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LIVELIHOOD DIVERSIFICATION AND IMPACT OF OFF-FARM INCOME ON AGRICULTURAL INVESTMENT IN NYERI AND KAKAMEGA COUNTIES, KENYA

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ABSTRACT

Aspects of livelihood diversification and impact of off farm income on agricultural investment and productivity have not received enough empirical research. The question whether off farm activities and the income there of enhance or impede agricultural investment and productivity is an area that requires further research. This study examined aspects of agricultural diversification and impact of off farm income on agricultural investment in Nyeri and Kakamega Counties of Kenya. The objectives of the study were to quantify the levels of diversification at crop, livestock and income levels and to assess the impact of off-farm income on agricultural investments and productivity. The study relied on a panel data set collected in the years 2002, 2008 and 2013 from two counties in Kenya namely Nyeri and Kakamega. The data was collected in 10 villages and 300 households sampled in the two counties. The Herfindahl index together with some descriptive statistics was used to analyze the degree of diversification. The tobit and double hurdle models were used to analyze the impact of off-farm income on input use, agricultural specialization and intensification. The key findings of this study are that households in Nyeri and Kakamega counties are diversifying (villages had Herfindahl indices of over 0.8) rather than specializing in their agricultural activities. The impact of off-farm earnings on input use, agricultural specialization and intensification was found to be minimal. The tobit and double hurdle models showed that non-farm income had negative coefficients on adoption and intensity of agricultural input use. It is recommended that policies that will encourage a shift from promoting broad agricultural diversification to facilitating specialization among households that are likely to do should be designed. A multifaceted approach to policy that considers other constraints to intensification and specialization especially with regard to technology generation returns to input use, input delivery systems and effectiveness of extension should also be used.

Key words: Livelihood Diversification, Crop, Livestock, Off-farm income, Inputs, Tobit, Intensification.

DYNAMIC QUANTITATIVE TRAIT LOCI AND COPY NUMBER VARIATION: THE MISSING HERITABILITY OF COMPLEX AGRONOMIC TRAITS

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ABSTRACT

There is a great need for improved crop varieties to feed the growing population under the changing climate. To achieve this, a central goal is to map genotype to phenotype. Genetic studies have identified thousands of loci controlling various agronomic traits, revealing important biological pathways and providing valuable insights into genetic basis of many traits variation. However, genome-wide association studies (GWAs) have explained relatively a small heritability of most complex trait. This has led to an important question of where is this 'missing' heritability. This study examined the potential sources of the 'missing' heritability and provides some experimental data that offer ideas on the underlying genetic architecture of complex trait such as biomass accumulation in maize. The study used 12 main effect and 6-pair of epistasis quantitative trait loci (QTL) displaying different patterns of expression at different developmental time point in 261 maize genotypes. Genotyping of the 261 genotypes was carried out using MaizeSNP50 chip. In addition, copy number variation (CNV) and presence absence variation (PAV) was used to study the genetic architecture of maize genome in 34 maize genotypes. The identified dynamic QTL and CNV were mapped on maize B73 as reference genome. A total of 182 genes were found to be harboured in the detected QTL regions. A complex CNV architecture, such as smaller CNV nested within larger CNV or overlapping CNV regions was detected throughout the maize genome, which may explain the extraordinary traits variation observed in maize. The complex CNV genomic architecture, differential gene expression and their interactions at different developmental time points, which are missing in many GWAs, may explain the missing heritability. Consequently, the genetic model from final trait values cannot reflect the real gene action during the entire growth and development of the plant. Therefore, it is necessary to understand the CNV and the dynamics of gene expression for complex trait at different developmental stages as a basis for quantitative trait manipulation.

Keywords: Copy Number Variation; Complex Trait; Heritability; Gene Action; Genome-Wide Association Studies

EFFECT OF MILLET AS TRAP CROP FOR CONTROL OF BIRDS ON WHITE SORGHUM IN EASTERN KENYA

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ABSTRACT

The semi-arid regions of Kenya have few crop enterprise options. One of the major constraints of white sorghum production is bird damage on the grain from soft to hard dough stage. A two seasons study was established at Katumani of Machakos County, Kampi Mawe of Makueni County and Ithookwe Kitui of County to delimit bird damage levels when a trap crop such as millet was incorporated in the farm. A complete randomized block design (CRBD) of three replicates of pure sorghum, sorghum alternate rows with sorghum and sorghum-encircled with millet plants was established for evaluation of millet as a trap crop of birds. The results showed that the highest bird infestation was at Katumani plots where *Serirus reichonowi* cumulatively reached over 2,000 individuals at two sites in a month. It was noteworthy that the *Quelea quelea* species was missing at Katumani site during the stated production periods. The second highest bird infestations was at Kampi by *Q. quelea* of a month's cumulative number of 842. Grain yield loss was highest at Katumani (99-100%), corresponding to the high bird infestation numbers. The second highest yield loss occurred at Kampi (60%), which had also the second highest bird numbers. The highest yield achieved due to effect of millet as a trap crop was at Ithookwe (19.3 t ha⁻¹) with less than 10% grain loss compared to Katumani at 100% loss. The results showed partial protection of sorghum damage by birds when intercropped with millet, although factors of bird level of hunger at the different sites have to be considered.

Keywords: Livelihoods, White Sorghum, Millet, Birds, Semi-Arid-Lands

LOCAL COMMUNITY PERCEPTION ON BENEFITS AND CHALLENGES OF CONSERVING KIANO'NDU FOREST IN THE EASTERN MOUNT KENYA FOREST BLOCK

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ABSTRACT

Forests are crucial to a country's health and development as they are important in providing environmental, economic and social benefits. Mount Kenya Forest in particular is a major water catchment area in Kenya. Unfortunately, communities living close to the forests carry out unsustainable extraction of forest products that puts the forest ecosystem under serious pressure. It is therefore necessary to understand the nature of interactions between the communities and forests and encourage support of the communities in the conservation and management of the forest. The main aim of this study was to determine the local community perception of the benefits and challenges of conserving the Kiango'ndu montane forest located in the Eastern Mount Kenya forest block. The study established the challenges that the communities face as a result of living close to the forest, their perceptions of the benefits they derive from the forest and their willingness to participate in conservation of the forest. The study was done through a qualitative ethnographic approach employing questionnaires, interviews and observations. The main target group was the forest communities bordering the forest. The study revealed that the local community enjoyed a diversity of economic, ecological, aesthetic and cultural benefits from the forest. However, they incurred losses caused by wild animals such as property and crop damage, loss of time spent chasing away wild animals, bodily injuries and even fear of wild animals. However, most of the respondents were willing to participate in conserving the forest. The study substantiates the need to resolve the human-wildlife conflicts as well as encourage initiatives geared towards enlightening local residents on updated forest/wildlife conservation practices and legal rights such as compensation of wildlife related losses.

Key words: Forest, Benefits, Community participation, Conservation

EFFECTIVENESS OF DOMESTIC TOURISM MARKETING STRATEGIES IN CENTRAL KENYA REGION: A PRODUCT- PROMOTION DISCONNECT

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ABSTRACT

This study addresses the claim that Kenyan tourism is failing to properly develop a differentiated tourism product and is over-dependent upon developing independent promotion initiatives. It examines the comparative effectiveness of applying promotion over product development strategies. The study represents a sample of 200 respondents drawn from tourism establishments in Central Kenya surveyed between June 2007 and December 2013. Regression results indicated that many stakeholders perceive promotion as more important than product development ($P < 0.05$). It implies that promotion disconnection from other strategies curtails attainment of competitive advantage. The findings report a marketing paradigm that integrates product differentiation with promotion.

Keywords: Competitive advantage, Differentiation, Marketing mix, Promotion, Domestic tourism

BIOCONTROL OF GREEN MOULD DISEASE OF OYSTER MUSHROOM (*Pleurotus ostreatus*) USING *Bacillus amyloliquefaciens*

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ABSTRACT

The occurrence of *Trichoderma harzianum* and *T. asperellum* in cultivation of oyster mushroom (*Pleurotus ostreatus*) frequently results in serious crop losses and considerable inhibition of growth of mycelium and fruiting bodies of oyster mushroom thus lowering the yield substantially. *Bacillus amyloliquefaciens* strain isolated from groundnuts proved very effective in antagonizing the oyster mushroom pathogenic *T. harzianum* and *T. asperellum* without having a negative effect on *P. ostreatus* mycelia. *Bacillus amyloliquefaciens* produced diffusible and volatile organic compounds and this strain is a potential biocontrol agent for *Trichoderma* green mould due to the lack of antagonistic activity towards *P. ostreatus* mycelia. However, field studies on this isolate as substrate inoculant in oyster mushroom are required in order to establish its actual performance.

Keywords: *Bacillus amyloliquefaciens*, Green mould, Mushroom, Biocontrol

DISTRIBUTION AND DIVERSITY OF ANTIBIOTIC RESISTANT BACTERIA IN NJORO RIVER IN NAKURU COUNTY

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ABSTRACT

Many in-stream activities occur in River Njoro whereby communities fetch water for domestic use, watering of animals and Laundry. Furthermore communities use the river for irrigation, washing of motor vehicles and for sewage disposal. Of major concern is that many pharmaceuticals used in the farms and hospitals as well as antibiotic resistant microbes find their way to the river in runoff and sewage. Presence of antibiotic resistance in river water exposes human and animals to contamination during these in-stream activities. Thus the current study determined the levels of bacteria resistant to various types of antibiotics both medical and veterinary used for disease treatment in the catchment. The levels of residual antibiotics present in river water and sediments were investigated as well as various physical chemical conditions and indicators of faecal pollution in the river. The total numbers of bacteria resistant to five antibiotics studied varied in sediments collected in different sites (ANOVA, $P < 0.05$). Turkana site showed highest resistance to ampicillin, tetracycline and streptomycin while Njoro canning factory showed highest numbers for gentamycin and chloramphenical. Indicators of faecal pollution were found in all sites even in Sigotik (the most upstream site) recording an *E. coli* density of $4.13 \times 10^4 \pm 15.28$ per 100 ml of water. Physical-chemical measurements were able to show site differences. A typical example is BOD whereby Njoro Canning factory had the highest value of 6.99 ± 0.20 mg L⁻¹ whereas Sigotik the furthest point upstream had BOD of 1.28 ± 0.13 mg L⁻¹. Positive *Shigella* spp., *E.coli* spp., *Salmonella* spp., *Vibrio cholera* and *V. parahaemolyticus* were recorded in Turkana and Ngata sites. There is cause for alarm due to the high antibiotic resistant bacteria in River Njoro. We recommend proper treatment of the river water before use or alternative safer water sources for consumption.

Keywords: River Njoro, Antibiotic resistant bacteria, Physico-chemical parameters, Microbiological indicators

IMPACT OF USING SCIENTIFIC CALCULATORS IN MATHEMATICS INSTRUCTION ON STUDENTS ACHIEVEMENT IN SECONDARY SCHOOLS IN EMBU COUNTY, KENYA

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ABSTRACT

Mathematics surrounds everyone and as such it is universal part of human culture. Mathematics is used throughout the world as an essential tool in many fields such as commerce, engineering and other sciences. Due to its importance and use in the learning of other subjects and its application in industry and real life situations, mathematics is compulsory for all students in Kenya and as such performance in mathematics is of concern to everybody. Use of scientific calculators was introduced in secondary schools in the year 2005 and the calculators were to be used from form three level. However, its influence on students' achievement in mathematics has not been established. The purpose of the study was to investigate the impact of using scientific calculators in teaching and learning mathematics on students' achievement in mathematics in secondary schools in Embu County. The study sought to determine whether there was a difference in achievement in mathematics when students used calculators in assessment. The study employed the descriptive survey research design. The research was carried out in nine secondary schools in Embu County. The subjects were form three students and stratified random sampling technique was used to draw the participating schools. The sample size was 370 students. The research instrument used was the Mathematics Achievement Test. The raw data obtained were scored, coded and analysed using both descriptive and inferential statistics involving *t*-test. The hypothesis was tested at $\alpha=0.05$ level of significance. From the study there was evidence that there was no significant difference in achievement in mathematics when calculators were used and when they were not used by students. The findings provide guidance in calculator use to instructors and policy makers who are undertaking the quest to improve students' achievement. The findings also may help the curriculum specialists who are responsible for selection of curriculum materials on how calculators affect the curriculum.

Keywords: Mathematics Achievement, Student Achievement, Scientific Calculator.

METAPHORS OF MENTAL ILLNESS IN GĪKŪYŪ, A BANTU LANGUAGE SPOKEN IN KENYA, AFRICA

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ABSTRACT

Metaphor is an instrument of understanding reality. Diseases and illness are phenomena that are reliably understood through metaphors. It is against this backdrop that this study set out to identify the metaphors of mental illness in GĪkŪyŪ, a Bantu language spoken in Kenya, then, interpret the metaphors using the Conceptual Metaphor Theory (CMT). To achieve this objective, a purposive sample of twenty speakers of GĪkŪyŪ (10 men and 10 women) was interviewed. The study collected 34 metaphors of mental illness in GĪkŪyŪ. In addition, the metaphors collected were mapped into different kinds of conceptual domains: Mental disease is a disturbance, a deficiency and a head disease. Further, the study noted that females tend to interpret the target domain of mental illness is disturbance; a deficiency and a head disease more than the males. The paper concludes that metaphor is an important cognitive process, central to language and thought in the conceptualization of mental illness in GĪkŪyŪ. The paper, therefore, recommends that there is need to examine the correlation between the language that people use, the thought line behind the language and the way they behave.

Keywords: Mental illness, Metaphor, GĪkŪyŪ, Gender, Conceptual mapping.

METAPHORIC ANALYSIS OF MŪRĪMI WA KAHALF'S POP SONG: "ĨNO NĪ MOMO"

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ABSTRACT

Gĩkũyũ vernacular singer, the late Sammy Mūrĩmi Nderi, better known by his stage name Mūrĩmi wa Kahalf, cut a niche for himself for his hilarious and metaphorical songs. In particular, the song: "Ĩno nĩ momo" has been a massive hit with revelers and deejays in Kenya since being released in 2012 thanks to its use of metaphors and witticism. Basically, the song is about a man who goes to the city and falls in love with a randy, huge woman "momo" and the challenges that come along with such a relationship. Using four annotators including the researcher, this paper set forth to identify the metaphors in the song through the Metaphor Identification Procedure Vrije Universiteit (MIPVU), an extended version of Metaphor Identification Procedure (MIP). In addition, the study explains the meaning of the metaphors using the Cognitive Linguistics Framework. Content analysis which is within the qualitative research paradigm, also guided the analysis of the song. The study notes that the MIPVU is an effective method of identifying metaphors in songs. The study concludes that metaphor provides a tool for reasoning about one thing in terms of the other. Further, it is recommended that language researchers should employ the MIPVU in the analysis of songs since it does not rely on unilateral introspection in the identification of metaphors.

Keywords: Mūrĩmi Wa Kahalf, Metaphor, ĩno Nĩ Momo, Song, MIPVU

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