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Sabaragamuwa University of Sri Lanka

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ARTICLES

An XPS Study of the Ag-S interface of L-Cysteine Films on Silver Surface

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ABSTRACT

L-cysteine has gained much attention as a versatile amino acid to create bioactive surfaces by assisting the bonding of proteins to metal surfaces. When L-cysteine interacts with metallic partners such as gold, silver and copper, the SH functional group is known to interact strongly with the metallic surface. The interaction of the L-cysteine with silver surfaces is particularly interesting because, L-cysteine adsorption on silver has been suggested to be stronger than on gold or copper surfaces and the interactions may strongly influence the formation of novel interface states of the L-cysteine-Ag interface. On the other hand, some studies report a weakening of silver-sulfur bond with increasing coverage. However, research has not been sufficiently addressed for experimental investigation to understand the interaction of L-cysteine with silver metallic surfaces. As the first step, we reported the results of experimental investigation of L-cysteine and silver interface electronic structure by thickness-dependent ultraviolet photoelectron spectroscopy (UPS) with a clear spectral feature in between Fermi edge and highest occupied molecular orbital (HOMO) of L-cysteine due to the formation of Ag-S bonding together with a weakening of the silver-sulfur bond with increasing of L-cysteine. In this study, the formation of Ag-S bond at the L-cysteine modified silver surface was systematically elucidated by X-ray photoelectron spectroscopy (XPS) for three different coverages, namely monolayer, two-layered and multi-layered. A prominent shoulder at 2475.2 eV of the main peak at 2473.2 eV was observed for the S 1s XPS spectrum for monolayer film, while only a single peak was observed in the case of two-layered and multi-layered. The spectral feature at 2475.2 eV can be attributed to the interaction of L-cysteine with silver. In addition, the disappearance of the spectral feature for the two-layered film can be attributed to the weakening of silver-sulfur bond by over layer of L-cysteine.

About the Journal

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Consumers' Knowledge, Attitudes, and Behavior Regarding Functional Food Products-A Survey from Selected Areas of Sri Lanka

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ABSTRACT

The purpose of this research is to assess the influence of demographical variables (gender, age, education level, study area, nature of residence, residential milieu, suffering from non-communicable diseases (NCDs), and monthly household income) on the consumption frequency of mostly available processed food products with health benefits (functional food products-FF) in Sri Lankan market. Consumers' knowledge of the health-promoting ability of FF, attitude on FF choices, and behaviors on FF consumption were also analyzed. A questionnaire was completed by 303 individuals (60.40% females, 39.60% males, and 83.17% of the total having a diploma/degree) from the Western, Central, Southern, Sabaragamuwa, and Uwa provinces. Cronbach's alpha coefficient assessed the reliability of the questionnaire and Pearson's chi-squared test was used to examine the independence among qualitative variables. The Likert scale numbers were transformed to means and articulated the weights of the study variables. The Correlation analysis was carried out to find the association between Consumers' knowledge and attitudes regarding FF. The age, education level, and NCDs of the respondents were significantly affected ($p < 0.05$) in the FF consumption frequency of the selected sample. The population between the ages of 18-34 who have a diploma/degree and no NCDs was more likely to consume FFs. However, most of them have no clear idea and were not sure of the curing ability of FFs or their bioactive ingredients. They were not always thinking about healthiness while purchasing. Consumers' knowledge and attitudes regarding FF observed a positive correlation ($P < 0.01$). The results showed that tea/herbal infusions were the most preferred FF type by the respondents. As per the responses, less awareness was a significant barrier to consuming FFs. The respondents in this study were biased toward the young age group with a diploma/degree. These findings provide valuable information concerning Sri Lankan consumers' behavior and attitudes toward FF consumption. The knowledge can be utilized in future FF development processes.

About the Journal

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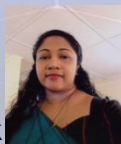
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Assessment of marine turtle nesting habitats from Tangalle to the Kumbukkan Oya estuary in south-eastern Sri Lanka

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ABSTRACT

This study assessed marine turtle nesting habitats along the south-eastern coastline of Sri Lanka, with the specific objectives of (i) reporting the quality of turtle nesting habitats, turtle nesting abundance, and threats to nesting turtles; (ii) comparing the current results with the results of a study conducted in 2004 and (iii) recommending conservation actions. The current study was carried out from August 2017 to May 2018 to assess the three parameters given in objective (i) above, along a 133 km coastal belt in 531 transects of 250 m each. Direct visual observations were supplemented with data collected from local people and validated using habitat suitability modelling using MaxEnt software. The study demarcated seven turtle nesting hotspots and recommends priority areas for nine turtle conservation activities. Those include the declaration of the Palatupana beach that connects the existing Nimalawa Sanctuary and Yala National Park including its shallow sea as a sanctuary. Its management is recommended through public-private partnerships ensuring healthy nesting turtle populations and their monitoring, while promoting turtle-based tourism under strict guidelines. Factors contributing adversely for nesting turtles such as coastal constructions and clearance of beach vegetation should be considered in management actions for the conservation of these globally threatened reptiles. The need for future research is also identified.

About the Journal

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Nutritional intake of sport undergraduates in Sabaragamuwa University of Sri Lanka

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ABSTRACT

Nutritional intake plays an important role in determining energy availability which is vital to health, wellbeing, and sports performance in an active population. This research assessed the sports undergraduates' nutritional intake compared to the Dietary Guidelines for Americans and nutrition goals provided by WHO. This study is a quantitative, cross-sectional descriptive study. One hundred and one ($n = 101$) sports undergraduates aged between 20 to 23 years were recruited and the nutrient intake was assessed using the three-day food diary method and quantified the macro and micronutrients by the food composition database. One sample t-test was performed to compare the mean nutrient intakes with the lowest recommendation values. Though most undergraduates were able to meet the dietary requirements in carbohydrates, they were deficient in their protein intake and exceeded in fats intake. Further, both male and female students were deficient in their daily energy intake (1723 kcal, 1607 kcal) and dietary fiber intake (8 g, 11 g). The saturated fat intake was met by all students while 20% of males and 21% of females exceeded the recommendations ($< 10\%$). The micronutrient intake of vitamins such as C, B1, B2, B9, and B12 and minerals such as Calcium, Magnesium, and Potassium, were significantly below the recommendations ($p < 0.05$) except for vitamin B3 niacin. Providing a nutritionally valuable meal is essentially required to maintain both physical and mental fitness. Our results revealed that the Sri Lankan sport science undergraduates do not have an adequate daily dietary intake of energy, proteins, calcium, magnesium, potassium, and vitamins such as C, B1, B2, B9, and B12.

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CONFERENCE PROCEEDINGS

Formulation and Characterization of Edible Packaging Material from Corn (*Zea mays L.*) Hull and Catla (*Catla catla*) Fish Scales

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ABSTRACT

There is a significant interest within the global community on edible food packaging to add an additional nutritive value to the packaged-food while overcoming environmental and food safety complications adhered with synthetic polymer materials. This study was aimed to develop an edible packaging film with corn hull (*Zea mays L.*) and Catla (*Catla catla*) fish scales which are underutilized, renewable resources though they are still wastes. Three packaging films were developed (with 100% corn hull, 75% corn hull with 25% Catla fish scales and 25% corn hull with 75% Catla fish scales). Films were characterized in terms of film-forming ability, mechanical, barrier, thermal, microbiological, and sensory properties. The highest swelling degree ($165.34 \pm 8.42\%$), L^* value (71.39 ± 0.19) and transparency were recorded with 100% corn hull incorporated material. The highest water uptake at any t-time and water solubility ($42.68 \pm 5.90\%$) were showed by 75% Catla fish scales incorporated material. The rupture test results determined that the fracturability increased with Catla fish scales incorporation and the highest value (450.53 ± 3.83 g) in 1% of load sensitivity was recorded with the material in which 75% Catla fish scales incorporated. The fracture deformation was significantly affected ($p < 0.05$) by the Catla fish scales incorporation which revealed that there was a significant increase of elasticity of the film. The same material recorded the highest total solid ($86.74 \pm 0.23\%$) and crude protein ($16.96 \pm 0.01\%$) contents in proximate analysis while the 100% corn hull incorporated material showed the highest crude fat ($2.54 \pm 0.05\%$) and crude fiber ($20.40 \pm 0.42\%$) contents in dry weight basis. In sensory evaluation, 100% corn hull material obtained the highest overall acceptability through a semi-trained panel. All the three materials showed negative results for the coliform test. Study results evidenced that the 100% corn hull material had desirable mechanical and physicochemical properties which is more suitable for edible food packaging applications.

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Formulation and Quality Evaluation of low Salted Garcinia Incorporated Jaadi Using Tuna Fish

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ABSTRACT

Jaadi is a fermented fish product that is produced at cottage level industry in Sri Lanka. The local traditional jaadi contains high salt concentration which has a low consumer acceptance and nutritional value. The objective of this study was to prepare jaadi using a low amount of salt and preserve its nutritional value and to increase the consumer acceptance. *Katsuwonus pelamis* (Skipjack tuna or “balaya”) was selected. Other than the salt levels, fish was treated with two varieties of garcinia as *Garcinia quesita* (GQ) and *Garcinia zeylanica* (GZ). Therefore, the study was carried out using four treatments by reducing salt concentration up to 10% and 20% and two garcinia varieties (15%) and a commercial jaadi sample as a control using triplicate samples. It was revealed that GQ has the best antibacterial activity with an inhibition zone of 1.94 ± 0.09 cm against *Salmonella* where it was 1.56 ± 0.07 cm for GZ. The moisture, fat, protein, and ash, composition of GQ and GZ were as follows; moisture content: GQ ($28.26 \pm 0.17\%$), GZ ($30.56 \pm 0.39\%$); crude fat: GQ ($9.27 \pm 0.26\%$), GZ ($10.91 \pm 0.08\%$); protein: GQ ($4.67 \pm 0.05\%$), GZ ($4.95 \pm 0.05\%$); ash: GQ ($5.16 \pm 0.02\%$), and GZ ($9.44 \pm 0.04\%$). The highest moisture content and crude fat were in jaadi sample of GQ with 10% salt, where crude protein and ash content were high in sample with GZ with 10% salt. According to the sensory analysis data it was found that jaadi made out of 20% salt and GQ has the best overall consumer acceptability (7.97 ± 1.13) and the crude fat, protein and ash percentages (wet basis) were 2.34 ± 0.09 , 30.92 ± 0.12 and 14.80 ± 0.51 respectively whereas crude fat, protein and ash percentages (wet basis) of commercial sample were 2.31 ± 0.02 , 29.15 ± 0.14 and 38.02 ± 0.62 respectively. Therefore *G. quaesita* with 20% salt was identified as best treatment which had enhanced sensory and quality attributes.

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Estimation of Water Yield and Soil Erosion in Samanalawewa Watershed in Sri Lanka using GIS-based InVEST model

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ABSTRACT

Ecosystem services (ES) are a group of tasks performed by the earth's ecosystems that are required to support life and offer benefits to humanity. Thus, this study explores two of the water-related ecosystem services, water yield, and soil retention that were distributed in the Samanalawewa watershed (SW) and its eight sub-watersheds in Sri Lanka, over 20 years (2000-2020) with five-year time intervals. Water yield and soil and water conservation play an important role in ecosystem management. Hydrological balance is a crucial component of the hydrological ecosystem services and assessing water yield, and soil erosion are crucial for watershed management. Thus, this study estimated and mapped the water yield and soil erosion, using the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST 3.9.2) Annual Water Yield (AWY) and Sediment Delivery Ratio (SDR) model which was introduced by the National Capital (NatCap) Project in collaboration with the Stanford University-USA. According to the obtained results, in 2000, 2005, 2010, 2015, and 2020, the estimated mean annual water yield was 2.62×10^5 , 2.6×10^5 , 3.5×10^5 , 3.58×10^5 , and 2.75×10^5 $\text{m}^3 \text{ha}^{-1} \text{year}^{-1}$, respectively. Furthermore, the estimated mean annual soil erosion rates for the above-mentioned years were 53.2, 52.9, 69.7, 87.7, and 70.2 $\text{t ha}^{-1} \text{year}^{-1}$. The estimated soil loss values of the SW are 10 to 18 times greater than the soil erosion tolerance ($5 \text{ t ha}^{-1} \text{year}^{-1}$) in Sri Lanka. The results show that the years 2015 and 2005 have the highest and the lowest water yield and total soil loss values, respectively. The upper part of the watershed has relatively moderate water yield and soil loss values than the lower part. These findings would be beneficial in developing watershed management strategies and in the implementation of suitable soil and water conservation techniques within the watershed.

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The Department of Forestry and Environmental
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