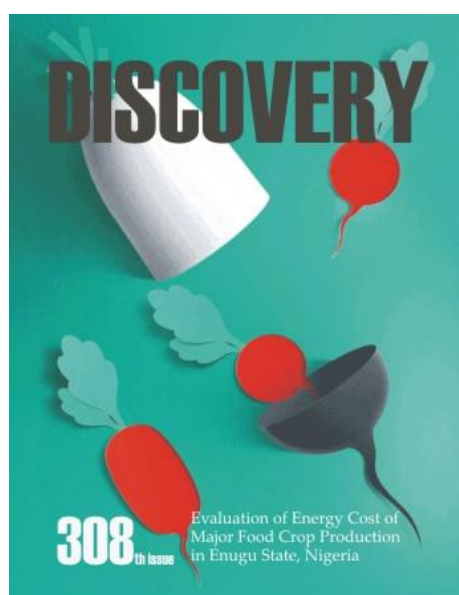


DISCOVERY

About the Cover



The energy cost of producing major food crops in Enugu State of Nigeria were determined and evaluated. Energy analysis of producing yam, cassava, maize, coco yam, rice, groundnut, black beans and Bambara nut were carried out based on field operation, fertilizer application and harvesting. Operational energy used in form of direct and indirect energy and energy sources involved in the production process were computed. The major issue of concern is that farmers use more energy to increase output but they do not have enough knowledge on most efficient energy inputs to use. The research study was planned on the basis of investigative survey research approach which involving the use of questionnaire and personal interview with the major produce of the selected crops during the field trips. In carrying out this investigative survey, the author visited thirty-two (32) farmers from each of the nine LGA selected within the stipulated time. The results showed that land preparation operation activities consumed the highest percentage of energy for producing maize, coco yam, rice, groundnut, black beans and Bambara nut (34.76 %, 32.50 %, 38.35 %, 31.18 %, 28.81 % and 28.42 %) except on cassava and yam that recorded highest production energy at harvesting (21.65 %) and planting (76.03 %) respectively. It was gathered also that direct, renewable and non-commercial energy used were higher than indirect, non-renewable and commercial energy used in producing those selected crops in the area. The low proportion of non-renewable energy indicated that farmers in the study area depend on manual labour in producing the selected food crops (Ref: Chikwado UK, Chidiebere D. Evaluation of Energy Cost of Major Food Crop Production in Enugu State, Nigeria. *Discovery*, 2021, 57(308), 643-657).

Analysis of Pre-Service Physics Teachers' Academic Achievement in Electromagnetism

Aina Jacob Kola, Keith Roy Langenhoven

The study is on pre-service physics teacher academic achievement in electromagnetism. The study obtained data from three hundred and eighty-eight graduated students of electromagnetism I and II from a College of Education. These achievement scores were that of students who graduated from 2011 to 2019. The authors employed three research questions to analyzing pre-service teachers' academic achievement in the research. The statistical analysis used was the Pearson moment correlation coefficient, Analysis of Variance (ANOVA), and descriptive statistics. Findings show a correlation between electromagnetism I and II, a no significant gender achievement gap, and weak students' achievement. Therefore, the authors believe good teachers' teaching method could be the best way to solve vulnerable students' academic achievement in physics, suggesting the shift of teaching paradigm to Peer Instruction Dialogical Argumentation (PIDAM).

Discovery, 2021, 57(308), 597-607**Assessing Drivers and Dynamics of Land Use Land Cover Change in Churia Region of Makwanpur District Using GIS and Remote Sensing**

Padam Prakash Jaishi, Sagar Budhathoki

Land use and land cover, a dynamic process, has become a key component of current natural resource management and environmental monitoring systems. Drivers and Dynamics of LULC in the Churia region were assessed with an integrated approach using remote sensing and GIS techniques together with socioeconomic data for land use land cover change detection. Landsat TM of 1995 and Landsat OLI/TIRS of 2018 satellite imageries were used for land use land cover change detection between 1995 and 2018 in the Churia region of Makawanpur district of Nepal. The study's goal was to look into land use and land cover (LULC) change detection between 1995 and 2018, and to examine the dynamics and the driving forces of these changes, and also to analyze the rate of LULC change. Key informant survey, training sample collection, Satellite images download, and direct observation was done for the collection data. Image processing was done through supervised classification to prepare land use maps using the Maximum Likelihood algorithm. Image classification was carried by emphasizing five main categories. Data of different LULC classes obtained from the field study (GPS location) were used as training samples for supervised classification. Ground verification was done during the field visit and through Google Earth images. The study reveals an astonishing net decrease in 'forest cover' 'cultivated land' and 'water' whereas a concomitant increase in 'built-up area' and 'sand/gravel'. The forest cover of 99,254.19 ha in 1995 decreased at a rate of 0.45 percent per year to 89,449.49 ha in 2018. Whereas cultivated land of 24,891.66 ha in 1995 decreased at a rate of 0.52 percent to 22,098.06 ha in 2018. Similarly, the built-up area of 4,938.76 ha in 1995 increased at a rate of 4.91 percent to 14,859.69 ha in 2018, sand/gravel of 7,662.86 ha in 1995 increased at a rate of 1.58 percent to 10989.59 ha. Forest cover is declining at the cost of cultivated land, while cultivated land is declining at the cost of built-up area. Different socioeconomic factors were associated with the forest cover decreased such as an increase in cultivated land, settlement, infrastructure development, riverbank cutting, and erosion.

Discovery, 2021, 57(308), 608-620**Molecular detection of *Laribacter hongkongensis* in Fresh fruits cocktail collected from Public market: An environmental and public health concern**

Igere Bright E, Ehwarieme Ayobola D, Olubunmi Akpomie

In recent times, the relevance of fruits to health and wellbeing have received attention which has welcomed various commercial interests and modified bagged/package fresh fruit products by businessmen/investors. However the safety of such fruit cocktail in public markets remain a concern especially as there have been reports of emerging contaminants of food products and freshwater. Our study examined the molecular detection of *Laribacter hongkongensis* from fresh fruits cocktail purchased at different locations using Polymerase Chain Reaction (PCR) and standard microbiological techniques. Eighty-eight presumptive isolates were retrieved from various locations including: CRW1: 14, CRB1: 11, CRA1: 16, CROS1: 12, CRL1: 18 and CRUB: 17. The PCR detection yielded 8/88 (9.09%) of positive species of *L. hongkongensis* with phenotypic virulence or *in vitro* virulent determinative test (VDT) revealing: lipase production (6/8: 75%), catalase (8/8: 100%), oxidase (8/8: 100%), urease (8/8: 100%), protease production (5/8: 62.5%), and lecithinase production (3/8: 37.5%). The antibiotic susceptibility testing (AST) reports reveals that the observed strains are both potential pathogens and harbors multiple antibiotic resistance (MAR) determining factors (Augmentin 37.5%; Nalidixic acid 37.5%; Imipenem 25%; meropenem 12.5; Ciprofloxacin 12.5%; Doripenem 12.5%; Kanamycin 12.5%). Observing such potential pathogen of emerging concern with virulent indices and MAR indicates a new problem in fresh fruit cocktail commercialization. It also indicates a possible cross-contamination of fresh fruit cocktail probably during preparation or shipment. The need for apt attention, monitoring and surveillance with adroit application of inter-personal hygiene is suggestive to eliminate such emerging species of concern.

Discovery, 2021, 57(308), 621-631

Gonadal sex differentiation in the fish, *Oreochromis mossambicus*

Sudha S Patil, Mangala S Nayak

The present work is an attempt to study the different stages involved in the development of gonads in the cichlid fish *Oreochromis mossambicus*. Histological studies of the gonad revealed the appearance of gonadal primordium in between the gut and pronephric duct in the developing stages from 2 day hatchling to 30 day hatchling. As per the observations made up to 30 days there is an increase in the gonadal analogue. The gonial cells at 20 day show some meiotic structure which initiates the sex differentiation, and shows sex differentiation in this species may take place after 20 days of fertilization.

Discovery, 2021, 57(308), 632-639

***Litsea glutinosa* (Lauraceae), a larval host plant of the Common Mime, *Chilasa clytia* L. (Papilionidae)**

Ch. Prasada Rao, A.J. Solomon Raju

Litsea glutinosa is a potential larval host plant for *Chilasa clytia* in deciduous forest ecosystems. Since it is a semi-evergreen tree, it bears leaves nearly throughout the year and this trait enables *C. clytia* to display multi-voltinism but it breeds mostly during early wet season when new leaves emerge and become available. Nevertheless, *C. clytia* can be maintained by planting *L. glutinosa* in butterfly parks and farms. This butterfly in adult stage utilizes *L. glutinosa* flowers as a source of nectar.

Discovery, 2021, 57(308), 640-642

Evaluation of Energy Cost of Major Food Crop Production in Enugu State, Nigeria

Ugwu Kenneth Chikwado, Diyoke Chidiebere

The energy cost of producing major food crops in Enugu State of Nigeria were determined and evaluated. Energy analysis of producing yam, cassava, maize, coco yam, rice, groundnut, black beans and Bambara nut were carried out based on field operation, fertilizer application and harvesting. Operational energy used in form of direct and indirect energy and energy sources involved in the production process were computed. The major issue of concern is that farmers use more energy to increase output but they do not have enough knowledge on most efficient energy inputs to use. The research study was planned on the basis of investigative survey research approach which involving the use of questionnaire and personal interview with the major produce of the selected crops during the field trips. In carrying out this investigative survey, the author visited thirty-two (32) farmers from each of the nine LGA selected within the stipulated time. The results showed that land preparation operation activities consumed the highest percentage of energy for producing maize, coco yam, rice, groundnut, black beans and Bambara nut (34.76 %, 32.50 %, 38.35 %, 31.18 %, 28.81 % and 28.42 %) except on cassava and yam that recorded highest production energy at harvesting (21.65 %) and planting (76.03 %) respectively. It was gathered also that direct, renewable and non-commercial energy used were higher than indirect, non-renewable and commercial energy used in producing those selected crops in the area. The low proportion of non-renewable energy indicated that farmers in the study area depend on manual labour in producing the selected food crops.

Discovery, 2021, 57(308), 643-657