and presentation*, and *Governance*, than users on a significant basis. These findings are expected to have substantial policy implications on users, preparers, policymakers, and regulators on the content elements of IRs.

**Keywords:** *Content elements, Integrated Reports, Perceived importance, Preparers, Users*

# ENHANCING FIRM PERFORMANCE: DO HUMAN RESOURCE DEVELOPMENT PRACTICES MATTER?

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## **Abstract**

The overriding importance of human resources in gaining competitive advantage has been at the top of the pecking order of many research studies during the last decade. The outcomes of those studies flagged up pressing needs for human resource development programmes in organisations. Human resource development helps employees keep abreast with the changes in the business environment, thereby punching over their weight with such up-to-date know-how. Although human resource development practices on firm success have been widely studied in developed countries, there is a paucity of such studies in developing countries. Since the human resource development practices vary from country to country and organisation to organisation, the findings from one study limit its generalisability. The present study fills a lacuna by investigating the effect of human resource development practices on firm performance. Data were marshalled through a self-reported questionnaire with 201 firms' employees working in both public and private sector organisations in Sri Lanka. The predictions—hypothesis— was tested with robust statistical analysis. The findings of the study revealed that the career system, development system, and HRD system significantly influence the firm performance. Nonetheless, the effect of the work system on firm performance was not statically significant. Therefore, human resource management practitioners should design well-thought-out human resource development practices to enhance firm performance. The study contributed to the extant human resource development literature in many ways that are discussed at the end of the paper. The present becomes a springboard for future scholarly works.

**Keywords:** *Human resource development, firm performance, competitive advantage, human resources*



# CONSUMER ACCEPTABILITY OF GARLIC BREAD AS A FUNCTIONAL FOOD WITH GROWTH POTENTIAL IN SMALL-SCALE BAKERIES

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## Abstract

Small and medium-sized enterprises have the opportunity for improvement through the food products developing with the flavourful basic characteristics from the cuisine of a target market but adhering to the principles of nutrition and health. Garlic bread is a well-known yet least consumed food commodity in the local context due to higher prices and inadequate marketability. This paper examines the consumer acceptability and the most preferred product formulation of garlic bread as a potential growth opportunity for small-scale bakeries. Implementation of a new garlic bread production line in a remotely situated bakery was the main focus. In general, Garlic (*Allium sativum L.*, *Liliaceae.*) is an essential vegetable used for both culinary purposes and herbal remedies with antibacterial, antioxidant, hypercholesterolemic and hyperglycaemic properties. A market survey was conducted with the participation of 60 random consumers of three main bakeries in the area primarily, determining a percentage of 85% in favour of consumption. Three formulations with the same garlic concentration were developed to identify the most acceptable sample by using garlic powder, garlic extract, and chopped garlic pieces. According to the Friedman test statistics, a significant difference ( $P < 0.05$ ) was observed concerning odour, texture, taste, and overall acceptance except for appearance. Moreover, the incorporation of garlic powder was determined as the best product formulation according to the sensorial evaluation, which was conducted, using a hedonic scale ranging from 1 to 5 with the participation of 30 untrained consumer panellists. All the sensory attributes, except odour, were dominant in the garlic powder incorporated bread over the other two formulations. Conclusively, polythene wrapped 150g garlic bread has been introduced as a healthier bakery option for dietary modifications owing to consumers' preference. In further work, the product quality, sales, and long-term competitive position should be evaluated with consumers from the target market, to confirm the success of the new implementation.

**Keywords:** *Consumer acceptability, Functional food, Garlic bread, Growth opportunity, Small-scale bakeries*

# CONSUMER ACCEPTABILITY OF GARLIC BREAD AS A FUNCTIONAL FOOD WITH GROWTH POTENTIAL IN SMALL-SCALE BAKERIES

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## Abstract

Small and medium-sized enterprises have the opportunity for improvement through the food products developing with the flavourful basic characteristics from the cuisine of a target market but adhering to the principles of nutrition and health. Garlic bread is a well-known yet least consumed food commodity in the local context due to higher prices and inadequate marketability. This paper examines the consumer acceptability and the most preferred product formulation of garlic bread as a potential growth opportunity for small-scale bakeries. Implementation of a new garlic bread production line in a remotely situated bakery was the main focus. In general, Garlic (*Allium sativum L., Liliaceae.*) is an essential vegetable used for both culinary purposes and herbal remedies with antibacterial, antioxidant, hypercholesterolemic and hyperglycaemic properties. A market survey was conducted with the participation of 60 random consumers of three main bakeries in the area primarily, determining a percentage of 85% in favour of consumption. Three formulations with the same garlic concentration were developed to identify the most acceptable sample by using garlic powder, garlic extract, and chopped garlic pieces. According to the Friedman test statistics, a significant difference ( $P < 0.05$ ) was observed concerning odour, texture, taste, and overall acceptance except for appearance. Moreover, the incorporation of garlic powder was determined as the best product formulation according to the sensorial evaluation, which was conducted, using a hedonic scale ranging from 1 to 5 with the participation of 30 untrained consumer panellists. All the sensory attributes, except odour, were dominant in the garlic powder incorporated bread over the other two formulations. Conclusively, polythene wrapped 150g garlic bread has been introduced as a healthier bakery option for dietary modifications owing to consumers' preference. In further work, the product quality, sales, and long-term competitive position should be evaluated with consumers from the target market, to confirm the success of the new implementation.

**Keywords:** *Consumer acceptability, Functional food, Garlic bread, Growth opportunity, Small-scale bakeries*

# **ADOPTING INTERNET-BASED TECHNOLOGIES AND IMPACT ON MANAGEMENT ACCOUNTING: PERCEPTION OF SRI LANKAN BANKING PROFESSIONALS**

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## **Abstract**

Management accounting facilitates organizational improvements from management and costs reduction to strategic-level decisions to competing globally. Adopting internet-based technologies (e.g., artificial intelligence, robotic process automation, big data, blockchain, cloud computing, internet of things) would strengthen this facilitation. However, studies on how these technologies influence management accounting are limited in developing contexts. This study attempted to address this empirical gap by answering the following three questions: How have internet-based technologies (IBTs) influenced management accounting?; What factors influence the adoption of the IBTs?; and What are the challenges for adopting IBTs?. Two in-depth case studies were conducted in two large scale licensed commercial banks that had adopted internet-based technologies. Seventeen online interviews (with four bank managers, seven staff in accounting, and six staff in information technology - IT) were conducted using a semi-structured interview guide. Even though the Institutional theory was used as a theoretical lens, the interview transcripts were coded inductively. The findings indicated that the management accounting practices such as customer risk management, performance measurement, and budgetary controls are influenced directly by IBTs. Internal factors (strategic decisions on innovations, increasing value addition to customers; improving internal business processes, developing employees' exposure level to technology in order to enhance productivity) and external factors (mimetic and coercive isomorphic pressures, customer expectations, investor expectations, environmental factors) influence the adoption of IBTs. Many challenges at the planning stage, implementing stage, and post-implementation stage are evident. The findings contribute to widen the knowledge on the impact of IBTs on management accounting practices, while the project teams may use the findings during their process improvement initiatives in management accounting that incorporate IBTs. Future research could explore the other contexts and make industry-wise comparisons and study the impact of different technologies separately.

**Keywords:** *Accounting, Artificial intelligence, Data analytics, Internet-based technologies, Robotic process automation*

# DYSFUNCTIONAL AUDITING BEHAVIOUR AMONG EXTERNAL AUDITORS IN SRI LANKA

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## **Abstract**

External auditors have a crucial role in ensuring reliability in financial reporting via providing independent assurance to the public. However, in a stressful and competitive working environment, external auditors may engage in dysfunctional behaviours and completely jeopardize public trust, which has manifested in contemporary auditing scandals. Based on this contemporary importance and empirical dearth noted in the local context, the purpose of this study is to assess the engagement of such dysfunctional behaviours among external auditors in Sri Lanka. This study used a quantitative research approach and performed a structured survey involving 89 external auditors of Big-four audit firms and small audit firms. The findings based on mean ranking and one sample t-test indicate that *under-reporting time* and *failure to research an accounting principle about which the auditor was unsure* were dysfunctional behaviours engaged by external auditors, which were significant. On the other hand, in general, the respondents reported that they did not engage in other dysfunctional behaviours. The findings of this study are expected to be important for practitioners and regulators to assess the level of dysfunctional behaviours and reduce such behaviours.

**Keywords:** *Auditing scandals, Dysfunctional auditing behaviour, External auditors, Public interest, Sri Lanka*

# LEGAL STATUS OF WORK FROM HOME CONCEPT: A COMPARATIVE ANALYSIS WITH SPAIN

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## **Abstract**

The work from home (WFH) concept has become an emerging trend as a result of the Covid-19 pandemic. The pandemic has highly affected the Sri Lankan economy by reducing the national growth and reducing the profits of the companies. As a result many issues relating to labour rights have emerged. Therefore, the study highlights the need for expanding the legal regime relating to WFH while balancing the legal interests of both employers and employees. Therefore, the study aims at finding out whether the existing labour laws in Sri Lanka are sufficient to cover the WFH situations. The objectives of this research are to identify the legal status of work from home concept, determine if Sri Lankan labour laws are adequate to address such difficulties and, if not, recommend required changes to the current legal framework to reduce the gap. The methodology of this research is a combination of doctrinal methodology and comparative research methodology with Spain. Moreover, this research would employ a qualitative analysis of primary data including legislative enactments such as Shop and Office Employees Act No.19 of 1954 and secondary data including internet sources. Furthermore, the International Labour Organization guidelines have also been analysed in this regard. It was revealed in this study that there are many unaddressed legal issues relating to WFH, some of which includes unequal employment opportunities, wage reductions, issues relating to worker's compensation, occupational safety and health etc. At last, the study concludes with a view that the existing labour laws are not sufficient to address the WFH situations.

**Keywords:** *Covid-19, work from home, labour laws, employment, legal interest*

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# ***iCMA 2021***

***“Multidisciplinary Perspective for Re-emerging with Resilience,  
Perseverance and Adaptability for a Sustainable Future”***

**ISSN: 2386 – 1509**

