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Book of Abstracts

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FEED FORMULATION RATIONS FOR LAYERS USING TWO-LEVEL FACTORIAL DESIGNS.

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Abstract.

Research has shown that about 80% of total cost of poultry production is incurred on poultry feeds. A farmer who manages to bring down this cost to about 60% to 50% will make good returns in the poultry business. In general the main objective of a firm is to maximize production thereby a good measure must be taken in formulating ration for poultry birds (chicks, broiler starter, broiler finisher, growers and layers) to ensure optimum use of resources which in turn ensure reduction in the total cost of production. If feed rations are right, the broilers will grow fast, and the layers will increase egg production at least 1 egg after every 27 hours i.e. approximately 26 eggs per hen in 30 days. To improve on the feed quality and cut down cost incurred on feeds farmers should make their own poultry feeds. The aim of layer diets must supply protein, carbohydrates, fats and minerals to optimize egg production, to safeguard health and maintain the desired bodyweight. This study employs the use of two-level factorial design to develop a regression model for determining optimal egg production in layers. The study uses the three main feed nutrients; carbohydrates (80% to 85%), proteins (13% to 15%) and minerals (1.5% to 2.5%). The design points were replicated twice and the average number of eggs per hen in 30 days were used. The analysis of variance table showed the main effects carbohydrates, protein and minerals are significant, carbohydrates and proteins, carbohydrates and minerals interactions were also significant. A plot of residuals versus the predicted values appeared satisfactory so we have no reason to suspect problems with validity of our conclusions.

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Synthesis, Characterization of ZnO Nanoparticles and their Application in Removal of Heavy Metals from Waste water

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ABSTRACT

In an effort to reduce the environmental and health effects of heavy metals in wastewater, various techniques have been employed. The objectives of this study were to synthesize ZnO nanoparticles, characterize and apply it in adsorption of heavy metals from waste waters. Precipitation technique was used to synthesize ZnO nanoparticles. Two samples L1 and L2 were synthesized. They were characterized using Powder X-ray Diffraction (PXRD), Fourier Transform Infra-Red (FTIR), Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDX), methods of analysis. The PXRD results showed diffraction peaks which were indexed to ZnO reference as per JCPDS file 80-0075. The size of ZnO nanoparticles was found to be 26 nm. FTIR spectra showed a broad band at around 430 cm⁻¹ with shoulder shape, characteristics of Zn-O bond. The images obtained by SEM showed rod shaped clusters of nanoparticles which were distributed well within a range of 100 nm which is a favorable property to exhibit better photo catalytic activity. The EDX results showed elemental composition of ZnO nanoparticles which showed 54% Zn, 44.07% O and 1.93% Mn impurities for L1 and 55.34% Zn, 42.3% O and 2.37% Mn impurities for L2. The results of heavy metal ions adsorption showed an increase in percentage removal with increase in adsorbent dose and contact time. There was a decrease with increase in heavy metal concentration. In conclusion, ZnO nanoparticles can be used as adsorbent of waste water from textile and metallurgical industries. Future studies could focus on possibilities of improving and commercializing this material through

designing a treatment facility that in co-operates commercial nanoZnO on large scale waste water treatment.

Key Words: Heavy Metals, Adsorption, ZnO Nanoparticles.

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INDIGENOUS LOCAL KNOWLEDGE IN CLIMATE CHANGE ADAPTATION BY SMALLHOLDER FARMERS IN LAKE VICTORIA BASIN, KENYA

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Abstract

The developing world, Kenya included is already grappling with extreme climate related events and such events pose a serious threat to agricultural production and particularly to the smallholder farmers. In Kenya, about 11% of arable land could be affected by climate change, including a reduction in cereal production, which is about 16% of the agricultural Gross Domestic Product (GDP). To avert this situation, adaptation to the effects of climate change is critical and of concern in developing countries particularly in Africa where vulnerability is high because the ability to adapt is low. However, a number of socioeconomic and culture specific factors of the farmer could be influencing the ability of the farmers to adapt to the effects of climate change. This informed the purpose of this study which investigated the influence of indigenous local knowledge on climate change adaptation by smallholder farmers in Homabay County, Kenya. The study employed cross-sectional survey design in which data was collected from smallholder farmers in one survey round. Quantitative data was collected from 398 smallholder farmers, while 48 key informant interviews and 12 focus group discussions were used to collect qualitative data to buttress information from farmers. Data was analysed using frequencies, percentages, cross-tabulations and chi-square at 0.05 significance level. The study established that indigenous local knowledge influences individual values and choices of climate change adaptation strategies. The study recommended the need to document the indigenous knowledge indicators across communities and how it has been used in climate change adaptation at household level. The study also recommended integration of indigenous knowledge with modern scientific knowledge in climate change policy documents at national and county levels for appropriate climate change adaptation.

Key words: Indigenous local knowledge, climate change adaptation, smallholder farmers, Homabay County.

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Numerical simulation as a key feature in the growth of solar energy

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Climate change has reached a major crisis point worldwide as a result of exhaust emissions arising from use of traditional transport fuels. Therefore, renewable sources of energy such as solar energy and biodiesel that seem to mitigate against environmental impacts have attracted intense research

attention. The concept of numerical simulation has equipped researchers with important knowledge on solar cell fabrication and simulation. Furthermore, it has reduced the cost of time during the actual fabrication of photovoltaic (PV) devices. The various simulation models that have been applied to PV devices include, technology computer-aided design (TCAD), one dimension solar cell capacitance simulator (SCAPS-1D) and general-purpose photovoltaic device model (GPVDM). This research study lays specific emphasis on SCAPS-1D software in simulating complicated practical problems in PV cells encountered during manufacture, not limited to time, cost and installation problems. The SCAPS-1D package provides physical information on solar cells in a quicker, better and practical information than any other inferior human method. In this paper, SCAPS-1D is used to model a solid state dye sensitized solar cell (SsDSSCs) consisting of all solid state layers with the configuration FTO/ETL/N719/CuSCN/Au, where electron transport layers (ETL) include IGZO, ZnO, SnO₂, TiO₂ and WS₂. The simulated output is analyzed from the current-voltage characteristics and summarized based on maximum incident photon conversion efficiency of every ETL material that was used. This paper also provides a high efficient solid state dye sensitized (SsDSSCs) solar cell architecture based on best transport materials, back contact and optimized input parameters. However, there is still room for exploration on SsDSSCs to match the silicon solar cells that currently dominates the market with a power conversion efficiency of about 32%.

Keywords: Renewable energy, SCAPS-1D, simulation, solar energy

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PHYSICO-CHEMICAL QUALITY OF WATER FROM VARIOUS SOURCES IN SAMBURU DISTRICT, KENYA

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Limited access to safe drinking water and information on water quality in sparsely populated arid and semi-arid regions has contributed to frequent outbreaks of diarrheal disease and other health conditions of concern. There is therefore urgent need to determine the physico-chemical quality of water in various sources in these regions. This study was undertaken in order to determine water quality of water sources (dams, rivers, springs and tap water) in Wamba Division of Samburu District. Physicochemical analyses were carried out using standard methods. Majority of the samples analyzed frequently recorded high levels of turbidity (range, 5 to 6100 NTU), alkalinity (range, 20 to 1577 mg L⁻¹ CaCO₃) and low salinity (range, 0 to 0.2 ppt). This study also found that the boreholes had the highest mean conductivity (830.8 μ S cm⁻¹) while wells had the widest range (4.6 to 5940.0). High levels of conductivity in water from groundwater sources can be attributed to the long period of contact between the water and mineral sources. This study therefore concludes that water from most sources is contaminated and must therefore be treated before consumption. It is recommended that further studies be conducted to identify the best eco-friendly and affordable technology to be used to reduce turbidity and salinity in most of the water sources. High conductivity levels also suggests that there is need to investigate the presence of underlying mineral ions which may be toxic to health of the water consumers.

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ASSESSMENT OF THE EFFECTS OF SOLID WASTE MANAGEMENT ON THE ENVIRONMENT IN HURUMA ESTATE UASIN GISHU COUNTY

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ABSTRACT.

The purpose of this study is to assess the effects of solid waste management on the Environment

in Huruma estate, Eldoret Uasin Gishu County. Huruma estate is located in Eldoret town that is situated in the mid-west of Kenya's Rift Valley. It is claimed that the reason for poor solid waste management in Huruma estate might have been due to lack of efficiency with the local authorities mandated to manage and also due to ignorance among the population on how to conserve the environment through proper solid waste disposal. It is from this background, the study sought to develop an efficient and effective solid waste management in Huruma estate, Eldoret, by investigating the presence of solid waste, evaluating the effects and assessing solid waste management practices among Huruma estate residence and relevant authorities. The target population was residents of Huruma estate. According to census 2019 the total population is 141 households with an average of four people per household adding up to 6230 people. A descriptive case study design method was used. Simple random sampling technique was used to select 95 respondents, thus is the sample size population, while questionnaire and interviews schedule was used as data collection instruments. Qualitative and quantitative analysis was used in analyzing data while descriptive statistics was used in presentation and interpretation of data with the help of Statistical Package for Social Sciences (SPSS) and Inferentially by the use of chi-square, regression and ANOVA. Findings indicated that there is large presence of solid waste within Huruma estate. As such, waste collection was not done properly because of lack of responsible authorities to manage both waste disposal and collection. The county government should therefore come up with strategies to enhance the proper collection of waste.

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TITLE: Agri-Environmental Communication Interaction: Strategic Link to Kenyan Food and Nutrition Security Solution.

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TITLE: Agri-Environmental Communication Interaction: Strategic Link to Kenyan Food and Nutrition Security Solution.

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Abstract

Developing countries face food insecurity and malnutrition on daily basis. Women and children are the main culprits and face death and hunger. Kenya faces the worst scenario over food deficits and malnutrition and struggling to meet its food requirements. Most of the food stuff in our stores is imported from other countries. Several reasons explain food deficit in Kenya and some propose lack of understanding between agricultural environmental knowledge communication interaction and environmental knowledge in agricultural practices. Farmers and stakeholders need to understand communication of the environmental conditions, its dynamics and interactive effect on food production. This essential agri-environmental communication technique between farmers and environmental dynamics is a missing link resulting to poor agricultural output. This paper seeks to address the claim that, agri-environmental communication interaction can be key to enhancing food production and nutrition as well as improving human health. Key objectives; To find out the causes of low food production due lack of agri-environmental communication interaction; To assess the effect of food insecurity and malnutrition on human health due to agri-environmental communication interactions and to make recommendations towards enhancing food production and nutrition in improving human health in Kenya through agri-environmental communication interaction. The research study and data information was collected from secondary sources, media observations and focus group discussions from the forty seven counties in Kenya. The findings revealed that, food production is very low due to poor communication in scientific agricultural terminologies interpretation in local language for effective use by farmers. The recommendation is that, government and stakeholders should take action and improve on effective agri- environmental communication interaction in order to solve food insecurity and malnutrition.

Key words: Agri-environmental, communication, strategy, food, nutrition, security

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The Nexus between Socio-economic Factors and Coping with Ef-

ffects of Climate Change Related Disasters on the Environment in Kisumu County

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Floods and drought afflict lower Nyando river basin in a cyclical pattern yearly. Each flood event is almost always followed by a drought event whose impacts include loss of lives, displacement of people, infrastructural damage and erosion of soils' and waters sources' potential to sustainably supply goods and services. This study explored the influence of socioeconomic factors on coping with impacts of Climate Change Related Disasters (CCRDs) namely floods and drought on the environment (soils and water sources). Descriptive survey research design was adopted, targeting a population of 162,162 and an accessible population of 14,675 households with a sample size of 374. Three divisions prone to both floods and drought were purposively selected from Nyando, East Kano and Nyakach sub-counties. Proportionate samples were drawn from eight (8) locations which suffer perennial floods and drought. A household questionnaire, key informants guide and observation schedule were used to collect data. Descriptive and inferential statistics were used to analyse data. Multiple regression tested at alpha $p < 0.05$ were used to correlate socioeconomic factors with coping. Most households engage multiple coping activities at different levels of intensity. Coping mechanisms that constitute Conservation Agriculture scored lower than conventional practices. Further, coping mechanisms on common (shared) natural assets also ranked lower than those on individual assets. Coping was significantly different across the divisions ($p = .027$). Whereas Gender (sex) ($p = .022$), age 56 – 65 years ($p = .000$) and 66 years and above ($p = .014$) significantly influenced coping of households, Level of education and farm size did not. The study recommends location specific interventions, upscaling of coping mechanisms, inclusion of socioeconomic factors in policy interventions targeting CCARDs, enhancement of extension services, and communal approach to resource management to enhance resilience-proofing against CCARDs and assure environmental sustainability.

Keywords: CCARDs, Coping, Impacts, Socioeconomic factors